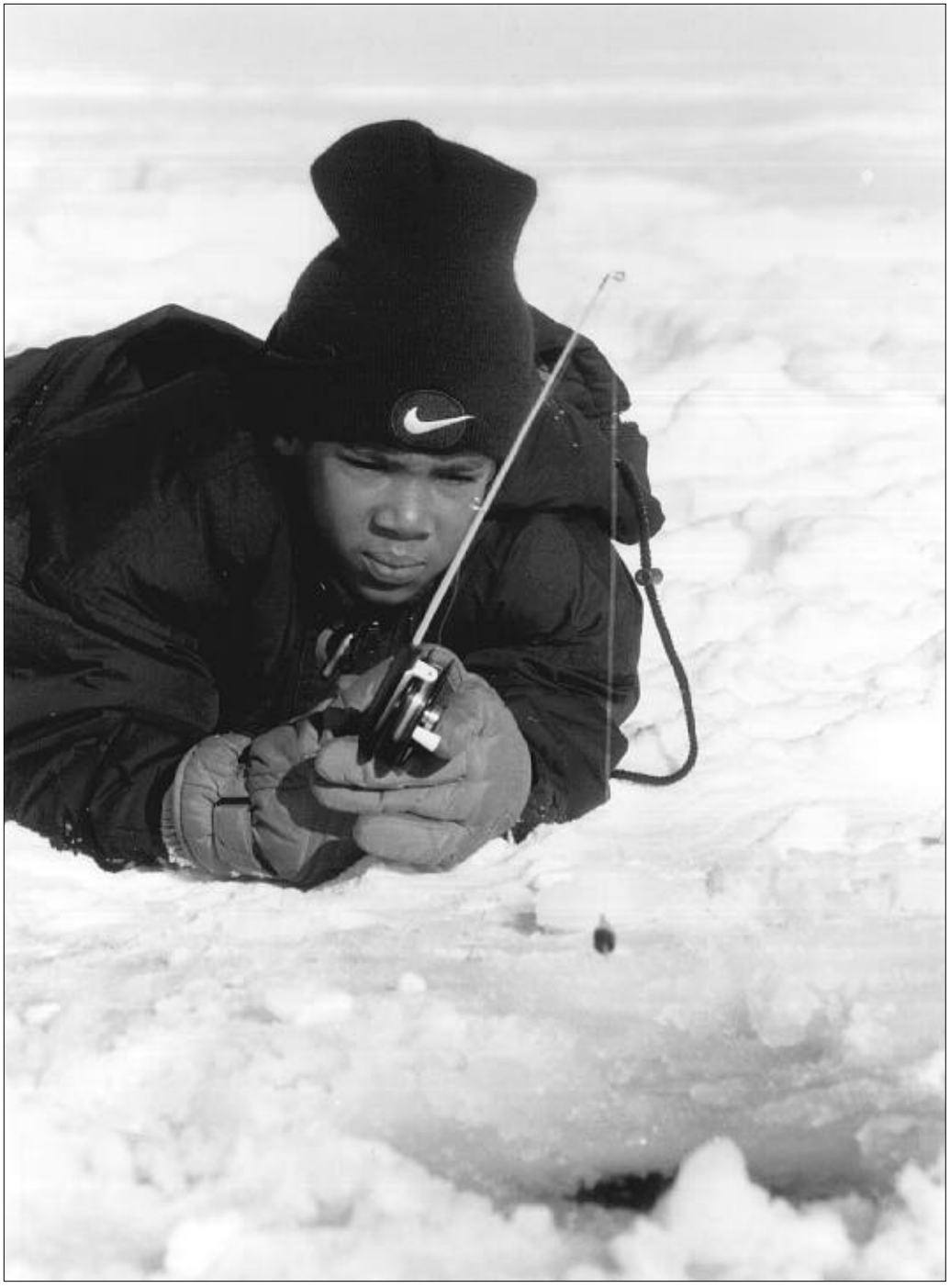
EDUCATING
YOUNG PEOPLE
about
Water

A guide to unique program strategies



Compiled by
Kelly J. Warren

Elaine Andrews,
project director

Sponsored by the
United States Department
of Agriculture,
Cooperative Extension
Water Quality
Initiative Team

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Sponsored by the United States Department of Agriculture, Cooperative State Research Education and Extension Service (CSREES) under the direction of Greg Crosby, National Program Leader for Youth Science Education, and the Cooperative Extension Water Quality Initiative Team, Andrew J. Weber, Chair.

The USDA-CSREES project to review youth water education needs was developed in support of youth and community water quality education goals of the National 4-H Environmental Stewardship Program and the USDA-CSREES National Water Quality Initiative Team.

Project director

Elaine Andrews
Environmental education specialist
University of Wisconsin-Extension
Environmental Resources Center

Lead writer

Kelly J. Warren
Environmental education research specialist
University of Wisconsin–Extension
Environmental Resources Center

Design team members

Elva Farrell, Gulf Coast World of Science, Sarasota, Florida

Joe Heimlich, Ohio State University–Extension, Columbus

Richard Ponzio, University of California–Extension, Davis

Kelly J. Warren, University of Wisconsin–Extension, Madison

Project support staff

Susan Anderson, design

Monica Burow, Environmental Resources Center office manager

Lynn Entine, editor

Meg Gores, editor

Phyllis Perk, data entry assistance

Sheila Voss, program assistant

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614/292-6717 or 800/276-0462

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Educating Young People About Water: A Guide to Goals and Resources

Educating Young People About Water: A Guide to Program Planning and Evaluation

An introductory video and workshop guide are also available: *Educating Young People About Water: Planning for Fun and Success*

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EDUCATING YOUNG PEOPLE about Water

Youth water education —an overview

Inspiring young people of all ages to take an interest in water resources, become active environmental stewards, and ultimately, carry these behaviors into adulthood is the goal of all water education programs.

Around the country, such programs encourage young people to become socially conscious about water resources, and in doing so, to work toward the common good. Sheldon Berman, president of Educators for Social Responsibility states that "social responsibility—that is, a personal investment in the well-being of others and the planet—doesn't just happen."[1] Berman asks "What motivates one individual over another to develop social responsibility?" According to his research,[2] the answer lies in a child's having positive role models. Those role models, Berman claims, take the form of parents, teachers and community leaders.

What attracts youth to water education programs? How can a program's design enhance young people's social and intellectual skills? Several water program coordinators throughout the country recognize water education as a way to address social and economic issues that involve youth directly, as well as an opportunity to develop environmental stewardship skills.

Many programs listed in this guide confront issues facing youth such as drug and alcohol abuse, crime, decreasing high school graduation rates, unemployment/underemployment, lack of critical thinking and life skills, and dwindling career options. In Austin, Texas, for example, river monitoring helps keep high school kids in school. Elementary school students in East Troy, Wisconsin find fishing a deterrent to drug and alcohol use. Researching restoration techniques along the Bronx River in New York offers employment and educational opportunities for urban youth. And week-long 4-H water camps in Monahans, Texas, highlight industrial and agricultural water use in arid regions of the state, sparking interest in future natural resource managers.

The coordinators of these programs identified the social issues *and* water education needs of the young people in their communities. Incorporating both into a water education program required defining target audiences critically— not just by age, but also by the events happening in their lives. After coordinators defined their target audiences, they customized the programs so that the youth participants, the community and the environment benefited as a result.

Nonformal education settings

Water education programs for youth exist in little pockets all over the world. The myriad sources and uses of water provide a variety of educational settings that appeal to youth. This guide examines programs that are based in the United States and set in a nonformal—outside-the-classroom—environment. To organize our research findings, we grouped the programs into the following ten categories:

- Campaigns
- Clubs
- Community service learning
- Day camps
- Festivals/fairs
- Museums
- Nature centers/environmental education centers
- Organizations
- Residential camps
- School enrichment programs

We then defined[3] each category based on program design and delivery strategies. The definitions are found in the Directory of Programs beginning on page 6.

Programs included under each category vary in location and method of delivery. For example, in the community service learning setting, youth may become actively involved in river restoration projects, urban and rural water conservation, or marine conservation. In the club setting, 4-H youth may learn about aquatic habitats by fishing, or experience watershed study using scientific investigation skills. Our examples of school enrichment settings encourage students to learn by hands-on activities how to integrate a wetland ecosystem into their studies. Our nature center example designs an outdoor groundwater adventure trail to teach youth about the source of their drinking water. And an annual groundwater festival actively involves 4th- to 6th-graders in understanding the largest aquifer in the U.S. (the Ogallala aquifer), which literally exists beneath their feet.

Program size and scope

Program design and delivery methods differ among the 10 categories depending on how much time youth spend in the program (a day, a week, a season) or whether the program is national or local in scope.

National campaigns such as *Adopt-A-Stream* set broad goals and place heavy emphasis on partnerships, local training and educational material distribution. After that, it is up to individual youth facilitators to adapt national criteria to the water education needs of specific youth groups and the community.

At the local level, programs like *Leap Into Lakes*, an interactive exhibit at the Madison Children's Museum, involve months of fundraising, display design and maintenance. The reward is in seeing thousands of children and adults who participate in the exhibit leave with a heightened awareness of local water issues. By contrast, *Ridges to Rivers*, a 4-H watershed exploration program (developed as part of national 4-H science education materials, SERIES) represents a common type of water program in the way it is administered—a small, independent group operating with a tiny budget, a few youth facilitators and community volunteers. Smaller programs dot the country and appear as clubs, day camps, nature centers, school enrichment and community service learning programs. Different settings offer youth *choices* about how to get involved, and research[4] shows that they are more likely to take part in an environmental program if they can choose how to participate.

Common goals

Regardless of size and scope, common threads run through the programs highlighted in this guide. The desired outcomes for youth range from giving them an understanding of land and water interrelationships to enhancing their critical thinking skills to helping them discover new facets of themselves and their world. Collectively, these programs aim to prepare young adults to: 1) become environmentally aware of their surroundings; and 2) pay close attention to how their daily activities affect water resources. All these efforts should culminate in community action and willingness to maintain healthy aquatic ecosystems.

WHY DID *YOU* DECIDE TO TEACH YOUNG PEOPLE ABOUT WATER?

How did you make the decision to become a water educator? What events in your life led you to this point? The answers to these questions often take adults back to their own childhood experiences with the outdoors.

Program coordinators featured in this guide (and in the companion video) expressed a deep passion for working with young people and water. One cited growing up along the coast and developing a love for and commitment to protecting marine animals. Another remembers attending a Trout Unlimited fishing camp and learning to tie flys as a key experience.

Tobin Smith, a volunteer leader for the program *Fishing for 4-H*, sums up the attitude of many water educators when he says, "I want to give back more than I received."

Identifying water programs

In 1988, the U.S. Department of Agriculture, in cooperation with other federal agencies, identified water as a priority issue.[5] As a result, the USDA Cooperative State Research Education and Extension Service (CSREES) made youth water education a priority in 1990. At the same time, nearly 80 public, private and nonprofit organizations joined together to support and design a new policy for national water quality, titled *Water Quality 2000*. In their final report (1993), the group recommended developing a national policy to improve and protect surface and groundwater quality.[6]

Following a 1990 USDA Youth Water Education Needs Assessment and a national water education curricula review,[7] a USDA-CSREES Design Team (members listed on the inside front cover) began researching successful teaching strategies in youth water education program design and delivery in 1993. To identify exemplary programs, we referred to the following sources: *Environmental Success Index 1991 and 1992*, by Renew America; *Directory of Water Education Programs in Southeast Michigan*, Southeast Regional Center for Groundwater Education in Michigan; *Water Quality Education in Puget Sound: Programs and Materials*, Aquatic Habitat Institute; *Public Involvement and Education Model Projects Fund: 47 Success Stories from Puget Sound, 1991*, and *Educating for Action: More Success Stories from Puget Sound*, 1993, both by the Puget Sound Water Quality Authority; newsletters such as *The Communicator* by the North American Association for Environmental Education and *NPS News Notes* by the U.S. Environmental Protection Agency; conferences; water resources conference proceedings; and personal referrals.

After we collected nearly 80 programs, we began to narrow down the selection to organize a working symposium to discuss program strategies. The symposium entitled, "Youth Water Education: Thinking About Program Strategies That Work!"[8] took place in Columbus, Ohio, in December 1993, with 40 youth water education programmers participating. This guide features program profiles written by many of those coordinators, along with others identified since the symposium.

Selecting unique programs

Programs in this guide were selected to represent the many successful and unique programs found around the country. Defining *unique* or *successful* is an arbitrary and ambiguous process. We realized this, and based decisions in part on referrals, interviews and professional experience. We followed up on a program if it stood out as employing an unusual delivery method, meeting community water education needs, or using water to address both social and youth development needs.

Applying an even simpler approach, we interviewed program coordinators if their program had consistently high enrollment. Then, by phone, mail or personal visit, programmers were questioned about their program's design and delivery methods such as goals, instructional approaches, content, partnerships and keys to success. (See the Program Profile Sheet on page 60).

Their responses during the 1993 Symposium and from later interviews formed a basis for our criteria about what constitutes a successful youth water education program. Responses were based on the coordinators' experience with community water issues, knowledge and recruitment of the target audience, ability to wring the very most from available resources, and a willingness to listen and respond to participant and partner feedback.

How to use this guide

The programs and coordinators featured here have discovered unique ways to attract youth and to keep them interested in water education programs. As you compare program design and delivery methods, you may choose to adopt ideas or contact the program coordinators for more details.

One way you can begin using this guide is by searching for programs with a setting similar to yours—day camps, museums or school enrichment programs (see Appendix A). While perusing the profiles, closely observe the program's goals. Many coordinators set similar goals, yet approach them in unique ways.

You may also choose to use the *Water Program Topics* cross-referenced listing (Appendix B) to find programs that address common water education themes such as watershed study, groundwater, lakes, fishing, etc. Using this method, for example, you learn that the *Austin Youth River Watch* program represents a river monitoring, school enrichment program that targets youth at risk for dropping out of school.

A few program profiles remain incomplete although every effort was made to allow for coordinators to provide information. Though some information was missing, these programs were still included because of their unique approaches. If a particular program appeals to you and you would like to know more, call the contact person listed on the profile.

Using other resources

This book and others in the *Educating Young People About Water* series are full of ideas, checklists, references, program partners lists, and community action education materials. We invite you to take advantage of them.

For ideas on program development, see *Educating Young People About Water: A Guide to Program Planning and Evaluation*. This user-friendly workbook explains program design and delivery methods for the nonformal educational setting based on feedback from many of the program managers who contributed to *A Guide to Unique Program Strategies*. It can be used alone or in a training session accompanied by a video and training guide.

To find and select water education curricula, see *Educating Young People About Water: A Guide to Goals and Resources*. This guide introduces more than 100 reviewed youth water curricula. It also lists educational topics and goals, unique resources, and multimedia materials that help create a water education opportunity or event.

■ ■ ■ ■ ■

The Design Team realizes that there are youth water education programs throughout the country that produce tremendous results for communities, but that did not reach our attention in time to be considered for this publication. If you know of, or are a part of such a program, please complete the Program Profile Form on page 60, and send to:

Educating Young People About Water
University of Wisconsin–Extension
Environmental Resources Center
216 Agriculture Hall
1450 Linden Drive
Madison, WI 53706.

Notes

[1]Berman, Sheldon. 1990. "Educating for Social Responsibility" in *Educational Leadership*, November 1990, 75-80.

[2]Berman, Sheldon. 1990. "The Real Ropes Course: The Development of Social Consciousness" in *Educators for Social Responsibility Journal*, 1-18.

[3]*Nonformal Program Setting Definitions* was developed by Kelly Warren and Elaine Andrews at the University of Wisconsin-Extension Environmental Resources Center, Madison. 1994.

[4]Children and the Environment, a survey of 10,375 children in grades 4–12. 1993. Conducted for Pew Charitable Trust by Louis Harris and Associates, 630 Fifth Avenue, New York, NY 10111.

[5]*Extension Review*, Vol. 59, No. 3, Fall 1988.

[6]Water Quality 2000. 1993. Water Quality 2000 Final Report, A National Water Agenda for the 21st Century. 601 Wythe Street, Alexandria, Virginia 22314.

[7]Andrews, Elaine. 1992. *Educating Young People About Water—A Guide to Goals and Resources*. Updated in 1995. ERIC Clearinghouse, Columbus, OH.

[8]*Educating Young People About Water: Thinking About Program Strategies That Work! Conference Proceedings*. 1995. ERIC Clearinghouse, Columbus, OH.

EDUCATING YOUNG PEOPLE about Water

Directory of programs

Based on their program settings, the unique programs featured in this guide have been organized into 10 categories. Arranging programs by category helps you identify programs similar to yours, and learn how other coordinators make their programs work. To identify programs by topic, see the Water Education Topics list (Appendix B) on page 59.

Campaigns

Campaigns are promotional efforts undertaken to advertise designated events or programs. They are intended to produce a specific outcome such as community action, education or increased awareness of a particular issue.

Program name: *Adopt-A-Stream* *page 13*

Institutional affiliation: Adopt-A-Stream Foundation

Address: P.O. Box 5558, Everett, WA 98206

Phone: 206/338-3487

Contact: program coordinator

Program name: *Blue Thumb Campaign* *page 14*

Institutional affiliation: American Water Works Association and USDA-Cooperative State Research Education and Extension Service (CSREES)

Address: USDA/CSREES, Aerospace Building, Suite 329 N., Washington, DC 20250-2210

Phone: 202/410-5620

Contact: Joe Wysocki, national program leader

Program name: *Georgia Waterway Cleanup* *page 15*

Institutional affiliation: Cordele/Crisp Clean Community, Crisp County Cooperative Extension, Department of Natural Resources, Waste Management Co., Crisp County Power Commission, and Keep America Beautiful

Address: P.O. Box 5494, Cordele, GA 31015

Phone: 912/273-3102

Contact: Kathy Odom, coordinator

Program name: *Give Water a Hand* *page 16*

Institutional affiliation: National Fish and Wildlife Foundation, USDA-Cooperative State Research Education and Extension Service, National 4-H Council and the University of Wisconsin-Extension

Address: University of Wisconsin-Extension, 1450 Linden Drive, 216 Agriculture Hall, Madison, Wisconsin 53706

Phone: 800/WATER-20

Contact: Kadi Row, project coordinator

Clubs

Clubs are water education programs that adopt a club's goals and structure, and may complement school education goals. A club may organize fishing trips, develop displays for a county fair, monitor water quality, visit a wetland, or conduct similar activities.

Program name: *4-H Watershed Project: From Ridges to Rivers—Watershed Explorations* *page 17*

Institutional affiliation: 4-H Youth Development Program, San Luis Obispo County, CA

Address: 2156 Sierra Way, Suite C, San Luis Obispo, CA 93401

Phone: 805/781-5940

Contact: 4-H watershed project coordinator

Program name: *Fishing for 4-H* *page 19*

Institutional affiliation: Arlington County Extension and the Northern Virginia Chapter of Trout Unlimited

Address: 800 Follin Lane, SE, Suite 250, Vienna, VA 22180-4949

Phone: 703/553-7732

Contact: Tobin Smith, Trout Unlimited volunteer youth coordinator

Community service learning

Community service learning refers to education-based programs and projects that emphasize learning by taking action in the community. Water service learning projects focus on stewardship activities, and provide an active educational component in areas such as ecology, watershed land use, risk and decision-making skills. These activities may benefit the community ecologically, aesthetically, or economically. Projects may include water monitoring, clean-up, restoration (streambank stabilization, seed collecting and planting), storm drain stenciling and career planning.

Program name: A*ustin Youth River Watch Program* *page 20*

Institutional affiliation: Colorado River Watch Foundation

Address: 1501 W. 5th Street, Suite #110, Austin, TX 78703

Phone: 512/320-8172

Contact: Daniel Apodaca, project coordinator

Program name: *Bronx River Restoration Project* *page 21*

Institutional affiliation: The Gaia Institute

Address: Cathedral of St. John the Divine, 1047 Amsterdam Ave., New York, New York 10025

Phone: 718/885-1906

Contact: Paul Mankiewicz, program co-director

Program name: *Duwamish River Youth Initiative* *page 22*

Institutional affiliation: Student Conservation Association (SCA)

Address: 1800 N. Kent Street, Suite 1260, Arlington, VA 22209

Phone: 703/524-2441

Contact: Chukundi Salisbury

Day camps and summer education programs

Activities organized as part of community-based recreation programs that may or may not be held at established camp settings.

Program name: *4-H Water-Wise Day Camps* *page 24*

Institutional affiliation: Hillsborough County Cooperative Extension Service

Address: 5339 South County Road 579, Seffner, FL 33584-3339

Phone: 813/744-5519

Contact: Shirley Bond, 4-H Extension Agent III

Program name: *Eyes On Conservation: Water Works* *page 25*

Institutional affiliation: University of Nebraska Cooperative Extension

Address: Sarpy County Office, 1210 Golden Gate Drive, Papillion, NE 68046

Phone: 402/593-2172

Contact: 4-H Extension educator

Program name: *MinnAqua*—Minnesota Aquatic Education Program *page 26*

Institutional affiliation: Minnesota Department of Natural Resources, Section of Fisheries

Address: 500 Lafayette Rd., Box 12, St. Paul MN 55155-4012

Phone: 612/297-4919

Contact: Statewide coordinator

Program name: *SOAR—Summer Orientation About Rivers* *page 27*

Institutional affiliation: Prairie Plains Resource Institute

Address: 1307 L Street, Aurora, NE 68818

Phone: 402/694-5535

Contact: Bill and Jan Whitney

Festivals and fairs

Festivals and fairs are usually one-day events where children can visit several stations or booths set up for hands-on activities that focus on water and water use issues. Such activities might include observing demonstrations, answering questions, playing games, role playing, practicing science investigation, or examining career planning options. Festivals or fairs may be conducted during school or during the summer. Those held in cooperation with schools usually include some background activities at the school.

Program name: *Children's Groundwater Festival* *page 29*

Institutional affiliation: The Groundwater Foundation Institution

Address: P.O. Box 22558, Lincoln, NE 68542

Phone: 800/858-4844

Contact: festival director

Program name: *Wonders of Wetlands*—1993 Wisconsin State Fair 4-H Action Center *page 30*

Institutional Affiliation: University of Wisconsin Cooperative–Extension

Address: 4-H, UWEX, 339 Lowell Hall, 610 Langdon St., Madison, WI 53703-1195

Phone: 414/761-1151

Contact: 4-H Environmental Education Subcommittee members

Museums

Museums offer water-related exhibits designed for youth and located in museums. Water education topics may include water conservation, natural history, geology, regional flora and fauna and habitats.

Program name: *Leap Into Lakes* *page 31*

Institutional affiliation: Madison Children's Museum

Address: 100 State Street, Madison, WI 53701

Phone: 608/241-8400

Contact: education coordinator

Program name: *Sarasota Bay* and *Midnight Pass Exhibits* *page 32*

Institutional affiliation: Gulf Coast World of Science: A Hands-On Museum

Address: 717 N. Tamiami Trail, Sarasota, FL 34236

Phone: 813/957-4969

Contact: Elva Farrell, executive director

Program name: *Water Works* laboratory and exhibit *page 33*

Institutional affiliation: The Chicago Academy of Sciences

Address: 2060 North Clark Street, Chicago, IL 60614

Phone: 312/ 549-0606

Contact: Ken Rose, education department

Nature centers and environmental education centers

This category encompasses water-related education programs held at established centers in parks, nature reserves or other public access property. Youth groups are brought to the center to experience natural water environments.

Program name: *Groundwater in Nature Program* *page 35*

Institutional Affiliation: Kalamazoo Nature Center/Western Michigan University

Address: Kalamazoo Nature Center/Western Michigan University, 7000 N. Westnedge, Kalamazoo, MI 49004

Phone: 616/381-1574

Contact: program coordinator

Program name: *Project ECO-Environmental Curriculum Outdoors* *page 36*

Institutional affiliation: Outdoor Skills Center

Address: 299 Fairview Drive, P.O. Box 84, Plymouth, WI 53073

Phone: 414/893-5210

Contact: Sterling Strathe, Executive Director or Scott Johnson, School Program Director

Organizations

The organizations listed here have selected youth water education as their operational goal or mission. They sponsor water-related events and provide funding, educational materials, or training workshops.

Program name: *America's Clean Water Foundation* *page 38*

Institutional affiliation: Association of State and Interstate Water Pollution Control Administration (ASIWPCA)

Address: 750 First Street, NE, Suite 911, Washington, DC 20002

Phone: 202/898-0902, fax 202/898-0929

Contact: Roberta Savage

Program name: *American Water Works Association-Youth Education* *page 39*

Institutional affiliation: American Water Works Association (AWWA)

Address: 6666 West Quincy Avenue, Denver, CO 80235

Phone: 303/347-6206

Contact: student programs manager

Program name: *Save Our Streams* *page 39*

Institutional affiliation: Izaak Walton League of America

Address: 707 Conservation Lane, Gaithersburg, MD 20878

Phone: 800/BUG-IWLA, Technical Assistance Hotline

Contact: Save Our Streams (SOS) Office

Program name: : *Whitney Water Center* *page 40*

Institutional affiliation: Regional Water Authority

Address: 90 Sargent Drive, New Haven, CT 06511

Phone: 203/624-6671, Ext. 263

Contact: Water Science Educator II

Residential camps

At residential camps, young people spend at least one night in an established outdoor setting where water education is the primary focus or an integral component of the program.

Program name: *Manatees and Mermaids—Manatee Dive Trips to Crystal River* *page 42*

Institutional affiliation: Florida Sea Grant and Escambia County Extension

Address: Escambia County Extension, P.O. Box 7154, Pensacola, FL 32534-0154

Phone: 904/477-0953

Contact: Sonya Wood, Sea Grant/Marine Extension agent

Program name: *NatureLink*—Family Fishing Weekend *page 43*

Institutional affiliation: National Wildlife Federation

Address: 8925 Leesburg Pike, Vienna, VA 22184-0001

Phone: 703/790-4056

Contact: Nature Link program coordinator

Program name: *Ohio 4-H Sea Camp—An Experiential Outdoor Learning Laboratory* *page 44*

Institutional affiliation: Ohio State University Extension

Address: 4-H Youth Development, Northeast District, 1680 Madison Avenue, Wooster, OH 44691

Phone: 216/263-3831

Contact: Extension District specialist

Program name: *Texas State 4-H Water Camp* *page 46*

Institutional affiliation: Texas Agricultural Extension Services

Address: 1900 South Stockton, Suite J, Monahans, TX 79756

Phone: 915/943-2682

Contact: Ward County 4-H Extension agent

School enrichment

School enrichment programs are water education programs that enhance an existing school curriculum or classroom experience. Participants are school groups or groups recruited through the schools.

Program name: *Active Watershed Education, It's AWEsome!* (formerly The Pawcatuck Watershed Education Program) *page 47*

Institutional affiliation: The Southern Rhode Island Conservation District (SRICD)

Address: 5 Mechanic Street, Hope Valley, RI 02832

Phone: 401/539-7767

Contact: Vicki O'Neal, district conservationist

Program name: *Adopt-A-Lake Program* *page 48*

Institutional affiliation: Wisconsin Lakes Partnership, University of Wisconsin–Extension, Department of Natural Resources, and Wisconsin Association of Lakes

Address: College of Natural Resources, University of Wisconsin–Stevens Point, Stevens Point, WI 54481

Phone: 715/346-3366

Contact: Libby McCann, program coordinator

Program name: *Adopt-A-Watershed* *page 50*

Institutional affiliation: Daedalus Education Foundation

Address: 12702 Via Cortina, Suite 201 B, Del Mar, CA 92014

Phone: 619/793-0523

Contact: education program director

Program name: *Hooked on Fishing, Not on Drugs* *page 51*

Institutional affiliation: Future Fisherman Foundation and East Troy Elementary School

Address: East Troy Elementary School, P.O. Box 257, East Troy, WI 53120

Phone: 414/642-6720

Contact: Twila Voss, physical education teacher

Program name: *Kids in Creeks: A Creek Exploration and Restoration Program* for Grades 3–12 *page 52*
Institutional Affiliation: San Francisco Estuary Institute (SFEI)
Address: Richmond Field Station, #180, 1301 S. 46th Street, Richmond, CA 94804
Phone: 510/231-9539
Contact: Kathy Kramer, Education Director

Program name: *Project FUR (Fighting Urban Runoff)* *page 53*
Institutional affiliation: Holy Cross High School
Address: 2770 Jonquil, New Orleans, LA 70122
Phone: 504/942-3100
Contact: Sue Ellen Lyons

Program name: *Project WET (**W**ater **E**ducation for **T**eachers)* Idaho *page 54*
Institutional affiliation: Idaho Water Resources Research Institute
Address: University of Idaho, 106 Morrill Hall, Moscow, ID 83843
Phone: 208/885-6429
Contact: Project WET program coordinator

Program name: *Testing the Waters: Linking Students and Water through Technology* *page 55*
Institutional affiliation: Riveredge Nature Center
Address: Box 26, Newburg, WI 53060
Phone: 414/675-6888
Contact: Terri Cooper, nature center director

Program name: *Yahara Watershed Education Network* (and *Summer Heron Institute*) *page 56*
Institutional affiliation: Edgewood College and University of Wisconsin–Madison
Address: Edgewood College, 855 Woodrow St., Madison, WI 53711
Phone: 608/257-4861
Contact: Jim Lorman (Edgewood College); Robert Bohanan (UW-Madison)

EDUCATING YOUNG PEOPLE about Water

Program profiles

Campaigns

Adopt-A-Stream Foundation

Program goals: To have schools, community groups, sports clubs, civic organizations or individuals adopt every stream. The Adopt-A-Stream Foundation was established to ensure that Pacific Northwest streams continue to provide spawning and rearing habitat for wild salmon, steelhead and trout, as well as serve a recreational function for the growing population.

Program setting: Local streams nation-wide

Target audience: Youth and adults throughout the U.S.

Community needs met: Population growth in the Northwest, where many people reside and visit because of the water resources, is having a noticeable impact on salmon runs in the streams and rivers, and on commerical fisheries.

Instructional approach: "Adopting" a stream means that volunteers provide long-term care of the stream and establish monitoring, restoration, and community-wide environmental education activities. By supporting these efforts, the Adopt-A-Stream Foundation provides the building blocks for an improved environment and sustained healthy wild fish production.

Educational content: In *Adopt-A-Stream* workshops, teachers and community leaders learn how people and nature shape watershed systems, and how to carry out the five steps involved in adopting a stream:

1. Investigating the watershed
2. Establishing a Streamkeeper group
3. Establishing short and long term goals
4. Creating an action plan
5. Carrying out the plan

Other workshops the Foundation conducts include Streamkeeper Training and Watershed Education Workshops for Teachers.

In-stream projects include water monitoring, raising salmon or trout eggs, revegetating streambanks, and adding or cleaning spawning gravels. As part of adopting a stream, youth partake in community education by designing brochures, building an interpretive trail, stenciling storm drains, and mapping and documenting pollution sources. The Foundation provides aquariums for raising salmon from egg to fry; then releasing the young in the "adopted" stream.

Institutional and community support: The Adopt-A-Stream Foundation began in 1985 with the long-term goal of seeing every stream adopted. The Foundation's overall function is to teach watershed residents how to become stewards of their streams. It sponsors conferences on stream restoration and environmental education for educators, scientists and volunteers.

Evaluation/modification strategies: Not reported.

Unexpected outcomes: AASF has received several local and national awards for its activities, such as the Achievement Award for the best environmental education effort nationally from the National Association of Counties, 1985.

Program promotion and outreach efforts: When the Foundation secures grant funding to sponsor workshops, they are offered free of charge; otherwise, fees are negotiated.

Contact information for each program is provided on pages 6-12.

Materials produced: *Adopting-A-Stream: A Northwest Handbook,* by Steve Yates. 1993; *Adopting-A-Wetland: A Northwest Handbook,* 1993; *A Streamkeeper's Field Guide: Watershed Inventory and Stream Monitoring Methods,* 1993; The *Streamkeeper* video, 1993; posters and t-shirts.

Keys to success: A comprehensive approach to stream and watershed monitoring, inventory and restoration.

Future endeavors: A Northwest Stream Center (an environmental education and interpretive facility) will become a regional Streamkeepers headquarters. Located in Seattle and Everett, WA, the Center will feature a wetland restoration project, salmon stream restoration, interpretive trails, exhibits, and education programs.

The Blue Thumb Campaign

Program goals: To encourage the media and community groups to "spread the word for water," thereby increasing awareness of water issues and commitment to responsible actions.

Program setting: Communities throughout the world

Target audience: All ages

Community needs met: Americans drink 110 millions gallons of water everyday. Our health depends on the quality of this water, so individuals need to know basic water conservation and what to do to maintain their drinking water quality.

Instructional approach: The *Blue Thumb* campaign was developed along with National Drinking Water Week to go beyond promoting drinking water awareness to encouraging citizens to take local action on water resources. *Blue Thumb* education packets are distributed to water utilities that belong to the American Water Works Association. From there, materials go to schools and community groups. *Blue Thumb* also receives support from 17 national nonprofit organizations, known as the National Drinking Water Alliance. The Alliance works with the media and local groups to "spread the word for water" by encouraging awareness of water issues and commitment to improving and protecting water resources locally.

Educational content: The Alliance, which sponsors National Drinking Water Week during the second week of May, recommends three basic principles for action: conserve water, protect it, and become involved in local decisions that affect water sources and water quality. Throughout the week, local groups hold events in libraries, near lakes, in schools, drinking water treatment plants, malls, and city halls. Community groups conduct river cleanups, hazardous waste collections, and water festivals. The Alliance makes information available to citizens on a variety of positive water behaviors called "Blue Thumb" actions that center around three principles: the need to use water wisely; the need to protect water from pollution; and the need for public participation in decisions about water quality and quantity.

Institutional and community support: Working closely with youth leaders, community groups and the media, water utility companies and Alliance members get out the *Blue Thumb* message. Alliance members include: American Water Works Association; U.S. Environmental Protection Agency; Cooperative State Research, Education and Extension Service (formerly Cooperative Extension Service); National Drinking Water Clearinghouse; Natural Resources Conservation Service (formerly Soil and Water Conservation); Water Education Foundation; Groundwater Foundation; American Ground Water Trust; and League of Women Voters Education Fund.

Evaluation/modification strategies: Education packets include questionnaires for users to evaluate the usefulness of the materials. We consider all comments when revising new materials.

Unexpected outcomes: The Regional Center for Environmental Education in Cracow, Poland has adopted the *Blue Thumb* campaign strategy. Funded by the U.S. Environmental Protection Agency and spearheaded by the nonprofit group, Water for People, located in Denver, Colorado, Polish residents are launching a multifacted project to help people conserve water and protect it from pollution. The group will develop seven "Blue Workshops" for students and three training sessions for teachers. Additionally, a Blue Festival for all ages opened Cracow's "Week for Water" in June 1995.

Program promotion and outreach efforts: Publicity announcements included in "Spread the Word for Water" packets; *Blue Thumb* novelty items for sale such as t-shirts, buttons, stickers, pencils, cups, water bottles and banner kits.

Materials produced: "Spread the Word" Information Packet; free brochures on the "Blue Thumb Basics," available at National Drinking Water Week Headquarters, American Water Works Association, 6666 West Quincy Avenue, Denver, CO 80235.

Keys to Success: A true grassroots strategy; lists of easy-to-follow water action tips; prewritten public service announcements; and international support.

Future endeavors: Continue to disseminate *Blue Thumb* materials through water utility companies and the Alliance, and further international *Blue Thumb* campaigns.

Georgia Waterway Cleanup

Program goals: To teach people not to litter at Lake Blackshear. Littering not only detracts from the lake's beauty, but also hurts the environment—from birds and fish to turtles and humans.

Program setting: Flint River which feeds into Lake Blackshear. The lake was formed to generate electric power. The Flint River is located approximately 10 miles from Cordele, Georgia in Crisp County. The cleanup is held each year, usually in May.

Target audience: 4-H youth are always strongly involved in this program. In April 1995, we pulled in Sumter County residents that live on the lake. We also sent out a newsletter from the Crisp County Power Commission, asking residents to clean up the lakebed in front of their homes, so litter and excess debris would not float downstream when the lake was flooded in June. Free bags were offered to the residents, compliments of Glad (First Brands). Our community is part of the nationally known "Glad-Bag-A-Thon." Approximately 750 residents took part in this offer and the results were overwhelming.

Community needs met: This highly visible, tourist attraction needs to remain clean and beautiful. Lake uses include boating, fishing, power generation, swimming, canoeing and other water-related activities. Boaters are not targeted as litterbugs; however, they are educated about the fact that when a boat starts at speeds above idle, the likelihood of littering increases. Even when trash sinks to the bottom, it is still considered littering since fish and other water inhabitants will be affected by the litter. There are many non-local users of Lake Blackshear, and since a state park has its home on the banks, the lake is available to everyone.

Educational content: The goals of the activities are to teach students that boaters can place litter in trash cans and how fish and animals are affected by litter. The chosen activities are designed to get youth to understand how animals encounter debris, such as a six-pack ring becoming entangled on a duck's neck or bill. Other activities include mixing oil and water to demonstrate how oil leaks from boats and other motorcraft on the lake. We also use activities found in "Waste in Place" curriculum by Keep America Beautiful.

Instructional approach: The more people know, the better they can understand why things are the way they are. With this approach in mind, TV interviews and newspaper articles help to educate adults and youth about our environment. We teach how water is affected not only by litter, but also by non-point source pollutants.

Evaluation/modification strategies: Campers and people coming into the state park are more than willing to help in our cleanups. Many were actually excited that an organized cleanup was being held while they were visiting Most campers and boaters have boats and subsequently, access to areas where some students cannot go. The Trappers' Association has expressed an interest in becoming involved, as have others from the water industry.

Unexpected outcomes: This event has become a large project for the Clean Community Commission—yet we never seem to have enough boats to assist with the large turnout.

Program promotion and outreach efforts: Word of the cleanup reaches the community through advertising and coordination with the Georgia's annual statewide waterway cleanup. The DNR sends press releases about our cleanup and publicizes the event at a major TV station and newspaper located in Albany, Georgia.

Materials produced: Posters are given to committee members and newspaper articles are written by the director Clean Community. In Fall 1995, we will distribute a brochure highlighting projects (by both youth and adults) in the Gum Creek Watershed Demonstration Project.

Keys to success: The more people and organizations aware of the program, the better. Through our involvement in the community, our board members spread activities by word of mouth so that most residents know that it is time for a cleanup.

Future endeavors: We will continue the cleanups in April as part of Keep America Beautiful Month. This year, BFI and Waste Management will donate bags for collecting litter. The Power Commission will continue to assist the DNR with the lake, and will notify the Commission of sites where cleaning is most needed.

Give Water a Hand

Program goals: To stimulate youth to *investigate* local water issues and to facilitate their taking *action* on problems; to encourage a *service-learning* approach to young people's understanding of environmental problems; to encourage partnerships between local natural resource experts and youth groups planning and carrying out projects; and to mobilize the networks of national partner organizations and facilitate cooperation among the agencies supporting *Give Water a Hand*.

Program setting: *Give Water a Hand* is a national program, supported by over 20 national agencies and organizations, designed to encourage local residents to take action on water issues in schools, communities, farms and homes.

Target audience: 4th- to 8th-graders, primarily in a nonformal settings such as 4-H clubs, scouts, or school-related environmental clubs.

Community needs met: A USDA national assessment of water education materials reported several needs in youth water education, including that of helping young people take action on local environmental issues. During a review of materials, it was determined that the very best water education materials are those in which young people are linked with local natural resources experts for ideas, information and resources. *Give Water a Hand* was developed in response to these findings. The *Give Water a Hand* materials, through a service-learning method, provide the steps young people need to take to identify local water issues and to plan and carry out service projects that address a problem they've identified. In addition, *Give Water a Hand* helps young people link up with local water experts and helps local resource people conduct effective outreach to youth.

Instructional approach: To ensure a successful national campaign, all major national water education agencies and organizations were contacted to participate as partners. The *Give Water a Hand* program helps these partners meet their goals of youth education and community outreach. The partners, in turn, assist *Give Water a Hand* by helping to develop materials, promoting the program, and disseminating the materials through their established networks. This partnership was developed through existing and new relationships with individuals in each organization. Through frequent contact with each partner (coordinated from a national office), we were able to most effectively and efficiently use our collective resources. For example, one member of the partnership may have the financial resources to print and mail materials, but no channels to distribute it. We can couple those resources with a partner who has limited funds, yet has education personnel in every county in the nation. This synergistic approach has proved to be successful.

Institutional and community support: Funders include National Fish and Wildlife Foundation; Church & Dwight Co., Inc. with additional support from over 20 national agencies and organizations.

Educational content: Through a series of exercises, *Give Water a Hand* engages young people in service projects to help them learn about water issues. First, participants map their watershed and complete a needs checklist to identify local water issues for themselves. Next, they prioritize the issues; solicit ideas, information and resources from local natural resources experts; and plan and carry out service projects that meet their abilities and interests. This approach emphasizes youth investigation, planning and action.

Evaluation/modification strategies: After the first year of the program, *Give Water a Hand* was evaluated for effectiveness based on feedback from young people, youth leaders and program partners. The materials were then revised for a second edition published in late 1995. The materials themselves contain strategies for youth groups to evaluate their own projects.

Unexpected outcomes: Getting youth to participate in *Give Water a Hand* in the first years was much more of a challenge than expected. Because each organization in the partnership had some role in dissemination and outreach, follow-up on who actually used the materials was difficult. This posed a problem, because the ability to identify youth participants and obtain their feedback is an important part of evaluation.

A positive unexpected outcome was the magnitude of success in gaining national recognition our first year. United Earth chose to focus its inaugural Youth Earth Service Award program on *Give Water a Hand* participants. The awards event added a prestigious element to the national recognition of youth participants and served to raise awareness of our program among youth and potential new partners.

Program promotion and outreach efforts: The partnership structure of *Give Water a Hand* has led to a great amount of publicity and promotion over a very short time. Each program partner is able to promote the materials through its own network. In addition, a highly-visible, national recognition program for program participants helps plant the seeds of future involvement.

Materials produced: *Give Water a Hand* materials consist of two guides: A Leader Guidebook, and a Site Action Guide for youth, focusing on four different sites: home, school, community or farm.

Keys to success: *Give Water a Hand's* success can be viewed on two levels. First is the ability to mobilize the national partnership to create and share a unique program for youth. Second, success depends on the motivation and dedication of young people and their leaders. With the service-learning approach, young people can investigate water issues and take action using the tools provided in the materials. This allows young people and communities to participate in their own environmental future.

Future endeavors: *Give Water a Hand* continues to involve new organizations in the partnership. With data collected during our pilot year, a revised version of the materials will be available.

Clubs

4-H Watershed Project: From Ridges to Rivers—Watershed Explorations

Program goals: These materials form a unit in the national 4-H science education program for nonformal settings, SERIES. This unit is designed to:

1. Help youth understand their watershed; learn their "ecological address"; explore how water and land interact; learn how they, as residents of their watershed, affect land-water interactions and the quality of the water around them
2. Help youth understand scientific inquiry and critical thinking skills
3. Impart a sense of community service—give youth confidence in their skills and knowledge that enables them to take thoughtfully-considered action as they continue to question and explore

Program setting: 4-H clubs; Scouts; after school groups; other youth clubs

Target audience: Stage I: grades 4–6; Stage II: grades 7–8; and Stage III: grades 9–12.

Instructional approach: Materials for Stages I and II have been designed for nonformal settings, although they can be adapted for classroom use. All of the activities are hands-on and inquiry-based, encouraging youth to develop their own questions and methods of testing. Stage I and II activities are designed

Contact information for each program is provided on pages 6-12.

to be led by teens trained in the activities. Stage III is a compilation of questions and issues concerning watersheds and water quality that can be explored by the teens within the framework of a club, science class, or science fair project.

Educational content: Stage I: Seven hands-on sessions

1. Watershed Overview
2. Creek Carvings
3. Rocks: Here Today, Soil Tomorrow?
4. Of Mudshakes and Mystery Soils
5. Life Underground
6. Creek Creatures
7. We've Got the Watershed in Our Hands

Stage II (currently under development): hands-on activities to include sessions on topography and topo maps, water quality in the watershed, community resource use. Stage III (currently under development): A guide for high school youth to help them develop science projects focused on watersheds and water quality issues that are relevant to their areas.

Community needs met: Community service projects are an integral part of the Watershed Project. Youth working with the project are encouraged to take part in education- or restoration-oriented projects.

Institutional and community support: USDA grant is part of the Morro Bay Hydrologic Unit Area Grant. *Ridges to Rivers* was adopted by the National 4-H SERIES (Science Experiences and Resources for Informal Educational Settings) Project.

Evaluation/modification strategies: Feedback from teens and groups to the Watershed Project Coordinator. Revisions made based on feedback.

Unexpected outcomes: Teens who present the activities have come to learn as much, if not more, than the youth with whom they work. Since the activities require no extensive prior knowledge of the results of the activities, the teens can truly become fellow investigators with the younger children. Their excitement and curiosity can be infectious!

Program promotion and outreach: Workshops are used to train teen and adult coaches in methods of scientific inquiry and use of the activities. These are advertised locally through the media, volunteer conservation groups, and special introductory sessions at the high schools. Stage I activities have been adopted by the National SERIES Project which has Regional Leadership Centers (RLCs) throughout the country that help organize training workshops. For more information on the SERIES RLCs, contact SERIES Project, 4-H Center, University of California, Davis, Davis, CA 95616-8599, or call 916/752-8824.

Materials produced: *From Ridges to Rivers: Watershed Explorations*, Stage I, 1994. The curriculum is free by attending a training workshop available from four regional SERIES offices located in New York, Georgia, Missouri and California, or your state 4-H program office.

Keys to success: A strong teen/adult coach team is essential. The adult must support the teen, but still allow the teen to take responsibility for leading the activities. This opportunity for teenagers to exercise real leadership is a crucial part of the program. Supplementary field trips to areas of interest in the watershed help make the knowledge gained through the activities come alive. The combination of activities and field trips enables the group to identify community service projects that will give them a sense of power about being able to make positive changes.

Future endeavors: Stage II and III materials will be available in spring/summer 1995.

Fishing for 4-H

Program goals: The goals of *Fishing for 4-H* are threefold. First, the program teaches young people how to fish for and identify several different species of fish. Second, modeled after Trout Unlimited, the club works to teach Arlington boys and girls important lessons in leadership, community service, conservation and environmental protection. Finally, *Fishing for 4-H* offers the youth of Arlington an opportunity to learn and have fun at the same time. Another primary objective of the program is to teach Arlington youth how to teach others about what they have learned in 4-H, thereby permitting the club's work to reach many sectors of the Arlington community.

Program setting: Youth interested in the *Fishing for 4-H* project are encouraged to join the 4-H Fishing Club which has been formed through the Arlington County Extension Office in coordination with the Northern Virginia Chapter of Trout Unlimited. The "Fishing for 4-H" club meets twice a month and is run entirely by Arlington teens with the assistance of an adult volunteer leader.

The club has regular guest speakers and also provides its members with plenty of opportunities to gain hands-on fishing and fly-tying experience.

Target audience: *Fishing for 4-H* programs and activities are offered to Arlington County Virginia youth, ages 8 to 18, who want to learn more about fish and fishing.

Community needs met: 4-H Fishing Club members have regularly provided assistance in Arlington County's own Four Mile Run stream cleanup and trout fishing effort. Last year, 4-H club members assisted county employees in the actual trout stocking. They have also helped at a number of fly-tying and fishing clinics in the community.

Aware that some disadvantaged youth may never have the ability to attend regular club meetings, *Fishing for 4-H* has sponsored special fishing clinics targeted specifically to providing these youth with an opportunity to go fishing.

Instructional approach: The instructional approach *Fishing for 4-H* takes is to draw upon the experience and expertise of Trout Unlimited's cadre of very knowledgeable adult members, as opposed to using any one curriculum. The assumption of the program is that the activities in which Trout Unlimited's members are involved are naturally interesting to kids. Young people often find fishing a very rewarding experience. They are fascinated with hands-on science and activities such as stream study, insect identification, fly tying and rod building. Therefore, this program encourages volunteers to teach what they know in a straightforward manner.

Educational content: Modeled after Trout Unlimited, the philosophy taught by the *Fishing for 4-H* program is that fishing is for sport rather than for food, and that the true enjoyment of the sport lies in the challenge and the love of the outdoors—not necessarily in having a full creel. It's about appreciating fish and their environments, respecting fellow anglers, and giving serious thought to tomorrow. At the same time, *Fishing for 4-H* teaches valuable lessons about fish conservation and preservation. It also works to develop positive self-esteem, leadership and citizenship. It does this by allowing youth participants to develop their own projects and run their own club meetings under the supervision of an adult 4-H volunteer leader.

Institutional and community support: One of the best things about the *Fishing for 4-H* program is that it can be easily replicated in all communities. While not all communities have a local Trout Unlimited chapter, most have access to a county Extension office through which they can begin their own program.There is no initial cost to start a *Fishing for 4-H* club. If the club wants money for certain activities, it may charge dues or conduct fund-raising activities.

Evaluation/modification strategies: No formal evaluation process exists for the program. However, participation has remained relatively steady with many of the original members of the club still active.

program featured in training video

Materials produced: Some Virginia 4-H activity guides such as *Ponds and Lakes, Streams, Fish Identification & Display, Fish Culture, Fishing, Hunting and Fishing Sportsmanship, Wildlife Ecology,* and *Making Artificial Lures,* dovetail very well with this program. The 4-H Leader's Guide also has an excellent curriculum matrix containing suggestions for working with different age groups on any particular project.

Unexpected outcomes: As a direct result of this program, on February 23, 1991, a Memorandum of Agreement was signed by the Virginia 4-H Youth Program and the Virginia Council of Trout Unlimited. In the agreement, the organizations pledged to work together in an effort to educate youth about "the need for conservation and sustainability of resources in order to promote individual ethical environmental behavior and develop a sense of stewardship."

Program promotion and outreach: In Virginia, other Trout Unlimited chapters as well as the Northern Virginia Chapter, are currently targeting counties where similar *Fishing for 4-H* clubs can be started. Moreover, since l990, the members of the Northern Virginia Chapter of Trout Unlimited have assisted in organizing and teaching a statewide 4-H Aquatic Resources Camp at the 4-H Educational Center in Front Royal, Virginia.

Keys to success: The success of *Fishing for 4-H* lies in the affiliation between the Arlington County 4-H program and the Northern Virginia chapter of Trout Unlimited. The 4-H club structure provides an excellent means through which Trout Unlimited can reach a larger number of youth on a more continual basis than it has in the past.

Future endeavors: This year, the Arlington Fishing for 4-H Club will begin a fishing mentor program in which teen club members will be assigned to younger children who are interested in learning how to fish and becoming members of the club. As mentors, the teens will be responsible for working with the younger children and their parents to teach them how and where to fish.

Contact information for each program is provided on pages 6-12.

Community service learning

Austin Youth River Watch

Program goals:

1. Improve the water quality of the Colorado River and its tributaries through ecological understanding and systems analysis
2. Reduce the dropout rate of students in the public and private high schools of Austin through positive role model interaction
3. Increase the participation of minority students in critical environmental issues and in technical careers that require understanding of science and mathematics.

Program setting: Lower Colorado River in Austin and the Youth River Watch office

Target audience: 9th- to 12th-grade minority students at risk of dropping out of school.

Community need met: In 1993, the dropout rate of minority high school students represented more than 53% of the total Austin school population. The expected rate is 25% between the 9th grade and senior graduation. Students in the Youth River Watch Program remained in school and achieved greater academic success. The city also benefits when students monitor the tributaries of the Lower Colorado River,because students report their findings on the source of Austin's drinking water.

Instructional approach: The *Austin Youth River Watch* program uses a peer mentoring unit consisting of two 9th-graders who are having difficulty with their course work and an older, successful 11th or 12th grade student. The older students tutor the younger ones on their academic subjects and they all monitor water quality each week of the school year. The students work about three hours a week and are paid a minimum wage

program featured in training video

for the project funds. Working with high school science teachers, the mentors use water quality monitoring as a vehicle for developing student awareness of environmental issues, and as an arena for practicing science and math skills. Once accepted to the program, students must maintain passing grades in math and science to retain eligibility.

Educational content: The *Austin Youth River Watch* program recruits minority at-risk students and trains them in river water monitoring. Eleventh and twelfth-grade student "mentors" who are academically successful and experienced in river monitoring are hired to work with 9th- and 10th-grade at-risk student "trainees" to form a water quality monitoring team. The mentors are required to conduct chemical and biological monitoring with the trainees at a designated monitoring station, located on one of the 22 creeks within the City of Austin that feed into the Colorado River. Designated teachers at each participating high school who have been trained in river water monitoring, supervise the mentor/trainee teams and give weekly monitoring data reports and weekly timesheets to the program coordinator. The results of each water quality testing are added to the Lower Colorado River Authority (LCRA) database of water quality testing done throughout the LCRA District.

Institutional and community support: Lower Colorado River Authority, the City of Austin and the Austin Independent School District. Students considered academically at risk are identified by the Office of Testing and Evaluation.

Program promotion and outreach efforts: When at-risk kids are identified, the program coordinator gives presentations to students explaining the program.

Evaluation/modification strategies: Students are asked to complete attitude surveys after various events and program activities. The surveys are used to determine the students' acceptance of particular aspects of the program; changes in students' attitudes towards academic subjects; and new directions for the Youth River Watch Program.

Unexpected outcomes: Through continuous stream monitoring, students detected and reported leaks in the city's water and wastewater sewer system. Other unanticipated events included the discovery that many cooperating teachers were unable to fulfill their commitments to the program and ceased their involvement. Another problem was dealing with a newly created nonprofit Board. Internal disputes among Board members slowed the project. At-risk students who were not U.S. citizens had difficulty obtaining a Permanent Resident Visa so they could not be paid and consequently dropped out of the program.

Materials produced: *Flying Fish Review* newsletter

Keys to success: We provide a program which builds personal self-esteem of young people who work together cooperatively. Each individual member learns the monitoring procedures and helps produce a high-quality weekly data report. Students have a chance to see new role models and replace stereotypes. Each team reports its monitoring data at an annual spring symposium which has become a community celebration of a job well done by Austin's young people. Community leaders and scientists review the students' work and recognize their academic achievement.

Future endeavors: Expand the Russian exchange program; help those that complete the program go on to higher education or careers, and encourage youth to gain credibility for their water monitoring efforts.

Bronx River Restoration Project

Program goals:

1. Foster interest, competence and appreciation of science
2. Restore local ecosystems while enhancing youth's perspective of the effect they have on their environment, and historical uses of the land.

Program setting: The Bronx River, New York public schools

Target audience: 2nd-grade to high school students in the New York Public School System

Community needs met: Students partake in ecological restoration of a bank along the Bronx River which flows near the participating elementary and high schools. Through the program, disadvantaged urban youth receive immediate jobs, and training in marketable skills such as landscaping, surveying, and environmental testing and evaluation. Students have contact with colleges and graduate schools willing to accept them when they graduate. They are encouraged to pursue career interests in environmental quality.

Instructional approach: Students collaborate with biologists, engineers and other professionals in researching the history of the Bronx River Valley Watershed and monitor local air, water and soil quality, and attempt to improve it through replanting native vegetation in the meadow and wetland.

Educational content: Students are encouraged to think creatively and test new ideas. They learn to identify plants and animals and to make topographical and vegetation maps. And most importantly, students learn that real science is discovering something that wasn't known before—not simply repeating experiments and trying to find the "right" answer. By conducting real science experiments—learning from their mistakes—students learn about scientific methods.

Institutional and community support: A classroom at Intermediate School 167 will be equipped to serve as the center of activity for the ecological restoration project. Coordinators received help from the New York City Parks Department and the Gaia Institute. The New York Botanical Garden Forest Project adds expertise in surveying and vegetation mapping. Professors from Lehman College provide expertise in fish ecology, aquatic toxicology and electron microscope facilities. These experiences expose students to higher institutions of learning that may offer them opportunities after the students graduate from high school.

Evaluation/modification strategies: Not reported.

Unexpected outcomes: Not reported.

Program promotion and outreach efforts: This general method of teaching science could be used in any school by choosing an appropriate environmental project.

Materials produced: None reported.

Keys to success: Introduce youth to many specialty fields of ecology restoration by involving academic professionals. Offer employment opportunities for high school students. Locate the project site near the school or project center so students do not have to worry about transportation.

Future endeavors: Continue to establish ecological restoration opportunities for students in New York City.

Duwamish River Youth Initiative

Program goals:

1. To recruit a diverse group of individuals to care for the Green/Duwamish watershed
2. To implement ongoing environmental restoration and revitalization projects on the Duwamish River corridor
3. To offer leadership training, career development and mentoring opportunities to urban youth using the Duwamish River as a focal point and case study
4. To teach youth urban environmental education using the Duwamish River as a focal point and case study
5. To involve local residents in the Duwamish River stewardship activities
6. To conduct ongoing evaluation of the Duwamish River Initiative, including an impact assessment on the youth served, level of community involvement, and the actual environmental impact on the Duwamish River.

Program setting: The project is located in urban Seattle in a low income, industrial and minority community.

Target audience: 16–21-year-old youth, mostly youth of color.

Community needs met: Each Duwamish River Initiative participant undergoes extensive training and study to be recognized as a Duwamish Ambassador. Program includes an exploration of the historical significance of this metropolitan river as a valuable cultural, economic, and environmental resource for the greater Seattle community.

Instructional approach: The Conservation Career Development Program (CCDP) offers year-round academic and career training as well as hands-on conservation work experience designed to give participants the competitive edge they will need when they compete for careers in conservation.

Educational content: In leadership training, participants are required to attend meetings and to engage in public speaking opportunities as a means to educate Duwamish corridor residents about environmental concerns affecting the Duwamish. Youth are asked to form committees, design work projects, and ultimately lead work project teams. Throughout the Duwamish River Youth Initiative, participants attend workshops that concentrate on actual skills needed to pursue employment. Such sessions include resume writing workshops, interviewing skills, college preparation and test-taking skills, and career nights, to name a few. Local public and private conservation agencies make site visits and when appropriate, place CCDP participants in conservation-related internships. Mentoring opportunities through the program give youth experience in a day "on the job" with an adult role model. Mentors come from the community and include the University of Washington, South Seattle Community College, and the Green/Duwamish Watershed Alliance.

Institutional and community support: U.S. Fish and Wildlife Service works in cooperation with the Student Conservation Association to enlist young women and people of color in efforts to restore and preserve the Green/Duwamish Watershed. Project success depends on partnerships with various government agencies, private businesses, community groups and schools that have already recognized the need to restore and preserve the Green/Duwamish watershed.

Evaluation/modification strategies: Ongoing impacts are measured as youth maintain group research project portfolios and assessments. A committee of volunteer advisors from the Green/Duwamish Watershed Alliance, community leaders, agency representatives, teachers and elected officials offer advice and act as an evaluation resource for the project. CCDP participants present research portfolios as well as detailed project reports at the end of each program year. Then the committee evaluates the progress toward each measurable goal and objective. The committee also assesses the environmental impact of the program on the Duwamish River corridor as well as the educational impact on the community residents and each youth participant.

Program promotion and outreach efforts: Youth are contacted through established recruitment strategies with administrators at community organizations and high schools. Young people active in the CCDP will be critical to the recruitment process, using their bilingual skills and cultural knowledge to access diverse populations that might not otherwise participate. Once in the program, students attend local meetings and forums to educate community residents about how small changes in their living patterns can make an impact on the environment. Students offer guidance on simple recycling techniques to more complex techniques for avoiding the use of certain toxic household substances and preventing them from entering the waterways.

Materials produced: The Seattle *CCDP Newsletter* for youth participants.

Keys to success: A supportive staff in touch with the difficulties of being a young adult in today's society.

Unexpected outcomes: We often have to search for service projects with an educational component. At times, we are asked to clean up trash on someone's property, but that's not what we're about. We are about community service learning and career awareness.

Future endeavors: Duwamish Ambassadors will continue to visit classrooms, make presentations at community meetings, network with local businesses and organizations, and lead on-site interpretive tours of the Duwamish corridor. Ambassadors will involve

local community residents in the ongoing implementation of hands-on projects for the duration of the 5-year program. Participants will take part by caring for previous work sites, thinning trees, stabilizing soil, controlling litter, and removing brush.

Day camps

4-H Water-Wise Guys Day Camps

Program goals: To help 9- to 11-year-old youth understand the environmental and economic issues associated with water conservation and quality.

Program setting: School portables; parks; community centers

Target audience: Ages 9–11

Instructional approach: Water education games, experiments, home water use inventory, video tapes and creative dramatics.

Educational content: The five *Water-Wise Guys* lessons include:

1. The Importance of Water
2. The Water Cycle
3. Water Use in the Home
4. Outdoor Water Conservation, and
5. Water Quality

Community needs met: Water conservation and quality are major issues in Florida. Through *4-H Water Wise Guys,* young people develop a personal environmental ethic and understand the individual's impact on water availability and quality. Pre- and post-tests show that youth increase their knowledge of water use through the program. Family telephone surveys show that not only do youth change their water use behaviors, but other family members also adopt new practices such as installing water-saving devices, taking shorter showers, turning off the water while brushing their teeth, etc.

Institutional and community support: Funding was provided by the West Coast Regional Water Supply Authority and the Southwest Florida Water Management District. The U.S. Sugar Corporation sponsored the adaptation, production and distribution of the curriculum packet and instructional workshops. In 1993, the Hillsborough County Public Utilities provided funding for *4-H Water-Wise Guys* day camps. Day Camps were held at the following sites: county and recreation centers; Boys and Girls clubs; school system's extended day programs; YMCA Latchkey Centers; Police Athletic League (PAL); and public housing facilities.

Evaluation/modification strategies: Pre- and post-tests are given to all youth in the 4-H Water-Wise day camps. Telephone surveys are conducted on 10% of the families by 4-H summer program assistants. The 4-H day camp staff evaluates the program, each site and the activities used at the sites.

Unexpected outcomes: Many of the agencies enrolled in the summer day camps request follow-up programs during the school year. Youth enrolled in the summer program have used the storm drain stenciling program as their Community Pride Project for the year. Thus far, they have stencilled 100 storm drains in two parts of the county. Another group of young people monitored neighborhoods during the summer to be sure people were watering their lawns at the correct times of the day.

Program promotion and outreach: County and city recreation centers, boys and girls clubs, Police Athletic League, Extended School Day/Latchkey Center and public housing.

Materials produced: *Water-Wise Guys Activity Book;* and *Water-Wise Guys: Don't Clown Around, Use Water Wisely*— a video.

Keys to success: The staff attends a comprehensive, week-long in-service program. Since some day camp sites are located in high-crime communities, the staff attends a session on being street smart. Each lesson includes a variety of reinforcement activities so instructors can use methods with which they are comfortable. Teaching kits for each lesson are organized into individual boxes. Youth are motivated to learn the information through a water drop competition. The young people earn water drops for being able to answer questions about the lesson and helping the instructor with the various reinforcement activities. Every child earns a 4-H Water-Wise ribbon, two flow-restrictors, a 4-H Hydro Trooper membership card and a *4-H Water-Wise Guys Workbook.* The top three youth in the water drop competition earn rosettes.

Contact information for each program is provided on pages 6-12.

Future endeavors: 4-H members are assisting with a county storm drain stenciling project to remind citizens of the consequences of pollution. A new 4-H water program has been developed for youth 11–14 years old. The new program, "H_20W You Can Make a Difference," builds on *4-H Water-Wise Guys.*

Eyes on Conservation: Water Works

Program goals:

1. Participants will increase their knowledge of water resources and how human actions can impact water quality
2. Participants will practice stewardship of natural resources

Program setting: Day camp

Target audience: Grades 5 and 6

Instructional approach: Students attend a day-long activity where they participate in active learning. Attendance is limited so that the quality of the experience can be controlled. Class participants are chosen at random. A 50¢ per student fee is charged. All other expenses are covered by donations, grants, or volunteer assistance.

Community needs met: In Nebraska, water quality has emerged as one of the paramount issues of the decade. This program helps to educate today's youth—tomorrow's leaders and decision makers—about the importance of water resources, and the need to manage them wisely.

Institutional and community support: *Eyes on Conservation: Water Works* is planned, supported, implemented and evaluated by a multi-agency team. The agencies on the team are the University of Nebraska Cooperative Extension, USDA Soil Conservation Service, Papio-Missouri River Natural Resources District, U.S. Army Corps of Engineers, Nebraska Game and Parks Commission, and Educational Service Unit #3. Additional support is obtained from many agencies and businesses, too numerous to list.

Educational content: Water Works is developed around six learning blocks. Each block is designed to teach a specific objective. Each year, the multi-agency Water Works Team selects the six objectives to be addressed, which change from year to year to meet current needs. Objectives have included the following areas (not written here as behavioral objectives): hydrologic cycle; groundwater; drinking water; public policy; ecosystems and living creatures; wetlands; pest management and water quality; waste management and water quality; wells; etc.

Evaluation/modification strategies: A 20-question pre- and post-test is given to each student participant. Pre- and post-test scores determine if students' knowledge of water resources increases as a result of attending the event. In addition, a student satisfaction index is given immediately following the event. A teacher's evaluation is also given after the event to solicit the educator's point of view. A presenter's evaluation is given to evaluate the effectiveness from the standpoint of delivery.

Unexpected outcomes: First opportunity for some urban youth to experience outdoor settings in a state park near the Platte River.

Program promotion and outreach: Promoted through schools and covered by television and local newspapers.

Materials produced: Numerous publications and supplemental materials; contact Sharon Skipton for information.

Keys to success: Multi-agency collaborative efforts. The program is designed around specific, identified learning (behavioral) objectives. Well-organized, with attention to detail.

Future endeavors: Will continue *Water Works* program as long as it continues to meet a need.

MinnAqua—Minnesota Aquatic Education

MINNAQUA PROGRAM

Program goals: Provide the citizens of Minnesota with educational opportunities that increase their knowledge, understanding, management, skills and stewardship of their aquatic resource environments while providing them with fishing opportunities.

Objectives:

1. Develop, implement, and evaluate a statewide aquatic resource education program that reaches at least 30,000 people per year and encourages public and community action
2. Using staff, volunteers, and other contacts, make at least 50% of the education and information opportunities available to statewide audiences targeted by age, culture, and socioeconomic background
3. Coordinate at least one study, survey, or evaluation each year that helps further program efforts and meets agency, state, and federal mandates
4. Purchase, develop, update, and distribute appropriate materials and equipment to meet 100% of the program's priority needs.

Program setting: Outdoors and classrooms

Target audience: All ages; special programs for new American citizens and people with disabilities.

Instructional approach: The *MinnAqua Program* is composed of seven work units. Five of the units (see 1–5 under "Educational Content') deal with the education and implementation components of MinnAqua. These units are carried out in cooperation with a variety of different organizations, including but not limited to, the Extension Service, county parks, the New American Program, community education, neighborhood organizations, clubs, and youth groups. Each work unit attempts to incorporate awareness of the natural environment with aspects of fishing. Therefore, mini-courses (from 1–6 hours in length) on ecology, conservation, and management are conducted using a combination of hands-on activities and fishing instruction. These courses are set up to meet the host agencies' needs and time frames. Consequently, no two *MinnAqua* events are ever alike. The other two units (see below) serve to administer and evaluate the program.

Educational content:

1. *Urban Angling*—provides aquatic education programs for all members of the urban public who are restricted in their ability to experience recreational fishing. We work with groups who are known for reaching single parents, people considered at-risk or with low incomes, and those with disabilities.
2. *Training*—train screened (references and criminal background checks as needed) individuals in nonformal groups to conduct *MinnAqua*-authorized aquatic education programs within the Urban Angling, Schools, and Special Seminars work units. This unit also trains teachers so they have a better understanding of aquatic resources and helps resource staff work with the public.
3. *Schools*—fill a void (instruction on aquatic issues, fishery management concepts, regulations, and ethics) in Minnesota's educational system.
4. *Specialty Fishing/Resource Seminars*—educate experienced aquatic resource users on important issues and provide them with current information by way of fairs, sport shows, conservation days, etc.
5. *Displays/Information Material*—provide interpretive materials to parks, fairs, nature centers, etc., about aquatic education issues not currently addressed at these sites.
6. *Surveys/Evaluations*—furnish information that will help keep the program viable and able to meet the needs of clientele.
7. *Coordination/Administration*—offer an avenue for other groups and agencies to work with this program. Also help maintain a financially viable program, accurate record-keeping and budgeting. Working advisory committees are used for these tasks.

Community needs met: Family activities, teaching of life-long skills, recreational opportunities and service projects.

Institutional and community support: Comes from donations of materials, equipment, facilities, and money from local vendors, organizations, individuals and clubs. All fund raising is done by permanent staff as needed. State monies from the sale of licenses (Game and Fish Fund) and lottery proceeds (Reinvest in Minnesota Fund) are appropriated for this project every two years through a legislative process. Federal monies (Sport Fish Restoration Act, USFWS) from the fishing equipment excise tax are rebated back to the state at a match of 75¢ for every $1 spent on approved projects within the program. Presently donations, in-kind and volunteer time are used as sources for this match.

Evaluation/modification strategies: Evaluation has been conducted to monitor instructors and pilot activities, to determine the amount of knowledge gained, and to acquire perspectives on how other cultures learn and view natural resources. Tools used have been case studies, pre- and post-testing, standard evaluation forms, and funding of graduate research projects.

Unexpected outcomes: Sharing of cultural views and attitudes. Increased interest in natural resource caucus. Program being used as a model for other states' agencies.

Program promotion and outreach efforts: Local advertising through media, volunteer groups, community centers and neighborhood groups. Also word of mouth and attendance at fairs and other events.

Materials produced: *Fishing: Get into the Habitat, Leader's Guide* and *Youth Book*. Send for price list of other materials used in program.

Keys to success: A supportive staff to implement the program and support volunteers. Create materials that provide a big-picture approach and show how issues relate to our lives. Expect flexibility in the programs and trainings to meet specific needs of participants, as well as strong, multi-agency collaborations.

Future endeavors: We hope to provide a mentoring program for youth that will bring more cultures to the natural resources fields. Also, we will strive to learn how various cultures view their natural resources, and to make sure people understand their role in natural resource management.

SOAR (Summer Orientation About Rivers)

Program goals: *SOAR* is a nature discovery day camp that emphasizes the Platte River ecosystem. Its chief aim is to get area children out on the land—and in the water—to discover the rich diversity of life that exists just beyond their own backyards.

Program setting: Aurora Middle School facilities are leased to Prairie Plains Resource Institute (PPRI) as *SOAR* headquarters for its two consecutive one-week sessions in July. Each morning, we meet at the school at 8 a.m.; then take buses to various natural areas (Platte River, Lincoln Creek, Big Blue River, rainwater basins, prairies, etc.) for the morning's field sessions. At noon, we return to the school for lunch and afternoon classroom and lab activities which follow up on the morning's field excursion. Students are dismissed at 3:30 p.m.

Target audience: Registration flyers are distributed to all 3rd- to 6th-grade students in the county in March. Students in that age group outside the county may also attend if they are within a reasonable commuting distance (*SOAR* is strictly a day camp). Sixty students are accepted into the program each week; the first session is for 3rd- and 4th-graders, the second session for 5th- and 6th-graders. In addition, 12 middle to high school students are selected as "peer leaders," each of whom is assigned 5 students to guide, assist and supervise during the SOAR week.

Instructional approach: The approach is experiential, hands-on and informal. Activities take many forms—from watching a demonstration to seining a slough, building a nest, or playing a game. The core planning-teaching staff includes four Aurora school teachers, two University of Nebraska Extension educators, and the two co-directors of PPRI. Each morning and afternoon, there are 3–4 sessions through which the SOAR group rotates. The activity (for example, "Damsels and Dragons," or damselflies and dragonflies) is presented by either a SOAR

staff person or a guest specialist—in this case, the director of Crane Meadow Nature Center. Whenever possible, guest presenters are brought in to expose the students to natural science professionals and to keep interest high by varying personnel. We stress making connections; for example, how does the subject fit into the larger scheme of things? How does water quality and quantity affect the subject?

Educational content: The curriculum is extremely diverse and interdisciplinary. Just a few subjects covered so far include hydrology (direct study of the river and wetlands as well as lab activities with watershed models), birds, spiders, soils, butterflies, trees, reptiles, and "Wet & Wild" in which various sites are seined and sampled for specimens to examine under microscopes in the afternoon's "Microbe Show." The 1994 program alone included 19 different field activities and 14 supporting classroom activities. SOAR also includes exercises in writing, art and local history.

Community needs met: *SOAR* has met the need for children to get outdoors for direct natural history education during summer—the peak time for outdoor education. Since schools aren't in session during the summer, this is one need they are unable to fill.

Institutional and community support: *SOAR* has a budget of $17,000. About 45% of the program costs are covered by student registration fees ($65 per student). In its first year, SOAR received start-up funding from the U.S Fish and Wildlife Service (USFWS), which in 1992 received a special federal allotment for preservation of biological diversity in central Nebraska. Since its beginning, SOAR has received support from the local Hamilton Community Foundation, which has contributed full student scholarships and money for equipment. Much of the administrative cost is covered through the general operations of PPRI; a number of its Nebraska members make generous contributions specifically to the SOAR program.

Evaluation and modification strategies: Every student, peer leader, adult supervisor, and parent fills out an evaluation form at the end of SOAR week. The results are reviewed in our planning meetings. We also meet with the peer leaders on Friday afternoons, immediately following the week-long sessions to consult with them about the program's strengths and weaknesses, and to involve them in the planning process.

Unexpected outcomes: The greatest surprise has been the intensity of the enthusiasm of the middle and high school student peer leaders. Their eyes are really opened to both "what's out there" (our local landscape) and what it takes to manage five kids for five days of intense activity. Peer leaders have strongly voiced their desire to be more involved in planning the sessions, and to be given even more responsibility. In fall 1994, a "SOAR Alumni Club" was formed, both to help plan the following year's program and to engage in some extra SOAR-like activities during the school year.

Program promotion and outreach efforts: Each year we have sent a mass mailing to community businesses and organizations describing the program and asking for support. The 1994 sessions were generously covered by several newspapers and television stations. The program itself, with its participants' shared enthusiasm, does the rest. (See also: Materials Produced).

Materials produced: *SOAR Journal* is published as a yearbook detailing each year's SOAR experience. Its 40–50 pages include a list of all participants, presenters, supporters, students' writing and art work, a photoessay, a description of every activity, and a financial report. In 1993, after two runs of the program, we also produced a 40-minute documentary videotape, *Welcome to SOAR!* This video has been used extensively as both a promotional tool and as a means for outdoor educators anywhere to study a model program.

Keys to success: Our keys to success include:

1. The sponsor, PPRI, which was established in 1980 as a 501(c)3 nonprofit organization. The Institute has the objectives, institutional framework and administrative experience necessary for running a program like SOAR
2. Outstanding field sites
3. A core of planning group/staff with a broad range of knowledge and experience that works exceptionally well together

4. Excellent guest presenters
5. Community involvement
6. A clear purpose
7. Group organizational structure, with emphasis on peer leaders.

Future endeavors: We plan to develop and expand the SOAR Alumni Club to involve more older students, and to sponsor year-round education outings. Ultimately, we want to reach all age groups and broaden the geographical base of *SOAR*. One later goal is to have a *SOAR* program for teachers. Also, every year the parents' evaluations include complaints that parents don't have a *SOAR* of their own. Yet another challenge!

Festivals and fairs

Children's Groundwater Festival

Program goals: To educate 4th- to 6th-grade students from across the state of Nebraska about groundwater in a festival atmosphere.

Program setting: An annual event at the Central Community College/College Park, Grand Island, NE

Target audience: 4th- to 6th-grade students in Nebraska—nearly 3,000 each year.

Instructional approach: Hands-on or "brains-on." Educate youth about groundwater in a fun, festival-like setting featuring participatory activities. The festival brings together natural resource professionals from the government, higher education and private businesses to teach children about groundwater.

Educational content: The festival provides a variety of opportunities for students to learn about groundwater and related natural resources. Students participate in classroom sessions, exhibit hall demonstrations and outside displays. These activities cover a range of subjects including: math, art, chemistry, music, poetry and social studies. Students are exposed to a wide variety of performing artists whose activities are as diverse as the people who present them. Subjects covered include water appreciation, pollution prevention, agriculture, wildlife and weather's impact on groundwater.

Community needs met: Young Nebraskans, as a community, are learning more about the abundance of groundwater in our state; 90% of Nebraskans rely on groundwater for drinking water. During the festival, students learn why we rely on groundwater for agriculture, how water is being polluted, how pollution can be prevented, and how to conserve groundwater.

Institutional and community support: Nearly every organization and agency affiliated with groundwater in Nebraska is involved in the Groundwater Festival in some way. Activities and displays are sponsored and presented by professionals representing higher education, government agencies, environmental organizations and private businesses. Support from the Grand Island community includes financial contributions, in-kind donations and volunteer services.

Evaluation/modification strategies: The Festival is evaluated using several methods. Teachers and students complete written evaluations. Students complete pre- and post-tests. The pre-test is taken before the teacher provides any information on groundwater and before attending the Festival. The post-test is taken after the Festival. The teachers record both scores on their evaluations and return them to the Foundation. In 1993, students test scores improved by 17%. Evaluation forms are also filled out by presenters and volunteers. Also, a team of educators, not associated with the Foundation, visits the Festival, provides written comments about the activities and suggests ways the event can be improved.

Unexpected outcomes: After attending the Festival, students promote environmental awareness to parents, grandparents and siblings. Also, responses from other states and countries indicate an interest in modeling events similar to the Nebraska Groundwater Festival.

Program promotion and outreach efforts: Fliers to all 4th- to 6th-grade teachers in Nebraska; media coverage; speaking engagements and a promotional video.

Contact information for each program is provided on pages 6-12.

Materials produced: *Nebraska Children's Groundwater Festival Outreach Packet; Making Waves: How to Put on a Water Festival; Ground Water Times,* a newspaper covering the Festival; and *Sprinkles,* a water festival newsletter of The Groundwater Foundation.

Keys to success: One aspect of the Festival's successful organization was the Foundation's network of potential presenters. When preparing Festival activities, presenters either developed their own activities or displays, or we came up with an idea and found an appropriate presenter. The great cooperation of all of these presenters is probably the main reason for the Festival's success. Other key aspects include devising new and fresh ideas every year; recruiting exciting presenters; organizing the Festival so that students are busy the whole time; providing educational materials to teachers prior to attending the event so they can prepare their students; learning from evaluations and improving the Festival each year.

Future endeavors: An international exchange program; and a national evaluation of water festivals.

Wonders of Wetlands—1993 Wisconsin State Fair 4-H Action Center

Program goal: Provide an interactive, hands-on learning experience about wetland habitat and its value for young people and their families .

Program setting: 4-H state Fairgrounds

Target audience: Families with children

Community needs met: Promotes wetlands awareness.

Institutional and community support: Cooperative Extension works with public and private partners to provide interactive educational opportunities for families at the State Fair each year.

Instructional approach: Station system that can be started or finished at any point. Participants are rewarded at the end of an activity and again at the end of their visit.

Young people were issued passports when they entered the exhibit. The inside of the passport featured a picture of a wetland surrounded by six ovals which were stamped when an activity was completed. When the six ovals were filled, the young person could go to the last station and receive a balloon animal. (The committee had some questions about the use of balloon animals, but they certainly did bring people in to interact with our displays).

Some of the activities were self-guided and others required volunteer support. Parents were encouraged to interact with their children during the activities. The parents were also provided with a video and some signage to read while their children participated in some of the activities. The majority of the activities worked well for ages 5–adult.

Educational content: (this is a sample list of activities presented)

- Pond study—Four 50-gallon Rubbermaid tanks contain a variety of aquatic life. Youth had the opportunity to hold and observe the plants and animals.
- Button making—Twelve wetland animal designs were available for youth to color and make into buttons. 4-H was also identified on the button designs.
- Wetland mural—Youth and families could use a key to identify plants and animals found in the wetland mural.
- Wetland metaphors—Large two-panel interactive display using the metaphors from Aquatic Wild's activity "Wetland Metaphors."
- All Living Things are TNS (temporarily not soil)—Wetland quiz with four questions and answers.
- Energy flow through wetlands—Large multi-paneled interactive display. (Large wooden gears meshed with a crank).
- Computer simulation—Simulation that showed the effects of adjusting the water levels of a dam on people and wildlife.
- Wisconsin Electric Power Co.—Interactive computer game on energy conservation; a display of compact fluorescent light bulbs and a variety of handouts in both English and Spanish.
- Video tape on wetlands—Three different video tapes were playing throughout the day.
- Origami wetland animals—Frogs and turtles were made by folding paper. (This activity was very labor-intensive).

- Coloring and cutting out pictures of common Wisconsin fish.
- Wetland animal costumes—Costumes were worn by volunteers to interest people in the exhibit and answer questions.

Evaluation and modification strategies: All participating organizations indicated on a questionnaire that the exhibit was highly successful as a quality program on an important topic. The exhibit brought people in and held their attention. There were activities of interest for all ages. Families participated together in hands-on learning and had several take-home items to continue to reinforce the value of wetlands and 4-H. Comments from the public were very favorable. Parents also appreciated the idea of something free for kids to do at the fair. Children had a great time. Many complained about not wanting to leave when their parents wanted them to go.

The Committee that planned the exhibit was satisfied with the external product but felt that the internal workings could have been smoother. Some of the activities worked better than others. Success of some activities depended on the volunteer leading them. Scheduling of volunteers is critical to running a ten-day exhibit. The success of the exhibit depended on well-trained volunteers. The degree to which volunteers understood the basic concepts of wetlands influenced their ability to lead activities and answer questions. The training quality varied from group to group as did the basic background knowledge of the individuals. Adequate and consistent information is critical if an exhibit of this type is to educate the public. Training will be improved for next year's exhibit.

Unexpected outcomes: After the fair, the native aquatics were returned to their home ponds. Bait shop minnows and leeches were given to an angler at one of the parks. Teen volunteers took the frogs home as pets and the bait shop dragonfly nymphs became food for the turtles. After checking with several DNR sources, it was decided to make the effort to return the creatures to their home ponds. This probably was not necessary in Milwaukee County, but it did set a good example for not importing species from one specialized area to another. This information was shared with the public.

Program promotion and outreach efforts: State fair promotions included this program.

Materials produced: None.

Keys to success: Families need something to do when they tire of visiting exhibits. Participants stated that they preferred this activity over midway games.

Future endeavors: Future programs will include an activity center focused on watersheds, and an activity center especially for 4- to 7-year-olds.

Museums

Leap into Lakes

Program goals: To increase public knowledge about water and water quality issues, and to guide visitors toward positive activities that encourage the protection of water resources.

Program setting: Semi-permanent (2½ years) installation of interactive exhibit, encompassing approximately 950 sq. ft. of the museum's floor space.

Target audience: Teachers, caregivers and families with children aged 3–11. Multi-layered activities specifically designed for elementary school grades K–5.

Community needs met: Because Madison is an isthmus surrounded by five lakes, the health and condition of the lakes directly affect the city's overall environment.

Instructional approach: A variety of hands-on opportunities stressing inquiry-based exploration and reflection.

Educational content: The exhibit includes interactive activities that explore glaciers, the formation of lakes, groundwater movement, watersheds, limnology, pollution, water treatment, wetlands and lake wildlife.

Contact information for each program is provided on pages 6-12.

program featured in training video

Institutional and community support: The museum's collaborators include the Heron Institute for Teachers (a water education network), the Wisconsin Department of Natural Resources, and the University of Wisconsin–Madison Limnology Department, Edgewood College's Biological Sciences Department, and the Dane County Lakes and Watershed Program.

Evaluation/modification strategies: Evaluation and modification are ongoing to ensure that the exhibit's components are safe and user-friendly. Data collection takes place through one-on-one interviews conducted by interns trained in evaluation techniques. Teachers on tour with their classes are given evaluation forms. Data regarding the number of visitors participating in related special programs and demonstration is also recorded.

Unexpected outcomes: It is constantly surprising to see where children end up spending the most time. Many visitors are intrigued by the vacuum-powered ping pong balls that simulate water and sewerage movement. We have received requests from teachers to provide exclusive use of the exhibit area for classroom study. Although flattering, this is difficult to arrange and coordinate.

Program promotion and outreach: The exhibit is advertised through local media such as posters in libraries and signs on the sides of public buses. We have given several presentations to Wisconsin educators on interdisciplinary approaches to art and science. Exhibit information is mailed to school district offices on a regular basis.

Materials produced: Two traveling trunks with accessories for teaching water education and *Leap into Lakes: The Teacher's Manual for a Hands-On Exhibit about Lakes and Water Quality.*

Keys to success: Soliciting input from children, a strong community advisory team, including experts from the University of Wisconsin System and the Wisconsin Department of Natural Resources. As a result, museum attendance is up 42% since the opening of *Leap into Lakes.*

Future endeavors: Upcoming exhibits include *Brazil: Beyond the Rainforest, Health and Wellness* and *Investigating Flight*.

Sarasota Bay and *Midnight Pass* exhibits

Program goals: To provide new opportunities for children of all ages to discover more about themselves and their world through experiential (hands-on) exhibits and activities.

Program setting: Museum

Target audience: Children of all ages; students on field trips.

Instructional approach: There are two permanent exhibits. *Sarasota Bay* consists of a wall-sized soft sculpture depicting Sarasota Bay. Stuffed fish, reptiles and animals indigenous to the area and bearing strips of velcro are displayed in a basket adjacent to the exhibit. Museum-goers create their own scene by attaching the creatures to the wall sculpture. Cards with information about the Bay, its value to the locale, and the ways in which humans can destroy the balance of nature are a part of the exhibit.

The other exhibit, *Midnight Pass,* is a large basin filled with water and sand which museum-goers can manipulate to block and alter the flow of water through the pass. The basin tips back and forth to portray the natural changing tides. This exhibit helps museum goers understand how nature, as well as human activity, can alter the landscape. Both exhibits depict local areas and were designed to help area residents understand issues relevant to their own locale. Trained adults and youth volunteers act as museum guides when groups visit.

Educational content: Both exhibits focus on water quality. At present there is no preparation or follow-up with students, although we are currently working with the public school science curriculum coordinator to develop teacher training and to coordinate museum programs with school curriculum guidelines. We design the exhibits to emphasize science concepts that develop thinking skills such as predicting and applying information. Exhibit

signage poses questions such as "What do you think will happen?" or "How might this action/type of action affect the real environment?"

Community needs met: Because of the critical state of local water, particularly Sarasota Bay, both exhibits help bring to life the issues which have been discussed in the local media for several years.

Institutional and community support: The *Sarasota Bay* exhibit was funded by the Bay Estuary Program, while the *Midnight Pass* exhibit was funded by the Midnight Pass Society. Two students from the Triad Program (for students suspended from regular schools) were selected to assist in building the Bay Estuary exhibit. The students worked every afternoon for 6 weeks to complete the project. Local vocational school students completed the woodworking portion for the Bay Estuary Exhibit, while two museum volunteers built the Midnight Pass exhibit.

Evaluation/modification strategies: Until the present time, evaluation has been limited to informal questioning of museum attendees; for example, "What was your favorite exhibit?" Students who visit on field trips complete a similar "evaluation" which is sent to the museum by the teachers. A more formal evaluation is being planned and will include a survey of adult museum attendees. Currently, the exhibit committee assesses all exhibits to determine age appropriateness. The demographics collected from people entering the museum indicates the ages and age groups of attendees, as well as groups which are not being reached. This information can be used to target new exhibits to specific audiences.

Unexpected outcomes: One student from the Triad Program made such progress in terms of self-esteem and attitude during the time she worked on the exhibit that the museum hired her as a staff assistant during afternoons for the remainder of the school year.

Program promotion and outreach: The museum recently held a members-only evening and an exhibit extravaganza to introduce new exhibits. The Bay Estuary exhibit was featured. These events resulted in media publicity for the museum and exhibits.

Materials available: Presently, tours are self-guided, with a one-sentence description of each exhibit. A volunteer has written a book with more detail on each exhibit, the scientific principles involved, etc. This will be used predominately for training volunteers and teachers, but will be available for others to review and possibly purchase. The book will also include related experiments which can be conducted at home following the museum visit.

Keys to success: Relating exhibits to local concerns, and involving outside organizations and volunteers.

Future endeavors: Plans call for a unit on water quality at Summer Science Series programs. This will target a specific age group, 9- to 12-year-olds. We plan to move the museum to another location. This will allow us to weed out exhibits which have not been popular based on attendees' responses, or that have been too difficult to maintain.

When we finally reach our permanent home, we plan to include space for traveling exhibits and a section of permanent, water-related exhibits.

Water Works laboratory and exhibit

Program goals: The goals of *Water Works* laboratory and exhibit are to:

1. Engage visitors in direct hands-on experiences (purposeful play and interaction with others)
2. Teach visitors about some of the tests used to determine water quality (what they are, why and how they are conducted)
3. Allow visitors to practice their thinking skills (observing, identifying, quantifying, comparing or contrasting, and communicating)

Program setting: Located in the Nature Museum of the Chicago Academy of Sciences. *Water Works* is a well-equipped, working laboratory, designed to perform all of the standard physical, chemical and biological water-monitoring tests environmental agencies used to determine water quality. The lab even has its own river testing site—a model with real water from the Chicago River which serves as a sampling station for teachers, students, and visitors. We often take people to the river to perform the tests, but having a river in the museum makes it easy for everyone to get involved.

Target audience: The lab is designed as a resource for the entire city of Chicago. It is set up to serve a variety of audiences with interactions appropriate for casual visitors to water quality specialists. We have used the lab for classes of all ages, from preschool through adult.

Community needs met: Our education staff and volunteers regularly provide technical assistance and volunteer training for the ongoing efforts of conservation agencies like Friends of the Chicago River and the Chicago Park District. We invite teachers who want to start water monitoring programs with their students to come in and learn how to do the testing, and how to adopt our successful program strategies for their schools. In addition, the Academy is now offering a weekend series of informal water quality workshops in the *Water Works* lab, and we especially encourage families to attend these sessions together. Participants test the pH, nitrate, phosphate and dissolved oxygen levels of the Chicago River and discover how these parameters are all related. They experiment with stream dynamics to see how stream geology is related to the tests. Most importantly, they learn how to get involved with citizen monitoring and restoration projects in the city and suburbs. Chicago, on the banks of Lake Michigan and the Chicago River, presents a perfect location for becoming involved in water monitoring.

Instructional approach: Our instructional approach depends upon the specific audience using the *Water Works* laboratory at any given time. Overall, our aim is to start with an individual's knowledge or experience in water quality and build upon that. The classes, under the direction of our staff, always end with real life applications of the science covered.

Educational content: The Lab is set up with the necessary equipment to perform the nine standard water quality tests. The content includes the physical, chemical and biological background for the tests, the technical steps in sampling and performing them, laboratory safety issues, the math involved in calculating an overall water quality index, and even the telecommunications skills to send the results to environmental agencies. We also look at the samples of benthic macroinvertebrates to determine water quality, and include a large stream table to investigate how stream dynamics relate to the test parameters.

Institutional and community support: The *Water Work*s laboratory, which opened in February 1994, was constructed with support from our institution. Programs are funded through individual agencies, such as the Department of Energy, Argonne National Laboratory and the Illinois Department of Conservation through its Wildlife Preservation Fund.

Evaluation/modification strategies: Visitor evaluation is conducted constantly, both before and after new elements are developed to determine how well the room works as an exhibit. When used as a classroom, we use a variety of evaluation strategies. Mostly, the ability to perform the tests, get accurate and reliable results, and to discuss the tests' relationships shows that an individual has absorbed the content.

Unexpected outcomes: As a result of our work in water monitoring and the success of the *Water Works* lab, the Department of Energy invited the Academy's staff to help organize a week-long national training workshop at the Oak Ridge National Laboratory in Tennessee for 28 different museums, aquaria, science centers and national parks from all over the country that are interested in developing water monitoring programs.

Program promotion and outreach: We have advertised the *Water Works* laboratory and exhibit through our quarterly newsletter, *Nature's Notes,* through newspaper articles and calendar listings, through conferences which are targeted for teachers or water quality specialists, and by word of mouth. The program has become very popular with conservation agencies, teachers and the general public.

Materials produced: As part of the Chicago Science Explorers program sponsored by the Department of Energy, 26 teachers and 6 students worked with our education staff to produce a wonderful set of classroom units focusing on water quality. These units feature local scientists and resources, and are used extensively in our professional development institutes. Teachers enjoy using the science, social sciences, language arts, math, and art activities in their classrooms. The curriculum helps us spread the word about water monitoring to ever-increasing audiences.

Keys to success: The *Water Works* laboratory truly has something to offer everybody—from the casual visitor who thinks that water quality monitoring is far beyond his grasp to the aquatic biologist who needs to use a water bath to complete a fecal coliform test. The *Water Works* Lab has helped us establish successful relationships with many community agencies, and this has benefited the entire community. There is a real need for this type of informal education and resource.

Future endeavors: The Academy's staff is currently expanding the *Water Works* lab to include several new components, including a teacher's center, a new computer program which visitors can use, and several more interactive elements to help citizens understand the ways they can help our watershed.

Nature centers and environmental education centers

Groundwater in Nature

Groundwater in Nature

Program goals: The overall goal of the Groundwater Education in Michigan (GEM) program is to help people understand the relationship between their actions and the quality of their environment—particularly groundwater.

Program setting: Outdoors on the Nature Center's grounds

Target audience: Grades K–6 and the general public

Instructional approach: Hands-on activity while integrating learning into the broader school curriculum. The *Groundwater in Nature* project uses the resources provided by nature and environmental education centers. Through the project, nature centers throughout Michigan have introduced groundwater education into their programming. Seven diverse nature centers have been chosen as models and now serve as "regional" sites for disseminating information.

Educational content: Our program focuses on groundwater concepts, the hydrologic cycle, water conservation, and the effects of people's actions on the environment. Activities run from 50 minutes–2 hours. We bring these activities into traditional nature center programming by integrating groundwater concepts where they are appropriate. For example, traditional nature center education programs include some type of pond study. We review these types of programs and integrated groundwater activities.

Community needs met: Nature and environmental education centers are typically a resource for local communities. They offer educational programs for schools and the general public. In southwest Michigan, our program has provided information, resources, materials and training on groundwater concepts.

Contact information for each program is provided on pages 6-12.

Institutional and community support: We have been fortunate to have two other GEM projects situated in the Kalamazoo area—one associated with the Cooperative Extension office and the other at Western Michigan University's Institute for Water Sciences. Both of these projects have focused on different audiences, but have provided support in overall program goals. Additionally, we have received a great deal of support from local teachers, educators and the community as a whole.

Evaluation/modification strategies: The Kellogg Foundation, which has provided funding for all of the GEM programs, places enormous emphasis on evaluation. It is very interested in knowing what individual projects are being conducted, if they are working, and why or why not. The philosophy has been to learn what works and what does not when trying to raise awareness about groundwater issues. This may include changing program goals midway, or focusing on different aspects of education. Our evaluation has stressed "lessons learned" in order to provide this information to other organizations and institutions that may be developing water education programs.

Unexpected outcomes: Teachers were more receptive to groundwater programs if the programs were included with a "more interesting" topic; for example, wetlands.

Program promotion and outreach: Promotion was carried out primarily through newspaper articles, newsletters, and public service announcements. Outreach programs focused on teacher-naturalist training and workshops. Programs were also listed in our Kalamazoo Nature Center Outreach Educational Programs.

Materials produced: *Groundwater Explorations: A Groundwater Curricular Guide for Michigan Environmental Education Centers,* 1992.

Keys to success: We feel that our program has been successful for several reasons. We provide groundwater information and resources to the nature centers involved in the program, as well as training for staff. Training the nature center personnel is essential to helping them feel comfortable teaching groundwater concepts. We have also found that providing these educators with materials has been an incentive for them to actually integrate the activities in their programming. It is important to provide relevant information, particularly when dealing with specific issues related to groundwater; for example, urban sprawl near the Detroit area, or contaminated wells near Midland. It is also essential when dealing with groundwater (which some may consider "boring") to keep the enthusiasm level high. This has been accomplished by being creative when developing activities and having fun!

Future endeavors: Without funding, the future looks somewhat status quo. A local girl scout troop is helping with the nature center programs.

Project ECO—Environmental Curriculum Outdoors

Program goals:

1. To create awareness and knowledge of biodiversity, the importance of ecological principles, and the impact humans have on wetland ecosystems
2. To encourage reflection about attitudes and values related to wetlands
3. To develop citizen action skills by identifying, investigating and making decisions about practices that affect wetlands negatively

Program setting: This experience takes place in two settings: in the classroom and in the field. In the classroom, students are introduced to wetlands through activities that *Project ECO* furnishes to teachers. These activities take place at the schools.

The field component takes place at the Sheboygan Marsh. This 18-sq.-mile wetland provides study of a variety of successional stages including cattail marsh, scrub brush, and wooded swamp. The Sheboygan Marsh is located in Sheboygan County, Wisconsin, approximately 1 hour north of Milwaukee. Back in the classroom, students continue their wetland study and action projects as provided in the activities included by *Project ECO*.

program featured in training video

Target audience: Primarily middle school-aged youth, grades 5–7.

Community needs met: All schools presently attending *Project ECO* used to participate in overnight camping sessions. Although these were wonderful social experiences, they were costly and often lacked focus. As such programs became more expensive, the schools dropped them in favor of *Project ECO*. As a result, a more unified message about the environment is brought to the students at less expense to the community.

Instructional approach: *Project ECO* uses hands-on field experience supported by classroom activities conducted both before and after the field trip. The overall program provides a comprehensive look at the wetland preservation issue and is multidisciplinary in nature. Characterizations, role playing, simulations, and hands-on investigations are the primary methods used. The 2-day field component is supported by a professional staff, up-to-date equipment, and a semi-trailer mobile laboratory. The learning environment is enhanced by this lab. Inside the well-lit lab are cabinets and countertops containing microscopes, water test kits, and displays.

Institutional and community support: *Project ECO* is a program of the Outdoor Skills Center, a local non-profit group. Our program is supported by businesses, conservation clubs, and schools. Our $40,000 mobile, semi-trailer laboratory was funded completely by donations from local businesses, foundations, and service clubs. The Phillips Environmental Partnership Grant (PEP) also supported the lab. Continued support of this program comes from the schools.

Educational content: The following educational concepts are covered in the field experience and supporting classroom activities: wetland identification, wetland types, locating wetlands, wetland functions, biodiversity, food webs, water chemistry, animal adaptations, succession, wetland management, wetland recreation, values of wetlands, analysis of wetland issues, wetland history, human impacts, wetland laws, and classroom actions to protect wetlands.

Evaluation/modification strategies: All students and teachers involved in the program complete an evaluation of the program approximately 1 month after the field experience. Suggestions from teachers and students are assimilated into future program options. Overall comments are in favor of this "hands-on, lifelong learning situation."

Unexpected outcomes: After completing the follow-up activities, which included a mock town meeting, one group of 180 students each wrote letters to their county supervisors urging them to fund our program. One student was so enthusiastic that he called all 36 supervisors himself.

Program promotion and outreach efforts: *Project ECO* has spread primarily by word-of-mouth. At the present time we contact new schools in the early winter by mail and then call to arrange an appointment for our team to discuss our experiences with their teachers.

Materials produced: The Outdoor Skills Center developed a comprehensive, multidisciplinary wetland unit for Wisconsin called Project W.U.L.P.(Wetland Understanding Leading to Protection). This unit is used as the pre-and post-activity for our wetland experience. Copies are available at the address listed in the Directory of Programs.

Keys to success: Our major key lies in providing outdoor experiences that focus on a central theme. These experiences are conducted by professional staff and supported by pre-and post-experience classroom activities. We are willing to customize the program to fit the school's needs.

Future endeavors: As we approach maximum capacity on our wetland program, we are planning to develop some winter season wetland activities as well. Our vision for long term expansion is to clone our current program, and organize field experiences supported by mobile labs and staff at other locations in Wisconsin.

Organizations

America's Clean Water Foundation

Program goals:

1. Citizen involvement and awareness activities that bring about real, local improvements and a lasting commitment to personal stewardship of clean water resources
2. Youth education activities, both in and after school, with special attention given to minorities, the learning disabled, and the handicapped
3. Innovation and technology exchange at both national and international levels. Government leaders and water professionals should be able to exchange information about advances in applied technology and environmental management.
4. A 20-year national status and trends report, presented to Congress and to the public
5. An assistance program for developing countries to help them create and implement environmental protection programs

Program setting: Educational items can be used in formal and informal (nontraditional) educational settings. The technology exchange is conducted in national and regional conferences with professionals and active citizens. The Assistance Program is conducted in the participating developing country.

Target audience: For educational items, the targets are teachers, students, professionals, recreationalists, citizen volunteer monitors and the interested general public, in addition to minority groups.

Instructional approach: Varied. We develop hands-on individual activities and questions to provoke thought and action. We produce booklets that teachers use in the classroom. We've written an interactive play that high school students can perform for elementary students. There are videos young people may watch in the classroom or at home.

Educational content: From thought-provoking questions, graphics, and multimedia sources such as video, computer, music, and informational brochures, students learn about water-related issues like water quality, water conservation, wastewater treatment, nonpoint source pollution, groundwater, quality standards, public involvement, stormwater events, and opportunties provided by other organizations.

Community needs met: Public education about water quality and potential pollution sources; positive changes in individual behavior and activities; encouragement for community planning and monitoring equipment ideas; broadening network of potential contacts.

Institutional and community support: State water quality manager contacts.

Evaluation/modification strategies: Pilot programs, peer review, and public comment.

Unexpected outcomes: Tremendous response for information from public; word of mouth advertising.

Program promotion and outreach efforts: Through state water quality program managers, news articles, newsletters, National Geographic Society, and 1992 National Celebration.

Materials produced: *Watershed*, a booklet; *Water: The Source of Life* booklet, Student Information Kit, Water Awareness Test, Personal Proclamation, Gee Whiz Water Quiz, *Public Involvement Guidance Manual*, *America's Clean Water Act* brochure, our annual report; and the *Murky Water Caper Musical Mystery Performance.*

Keys to success: Quality program, quality reviewers, key players advertising the program, and good public relations.

Future endeavors: Volunteer monitoring guidance manual, international coalitions.

Contact information for each program is provided on pages 6-12.

American Water Works Association—Youth Education

Program goals: Provide educational materials to teach young people, K–12, about water treatment, distribution, conservation, cycle and careers.

Program setting: International nonprofit, scientific and educational organization

Target audience: Grades K–12 teachers

Instructional approach: AWWA is an international, nonprofit organization of more than 55,000 members associated with the public drinking water industry, including utilities, manufacturers, consultants, educators and students. AWWA provides and distributes youth water education materials to grades K–12 school teachers. Special programs and benefits are also offered for post-secondary student members.

Educational content: Materials include activity books, teacher guides, comic-style books, computer software, videos, bookcovers and novelty items.

Community needs met: Public education about issues related to public drinking water treatment and supply. Promotion of partnerships between communities, businesses, and schools for quality science education.

Institutional and community support: Programs are supported by the AWWA annual budget.

Evaluation/modification strategies: All program activities are overseen by the AWWA student programs manager with assistance from an advisory committee. The committee is composed of AWWA members who are also water education managers from water utilities and management districts throughout the U.S. and Canada. The utilities and 43 AWWA Sections who use the programs and materials also provide feedback.

Unexpected outcomes: In 1995, the Blue Thumb campaign began in Cracow, Poland, headed by Water for People, a local organization. Funded by the U.S. Environmental Protection Agency, Water for People launched a multifaceted project to help citizens protect their water resources from pollution.

Program promotion and outreach efforts:

1. Present excellence awards to students, teachers, and individuals
2. Sponsor the Blue Thumb Club for school children who send in their conservation ideas promoting National Drinking Water Week
3. Present monetary awards at the International Science and Engineering Fair
4. Recognize teachers and individuals who develop exemplary water programs for minority students at the elementary, middle or secondary levels
5. Offer four scholarships for Master's and doctoral students and an Academic Achievement Award for outstanding dissertations and theses related to drinking water.

Materials produced: *Project Water Works,* computer software program; *Water Magic* (1991); *Splash!* (1992); and many, many more. Call for a catalog.

Keys to success: AWWA's networking power and great volunteers.

Future endeavors: Development of career education materials including brochures, a video and a sourcebook of training programs for water supply careers.

Save Our Streams

Institutional affiliation: Izaak Walton League of America

Program goals: Teach people to act as stewards of their watersheds, and motivate them to change their behavior by learning how to improve the quality and health of the environment.

Program setting: There are *Save Our Streams* chapters at community and state levels throughout the U.S.

Target audience: Youth and adults of all ages.

Community needs met: In addition to stream monitoring, volunteers conduct stream cleanups, testify at permit hearings, develop land use plans for watersheds, plant trees, stabilize streambanks, hatch fish fry, stock streams and conduct workshops for citizens and government officials.

Instructional approach: Workshops, conferences and on-site training offered to SOS youth and youth leaders. Volunteer water quality monitoring. *Save Our Streams* distributes training materials to volunteers, schools, and government agencies interested in water quality monitoring. There are four major program areas: Volunteer Water Monitoring; Environmental Education; *SOS* Urban Program; and Stream Doctor, a stream restoration program.

Educational content: Using the *SOS* Stream Quality Survey, volunteers collect both biological and chemical data quarterly. The SOS staff trains volunteers to analyze and report the results to state environmental agencies. Volunteers are also responsible for noting present or potential threats to stream health such as erosion, discharge pipes, etc. The hands-on *Save Our Stream* curriculum is designed for grades 1–12. The *SOS* program also works with schools by taking kids camping.

Institutional and community support: People who adopt a stream and register their project with the League become part of a national network of stream protection activists. *Save Our Streams* has developed partnerships among environmental, governmental agencies and state and local governments. Such agencies include USDA–Natural Resources Conservation Service (formerly Soil Conservation Service), National Parks Service, U.S. Environmental Protection Agency, and the U.S. Geological Survey.

Evaluation/modification strategies: All projects are extensively field tested and reviewed before being distributed to the public. *SOS* uses a quality assurance/quality control (QA/QC) plan approved by the Environmental Protection Agency. The QA/QC plan allows for periodic retraining and testing of volunteers.

Unexpected outcomes: Not reported.

Program promotion and outreach efforts: Not reported.

Materials produced: *Save Our Streams* training kit, a Monitor's Guide to Aquatic Macroinvertebrates, hands-on *Save Our Streams* curriculum for grades 1–12.

Keys to success: Easy-to-understand training materials; an overall philosophy that volunteers can and do make a difference; a national database called Monitors that lists volunteer monitoring projects throughout the U.S.

Future endeavors: *Stream Doctor* video; Wetland Sustainability Monitoring Initiative; Urban Health Project; and a National Clean Water Snapshot Day.

Whitney Water Center

Program goals: The Regional Water Authority education programs are based on the following goals:

1. Increasing public understanding of the ways human activity affects drinking water quality
2. Increasing public understanding of the scientific principles we use to manage and operate at the regional water supply system
3. Broadening understanding of the scientific principles reflected in the conservation of our region's water and land resources; and
4. Expanding our constituency for safe drinking water by educating consumers, watershed residents and key audiences about the relationships between human activity and environmental quality.

Program setting: Whitney Water Center, classroom and community.

Target audience: Local elementary and secondary students.

Instructional approach: Our water science education program teaches watershed residents about the interrelationship between human activity on land and water quality in reservoirs and aquifers. We emphasize clear examples showing how participants can help protect water quality by protecting the environment. Within our region, we seek to serve some 162 elementary and middle schools in 16 municipalities. Combined, these schools hold between 40,000 and 45,000 students. At the Whitney Water Center, we have served a minimum of 5,000 students annually during class visits. We offer 19 different programs, designed to provide on-site experiences to both teachers and students. These cover the study of ecology, environmental science and water resources utilizing lake, stream, wetland and forest ecosystems. Students can also study environmental science using our *Exploring the Water World* workbook in the classroom, experience ecology firsthand during nature walks on our interpretive nature trails, or learn what it takes to get water to the faucet by touring one of our treatment plants.

Educational content: Educational programs at the Authority focus on water resources, while providing experiences in ecology, biology, chemistry and earth science. At the Center, students work with state-of-the-art laboratory equipment—water quality test kits, microscopes, interactive sand tank groundwater models and a video-microscopy system in hour-long activity-oriented programs. A "Pre-Visit Packet" is sent to teachers prior to their visit so that they may prepare students for the program and reinforce concepts back in the classroom.

Community needs met: Based on an Education Development Study in 1986, area school systems supported the idea of an environmental education center. The Regional Water Authority land and facilities were seen as valuable new resources for area science programs at all grade levels and could be used to strengthen existing science curricula. The study found "wide support for the development of water-related studies and for teacher training in the immediate New Haven area. Area educators believe science instruction should be increased and deal with real issues. Educators were convinced that the introduction of new ideas in science instruction will refresh and strengthen science curricula."

Institutional and community support: With the support of local school superintendents, principals and teachers, the Whitney Center opened in October, 1990 and offered programs to more than 3,000 visitors in its first year. *Exploring the Water World* was published in late 1991, and has been distributed to more than 14,000 local students. More than 250 teachers have participated in training workshops. The Regional Water Authority supports the operation and maintenance of the Center, while new programs and additional staff are supported by grant funds. To date, the Center has received nearly $100,000 in grant funds which have supported the start-up of an after-school program, summer discovery (an outreach program), science camp and teacher training workshops. Additionally, a series of public meetings were held to gather input from our consumers to provide direction for the development of an education program and associated facilities. A Teacher Advisory Committee was established whose members offered to pilot new programs and communicate the availability of new efforts to their colleagues.

Evaluation/modification strategies: At the completion of all programs, the instructor is asked to complete an evaluation questionnaire, providing us with input on the presentation of the program, applicability to the classroom and suggestions for future endeavors.

Unexpected outcomes: Not reported.

Program promotion and outreach: Promotional brochures are mailed to school superintendents, principals and teachers on our mailing list. Through familiarity with one of our programs and by word-of-mouth, we have achieved a level of success unanticipated with respect to the newness of the program. A full-time staff person, assisted by college interns or part-time staff supported by grants, presents programs and supervises the Center. The Manager of Education is responsible for program development, staff supervision and management of the entire education program, and reports to the Director of Public Affairs.

Materials produced: *Exploring the Water World,* a workbook for students

Keys to success: Not reported.

Future endeavors: Not reported.

Residential camps

Manatees and Mermaids—Manatee Dive Trips to Crystal River

Program goals:

1. To increase participants' awareness and knowledge of manatees and manatee-related issues ("to replace an empty mind with an open one")
2. To increase participants' involvement in protecting manatees
3. To increase participants' skills and enjoyment of boating, snorkeling and underwater photography.

Program setting: The Crystal River area, in Citrus County, Florida.

Target audience: 4-H groups, teachers and nonformal educators, low-income youth, deaf youth, math and science students, and others. This year our dive trip was open to the general public.

Instructional approach: Mandatory planning meeting for participants covers the life history of manatees and their status in Florida, concerns about manatee population, how to avoid harassing manatees, and logistics of the trip. Two weeks before the dive trip, novice divers complete a skin diving session held at a local YMCA or university pool.

Day 1 of dive trip: Attend the Manatee Presentation at Homosassa Springs State Wildlife Park, something of a half-way house for injured manatees. Group has the opportunity to see about ten captive manatees in a natural spring. Tour the rest of the wildlife park to see alligators, Florida panthers, black bears and egrets.

Day 2: Meet at the dive shop at sunrise. Go out on a dive boat to one of the springs on Crystal River, which may have as many as 300 manatees during the winter. In addition to swimming with and photographing the manatees, we collect any debris we find in the river. Lunch is held on the boat. In the afternoon, we do a drift dive from the headsprings of Rainbow River for several miles. Rainbow River, ten miles north of Crystal River, has 1000-ft. visibility, grassbeds, turtles, cormorants, anhingas, bass and bream, Indian pottery shards and artifacts. Dozens of springs feed into it along the way. Present the Manatee Spirit Award, voted on by all participants, to the person who was the most helpful, collected the most debris, and showed the most concern for the manatees.

Day 3: Tour the Native American archeological site and mounds just north of Crystal River; then head home.

Educational content: In addition to learning about manatees and their plight, participants learn about other marine mammals of the Gulf coast, how to identify them, and how to assist a stranded marine mammal. They learn how they can adopt a manatee individually or as a class, how they can purchase a manatee car tag, and how to communicate with their elected representatives about manatee legislation.

Community needs met: There are only about 1,800 manatees left in the state of Florida. This is probably the only opportunity that participants will have to swim with and photograph these gentle giants. It is likely that skin diving with manatees will be discontinued altogether in another ten years, and it is very possible that our grandchildren will hear of manatees only in stories. This is the closest many of us will come to an animal of this size in the wild.

Institutional and community support: Instruction, videos, slides, and resource materials provided by Florida Sea Grant, the Save the Manatee Club, and the Center for Marine Conservation. Free access to pools provided by the YMCA and the University of West Florida. Group rates provided by Homosassa Springs State Wildlife Park. Reduced rates on dive gear and wet suit rental, captain and dive boat, dive flags, etc., provided by Crystal Lodge Dive Shop. Reduced rates on rooms provided by Hayes Motel. Free awards and door prizes provided by the Manatee Toy Company and K-Mart. Free beverages and desserts and reduced-rate dinners provided by Pec's Seafood Restaurant. Scholarships provided to participants by Escambia County 4-H, Catholic Social Services, the John L. Scott Marine Education Center, and the University of West Florida.

Evaluation/modification strategies: Each participant completes an evaluation form at our awards dinner. Participants also, often without encouragement, write poetry, songs and letters to their

Contact information for each program is provided on pages 6-12.

congressional representatives, draw pictures, submit photos and videos, make clay figurines, encourage their parents to buy manatee tags, encourage their schools to adopt a manatee, and lead their own group manatee dive trips the following year. All of this feedback helps us to fine-tune our dive trip. One instructor has dived with the manatees 36 times since 1978, and has led 20 groups on organized manatee dive trips. The youngest participant was 3 and the oldest was 78. Through the years, we have adjusted the dive trip to fit different groups' interests or needs, but this format seems to work best.

Program promotion and outreach: We promote this program each fall in our marine newsletter *Turning the Tide* and in our 4-H newsletter. High school marine biology teachers are also mailed registration information each year that they make available to their students. We work with the university and with social services to arrange scholarships for low income youth. Often special groups contact us to coordinate a dive trip for them in the future.

Materials produced: We have a packet of general information about manatees and other marine mammals that each participant receives. We have produced videos that are composites of numerous manatee dives and drift dives with some excellent underwater footage of the manatees. We have produced a slide program of 160 slides entitled, "Manatees and Mermaids," and often give programs about the manatees and our manatee dive trips.

Unexpected outcomes: We have dived in downpours and in temperatures as low as 34 degrees. Participants like to see at least a few manatees. These are wild animals, however;they do not wait around for us. Liability is always a concern with a high-risk activity like diving. We fortunately have had very few accidents, although one diver fell off the boat and one participant died of heart failure while on board.

Keys to success: Lead manatee dive trips only in January and February, when participants are guaranteed to see manatees in the rivers. Keep group size between 18 and 48. Develop a great working relationship with local dive shops, gift shops, motels, restaurants, state parks and volunteers. Work closely with the manager and staff of the U.S. Fish and Wildlife Service. Constantly remind participants of proper diving etiquette. And finally, keep in mind that we are there to learn about the manatees and are visitors in their home.

Future endeavors: Continue to coordinate one open manatee dive trip each winter. Offer special group manatee dives as the need arises. Offer presentations on manatees and other marine mammals to school groups, community groups and the general public. Continue to attend international manatee and dugong conferences, and offer help and information to manatee conservationists in other countries.

NatureLink—Family Fishing Weekend

Program goals: To teach the importance of protecting natural resources by encouraging hands-on education and personal involvement, and by fostering a commitment to environmental ethics and good stewardship.

Program setting: Outdoors; camps and nature centers

Target audience: Families (in whatever way family is defined)—especially urban and suburban populations that may have limited awareness and exposure to the natural environment. *NatureLink* organizers work in cooperation with other service organizations such as Big Brothers/Big Sisters and NWF state affiliates to recruit families.

Community needs met: Identifies and develops community leaders, recruits family mentor-volunteers willing to share expertise and outdoor experiences; supports community needs by placing the focus on stewardship and the stewardship pledge each participant is asked to make. *NatureLink* is adaptable to suit specific needs, recreational opportunities and resource issues.

Instructional approach: Outdoor skills and awareness of the interrelatedness of ecosystems using nonformal, hands-on learning. Support from mentors helps to reinforce skills and awareness.

Educational content: Many programs focus primarily on fishing. Hands-on lessons are used to teach aquatic ecology lessons, outdoor skills classes, and plant and animal identification, to name a few. Mentors are used to help support and guide the participants through the weekend's education programs. Other themes besides fishing are also used. *NatureLink* is flexible enough for host organizations to tailor the program to their own needs.

Institutional and community support: The primary support comes from a grant from American Greetings. *NatureLink* encourages recruitment of partners from local community groups and among national organizations and companies such as local 4-H groups, Georgia Wildlife Federation, and Wyman Center.

Evaluation/modification strategies: In 1993, *NatureLink* was piloted in three states (Georgia, Colorado and Pennsylvania) to determine potential for success. Cornell University's Human Dimensions Research Unit plans to conduct a two-year study to evaluate *NatureLink's* effectiveness in fostering a conservation ethic.

Unexpected outcomes: Program is in early implementation stage, too soon to assess.

Program promotion and outreach: Host/facilitator training workshops.

Materials produced: Promotional video; *NatureLink Facilitator's Guide,* Program Guide for Volunteers & Mentors; and a *NatureLink* newsletter.

Keys to success: Potential to reach ethnically diverse communities with message of environmental stewardship; intergenerational learning through family involvement; extended impact reaching beyond weekend program through mentor/community follow-up. Mentors will participate in outdoor activities with their families at least 3 times in the year after the *NatureLink* weekend. NWF provides training, support and scholarship money for organizations that elect to adopt the *NatureLink* program

Future endeavors: Not reported.

The Ohio 4-H Sea Camp—An Experiential Outdoor Learning Laboratory

Program goals: As a result of participating in *Ohio 4-H Sea Camp,* campers will:

1. Develop an awareness of the importance of Lake Erie as a commercial, environmental and recreational resource
2. Become aware of the impact of pollution and the introduction of exotic living species such as zebra mussels into the lake environment
3. Become acquainted with, and develop basic skills for lifetime recreational interests and skills related to Lake Erie

Program setting: The Erie County 4-H Camp, located on the north side of Kelleys Island in Lake Erie, 3½ miles north of Sandusky, offers an ideal setting with its sandy beaches, shallow shoreline, unusual geological formations, and a state-owned abandoned limestone quarry.

Target audience: *Sea Camp* is available to all youth, 13–18 years of age. Nearly one-half of the participants attend as recipients of annual standing scholarships from individual Ohio counties. Because the number of teens who are interested in attending exceeds the 80 spaces available annually, an application process is used to select those who will attend *Ohio 4-H Sea Camp* each year. All candidates are asked to write an essay on "Why I want to attend the Ohio Sea Camp" which the staff uses to make its selections. There is no application fee.

Instructional approach: Since 1985, almost 1,000 teens have attended *Ohio 4-H Sea Camp* and experienced the adventure of exploring and enjoying one of Ohio's greatest natural resources—Lake Erie. Through a total immersion program, campers learn about the lake environment and activities that occur on and

around it. The program offers variety in transportation, boating, fishing sites, sports, and food preparation.

There are special events, too. Charter boats carry campers and adult staff to the western end of Lake Erie and into Canadian waters for an all-day charter fishing trip. An hour-long ferryboat ride transports campers to Put-In-Bay where they learn about the International Peace Monument and the Battle of Lake Erie. By bicycle, they tour the island and visit an Ohio Department of Natural Resources fish hatchery, the Lonz Winery, and Crystal Cave.

The cabin counseling staff is composed of adults who are former 4-H sea campers and/or former county 4-H resident camp counselors. The staff includes professionals from the university who serve in leadership and teaching roles. Counselors must be skilled or certified in specific subject areas prior to camp. The program does not provide formal training to the staff.

Educational content: A tightly packed and carefully planned five-day schedule includes sessions where campers explore shoreline ecology, astronomy and navigation, and Lake Erie geology. Campers participate in brief introductory experiences with SCUBA and snorkeling; sailing, canoeing and power boating; casting and fishing, cleaning fish and lure making; recreational and social skill-building activities. Campers must also take responsibility for materials and equipment.

Community needs met: Lake Erie provides a perfect backdrop for youth to learn about and develop simple skills for water sports and water-related recreational activities.

Campers get first-hand experience with a natural resource that was once polluted and unsafe, but that is now important commercially, environmentally and recreationally. They see how time and effort can change outcomes. Young people need to learn that everything is interconnected and how an economic decision can produce environmental effects (for example, the introduction of exotic living species such as zebra mussels into the lake environment.)

Institutional and community support: One of the great strengths of the camp is the teaching staff who are drawn from The Ohio State University, the school systems in the Lake Erie shore counties, COSI-Ohio's Center of Science and Industry, Ohio Department of Natural Resources, Water Safety Division, area water-related businesses and services, as well as independent professionals skilled and licensed in specific water-related areas.

Evaluation/modification strategies: When asked to identify the two most important things they gained by attending O*hio 4–H Sea Camp,* campers consistently cited their new awareness of the importance of environmental concerns and of Lake Erie as a water resource. When asked to identify their two favorite activities, the responses aren't as clear cut. Every activity is someone's favorite.

Unexpected outcomes: Part of the enjoyment of *Ohio 4-H Sea Camp* has been the discovery of agents' hidden talents, interests and connections. From a basic fishing camp in 1984, the camp has built on these special opportunities and widened its offerings to the campers.

Another unexpected outcome has been several campers' broadened attitudes about their ranges of personal "possibilities." Even if their lives go in different directions, they still carry with them the experience of catching fish with the lures they made, eating the fish they caught themselves, rigging a sailboat, and looking for fossils.

Program promotion and outreach: The *Ohio 4-H Sea Camp* is heavily promoted informally by former campers, counselors, and staff. Formally, notices and news releases are sent to each county office for use in newsletters and local newspapers. A promotional display has been developed to help potential campers learn more about the *Ohio 4-H Sea Camp* experience. Sea Camp has become one of the top 4-H activities in the state. First-time applicants are selected first; remaining spaces are offered to returning campers. Returning campers often serve as group helpers in all camp activities such as lure making, fish cleaning and fossil hunting.

Materials produced: *Ohio Sea Camp* utilizes existing educational materials from the Ohio Department of Natural Resources, Sea Grant, 4-H, and commercial sources. A counselor's handbook has been developed.

Keys to success: One of the secrets of the camp's success has been the teaching staff.

Future endeavors: The program changes each year as the dedicated people who plan

and conduct the *Ohio 4-H Sea Camp* work to respond to the comments and suggestions of the campers and resource persons. They are always looking for more effective and exciting ways to deliver their programs.

Texas State 4-H Water Camp

Program goals: The *Texas State 4-H Water Camp* teaches high school youth about the importance of water stewardship. The camp's goal is to instill in young people—water resource management's future leaders—a respect for water resources.

Program setting: The *Texas 4-H Water Camp* is held at the 50-acre George and Opal Bentley 4-H Center in Monahans, Texas. Campers spend one-third of their time at the Bentley Campus; the remaining camp time is spent on excursions and field trips in the area.

Target audience: The camp is open to all students who will be high school sophomores, juniors, or seniors. Admission is on a first come, first serve basis.

Community needs met: Not reported.

Educational content: Participants conduct water-related experiments as group projects in areas such as groundwater protection, urban water use, range water use, the use of saline groundwater and water microbiology.

Instructional approach: To ensure that campers learn as much as possible from field trips, the first full day of camp is spent teaching them about water resource basics. The campers are trained in chemical water analysis and taught vital water statistics. On the first day, the campers are assigned college-level group projects. During the course of the camp each group collects data and gives a final oral report. Field trips include visits to sites where water plays a key role, as in the production of electrical energy and in the recovery of petroleum products. The campers visit farms where state-of-the-art water conservation technology, surge as surge flow and drip irrigation is being used. The West Texas Aquaculture Project in Imperial, Texas, is one of the sites visited. Research there is being conducted on alternative uses of saline water resources available along the Pecos River.

Institutional and community support: The *Texas 4-H Water Camp* is staffed by professionals from several state, federal and private agencies, under the leadership of the Texas Agricultural Extension Service. These professionals come from: Texas Agricultural Extension Service; Soil Conservation Service; Texas Water Development Board; Texas Water Commission; State Attorney General's Office; State Water and Soil Conservation District, Permian Basin Underground Water District; DuPont; Mobil Oil; Chevron Oil; Texaco; and TU Electric.

Evaluation/modification strategies: Pre- and post-test results, as well as project group and tour evaluations. During the course of the camp, each project group collects data and gives a final oral report.

Unexpected outcomes: Tremendous support from local, state and national sponsors. Sponsors support 90% of all who attend the camp.

Program support and outreach efforts: The camp is publicized through every county Extension agent in the state, as well as all Texas Soil Conservation Offices and all water districts.

Materials produced: Each project leader has produced a curriculum guide.

Keys to success: Cooperation of many agencies and organizations to make this camp happen.

Future endeavors: The *Texas 4-H Water Camp* is committed to preserving and protecting Texas water resources for future generations. Educating young people today can help achieve that goal. An endowment is being established that will provide the camp with a permanent water testing laboratory, increased dormitory space and an on-site water conservation testing unit.

In the future, there will be four sessions of Water Camp for youth each summer, and one for teachers and other educators. We will need to increase the volunteer base to supply these needs.

School enrichment

Active Watershed Education, "It's AWEsome!" (formerly The Pawcatuck Watershed Education Program)

Program goals:

1. To provide students with a relevant and empowering educational experience about an aspect of the environment
2. To tie classroom concepts to real life experiences
3. To teach students how to take action on community issues.

Program setting: School enrichment (includes both classroom instruction and field experience) and Community Service Learning (program is dynamic and evolving). Southern Rhode Island Conservation District (SRICD) encourages teachers to work with community leaders and watershed associations to implement community projects.

Target audience: Youth, grades 5 through 8

Instructional approach: Based on the environmental education model developed by Hungerford, et al (1980), the program combines classroom sessions and field experience to further instill the water concepts. The curriculum design encourages students to use higher level, critical thinking skills in the final evaluation and debate. The curriculum provides a variety of models to demonstrate important concepts. Such concepts include: the definition of a watershed; the relationship of the participants to the watershed; the interconnection of groundwater and surface water, wetlands; and nonpoint source pollution and its control.

Educational content: The *AWEsome* program is comprehensive, with each unit building upon the previous one. Students first learn basic ecological concepts about the watershed, and then begin to understand issues and how conflicting values give rise to problematic issues. The units culminate in a Citizen Action project where students learn investigation and evaluation skills in dealing with community water issues. Unit topics center on watersheds, water and soil resources, wetland ecology, point and nonpoint pollution, and a simulated public hearing and citizen action. Students select a current issue in their community for the discussion and debate during the public hearing.

Community needs met: Initially developed because of the need for a locally-based, comprehensive environmental education (EE) program, the *AWEsome* program improves upon existing programs by providing a vehicle for teachers to bring education about local resources to students in the community. During the initial development of the curriculum (1991), SRICD invited several representatives from local organizations to discuss current EE programs available to teachers and students throughout the state. Participants agreed that existing EE programs in Rhode Island lacked a holistic approach and did not provide for adequate follow-up with students to determine the level of comprehension or retention of the material. The goal was to tie concepts the students learned in the classroom to real-life experiences. Through consultation with other EE program providers, the *AWEsome* program was developed to address these concerns with a curriculum guide and intensive teacher training workshops. Programs first concentrated on the Pawcatuck watersheds in Rhode Island, but are expanding to other watersheds in the state.

In 1990, the USDA funded the Pawcatuck Watershed Project in southern Rhode Island to address the problem of potential sources of nonpoint pollution. SRICD became involved in building knowledge and interest in conserving watershed resources. It initiated the watershed education program in an attempt to teach youth about the resources in the area, and leave them with the skills needed to address concerns in their communities.

Institutional and community support: The Southern Rhode Island Conservation District relies on its partners to provide training to new employees and assistance with teacher workshops, identify community needs, organize student activities, promote the program, raise funds, etc. Partners

Contact information for each program is provided on pages 6-12.

include the Natural Resources Conservation Service (formerly the Soil Conservation Service), other conservation districts, the Wood-Pawcatuck Watershed Association, RI Department of Environmental Management, Town Planners, University of Rhode Island, local corporations and virtually all other EE providers in the state (non-profits).

Evaluation/modification strategies: Pre- and post-tests results, workshop evaluations, University of Wisconsin–Extension Environmental Resources Center evaluation, direct feedback from teachers using the program (many teachers who enroll in workshops elect to earn graduate credit through URI and are required to provide feedback as part of a final class paper).

Unexpected outcomes: Tremendous support from local communities for existing programs and requests from other communities and teachers to bring the program to their schools.

Program promotion and outreach: Teacher training workshops, EE conferences, media, Town Planners, partners support and fundraising campaigns.

Materials produced: ***A**ctive **W**atershed **E**ducation Program Curriculum Guide*, 1993, revised August 1994. Cost: $40 plus $5 for shipping and handling.

Keys to success: While this project is currently limited to the Pawcatuck Watershed, it has potential for wide application to other watersheds. An *Appendix* accompanies the curriculum guide with techniques and suggestions for adapting the program to different locations. In Rhode Island, SRICD is working to revise the curriculum with state and town partners to bring the program to other watersheds.

Future endeavors: The Southern Rhode Island Conservation District envisions a long-range program in which this curriculum provides the basis for environmental programs throughout the junior high or middle school science curriculum. SRICD is working with schools, URI, and other EE providers to develop a river/watershed monitoring network for all students in selected watersheds. Students from different areas in the watershed could compare and discuss their monitoring results. SRICD is also working with other EE programs in the state. In addition, SRICD is just beginning to work with the RIDEM and RI Department of Education to draft state guidelines for EE programs, which will include a comprehensive training program for teachers (this was agreed upon, but will happen only if funding is secured).

Adopt-A-Lake

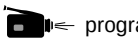
Program goals: *Adopt-A-Lake* is a youth program designed to provide both young people and adults with a better understanding of the aquatic ecosystem through hands-on activities. Specifically, *Adopt-A-Lake* has four primary goals:

1. To increase young people's awareness of the value of Wisconsin's inland lakes
2. To empower youth to participate in hands-on lake protection activities
3. To develop an understanding of lake management and the social dynamics of lake issues in the next generation of lake leaders and citizen volunteers
4. To build links between youth and adults on lake issues, and to stimulate adults to take action on lake management issues.

Through *Adopt-A-Lake* projects, ranging from water quality testing to litter clean-ups to lake use surveys and other activities, youth gain the skills and knowledge necessary to become leaders and informed environmental citizens. The *Adopt-A-Lake* program will provide direction and resources to teachers and youth leaders interested in adopting a lake.

Program setting: *Adopt-A-Lake* program settings can range from classrooms to lake sites, depending on the group's objectives and the resources available.

Target audience: *Adopt-A-Lake* targets youth (K–12) in both school-affiliated youth groups (specific classrooms, grades, and/or environmental clubs, among others), and other youth groups, for example, 4-H clubs or Boy/Girl Scouts.

 program featured in training video

Instructional approach: The *Adopt-A-Lake* program is interdisciplinary in scope with strong leadership development and action components designed to empower youth to be active leaders in lake protection. Student-initiated projects and participation in the planning process, including training workshops, is encouraged. Both formal and non-formal settings are appropriate, with emphasis on hands-on activities.

Educational content: This program attempts to provide both youth and adults with a better understanding of lakes and the social dynamics involved in protecting them. Participants will not only learn more about lake ecosystems, but will also examine other facets of lake issues—social, economic, historical, cultural, ecological and political. After young people have developed a better understanding of the lake in their community, the program moves on to the importance of taking action; for example, making presentations, writing articles, conducting litter clean-up activities, planning and implementing educational workshops, or publishing materials about lake issues. Such activities are designed to improve students' decision-making and critical thinking skills, and give them the knowledge and confidence to become leaders in lake protection.

Community needs met: *Adopt-A-Lake* projects focus on lakes within the youth group's community. Consequently, projects can potentially increase community members' awareness of the importance of lakes and activities which ensure the protection of these local natural resources. Likewise, this program links youth with community "lake leaders," using the "Master Teacher" concept. "Master Teachers" are individuals involved in lake protection through local lake associations, lake monitoring activities, etc. These individuals and the lake associations can provide resources for *Adopt-A-Lake* projects while also giving youth insight into possible avenues of affecting change. These community members are also excellent role models for youth leaders. Lake associations are often involved in community educational outreach; their work with *Adopt-A-Lake* projects can help with such outreach.

Institutional and community support: There is tremendous support, both institutional and community-based, for *Adopt-A-Lake,* primarily due to its unique affiliation with various institutions and the fact that there are roughly 15,000 lakes in Wisconsin—a crucial resource to be protected for future generations. *Adopt-A-Lake* is part of the Lakes Management Partnership, a multi-faceted partnership among University of Wisconsin-Extension, the Wisconsin Department of Natural Resources (DNR) and concerned citizens, primarily represented by the Wisconsin Association of Lakes and its local affiliates.

Evaluation/modification strategies: We receive input from various sources, both institutional and community-based, about the needs and interests of youth and youth leaders, and we try to adjust the program accordingly. Likewise, evaluation processes are a strong part of *Adopt-A-Lake* staff activities, particularly with regard to workshop content and structure. Teachers, youth leaders, and youth are encouraged to include evaluation processes throughout their projects to ensure that their projects are effective in meeting the group's objectives.

Unexpected outcomes: We have had a wonderful response to the *Adopt-A-Lake* program. Young people, teachers, youth leaders, and other community members have all shown support. It has been gratifying to work with people who are truly interested, rather than having to "recruit" groups for the program!

Program promotion and outreach efforts: Newsletter articles (*Lake Tides*, 4-H publications); local news sources; attendance at local, state, regional, and national conferences which deal with lakes, environmental education, etc.; *Adopt-A-Lake* programs at various Wisconsin Lake Fairs; regional *Adopt-A-Lake* workshops for interested youth leaders, teachers, youth and community members.

Materials produced: *Adopt-A-Lake Project: A Resource Guide for Leaders;* workshop packet for participants including materials on specific water quality monitoring activities, arts and crafts activities; plant and aquatic insect identification keys; other resources people can use in their lake projects.

Keys to success: One of the primary keys to success in this program has been allowing the students to participate fully in the project, from its conceptualization to its actual implementation. The more students are involved in the process, the more likely the activities will be successful, with the added benefit that students will feel a degree of "ownership" about the project.

Another key element to *Adopt-A-Lake's* success is the variety of resources and support programs available to participants, from Extension to DNR educators and researchers, to citizen groups like the Wisconsin Association of Lakes. Likewise, programs such as the DNR's Self-Help Lake Monitoring Program are willing to commit time and energy to *Adopt-A-Lake* through their organizations. In the case of the Self-Help Lake Monitoring Program, DNR staff have been willing to train teachers and youth leaders in water monitoring techniques so that the students can then begin collecting water quality data for the state. Such "real life" experinces can help both youth and adults involved in *Adopt-A-Lake* projects feel their efforts are worthwhile.

Future endeavors:

1. Continue to build support for *Adopt-A-Lake* activities throughout Wisconsin
2. Prepare and publish interdisciplinary *Adopt-A-Lake* curricular materials
3. Continue to identify and train "lake leaders" throughout the state to become regional contacts for youth groups interested in "adopting" a lake.

Adopt-A-Watershed

Program goals: Help students develop a land ethic—a sense of stewardship toward their environment and community—and give them the skills to make educated, informed decisions regarding wise resource management.

Program setting: School-based with emphasis on community projects

Target audience: Grades K–12

Instructional approach: Thematic, unit-based K-12 science program.

Education content: Students have the opportunity to observe up to 13 years of change in their watershed. Kindergarten students adopt a watershed and follow it as a focal point of their science curriculum through grade 12. The watershed becomes a living laboratory in which students participate in hands-on activities, making science directly applicable and relevant to their lives. Students at the younger grade levels focus on observation and appreciation, in the middle grades on relationships and interactions, and in the upper grade levels, students discover how science impacts watershed management, policies and regulations.

The following elements make up each watershed unit:

1. Hands-on, activity-and project-based classroom lessons relating the watershed topics to science concepts appropriate to the science curriculum for that grade level, including cross-curriculum connections such as art, language arts, math, and social science
2. Long-term field studies which are repeated at specified grade levels so that data, passed on through a computer database, can be compared and changes recognized.
3. Restoration projects which help students feel a sense of caring for their watershed.
4. Community action projects in which students communicate what they have learned about their watershed to their community

Community needs met: Watershed education and community collaboration.

Institutional and community support: The program develops partnerships between schools, agencies, organizations, industry and community members. These partners provide services and technical assistance. The program is a conduit for schools, agencies and industry to interact cooperatively to work toward solutions for controversial issues.

Evaluation/modification strategies: Authentic assessment that includes portfolios and journals are used to assess student outcomes.

Unexpected outcomes: Models collaborative skills useful for other community-based concerns.

Program promotion and outreach efforts: Presentation at conferences, community groups and meetings. Articles in magazines and newsletters to promote the pro-

gram. We implement the program only in areas where we are invited.

Materials produced: 32 thematic units written for grades K–12.

Keys to success: The entire teaching staff, or only one teacher, can embrace the program. Each unit stands on its own, and can easily be incorporated into existing programs. The curricula is based on the most current California state science framework and correlates with the history/social science, language arts and math frameworks.

Future endeavors: *Adopt-A-Watershed* will begin national implementation in 1997. Currently, students can share and compare data, and find solutions to complex issues via a telecommunications network.

Hooked On Fishing, Not On Drugs

Program goals:

1. Educate students about drug awareness
2. Provide each student with an alternative to alcohol and other drug abuse
3. Help kids learn how to say "no" to drugs through good communication skills
4. Become more aware of environmental issues
5. Introduce fishing to students as a lifetime activity

Program setting: School and field experience

Target audience: Grades 3–5

Instructional approach: Classroom presentations, lessons, assemblies and field trips. The "good communication skills" taught are ways to say "no" to friends and peer pressure. Nearly 80% of students in the program currently fish or have fished in the past.

Educational content: Students are taught basic angling skills such as identifying clean, safe areas to fish and how to practice catch and release techniques. The program offers youth positive choices. They can fish by themselves, with a partner, or with their families. Some participants have said fishing fills their spare time with something enjoyable. If people are content, they are less likely to use drugs.

Program activities are integrated into the curriculum through essays and bulletin board messages. One guidance counselor wrote a song that the music department uses in its curriculum; the art department makes and decorates the halls. The library displays books and materials for student use, and in computer classes, students write their essays while mastering computing skills.

Community needs met: Drug offenders are a community concern. And East Troy does not have a lot of activities for growing, active youth. Fishing offers them something constructive to do.

Institutional and community support: We receive program support from the D.A.R.E. officer (a police liaison), local and statewide anglers, and local and statewide businesses (such as Gander Mountain). The cost to conduct the program hovers at around $500 per year. This covers transporation to fishing sites, Future Fisherman's Foundation educational materials, and food supply to fishing trips. Community involvement includes: a local sporting club that helps with angler education; monetary donations; parent chaperones; and media advertisements on local radio stations. All support staff (cooks, janitors, secretaries and bus drivers) are knowledgeable about and help with the program. Classroom teachers integrate the program into their daily lessons.

Evaluation/modification strategies: Yearly reviews and surveys

Unexpected outcomes: Great success; this particular program has become a national success story.

Program promotion and outreach: Local media, local radio station has broadcasted at the all-day fishing event. Mentioned in a national newspaper article.

Materials produced: Brochures, photographs and a videotape

Keys to success: Support from school personnel; family and community support and involvement.

Future endeavors: To continue and eventually add other grade levels to our curriculum. But most of all, to gain county or even state support for a day devoted to *Hooked On Fishing, Not On Drugs.*

program featured in training video

Kids In Creeks: A Creek Exploration and Restoration Program

Program goals:

1. To engage students in real science and make them aware of the natural world near their homes and schools
2. To provide opportunities for students to feel proud of their neighborhoods
3. to give students an awareness of the sources and impacts of water pollution
4. To help young people develop values related to environmental stewardship and to enhance their problem-solving and critical thinking skills
5. To stimulate thought about the effects our lifestyles have on the environment

Program setting: School enrichment (includes both classroom instruction and field experience)

Target audience: Grades K–12

Community needs met: Until now, urban creeks have been largely overlooked in environmental education. *Kids in Creeks* is the first comprehensive educational program in the Bay Area that focuses on creek studies as a way of introducing students to urban runoff pollution. Most teachers participating in the program have conducted an action project with their class, or have taught the students about creek ecology and urban runoff. Through these projects, *Kids in Creeks* has raised students' and the public's awareness and focused attention on local environmental issues. Creek-based coalitions between schools and communities have carried out projects such as storm drain stenciling, creek clean-ups, and *Adopt-a-Creek*.

Instructional approach: *Kids in Creeks* is a student-driven, action-oriented program. Teams of teachers are selected from elementary, middle, junior high and high schools throughout Alameda County to participate in the workshops. These teachers are provided with curriculum, equipment kits (on short-term loan), and assistance in conducting projects.

Educational content: In the 2½ day workshops, teachers learn to identify aquatic insects, sample water, conduct animal tracking activities, stencil storm drains, use mapping to make discoveries about nearby creeks and watersheds, and teach about creeks across the curriculum. The first day and a half, participants spend time at a creek site to give them the opportunity to familiarize themselves with a natural setting. During the last day, the workshop is held at a school to expose teachers to the challenges they will face while teaching about urban creeks.

Institutional and community support: The Alameda County Clean Water Program underwrites *Kids in Creeks*. The Contra Costa Clean Water Program, the U.S. Fish and Wildlife Service, and the San Franscico Bay Program are also among more than two dozen funders of *Kids in Creeks*.

Evaluation/modification strategies: Every six months, the Estuary Institute conducts a phone survey of teachers who have participated in *Kids In Creeks*. The surveys tells us which projects teachers have used with their students, and what parts of the program they found particularly good. The Institute then tries to respond to the teachers' changing needs by changing elements of the workshop. Certainly, the most important measure of success is the number of teachers who feel motivated to get out of their classrooms with their students and teach about creeks. Most teachers who have participated in *Kids in Creeks* have conducted action projects. Many have applied for funds to get their students out of the classroom to plant native plants, conduct water quality monitoring, or just clean up their local creek!

Unexpected outcomes: The response to *Kids in Creeks* has been astonishing. Over 300 teachers have participated in the 20-hour workshops, and those continue to fill up rapidly. *Kids in Creeks* has spawned Teacher Action Grants Programs in two counties. These are grants offered only to teachers who have participated in Kids in Creeks, and that support projects on creeks located near their schools. To date, $21,000 has been distributed to 36 *Kids in Creeks* participants. The program recently received a statewide award from POWER (Public Officials for Water Education Reform) acknowledging the devel-

opment of an innovative environmental education program. *Kids in Creeks* has also received national attention, receiving an award from the Environmental Protection Agency in 1994 for its contribution to Alameda County's nationally acclaimed storm water control program.

Program promotion and outreach: The *Kids in Creeks* program is most effectively promoted by word of mouth. Teachers who have attended a workshop encourage their peers to participate. For every workshop, press releases and camera-ready art are sent to the local newspapers, radio stations and environmental newsletters. The Insitute also sends fliers to each school principal in participating districts and to all 900 educators currently in our database. The Education Program Coordinator and the Education Director also give slide show presentations to schools upon request. Other program promotion and outreach efforts include sponsoring the annual *Kids in Creeks* reunion, coordinating afterschool and weekend field trips to local creeks, and publishing a quarterly newsletter containing stories, artwork, curriculum ideas and upcoming events of interest to participants.

Materials produced: *Kids in Creeks: A Creek Exploration and Restoration Program, Leader's Guide,* cost: $30 (available to workshop participants only).

Keys to success: Teachers who attend the *Kids in Creeks* workshops receive curriculum, equipment kits and assistance with action projects. Workshop participants have access to a lending library that consists of curriculum, a creek and water quality video collection, a full-body salmon suit, stream inventory kits, native creekside plant identification sheets, maps and slides, and lists of local organizations interested in working with youth groups.

Future endeavors: Create a student-based water quality monitoring program for grades 3–12.

Project FUR (Fighting Urban Runoff)

Program goals:

1. Promote public awareness of negative impacts of urban stormwater runoff on local water bodies
2. Develop civic action projects to reduce nonpoint source pollution (NPS).

Program setting: Metropolitan area of greater New Orleans

Target audience: Elementary to high school students; general public

Instructional approach: A Speaker's Program made up of students, grades 11–12 giving presentations on wetlands, urban runoff and water quality. Students also staff a booth at environmental fairs and conductstorm drain stenciling, used motor oil filter recycling, and water quality monitoring projects.

Educational content: Through classroom or group presentations, activities and water quality monitoring, students learn about wetlands ecology, watersheds, nonpoint source pollution, the effects of NPS on aquatic ecosystems, the geography/geology of Lousiana and New Orleans, and Gulf of Mexico ecosystems.

Community needs met: Lake Pontchartrain provides recreation, seafood and industrial uses. The surrounding land is used for agricultural, industrial and residential purposes. Education was necessary to raise the public's awareness of the effects of land use on water quality. Students conducted civic action projects to reduce urban runoff into the lake ecosystem.

Institutional and community support: Holy Cross School; Lake Pontchartrain Basin Foundation; Lousiana Department of Environmental Quality; and other grants and in-kind services.

Evaluation/modification strategies: Students submit water quality data to the Lousiana Department of Environmental Quality; student journal entries; and the number of returned used motor oil filters.

Unexpected outcomes: Although not a goal of the program, students became interested in environmental careers; the community extended support and recognition; students received local, state, and national awards and honors. *Project FUR* was listed in *Renew America's Environmental Success Index* 1992.

Program promotion and outreach: Speakers' program involving school and civic group representatives; students staff booths at area environmental fairs.

Materials produced: Flyer and information sheets about urban runoff noting the effects on Lake Pontchartrain ecosystem.

Keys to success: Dedicated students who work, work, work; changes in leadership teams as students graduate.

Future endeavors: Wetlands ecology service learning project; *Project F.U.R.* team leaders will participate in field exercises to experience wetland ecology. They will teach their peers the basics of wetlands ecology on subsequent field trips. We hope to expand the program to teach elementary and middle school students in the same manner.

Project WET (Water Education for Teachers) Idaho

Program goals: The goal of the program is to facilitate and promote water resource awareness, appreciation and knowledge through statewide implementation of *Project WET Idaho's* water education curriculum.

Program setting: Classroom-based instruction enhanced with some field experiences.

Target audience: Grades K–12

Instructional approach: Training workshops for Idaho teachers.

Educational content: *Project WET Idaho* is continuously achieving its goal through conducting workshops and training sessions throughout the state, developing new water education materials and acting as a state water education resource. In the workshops, participants learn strategies for teaching awareness and appreciation of water resources and how to integrate water-related topics into the curriculum. The program covers topics such as the properties of water, point and non-point source pollution prevention, water treatment and conservation. The program is designed to be a "hands-on" learning experience. Participants are trained in the use of the Project WET teaching aids, including the Ground Water Flow Model, the Liquid Treasure History Trunk, EnviroScapeTM, the Water Use Simulator and the Project WET Idaho Activity Guides.

Community needs met: *Project WET Idaho* is a statewide, interdisciplinary, supplementary water education program for Idaho educators and young people. In its first year of existence, *Project WET Idaho* has established itself as a source of water education information materials and teacher training for the state. The increasing demand for *Project WET Idaho* workshops and materials is evidence of interest in water education from the state's educators and youth.

Institutional and community support: *Project WET Idaho* is administered by the Idaho Water Resources Research Institute at the University of Idaho. Additional support is provided by Eisenhower Funds and other state and private organizations interested in water.

Evaluation/modification strategies: There are two techniques that Project WET uses for evaluation. A course evaluation is requested of each of the workshop participants at the end of each workshop. Additionally, each participant is required to complete at least three of the WET activities with their students in the normal educational setting. Teachers are then required to send a summary report to the Project WET coordinator stating which activities they tried, any modifications they made for their classes and an evaluation of the activity.

Unexpected outcomes: Not reported.

Program promotion and outreach: Through state education conferences, newsletters and by word-of-mouth.

Materials available: The Comprehensive K-12 and K-3 Curriculum Guides; *The Streamwalk for Teachers Manual;* 15 groundwater flow model trunks; 4 "Liquid Treasure History" trunks; The Water Use Simulator computer program; The Resource Library and Resource List; Water Quality Test Trunks; EnviroScape.TM

Keys to success: Hands-on teacher training and the availability of teaching aids.

Future endeavors: We intend to incorporate the new National Project WET materials with the best of the *Project WET Idaho* materi-

als to give *Project WET Idaho* a new focus on watersheds. The watershed approach will provide a backbone for content and delivery of the *Project WET Idaho* workshops. A statewide facilitator network will also be established, so that we can increase the number of workshops presented per year.

Testing the Waters: Linking Students and the Watershed through Technology

Program goals:

1. To provide training for teachers in riverine system ecology, Milwaukee River issues and proposed intervention strategies to improve the watershed
2. To establish a network of high schools collecting and reporting water quality data through a central computer system
3. To develop students who have knowledge of local environmental issues, competency in using scientific equipment and research methods and awareness of potential careers in science, computer science and natural resources
4. To develop citizens who are able to take active and responsible steps in resolving complex socio-environmental issues.

Program setting: Classroom instruction and river monitoring

Target audience: Middle and high school students within the Milwaukee River Watershed

Instructional approach: Four area nature centers each work with approximately 9 teachers and their classes for a total involvement of 34 high schools and 6 middle schools. The high school teachers along with 4 students they choose attend a 2-day training workshop in the fall.

Community needs met: *Testing the Waters* offers young adults an educational opportunity to become more aware and knowledgeable about river systems. Youth develop community action skills and learn the importance of participation in addressing and resolving environmental issues.

Institutional and community support: Along with Riveredge Nature Center, the program receives financial and in-kind support from the following organizations: Wisconsin Department of Natural Resources; Milwaukee River Priority Watershed Program; Milwaukee County Extension; Schlitz Audubon Center; Havenswood Environmental Awareness Center; Wehr Nature Center/Extension; and the Milwaukee Metropolitan Sewerage District, Southeastern Wisconsin Regional Planning Commission, and the University of Wisconsin–Extension. All fund raising takes place locally.

Educational content: During the school year, teachers and students monitor the river as part of their science class experience. Ten different parameters are measured and a water quality index for each site is determined. The students communicate their results through modems and a bulletin board called Omnitest at University of Wisconsin–Milwaukee. In April, all students are invited to attend a student Congress where they discuss results and strategies for action. Classes encourage students to take appropriate action to improve water quality. Action projects range from clean-ups to Mud Patrols (looking for construction erosion ordinance violations) to attending public hearings.

Program evaluation/modification strategies: Likert-style questionnaires for teachers and students at year's end.

Unexpected outcomes: Many exciting student action projects; national recognition for some.

Materials produced: Milwaukee River curriculum; poster; and video.

Program promotion and outreach efforts: Students and teachers are recruited through meetings with school district officials and principals. Other promotional efforts include conference presentations and word-of-mouth promotion. The annual Kiwanis Milwaukee River Cleanup increases community awareness of the river and recognition for Testing the Waters.

Keys to success: Paid staff; network of cooperating agencies; support of school districts; and excellent funding support.

Future endeavors: Heavy metals and PCB testing starting 1994–95; plans to implement a larger middle school program in 1994–95 that is similar to the current high school program.

Yahara Watershed Education Network (and *Summer Heron Institute*)

Program goals: Establish an ongoing support network of educators, researchers, and public policymakers interested in long-term ecological research on local watersheds; improve science education, integrate environmental and science education, and improve public policy decision-making on land and resource management.

Program setting: *Summer Heron Institute* at the biological field station on Lake Wingra; networking throughout academic year with area schools, other field sites, and informal education centers.

Target audience: K–16 educators; informal educators; professional researchers in public and private arenas; public-policy makers concerned with resource management decisions.

Community needs met: Need for bringing together various sectors interested in land use, water quality, and watershed study and management; need for improved science education.

Instructional approach: Collaborative research that combines "student inquiry" and "teacher-as-researcher" approach; collaborative evaluation and development of instructional approaches; shared leadership.

Educational content: Teacher training in water quality; ecological research; field sampling methods; land use and watersheds.

Institutional and community support: Eisenhower Science and Mathematics Education Grant Program; UW Center for Biology Education; UW Institute for Environmental Studies; UW Teacher Enhancement Program; Edgewood College; DNR; UW–Extension; area schools and school districts; Madison Children's Museum.

Evaluation/modification strategies: Evaluation of changes in the way teachers conduct their classes; evaluation of extent of ongoing collaboration and networking among educators, researchers and public policymakers.

Unexpected outcomes: Widespread interest among nonformal as well as formal educators. There is reluctance among some teachers to see themselves as scientists.

Program promotion and outreach: Participating teachers expected to conduct in-service training for their colleagues and recruit new participants; workshops by participating teachers and coordinators; annual Yahara Watershed Education Fair.

Materials produced: Newsletter; annual journal; informational research reports from *Summer Heron Institute.*

Keys to success: Teacher involvement in program design and evaluation; support from a large number of sectors.

Future endeavors: Expand number of participants; connect all participants via computer network; expand collaborative research projects.

program featured in training video

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YOUNG PEOPLE
about
Water

Appendices

APPENDIX A

Definitions of nonformal youth water education settings

CAMPAIGNS— Promotional efforts to advertise designated events or programs. Campaigns are designed to produce a specific outcome, such as community action, education, or increased public awareness of a particular issue.

CLUBS—Water education programs that adopt a club's goals and structure, and may complement school education goals. A club may organize fishing trips, develop displays for a county fair, conduct water monitoring, or visit a wetland.

COMMUNITY SERVICE LEARNING—Refers to education-based programs and projects that emphasize learning by taking action in the community. Water service learning projects focus on stewardship, and provide an active educational component in areas such as ecology, watershed land use, risk and decision-making skills. These activities may benefit the community ecologically, aesthetically, or economically. Projects may include water monitoring, clean-up, restoration (streambank stabilization, seed collecting and planting), storm drain stenciling and career planning.

DAY CAMPS/SUMMER EDUCATIONAL PROGRAMS—Activities organized as part of community-based recreation programs. They may or may not be held at established camp settings.

FESTIVALS/FAIRS—Usually one-day events where children visit several stations or booths set up for hands-on activities that focus on water and water use issues. Such activities might include observing demonstrations, answering questions, playing games, role playing, practicing science investigation, or examining career planning/options. Festivals or fairs may be held during school hours or during the summer. Those held in cooperation with schools usually include some background activities at the school.

MUSEUMS—This category includes water-related exhibits designed for youth and located in public museums, or in museums emphasizing water education (found in waterfront or coastal areas). Water education topics may include water conservation, natural history, geology, regional flora and fauna and habitats.

NATURE CENTERS/ENVIRONMENTAL EDUCATION CENTERS—Water-related education programs held at established centers in parks, nature reserves or other public access property. Youth groups come to the centers to experience natural water environments.

ORGANIZATIONS—Adopting youth water education as their operational goal or mission, organizations provide funding, educational materials, training workshops, or sponsor water-related events.

RESIDENTIAL CAMPS—Programs held at established outdoor education settings where water education is the primary focus or an integral component to the environmental education program.

SCHOOL ENRICHMENT—Water education programs that enhance an existing school curriculum or classroom experience. Participants are school groups or are recruited through the schools.

Compiled by Kelly Warren and Elaine Andrews, University of Wisconsin–Extension Environmental Resources Center, Madison, WI

APPENDIX B

Water education topics cross-referenced with programs

If you are looking for ideas to help develop programs about specific topics, then this list is for you. Use the Directory of Programs on pages 6-12 to locate the program descriptions.

Coastal/marine

- 4-H Watershed Project: From Ridges to Rivers
- Mermaids and Manatees—Manatee Dive Trips to Crystal River
- Sarasota Bay and Midnight Pass exhibits

Ecological concepts

- Active Watershed Education, "It's **AWE**some!"
- Bronx River Restoration Project
- Ohio 4-H Sea Camp

Fishing programs

- Fishing for 4-H
- Hooked on Fishing, Not on Drugs
- MinnAqua Angler Education Program
- NatureLink—Family Fishing Weekend

Groundwater

- Children's Groundwater Festival
- Groundwater in Nature

Lakes

- Adopt-A-Lake
- Georgia Waterway Cleanup
- Leap Into Lakes museum exhibit
- Ohio 4-H Sea Camp

River study

- Austin Youth River Watch Program
- SOAR (Summer Orientation about Rivers)
- Testing the Waters
- Water Works Laboratory and Exhibit

Science inquiry/research based

- Bronx River Restoration project
- 4-H Watershed Project—From Ridges to Rivers
- Texas State 4-H Camp
- Yahara Watershed Education Network

Stewardship/restoration

- Adopt-A-Lake
- Adopt-A-Stream
- Adopt-A-Watershed
- Bronx River Restoration Project
- Duwamish River Youth Initiative
- Georgia Waterway Cleanup
- Give Water a Hand
- SOAR (Summer Orientation about Rivers)

Stream study

- Adopt-A-Stream Foundation
- Kids in Creeks
- Save Our Streams

Urban outreach

- Austin Youth River Watch Program
- Bronx River Restoration Project
- Duwamish River Youth Initiative
- Hooked on Fishing, Not on Drugs
- NatureLink—Family Fishing Weekend
- Sarasota Bay and Midnight Pass exhibits
- Water Works Laboratory and Exhibit

Water pollution

- America's Clean Water Foundation
- Project FUR (Fighting Urban Runoff)
- Ohio 4-H Sea Camp

Water quantity/conservation

- 4-H Water Wise Day Camps
- Blue Thumb Campaign
- Eyes on Conservation: Water Works
- Project WET Idaho
- Texas State 4-H Water Camp
- Whitney Water Center

Watersheds

- Active Watershed Education, "It's **AWE**some!"
- Adopt-A-Stream
- Adopt-A-Watershed
- 4-H Watershed Project: From Ridges to Rivers
- Leap Into Lakes museum exhibit
- Save Our Streams
- Yahara Watershed Education Network

Wetlands

- Wonders of Wetlands
- Project ECO—Environmental Curriculum Outdoors

Youth development/ social needs

- Austin Youth River Watch Program
- Bronx River Restoration Project
- Duwamish River Youth Initiative
- Hooked on Fishing, Not on Drugs
- Texas State 4-H Water Camp

APPENDIX C

Program profile

Program name:

Institutional affiliation:

Address:

Phone:

Contact:

Program goals:

Program setting:

Target audience:

Instructional approach:

Education content:

Community needs met:

Institutional and community support:

Evaluation/modification strategies:

Unexpected outcomes:

Program promotion and outreach:

Materials produced:

Keys to success:

Future endeavors:

If you would like to share information about your program or others, complete and return to Educating Young People About Water, University of Wisconsin-Extension, 216 Agriculture Hall, 1450 Linden Drive, Madison, Wisconsin 53706. Telephone 608/262-0020 or fax 608/262-2031.

APPENDIX D

References for youth development skills

Critical thinking skills

Critical thinking skills involve the ability to solve problems, make decisions and evaluate one's stance on particular issues. To carry out these tasks, young people need to experience multiple perspectives, practice independent thinking, and be able to act on their thinking.

Berman, Sheldon. 1991. Thinking in Context: Teaching for Openmindedness and Critical Understanding in *Developing Minds: A Resource Book for Teaching Thinking,* ed. Arthur Costa. Educators for Social Responsibility, Alexandria, VA.

Educators for Social Responsibility claim that students lack the necessary thinking skills to understand complex social issues. Under the whole-language approach, thinking is an integrative process that enhances the context of real, meaningful situations. Berman lists 9 strategies that enrich students' thinking abilities through empowerment and confidence, including: creating a safe environment; collaborative thinking; teaching interconnectedness; multiple perspectives; and providing opportunities to act on their thinking. To become active participants in society, youth must feel confident that others value their thinking and that their thinking makes a difference by improving their own lives or influencing others.

Howe, Robert W. and Charles R. Warren. 1989. *Teaching Critical Thinking Through Environmental Education*, in ERIC/SMEAC Environmental Education Digest, Columbus, OH 43212 (614) 292-6717. EDO-SE-89-22.

Critical thinking skills are an intricate part of daily life. Students are asked and expected to make complex choices, judgements and evaluations every day. Authors list several critical thinking skills definitions, including Ennis's (1987)—critical thinking is composed of the process and skills involved in rationally deciding what to do or believe. Business and industry continue to report that many employees are not able to think critically in job situations. Authors argue that schools need to reevaluate how and what they teach and how to better prepare students for various societal situations. Environmental education is a good mechanism for teaching critical thinking skills because of the scope, breadth and reality of environmental issues.

Jones, Jo and R. Dale Safrit. 1992. *Critical Thinking: Enhancing Adolescent Decision-Making*. Journal of Home Economics, 84(3): 4-7.

Critical thinking skills involve problem-solving, decision-making, and evaluating one's position on issues. Key elements in the critical thinking process are dialogue, reflection and questioning. These underlie the authors' 13 effective strategies to foster critical thinking in teens. Strategies include use of debating teams, dramatizations, journal writing, listening teams and consideration of alternatives. Each strategy presents teens with realistic situations after which they are asked to consider the points of view of those involved in the conflict.

Neilson, Allan R. 1989. C*ritical Thinking and Reading: Empowering Learners To Think and Act*. ERIC Clearinghouse on Reading and Communication Skills, Smith Research Center, Indiana University, Bloomington, IN.

Neilson argues that students' lack of critical thinking skills reflects our current educational system and the assumptions it holds about the nature of knowledge, teaching and learning. According to Neilson, educators place overwhelming emphasis on direct instruction (lectures, readings, and drill exercises) as the primary means of transferring facts and skills. When students have little active involvement in their education, compliance is valued more than independence. Neilson asks "How can we better prepare our children for the world beyond the classroom?", applying an alternative framework that encourages personal independence.

Learning cycle

Science educators consider the learning cycle one of the most effective ways for students to learn science concepts and processes. The learning cycle has been effective in helping to develop reasoning skills and reduce scientific misconceptions. The learning cycle involves three distinct types of instructional methodology: 1) exploration; 2) concepts introduction; and 3) concepts application.

Renner, John W. and Edmund A. Marek. 1988. *The Learning Cycle and Elementary School Science Teaching,* chapters 4–7 and 9–10. Heinemann, Portsmouth, N.H.

These chapters summarize key components and philosophy of the learning cycle as developed by Robert Karplus based on educational principles described by Jean Piaget. The learning cycle focuses on development of the ability to think rather than memorize. The learning cycle approach includes three stages: exploration, conceptual invention and concept implementation. Programs designed around the learning cycle strategy have been demonstrated to produce students equally knowledgeable about content as students in a traditional course of study, but more able to apply what they have learned in a new situation.

The following references also examine the learning cycle, science education and thinking skills.

Guzzetti, Barbara; Snyder, Tonja; Glass, Gene; and Gamas, Warren. 1993. "Promoting Conceptual Change in Science: A Comparative Meta-Analysis of Instructional Interventions from Reading Education and Science Education." *Reading Research Quarterly.* Vol 28, No. 2, pp. 116–159.

Lawson, Anton E., et al. 1989. *A Theory of Instruction: Using the Learning Cycle to Teach Science Concepts and Thinking Skills.* National Association for Research in Science Teaching Monograph, Number One.

Learning styles

Individuals receive and process information differently and research shows that the way we learn has little to do with age, sex, race, intelligence or income. Children are best served when parents and teachers take an active role in channeling both the kinds of information children process and their learning styles.

Spinner, Nancy R. 1992. *Using Learning Styles to Empower Youth and Families.* Journal of Home Economics, 84(3): 8-11.

Learning reflects our response to environmental, social, emotional, physical and psychological stimuli. Spinner describes studies comparing American and Asian student family situations. These studies suggested that American mothers tend to believe that school success results from innate ability, whereas Japanese and Chinese mothers believe more in the relationship between hard work and success. Spinner also notes various learning styles: visual, auditory, manipulative (kinesthetic), and global learning. The style that suits a child's interest can best be determined by the parents. Determining a child's learning style and encouraging parental involvement in the its education may lead the child to higher achievement. Through greater parental expectations, a child may express him/herself through positive learning attitudes, self-confidence, curiosity, initiative and persistence.

Social responsibility

Social responsibility involves aspects of community service, political and social involvement, conflict resolution and environmental education. The initiatives behind social responsibility are helping youth develop basic social skills, a sense of connection with their surroundings, and the confidence to make a difference in the world.

Gigliotti, Larry M. 1990. *Environmental Education: What Went Wrong? What Can Be Done?* Journal of Environmental Education, 22(1):9-12.

The author argues that although environmental education has been successful at producing ecologically concerned citizens, people are generally unwilling to change their personal lifestyles in ways which are necessary to solve some environmental problems. Citizens who have learned misconceptions or myths about the environment have criticized the behavior of others, but lack the knowledge and conviction to change their own behaviors. Gigliotti states that every citizen needs a basic understanding of ecological principles, information on the alternatives and consequences of actions, and information on possible individual action. To help change the myth that people are separate from the environment, environmental education messages must make the connection between environmental information and individual actions and solutions to environmental problems.

Hungerford, Harold R. and Trudi L. Volk. 1990. C*hanging Learner Behavior Through Environmental Education*. Journal of Environmental Education 21(3): 8-21.

Research into environmental behavior has not shown that increased knowledge changes human behavior. To achieve responsible citizenship behavior, individuals must be given the opportunity to develop a sense of "ownership" and "empowerment." Individuals who act have "expressed an intention to take action" and "possess a desire to act." The authors also found that to change learner behavior, strategies should be implemented across all grade levels. The cooperation of nonformal education agencies as well as local and regional educational resources would maximize this opportunity for success.

Newhouse, Nancy. 1990. *Implications of Attitude and Behavior Research for Environmental Conservation*. Journal of Environmental Education, 22(1):26-32.

Most environmental attitudes are formed as a result of life experiences versus a specific program designed to change attitudes. One explanation for the discrepancy is the possibility that attitudes being taught do not correspond well to behaviors which are being measured. Attitudes have been found to change through certain types of experiences. A sense of loss, repeated exposure to a stimulus, hands-on contact, information and modeling by a respected or liked person, are perceived as having the potential to promote attitudinal change. Yet, in order for a person to take action, he or she must believe in their ability to bring about change through personal behavior. Additionally, change is accompanied by an individual sense of responsibility, a clear understanding of the issues and a supportive atmosphere.

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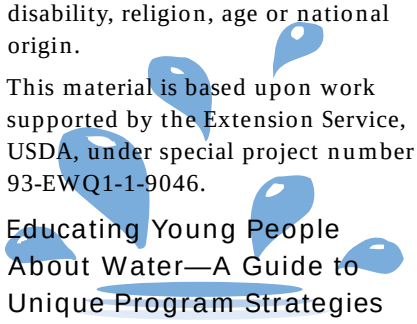

Educating Young People About Water—A Guide to Unique Program Strategies