

## ***ECOSTART: Teaching Teachers to Use a Watershed's Outdoor Classroom***

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Hydrology education can provide an important link among university researchers, organizations, government officials, and watershed communities struggling to understand complex issues of economic development and water resource management.

ECOSTART, a binational environmental education program, trains elementary and secondary teachers in Arizona and Sonora to educate their students about water conservation, basic ecological concepts, and wildlife habitats tied to the riparian corridor along the Upper San Pedro River in southeastern Arizona and northeastern Sonora.

The watershed-based program arose through the efforts of individuals from numerous University of Arizona programs, including GLOBE, the departments of hydrology and water resources and geosciences, the Water Resources Research Center (WRRC), and Udall Center for Studies in Public Policy, and private organizations such as Corredor Colibri, Hands Across the Border, and the Arizona-Sonora Desert Museum.

Since 2000, ECOSTART has offered workshops and field trips to share knowledge and promote understanding of the relationships between hydrology, ecology, and land use in the region. The program initially brought together Mexican and U.S. students through field trips and activities following a series of teacher workshops to develop the curriculum. After Sept. 11, 2001, transnational educational work became more of a challenge, so ECOSTART became two separate efforts with continuing local field trips.

The project uses diverse instructional materials: water quality testing kits and curriculum materials from WRRC's

Project WET (Water Education for Teachers); riparian habitat and pollinator garden instruction materials from the Arizona-Sonora Desert Museum; and global positioning systems (GPS).

A typical ECOSTART workshop is geared to primary or secondary school teachers in border towns and includes activities on the physical and chemical characteristics of water, water quality issues, the water cycle, and water as a community resource. Each activity has educational objectives linked to the teachers' existing curricula, evaluation strategies, and extension activities. Curriculum materials are available in English and Spanish. Teaching tools include environmental pollution and groundwater flow models, games, writing exercises, debates, role-playing, computer simulations, monitoring, mapping, and testing with scientific protocols.

Mexican teachers participating in the program have welcomed more frequent opportunities for workshops for area teachers "so that we could all work together to reach goals related to environmental education and stimulate a culture of water conservation."

U.S. teachers report appreciating the opportunity for one-on-one curriculum planning that the ECOSTART team offers. Teachers pinpoint specific units they want to incorporate in their curriculum, then meet with ECOSTART members to discuss planning and logistics in their particular geographical context. They enjoy learning to use computer materials and GPS in their high school science classes to map water monitoring projects.

ECOSTART teams have learned the following from their experiences thus far:

- Instruction for teachers has to be linked to curriculum requirements in language arts, science, math, geography, and the arts to be multidisciplinary;



*Students in an ECOSTART class in Mexico.*

- Instructional teams should first become familiar with local water issues and learn what the teachers have already experienced in environmental education and want to accomplish/gain from further professional development;
- Community resources such as museums, water companies, newspapers, and forums effectively supplement and complement academic and professional experience;
- Workshops should be geared to specific grade levels with an emphasis on alternative teaching strategies, such as classroom and field activities, based on available financial and ecological resources;
- Organizers should recognize that communities may give priority to other issues such as economic growth and health;
- Discussions and activities on water resource use and conservation can be linked with weather observations and drought indicators.

Currently, ECOSTART is working to expand the existing water education program in Sonora in northwestern Mexico. Specific efforts include Project WET and GLOBE workshops, working with the Centro de Maestros and Scouts of Mexico in levels K-12 and colleges in Cananea and Hermosillo, Sonora. The expanded program will include climate vulnerability components, GPS training to aid in water quality monitoring, and water and community health, all in Spanish.

*The authors thank the Consortium for North American Higher Education Collaboration, U.S. Environmental Protection Agency, Morris K. Udall Foundation, SAHRA, Sierra Vista Rotary Club, Club de Rotarios de Cananea, and Cananea Centro de Maestros for their funding and support. For further information, visit [www.udallcenter.arizona.edu/programs/usmex/ecostart](http://www.udallcenter.arizona.edu/programs/usmex/ecostart).*