

Water Education in Integrated Watershed Management

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An Incredible Journey

The audience's attention is riveted on the steaming geyser. It has begun to *play*, a short column of water rises a few feet and falls to splash on the sinter cone. Cameras poised, visitors wait. Suddenly Old Faithful erupts with a roar. The waters hang suspended for one shimmering moment against a blue sky. Some of these droplets may have last reflected the sunlight when mountain man John Colter saw Yellowstone in 1807. As the eruption subsides, people applaud and put cameras away. Largely ignored, streams of water flow away from the now quiet geyser.

Since its discovery, Old Faithful Geyser has erupted over a million times and thousands of visitors have viewed it. But how many people have wondered where the waters flow. Some water will evaporate, some will return to groundwater and some will begin an incredible journey that carries it to the Mississippi Delta.

On its journey from the Yellowstone it will wet the lines of fly-fishermen and slake the thirst of bison and bears. Eventually it will moisten the roots of soybeans and alfalfa. Water will flow from reservoirs through turbines to generate power for urban dwellers. Contributing to rivers it will carry barges that share the wealth of the watershed with the nation.

Within a watershed the needs and activities of all living things are interconnected. All water users take from and give to the watershed. The concept of a *whole* watershed is the sum of the parts.

The Watershed Approach

Integrated watershed management recognizes the connections among all land and water use activities in a river basin. Watersheds are not confined by political boundaries; lines on maps do not contain them. Therefore, problems which develop in a river, lake or aquifer must be solved by considering the effects on the health of the whole.

In the isolated drainages in the West, instream flows and consumptive uses are at play with one another, primarily because of seasonal water shortages. The integrated watershed approach looks for the critical balance among water and land use activities, with a keen eye toward preventing water quality degradation.

The same applies to larger watersheds like the Missouri River Basin. The interplay between critical consumptive and non-consumptive water demands set the stage for a

number of management issues involving water allocation, habitat protection and the economy. Within the Missouri Basin, ten states, twenty-six tribal governments and a number of federal agencies bear responsibility for the management of the watershed.

In the Kissimmee-Okeechobee-Everglades watershed, water managers struggle to provide water resources for a rapidly growing population (800 people move to South Florida weekly), prevent flooding and maintain the ecological integrity of natural areas. As managers balance water quality, quantity, distribution and seasonal flow in respect to the needs of myriad water users, agencies and organizations have an obligation to help citizens understand these issues. The daily decisions of these people are creating the South Florida that our children will inherit. Decisions made within a watershed have effects far beyond its range.

Why Education?

In this time of water allocation disputes and concerns about water quality, citizens will be asked to make choices about water and how it is used. To participate effectively in the decision-making process, citizens require accurate, current and comprehensible information on complex issues. Education is the link to effective public participation.

Individuals who are connected to the decision-making process through education feel some investment in the programs established by policy-makers. Because of their investment of time and energy, they will be more likely to support these policies.

Informed individuals can be more efficient in working together in communities. Recognizing the diverse values and water needs of neighbors can help community members to move beyond gridlock to understand and finally compromise.

Water education for children brings the process full circle. Children carry home information and concerns that they share with parents. In support of adult water resource education, informed parents can, with greater confidence, reinforce the lessons and interests introduced by teachers. As children mature into young adults, they will retain water conservation practices and habits instilled by teachers and parents.

In the Face of Change

In keeping with societal changes, the Watercourse, a

national adult and youth water education program funded by the Bureau of Reclamation, conducted a survey to learn more about communication between water managers and citizens. The purpose of the survey was twofold: to guide the direction of its adult water education program and to avoid duplicating the efforts of other organizations; to direct the subject matter of the Watercourse's youth water resource curriculum, National Project WET.

The topic of integrated watershed management rose to the surface as a fundamental category to address. How do planning and land uses in a watershed impact water quality and quantity? One respondent commented, "Please focus on the fact that rivers are an integral part of a watershed and that individuals should learn to identify not only with their city, county or state, but also with their watershed."

Another said, "People need to understand linkages—where does water come from before it reaches the tap, and where does it go when it goes down the drain?" And finally, "We need a general awareness of the role water plays in our lives; we need to know that individual efforts are part of a bigger picture." Many commented that there is an integral connection between land use activities and the watercourse impacted by those activities, a connection that our education programs need to emphasize.

Through its support of the Watercourse water education program, the Bureau of Reclamation is making a commitment to educate the public on critical water management issues. The two major branches of the Watercourse are the Watercourse Public Education Program (PEP) and National Project WET (Water Education for Teachers).

The goal of the Watercourse Public Education Program is to facilitate awareness of water resources and related issues through publishing educational materials, providing outreach programming and instruction, and through networking. The program's scope is nationwide, its delivery unbiased, and its mission to increase public understanding of contemporary water management issues. It attempts to increase citizen involvement in local, regional and national decision-making processes.

National Project WET is an interdisciplinary water education program intended to supplement an educator's existing curriculum. The goal of Project WET is to facilitate the knowledge and stewardship of water resources by young people through the development of classroom ready teaching aids and through the establishment of state sponsored Project WET programs. National Project WET and the Watercourse Public Education Program are complementary; they support the idea that education is a lifelong process.

Watershed Programs of the Watercourse

The Watercourse believes that water is important for all water users (energy producers, farmers and ranchers, fish and wildlife, manufacturers, recreationists, rural and urban dwellers) and that water education is a critical component of successful water resources management.

Teaching aids are designed to accommodate different learning styles and educational interests. Program materials and networking strategies are based on a decade of water resource education experience. Over this ten-year period, instructional aids have been used successfully and refined by educators and resource people.

Networking and partnerships are fundamental to the success of the Watercourse. Within the next year, state Project WET programs will be established by agencies and education groups in all 50 states, the District of Columbia and the U.S. Territories. The Watercourse is developing several programs for educating adults and young people about watersheds and integrated watershed management.

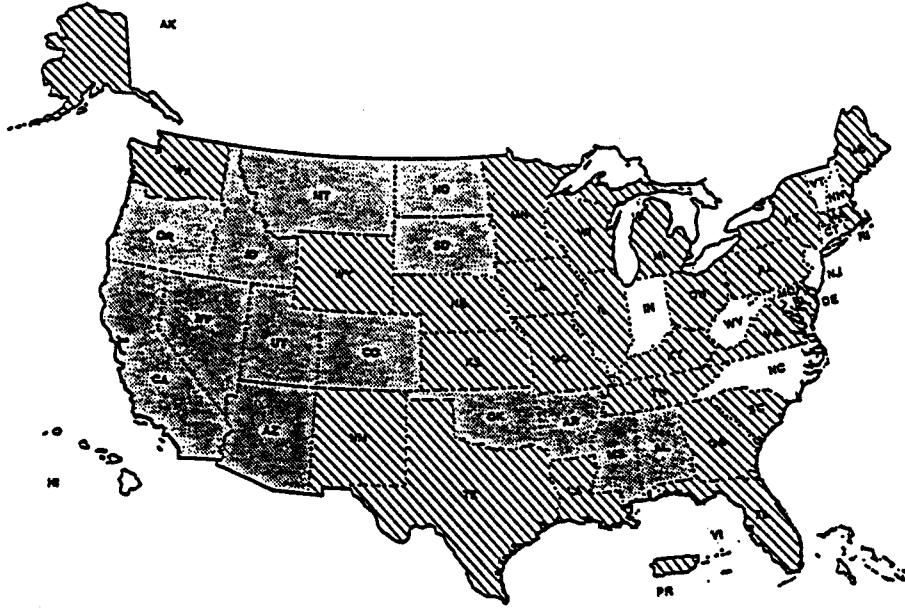
The Watercourse has teamed up with Dr. John Amend, Montana State University Department of Chemistry and Biochemistry, to develop an electronic computer software program called **The Watershed Manager**. This creative teaching aid challenges participants to make decisions about contemporary water uses within a watershed. Ensuring all water users their fair share, players make important decisions and witness the effect of their actions.

Wetlands Discovery Guides, funded by the Environmental Protection Agency and the Bureau of Reclamation, describe how wetlands function in the context of watersheds. The project is guided by an advisory team of wetlands scientists and science teachers throughout the country. A wetlands manual for landowners as well as a wetlands curriculum for teachers is being produced. Both guides will describe the important role wetlands play in watershed hydrology, water quality, and the culture and history of the area.

Through **Professional Development Projects** the Watercourse and its state sponsors provide training for agency staff members required to lead public meetings in selected watersheds. Effective communication skills and the use of teaching aids are two areas of concentration.

National Project WET is producing the **Project WET Curriculum and Activity Guide** scheduled for release in 1994. The guide will include over one-hundred innovative water activities for use by educators for grades K-12. Watershed activities published in the guide will serve as the core for more extensive activities provided in a companion volume devoted specifically to watersheds — **The Watershed Module**. The module will include comprehen-

STATUS REPORT
State Project WET Programs
September 14, 1993



Existing Commitments



Positive Inquiries



sive reference materials as well as 15-25 integrated watershed activities that address scientific, social and historical aspects of watersheds and watershed management.

National Project WET conducted a series of eight regional writing workshops involving educators and resource specialists from the fifty states, the District of Columbia and three U.S. Territories. Workshop participants contributed over 500 lessons and activities related to water and water resources. Materials related to watersheds will be included in **The Watershed Module**.

Forming a partnership with the South Florida Water Management District, National Project WET is developing the first in a series entitled **Discover a Watershed: The Everglades**. The district will use this project in its environmental education program and National Project WET will distribute the materials nationwide to educators interested in teaching about this important resource.

In order to make its materials and programs more accessible to teachers, the Watercourse seeks to create partnerships among state Project WET Coordinators and water resource and education professors in training teachers with Project WET materials through **pre-service programs**. A goal of the Watercourse is to provide training in the use of the **Project WET Curriculum and Activity Guide** and other materials for students of water resources management.

For formal and non-formal educators of K-12, Project

WET plans to continue to create easy-to-use and relevant materials on watersheds that are educationally sound. Project WET intends to reach thousands of teachers and millions of students through workshops, seminars and institutes conducted by national and international Project WET programs.

The Role of Public Agencies

Education plays a critical role in integrated watershed management. Acknowledging the need for education is an important first step. Acting on that need is a giant second step requiring a commitment of people and resources. Although there are exceptions, the role of education in resource agencies has not been adequately defined. Whether education becomes a focus during a crisis, such as flood or drought, or as part of a long-term management commitment, it is one of the few management options that encourages and empowers citizens to become involved.

In the context of integrated watershed management, education should be intimately involved with planning and public outreach efforts. Staff members need to understand the role of outreach in their agencies and should feel comfortable interacting with the public. To be successful, education programming must have enthusiastic administrative support.

Pro-active education programs are organized to meet specific management objectives (such as reducing municipal water consumption by 10% in five years). Less effective,

educational programs are sometimes developed in response to a political initiative or water resource crisis. In a crisis, education projects are activated as a last resort to end a conflict.

A long-term approach involves a commitment of time and resources. Agency public education programs become closely aligned with research, data collection and planning functions. The education program transfers information and provides instruction internally and externally to meet the needs of the public. The planning staff is in tune with public information needs and confident in fielding tough questions.

The Future

We are forming an accurate picture of the water education programs that need to be jointly undertaken by public agencies and private interest groups. Even so, information on water resources is of little value unless it is relevant and presented in an accurate, unbiased and inspiring manner.

Regardless of scope, the efforts of the Watercourse and other water education programs must be to build leadership and enable citizens to make a difference in watershed management through their actions. Watershed education programs for young people must address a wide range of water-related disciplines including natural and social sciences, mathematics and the arts. Provided this knowledge base, young people will understand the nature of water and its importance to all water users.

The implementation of these watershed education programs requires a long-term commitment of time, energy and resources. Agencies and organizations can involve the public by inciting its curiosity and sense of ownership in water management and protection. Every person makes a difference in the grand scheme to conserve supplies and improve water quality.

The Continuing Journey

Students gather around their high school science instructor as she draws a water sample from the Mississippi River near their delta town. She holds up the sample in a clear stoppered bottle. The sunlight passing through it reveals sediments and organics. She pauses before opening the water quality test kit and asks her students, "Where has this water been?"

"Memphis! St. Louis! Kansas City! Bismarck! The Yellowstone!"

Water on its incredible journey . . . a journey that will take our young people into the future. Only through education can we help them chart the course.

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