



START MONITORING

Teacher/student tested successful programs

Follow the leaders!

Join these leaders of successful water-based curricula and educational programs. Take a journey of discovery, education and hope for improving our natural environment. Based on experience and recommendations from these experts, you can begin a program that meets numerous educational standards and includes overlapping disciplines. Your environmental course can integrate writing, math, art, social studies, chemistry, biology, and service learning. LaMotte specializes in custom kits for your specific needs. Call our customer service department at 800-344-3100 for a free Environmental Science catalog, pricing and ordering information or have a free consultation with our technical department. Start Monitoring is also available on-line at <http://www.lamotte.com/pages/edu/curricul/index.html>

Comprehensive Water Quality Curriculum

George Radcliffe, Centreville Middle School, Maryland

George Radcliffe teaches middle school scientists. Starting with a Toyota grant, he designed an on-going water monitoring curriculum for his students, who primarily live in a rich agricultural region which empties into the Chester River and Chesapeake Bay Watershed. Many students used their research to enter science fairs and join community service programs with their advanced knowledge of the relationship between land use and water quality. Download five free lesson plans for 7th to 12th grade.

Website:

Start with www.qacps.k12.md.us/cms/sci/MONCHEST.HTM

Lesson Plans:

Download from <http://www.qacps.k12.md.us/cms/sci/ecounit/ECOGRRUN.HTM>

LaMotte Resources Used in This Project

Test kits:

- **Dissolved Oxygen**
Code 5860
0-10 ppm/0.2 intervals,
Titration Method
- **Nitrate-Nitrogen**
Code 3615
0-1 ppm, Cadmium
Reduction, Octet
Comparator
- **pH**
Code 5858
Wide range 3-10.5,
Comparators
- **Salinity**
Code 7459-01
0-40 ppt/0.4 intervals,
Titration Method
- **Turbidity**
Code 7519
5-200 JTU, Drop Count
Method

Monitoring Macroinvertebrates

- **Leaf Pack Stream Ecology Kit**
Code 5882
All materials needed for collecting, sorting, and identification of aquatic macroinvertebrates, comprehensive instructor's manual
- **Aquatic Macroinvertebrate Identification Flashcards**
Code 5882-SA1
Moisture resistant 18 full color laminated photos, line drawings, and identification tips
- **Aquatic Macroinvertebrate Insect Life Cycle & Habitat Flashcards**
Code 5946
Moisture resistant 22 full color laminated photos of immature to adult accompanied by 6 activities
- **Kick-net with poles**
Code 3-0021-P
Macroinvertebrate Collection Device
- **Armored Thermometer**
Code 1066
Non-mercury, encased in protective plastic jacket, -5 to 45C in 0.5 increments
- **Dissolved Oxygen Sampler**
Code 1054-DO
Accommodates a DO sample bottle for increased accuracy at various water depths; Designed by Univ. of Rhode Island scientists
- **Secchi Disk**
Code 0171-CL
Turbidity and visibility measurement in natural waters with weighted 20 cm diameter disk and line marked every half meter up to 20 meters
- **SMART2 Colorimeter**
Code 1919
perfect for field or classroom handheld colorimeter with 4 sample tubes, AC adapter, and instruction manual with 70 test factors available
- **pH 10 Pocketester**
Code 5-0103
Range 1 to 15/0.1 increments, 0.1 pH accuracy
- **Conductivity Pocketester**
Code 5-0082
0-1990 μ S, Resolution 10 μ S

Sampling equip and Electronic Meters:

Texas Stream Team- Caring For Our Waters

A volunteer Water Monitoring Program and K-12 Education Outreach

This volunteer water monitoring organization has been improving water in Texas for more than a decade. You might not think that Texas would have enough water to protect but Texans are proud of their accomplishments on the Colorado River and elsewhere to conserve this precious resource. On their website, you will discover that 40% of the Texas Stream Team monitoring groups are teachers and students. Texas Stream Team appreciates the efforts of their hard working volunteers by offering teacher professional training in biology, chemistry, and ecology dealing with the scientific method of measuring what is happening in their environment. The State Board of Education recognizes the high quality of the courses they offer by authorizing continuing professional education credits. Texas Stream Team is financed by grants from EPA through Texas Natural Resources Conservation Commission.

Free Lesson Plans and activities can be downloaded. Targeting grades 4-12, there are more than 20 lessons on water quality monitoring curriculum, conducting a watershed survey, and understanding nonpoint source pollution.

The Intermediate Water Quality Monitoring curriculum targets grades 4-6.

A surface water quality data interpretation workbook and curriculum companion creates opportunities to teach critical thinking and problem solving skills targeting 8th grade. These cross-curriculum exercises are appropriate for classrooms that have been collecting monthly water quality monitoring data at a local site or that are able to download water quality data from the web. This curriculum is appropriate for 8th Grade Science; Aquatic Science classes, Geology, Meteorology, Oceanography; Environmental Systems; 8th Grade Math; Geometry; Integrated Physics and Chemistry; Biology; Chemistry; and Computer Science.

They continue to add to their resources so keep checking their website frequently.

Website:

<http://www.texaswatch.geo.txstate.edu/educators.asp>

Lesson Plans:

Download from

<http://www.texaswatch.geo.txstate.edu/educators.asp>

Select Publications and Curriculum

LaMotte Resources Used in This Project

- A variety of custom kits are Available from NAPCO, PO Box 1239, Spring, TX 77383-1239 (800) 929-5976

Stroud Water Research Center and the Leafpack Network®

Understanding streams and rivers

The mission of Stroud Water Research Center in Avondale, PA is to understand streams and rivers. They are leaders in promoting environmental stewardship and resolving freshwater challenges throughout the world. Their applied research projects provide solutions for public agencies and private corporations.

Stroud specializes in macroinvertebrate research and training materials. Partnering with the LaMotte Company, they developed the popular "Leaf Pack Stream Ecology" Kit. It is rich with full color enlarged flashcards of common aquatic macroinvertebrate larvae used by aquatic researchers to calculate a "bioindex" of stream water quality. Educators and students find this type of scientific investigation challenging and motivating.

The LeafPack Network® is a unique and valuable data management resource where macroinvertebrate results may be compared in different geographic regions. A network of teachers and students share data through the internet.

Another low cost but extremely effective teaching resource Stroud developed with LaMotte is the "Watershed Tour". Students learn about their own watershed by investigating a virtual Big River Watershed. A CD-ROM, "Wet Your Waders", is an interactive companion. Activities in this curriculum include topographic map reading, macroinvertebrate identification, testing of pH, nutrients, and dissolved oxygen. Discussion topics include the water cycle, water use, habitat, ecosystems, effect of land use on water quality, water chemistry, and the food chain. Lecture material, reagents, data sheets, formulas for making water for hands-on activities, site photos, posters, and handouts and extensions are included. This curriculum incorporates science, math, and geography activities.

Website:

www.stroudcenter.org

LaMotte Partner Products

- **Leaf Pack Stream Ecology Kit**
Code 5882
All materials needed for collecting, sorting, and identification of aquatic macroinvertebrates, comprehensive instructor's manual
- **Aquatic Macroinvertebrate Identification Flashcards**
Code 5882-SA1
Moisture resistant 18 full color laminated photos, line drawings, and identification tips
- **Aquatic Macroinvertebrate Insect Life Cycle & Habitat Flashcards**
Code 5946
Moisture resistant 22 full color laminated photos of immature to adult
- **Watershed Tour**
Code 5419
Virtual classroom or field curriculum includes topographic map reading, macroinvertebrate identification, pH, nutrients, dissolved oxygen testing. Discuss water cycle, water use, habitat and ecosystems, effect of land use on water quality, water chemistry, and the food chain. Lecture material, reagents, hands-on activities, data sheets, site photos, posters, handouts, and extensions. Incorporates science, math, environment, and geography.
- **MacroMania**
Code 5942
An introduction to the use of macroinvertebrates to determine water quality

Washington Virtual Classroom Water Quality Project

Student and Teacher Tested Water Quality Curriculum
Grades 3-9

The Washington Virtual Classroom's Water Quality Project (WVC) was an eight year program with twelve Washington state school districts. It provided elementary, middle, and high school curriculum modules for scientific investigation of the health of salmon spawning streams. Using qualitative and quantitative tests, data was compared and evaluated through an on-going water quality monitoring program using internet and distance learning tools, such as videoconferencing. Students visited and tested several locations along the streams in fall, winter, and spring every year. The curriculum was integrated with the creative arts. 7th graders mentored 3rd graders.

Even though the program was disbanded in 2005, the website is still a great resource for ideas on starting your own curriculum without reinventing the wheel. You will find advice on handling field trip logistics, how to do research, and hints on data entry and analysis. The on-line curriculum is just as vital today as it was then and includes how to take appropriate action. Learning about problems and solutions that may be different from our own issues allows students to see just how large an issue fish habitat restoration and maintenance is throughout the world. They see it in the broad context of global concern, not just local, state, or national.

Students learned about water quality issues in the context of their study of ecosystems. They raised baby fish, i.e., coho salmon, shad, etc., in the classroom and released them into a creek that passed water quality inspection. Students tested for dissolved oxygen, temperature, pH, bacteria, nitrate, phosphate, and turbidity while observing and recording physical characteristics, such as, the status of the riparian zone, over time. Students also studied aquatic macroinvertebrates and developed a biotic index as an indicator of stream health.

Website and Curriculum:

<http://www.forks.wednet.edu/wvc/cadre/waterquality/index.html>

LaMotte Resources Used in this Project

- **GREEN Standard Water Monitoring Kit:** Code 5848
large class or multiple sampling locations and dates, 100 tests each, 44 Coliform tests
- **Wet Your Waders:**
Code 5929
CDROM Virtual instructions and field guide for GREEN and TesTabs® water quality monitoring test methods
- **Leaf Pack Experiments Stream Ecology Kit:**
Code 5882
Macroinvertebrate Stream Study, complete classroom set of collection, sorting, and identification apparatus, comprehensive instructor's manual, field and data sheets, bioindex calculation of stream health
- **GREEN Low Cost Water Monitoring Kit:**
Code 3- 5886
an individual or small group introduction to water quality monitoring, 10 tests each, 8 factors

Kentucky Citizens, Students, and Educators United in PRIDE



Personal Responsibility in a Desirable Environment

Kentucky PRIDE and Eastern Kentucky PRIDE are non-profit organizations that unite volunteers with the resources of federal, state, and local governments in 38 counties of southern and eastern Kentucky. The goal is to clean community waterways, remove illegal trash dumps, and promote environmental awareness and education.

Environmental Education Grants are available for up to \$5,000 per year. The funded activities, such as Earth Day events, PRIDE clubs, greenhouse building, and water quality monitoring, help young people understand the importance of a clean environment, personal responsibility, and community pride. Students receive hands-on lessons and learn how water pollution problems are resolved in real life.

Kentucky Water Watch, a dedicated team of volunteers, is also protecting Kentucky waterways. "What we do best is deliver science to the people and then deliver the people to the water's edge." Their water quality monitoring projects, community education initiatives, and community leadership and action plans serve as models of excellence for all other volunteer water monitoring programs throughout the U.S. Organizing more than 3,000 volunteers in a campaign to measure water quality, develop skills, and learn how to become advocates requires the devoted efforts of more than 300 organizations and 100 leaders in eight local Watershed steering committees. Every year 25 or more training workshops in basic and advanced stream water quality monitoring, regulatory processes, and watershed science are conducted. Volunteers collect samples from more than 700 sampling sites in Kentucky, Virginia, West Virginia, and Tennessee. KWW also provides technical assistance to local watershed groups and conducts fall "Watershed Protection Conferences".

Websites:

www.kypride.org

www.kentuckypride.com

www.state.ky.us/nrepc/water/wwhomepg.htm

LaMotte Resources Used in this Project

- **BLUEGRASS PRIDE Clean Streams Kit**
Code XX00803-1
armored thermometer, pH, DO, Nitrate, Conductivity PockeTester and conductivity standard- in a water resistant black case with BLUEGRASS logo
- **Armored Thermometer**
Code 1066
Non-mercury, encased in protective plastic jacket, -5 to 45C in 0.5 increments
- **Dissolved Oxygen Sampler:**
Code 1054-DO
Accommodates a DO sample bottle for increased accuracy at various water depths; Designed by Univ. of Rhode Island scientists
- **Secchi Disk:** Code 0171-CL
Turbidity and visibility measurement in natural waters with weighted 20 cm diameter disk and line marked every half meter up to 20 meters
- **Conductivity PockeTester:**
Code 5-0082
0-1990µS, Resolution 10µS

Volunteer Water Quality Monitoring

University of Rhode Island, University of Wisconsin

Comprehensive Support and Ideal Model for volunteer water quality monitoring programs throughout the U.S. Condensed information specifically targeted to the volunteer monitoring agencies from manuals, test fact sheets, recruiting and retaining volunteers, databases, fund raising, training, quality objectives, and contacts for follow-up questions; educational component

Website:

<http://www.usawaterquality.org/volunteer/>

LaMotte Resources:

Varies with factor: refer to product catalog
<http://lamotte.com/pages/edu/pdf/ese07.pdf>

Alabama Water Watch (Global Water Watch)



Globally Aware,
Locally Active Communities

Since the AWW Program began in 1992, nearly 250 citizen groups have become involved with water monitoring on hundreds of waterbodies. Monitors have sampled about 1,900 sites on 700 waterbodies and submitted over 38,000 water chemistry and 8,000 bacteriological data forms. This water information has had positive impacts on education, restoration and local-to-state water policy. Training and quality assurance keeps data credible through certifications.

Website:

<https://aww.auburn.edu/awwp/aww.aspx>

LaMotte Resources Used in This Project

- **Alabama Water Quality Monitoring Kit:** Code 9844-01 A custom kit for Dissolved Oxygen, pH, Alkalinity, Hardness, Turbidity, Temperature with options for Secchi disk Depth and Salinity

Bridging the Watershed

National Park Service helps schools monitor watersheds

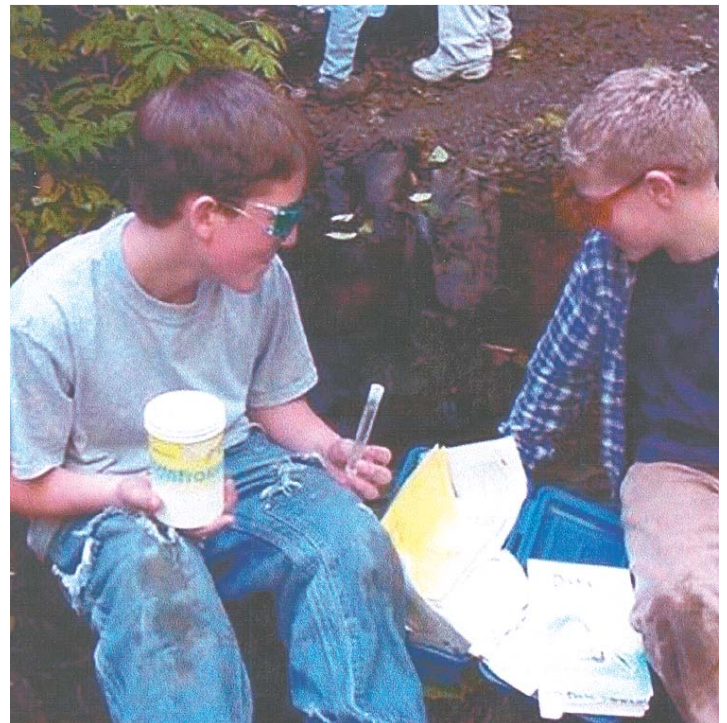
An exciting "National Park Labs" partnership involving the National Park Service, a nonprofit organization, and school systems uses five high school science curriculum modules available on CD-ROM or hard copy binders. The "BTW Action Kit" helps students understand real world issues that impact natural resources in national parks. Interdisciplinary curriculum incorporates math, geography, language arts, social studies, and lesson plans. Attend a professional teacher training workshop.

Website:

www.bridgingthewatershed.org

LaMotte Resources Used in this Project

- **Water Quality Educator & Monitoring Outfit:** Code 5870 Complete outfit for performing pH, nitrate, phosphate, dissolved oxygen, alkalinity, turbidity, temperature, including a Monitor's Handbook reference guide for natural water monitoring, and a pre-lab CD ROM with step-by-step instructions for water quality test procedures
- **TDS Waterproof PockeTester:** Code 5-0080 Cost-effective hand held electronic digital readout for low range total dissolved solids up to 1,990 ppm, automatic temperature compensation, requires four 1.5V batteries (supplied) (To avoid converting to μS conductivity, the EC conductivity PockeTester Code 5-0082 is available with a range of 0-1,990 μS)



Cyberways & Waterways®

Water Science Curriculum

4empowerment® developed an innovative concept, called Cyberways & Waterways®, which uses online water based lesson plans and creative collaboration to engage students in hands-on science activities in an interdisciplinary context. This program started in Texas but has universal appeal and fulfills federal science content standards with content that can be easily adapted to any state objectives. It is open to anyone interested in the exciting prospect of developing responsible students connected to their communities.

To begin your research, read the Program overview, What's in it for teachers, What's in it for students, How do I get started, What teachers and students think about the program, and press/recognition of the program from this website:

www.4empowerment.com/en/science/cw_overview.jhtml

Website:

www.4empowerment.com

Lesson Plans:

Download from:

www.4empowerment.com/en/curricula/science/

LaMotte Resources Used in Cyberways and Waterways® program

- **Cyberways & Waterways Custom Water Quality Test Kits** with 10 factors using more advanced methods for middle school to high school level, Secchi disk for turbidity, non-mercury thermometer, pH, dissolved oxygen, nitrate, phosphate, and conductivity PockeTester

Lower Colorado River Watch Network

The Colorado River Watch Network (CRWN) began with a small group of citizens concerned about water quality. It has grown into a sophisticated system of more than 300 volunteer monitors at 100 sites along the Colorado River. The network collects and analyzes data from these sites creating an early warning system that alerts LCRA to potential water quality threats. The network also strives to educate students and citizens about how their actions can improve water quality. Visit the website to download a illustrated protocol manual and answer many technical questions by reading their newsletters.

Website:

<http://www.lcra.org/water/crwn.html>

LaMotte Resources Used in this Project

• Secchi Disk Code 0171-CL Turbidity and visibility measurement in natural waters with weighted 20 cm diameter disk and line marked every half meter up to 20 meters	• Nitrate Nitrogen Code 3354 Zinc reduction Octa-slide Method
• Dissolved Oxygen Code 5860 0-10 ppm/0.2 intervals, Titration Method	• Conductivity PockeTester: Code 5-0082 0-1990µS, Resolution 10µS
	• pH 10 PockeTester Code 5-0103 1 to 15/0.1 increments, 0.1pH accuracy

Delaware Science Coalition Watershed Curriculum

Investigating Watersheds is easy for 7th grade teachers in the state of Delaware with this virtual and field watershed curriculum. Students research and determine how to restore the health of their local watershed. Topics include: drinking water, water cycle, topographic mapping, land use effects on water quality, and developing a Land and Water Action Plan. School districts can borrow science totes containing all materials needed to complete the curriculum from the John W. Collette Education Resource Center. The Center pools state budget appropriations, grants from the federal government, and competitive grants from business and industry to take advantage of economies of scale via large purchases of equipment and materials at one time. The John W. Collette Education Resource Center also provides incentives to motivate elementary and secondary teachers to utilize curriculum by offering teachers continuing education credits, and the opportunity to access new technologies.

Website:

http://www.sciencede.org/science_index.html

LaMotte Resources Used in this Project

• Delaware DOE GREEN Water Monitoring Kit Code XX01181 includes 8 test factors, teacher's manual in English/Spanish, color chart.	• MacroLens Code 5508 magnify your stream bugs, fits over a petri dish
• Wet Your Waders CD-ROM Code 5929 interactive instructions and virtual watershed study	• Watershed Tour Code 5419 Virtual classroom or field curriculum include topographic map reading, macroinvertebrate identification, pH, nutrients, dissolved oxygen testing. Discuss water cycle, water use, habitat and ecosystems, effect of land use on water quality, water chemistry, and the food chain. Lecture material, reagents, hands-on activities, data sheets, site photos, posters, handouts, and extensions. Incorporates science, math, environment, and geography.
• Aquatic Macroinvertebrate Identification Flashcards Code 5882-SA1 Moisture resistant 18 full color laminated photos, line drawings, and identification tips	• Salinity Tracer with calibration standards Code 1749 Probe for determining salinity and temperature
• Aquatic Macroinvertebrate Insect Life Cycle & Habitat Flashcards Code 5946 Moisture resistant 22 full color laminated photos of immature to adult	

Monitoring Manuals and Fact Sheets available on-line

<http://www.clu-in.org/live/archive.cfm> (go to October 11, 2006 archived seminar) A PowerPoint course by University of Rhode Island Watershed Watch Program and NJ DEP on How to Start a Monitoring Program: Throughout the world, trained volunteers provide an invaluable service: monitoring and providing data on the quality of rivers, streams, lakes, estuaries, and wetlands. This session will provide a primer on starting a volunteer water quality program. Instructors will discuss key steps to follow, questions to ponder, examples of success stories, and where the best resources are for further information. They will also introduce a tiered approach to ensure the best use of volunteer-collected data. The data use tiers are defined by the purpose of the program, the intended use of its data, and the intended data users. Also, learn about World Water Monitoring Day, celebrated every October to raise awareness about the importance of water quality monitoring.

<http://www.waterboards.ca.gov/nps/cwtguidance.html#30>: California Watershed Monitoring Protocols and fact sheets interpreting water quality test results, starting a monitoring group, safety, sample collection, field manual

<http://www.waterwatch.org.au/sitemap.html> Australia Waterwatch Program, excellent water monitoring program and helpful hints, technical manual, download a database for managing test results (<http://www.waterwatch.org.au/data.html>)

<http://www.water.ncsu.edu/watershedss/> definitions and fact sheets interpretations of water testing factors

<http://www.lcra.org/water/quality/crwn/index.html>: Lower Colorado River testing Manual

<http://www.water.ncsu.edu/watershedss/> A comprehensive pictorial description of the useful information generated by testing water quality factors.

<http://yosemite.epa.gov/water/volmon.nsf/VST?OpenView&Star%20t=1&Count=30&Collapse=6#6> View all the state water monitoring programs that might help you join or start a water monitoring program

<http://www.uwex.edu/ces/csreesvolmon/> Learn everything you wanted to know about water quality

<http://www.forks.wednet.edu/wvc/cadre/waterquality/index.html> For five years this Washington statewide curriculum used internet communication and field studies to ideally visit several locations along the streams they chose to study. They shared information and taught each other via videoconferencing throughout the year. The Water Quality Project also developed an on-line stream studies curriculum at the following website at this website for schools, from grades 3-9 with extension activities for high school. This curriculum was integrated with the creative arts. In providing their students the opportunity to communicate with others in the consortium all over the state, students learned about the diverse ecosystems and habitats of areas much different from their own. Learning about problems and solutions that others have to deal with that may be different than our own allows students to see just how large an issue salmon habitat restoration or maintenance is throughout our entire state. It is not a local issue, but rather one of state, national and global concern.



2008 Photo Contest



The LaMotte Company Science Education Photo Contest is an opportunity to win **FREE LaMotte equipment** for your school, educational program or volunteer monitoring group. Many winners appear in upcoming LaMotte catalogs and publications, or on the website. Please read and follow the guidelines below when planning and submitting your entry.

- Photo(s) must show current LaMotte testing products being properly used by students in the classroom, lab, or outdoors. Safety equipment must be worn when applicable.
- Please indicate a brief description of how LaMotte products are used in your program.
- Photo(s) should be good quality black and white, color slides, or color prints (please include negatives). Digital files should be high resolution (300 ppi) and supplied on disk or CD. All submissions must be accompanied by a completed entry form and signed photo release. Call LaMotte or visit our website www.lamotte.com for entry and release forms. Submissions must reach the LaMotte Company advertising office by

Friday after Thanksgiving to be eligible for prizes.

- Prizes will only be awarded to educational institutions and organizations.
- All submissions become the property of LaMotte Company. Please send original photos (please include negatives, if possible), slides or hi-res digital photos. Make copies for your use before submitting. Sorry, but submitted photos and slides cannot be returned.
- Winners will be notified by the end of February.
- All prizes are merchandise certificates for LaMotte equipment.

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21620

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To request a current catalog or download the pdf:

<http://www.lamotte.com/pages/edu/index.html>

or email

mkt@lamotte.com

LaMotte Photo Contest Entry Form:

<http://www.lamotte.com/pages/edu/pdf/contest.pdf>

 LaMotte

www.lamotte.com