

Water Rights Settlement Agreements in New Mexico: Institutional Change Underway

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"The history of water resources development has been the creation of coalitions around big projects which increased the water pie—all the players got more. Now the challenge is to shape institutions that can respond to signals that the carrying capacity of the resource has been exceeded and that can pull groups together to reallocate a shrinking pie—a nearly impossible task for our current institutions."

-- Western Water Policy Review Advisory Commission (1998)¹

Introduction

It is increasingly recognized that new approaches to the governance of water are needed to reconcile entrenched but outdated institutions and management processes with the new realities of scarcity, environmental change, and evolving attitudes toward the environment. This situation is exemplified in the American West, including New Mexico, where expanding populations and economies are colliding with dwindling water supplies and increased competition for water. There is increasing pressure to reallocate water from traditional uses such as irrigated agriculture to higher-economic-value uses in urban areas or to environmental purposes. The resulting conflicts between urban and rural populations, agriculture and other economic sectors, forces for environmental conservation and forces for

development, wealthy and poor, and traditional cultures and suburban sprawl are not easily resolved.

As in much of the western United States, New Mexico's existing water institutions were motivated by the goals of settling and developing the west. However, for a number of reasons, these institutions are proving to be inadequate for addressing today's realities of increasing water scarcity and entrenched conflict. First, the water rights adjudication process is slow, expensive, complex, and has been completed in only a few basins. This situation, combined with hydrologic complexity and the difficulty and expense of metering and monitoring water withdrawals, has resulted in poor enforcement of rights and unsustainable water use in many basins. Second, pressure to reallocate water is increasing. Although New Mexico has a long-standing water market

¹Wester Water Policy Review Advisory Commission, *Water in the West: Challenge for the Next Century* (Denise Fort ed., National Technical Information Service. 1998).

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and many water transfers have occurred over the years, transaction costs, lead times, and increasing numbers of protests make the market highly inefficient in some circumstances. There are also unsettled questions regarding public welfare and the effects of transfers on third parties and areas of origin. Third, and perhaps most significant, much of New Mexico's economy is based on junior water rights, so using priority administration to curtail total water use in the absence of efficient water markets could be economically devastating. Changing the existing institutions is difficult though, because departing from the doctrine of prior appropriation or otherwise altering property rights to water would require a change to the state's constitution and possibly raise complex and potentially expensive federal takings issues among existing water rights holders.

This paper examines the use of voluntary negotiated agreements as an alternative to wholesale changes in existing entrenched institutions. Several large and complex water rights settlement agreements have been negotiated in New Mexico in recent years. This paper argues that these agreements are a response to problems that cannot easily be resolved via existing institutions, and that they represent significant change to New Mexico's water management institutions regarding both the determination of property rights to water and the administration of those rights. In the language of the quote above, the settlements "shape institutions" to address the fact that the "carrying capacity of the resource has been exceeded" and "pull groups together to reallocate a shrinking pie."

Defining Institutional Change

Before proceeding, it is useful to define what is meant here by the phrase "institutional change." North (1990) defines the word "institution" as the formal and informal rules that societies use to govern themselves. Schlager and Ostrom (1992) define rules as "generally agreed-upon and enforced prescriptions that require, forbid, or permit specific actions." For example, property rights regimes, which determine how rights to a good are defined and how they are monitored and enforced, are fundamental societal institutions.

Institutional change is thus defined here as significant changes in rules and associated norms, in this case those that relate to the allocation and management of water and water rights in New

Mexico. Note that, as defined here, institutions are distinct from the organizations that administer the rules (e.g., the NM Office of the State Engineer).

Water Rights Settlement Agreements in New Mexico

In the last ten years, at least eleven significant water rights settlement agreements have been negotiated in New Mexico, and at least one other is under negotiation (Table 1). They vary by location, by the number of claimants involved, by the amount of water involved, and by the range of issues that they address. Some are focused on one particular issue, such as shortage-sharing, a specific aspect of a water right or group of water rights, or storage rights. Others are much more broad and complex, addressing a wide range of highly complicated, fiercely contested, and interrelated issues. Settlement participants and stakeholders include tribes and pueblos, centuries-old acequia communities and other non-Indian irrigators, ranchers, municipalities, power producers and other industrial interests, and domestic-well owners.

This paper is based on a comparative case study of four of the largest settlements from the list in Table 1 — the Lower Pecos, the San Juan-Navajo, the Taos, and the Aamodt. The map in Figure 1 shows the location of the basins associated with each of the four case-study settlement agreements. The Lower Pecos, in southeastern New Mexico, includes the Roswell Artesian and Carlsbad sub-basins, which are the primary focus of the settlement.² The San Juan basin, in the northwest portion of the state, encompasses a significant portion of the Navajo Nation, whose rights are of primary concern in that settlement. The Taos basin in northern New Mexico includes the Taos Pueblo, as well as the Town of Taos, fifty-five acequias, and other water users. The Nambé-Pojoaque-Tesuque basin ("NPT" on the map) is the location of the Aamodt adjudication and associated settlement involving the four Pueblos of Nambé, Pojoaque, San Ildefonso, and Tesuque. The map shows the considerable variation in the drainage areas of the basins. As became evident from the case studies though, the land area in a basin is much less of a factor in the complexity and difficulty of the settlements than the number of water rights claimants and the needs for water relative to the amount of water available.

²The Lower Pecos basin also includes the Hondo and Penasco sub-basins, but they are not directly involved in the settlement agreement.

Table 1. Recent Water Settlement Agreements in New Mexico

AGREEMENT	YEAR SIGNED*
Jicarilla Apache Tribe Water Rights Settlement	1992
Rio Jemez Shortage-Sharing Agreement	1996
San Juan Basin Shortage-Sharing Agreement	2003 & subsequent years
Lower Pecos Settlement Agreement	2003
Gila-San Francisco Basin: New Mexico Consumptive Use and Forbearance Agreement, a subset of the Gila River Indian Community Water Rights Settlement Agreement	2005
San Juan River Basin in New Mexico: Navajo Nation Water Rights Settlement	2005
Taos Pueblo Water Rights Settlement	2006
Aamodt Settlement Agreement (in Nambé-Pojoaque-Tesuque Basin, including Pueblos of Nambé, Pojoaque, San Ildefonso, Tesuque)	2006
Eagle Nest Reservoir Management Settlement Agreement	2006
New Mexico Pecan Growers Settlement Agreement (in Lower Rio Grande Basin)	2008
Elephant Butte Irrigation District and El Paso County Water Improvement District No. 1 Compromise and Settlement Agreement	2008
Rio Jemez	In negotiation

(*Year settlement agreement signed by the key parties involved; some settlements not finalized until required legislation enacted and/or court orders issued, which in some cases may take years.)

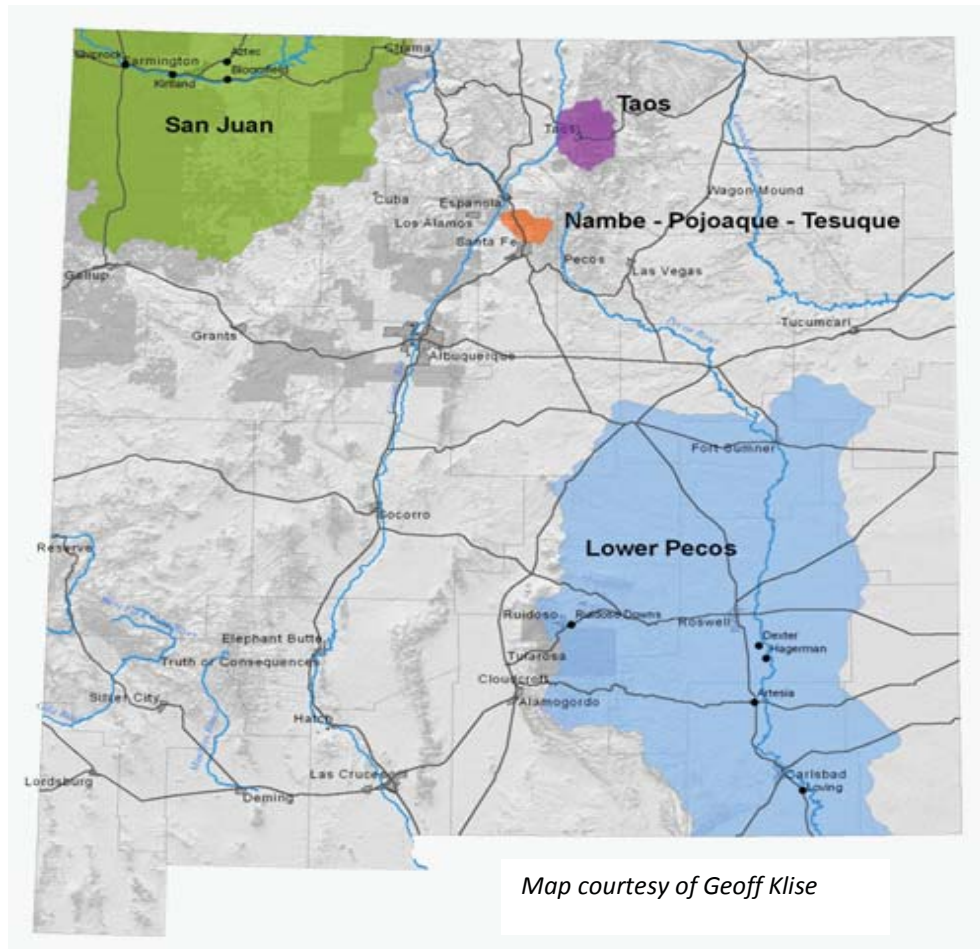


Figure 1. Case Study Basins: Lower Pecos, San Juan, Taos, and Nambé-Pojoaque-Tesuque

Lower Pecos Settlement Agreement

The New Mexico Office of the State Engineer (NM OSE) termed the Lower Pecos settlement a “landmark compromise of disputed water rights.” Signed in March of 2003, it settled a nearly fifty-year-old water rights adjudication dispute involving the Carlsbad Irrigation District, the Pecos Valley Artesian Conservancy District, the Fort Sumner Irrigation District, the federal government, and the state of New Mexico. In addition to defining certain property rights to water, the settlement includes a land and water-rights acquisition and retirement program, provisions for short-term leasing of water, a well field to pump groundwater from the Roswell Aquifer into the Pecos River, and resolution of a long-standing priority call (NM OSE 2003). It also allows for the substitution of shortage-sharing for priority administration in certain circumstances (NM OSE 2006). These features are intended to bring the Pecos River into short-term and long-term hydrologic balance,³ meet the terms of the Pecos River Compact with Texas, and avoid federal takeover of water management in the basin. As of December 2010, the Lower Pecos settlement had largely been implemented.

San Juan-Navajo Water Rights Settlement Agreement

The San Juan-Navajo settlement agreement (NM OSE, et al. 2005) is intended to resolve the water claims of the Navajo Nation in the San Juan River Basin in northwestern New Mexico. Signed in April 2005 after more than twenty years of litigation to adjudicate the water rights of the Navajo Nation, it provides resources for water development projects for the Nation in exchange for a “release of claims to water that could potentially displace existing non-Navajo water users in the basin and seriously damage the local economy (NM OSE 1999).” The Navajo Nation is the senior rights holder and has

made claims to essentially all of the water in the basin.⁴ The settlement provides certain protections for other existing uses of water and is intended to allow for future growth in the basin within the amount of water from the Upper Colorado Basin apportioned to New Mexico by the Colorado River Compact. Thus, although only Navajo claims are determined through this settlement, the agreement resolves large uncertainties about the other water rights in the basin. As of December 2010, Congressional and presidential approval of the settlement had been obtained.

Taos Settlement Agreement

The Taos Settlement (NM OSE, et al. 2006b), announced in March 2006, was the result of seventeen years of negotiations representing most of the water users in the Taos basin. It settles the rights of the Taos Pueblo and expedites the adjudication of the other non-Indian water rights in the basin. It allows existing uses of water in the basin to continue and provides protection for the Buffalo Pasture, a wetland with great significance to the Taos Pueblo. It also provides funding for a water development fund for the Pueblo and a number of smaller water infrastructure projects for non-Indian entities. It includes some importation of San Juan-Chama Project water. As of December 2010, the settlement was nearing completion of the Congressional and presidential approval process.

Aamodt Settlement Agreement

The Aamodt adjudication is widely reported to be the longest-running case in the federal court system (*New Mexico ex rel. State Engineer v. Aamodt*, No. 66cv6639 (D.N.M.)). Filed in 1966 and extensively litigated for more than forty years at an estimated cost of \$200M,⁵ it seeks to define the water rights of the Nambe, Pojoaque, Tesuque, and San Ildefonso Pueblos and other water users in a geographically-small basin, the Nambé-Pojoaque-

³ The term “hydrologic balance” as it is used here means that water withdrawals and consumption do not exceed the renewable supplies.

⁴ The Navajo Nation’s claims exceeded New Mexico’s entire allotment under the Upper Colorado River Compact. If the Nation prevailed in court, all water for the Farmington and the San Juan Basin region would be under control of the Navajo Nation. NM OSE, 1998-1999 Annual Report (New Mexico Office of the State Engineer & Interstate Stream Commission, 1999). See also Appendix D of San Juan Basin Regional Water Plan (NM Interstate Stream Commission ed. 2003).

⁵ This cost number was mentioned by several panelists at the 2005 New Mexico Water Dialogue Annual Meeting. (Brown 2005)

Tesuque (NPT) basin. This basin is located in north-central New Mexico just north of Santa Fe. The Aamodt settlement (NM OSE et al. 2006a) was signed in 2006 after five years of court-ordered settlement negotiations. The agreement is intended to resolve the water rights claims of the four Pueblos while protecting the water rights for other existing uses. It includes transfers of water rights into the basin to help balance supply with demand, and it provides for a regional water supply pipeline intended to reduce the use of domestic wells and deliver imported water to the Pueblos. Similar to the Taos agreement, as of December 2010, the Aamodt settlement was nearing completion of the congressional and presidential approval process.

Comparative Analysis

A comparative case study of the four settlements – the Lower Pecos, the San Juan-Navajo, the Taos, and the Aamodt – revealed that although there are significant underlying differences, the agreements have surprising and significant commonalities. All four of the agreements are highly complex and address long-standing entrenched conflicts. They stem from water rights adjudication processes that

have been ongoing for decades. The adjudications and associated settlement agreements involve thousands of diverse litigants and stakeholders with a wide variety of interests. Despite the fact that the four agreements were negotiated largely by local people in different basins with substantially different local characteristics and widely varying amounts of water, the overarching outcomes of the settlements are surprisingly similar.

To provide some perspective, Table 2 lists some introductory statistics associated with each of the four case studies. Each of the case studies involves water rights adjudication litigation that was filed decades ago, is highly complex, and remains incomplete. All four involve settlement agreements that were signed within a few years of each other, although the length of time to negotiate each settlement varied widely. The basins vary greatly in size, population, and quantity of water involved. There are Native American lands in each of the basins, but only three of the settlements involve tribes. Correspondingly, although all four settlements require significant government funding, funding from federal sources is provided only for the three settlements involving tribes.

Table 2. Basic Statistics

	Lower Pecos	San Juan-Navajo	Taos	Aamodt
Year Adjudication Filed	1956	1975	1969	1966
Number of Water Rights Claimants	~2000+	~18,000	~7,000	~3,000+
Year Settlement Signed	2003	2005	2006	2006
Years to Negotiate Settlement	2	9	17	5
Population of Basin (in 2000)	139,000	97,000	16,000	11,000
Area of Basin (square miles)	16,777	9,762	524	200
Available Water in Basin (AF/yr)*	125,000	1,100,000	68,000	7,000
Water Rights Settled (AF/yr)*	56,000	326,000	~65,000	~7,000
Number of Tribes in Basin	1	3	1	4
Number of Tribes Involved in Settlement	0	1	1	4
Federal Funding**	0	\$820M	\$120M	\$170M
State Funding**	\$100M+	\$25M	\$14M	\$50M
Local Government Funding**	0	\$30M	0	\$62M
Total Government Funding**	\$100M+	\$875M	\$134M	\$282M

* Available Water and Water Rights amounts are based on consumption, not diversion, and are rough estimates meant to allow comparison of the cases.

** Funding amounts are estimates as of 2008, may be out of date.

The settlement agreements are extremely complex documents, with a myriad of provisions and details addressing the specific circumstances in each basin and the particular interests of the stakeholders involved. Correspondingly, there is variation in the specific provisions contained in each settlement. However, despite the quite large differences in structure, language, and details, the settlements address very similar core issues. All four settlements, in one way or another are about:

- determining property rights to water and the limits to these property rights;
- achieving hydrologic balance (meaning water withdrawals do not exceed the renewable supply);
- resolving over-allocation problems (meaning that the rights to water do not on average exceed the quantity of water available, or “paper water” is consistent with the supply of “wet water”);
- avoiding priority administration as a means for achieving hydrologic balance and/or resolving over-allocation problems; and
- facilitating the leasing of water.

In addition, as mechanisms both to achieve settlement and to resolve chronic problems, all four settlements rely on physical water projects and external government funding.

Although certain agencies, such as the NM OSE, were involved in all of the settlements, the four agreements were negotiated largely by local people in different basins with substantially different local characteristics and widely varying amounts of water. The Lower Pecos is dominated by large irrigation districts and interstate compact compliance issues. Water in the San Juan is dominated by federal projects and a large Navajo Nation presence. The Taos basin has both a Pueblo and a large number of acequias competing with each other and a growing population. The NPT basin has four Pueblos and is located between the growing city of Santa Fe and Los Alamos National Laboratory, a situation with striking contrasts as well as development pressures. The language, organization, complexity, and details of each settlement are quite different, but much of the core content is strikingly similar. All four settlements contain provisions that are well beyond the scope

of traditional litigated adjudications. In addition to clarifying property rights to water, all of the agreements provide for the construction of water projects and measures to balance demand with renewable supply. They also include provisions to facilitate the leasing of water, and they place heavy emphasis on avoiding priority administration. Thus, the settlements not only go beyond traditional litigations by “enlarging the pie” to create incentives to settle; they change how water will be managed.

Although the details and circumstances vary, the fundamental motivations underlying each of the settlements are essentially the same. Perhaps as expected in any settlement related to a lawsuit, all expressly seek to eliminate uncertainty in outcomes (and avoid the possibility of a negative outcome) inherent in litigation and to save the time and expense associated with continuing to litigate. But, all four of the settlements also seek to resolve uncertainty in the supply of water, bring the associated basins into hydrologic balance, and address the problem that there are more water rights than there is water, all in a manner that does not cause severe disruption to the economy or the society.

What is particularly interesting is that the settlements go to great lengths to avoid priority administration, the foundation of water law and management in New Mexico and the western U.S. To quote one eminent observer of the Pecos situation, “Priority enforcement had switched from a centerpiece of New Mexico state and federal Pecos River Compact law to a threat whose consequences should be avoided at any cost.”⁶

Why were these settlements necessary? Why were negotiated agreements pursued rather than other options to address entrenched over-allocation problems? Why in some key circumstances was the Doctrine of Prior Appropriation set aside in favor of other approaches to managing water? The following sections explain that the existing water management institutions are not well-suited for addressing the problems that exist in the case study basins, that wholesale institutional change would be very difficult if not impossible, and that these voluntary agreements were a way to overcome these challenges.

⁶ Quote by Emlen Hall in Johnson 2003, p. 60.

Water is Over-Allocated

When more water is allowed to be used than the system can support over time, a state of over-allocation exists. Also called over-appropriation, over-allocation is sometimes described as “paper water” exceeding “wet water.”

In the western U.S., over-allocation is related closely to how rigorously the Doctrine of Prior Appropriation is implemented, including the degree to which water rights under that system are monitored and enforced. It is also in many cases closely connected to the use of non-renewable groundwater. In New Mexico, water has become over-allocated as a result of a variety of factors. Legal exceptions to the beneficial-use (or “use it or lose it”) requirement allow the considerable amounts of water associated with unused senior Indian rights (and to some extent unused municipal rights) to be used by others. Reliance on unsustainable groundwater pumping has allowed municipal populations to grow and become dependent on diminishing water supplies without a clear source of water once supplies run low. Lack of enforcement (due in part to the lack of adjudication) has enabled water use in excess of water rights. Climate variability has allowed water usage patterns to be established during wet periods, patterns that cannot be supported during normal or dry periods. Climate change is projected to further reduce water supplies in New Mexico (Hurd and Coonrod 2007). Incomplete information about the resource, such as the delayed effects of groundwater pumping on streams or the establishment of water rights during wet years (such as was done among the states that share the Colorado River) has also contributed to over-allocation. As a consequence of these and other factors, there are now substantially more rights to water than there is water.⁷

The consequences of over-allocation can be severe. In the long run, consuming water at a rate that exceeds the renewable supply means that it will run out at some point. This is of particular concern for communities and economies dependent

on nonrenewable groundwater supplies, but it also applies to surface water (typically viewed as a renewable resource) when it is hydrologically connected to declining groundwater resources. A more immediate consequence of over-allocation is failure to comply with the requirements of interstate compacts and the associated need to make large adjustments in allocation quickly when the compacts are enforced; a similar situation will exist with respect to Indian water claims if and when they are quantified and enforced. Over-allocation also causes serious environmental problems. For example, depletion of groundwater can result in desertification and decline in interconnected surface water flows. Endangered Species Act issues may arise if streams are diverted to the point that critical habitats decline.

In general, over-allocation increases uncertainty and conflict, and may result in potentially expensive litigation with unpredictable, potentially negative, outcomes.⁸ In an increasing number of basins, the current rate of water consumption cannot be sustained, and allowing over-allocation to persist is no longer an option.

Correcting Over-Allocation with Existing Institutions is Not Feasible

In the past, over-allocation in New Mexico has been avoided or corrected by developing new water supplies and increasing storage capacity, but these options are, for the most part, no longer available. Measures such as water conservation and efficiency improvements can alleviate or postpone the consequences, but alone are not able to resolve severe over-allocation problems. In the absence of other options, the obvious approach to correcting an over-allocation problem would be to implement the existing law, using priority administration to curtail junior rights holders and allow the market to reallocate water as appropriate. (Note that reallocation alone, via markets or otherwise, is not a complete solution because what is required in the absence of new supplies is some form of “de-allocation” of water, which reallocation does not accomplish.)

⁷ Having more rights to water than there is water would not necessarily be a problem in a prior appropriation system if priority was enforced to keep total water use within sustainable limits.

⁸ One key example is the U.S. Supreme Court ruling that required New Mexico to pay Texas \$14M and immediately begin delivering more water to the state line or face loss of management control of the Pecos basin. *Texas v. New Mexico*, 485 U.S. 953, (Supreme Court of the United States March 28, 1988). Another is a ruling by a lower court judge in response to a lawsuit by senior rights holders in Mimbres Basin declaring that the domestic well law is unconstitutional. *Horace Bounds, Jr. and Jo Bounds, and the San Lorenzo Community Ditch Association vs. The State of New Mexico, ex. rel. John D’Antonio, New Mexico State Engineer*, No. CV-2006-166, State of NM, County of Grant, Sixth Judicial District, (July 10, 2008).

However, actually implementing the Doctrine of Prior Appropriation to address pressing over-allocation or water-shortage problems has proven to be virtually impossible in key basins for several reasons. First, administering priority is difficult and possibly illegal⁹ in the many basins where water rights adjudication has not been completed. If it is required that adjudication be completed in a basin before the state engineer can implement priority administration, then it is unlikely that priority could be administered in a meaningful time frame in most basins because of the time and costs associated with the water rights adjudication process. Second, the highest economic-value uses of water are generally associated with entities holding junior rights, so administering priority to curtail water use would cause immediate and severe welfare losses in local and regional economies.¹⁰ In some basins, the priority system and the hydrology interact in such a way that a priority call would be futile; shutting down water withdrawals in most of the basin would be necessary in order to increase deliveries to the most senior users.¹¹ Third, water markets would not be able to mitigate adequately the welfare losses associated with curtailing high-economic-value uses. Although such welfare losses could be avoided in theory, this is not the case in practice: transaction costs and (especially) the time required to implement transfers make the market transfers too cumbersome to be relied on to prevent large losses, especially in the short run.

Both the time involved and the transaction costs could conceivably be reduced, but changes in the process are limited by laws that protect third parties from impairment. Thus, in circumstances where over-allocation must be corrected, alternatives to traditional litigated adjudications, priority administration, and existing market mechanisms are required. Many alternatives can be imagined; examples include streamlining the water rights adjudication process to make it less costly and time-consuming, using alternative water-sharing schemes instead of priority administration to alleviate economic welfare losses associated with the curtailment of water supplies, and/or

developing expedited water leasing or transfer mechanisms that would make the water market more agile in responding to near-term shortages. However, these alternatives are difficult to implement at the state level, either via legislation or through directives from the OSE, because they would require fundamental restructuring of the legal basis for managing water in the state, including amending the state's constitution.

In sum, priority administration is not well-suited to resolving entrenched over-allocation problems. The water rights adjudication process is cumbersome, slow, and expensive. Adjudication has not been completed in most basins (or even started in many basins), and thus property rights to water generally remain unclear. Even where water rights have been determined, enforcement including metering, monitoring, and follow-up, is difficult and expensive, and resources are limited. The complexity of hydrologic systems adds to the difficulty, as it is often unclear whether one entity's use of water is impairing another's right. Most important, large-scale curtailment of high-value junior rights would incur huge welfare losses, and existing water market (reallocation) mechanisms are inadequate for mitigating losses despite the long-standing market for water rights in New Mexico.

Incentives to Negotiate

The over-allocation problems in the case study basins were severe enough to require resolution, but implementing the existing rules ("institutions") to resolve the problems was not politically, economically, or logistically feasible. Changing the relevant water management institutions is very difficult, as wholesale departure from the Doctrine of Prior Appropriation would require a change to the state's constitution. Even if such a change was politically feasible, it would raise complex and potentially expensive federal takings issues among existing water rights holders. However, voluntary (negotiated) measures are allowable, including mutually agreed upon departures from the

⁹ In the past, the state engineer has maintained that priority could not be administered unless a basin was adjudicated. More recently, the OSE has proposed administering priority in basins that have not been adjudicated, using existing records as a basis.

¹⁰ For a more complete economic analysis of the welfare effects of priority administration in New Mexico see Chapter 5 of E. H. Richards 2008. Administering priority may also be politically difficult when large populations are dependent on junior rights for household use.

¹¹ A futile call situation was present in the Lower Pecos case study. Shutting down the upstream junior groundwater users would have no effect on downstream senior surface deliveries, including compact deliveries, for decades.

Doctrine of Prior Appropriation, without requiring wholesale change to existing laws.

In addition to allowing for rule changes, negotiated agreements offer other advantages. A wider range of alternatives can be considered as compared to traditional litigated adjudications, including solutions that are tailored to local circumstances and/or based on historically successful practices. A collaborative process can be employed rather than the inherently adversarial court-based process. Negotiated settlements also make it possible to reduce transaction costs, time, and uncertainty involved in the determination of water rights.

The water rights claimants who were parties to the four settlements were diverse entities. The attributes of each entity's water rights also varied, for example, senior vs. junior, upstream vs. downstream, surface water vs. groundwater, and so on. Correspondingly, the entities had diverse preferences for specific provisions in the settlements. For example, senior rights holders suffering impairment might prefer priority administration (to the extent it did not damage the overall economy), while junior rights holders at risk of being denied water in the event priority was enforced might prefer alternatives to priority administration. Some parties no doubt benefited, at least in the short term, from the status quo.

Although their specific preferences varied, most or all of the claimants were concerned about uncertainty associated with their water supply. For example, the size of tribal rights was unknown and, due to lack of resources for infrastructure, it was largely unclear if and when tribes would be able to make use of their water rights. These uncertainties with respect to senior tribal rights affected all rights holders in the associated basin, not just the tribes. Some acequias were concerned that individual water rights transfers out of their communal ditch systems would render their systems inoperable. In addition, increasing hydrologic imbalance made the future water supply less certain, and incomplete adjudications left water rights unclear.

Although reducing uncertainty was a primary motivation for both junior and senior rights holders to agree to the settlements, it was not the only motivation. While the agreements reduce uncertainty about overall water supplies in a basin, some provisions in the settlements may increase risk for specific parties in certain circumstances. Achieving agreement required consideration of

the different and competing interests of all of the parties to the settlements. Any provisions that negatively affected some rights holders had to be offset with other provisions that compensated for the negative effect in order to create the necessary incentives to settle.

Settlements as Institutional Change

The four case study represent diverse agreements with common themes. Similar to the outcome of a litigated adjudication, all four case-study settlements clarify property rights to water and reduce uncertainty. But the settlements also go well beyond determination of water rights to avoid large-scale priority administration, facilitate water leasing, improve enforcement, include federal and/or state funding for projects and other measures, and resolve over-allocation problems to restore hydrologic balance.

The water rights settlement agreements represent institutional change in at least two ways. One is that they significantly alter the procedure by which property rights to water are determined. The traditional litigation procedure still exists, and may continue to be followed in some basins, but the settlements establish a new option that fundamentally changes the process of defining rights. In particular, instead of exclusively using the top-down formal and adversarial litigation process controlled by the state government and the courts, participants may instead engage in direct communications, negotiate, and/or collaborate with the OSE and each other in the determination of water rights. Unlike the purely litigated process, compromise and bargaining is possible, and interactions are not constrained by prescribed court processes. More alternatives are possible, including the use of principles besides historical water usage to establish rights, consideration of interdependencies, and the use of water transfers or government funding (assuming it can be appropriated) to "enlarge the pie." Participation by stakeholders other than those who claim water rights may be possible. Unlike litigation that can (and has) dragged on for decades, settlements may involve a deadline that greatly speeds the process. Settlements may be used to augment the litigation and/or to replace pieces of the litigated process substantially, such as the inter se phase where rights holders may challenge the rights of others.

The second way that the settlement agreements represent institutional change is that they change

some of the formal and informal rules for how water is managed. One of the most striking changes is that all four settlements have alternatives to priority administration, the heretofore fundamental procedure for managing water allocations in New Mexico. These alternatives include government-funded buyouts of water rights and transfers, shortage sharing or other “alternative administration” procedures, and forbearance agreements with respect to priority calls. The settlements also change the rules regarding the leasing of water, creating mechanisms to expedite the leasing of water under some circumstances and facilitating legislation to allow leasing of large amounts of Indian water that previously was not permitted. And, the settlements adjust various other management processes to enhance enforcement of water rights.

The fact that five major water rights settlements have been signed in New Mexico (the four case-study agreements, plus the 1992 Jicarilla Apache agreement), a sixth major one is currently being negotiated (in the Jemez Basin), and a variety of smaller ones have been completed, provide evidence that negotiated water rights settlements are not anomalies. The total water rights resolved in the five settlements to date represent a substantial portion of the water consumed each year in the state: ~486,000 AF/year of consumptive water rights out of the 2.0 MAF/year of water consumed in New Mexico. Settlement of Indian water claims also has been and is being pursued in other states, and it is conceivable that settlements will be pursued for other basins in New Mexico with unresolved Indian water claims. In addition, the fact that one of the agreements (Lower Pecos) is not related to the settlement of Indian claims demonstrates that negotiated water rights agreements are not limited to adjudications involving Indian claims.

Conclusions

The settlements are a response to inadequate but entrenched institutions (rules). They represent institutional change with respect to the governance of water in New Mexico in that they change the rules for both how water is allocated (or how water rights are determined) and how water is managed (or how water rights are administered). Because they are voluntary agreements, the settlements were able to change key institutions through collective action without requiring changes to the underlying fundamental water law and remain compatible with the state constitution. Voluntary

collective action was possible because the provisions in the settlement provided net benefits not only to the group as a whole but also to the individual signatories. The number of settlements and amount of water involved indicates that fundamental institutional change in New Mexico’s water management is underway. It is conceivable that the settlements represent an interim step to broader, more overarching, institutional change in the management of water.

Going forward, a number of additional questions can be raised: When are settlements desirable, from a local, basin, state, and/or national perspective? What do the various stakeholders gain or give up relative to litigated adjudications or business as usual? How are settlements initiated and negotiated, and is an external threat necessary to get the process started? Given the large number of claimants involved in a typical water rights adjudication, how can transparency and participation be maximized while keeping the negotiation process feasible? How can settlements be implemented successfully? And finally, how should settlements be funded? What are the cost-benefit tradeoffs relative to traditional litigated adjudications and the status quo? Are large sums from outside the basin in question necessary to achieve agreement, and if so, what are the incentives for outside entities such as the federal or state government to provide such funding?

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