

ARROYO

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Above are members of the Colorado River Commission. Left to right: Delph Carpenter, Colorado; W.S. Norviel, Arizona; Clarence Stetson, executive secretary of the commission; Herbert Hoover, U.S. Secretary of Commerce; James Scrugham, Nevada; R.E. Caldwell, Utah; W.F. McClure, California; Stephen B. Davis, Jr., New Mexico; and Frank C. Emerson, Wyoming.

Sharing Colorado River Water: History, Public Policy and the Colorado River Compact

1997 marks the 75th anniversary of the signing of the Colorado River Compact. Delegates from the seven Colorado River Basin states met on November 9, 1922 in New Mexico to discuss, negotiate and ultimately

work out the compact. It was then signed in the Palace of the Governors, Santa Fe, on November 24. The compact apportioned Colorado River water between Upper and Lower Basin states and, as a result, is con-

sidered a defining document in Colorado River management.

As a measure of its importance and stature, the compact became the keystone to the "Law of the River." The Law of the River is a com-

posite — some might say an “assortment” to better describe its piecemeal assemblage — of state and federal laws and regulations, court decisions, and international treaties made over time for the purpose of managing the Colorado River. Concerned with one of the West’s most important rivers, the compact clearly stands as a monument in U. S. western water law.

As befits a monument, the signing of the compact is a notable event which western water interests remember and celebrate. Accordingly, during May 28-31, 1997 a Colorado River Compact Symposium was conducted at Bishops Lodge in Santa Fe — the site where compact delegates met in 1922 — to celebrate the 75th anniversary of the signing of the compact. The symposium topic was “Using History to Understand Current Water Problems.”

Much of the following discussion relies on ideas and information coming from the May 28-31 Santa Fe conference, from individual speakers, panel discussions and informal remarks and comments.

The Compact: History & Public Policy

The theme of the May 28-31 symposium, “Using History to Understand Current Water Problems,” broadly interpreted the significance of the compact. It invited participants to view the compact both as an historical event and as public policy. Reviewing the compact’s creation and legacy in this way demonstrated that the boundary between history and public policy is not always clearly defined.

Occurring at a certain time and place, all laws and public policies have an historical and cultural significance. This significance gets more attention, however, when the Colorado River is involved, the “River of the West.” The West has al-

ways been a land of myth and legend, its symbolic importance at times overlaying, and even eclipsing its physical reality of land, water and people. And the Colorado River shares this grandeur and mystique.

Some of this rubs off on Colorado River public policy studies. What seems called for is a broader, deeper and more varied approach to such studies. Viewed accordingly the Colorado River Compact is revealed as a complex historical, cultural and public policy document.

For those interested then in the development of western water, whether the hydrology, history or current affairs, the Colorado River Compact — and, more broadly, the management of the Colorado River — becomes a rich vein to mine. More than just a water topic, the compact grandly represents a central theme of western water; i.e., the allocation of scarce water resources among competing interests to ensure present and future growth and development. The compact is this theme writ large.

The conference theme also has implications beyond the Colorado River. Its broad and interdisciplinary view of water policy, an approach that comes naturally to Colorado River studies, also is applicable in other situations of lesser scale; e.g., when managing the San Pedro, Santa Cruz or the Verde rivers. History also can be used to understand current water issues along these rivers.

History of the Compact

By the early 1920s the Colorado Basin states were anxious about their share of the Colorado River. Then, as now, California’s growth was viewed with concern. Burgeoning growth meant increased water demand, and the other Colorado Basin states feared California would establish priority rights to Colorado River water. That California con-

tributed the least amount of runoff to the river added gall to the situation.

(In her conference presentation, Pat Mulroy, general manager of the Southern Nevada Water Authority, commented, “Things have changed, but what remains the same is that California was the problem back then, and California is the problem today.”)

Concern was hardly allayed by a federal report recommending the construction of a dam “at or near Boulder Canyon” which would increase California’s access to the Colorado River. Concern turned to alarm when the U.S. Supreme Court ruled in June 1922 that the law of prior appropriation applied regardless of state lines. A fast growing state, i.e. California, could then establish priority use of Colorado River water to the extreme disadvantage of slower growing states in the upper basin.

Some form of concerted effort seemed called for. Delph Carpenter, a Colorado attorney, rose to the occasion and proposed that the

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Colorado River states negotiate a compact to determine individual state's rights to the river water. At the time interstate compacts to resolve water disputes was an untried, untested strategy.

Carpenter's reasons for advocating an interstate compact strikes a familiar note today. He was very wary—some even say paranoid—about federal involvement in state affairs and feared if the states did not get their houses in order the federal government would take charge, to the disadvantage of the states. Also, he wanted to head off litigation that would be time-and-resource consuming and believed an interstate compact would accomplish this end.

The compact's crowning accomplishment was the apportionment of Colorado River water, between Upper and Lower Basin states. The delegates initially intended to apportion river water directly to each state. A seemingly sensible approach, this strategy had the potential to prevent future conflicts among the states. The basis to determine each state's share was to be the amount of irrigable land within a state. Determining such acreage, however, proved to be a very contentious issue, one that threatened to undermine compact negotiations.

Further, as the discussions progressed it became clear to many of the delegates that the major disagreements on the table were between the upper and lower basins, not among the states within each basin. Also the data to determine appropriations to individual states simply was not available. A two-basin strategy was viewed as a means to resolve the difficulties, although it was not to the liking of all the delegates. Arizona's delegate W. S. Norviel complained, "It doesn't arrive at any conclusion, and ... it leaves the two divisions to work out their own salvation."

Despite the objections the adopted strategy was to divide Colorado River water equally between Upper and

Lower Basin states, with the demarcation line set at Lee's Ferry, located in northern Arizona's canyon country close to the Utah border. Wyoming, Colorado, Utah and New Mexico were designated Upper Basin states and California, Arizona and Nevada Lower Basin states. Each basin was to receive 7.5 million acre-feet (maf) per year. Along with their allocations, the Lower Basin states could increase their apportionment by one maf. This represented a bonus to ensure lower basin acceptance of the compact

(Actually the Upper Basin states were obliged to deliver 75 maf at Lee's Ferry during each ten-year period. The extended time frame allowed the required delivery to be averaged over time to make up for years of low flow.)

The delegates figured allocations on hydrologic data from the Reclamation Bureau that indicated annual Colorado River flow at Lees Ferry to



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be 16.4 maf. In truth, however, Colorado River flow is a good deal less than that. Data from three centuries indicate an average flow of about 13.5 maf. Also, flows are highly erratic, ranging from 4.4 maf to over 22 maf.

Built into the compact then, between what it promised and what the river was prepared to deliver, was water scarcity. There is not enough water to go around. As a result, water scarcity is the root of most of the disputes and problems subsequently arising over the compact and the Law of the River. It is a situation that links

past and present Colorado River issues and will be an abiding concern in the future.

When further examining the history of the compact and especially Arizona's role in it, water scarcity is seen as a driving force behind many developments. An historical review also shows how subsequent events affected the compact in ways that violated the political ideals of its framers. Arizona, in seeking to protect its Colorado River interests, was a key player in some of these undermining events.

Arizona Stands Firm

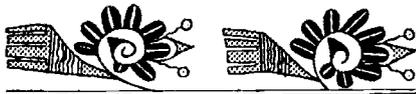
In reviewing the give and take of compact negotiators, one figure stands out as especially obstreperous and contrary, W. S. Norviel of Arizona. His insistence that the Lower Basin states receive all the water of their tributaries, plus half the river's flow at Lee's Ferry, almost wrecked the negotiations. The extra one maf that was allowed to the Lower Basin states was to placate Norviel, in a battle over whether tributary flow would be counted as part of a state's Colorado River allocation.

(Although Norviel's feistiness complicated and prolonged the proceedings, he was viewed as an effective fighter for his state's cause. Herbert Hoover, the federal chairman of the commission, described Norviel as "the best fighter on the Commission" and told him, "Arizona should erect a monument to you and entitle it 'One million acre feet.'")

Even after the signing of the compact, Arizona played a divisive role, still acting "the dog in the manger," as described by Rita Pearson, director of the Arizona Department of Water Resources, at the recent conference. Within five months of the signing all states except Arizona ratified the compact. Arizona's

Governor Hunt faulted the compact for not allocating water directly to the states, instead of to the basins. As per the compact, the law of prior appropriations would not apply between the basins, but if enforced within basins, Arizona would be competing with rapidly growing California.

The proposed Boulder Canyon project, which included construction of the All-American Canal and a high dam on the lower river, intensified



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animosity between Arizona and California. The project increased California's access to the Colorado River, to Arizona's distinct disadvantage. The bill approving the project passed despite Arizona's objections. Arizona then turned to the courts in an effort to get satisfaction, but without success.

In the early 1940s, Arizona began to reassess its strategy. To effectively use its Colorado River apportionment, the water would need to be delivered to the growing population in the south-central part of the state. State leaders realized that support for such a reclamation project would be contingent upon Arizona's ratification of the compact. On February 3, 1944, Arizona unconditionally ratified the compact, 22 years after it was negotiated. Negotiations for a Central Arizona Project commenced.

Formal approval for such a project, however, was not likely until California and Arizona resolved their dispute over Colorado River use. Lingering animosities prevented any agreement between the two states,

and so in 1952, Arizona asked the U.S. Supreme Court for a judicial apportionment.

After 11 years the mammoth and complicated case concluded. The decision in *Arizona v. California* resulted in major power shifts, between the states and between the states and the federal government. Colorado River water was apportioned, with California receiving 4.4 maf, Arizona 2.8 maf and Nevada 300,000 af, with each state also awarded all the water in their tributaries. Arizona was a big winner, gaining almost all the advantages it sought in the 1922 compact. A nagging water supply problem was resolved.

In its quest for a settlement, however, Arizona cut across the grain of the original compact, and its victory is tinged with some sense of irony. The labors of the compact negotiators were greatly motivated by a desire to avoid costly and lengthy litigation. Yet, due to Arizona's efforts, the compact has had not only its day, but literally years in court. One of the most complicated and hotly contested cases in U. S. Supreme Court history, lasting 11 years and costing almost \$5 million, *Arizona v. California* easily lived up to the worst fears of the compact negotiators.

Further, compact delegates distrusted, and in some cases actually feared federal involvement in Colorado River affairs. *Arizona v. California* opened the door to federal participation. The decision interpreted the Boulder Canyon Act as empowering the Secretary of Interior to act as water master of the Lower Colorado River, to apportion future surpluses and shortages among the states and even among users within the states.

Arizona's actions greatly contributed to undermining some of the political ideals that motivated the making of the compact. Future application and interpretation of the

compact must reckon with this legacy. Yet Arizona was merely acting to protect its interests. California was using its congressional clout to frustrate Arizona's claims. However, in turning to the courts — which generally sided with Arizona — the state brought on unintended consequences.

Arizona's dispute with California might truly be described as "living history," having roots in the past but, at the same time, sounding a theme that remains very much in force today. Concern about California still stalks Colorado Basin states, especially, once again, Arizona, and greatly determines their Colorado River policies.

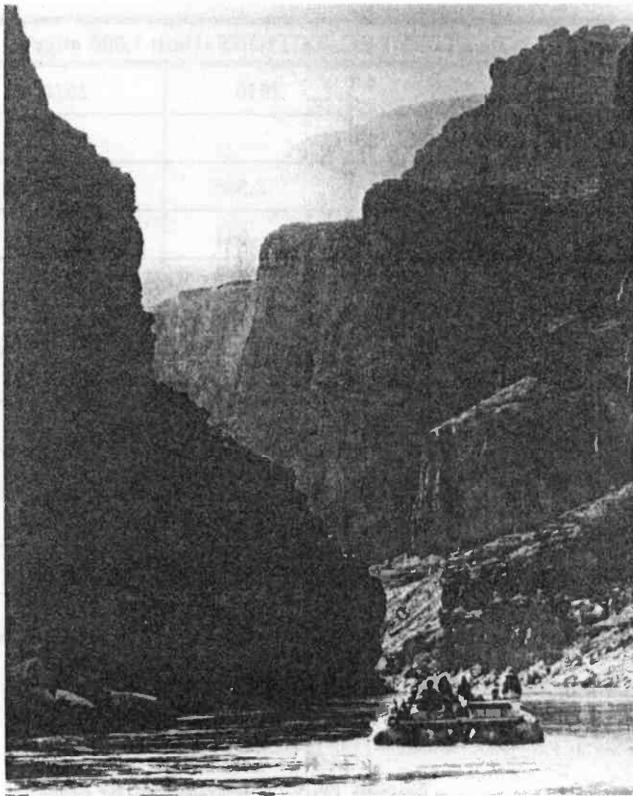
Colorado River Use Today

The compact "apportioned from the Colorado River in perpetuity to the Upper Basin and the Lower Basin" 7.5 maf each per year. The states within each basin were to work out each state's allocation. Unable to agree among themselves, the embattled Lower Basin states settled the matter in the courts.

The Upper Basin states proved more amendable to a cooperative settlement. (By reaching accord among themselves they avoided the more intrusive federal role that their quarrelsome southern states brought upon themselves.) A contract was signed in 1948 assigning 51.75 percent to Colorado, 23 percent to Utah, 14 percent to Wyoming and 11.25 percent to New Mexico.

Percentages were given rather than actual amounts because by this time the Upper Basin states were unsure of the amount of water they would have for themselves, after complying with the Law of the River and delivering 7.5 maf per year to the Lower Basin states.

The states vary to the extent they are currently using their Colorado



The Colorado River Commission did not consider recreational uses of the Colorado River when discussing river management issues in 1922. It was not until the 1992 passage of the Grand Canyon Protection Act that the recreational value of the Grand Canyon and the Colorado River was recognized.

River allocation. Development is occurring much slower in the Upper Basin states than in the Lower Basin and as result Utah, Wyoming, Colorado and New Mexico have not yet used their full allocation of Colorado River water.

The rapidly growing Lower Basin states have a more immediate need of their Colorado River apportionments. Southern Nevada anticipates that the state's 300,000 af of Colorado River allocation along with its groundwater resources will meet its needs only until about 2015. Officials are vigorously exploring options for obtaining more water, including dipping into Arizona's hitherto unused portion.

The Central Arizona Project was to enable Arizona to more fully use its full 2.8 maf allocation of Colorado River water. Transported CAP water, however, has not sold as readily as expected. As a result, Arizona in recent years still used only part of its allocation, leaving from 300,000 to one maf in the river. With the establishment of

a water bank, Arizona is expected to use almost its full allocation for the first time this year. Before the water bank, the state did not expect to use its full allocation until the mid-21st century.

Meanwhile at the end of the line is thirsty southern California. California long has profited from other states not using their full allocations. Conveniently located downriver, California has been diverting unused water apportioned to other states. Although allocated 4.4 maf of Colorado River water, California is using about 5.2 maf in 1997.

(The table on page 6 shows projections of Colorado River use for each basin state. Although the report is fairly recent, the 1990 figures still are considered estimates since obtaining final information is a lengthy process. Efforts are currently being made to facilitate the acquisition and tabulation of data to ensure a more timely release. Also, these figures do not take into consideration the effects of Arizona's new water bank. This

recent development is considered an "assessment buster.")

In this manner Colorado River water is shared and used. The system has worked up until now mainly because the states have not been using their full allocations. As each state's supply is fully appropriated the system will tighten. A milestone was reached in 1990 when Arizona, California, and Nevada consumed for the first time the total Lower Basin's 7.5 maf allocation.

Meanwhile each of the Lower Basin states has somewhat different goals in managing its Colorado River water. In response to a directive from the Secretary of the Interior, California is working on a plan to limit its use of Colorado River water to 4.4 maf per year, its legally apportioned amount. Nevada is seeking to obtain additional Colorado River water for the rapidly growing Las Vegas area, and Arizona is devising plans to use its entire entitlement, by banking or recharging water not presently needed.

Along with working out their Colorado River plans and strategies the states also must contend with various issues that compact delegates did not address and that later arose to prominence. Some, like environmental concerns, were not recognized as important at that time, while others, like Indian water rights, were simply side-stepped by compact negotiators. The result was that Law of the River would be in the making for many years to come. Many of those neglected issues are among the most important facing westerners today.

Indian Water Rights

Drafters of the Colorado River Compact were not unduly concerned with Indian water rights. Article VII, the compact's token acknowledgement of Indian water rights, was

inserted at the insistence of Herbert Hoover. Article VII simply states, "Nothing in this compact shall be construed as affecting the obligations of the United States of America to Indian Tribes."

It was not that Indian water rights was a nonissue at the time. The 1908 Supreme Court decision *Winters v. United States* recognized Indian water rights regardless of whether a tribe had used the water or not, with rights established at the time reservations were created. Further, the decision stated that the state in which a reservation is located must fulfill the tribal water right. Indian water rights then was a looming question, not one to be left hanging.

The neglected issue was to return with a vengeance in the 1963 Supreme Court decision *Arizona v. California*. Along with determining the Colorado River rights of Arizona, Nevada and California, the decision also quantified federal reserved rights of the five Indian reservations along the lower Colorado River: Chemehuevi, Cocopah, Colorado River, Fort Mohave and Quechan (Fort Yuma).

The court granted the reservations enough water to irrigate all practically irrigable acreage within their boundaries. The water was to come from the Lower Basin states' Colorado River apportionments. Under this standard, five Indian reservations with a total population of about 10,000 were granted approximately 900,000 af of water. The lower Colorado River reservations presently are using about 80 to 90 percent of their entitlement.

Because of this landmark case these tribes have the best water rights along the Lower Colorado River. From neglected interests or parties, Indians became major players.

Indians of the Upper Basin states do not have a comparable court case to define their water rights. Through federal legislation and court cases, however, the Upper Basin tribes have

COLORADO RIVER BASIN DEPLETION PROJECTIONS (Unit: 1,000 af/yr)				
	1990	2000	2010	2020
Upper Basin				
Colorado	2,296	2,445	2,565	2,636
New Mexico	503	535	641	743
Utah	857	951	1,030	1,073
Wyoming	495	505	530	539
<i>Totals</i>	4,151	4,436	4,766	4,991
Lower Basin				
Nevada	214	258	304	341
Arizona	1,351	2,019	2,373	2,537
California	5,162	4,916	4,823	4,622
<i>Totals</i>	6,727	7,193	7,500	7,500

Source: *Quality of Water, Colorado River Basin Progress Report, Number 18, January 1997. U.S. Department of the Interior Report.*

acquired about one maf.

Along with the above-mentioned tribes, other Arizona tribes have potential claims to Colorado River water. Walapai and Havasupai claim to have rights, although neither has taken any legal action. About 180 miles of the Havasupai reservation borders on the Colorado River.

Still unquantified and conceded to be potentially huge, the Navajo Tribe's water rights claim could cut into the Colorado River apportionment of four states: Arizona in the Lower Basin and New Mexico, Colorado and Utah in the Upper Basin, with the major burden on Arizona. The reservation is 25,000 square miles and is located entirely within the Colorado River basin. Its western boundary is the mainstem of the Colorado River, and two tributaries, the San Juan and the Little Colorado rivers, flow through tribal land.

Some officials have speculated on what the Navajo claim might be. Noting two such publicized figures, about two maf and five maf, Stanley Pollack, special counsel for the

Navajo Tribe, remarked at the conference that he is unable to figure a claim under five maf. Pollack referred to the Navajo Tribe with its unquantified water rights as a "sleeping giant" and viewed Indian water right claims as possible "compact busters."

Quantification is not the only Indian water right to be settled. Lacking sufficient development to put all their water to use, some tribes view marketing as a means to earn needed income. Questions and controversies thus arise. For example, should tribes be allowed to market water out-of-state? States generally prefer limiting tribes to intra-state water marketing.

The legal status of tribes to market their water remains relatively undefined. Various entities, including individual states, the U.S. Department of the Interior and the tribes themselves, have expressed different opinions. Some officials believe a court case, possibly at the U. S. Supreme Court level, will be needed to settle the controversy.

In the matter of water transfers, tribes generally view themselves as sovereign entities, not unlike states.

Gary Hansen, attorney for the Colorado River Indian Tribes, said that, under the Winter's Doctrine, tribes have complete control of all beneficial uses of their land and water. Tribes therefore have the right to lease their water to interested entities, without the interference of the states in which their reservations are located. As might be expected states contest this view.

Water Marketing

Water marketing is another issue to emerge to challenge the compact and the Law of the River. Water marketing would enable water—in this case, Colorado River water—to be transferred, leased, or sold, from one party to another. Different transactions are possible, between entities within a single state or different states, either states within the same basin or in different basins. (The legal and political acceptability of these options vary.) Many view water marketing as a suitable, even a preferred strategy to help Colorado River states meet increasing and changing water demands. The Santa Fe conference included a panel on water marketing.

Seemingly sensible in theory, such arrangements, however, are very complicated to work out, especially when Colorado River water is at issue. Several factors complicate the situation, but according to conference panelists the principle constraint is politics.

Panelist Larry MacDonnell, a Colorado lawyer, called the Colorado River the most political river in the West, a situation that greatly complicates its management. He argued that the compact contributed to this situation in various ways. By dividing river water between Upper and Lower Basin states, the compact created competing interests, each maneuvering to achieve maximum advantage. Further, whereas in the West in-

dividual water users traditionally made allocation decisions for particular beneficial uses, the compact empowered individual states to allocate their apportionment of Colorado River waters. Decisions thus became more complicated and raised the political stakes.

Tim Quinn, general manager of the Metropolitan Water District of Southern California, described the perils of water marketing, at least in California where political pitfalls prove to be especially ominous. He said, "The institutions we are living with are not in alignment with the increased acceptability of water marketing ... Any water transfers must run a gauntlet at the local, regional, state levels. We have a long road to travel before we have reform."

A Californian may well be disenchanted with the present water marketing arrangements since the state now is embroiled in an involved



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and embittered intrastate effort to market water. The parties in the transfer are the Imperial Irrigation District, the Metropolitan Water District and the San Diego County Water Authority. The proposed deal is a complicated, highly contested proposition; at stake are vast amounts of money and the control of Colorado River water. The situation has attracted national attention, most recently in a front-page story in the July 11 *Wall Street Journal*. The article is subheaded: "Why Markets Seem Inevitable."

Meanwhile the federal government

supports the transfer and marketing of Colorado River water. The *Wall Street Journal* article noted above quotes Interior Secretary Bruce Babbitt as saying, "Without water markets we can't solve the problem of meeting the future water needs of the West."

In its role as manager of the Colorado River, the U. S. Bureau of Reclamation (BuRec) released draft regulations in 1994 with provision for intrastate and interstate transfers of certain types of water: unused entitlements or water conserved in the Lower Basin. Controversy arose, with states objecting, Arizona the most vigorously, to what was perceived as a federal infringement on state Colorado River rights. BuRec subsequently stepped back, allowing the states and tribes an opportunity to devise their own water banking and marketing plans. Meanwhile BuRec is revising its regulations which when released will again support transfers and marketing.

Prompted by the federal action the Arizona Legislature in 1995 created a state water bank. The bank serves several purposes. For one, it is a strategy for Arizona to secure the unused portion of its 2.8 million acre-foot Colorado River allocation.

Arizona feels very protective about its unused Colorado River allocation, aware that thirsty California and Nevada have designs on it. Up until CAP came on line in 1985, the state was able to use only about 1.5 maf of its 2.8 million allocation. As noted earlier even with CAP on-line Arizona still was not using its full allocation.

Arizona's water bank is to save some of that water for use in the state. Plans call for 260,000 af of Colorado River water to be delivered via the CAP aqueduct to central and southern Arizona, for underground storage in existing aquifers or to be exchanged with water districts that pump groundwater. Mainly because

of the bank's activities, BuRec is predicting that Arizona will use its full entitlement for the first time in 1997.

Along with storing the state's unused Colorado River allocation, the Arizona water bank also provides water storage services to California and Nevada. These states can pay Arizona to store any of their unused Colorado River water and then receive credits depending upon how much water is stored. Pursuant to rules to be adopted by the Interior Secretary, Arizona would restore the water to the states in the future. Arizona would do this by using their stored groundwater instead of its Colorado River apportionment. The states could then pump water directly from the river up to the credited amount they stored in Arizona.

The Arizona water bank is not a marketing strategy. Instead, it provides an interstate service through its conjunctive use of Colorado River surface water and Arizona groundwater reserves. In this way it encourages greater flexibility in Colorado River management.

Despite present difficulties some officials view water marketing as the future of Colorado River management. MacDonnell claims water marketing represents the "third generation of the division of the waters of the river." The first generation occurred when the compact apportioned water between the Upper and Lower Basins. The second generation extends from 1922 to the present and is characterized by development determining water division. A strong presence during generations one and two, politics according to MacDonnell is expected to play a less heavy-handed role during the anticipated third generation. Market forces are likely to gain greater influence.

Before more transferring and marketing of Colorado River water occurs, basic questions about the in-

terstate and intrastate movement of water must be answered. According to panelist Robert Johnson, Lower Basin States regional director, whatever breakthroughs occur in the near future regarding water marketing and transfer likely will apply only to intrabasin transfers. He said that at present the legal and political obstacles are sufficiently formidable to prevent exchanges between the Upper and Lower Basin states.

Colorado River Environmental Concerns

That the Colorado River Compact did not include provisions to protect the environment is no more surprising than that Model T's did not have seat belts. Ideas mature, ripen and have seasons. 1922 was not the season for environmental protection.

Environmental issues, however, are very prominent on the Colorado River today. Patricia Beneke, Assistant Secretary for Water and Science, U. S. Department of the Interior, stated at the conference that environmental concerns will be the next generation of issues on the Colorado River.

An environmental ethic arises as a force in contemporary life through a somewhat different historical process than, say, water marketing and to some extent Indian water rights. Espousing an environmental ethic involves a shift in thinking, a reorientation of values, away from the human-centered and toward acknowledging an obligation to the natural world.

Development, however, was the overriding concern of the 1922 compact. Its intent was "to secure the expeditious agricultural and industrial development of the Colorado Basin, the storage of its waters, and the protection of life and property from floods." Establishing Colorado River rights was a prerequisite to building

flood control and storage projects, to better manage the river to serve human needs. This boosted states' potential to grow and develop.

Such a strategy, however was undertaken at a great cost to the environment, and a range of environmental concerns now beset the Colorado River, both in the United States and Mexico. For example, dams and diversions, with water used and reused, created conditions very unfavorable to native fish species. Not only do dams block fish passage, they also reduce spring flows, trap silt, and alter water temperatures, all to the disadvantage of native species. Further, regulated flow destroys inner canyon beaches and is detrimental to spawning habits of native fish. The introduction of exotic fish posed a further threat to native fish. Four species of native fish are endangered in the Colorado River Basin.

A history of environmental neglect on the river and in many other areas throughout the United States signaled the need for protective measures. One such measure, the 1973 Endangered Species Act (ESA), greatly complicated Colorado River management. New criteria now were to be met. Harnessed to turn turbines and irrigate crops, the river now was viewed as part of an ecosystem, its flora and fauna to be protected and preserved. Controversy thus arose whether valuing a river as a vital part of an ecosystem would interfere — if not actually conflict — with using its waters for strictly utilitarian purposes. This controversy lingers today to fuel environmental debates about the river.

Who is to bear the cost of environmental protection is an unresolved issue. In a panel devoted to environmental concerns, John Leshy, solicitor, U. S. Department of the Interior, expressed concern that the costs of ESA environmental remedies is being unfairly borne by some water users. For example, Indians have

Two Publications Explore Colorado River Past and Future

The May 28-31 Santa Fe conference was titled "Using History to Understand Current Water Problems." The conference and its presentations stressed the importance of looking beyond the present to better grasp the fuller implications of an issue.

Two Water Resources Research Center-related publications help provide readers with this wider perspective to water issues.

Severe Sustained Drought: Managing the Colorado River System in Times of Water Shortage is concerned with the future, not the past. The publication discusses how a future drought would affect Colorado River management. "The Severe Sustained Drought Study contemplates a much more dire water supply scenario than that which has occurred in the past century. ... The SSD researchers have created a highly plausible scenario of severe and sustained drought and used that as a means of assessing what the hydrologic, social, and economic impacts of such drought would be under the current law of the river. ... The SSD researchers have also explored what possible combinations of changes in institutional arrangements regarding how the river is operated might be made to reduce or mitigate the impacts of such a drought."

The above publication was sponsored by the Powell Consortium, an alliance of seven Water Resources Research Institutes and Centers from the states of Arizona, California, Colorado, Nevada, New Mexico, Utah and Wyoming.

Arizona Changing Rivers: How People Have Affected the Rivers by Barbara Tellman, Richard Yarde and Mary G. Wallace provides a big picture by describing historical changes to the major rivers in Arizona. Following is an excerpt:

Stock Reduction "Saves" Hoover Dam

Hoover Dam, which provides energy for southern California and parts of Arizona, may seem unrelated to the Navajo Nation which is far to the east of it. However, the interconnectedness of rivers is illustrated by the stock reduction program on the Navajo Reservation which began in 1934. When Hoover Dam was being built in the 1930s, engineers were worried that silt deposits behind the dam would decrease storage capacity. The San Juan and Little

Colorado Rivers, running through the Navajo Nation, supplied 14 percent of the water in the dam, but almost half its silt. The conclusion was obvious. Overgrazing on the Navajo Nation, with its consequent erosion and siltation would have to stop if the dam was to be saved.

As one federal official explained to the Indians, "Down there on the Colorado River is the biggest, most expensive dam in the world, the Boulder Dam now being built which will furnish all Southern California with water and with electric power, and the Boulder Dam will be filled up with your fine agricultural soil in no great number of years if we do not stop erosion on the Navajo Reservation ... and thereby injure the population of all Southern California and a good deal of Arizona as well." The Soil Conservation Service concluded that if overgrazing was not halted, "the entire alluvial fill of most of the valleys of the Navajo Reservation will be deposited behind the dam. ..." Even before construction, the Bureau of Indian Affairs forester had reported that 1.3 million sheep and goats were grazing less than 12 million acres, about twice what the land could support.

As a result, about half the grazing animals (many of the goats) were destroyed from 1935 to 1946. Unfortunately, while changes in grazing practices were necessary for range health, the way the program was carried out resulted in enormous hardships for the Navajos, especially after the droughts of the 1930s. Some Navajos starved because goats were a mainstay of their diet and the last refuge when other food sources failed. Livestock and agriculture, which accounted for 54 percent of total Navajo income in 1936, dropped to 10 percent by 1958. Stock numbers have never approached former levels.

The effort, however, failed to reduce silt buildup behind Hoover Dam. By the 1950s silt was still coming down the river as it had for centuries, and building up behind the dam. Overgrazing was only one source of silt. One of the reasons for building Glen Canyon Dam was to solve the Hoover Dam silt problem. Silt now builds up behind Glen Canyon Dam and isn't available to replenish soils and beaches downstream.

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been late in using their water due to a lack of capital to develop projects. The Upper Basin states also have been late in developing their water. They now must contend with ESA provisions that those who developed their water earlier avoided. Leshy questions whether it is fair that those who developed their water uses after the passage of the ESA should shoulder the major environmental cost for overall basin recovery.

Not to be ignored are environmental problems in Mexico resulting from this country's management of the Colorado River. Located in Mexico, the Colorado River delta once was lush with vegetation and wildlife. But the construction of 29 dams and numerous up-river diversion projects during the past 60 years has deprived the delta of natural water flow, with its vital supply of silt and nutrients. As a result, the delta fell victim to Colorado River development. Delta wetlands now persist only where fed by agricultural drainage water or from groundwater seepage.

Arizona's Wellton-Mohawk Irrigation District's drainage flows now make up the primary source of water for the Cienega de Santa Clara, the delta's largest estuary. The district began channeling its highly saline drainage into the delta in 1977 to keep flows from draining into the mainstem of the Colorado River and adding to the river's water quality problems. If the Yuma desalting plant were to come fully on-line, Wellton-Mohawk's drainage would be treated for release into the mainstem of the river. The Cienega de Santa Clara would then be deprived of its vital water source.

The minimal Colorado River flow allocated to Mexico by the Law of the River is not sufficient to protect and preserve the delta. As a result, any preservation efforts must involve maintaining or increasing inflows, especially on a long-term basis. Officials note that this will require a

cooperative bi-national effort, with basin states agreeing to an appropriate strategy, possibly involving a reduction of their Colorado River supplies.

Reviewing the compact and its effect on the environment broadens the study of history. Along with showing a connection between past, present and future, a study of the Colorado River Compact also demonstrates how human and natural history interact. This awareness deepens and enriches the meaning of history.

Responding to natural forces, rivers have a history apart from humans. In seeking to use and control rivers, whether with a primitive, hand-dug irrigation ditch or the very complex Law of the River, humans impose their history on the river. Human history then affects and, in turn, is affected by the river's natural history. The workings of this process is very evident when examining environmental concerns along the Colorado River.

Future Uncertainties

History demonstrates the need of the compact and the Law of the River to be flexible in meeting new circumstances. Future situations no doubt will arise to further challenge the legal and institutional arrangements regulating the Colorado River.

One such occurrence briefly discussed at the conference is if the United States suffered an economic setback due to a prolonged period of inflation, recession or even a depression. A reordering of river management priorities might then occur. For example, support for recreational and environmental efforts might be questioned. The Grand Canyon Protection Act of 1992 requires that river managers consider recreational and fish and wildlife concerns. The act moderated somewhat the strategy of regulating river flow to maximize

power generation. In the event of financial hardship would such a commitment be maintained? More broadly, what changes would a financial crisis impose on Colorado River management?

Another contingency that would affect river management is severe sustained drought. Again history, this time the history of Colorado River flows, can help set public policy directives. Historical records indicate that droughts of various severity occur periodically. Tree ring records show that 1584 to 1593 was a period of severe drought, with Colorado River flows averaging about 9.7 maf. More recently, the period from 1954 to 1963 averaged 11.826 maf. (See sidebar on page 9 for information on the effects of drought on the Colorado River.)

Water shortages were not on the minds of compact negotiators; in fact, they seemed to believe that surpluses were more likely. As a result, the com-



San Ildefonso pottery design

compact does not include provisions to deal with shortages due to drought.

Some strategies adopted pursuant to the Law of the River are efforts to cope with drought. Water storage facilities built by BuRec provide drought protection to the states, particularly the Lower Basin states. These facilities have a capacity of about four times the annual flow of the Colorado River and are capable of redistributing water from wet years to dry years, at least in response to normal climatic fluctuations.

A prolonged drought, however, would strain the entire system. Who

Proceedings to be Published

Proceedings of the symposium *Using History to Understand Current Water Problems* are expected to be available at the end of the year. Papers will be included from the various sessions — “States’ Perspective 1922;” “Federal and State Issues After the Compact: Then and Now;” “History of Conflict and Consensus on the Colorado River;” “Post Compact Issues: Upper and Lower Basin;” “Law of the River Panel;” “Environmental Issues: Looking at the Whole River;” “Water Marketing Panel;” “Historical Perspective on Western Land and Water Law;” and “Future Scenario: On the Colorado River.” Persons interested in the proceedings should contact: Western Water Education Foundation, 717 K Street, Suite 517, Sacramento, CA 95814; 916-444-6240; fax: 916-448-7699; Email: wateredfdn@aol.com.

then has priority water rights from a drought-stricken Colorado River? This is a debated issue. Reference to the compact and key elements of the Law of the River suggest some answers. Interpretations, however, vary; a different legal view might find fault with the following premises.

Recognizing the likelihood of a Colorado River treaty with Mexico the compact designated that water for that country would come from unallocated “surpluses” then thought to be available. Upper and Lower Basin states would equally make up any resulting “deficiency.” A 1944 U.S.-Mexico treaty allocated 1.5 maf of Colorado River water to Mexico. In the absence of surpluses, it would seem that the Upper and Lower Basin states, according to the compact, must each provide 750,000 af for Mexican use. Some say this would be a priority even during severe, sustained drought.

Meeting “present perfected rights” pre-dating the compact including tribal reserved water rights also might be a priority. The compact designated that its provisions would not affect such rights. At the time, this mainly referred to irrigators using Colorado River water. The 1964 Supreme Court decision *California v. Arizona* recognized tribal reserved water

rights under the Winters Doctrine to be present perfected rights.

The compact directs the Upper Basin states to deliver 75 maf in any ten-year period to the Lower Basin states. To help the Upper Basin states make good this obligation, the Colorado River Storage Project Act of 1956 authorized four projects. In the event of a severe drought, the Upper Basin states might need to curtail water use to fulfill their delivery obligation.

With the occurrence of drought, various ambiguities and uncertainties no doubt would surface to challenge the Law of the River. Not securely in place are the necessary legal and institutional mechanisms to interpret the priorities, define various options and devise strategies for dealing with drought.

Conclusion

A Greek philosopher once said a person never steps into the same river twice. Water flows and surges onward, replacing and replenishing itself. And, indeed, in philosophy and literature a flowing river often symbolizes change and the passing of time.

That a flowing river represents change might also be borne out in public policy matters. This is evident

in a study of the Colorado River Compact. In “Future Scenario: On the Colorado River,” a concluding session at the Santa Fe conference, Gary Weatherford, attorney with Weatherford & Taaffe, conveyed a sense of that change by chronologically listing various events.

Weatherford emphasized the relatively brief time span, 68 years, between when the compact became effective in 1929 to the present. He also mentioned that only 51 years have passed since the Upper Basin states submitted to Congress their Colorado River planning document. This was at about the same time that the Central Arizona Project was officially presented. Lake Powell was filled 35 years ago. Three years ago Arizona expected not to be using its full CAP allocation until 2040; last year Arizona amended its prediction, now expecting full use by 1998. Public policy changes occur swiftly along the Colorado River.

Not only does public policy run a swift course but it also broadens to cover new areas. Consider three issues not addressed by the compact: water quality, endangered fish, and recreation. As these issues emerged the need for regulatory action became apparent. In response, the 1974 Colorado River Basin Salinity Control Act was passed to deal with salinity and water quality; the 1973 Endangered Species Act protected endangered fish; and the 1992 Grand Canyon Protection Act recognized the recreational value of the Colorado River to Grand Canyon National Park.

Change and the Colorado River also can be viewed from another broader perspective, from one era to another. The Colorado River Compact was instrumental in inaugurating the age of great water projects, built to ensure that water supplies would be available and delivered when and where needed. That era has ended; institutional and management strategies

have replaced engineering feats in solving water supply problems. The compact is a monument to this change, a bridge from one era to another.

By reviewing history, the conference also was encouraging a look ahead, because what is true of the past may be true of the future. History shows that the compact and the Law of the River have evolved to confront emerging issues. This historical record lends confidence that further evolution will take place to meet future Colorado River priorities, whether urban growth, environmental goals or water marketing and transfer.



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