Transboundary Watershed Education as a Tool for Building International Cooperation

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Abstract
Water management is framed in terms of political boundaries, but water flows across them. Transboundary watersheds present unique water management challenges as water use in one nation can affect water users in another. This dynamic can cause conflict. During the past six years, Project WET International (Water Education for Teachers) and the Discover a Watershed Series have encouraged international cooperation and understanding through the development of watershed-based educational materials focused on the Rio Grande/Rio Bravo and Colorado River Watersheds, both of which are shared by the United States and Mexico. The development of these programs was directed by international leadership teams, funded by organizations in both countries, and implemented using simultaneously interpreted development workshops. All materials are available in English and Spanish and are being used to teach children about water resources in the United States and Mexico. These watershed-based education initiatives are a model for building international cooperation and understanding through education.
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Introduction
Without water, life cannot exist. Rivers connect people and ecosystems through communities’ mutual need for water. Rivers may mark political boundaries, but their tributaries flow from both sides. Pollute or overuse water in a tributary and the river to which it flows will be affected. Viewed in this way, rivers and their watersheds are systems in which resident water users, no matter how distant, are affected by water use in other areas. Water users must cooperate to meet a broad spectrum of water needs, but without an understanding of the values and needs of other stakeholders, this cooperation is difficult to attain and managing the resource is made more difficult.

When a river crosses international borders, its management becomes even more challenging. On either side of the border, water is managed according to rules and regulations that have been developed to match social and cultural values there. Water that flows across a border carries with it the result of a multitude of uses and management decisions made upstream. This is true worldwide; more than 300 watersheds are shared by two or more countries.

As populations grow, it becomes increasingly difficult to develop systems that meet the needs of all water users. Compromise and innovative thinking will continue to be necessary in order to meet water needs. Project WET International’s experience in developing transboundary water education programs has shown that education and the development of teaching resources can foster an environment of cooperation and collaboration as well as improving understanding of the issues involved in managing an international river. Through an egalitarian, international curriculum development process, a network of transboundary educators and water resource managers has been established. This network will serve as a foundation for continuing the discussion of transboundary education and water management.

If today’s children—future leaders in water resource management—learn how the universal need for water binds us all together, the development of future solutions will be facilitated and conflict minimized.

Watershed-based Education
Ecosystems, cultures, and economies develop around water and a river is the liquid link that binds together its users. Whether it is a local stream or an international waterway, changes in water supply affect the people, plants, and animals using its water. In this sense, a watershed is not only a geographic distinction (an area of land that drains to the same river); it also encompasses the cultures and ecosystems that are connected to and use its water. Watersheds present an ideal unifying theme for educational programs addressing water resources.

The Discover a Watershed Series, a program of Project WET International, focuses on major watersheds in North and Central America and uses an unbiased approach to promote awareness, appreciation, knowledge, and stewardship of watersheds and water. Materials in the series cross political, cultural, economic, and natural boundaries and are specific to individual watersheds. The series is guided by the following convictions: 1) water is important for all water users, 2) wise water management is crucial for providing tomorrow’s children social and economic stability in a healthy environment, 3) awareness of and respect for water resources can encourage a personal, lifelong commitment to responsible and positive community participation.
To date, the Discover a Watershed Series (DAWS) has focused on five major watersheds including the Missouri River, the Florida Everglades, the Rio Grande/Río Bravo River, the Columbia River, and the Colorado River. Each watershed project in the series has three core elements: publications, education events, and networking services. The publication process includes building a watershed-wide network of educators and resource managers through curriculum development and training workshops. This network collaborates to develop an Educators Guide (200-500 pages), which provides background information and lesson plans designed to teach students about the geography, hydrology, ecology, cultures, history, and water management issues of the watershed. In addition, one or more 16-page, full-color, KIDs (Kids In Discovery Series) Activity Booklets are developed. These KIDs booklets are designed for 8–12 year olds, to present information about water resources in a fun and informative way, and can be used in classrooms, at education events, and in other educational settings.

Both the Rio Grande (Río Bravo in Mexico) and Colorado Rivers are transboundary streams, and will be the focus of this presentation. During the development of Discover a Watershed: The Rio Grande/Río Bravo and Discover a Watershed: The Colorado, Project WET International worked with hundreds of educators and water resource managers from the United States and Mexico to create educational programs that are relevant to diverse areas of the watershed and fairly discuss the water needs of a variety of water users. When used in formal and non-formal education settings, this helps to develop understanding that facilitates communication and encourages collaboration.

The Rio Grande/Río Bravo and the Colorado River: International Watersheds
The Rio Grande begins in the mountains of Colorado and flows south to its mouth at the Gulf of Mexico. For much of its journey the river forms the border between the United States and Mexico, its waters shared by the two countries. By the time it reaches El Paso, Texas (U.S. side) and Juarez, Chihuahua (Mexico side), the river is a trickle, its waters used for drinking, farming, and industry among other things. Only after the Conchos, flowing north from Mexico, joins the river is its flow restored. By the time the river reaches its end it has been depleted; a few hundred yards short of the Gulf of Mexico, the river disappears into the sand.

On the Colorado River, the story is similar. The river begins in the mountains of Colorado and Wyoming and, in most years, is completely used up before reaching its mouth at the Gulf of California (Sea of Cortez) in Baja California and Sonora, Mexico. Although there are no major Mexican tributaries that contribute to its flow, the river historically had great volume by the time it reached the border and communities in Baja California and Sonora have relied on the river for thousands of years.

The Colorado and Rio Grande/Río Bravo Rivers and their tributaries are lifelines in the arid southwestern United States and northwestern Mexico. During the journey to the sea, their waters are used and reused by humans for drinking, washing, raising crops, industry, and other uses (it is estimated that water in the Colorado, for example, may be re-used as many as seventeen times between headwaters and mouth). Fish, wildlife, plants, and other organisms also rely on the water carried by the river and its tributaries.

Both the Colorado and Rio Grande/Río Bravo Rivers face over-allocation, pollution, altered ecosystems, and other problems. These issues are complicated within individual countries themselves, and become more difficult when they involve two countries. For example, on the Rio Grande/Río Bravo, increased agricultural development on the Rio Conchos in Mexico has made it possible for most of the flow of the Conchos to be used before it reaches the Rio Grande/Río
Bravo. Increased development, in addition to drought, has strained limited water supplies and resulted in increased tension between water users in both countries. The international treaty that governs both the Rio Grande and Colorado Rivers (the 1944 U.S – Mexico Water Treaty) requires specific deliveries of water to entities in both countries; however, situations on the two rivers have changed dramatically in the sixty years since it was drafted.

Another current issue that is raising questions of water policy is in the Colorado River Watershed on the United States/Mexico border, where the Imperial Irrigation District in California is working to reduce the amount of water it loses to seepage from the unlined All American Canal. The irrigation district plans to line a thirty-mile section with cement to prevent the water loss.

This action causes a problem for water users in Mexico who use ground water that has seeped from the All American Canal to irrigate crops. Thousands of acres of crops provide millions of dollars of economic benefit to the region, and much of this land relies on shallow ground water. When the canal is lined, the water supply will disappear. As guided by international treaty, the United States is entitled to the water seeping from the canal, but it has become important to the livelihood of farmers in Mexico.

These examples illustrate only two of the myriad challenges facing policy makers and transboundary water managers in the U.S. and Mexico. When stakeholders on both sides of the border are educated about the effects of various actions, it is more likely that informed discussions will lead to mutual understanding and workable solutions.

**Discover a Watershed Series Project Development**

The development of a DAWS project begins with the establishment of a partnership of sponsors. For the Colorado Project, initial grants were provided by the Bureau of Reclamation’s Upper and Lower Colorado Regional offices. Major support was then provided by a private funder from the United States whose challenge grants in turn leveraged additional funds from U.S. agencies and private donors. A partnership with the Mexican Institute for Water Technology (IMTA) was developed at the project’s inception; this partnership helped in securing significant funding from a private Mexican foundation. The Rio Grande/Río Bravo project was funded primarily by the Bureau of Reclamation and a private sponsor from the United States, with important in-kind contributions from IMTA and other Mexican water agencies. On both projects, efforts were made to involve local agencies and individuals in the development process.

Once funding for a transboundary DAWS project has been established, an international leadership team is organized to guide the project. Leaders in education and water resources are included in this team of 10–15 individuals. Their input helps to ensure that regional and cultural biases are avoided in the curriculum development and program implementation. In the Colorado project, Leadership Team members include educators and resource managers from California, Arizona, Colorado, Utah, Nevada, Montana, Sonora, Baja California, and the Federal District of Mexico. Rio Grande/Río Bravo Leadership Team members also included representatives from throughout the region. This team traveled through the watershed in order to become more familiar with it before identifying issues to be addressed. In addition, the team helped to build a larger network of people interested in the watershed and issues associated with it.

During the Discover a Watershed: The Colorado project, this connection to local communities was extended beyond the Leadership Team through the implementation of a watershed expedition for college students. A group of competitively selected university students from the United States and Mexico traveled on a 6-week expedition from the headwaters to the delta of the Colorado River. Their purpose was to research water-related issues associated with the watershed and to
learn from diverse stakeholders throughout the region. The results of their investigation helped guide the writing of the *Discover a Watershed: The Colorado Educators Guide* by communicating the diverse perspectives associated with Colorado River water use.

One of the roles that Leadership Team members fulfill in representing their region of the watershed is to help identify other educators and resource managers that may be interested in participating in the project. Curriculum development workshops are a critical part of the development of DAWS projects. During the workshops, educators and resource managers from a variety of backgrounds and parts of the watershed collaborate to develop teaching methods that will be included in the Educators Guide.

When a watershed encompasses regions where more than one language is used, workshops are simultaneously interpreted. This is essential as it facilitates equal participation from all water users. The dialogue about water and watershed resources is deepened and colleagues are developed where language barriers would otherwise have been prohibitive. Materials developed during the workshop are then incorporated into a *Discover a Watershed Educators Guide*, which is published in both English and Spanish. The guides are extensively reviewed by experts in a variety of fields and from both sides of the international border.

This international and multi-language approach results in programs that are appropriate in both countries. Discover a Watershed Series material published in more than one language are not simply translations—they are internationally and cooperatively developed programs that are relevant to residents on either side of the international border.
While the unique and valuable teaching materials that result from Discover a Watershed projects are the primary product, the development process itself is important, as it creates a community of diverse educators from throughout the watershed who otherwise would not have had the opportunity to collaborate. The development of the *Discover a Watershed: The Colorado* and *Discover a Watershed: The Rio Grande/Río Bravo Educators Guides* have established strong bonds between educators and resource managers in the United States and Mexico. These connections create a ripple effect, as educators share their understanding and knowledge with students through use of the curriculum, by conducting teacher-training workshops, and by developing additional collaborative projects. These relationships help to establish ongoing distribution networks that ensure that the materials will be used and continue to have impact throughout the watershed.

**Conclusion**
By developing broad understanding about how water connects all water users and by building collaborative relationships among teachers, citizens, and water resource managers, the Discover a
Watershed Series helps facilitate the management of transboundary waters. When water users understand how they affect and are affected by other water users, they are more likely to work together to develop mutually acceptable solutions.

It is our hope that the Discover a Watershed Series will inspire teachers and students to connect to their watershed, use its water wisely, and develop sustainable water management solutions. Good policy decisions rely on the presence of sound information to make informed decisions. Children become leaders. This program’s goal is to build a foundation of understanding to assist them in making a positive difference through informed decisions, personal actions, and future leadership.

References

