

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<sub>2</sub>O 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

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. Conse-

quently, 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 per-

forming 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 hand-outs 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.

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 Works* 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*.

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 opportunities 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.