Reaching Communities Across Arizona with Water Education

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Abstract

The University of Arizona Cooperative Extension, in collaboration with Arizona Department of Environmental Quality and other state and federal agencies, is developing a water education program for the residents of Arizona. The program addresses education needs for K-12 school levels, general adult education, and specific stakeholder groups. The paper will discuss the different facets of the extension program.

Keywords: watershed, water quality, nonpoint source pollution, outreach

Introduction

Arizona's increasing population continues to have an enormous impact on vast tracts of public and private land. Open space is being converted into housing developments, golf courses, and other recreational uses. This has put greater demands on the limited natural resources of these predominantly arid and semi-arid landscapes. In many areas of Arizona, ground water withdrawal is exceeding recharge. Agriculture, suburban development, recreation, grazing, and other activities are all influencing surface and ground water quality. This rapid urbanization permanently alters natural watershed characteristics. The factors cited above often give rise to contentious battles among land managers, ranchers, farmers, miners, developers, environmental activists, and recreational users. Each group has their own, often contradictory, visions of the land's fair, appropriate, and responsible use. Yet, each impacts water quality and quantity in its own way.

Nonpoint source pollution and sustainability of water supplies are the two primary water issues facing Arizonans. Stakeholders need to be involved in decision-making processes that affect their land and water resources. Watershed integrity is inextricably linked to varying land uses and the quality and quantity of water resources. Better land use decisions are the key to protecting the natural resources, community character, and long-term economic health of Arizona's communities.

Because land use is a principal issue, the people making land use decisions are our key target audience. In Arizona, this means bringing together municipal and county governments, public land managers, ranchers, miners, hunters, recreational users, environmental groups and other concerned citizens groups to discuss land use practices and develop watershed-based goals.

The Arizona Cooperative Extension is in the process of developing a water education program that will address the needs of an array of stakeholder groups in the state.
While some components such as Project WET and xeriscape education have been in place for many years two new components have began in the last year. This paper will outline the current status of the Cooperative Extension education program.

Water Education in Cooperative Extension

The goal of Arizona Cooperative Extension water education programs is to provide knowledge to a

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target audience so that they can make "better," more informed decisions. It is the assumption that if people are aware of the consequences of their actions, personally and to the wider community, they will change their behavior.

The University of Arizona Cooperative Extension in the College of Agriculture and Life Sciences delivers research-based outreach and education to engaged stakeholders to foster better decisions to promote healthy and sustainable communities. Cooperative Extension faculty are based in all 15 counties and on six Indian reservations; Arizona residents have input on Extension programs that are delivered in their locale. Cooperative Extension uses volunteers to further disseminate their outreach and education.

There is increasing demand by Arizona residents for information and education on water issues and Cooperative Extension has been addressing this need. State-wide, Cooperative Extension faculty made 10,348 face to face contacts in 2002 in educational programs related to water resources. The University of Arizona research scientists are working on these issues as well; a communication network between campus water centers and state and federal agencies is in place. However, in the past the water education effort has been piecemeal, with many small individual efforts. The current goal is to organize the water education efforts to address the needs across the entire state.

The basic audiences to be addressed through education programs are: K-12, general adult education, and specific stakeholders groups. Three extension programs have been created and/or enhanced to address the education needs for the three audiences: Water Education for Teachers (WET) which addresses teachers of K-12 education, Master Watershed Steward Program (MWS) for general adult education, and Nonpoint Education for Municipal Officials (NEMO) which addresses elected and appointed officials, as well as specific stakeholder groups.

Project WET

Project WET is an international, interdisciplinary, water education program for formal and nonformal educators of students ages 5 to 18 administered in Arizona by the Water Resources Research Center and College of Agriculture and Life Sciences. Curricula, teaching aids, and materials are offered to school districts across the state. The curricula cover the properties of water, the water cycle, watersheds, groundwater, water quality, water rights, as well as an understanding of the importance of water to all water users.

Arizona Project WET facilitators conduct workshops where educators learn about Arizona's water resources by participating in fun, interactive, classroom-ready activities. The activities, developed and tested by teachers, are designed to develop critical thinking and build an understanding of concepts by experiential learning. The National Project WET Curriculum and Activity Guide, is a nationally acclaimed teaching resource. Other resources include a Nonpoint Source Curriculum for grades 9-12 and K-6, a Watershed Manager Guide, an Arizona WET Guide, Conserve Water Educators' Guide for grades 6-12, and a brand new Healthy Water Healthy People Guide with water testing kits.

As part of the education program, students learn to use the scientific process in activities like *H2Olympics*. In *Just Passing Through*, and *Incredible Journey* and dozens more activities, students use their own bodies as models for simulating processes. Students learn to organize and present data gathered from their own experiences using mathematical and graphical representations in activities like *Back to the Future* and *Get the Groundwater Picture*. Students are asked to analyze data and scientific reports as well as learning to come to consensus with people that hold different opinions in *A Grave Mistake* and *Water Bill of Rights*. At all levels the students develop critical thinking skills and learn about how water affects their communities and lives.

There were 370 Arizona Project WET educator workshop participants in 2002 affecting a reported 22,445 students per year. Many of the materials used in this program, designed for youth, can be adapted for adult audiences. Educators can arrange to receive Project WET resources by attending a workshop or purchasing materials at the National Project WET website. Teaching tools including groundwater flow models, nonpoint source pollution models, and Liquid Treasure History Trunks are available for check out in five different regions statewide. Project WET staff work with local groups (e.g., school systems, cities, and local resource organizations) to sponsor, plan and conduct water education events. WET resources are made available at in-service teacher training seminars, through classroom

presentations, and at most major environmental education events.

Master Watershed Steward Program

The Master Watershed Steward Program (MWS) began in Oregon and has been found to be a very successful approach to general adult education. MWS aims to increase the capacity of community members to identify and address water resource issues at local levels. The MWS program provides educational sessions and materials to help individuals understand how their watershed works. These volunteers then apply this knowledge of watershed stewardship by serving as community resource persons/educators to disseminate research-based watershed information, coordinate local projects, and assist in data collection in their communities. The program is modeled after the successful Master Gardener Program, an intensive and comprehensive, hands-on, learner-centered program that educates volunteers about horticulture; Master Gardeners then assist in the delivery of Cooperative Extension educational programs. Like the Master Gardener program, Master Watershed Stewards assist in the delivery of Cooperative Extension watershed/water resource education programs.

Both Yavapai and Cochise Counties have delivered pilot MWS courses in the last two years. A course typically consists of 40 hours of course work and two full-day field trips. Topics covered in the course include: hydrology, meteorology, geology, soils, climate, riparian and aquatic ecology, water law, best management practices, group organization, and funding sources. The primary focus is how these various topics affect water quality, water quantity, and watershed processes. Personnel from universities, governmental agencies, tribes, and non-governmental organizations may assist in delivering the lectures, field experiences, and hands-on activities.

Upon successful completion of the course, including a comprehensive final examination, participants are given Associate Master Watershed Steward Status. After contributing 40 to 50 hours of volunteer service to their community, delivering pre-approved, watershed-related education, they become Certified Master Watershed Stewards. MWS volunteer service has included working with local schools, field data collection, assisting a range of agencies in water/watershed projects, and organizing educational conferences.

Over the next three years the Arizona MWS program will be going statewide. A coordinator will be located at the main University of Arizona Campus in Tucson, Arizona. The state will be divided into four regions: Colorado River which includes the lower Gila and Bill Williams watersheds, Southeast which will include the Upper Gila watershed and tributaries such as the Santa Cruz and San Pedro watersheds; Northcentral which includes the Verde, Agua Fria, and Hassayampa watersheds, and Northeast which covers the Little Colorado and Upper Salt watersheds. The main campus coordinator also will provide support in the urban corridor between Tucson and Phoenix.

The statewide MWS program will review and adapt education materials to address Arizona needs and conditions, develop a web site to provide access to educational materials, assist in the MWS courses, and conduct workshops to train local facilitators. Each region will also have a coordinator. The responsibilities of the regional coordinators are to organize the MWS courses within their region and supervise and support the volunteers.

Nonpoint Education for Municipal Officials

The Southwestern United States, including the State of Arizona, is the fastest growing region in the country. Consequently, this once rural area is rapidly developing, and environmental issues that were once considered to be “eastern” problems must now be addressed. This includes water quality and nonpoint source pollution. Problems can no longer be neglected without evoking conflicts. As the result of increased population, there is a need to address health and quality-of-life issues that may result from contamination of water resources from nonpoint sources.

Nationally, the Nonpoint Education for Municipal Officials (NEMO) program has been very successful in helping to mitigate nonpoint source pollution. The goal of NEMO is to educate land use decision-makers to make voluntary actions that will mitigate nonpoint source pollution and protect our natural resources. Arizona Cooperative Extension at the University of Arizona, in cooperation with the Arizona Department of Environmental Quality, has recently initiated a NEMO program in the State of Arizona.

Arizona NEMO will consist of educational projects focusing on both water quality and quantity issues as identified by watershed characterizations. This will include topics such as comprehensive and integrated watershed planning, best management practices, water conservation, and riparian restoration. Part of the effort will include illustrating current and future conditions using geospatial technology (e.g. geographic information systems) to assist in the educational process. All stakeholders in a watershed will be included in the process. Educational projects will be tailored for the specific watershed conditions and water quality problems identified from watershed characterization.

Presently, NEMO programs have been concentrated in the eastern United States. The Arizona NEMO will adapt the NEMO approach to conditions in the semiarid, western United States. There are sharp differences between the eastern and western United States that must be considered for the successful application of the NEMO approach. First, the land ownership patterns are vastly different. The eastern United States is primarily comprised of private land, and the local land use authority is concentrated in municipal (village, town and city) government. In contrast, watersheds in the western United States are often a mosaic of different landowners and land use authorities. This mosaic may include municipal, county, state, and federal land owners, each with its own set of goals and policies. Land use in a watershed can range from intensive irrigated agriculture, open range grazing, residential development, and extensive wilderness areas, all within the same watershed. The western United States with more diversity, will require adapting methodologies to meet the conditions in each watershed that includes all of the local, county, state, tribal, and federal land use and water authorities into the process.

The second major difference between the eastern and western United States is the availability of water. In the eastern United States the supply of water is not the limiting factor and water quality is the chief concern. Watershed management focuses on nonpoint source pollution problems from private land. Municipal government uses regulatory (e.g. zoning) and incentive programs to mitigate the problems. In the semiarid, southwestern United States the water supply is limiting, and many natural resource problems are related to the lack of water, as well as water quality. The successful application of the NEMO approach will require integrating water supply and water quality concerns into the watershed planning process.

Arizona NEMO was initiated in October 2002. During the first year, the project concentrated on conducting watershed characterizations to support the watershed-based planning process in cooperation with Arizona Department of Environmental Quality (ADEQ). Arizona NEMO will work in partnership with ADEQ in developing watershed-based plans and serve as the education component during the implementation phase. In summer of 2003, Arizona NEMO will hire a coordinator who will be located on the main University of Arizona campus. The coordinator will contact stakeholder groups, develop an education needs assessment, and develop a web site to provide access to educational materials. Education material will be developed for the different stakeholder groups and workshops and seminars will be conducted starting in 2004.

In developing the education material, Arizona NEMO will stress the concept of Integrated Watershed Management and Planning (IWMP). The goal is to emphasize the linkages between water supply and quality and adapt concepts from the EPA Smart Growth program and National NEMO.

Summary

The goal of the Arizona Cooperative Extension is to deliver research-based, non-advocacy professional education to engage stakeholders and foster better water and land use decisions to improve water use, water quality and community sustainability. It is hoped that the education programs outlined above will serve as an instrument to guide research being conducted at our state universities to serve our stakeholders in local, state, tribal, and federal agencies and to the people of the State of Arizona. Wise decisions are only made when everyone has good and complete information.

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