

Local Cultural Knowledge and Water Resource Management: The Wind River Indian Reservation

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ABSTRACT / Ecology and culture comprise interacting components of landscapes. Understanding the integrative nature of the landscape is essential to establish methods for sustainable management. This research takes as a unifying theme the idea that ecological and cultural issues can be incorporated through management. As a first step in developing integrative management strategies, information must be collected that compares and contrasts ecological and cultural issues to

identify their areas of intersection. Specifically how can local cultural knowledge enable water resource management that reflects cultural and ecological values? This research examines Native American cultural knowledge for setting water resource management priorities in the Wind River Indian Reservation in central Wyoming. A cross-cultural approach is adopted to assess the relationship between indigenous cultural knowledge and Euro-American perspectives through a comparative examination of the Wind River Water Code and Wyoming Water Law. This research indicates that cultural perspectives provide a rich arena in which to examine management issues. Understanding and identifying cultural practices may be an important first step in collaborative resource management between different cultural groups to prevent conflict and lengthy resolution in court.

Worldwide environmental managers are acknowledging the long-range environmental benefits of indigenous approaches for managing natural resources (McNeely 1993; Lalonde and Morin-Labatut 1995; Huffman 1992). Indigenous people are developing resource management solutions for nature conservation and resource management agendas in diverse geographic areas (Laituri and Harvey 1995; Micheals and Laituri 1999). Indeed, resource managers are questioning whether Euro-American resource management adequately constitutes an effective model for managing resources in a sustainable fashion (Ruppert 1996). With the quantification of Reserved Indian Water Rights by many American Indian Tribes in the western United States, tribes are being recognized as senior water right holders (Checchio and Colby 1993). Reserved Indian water right judgements have established American Indians as important players in the competition for water with implications for future water allocation and use. The integration of Euro-American resource management with indigenous management adaptations may offer alternative strategies for sustainable management and develop-

ment (DeWalt 1994; Sterling 1990; Cashman 1991; Clarke 1990). Models for incorporating culturally specific information into resource management decisions are needed to provide Native American tribes and indigenous people around the world with equitable roles in resource management decisions to ensure fairness in contentious resource arenas to provide for better management practices and to guarantee legal standing.

Few research efforts have focused on developing ways to integrate indigenous ecological knowledge with Euro-American scientific perspectives. In the United States, Native Americans' cultural and ecological knowledge of local ecosystems has often been overlooked in making resource management decisions. Developing clearly defined methodologies for examining and integrating indigenous ecological knowledge with Euro-American scientific knowledge is needed to advance and enhance sustainable resource management strategies.

To address this issue of integration across cultures, a case study on local cultural knowledge of the river corridor (the stream channel and riparian ecosystem) was conducted in the Shoshone Arapaho Wind River Indian Reservation in Wyoming. The Wind River Basin the traditional home of the Shoshone for centuries, was established as a reservation under the Fort Bridger Treaty of 1868 and is the third largest in the United States. The Northern Arapaho settled on the reservation beginning in 1877 (Their Southern Arapaho rela-

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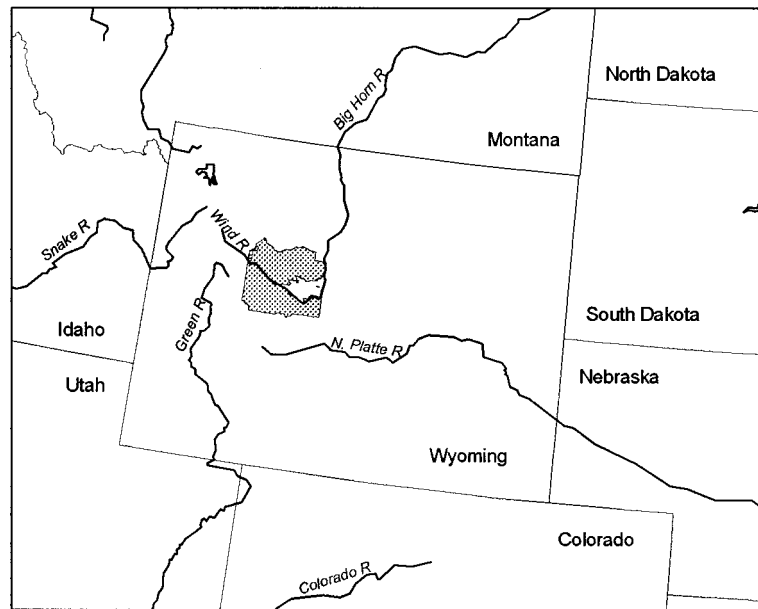


Figure 1. Map of Wind River Indian Reservation.

tives were moved with the Southern Cheyenne to a reservation in western Oklahoma, where their descendants remain today.)

The river corridor was chosen because of its ecological and cultural importance for stream channel-health plant and animal habitat, and recreational and subsistence activities for both Native Americans and Euro-Americans. Eastern Shoshone and Northern Arapaho ecological and cultural knowledge were collected through interviews and the development of a cultural database (Flanagan 2000). This database provided the basis for identifying cultural perspectives of the tribes for water resource management and is expressed in the Wind River Water Code (WRWC).

In contrast, the state of Wyoming water resource management is articulated in law and based on the Doctrine of Prior Appropriation. Arguably this Doctrine reflects the cultural milieu of the Euro-American settlers based on competition for a scarce resource and resulting in the creation of a system of water rights based on seniority and appropriation dates. The Wyoming State Water Statutes and the WRWC were analyzed to determine the relationship between Native American and Euro-American water resource management strategies and to determine where integration can occur and where compromise must be brokered. This research is particularly relevant due to the multiple demands upon scarce water resources in the American West.

Water Resources in the Wind River Indian Reservation

The Wind River Reservation is located in the Wind River Basin, Wyoming and is home to the Eastern Shoshone and Northern Arapaho tribes (Figure 1). The Reservation is 2.2 million acres. The Wind River, Popo Agie River, and Big Horn River contribute to the estimated average annual runoff of 897,000 acre-feet (Flanagan 2000). Located within the Reservation is the Riverton Reclamation Project operated and maintained by the Midvale Irrigation District a non-Indian entity. A total of 332,000 acres of reservation lands were withdrawn from the Shoshone and Arapaho tribes for the Riverton Project. In 1989, the US Supreme Court upheld the Wyoming Supreme Court decision to award the Shoshone and Arapaho tribes a reserved Indian water right of 500,717 acre-feet with a priority date of 1868 (Checchio and Colby 1993). The project includes several dams, reservoirs, canals, drains and a power plant critical to the agricultural and ranching economy of the Wind River Basin.

The Riverton Reclamation Project alters the hydrology of the Wind River and affects tribal use of water within the reservation. Water released from Bull Lake Reservoir, the main water storage facility, flows through Bull Lake Creek to the Wind River augmenting the flow. The effects of releases from Bull Lake Dam on the ecological health of the lower reaches of the Wind River have prompted studies by the Wyoming Division of Fish and Wildlife (1993) and the University of Wyo-

ming (1996). These studies have documented the effects on the stream channel and change in fish habitat associated with increased flows and sediment loads in the lower reaches of the Wind River. The tribes have no control over these flows and have been unable to protect the ecological health and blue ribbon trout habitat on the reach of the Wind River that attracts large numbers of tourists and is a tribal resource for subsistence fishing. One strategy for protecting these instream flows is by invoking their reserved Indian water rights in the Wind River. If the Wind River Reservation reserved Indian rights are considered, water rights in the Wind River Basin are overappropriated and non-Indian water rights are dependent on unused Indian water. In addition, downstream and/or junior rights are heavily dependent on return flows for irrigation further complicating water resource use and dependency on a finite water supply.

However, the tribes ability to apply their reserved Indian water rights is limited by the State Water Engineer, who has administrative authority for the Basin and, thus dictates the flow of tribal water to non-Indian water rights users in the Midvale Irrigation District. The tribes must submit requests for their reserved water right to the State Water Engineer, who determines whether the applicability of that right is allowable under the Supreme Court decision and federal and state water statutes. The tribes consider these procedures as a threat to their sovereign right to manage their water resources according to the WRWC (Wind River Tribes 1991). The Midvale Irrigation District water right holders fear that their agricultural and ranching livelihoods could be impacted by the eventual use of tribal water (Aragon, personal communication)

To date, the tribes have been unable to effectively apply their water code to certain stream reaches within the reservation and for tribal water rights. Although tribal water rights are held in trust by the tribes, they are ultimately controlled by the state of Wyoming. This control stems from a 1992 Wyoming Supreme Court decision which ruled that the tribal government did not have blanket jurisdiction over non-Indian water users on the reservation and that the state had some jurisdiction over water rights exercised on the reservation (Cheechio and Colby 1993). This ruling, coupled with the 1988 Wyoming Supreme Court ruling, which states that reserved water rights do not extend to groundwater and denied reserved water rights for instream flow and other tribal purposes, limits the tribes' ability to manage their water resources.

The Big Horn III instream flow case exemplifies this limitation. In 1977, the State of Wyoming filed suit in the Fifth Judicial District Court for the determination

of water rights in the Big Horn River basin. Because of the complexity of this case, the Special Master for the litigation divided the adjudication into three phases. Phase I addressed the quantification of the Reserved Water Rights for the Wind River Indian Reservation Phase II of the suit considered non-Indian Federal Reserved Rights. Phase III determines the status of all uncanceled, unadjudicated permits (both surface water and groundwater) in the basin.

In April 1990, the tribes dedicated a portion of their 1868 Reserved Indian Water Right to maintain instream flow in the segment of the Big Wind River that is controlled by non-Indian interests. The water rights were enacted to protect fisheries, as well as stream channel and riparian corridor habitat, water quality, cultural and spiritual needs and subsistence hunting and fishing. Under the McCarran Amendment (1952), stream adjudications associated with Indian Reserved Water Rights could be heard in state courts. The Wyoming Supreme Court denied the tribes this right. The enactment of the reserved rights would mean that first right would be allotted to the tribe in an overappropriated basin and could potentially leave junior water rights holders without water in normal and drought years. Based on their own water code, the Tribes argued for instream use as a beneficial use; however, this use is not identified as beneficial in state statutes.

Conflict between American Indians and Euro-Americans has often been based on cultural differences in their land management philosophy (Burton 1991). The need for water to support the agricultural and ranching economy of the Wind River Basin is in conflict with the Wind River tribes' application and control of their reserved Indian water rights. The Doctrine of Prior Appropriation; Wyoming Water Statutes, and the Tribal Water Code are all evidence of these conflicting demands and contrasting values.

Framework for Analysis: Cultural Perspectives and Water Resource Management

This research conducts a cross-cultural comparison of the doctrines and water codes that reflect cultural values in two distinct societies. These documents drive policy and activities that influence resource management and ecological functioning. Each set of codes; the Wyoming Water Statutes and the Wind River Water Code, were examined to identify the underlying cultural perspectives that drive water resource management.

Interviews were conducted with tribal elders, ceremonial elders, healers, and individuals familiar with cultural practices from the Eastern Shoshone and

Northern Arapaho tribal members of the Wind River Indian Reservation. This sample population was based on the ability of individuals to provide elements of Shoshone and Arapaho oral tradition, language, and indigenous knowledge. Meetings were arranged with the Tribal Business Councils, The Wind River Environmental Quality Council, and individual tribal members, which facilitated the selection of the sample population. Individuals in the sample population were identified by members of the Arapaho and Shoshone communities because of their tribal role and knowledge of cultural practices and information. Individual tribal members, who hold culturally specific positions within the community as ceremonial elders, healers, or culturally active members were identified and interviewed. The interviewees ranged in age from 35 to 80 years; of the 13 interviewed (7 Arapaho, 6 Shoshone), 4 were women. This sample of the population was by no means exhaustive of the multiple perspectives of a dynamic culture regarding their resources; rather, this sample was used to understand the basis of the Wind River Water Code that represents an agreed-upon water strategy between the two tribes of the Wind River Reservation.

A dataset of Shoshone and Arapaho cultural perspectives and specific information regarding water and the river corridor was constructed. This information provides the basis for identifying culturally specific management strategies of the Wind Rivers Water Code to compare with the Wyoming Water Code.

The Doctrine of Prior Appropriation and the Wyoming Water Statutes

Enacted in 1872, the Doctrine of Prior Appropriation determines the distribution and use of water resources by individual water right holders and users. It is premised on three principles: (1) *first in time, first in right* for access and use of water, (2) the use must be deemed beneficial, and (3) the water must be used or the right to it will be lost. *First in time, first in right* rewards water rights chronologically to those who were simply the first to divert water from its natural watercourse. Beneficial use defines the manner, measure, and limit of the water right; *water must actually be diverted and consumed if the use is to be considered beneficial*. The principle of use it or lose it mandates that water right holders use all of the allotted volume of water to its stated beneficial use or forfeit that right (Clyde 1989). The doctrine has encouraged control over and maximum use of water for economic development by private parties by way of diversion and storage of channel stream flows (Wilkinson 1990).

Wyoming water law is predicated upon the Doctrine of Prior Appropriation and articulated in Title 41 of the Wyoming State Statute (Figure 2). The statute defines beneficial use, the purposes of stream preservation, and instream flows. According to Wyoming water statutes, a water use right is a right to use the water of the state for beneficial use. Beneficial uses are administered according to their order of importance and are prioritized by Wyoming water statutes. The purpose of stream preservation is to preserve the scenic and recreational quality of Wyoming streams (§41-02-101). Instream flows are for the specific purpose to improve existing fisheries and are declared beneficial on a case-by-case basis by the State Water Engineer. Currently, instream flows can only be held by the State Water Development Commission. Despite the importance of instream flows for Eastern Shoshone and Northern Arapaho and their reserved water rights, the only reference to Indian interests in the statute relates to funding from the state for rehabilitation or expansion of existing water delivery systems and water storage projects within the Wind Rivers Indian Reservation.

The management of water through the Doctrine of Prior Appropriation and western water law are predicated upon economic development for domestic, agriculture, ranching, and industrial uses where the system of water diversion and storage have been constructed for storing and controlling the movement of water (Wilkinson 1992). Resource management and scientific methods informed by ecological knowledge provide the basis for the establishment of water law and the resulting management practices. Beneficial use is narrowly defined for activities ensuring that the water resource is fully used and exploited for development purposes (e.g., agriculture, ranching, industry). However, environmentalists, resource managers, recreationists, politicians, and nongovernmental organizations are challenging this narrow notion of beneficial use, arguing for the inclusion of Indian reserved water rights, instream flows, habitat restoration, and more sustainable development strategies. These efforts have influenced water resource management, as evidenced by the numerous states of the western United States (Oregon, California, Arizona, Idaho) that are enacting legislation or language to address instream flows for fish and wildlife resources and habitats.

The Wind River Water Code

Just as the Wyoming water statutes reflect the prevailing perspectives with regard to water from a Euro-American perspective, the WRWC reflects the cultural perspectives of the Arapahoe and Shoshone tribes (Figure 3). The code is a Euro-American construct and not

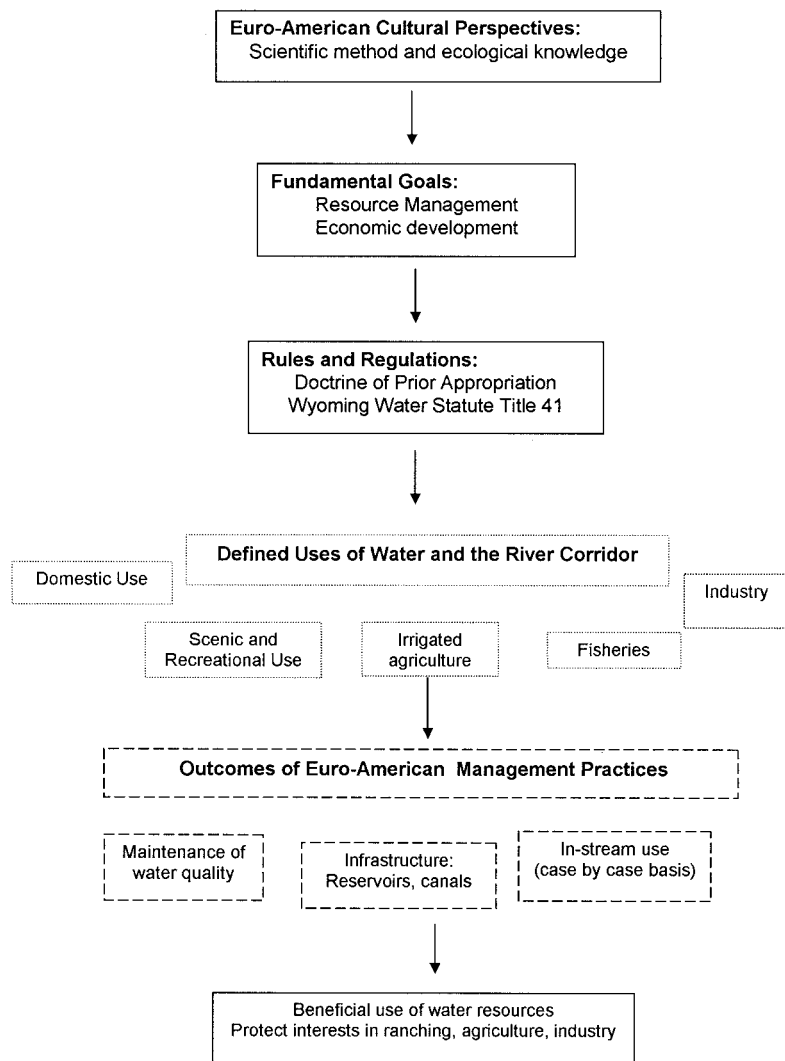


Figure 2. Euro-American cultural perspectives and water resource management.

an indigenous instrument. The two tribes created their water code in response to existing water law that does not address their specific cultural needs and legal rights. In addition, the code was created to address ongoing management activities that needed to be legally recognized.

The WRWC outlines the legal criteria for making water resource decisions and is the recognized law of the two tribes on the Wind River Indian Reservation. It was created to ensure that decisions associated with water and the river corridors are applied according to precedence set by the tribes. The code is applied when determining whether water permits and licenses should be granted to tribal members and to determine the allowable applications of reserved Indian water right.

Throughout the code, there are numerous culturally specific citations for management practices. Specifi-

cally, the code addresses the importance of interconnections between water and other resources on the landscape, identifies beneficial use of water for both cultural and religious purposes, and emphasizes the role of local indigenous ecological knowledge determining sufficient water for various uses.

The information gathered from interviews and documents describe the cultural perspectives and management strategies for the river corridor (Table 1). Water provides a strong spiritual connection between people and their surrounding environment. One tribal member states that “medicine flows along the water,” indicating the importance of ceremonial riparian plants (White, personal communication). Local ecological knowledge coupled with traditional practices are critical to resource management on the reservation. Water is essential not only for spiritual, ceremonial, and environmental purposes but

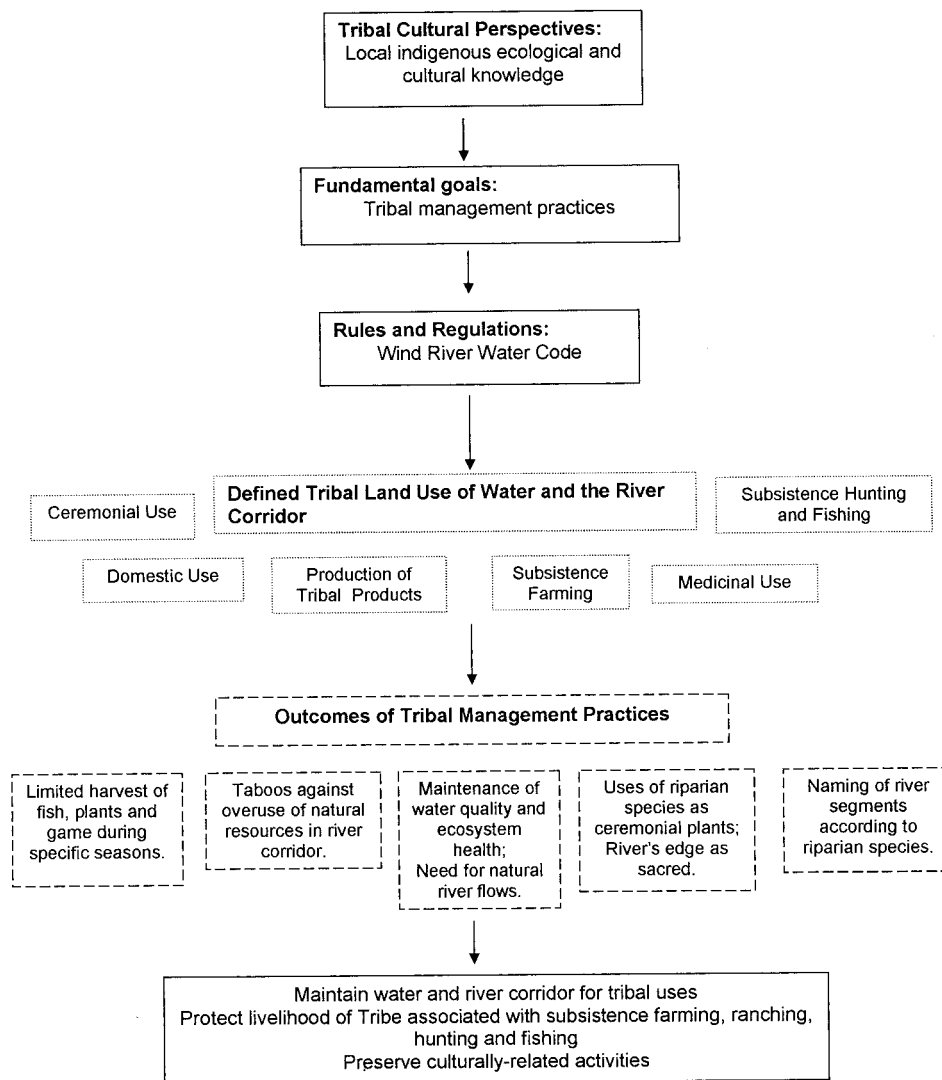


Figure 3. Araphoe and Shoshone cultural perspectives and water resource management.

also for human use. Many tribal families continue to practice subsistence agriculture, ranching, hunting, and fishing. Water and the surrounding ecosystem provide the tribe with their livelihood.

The Wind River Water Code articulates the importance of stream preservation. The Tribes find that all of the Reservation's natural resources are interconnected. They believe that water has cultural, spiritual and economic values that guide the appropriate use, management and protection of that resource. They also believe that these values condition all water and land use activities in the watersheds and drainage basins of the Reservation. [§11-8-I(A)(1), p.2]

The WRWC states: "instream flow use including instream flow for fisheries, wildlife, and pollution control, aesthetic and cultural purposes" (Wind River Tribes

1991). The tribes' desire to make the maintenance of instream flows a beneficial use predicated on cultural purposes reflects the need to create a cultural database from which to understand what is meant by cultural use and determine methods to measure such uses. A critical caveat with regard to the development of a cultural database is that such a database can and should only be developed by and for the two tribes. Outside researchers will not necessarily be invited to develop or facilitate such a process, as they are outsiders in the community.

Comparing the Water Codes: The Wind Rivers Water Code and Wyoming Water Law Statutes

Title 41 of the Wyoming State Statutes defines the management of water resources in Wyoming. The Wind

Table 1. Selected information from cultural database of Eastern Shoshone and Northern Arapaho interviews

Spiritual connection to land and water	Cultural and ecological knowledge	Tribal land-use practices
Ceremonial significance: holy water	Need for natural flow of water in streams (instream flow)	Communal ownership of water
Medicinal properties of water	Sacred places: river's edge as a sacred place Water quality must be maintained Knowledge of location of riparian plants for medicinal purposes	Cultivation of riparian plants for medicinal purposes
"The water of life"	Water provides interconnections to other parts of the ecosystem	Ceremonies that celebrate water and its importance for life
Recognition of "pure" water	Knowledge of habitat, climate, land-use practices, river flows	Taboos against overuse of natural resources in river corridor
Spiritual offerings	Understanding the hydrologic cycle	Ceremonial practices Cultivation of riparian plants
Water as elemental to life	Long-term association with land to understand human–environment relationships	Limited harvest of fish, plants, and game during specific seasons
Ceremonial use of water	Location of fishing sites, riparian species for ceremonial use	Naming of river segments based on riparian species
Importance of water in traditional stories	Significant/sacred places	Oral tradition of story-telling passed to each generation by elders

Note: The cultural database is in Flanagan, C.M. 2000. Culturally specific information in Water and River Corridor management: The Wind River Indian Reservation, unpublished master's thesis, Colorado State University.

The columns identify the unique practices that are part of each cultural perspective. The rows associate the different practices and indicate how they are connected.

Table 2. Comparison of the Wyoming and Wind River Water codes

Purpose	Wind River Water Code	Wyoming water law
Beneficial use	Domestic and municipal instream flows Cultural/religious uses Pollution control	Property of the state Economic gain Drinking purposes Municipal and industrial uses Irrigation
Stream preservation	Interconnections with all natural resources Cultural, spiritual, and economic values to guide use, management, and protection Values condition all water and land-use activities	Scenic and recreational quality of rivers and streams Studies to define character, quality, recreational, scenic, historical, aesthetic, and fish and wildlife potential
Instream flows	Maintenance of fisheries for subsistence fishing Maintenance of riparian plant species for medicinal and cultural purposes Maintenance of baseflow for ceremonial purposes	Maintain or improve existing fisheries Cannot impair or diminish rights of any other appropriator

River Indian Reservation is mentioned only in regard to state funding available for rehabilitation or expansion of existing water delivery systems and water storage projects within the Wind River Indian Reservation (Wyoming State Legislature 1998, Chapter 2, Article 11, §41-2-101).

There are three general areas of cultural conflict between the two water codes: defining and prioritizing beneficial use, the purpose of stream preservation, and the purpose of instream flows (Table 2).

1. Defining and prioritizing beneficial use. According to the Wyoming Title 41, water is regarded as the property of the state and is put to beneficial use to contribute to economic gain through agricultural, ranching, industrial, and commercial activities. Beneficial uses are administered according to their order of importance and prioritized in the following way:

Water for drinking purposes for both man and beast; water for municipal purposes; water for the use of steam engines and for general

railway use, water for culinary, laundry, bathing, refrigerating (including manufacture of ice), for stream and hot water heating plants, and steam power plants; and industrial purposes. The use of water for irrigation shall be superior and preferred to any use where water turbines or impulse water wheels are installed for power purposes; provided however, that the preferred use of steam power plants and industrial purposes herein granted shall not be construed to give the right of condemnation. (Wyoming State Legislature 1998, §44-3-102).

The beneficial use of water entails the removal of water from the stream channel for consumptive, industrial, and agricultural use. Although the tribes list domestic, municipal, and industrial uses of water as beneficial, they also include instream flow, cultural, religious, and pollution control as beneficial uses.

2. The purpose of stream preservation. According to Wyoming state law, "stream preservation feasibility studies are authorized to determine methods and criteria for preserving the scenic and recreational quality of Wyoming's rivers and stream" (§41-2-101). Feasibility studies should include "a preliminary survey to define the character, quality, recreational, scenic, historical, aesthetic, fish and wildlife potential, and any other value to be considered in preserving streams for public use and benefit" (§41-2-102). These studies are conducted by a committee of 14 members with no stipulation of tribal representation. Stream preservation is specifically identified as related to the scenic and recreational quality of Wyoming streams.

The Wind River Water Code articulates the importance of stream preservation but for different purposes and from a different perspective. The WRWC states:

"The Tribes find that all of the Reservation's natural resources are interconnected. They believe that water has cultural, spiritual and economic values that guide the appropriate use, management and protection of that resource. They also believe that these values condition all water and land use activities in the watersheds and drainage basins of the Reservation." [§11-8-I(A)(1), p.2]

3. The purpose of instream flows. According to Wyoming water law, the purpose of instream flows is "to maintain or improve existing fisheries, and are declared a beneficial use of water on a case by case basis by the State Engineer, if such use does not impair or diminish the rights of any other appropriator in Wyoming" (§41-3-1001). Instream flows are identified as needed for fisheries only and are held by the state. The WRWC specifies numerous cultural uses of the river ecosystem that require the maintenance of instream

flows: maintenance of fisheries for subsistence fishing; maintenance of riparian plant species for medicinal and cultural purposes; and maintenance of base flow for ceremonial purposes associated with the river.

Conclusion: New Dimensions in Cultural Significance for Water Resource Strategies

The WRWC is significant as a cross-cultural document informed by the cultural perspectives of the two tribes of the Wind River Reservation. It represents the adoption of a Euro-American strategy to codify American Indian perspectives for resource management. It integrates culturally specific information into a management code composed in a Euro-American legal framework demonstrating the integration of two different cultural perspectives. However, the document is only a preliminary step, as the practice and implementation of water law indicates that Wyoming Water Law will take precedence over tribal water regulations.

The competing and conflicting interests for surface water within the Wind River Basin make it difficult for the tribes to apply water to culturally determined uses. Within the Wind River Basin, water is critical to the economic livelihood of the non-Indian farmers, ranchers, and the towns of Riverton, Lander, and Dubois. The need for water off the reservation is directly related to the economies of these communities. The non-Indian communities are in competition with the two tribes for the use and control of the Reserved Indian Water Right. They are also in conflict with a societal group that does not share their cultural perspectives and whose needs are centered around beneficial uses of water defined for economic gain.

The cultural database created for this project represents an initial step in creating methods for incorporating alternative perspectives in resource management. Methods for the collection of cultural data were established with the aim of incorporating such information into existing databases that tribes are developing for resource management activities. Such data can be used to reinforce the importance of sensitive ecological areas, integrating social and physical data in new and innovative ways. However, this is a contentious process in which the community must be fully involved and issues of trust, output of products, access to data, and dissemination of various outputs need to be clearly identified and agreed upon by all participants (Laituri, 2002). In cases where information is considered too sensitive to share with other parts of the community or with researchers' data management issues will have to be developed and agreed upon. Sensitive information

represents values and ideals that do not easily translate across cultures. How can sensitive or sacred knowledge be incorporated into management strategies that are responsive to the needs of all of the cultural participants without compromising such data?

The need for providing indigenous societies an equal role in the decisions being made about their resources is apparent from biodiversity conservation and indigenous property rights research (Roht-Arriaza 1996; Cunningham 1991). The integration of indigenous and Euro-American methods of resource management needs to respect the indigenous perspectives and approaches that apply culturally specific information for resource management decisions. Understanding and identifying cultural practices may be an important first step in collaborative resource management between different cultural groups to prevent conflict and lengthy resolution in court.

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