

Water-Resources Management in the San Pedro Basin: Building Binational Alliances

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Transboundary water management poses difficult institutional and cultural challenges for U.S.–Mexico watershed initiatives, yet current and past experiences can offer useful lessons for other transboundary water managers and policymakers attempting to use coordinated resource management to better address water allotment and quality issues. While acknowledging that transboundary watershed initiatives in this region are relatively new and “their operational scope, mode of decision-making, and linkages amongst participating actors vary considerably by area and project throughout the border region” (Mumme 2002: 6), the potential for transboundary watershed initiatives to build on the experiences of others points to the value of a comparative case study. At the same time, generalizing about organizational structure and process of these initiatives is much easier than evaluating performance and productivity. Effective governance structures generally reflect specific local or regional contexts, yet if we base our discussion on the premise that “building local initiatives can advance regional cooperation on water resources” (Brown 2000), we must ask, What makes local initiatives successful? While it is too early in the development of U.S.–Mexico transboundary watershed initiatives to evaluate outcomes comprehensively, we can draw from the literature on watershed initiatives in the western United States and Mexico the following analytical criteria (Kenney et al. 2000: xii, 403; Born and Genskow 2000; Barba Pérez 1998; Barragán 1999: 550–57; Canto 1998: 77–97; Leach and Pelkey 2001; Olivera 2001: 53–64; Schuett, Selin, and Carr 2001; U.S. Environmental Protection Agency 1998):

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1. historical setting and current water resource issues;
2. organizational constraints, including clear identification of mission and focus with long-range vision and goals, monitoring and assessment, well-defined process rules, decision-making style, strong leadership, and consistent funding;
3. representation of all interests: state and municipal agencies, non-governmental organizations (NGOs), and private stakeholders, with the development of trust and mutual understanding; and
4. linkages between science, policy, and local stakeholder interests, and the education of participants and public in science and policy.

This case study examines two watershed initiatives in the upper San Pedro River basin, located in northeastern Sonora, Mexico, and southeastern Arizona. The basin was selected on the basis of our collective multiyear experiences working as participant-observers, policy analysts, program managers, and community collaborators. We begin with a brief account of the methodologies used in the case study and descriptions of the two watershed initiatives, stressing their similarities and differences. We then examine both initiatives in terms of (a) historical setting and current water resource issues, (b) organizational structures and processes, (c) representation of stakeholder interests, and (d) linkages between policy and science with basin stakeholders. We also compare their relative successes and problems. We anticipate that the scale of the basin and specifically, the level of government at which resource-management problems are addressed and policy implemented will be important in terms of effective management. We also expect national governments to have a stronger role in the policy debate than will the states, despite decentralization playing an increasingly important role in the rise of regional watershed groups. We conclude with a look at the implications of these differences in the two portions of the basin for coordinated binational resource management and with a discussion of the significance of this case study for potential transboundary collaboration.

METHODOLOGY

Surveys are frequently used to evaluate the performance and effectiveness of western U.S. watersheds (Born and Genskow 2000; Buffalo River Stewardship Foundation 2000; Leach 2000; Kenney 2000), as are

case studies involving interviews, text analysis, participant observation, or some combination thereof (Imperial and Hennessey 2000; U.S. Environmental Protection Agency 1998; Schuett, Selin, and Carr 2001). Our approach was to interview agency members, NGO staff, municipal officials, water managers, legislators, and other policymakers; to use our own experiences as participant-observers, policy analysts, and collaborators; and to review case studies of transboundary watershed initiatives.

THE CASE OF THE SAN PEDRO BASIN

The San Pedro River originates in northern Sonora, Mexico, and flows north into Arizona, eventually joining the Gila River, which flows into the Colorado River and later drains into the Gulf of California. As noted in figure 1, the upper San Pedro River basin (USPB), which lies entirely within the Basin and Range Province, consists of the northwest-trending San Pedro River valley and the surrounding mountains, ranging from 4,200 feet (1,280 meters) to 3,300 feet (1,006 meters). The basin represents a transitional area between the Sonoran and Chihuahuan Deserts, with topography, climate, and vegetation varying considerably across the watershed (Kepner, Edmonds, and Watts 2002: 7).

The USPB, an area of approximately 1,875 square miles (6,400 kilometers), can be characterized as a mixture of desert and grasslands ecosystems with semiarid climate. Precipitation varies from a little more than 450 mm/year in Cananea, Sonora, at the southern end of the basin, to about 270 mm/year in the lowlands outside of Sierra Vista, Arizona (U.S. Department of the Interior 1997: 3; Vionnet and Maddock 1992: 2–6). A change in land cover from grasslands to mesquite from 1973 to 1986 was the result primarily of climate fluctuations, livestock grazing, and more recently, rapid urbanization (Arias 2001: 6–7, Kepner, Edmonds, and Watts 2002: 18).

Approximately 114,000 people live and work in seven incorporated towns and several unincorporated communities in the two countries within the USPB. Population in the Mexican portion of the USPB is concentrated in Cananea and Naco, Sonora. Most of Cananea's 32,000 residents depend economically on the copper-mining operation that has been there for more than one hundred years. Closer to the border, Naco has approximately 5,300 residents, which can grow to 7,000, counting

UPPER SAN PEDRO RIVER BASIN U.S. and Mexico

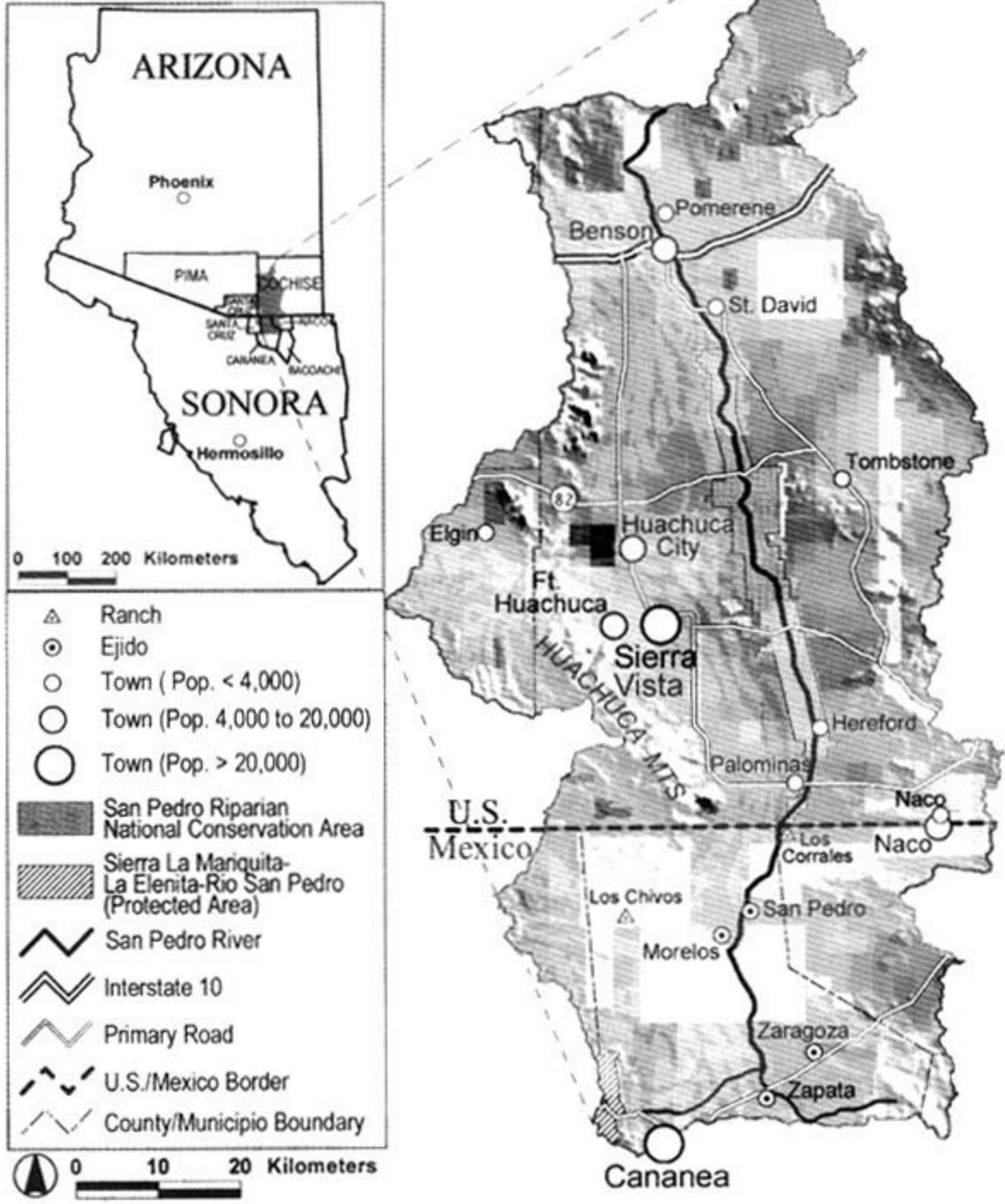


Figure 1. Upper San Pedro River Basin.

transient workers waiting to cross into the United States (INEGI 2000). Approximately nine *ejidos*, or communal agricultural settlements, are dispersed across the Mexican portion of the region. In the U.S. part of the basin, population is concentrated in Sierra Vista, with 38,000 residents, drawn largely from the army base at Ft. Huachuca and retirees (U.S. Census Bureau 2000; Varady, Moote, and Merideth 2000).

HISTORICAL SETTING

Conflict over water issues needs to be understood in terms not only of scarcity or quality, but also in the context of conflicting attitudes and meanings developed over time; the local historical setting strongly influences international dynamics (Wolf 2002: 11). In the U.S. side of the basin, the legacy of the frontier Ft. Huachuca and an “independent spirit” characterize many of the stakeholders’ reasons for moving to the area. This perception has affected views of resource use, transformation of the environment, and private property rights and helps explain the pro-development position of some stakeholders (Varady and Morehouse 2003: 19). In the Mexican portion, Cananea has a reputation as the town that sparked the Mexican Revolution with its 1906 strike against the mine owner, William Cornell Greene, who once wanted to make Cananea a part of the United States. Cananea has had a century-long tradition of social activism that has included concern with environmental problems affecting community health, but the mine management’s economic power and influence in the community have traditionally subdued environmental protest (Browning-Aiken 2000: 240–74).

More recently, in 1998, the Commission for Environmental Cooperation (CEC) initiated a study of the San Pedro Riparian National Conservation Area (SPRNCA) characterizing the physical and biological conditions required to sustain and enhance the riparian migratory bird habitat on the upper San Pedro River (Udall Center 1998). The CEC asked the Udall Center to facilitate a public response period to the report written by the advisory panel of experts, and the panel developed policy recommendations, which included coordinated water resource management of the transboundary basin (San Pedro Advisory Panel 1998).

WATER ISSUES

Several issues of water allocation, demand, and quality create challenges and conflict.

Multiple Uses

More recently, water-allocation issues surrounding human and environmental uses have become critical concerns and have sparked divisiveness among water users and water-management entities. Agriculture, cattle grazing, mining, and recreation remain the predominant land uses, though they are being supplanted by increasing urbanization. Additionally, as one of the most ecologically diverse areas in the Western Hemisphere, the basin contains as many as twenty different biotic communities and supports a number of plant and animal species of special concern to both countries. The SPRNCA, an area of approximately 7,280 acres (18,200 hectares) managed by the U.S. Bureau of Land Management, is located north of the border. This strip is a major North American migratory bird corridor used by more than 350 species (CEC 1999; Liverman et al. 1997). The area has also been the object of an extensive series of observation and modeling activities by the Semi-Arid Hydrology and Riparian Areas Project (SAHRA) at the University of Arizona, the Semi-Arid Land-Surface-Atmosphere Program (SALSA), the Southwest Center for Environmental Research and Policy (SCERP), and the Instituto del Medio Ambiente y el Desarrollo Sustentable del Estado de Sonora (IMADES), among others.

Demand

For the basin as a whole, most of the water demand has been for mining, municipal and domestic use, and irrigated agriculture. Recent research suggests that riparian vegetation also requires a large portion of the water budget. In northern Mexico predicted decline in water availability due to climate variability may exacerbate competition for water resources between productive sectors, such as agriculture and industry, and domestic consumption (Magaña and Conde 2001: 1). Currently the basin's water supply is considered to be in deficit, with annual withdrawals exceeding recharge by approximately six to twelve

million cubic meters. Increased production of copper from extensive ore reserves in Mexico limits groundwater availability for municipal and agricultural uses in that region and compromises water-conservation efforts. Expansion and modernization of the Cananea mine, particularly of the new concentrator, from 1978 to 1986 and again between 1992 and 1997, increased water extraction from 12.9 million cubic meters in 1980 to 20.2 million cubic meters in 1989 and 18 million cubic meters in 1990. On the U.S. side of the basin, total water extraction was 12.2 million cubic meters (CEC 1999: 4, 50; SIUE 1993: 19, 21). Pumping in Sonora between Naco and Cananea in 1986 was estimated at 11.28 million cubic meters, but forty-eight wells were drilled between 1986 and 1994 to increase the water supply for mining operations, building up the pumping capacity to 40.2 million cubic meters (Arias 2001: 210). The Comisión Nacional de Agua (Mexican National Water Commission) has recommended reducing the mine's use of fresh well water (SIUE 1993: 19, 76). Population projections for southeastern Arizona parallel those elsewhere in the Southwest—with roughly a 40 percent increase anticipated from 2000 to 2030 (Arizona Department of Economic Security 1997)—and will result in a major rise in water use to support subsequent municipal and domestic needs.

Quality

In addition to the potential for water scarcity associated with overextraction and climate variability, groundwater and surface-water contamination also affects the quality of potable water supplies near the source of the San Pedro River. Inadequate (Naco) or nonexistent (Cananea) wastewater-treatment plants contribute to uncontrolled discharge of residual waters into the river. Unlined landfills introduce a variety of known and unknown substances that infiltrate into the aquifer. Moreover, the copper mines produce industrial waste that contaminates groundwater supplies via unlined and occasionally overflowing tailing dams (Moreno 1991: 7; Jamail and Ullery 1979: 37–45; Zavala 1987: 5). With the approval of the municipalities of Cananea and Naco, Sonora, and the support of the International Boundary and Water Commission (IBWC) and its Mexican counterpart, the Comisión Internacional de Límites y Aguas (CILA), the University of Sonora's Department of Scientific Research and Technology (DICTUS), and the Arizona Department of Environmental Quality (ADEQ) conducted water-quality tests

of the San Pedro River from 1997 to 1999. Results indicated the presence of raw sewage and mining by-products, including cadmium, chromium, copper, iron, manganese, nickel, and lead, near the headwaters of the San Pedro and in wells close to Cananea (Da Viana 1998: 1; Kamp 1999; Gómez-Alvarez et al. 2002: 385). Further studies are needed to detect possible health problems due to the accumulation of heavy metals and sewage (nutrients) in people living in communities located along the San Pedro River.

In the U.S. portion of the basin, numerous projects, SALSA and SAHRA particularly, have been conducting research on the hydrogeology of the area and the water needs of the SPRNCA. The purpose of this research is to provide information essential to the watershed organization, the Upper San Pedro Partnership (hereafter the Partnership), in constructing a water-conservation plan. The military base has lowered its water use considerably, and other conservation measures are being implemented. However, both the military base and the SPRNCA, as reserved areas, have prior rights claims to basin water, and the community in general and the Partnership in particular face both environment versus development and rural versus urban water conflicts.

These conflicts are complicated by binational suspicion. Mexican communities commonly think Sierra Vista wants Sonora to conserve basin water in order to promote more urban development, while some Sierra Vista residents believe that the Cananea mine's increased water use will dry up the SPRNCA and that its untreated sewage and heavy metals could contaminate San Pedro water flowing into the United States.

ORGANIZATIONAL CONSTRAINTS

ARASA

In 2001, a diverse group of stakeholders created ARASA, or the Sonora-Arizona Regional Environmental Association, in Sonora, Mexico. The founders included teachers, doctors, mining engineers, attorneys, farmers, ranchers, and other citizens from Cananea and Naco, Sonora, as well as a small number of participants from Arizona, who sought to address regional environmental issues in Sonora. ARASA has defined its objective as being "to carry out actions that benefit the environment and at the same time improve the quality of life, through projects and actions

oriented towards the protection, preservation, education, and scientific investigation of ecosystems and populations in the northeastern region of Sonora and southern region of Arizona.” Additionally, members created an organizational philosophy of respect, tolerance, honesty, and professionalism.

ARASA’s success has been impeded by a number of factors common to developing grassroots efforts. First, it has experienced difficulty narrowing its focus. Issues under consideration range from forest fires to environmental education and from biodiversity to industrial waste, to name just a few. Until recently, ARASA was unable to limit itself to a small number of issues it could begin work on and consequently establish its viability within the community.

Similarly, insufficient organizational skills among the leaders has detracted from ARASA’s effectiveness and deterred participation from citizens and state and regional agencies. Some members complain that, “They [ARASA] talk more than they act.” However, given the fact that ARASA has been organized for only a few years, it has been remarkably successful in obtaining funding, constructing an organizational infrastructure with subcommittees, and selecting work activities tied to its objectives, including working with its U.S. counterpart, the Partnership.

At the same time, poor access to scientific information has limited ARASA’s capacity to carry out projects. A baseline of scientific evidence is essential. Without such information, ARASA’s work cannot be fully legitimized in the eyes of local industries, federal and state agencies, and local communities. With this in mind, ARASA has recently established a technical subcommittee to collect and interpret current research on the hydrogeology of the basin and on land-use changes.

Finally, the search for funding has delayed project implementation, the development of group infrastructure, and the ability of the administrative council to move forward. ARASA has obtained grants from the Mascareñas Foundation and Foundation Mexico for Conservation, donations, and in-kind contributions by members. While ARASA now has office support, meeting space, and funding for environmental education, implementing projects will require additional money. Furthermore, ARASA depends on council members to volunteer their time, but many of them have one or two jobs along with ARASA responsibilities. Still, ARASA has defied heavy odds simply in coming into existence: no real government support, a powerful mining coalition, few resources, and a town fearful that environmental reform would threaten economic survival.

Upper San Pedro Partnership

In 1998 the CEC initiated a technical study of the effects of water withdrawals on the international flyway along the river in response to a lawsuit filed by the Center for Biological Diversity. “Over strenuous objections by some local officials, property-rights advocates, and anti-United Nations activists,” a binational team completed the study and issued a report, *Ribbon of Life: An Agenda for Preserving Transboundary Migratory Bird Habitat on the Upper San Pedro River* (1999). The CEC, recognizing the importance of public response to this report, requested that the Udall Center conduct a public-input process with basin stakeholders and residents. One of the report’s recommendations was that multi-stakeholder watershed initiatives be created to help watershed decision making (CEC 1999; Emerson, et al. 1998; Varady and Morehouse 2003: 25–26).

One year later a binational conference, “Divided Waters, Common Ground,” was held in the basin, and a group of U.S. basin stakeholders began meeting in Sierra Vista. Within a year this group constituted itself into a watershed initiative, the Upper San Pedro Partnership. The Partnership’s mission was “to coordinate and cooperate in the identification, prioritization and implementation of comprehensive policies and projects to assist in meeting water needs . . . to protect the people and natural resources of the Sierra Vista Sub-watershed . . . [and] to ensure an adequate long-term groundwater supply is available to meet the reasonable needs of both the area’s residents and property owners (current and future) and the San Pedro Riparian National Conservation Area (SPRNCA)” (Upper San Pedro Partnership 2002: 2). The Partnership has been conducting research on basin geology, quantifying the hydrologic cycle in the basin, and developing hydrologic models in collaboration with other scientists. While the research is not yet completed, preliminary information has enabled the Partnership to begin developing a conservation plan to eliminate deficit water use in the sub-basin.

The Partnership Advisory Committee meets monthly in a venue open to the public and has formed its Staff Working Group whose chief concern is the conservation plan. The chairperson conducts meetings with a clearly established agenda. The Partnership has developed a \$34 million five-year plan that pools financial resources from federal and state agencies.

Looking at both of these sub-basin groups, we can easily see that the Partnership has had three years longer to evolve and to acquire funding for projects. Similarly, the Partnership has established an organizational structure with subcommittees working on specific tasks, while ARASA has just begun to do this. Each group benefits from strong leadership from dedicated local people knowledgeable in policy issues and community concerns. Fortunately both ARASA and the Partnership have as part of their goals strengthening collaboration. The two organizations have exchanged letters indicating their desire to work together on a shared agenda regarding the exchange of scientific information and discussion of water-conservation strategies. The Dialogue on Water and Climate (described later) provides a forum for the groups to meet and discuss potential coordinated management projects.

REPRESENTATION OF STAKEHOLDER INTERESTS

ARASA

ARASA has developed a solid base among teachers, ranchers, and three Mexican environmental NGOs. However, membership and attendance suffered when ARASA became involved in a political controversy in 1999 over the attempted creation of a Mexican San Pedro Reserve that set rural landowners and the mining industry against regional environmentalists and SEMARNAT, the Mexican federal environmental agency. SEMARNAT has been managing the existing Ajos-Bavispe Reserve, which former director Julia Carabias Lillo wanted to extend to include portions of the San Pedro basin. Carabias and former Department of the Interior director Bruce Babbitt signed a letter of intent to create this new Mexican reserve, called Mavavi. However, Sonoran mining companies feared their water supply would be cut off or limited, and ranchers feared their lands would be taken over and managed by SEMARNAT. Since ARASA's founders had advocated the creation of a San Pedro reserve, their role in the Mavavi flare-up placed them in a politically volatile position in the region. While this controversy has not been fully resolved, ARASA membership does include rural landowners and mining company representatives.

THE PARTNERSHIP

Membership in the Partnership's Administrative Committee (PAC), which handles financial decisions, is open only to funding agencies. Membership on the PAC consists of agency heads, elected municipal leaders, two environmental NGOs, and a water company. While other stakeholders may attend and speak during PAC and Staff Working Group meetings, they do not have decision-making authority. When the group first began to meet publicly in 1998, there was considerable tension between city council members and Partnership members, but the Partnership has since admitted city council members and worked out many of the early differences over its responsibilities and power. The relationship between elected officials and other members of the Partnership may be tested once again when the Partnership completes its conservation plan and attempts to obtain public support for it.

Of the two San Pedro watershed groups, the Partnership is more heavily represented on the government agency side, while ARASA represents a strong grassroots effort, including three Sonoran environmental groups. At the same time, Mexico historically has lacked funding and governmental support for watershed councils (*consejos de cuenca*) along the border. It is that much more surprising, then, that SEMARNAT challenged Mexican San Pedro inhabitants to form their own environmental group (R. Barba 1999). ARASA took up this challenge and positioned itself as a grassroots organization with regional support. Now it holds public meetings with open doors and more private executive council meetings.

LINKAGES

ARASA

Currently ARASA seeks, through a technical subcommittee, a scientific assessment of current geohydrologic conditions in the entire basin, and is in the process of compiling research from both sides of the border on this topic. As part of this effort, ARASA is participating with the Partnership, the Climate Assessment of the Southwest (CLIMAS), and the Udall Center for Studies in Public Policy in the Dialogue on Water and

Climate (DWC), which interprets scientific research about the region and considers how this information might help water stakeholders, including managers, understand and establish an effective coordinated watershed management plan. Outreach to community members is one of ARASA's goals, and the group is designing an educational program for schools and the community.

ARASA's strongest card may be its capacity to initiate a community environmental education program. ARASA members have already had experience with educational programs in the local schools and are working with environmental NGO La Red Fronteriza del Medio Ambiente y Salud (Borderlands Network on the Environment and Health) which specializes in environmental education projects along the border. At the same time, while several of ARASA's members have science backgrounds and some policy experience, ARASA has only just begun to establish a baseline of scientific knowledge about the basin. Linking ARASA and the Partnership is essential, initially to share scientific research occurring in the Sierra Vista sub-basin, and later possibly to coordinate resource management. Interpretation of this research is essential for both community understanding and for water managers and city planners.

The Partnership

The Partnership has had the legislative support of Representative Jim Kolbe in attracting the funding necessary for geohydrologic research in Arizona. Its success in obtaining financial support was also due to the fact that it was one of the earliest of the Arizona Rural Watershed Initiatives to request funding for watershed research, so that the available funding pot was much larger. If the Partnership were starting now, it would have seventeen other watersheds to compete with for funding. Early on, Partnership agencies developed ties with the Southwest Watershed Research Center and SALSA researchers at the University of Arizona. These researchers have helped the Partnership answer questions about water needs and existing and potential water supply in the Arizona basin.

In addition, while the Partnership's outreach program is just getting established, the group has had the advantage of an existing community environmental education program stressing water conservation (Project WET, also linked to the University of Arizona's extension in Sierra Vista).

IMPLICATIONS

The differences in these two watershed initiatives have several implications for coordinated binational watershed management:

- Historical knowledge of stakeholders' perspectives in this basin helps us understand how U.S. and Mexican stakeholders may be suspicious of each other's motives for participating in coordinated basin management. Mexicans claim upstream water rights, unlike the case in the Rio Grande or Colorado River, and see water as key to regional economic development. Downstream Sierra Vista has historical reasons for being anxious about the quality and quantity of water flowing from Mexico. The lack of economic and institutional parity between the two countries has also contributed to suspicion.
- Water issues in the two portions of the basin are different. Mexican residents have problems with water delivery and quality. Arizona inhabitants are concerned about a water deficit. However, these differences could provide bargaining strategies for both sides. Cananea and Naco need help with wastewater treatment, which could become recharge to the basin, thus potentially augmenting water available in the Arizona portion.
- Organizational constraints in the two parts of the basin could likewise be converted to strengths in coordinated management. The current DWC attempts to link the Partnership and ARASA in terms of research needs. Both organizations have geohydrologic information that the other would like to learn to improve local planning, especially with regard to decision support system models for water planners. Other opportunities exist for technology transfer, especially regarding water conservation, from Arizona to the United States.
- Watershed councils or groups should be truly representative of their stakeholders in order to obtain community acceptance and the political power to implement their decisions. Both the Partnership and ARASA could learn from each other about representation. We hope that the DWC can be a means of this occurring.
- Collaboration among scientists, policymakers, and stakeholders varies from country to country, but in the case of the San Pedro, ARASA is very interested in strengthening its ties to university researchers and stakeholders within Sonora. ARASA views the Partnership's success as being linked to its university connections. However, ARASA is suspicious of Mexican government participa-

tion in their efforts. The group feels its efforts may be co-opted by state or national agencies, as has often happened in the past.

- National policy considerations influence the potential for coordinated basin management. Local initiatives along the northern Mexican border are linked to national policy demands. Mexican environmental policy frequently runs counter to Mexican economic policy in the critical importance attached to development, especially in mineral resources and *maquiladoras* along the northern border. One study of textile enterprises indicated profits were more important than environmental protection to 46 percent of the managers. Second, SEMARNAT receives very limited resources that must be allocated among too many programs for it to effectively manage environmental policy (Romero Lankao 2001: 176–178). At the same time, within SEMARNAT the Comisión Nacional de Agua has instituted a new “culture of water” and provided guidelines for restructuring the management of aquifers through watershed councils (*consejos, comisiones, o comités de cuencas*). These watershed councils are intended to link state and municipal government with local community participation in managing and financing systems for potable water, sanitation, and irrigation (SEMARNAT CNA 2002a).
- Because the northern frontier is characterized by rapid demographic and industrial development, the border has its own water program emphasizing conservation of ecosystems, reversal of industrial contamination, public participation, and environmental education (SEMARNAT CNA 2002b: 2). This program promotes binational environmental educational programs and information exchange. While the role of environmental NGOs in the *consejos* is not discussed directly, SEMARNAT policy programs all clearly advocate the participation of civil society, including environmental groups. However, no indications of government funding support exist, except for one education program in 2002 and six planned by 2006.

CONCLUSION

What is so significant about the potential of the binational resource alliance?

While the San Pedro River is not on the same scale as the Euphrates, the Colorado, or the Rio Grande, this alliance between its two watershed organizations provides the opportunity to link science with water

management and policymakers. While basin research has been extensive in the U.S. portion of the basin, scientists on both sides realize their findings need to be integrated in order to achieve a more accurate and useful picture of watershed supply and demand. Without this integration, basin water managers and policymakers are handicapped in their planning efforts and opportunities for effective conservation strategies are more limited. The San Pedro DWC provides opportunities of scale in that hydrologic models and decision-support tools are being constructed for binational use. Transboundary, rather than separate, management strategies are especially important in a situation where what Mexican stakeholders do has the potential to affect what happens in the U.S. portion of the basin.

High stakeholder involvement, particularly on the Mexican side, increases the potential for success in any watershed initiative (Born and Genskow 2000; Imperial and Hennessey 2000; Kenney and Lord 1999; Leach 2000; Schuett et al. 2001; Scurlock and Curtis 2000; Vazquez-Castillo 2001). Public debates within these two watershed organizations have “stirred controversy and revealed the importance of accounting for the region’s social and political forces” (Varady, Moore, and Merideth 2000: 234), but this has been a necessary step in the process of educating water managers, municipal officeholders and agency representatives, as well as basin residents in general, about the science of basin water management. While this process of public debate and planning, assisted by the recently initiated DWC, will continue for years and probably decades, current Mexican and U.S. water policies encourage the linkage between grassroots stakeholder organizations, governmental agencies, and scientific research as a more effective management tool than the old top-down model. The Partnership has been receiving ample funding and legislative support for basin research, and ARASA has been successful in obtaining capacity-building and program grants within a relatively short period of time.

Finally, the diversity of administrative issues and cultural concerns in this case provides a good model of what goes on along the U.S.–Mexico border. The upper San Pedro River basin offers an opportunity of scale in that complex water issues are being addressed by scientific research and policy debate within a compressed area. As a result, the upper San Pedro has become a demonstration basin for the North American HELP and DWC projects with the idea that water managers and policymakers, especially the majority confronted with transboundary water management, can learn from each other’s experiences. ❖

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