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Water, technology, and the courtroom: negotiating reclamation policy in territorial New Mexico

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Abstract

Historical investigation of arid landscapes and communities in the American West has long focused on the pivotal influence of federal reclamation policy, typically characterizing its implementation as the application of scientific and technological methods to a variety of water resource management issues. This paper departs from traditional views of reclamation by highlighting the highly variable and contingent ways in which new science-based forms of water management were proposed and negotiated in specific local places with particular cultural, legal, and historical geographies. Drawing theoretically from literature on the ‘geography of science,’ the paper probes the ways in which authority for a scientific approach to water management was created, negotiated, and expressed in local and regional contexts in the Territory of New Mexico, where authoritative systems of practical resource use and administration had been in long use before the U.S. government initiated its federal water reclamation program in 1902. Specifically, the paper examines two disputes entered and argued in front of northern New Mexico’s Rio Arriba District Court between 1903 and 1905. By departing from the geographical and scalar perspectives typically applied to environmental histories of the West and its reclamation landscapes, this ‘microgeographical’ approach promises a fresh perspective that emphasizes the highly contingent ways in which science-based water policy was implemented in multiple and complex environments.

Keywords: Water management; Reclamation; Legal geography; Geography of science; New Mexico; American West

Historical investigation of arid landscapes and communities in the American West has long focused on the pivotal influence of federal reclamation policy. As numerous authors have now shown, centralized water management was fundamental to the economic, social, and political developments that gave birth to the West and its iconic and sprawling southern metropolises. The influence of federal reclamation policy and projects, however, was not uniform throughout this highly varied region. Beyond the well-known and much-discussed landscapes of the Imperial Valley, the Owens Valley, Lake Mead, Lake Powell, and central Arizona, a long list of other western places and peoples interacted with state and federal water management efforts in a variety of nuanced ways. In New Mexico, for example, where irrigation practices had been driving environmental and cultural change for centuries, reclamation initiatives had to contend with existing norms for resource management, few of which intersected seamlessly with new federal models for scientific water control. The development of political support for reclamation projects in New Mexico was thus highly dependent on the realities of the territory’s complex cultural and ethnic geographies. Perhaps because of this complexity, areas like the upper Rio Grande and its tributaries have remained largely out of the main stream environmental–historical spotlight on Western waters.1 I suggest in this paper, however, that there is space in this sub-region’s very complexity for a rethinking of the nature, deployment and impact of science-based reclamation policy as a driver of water management.

The development of water resources in the American West was a key element of the Progressive political agenda that focused on nation-building through both international expansion and domestic social transformation. Seen as a storehouse of untapped natural resources, the West was considered critical to the growth of an export-based economy that would help America cement its influence among other Western imperial powers. A region of vast and largely unsettled open spaces, the West was simultaneously seen as an outlet for relieving the landlessness and

1 See D.R. Littlefield, Conflict on the Rio Grande: Water and the Law, 1879–1939, Norman, OK, 2009 for the first serious look at the Rio Grande’s importance in the development of federal approaches to water management, noting that it focuses on the lower Rio Grande near the boundary that divides Texas from New Mexico and the United States from the Republic of Mexico.
overcrowding blamed for social degeneration in the face of massive immigration. For the American West to live up to its potential in either of these cases, however, water development was a critical piece of the puzzle.2

In general, the federal push for water reclamation was justified with an argument that natural resources should ideally be managed through scientific methods of quantification and rationalization. In many ways, this science-based policy relied heavily on the presumed universality of science itself, as seen in centralized and often remote management structures that were meant to govern resources uniformly across highly uneven environmental and political landscapes. Although our historiographical approaches to Western waters seem largely to have accepted this idea of universality, treating the 1902 Reclamation Act’s underlying scientific ideals and impacts as monolithic and uniform, recent critical attention to the ‘geographies of science’ demands a rethinking.

Explicit spatial understandings of science have now come to the forefront of contemporary science studies. The presence of knowledge—suggested by recent scholarship—suggesting that our understanding of science-based resource management policy must do the same. The places in which scientists conduct their work, the pathways and networks along which scientific claims travel, and the unique locations in which audiences engage with scientific knowledge have all been shown to have important influences not only on the substance of scientists’ work, but also on scientists’ ability to gain credibility. Early works in science and technology studies (STS), for example, showed that the emergence and institutionalization of experimental science was dependent on the physical gathering of ‘witnesses’ who vouched for the legitimacy of experimental observations in ways that were convincing to those who did not witness the reported empirical phenomena in person.2 Given that the uniquely local laboratory sites in which this witnessing typically occurred strongly reflected and replicated social geographies of privilege, the cultivation of ‘trust’ in the truth of scientific claims can be viewed in distinctly spatial ways.3

Despite these early acknowledgements of spatial influences in the practice of science, however, the ‘geographical turn’ in this literature is just now coming into full swing. The spatial settings in which scientific work is undertaken are no longer viewed ‘as passive backdrops, but as vital links in the chain of production, validation and dissemination.’4 Ophir and Shapin helpfully suggest that the ‘irremediably local dimension’ of scientific knowledge should be seen not as a damaging critique but as a methodological point of entry.5 Livingstone’s repeated calls for attention to science’s geography have accordingly focused on the ‘regionalization’ of knowledge, the ‘political topography’ of scientific activities, the ‘spatial diffusion’ of scientific claims, and the ‘complex relationships between science and empire.’6 A full examination along these lines of the spatial nature of scientific knowledge production thus requires sophisticated attention to ‘place,’ a key geographic concept that provides for the definition and characterization of spaces in which identities, economic formations, and social relations are formed.7

In applying a place-based approach to science and knowledge, important recent work has shown that scientific claims are both produced and consumed in a multiplicity of sites, including not only the controlled laboratory, but also the field, museum, hospital, pub, coffee house, bazaar, ship, and body, to name a few examples.8 The microgeographies affecting each site of science are ‘central to the veracity of the knowledge produced,’ despite the common perception of science as a ‘placeless’ activity that does not vary by location.9 At a broader scale, regional geographies have been shown to influence not only how scientists will approach their work, but also how that work will be circulated and received.10

This paper brings this scholarship to bear on science-based resource management and policy by focusing a detailed lens on the region of territorial New Mexico and the ‘site’ of Rio Arriba County’s District Court. Territorial New Mexico’s district court archive is a particularly salient one in which to investigate the spatial inflections of science-based resource policy, given the unique complications this territory faced following its incorporation into the United States. After 250 years of Spanish and then Mexican rule, New Mexico entered the United States as part of the massive territorial cession that ended the Mexican–American War in 1848 and established the territorial boundaries of the modern American Southwest. With a complex political and ethnic geography dominated by indigenous, Iberian, and mixed-lineage peoples who relied primarily on small-scale irrigation agriculture throughout the Rio Grande Valley, New Mexico soon became a target for Anglo settlement and large-scale water development. The political difficulties of resolving numerous conflicts over pre-American residents’ land ownership, water rights, and citizenship privileges, however, proved highly intractable and were largely responsible for preventing

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7 These terms were first used in one of Livingstone’s early appeals for geographic attention to knowledge production: D. Livingstone, The spaces of knowledge: contributions towards a historical geography of science, Environment and Planning D: Society and Space 15 (1995) 5–34. His arguments have expanded since then but remain committed to the value of these core concepts, as seen in his identification of ‘site,’ ‘region,’ and ‘circulation’ as key foci in his most concise recent statement on the promise of a geographical approach to science: D. Livingstone, Putting Science in Its Place: Geographies of Scientific Knowledge, Chicago, 2003.


New Mexico’s transition to statehood for more than six decades. In the northernmost communities of the San Juan Mountains, the resistance of pueblo (indigenous) and Hispano (Spanish-colonial descendant) residents to new Anglo settlers, administrators, and policies was carried out on multiple levels. Although the historical record shows clearly that these groups lost power, land, and influence to Anglos in the second half of the nineteenth century through a variety of legal and illegal maneuvers, it is well worth examining the nature and impact of their resistance to the emerging Anglo control of judicial and political power structures related to resource management. This study focuses on water management by carrying out what is essentially a microgeographical study of reclamation science and technology, as applied and contested in the litigation of two local water disputes (comprised of four actual legal cases) entered and argued between 1903 and 1905 in front of the district court in northern New Mexico’s Rio Arriba County.13 As the traditional center of Hispano settlement, Rio Arriba long maintained influence and power as a stronghold of resistance, even into the present. As a historical case study, this particular site allows for a detailed investigation of the ways science-based water management ideals were influenced and challenged by the merging of cultures, customs, and legal systems in specific places.

The paper’s first section discusses the importance and impact of science-based Reclamation policy in the American West, noting the potential for viewing Progressive-era water policy developments from a spatial perspective. The second section examines the particular legal geographies of water management in New Mexico, emphasizing the territory’s cultural uniqueness and spatial variability within the regional context of the arid American West. The next two sections analyze the ways New Mexico’s late Territorial-era courts grappled with the difficulties of enacting reclamation-era resource management ideals in local-level dispute resolution in the First Judicial District of New Mexico, which was seated in Rio Arriba County. This spatial–legal–historical analysis focuses on the role of science and technology as points of dispute rather than as agents of unification (as typically expressed in the early-modernist view of reclamation and other Progressive modes of resource management).14 In so doing, the paper illuminates the ways in which we can begin to understand the highly contingent implementation of science-based water policy in the American West a century ago.

**Reclamation, science, and the American West**

For more than 100 years now, centralized water management has been a fact of life in the American West. The 1902 Reclamation Act was one of the most sweeping pieces of federal legislation in U.S. history, enabling unprecedented levels of federal involvement in local- and regional-scale resource management, economic development, and public works. With this legislation in place, the U.S. government began an aggressive campaign to install and administer infrastructure for irrigation, flood control, and power generation across sixteen western states and territories. These projects were initiated and overseen largely by the new U.S. Reclamation Service, often in conjunction with state bureaucracies that quickly sprang into existence in the first years of the twentieth century. Although reclamation-era logics and technologies have come under increasing criticism in recent decades, the governance structures and material infrastructures they enabled have had profound and lasting effects on the urban, economic, and political geography of the modern American West.14

Federal water reclamation was similar to other Progressive-era resource conservation efforts in that it encouraged resource development yet also regulated extraction rates in order to provide ‘the greatest good for the greatest number,’ as famously articulated by President Theodore Roosevelt. Reclamation was, however, significantly more extensive than initiatives then underway to manage timber resources and mineral deposits. In addition, it served multiple political purposes beyond the mere conservation of water as a natural resource. Rhetorically justified in Congress and in the press by its theoretical ability to provide homesteads to landless eastern urban dwellers through the irrigation of otherwise unusable arid lands, reclamation was also fundamentally a means of nation-building and imperial expansion.15 By opening land for intensive agricultural development, western irrigation projects were meant to ‘augment American wealth and muscle’ in international commodity markets while also offering land as ‘a safety valve for the discontented, unemployed, unplyeul class in the cities.’ This followed the larger pattern of American expansionism that pursued empire through commerce, rather than through colonialism.16

Alongside these larger political and geopolitical meanings, reclamation policy also served as a means of enacting state power through the rationality of resource governance.17 As Kirsch has noted, nineteenth-century expeditions to survey lands, waters, and peoples in the American West were funded by the U.S. federal

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15 For a thorough analysis of this philosophy and the relationship between federal forestry and reclamation initiatives, see Pisani, *Water, Land, and Law in the West* (note 14), particularly chapters 7 and 8. For a discussion of the way Reclamation was intended as a re-settlement project, see Pisani, *Water and American Government* (note 14). For a discussion of the fundamentally imperial concerns that spurred Congress to pass the 1902 legislation, see Worster, *Rivers of Empire* (note 2). Both Worster and Pisani reject a reading of the Reclamation Act as merely a resource conservation policy. Building on these classic works, the most recent critical treatment of reclamation focuses on the racial theories and nationalist concerns that underpinned support for one of the U.S. Reclamation Service’s most celebrated projects: the damming of the Colorado River. E. Boime, *Beating plowshares into swords*: the Colorado River delta, the Yellow Peril, and the movement for federal reclamation, 1901–1928, *Pacific Historical Review* 78 (2009) 27–53.


government primarily ‘to make [the West] legible from the capital.’ Today’s frequent lionization of explorer John Wesley Powell as a prescient environmentalist thus often overlooks his fundamental role as an agent of the federal government. Although Powell’s prescriptions for watershed-scale resource management in the West were rejected in the 1890s in favor of a centralized federal model, reclamation policies were fundamentally oriented toward putting responsibility for natural resources in the hands of a technocratic elite, as epitomized by the surveying and cartographic work of Powell himself. Before 1902, most western water management was done at local scales, based on community norms and individual innovations. With the passage of the Reclamation Act, however, responsibility for water development shifted dramatically to a new federal agency staffed primarily by engineers: the U.S. Reclamation Service (later re-christened as the Bureau of Reclamation). This federal bureaucracy served as a model for American governance more generally, while also laying the foundations for the bureauconsecrating that mimicked its central principles. Under pressure from President Roosevelt and Reclamation Service officials like its first director Frederick Newell, for instance, the western states and territories were urged to create centralized water permitting systems, water commissions, and state/territorial engineer appointments that became cornerstones of then-emerging governance structures.

All of these bureaucracies were premised on the idea that water resources in the semi-arid west could and should be managed for the public good in a technical and scientific way. Reclamation was meant to enable massive agricultural and municipal development on the basis of expert control of hydraulic science and ultra-advanced technology. If we focus on these scientific and technological aspects, reclamation policy can be seen as a significant break from pre-existing management schemes. For all of the Reclamation Act continuity with existing political movements and geopolitical interests, there is simply no precedent in the American West for centralized water rights permitting systems based on detailed hydrologic survey data.

Management plans, problems, and disputes had never before been so fully entrusted to engineers, scientists, or other technocrats as they were in the twin agencies of the Forest Service and the Reclamation Service. The science of hydrology, in fact, emerged in the United States largely in order to manage America’s western waters more effectively. Before it became a national priority to turn western rivers to productive use, that is, European methods and equations for describing water flow were virtually unknown to American engineers.

Given the highly contingent nature of scientific knowledge, especially in spatial context, it is imperative to explore the science-based policy mandates of reclamation’s implementation as well. In what follows, I focus not on the contingency of the Reclamation Act’s legislative success or its political enactment but on the contingencies of its local and regional implementation. How exactly did states and territories execute new governance models that included new scientific positions and personas like state engineers? How did local communities deal with new administrative and legal requirements like permit applications for water rights and water use? And given the inevitability of resistance to these new schemes, how did local-level resistance impact the implementation and nature of reclamation itself?

Legal geographies of water management in New Mexico

Of all the western states eligible for federal reclamation investment, New Mexico had by far the most complicated cultural and historical geography with regard to water resources. At the time of the Reclamation Act’s 1902 passage, indigenous pueblo communities in the Rio Grande Valley had already been practicing irrigation-based subsistence farming for as long as 600 years. Even the ‘latecomer’ colonial Spanish had begun practicing community-based irrigated agriculture in New Mexico as a full 300 years before the Act was passed. More importantly, the practices and governance of irrigation had become mainstays of cultural identity for these newly marginalized ethnic groups after the Mexican Cession of 1848 saw their communities transferred from Mexican sovereign to American territorial control.

As Anglo presence increased in the Southwest in the nineteenth century, northern New Mexico emerged as the primary stronghold for Hispano culture. One of the bases of Hispano (or Spanish-colonial) community coherence during this period was the water governance institution of the acequia or irrigation ditch. Having originated in the Iberian peninsula under Roman, Visigothic and Islamic influence, acequias came to New Mexico with the first colonial Spanish settlements. Their specific New Mexican forms of use and governance developed over centuries of interaction between indigenous pueblo communities and Spanish-colonial settlers along the valleys of the Rio Grande and its tributaries.

In material terms, an acequia is a ditch technology that diverts water from the main stream of a river and conveys it by gravity past agricultural settlements – where it is distributed to individual fields via a network of distributary ditches regulated by hand-operated head-gates – before returning excess waters to the main

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20 A.K. Biswas, History of Hydrology, Amsterdam, 1972. To remedy this deficiency in the late nineteenth century, numerous civil engineers from elite American schools in the eastern seaboard were transported to the West for training in the science of hydrology under the auspices of the Irrigation Survey, a short-lived branch of the United States Geological Survey. New Mexico’s upper Rio Grande was one of the first sites chosen, as it was considered a perfect case study for training in the art of river hydrology. A. Fraizer and W. Heckler, Embudo, New Mexico, Birthplace of Systematic Stream Gaging, Geological Survey Professional Paper 778, Washington, 1952.


22 For the Iberian origins of acequia irrigation, see T. Glick, Irrigation and Society in Medieval Valencia, Cambridge, Mass., 1970. For works that discuss the cultural importance of the acequia as an institution in New Mexico specifically, see J. Rivera, Acequia Culture: Water, Land, and Community in the Southwest, Albuquerque, 1998; S. Rodríguez, Acequia: Water-sharing, Sanctity, and Place, Santa Fe, 2006.
river channel through an outlet ditch. In institutional terms, an acequia is a governance institution that vests rights of water use and elective suffrage in all of its members in return for contributions of labor and money to the maintenance and repair of the material infrastructures of the ditch. In New Mexico, each acequia is overseen by an annually elected mayordomo, who is responsible for setting water distribution schedules and making decisions about water allocation during times of scarcity, and by a three-person elected commission, which is responsible for enforcing acequia members’ obligations and resolving any disputes. In times of scarcity, water resources are typically apportioned according to principles that recognize individual need, fairness, and seniority based on prior use. Acequias still exist in New Mexico today and are recognized as political subdivisions of the state, on par with other entities such as counties (see Fig. 1).

Given the cultural importance of this well-established irrigation history in a state that ‘had all the problems of the arid West as well as those unique to itself,’ New Mexico presents a particularly fertile region in which to examine the place-based contingencies of reclamation policy implementation. During New Mexico’s Territorial period (1848–1912), the difficulties of distributing land and developing water were seen by new Anglo elites as the primary obstacles to economic development as well as future statehood. They therefore ‘scrutinized closely all activities in Washington which might affect [economic] growth,’ including the debates over reclamation policy, and successfully promoted several large-scale

Fig. 1. Modern map of New Mexico’s irrigation infrastructure. Note the concentration of traditional acequia systems along the upper Rio Grande in the north-central part of the state, indicating a high concentration of communities dominated by Hispano and Pueblo ethnic groups. Courtesy Utton Transboundary Resources Center and Jerold Widdison.

23 For key works that discuss how these institutions were impacted by and responded to new American institutions, see the works cited in note 21 above, especially Clark, Water in New Mexico (note 18) (especially Chapter 8, New Mexico expands its local water institutions, 100–114); Ebright, Sharing the shortages (note 21).
irrigation projects for inclusion in the first wave of federal reclamation investment after 1902. At the same time that New Mexico’s Anglo elites were jockeying for federal reclamation dollars, they were also working to reform the Territory’s own water laws and administrative water management practices to facilitate private speculation in water development projects. The territorial government had passed a bill in 1887 that allowed for the development of large-scale irrigation projects yet also provided for the protection of traditional acequia systems. The law’s accommodation of ‘dualistic authority’ for fundamentally different approaches to irrigation, however, served only to prolong conflict among communities and water users. In 1905, a new law was created to draw a line under myriad water conflicts. Revised in 1907 and substantially unchanged today, the state water code created a centralized authority for water administration, with the locus of new authority vested in the Office of the Territorial Engineer. The gubernatorially appointed Territorial Engineer was charged in the statute with ‘conducting hydrographic surveys of all stream systems and other sources of water, beginning with those most used for irrigation and including the location of suitable dam and reservoir sites’ and ‘with the added responsibility of recording all available data for determining, developing, and adjudicating the supply’ via an administrative water permitting system. In accordance with the federal reclamation philosophy on which this agency’s enabling legislation was based, the Territorial Engineer was required by law to ‘be a technically qualified and experienced hydraulic engineer’.

The creation of the Territorial Engineer’s office reflected the New Mexico legislature’s desires both to move toward a more rational-scientific system of water management and to control water via centralized administration rather than through local litigation. This was a significant departure from predecessor systems under colonial Spanish and sovereign Mexican rule, in which water disputes had typically been resolved in local probate courts rather than by any centralized water authority. In the subsequent American territorial period, water-related cases had already begun to shift out of local probate courts and into Territorial district courts, which were dominated by non-local, federally appointed Anglo judges and attorneys. But even as the Territory gained power over local acequia communities in this shift, the difficulties of enacting fully rational-scientific water governance through court-based dispute resolution persisted, as the following cases show.

Case study: technological prescriptions meet cultural realities

In the case of George Anton et al. vs Juan Bautista Talache, Governor of the Indian Pueblo of San Juan et al., water-control technology was at the center of an entrenched dispute that raged from 1903 to 1905 between two acequia communities along the Rio Grande. The plaintiffs were members of the Acequia Nueva, an acequia that diverted its water from the Acequia Madre de San Juan Pueblo at a point downstream of the pueblo itself and near the Hispano village of Ranchitos (see Fig. 2). The defendants were members of the San Juan Pueblo. The Acequia Nueva irrigators petitioned the court in 1903 for an injunction, claiming that the San Juan irrigators had destroyed their acequia’s intake diversion and then bodily prevented its repair, depriving the acequia (and thus their fields) of water. In the original request for civil injunction, the plaintiffs stated that the defendants had been ‘threatening personal violence and using force to destroy the said intake as fast as plaintiffs try to repair it and put it in good condition ... and that said defendants threatened and continue to threaten and are to this day threatening to close, obstruct, destroy and impede the said intake and stop the water from the said main ditch in order to deprive plaintiffs of the use of said water to irrigate their said lands, and if they, plaintiffs, should be deprived of the use of said intake and water in the manner aforesaid, their crops will be totally ruined for want of water, and will thus be deprived of some of their means of maintenance for themselves and their families. This destruction had
been perpetrated through the installation of a wooden spill-way structure that was designed to let water in the main acequia pass through to its original outlet channel, or desaguie, rather than entering the Acequia Nueva.

The Acequia Nueva was at that time a relatively new addition to the overall system of the Acequia Madre de San Juan Pueblo, which derived its waters from the Rio Grande and fed acequias in the Hispano communities of La Joya and Plaza Alcalde before reaching San Juan Pueblo. In the early to mid-1890s, a group of irrigators from the upstream Hispanic communities had moved downstream to the Ranchitos settlement, successfully petitioning the main ditch for permission to divert water from the desaguie to their own fields.\textsuperscript{22} At the time this case was brought to court, the defendants from San Juan Pueblo insisted that permission to divert unallocated water from the Acequia Madre's desaguie into the Acequia Nueva had been granted as a courtesy or 'a matter of grace,' rather than as a water right.\textsuperscript{23} The Acequia Nueva irrigators argued, however, that they and their ancestors had jointly built the Acequia Madre de San Juan with the pueblo peoples and had been joint irrigators with joint water rights in the main ditch from time immemorial: '[the] Acequia Madre is not owned exclusively by the Indians of the village of San Juan, but it is owned by the plaintiffs in this case, the defendants, and other parties who live outside from the said Indian village and are not members thereof, but are Mexican people and it has always been owned by all of the said parties in common.'\textsuperscript{24}

The rights-vs-courtesy issue mattered because the Acequia Nueva diversion had caused flooding on upstream lands in the pueblo since its inception. If the Acequia Nueva irrigators were using the water as a mere courtesy, the San Juan Pueblo irrigators could claim that the priority need to prevent flooding and maintain the upstream banks of the Acequia Madre outweighed the need to fulfill the courtesy of water-sharing with a downstream neighbor. If the Acequia Nueva irrigators had an actual right to the water, however, any upstream flooding problems would need to be resolved without fundamentally impacting the flow of water to the downstream community.

According to the defendants from San Juan Pueblo, flooding of their ‘door-yards, gardens and orchards’ was caused by a fundamental fault in the Nueva Acequia. From the first, they asserted, the new acequia had not been dug to the bed depth of the Acequia Madre, meaning that water could not enter the acequia intake unless the diversion first raised the water level high enough to cause a pool to develop. For most of the year, this pool did not generally pose any problem. During a flood event, however, the pool caused the main stem of the Acequia Madre ‘to back up and overflow the banks ... above the point of intake of the said Acequia Nueva,’ causing numerous negative impacts to upstream irrigators. Before the Acequia Nueva was built, the defendants claimed, the old outlet ditch ‘did by reason of its rapid [topographical] fall, carry off all the surplus waters of flood and freshet and all accumulations of sand and sediment, and that no overflows were known to take place from such causes.’\textsuperscript{25} The reduced gradient of the Acequia Nueva combined with its too-high intake, therefore, had drastically slowed the outflow of water during flood events, when drainage was of utmost importance to upstream users. Several members of the San Juan Pueblo testified that the banks of the Acequia Madre had been breached on multiple occasions since the installation of the Acequia Nueva, with their lands and homes subsequently coming under unacceptable flooding threat. They admitted breaking the diversion of the Acequia Nueva (after warning the downstream community multiple times that the bed of its ditch needed to be deepened) and installing the wooden spill-way, claiming that it was their responsibility to ensure the safety of those who had water rights along the main ditch.

According to Acequia Nueva, however, the upstream flooding had nothing to do with the height of their intake and was actually caused by an upstream arroyo that delivered particularly forceful freshets into the Acequia Madre during rain events. They admitted that their acequia intake was higher than the bed of the Acequia Madre but denied that this had ever been the cause of a ‘back-up’ of waters into the fields of San Juan Pueblo. They complained to the court that their legitimate water right was being disrespected ‘without any cause or reason whatsoever,’ invoking the old Spanish legal principle (which was of course compatible with a Progressive-era mantra as well) that waters should never be left to ‘go to waste’ when they could be put to irrigation purposes. And since the ‘wasted’ waters had been routed down the old desaguie channel through lands that by that time had been put into cultivation, the resulting erosion was decried as a double insult.\textsuperscript{33}

How did the court rule on this dispute? District Judge John R. McFie ordered that the defendants must maintain and control a spill-way at the point of Acequia Nueva's diversion, with the following specifications: a height of no more than 24 and no fewer than 18 inches from the bottom of the ditch and an ability 'to operate automatically whenever the water at said point shall from any cause rise to a height above the level of the said spill-way.' The defendants were given the 'burden of maintaining the said spill-way ... forever' and of contributing labor to the construction of a reinforced channel that would prevent waters passing the spill-way from destroying existing cultivated lands. With this ruling, Judge McFie essentially skirted the parties' fundamental dispute over water rights by prescribing a fully technological solution. In the court's technological vision, the spill-way would automatically allow water to flow quickly back to the Rio Grande during times of storm and flooding, while functioning during normal weather to 'throw a full head of water into the canal of the Acequia Nueva.'\textsuperscript{34}

This seemingly straightforward solution did not, however, in any way resolve the dispute. Since the wooden spill-way had already been constructed at the time of the court's ruling (and was the reason for the court case in the first place), the Pueblo did not see fit to re-build it to meet the court's specifications. The spill-way was in fact capable of creating a diversion of 24 inches, but it had been installed only after the excavation of sediments in the bed of the main ditch, meaning that the resulting diversion raised water barely high enough to reach the bottom of the Acequia Nueva intake, which was a full foot above the bed of the Acequia Madre. Furthermore, the spill-way did not operate in an 'automatic' way, as had been prescribed by the court. To maintain the 18- to 24-inch diversion required, it used removable planks that were 'not fastened or nailed, but [were] merely set one on top of the other [with] no groove or other arrangement to hold them fast, or to prevent them from falling after being set.' The plaintiffs complained

\textsuperscript{22} The two sides disagreed on the date of the acequia's initiation, with the plaintiffs claiming it had been constructed in 1892 while the defendants protested that it had not begun diverting water until 1895.

\textsuperscript{23} Anton et al. vs Talache et al., SRCA, Defendants’ reply, n.d.

\textsuperscript{24} Anton et al. vs Talache et al., SRCA, Plaintiff's Exhibit 5: affidavit by S.S. Filonmo Sanchez, 26 May 1903.

\textsuperscript{25} See note 30.

\textsuperscript{33} Anton et al. vs Talache et al., SRCA, Plaintiffs’ reply, 24 May 1903.

\textsuperscript{34} Anton et al. vs Talache et al., SRCA, Court order and decree, 27 May 1903.
about this condition in a follow-up petition to the court, noting that the planks ‘constantly fall off’ the spill-way opening because, as the water rises behind them, it buoys them up, and lifts them from their place, and they fall down on their sides and float on the water.’ On account of this ‘leaky condition and bad construction,’ they continued, ‘between the joints of these boards, or between their edges, a great amount of water escapes, and ... it is utterly impossible, without sitting at the spill-way and holding these boards down firmly and in place, to divert any water into the Acequia Nueva.’

Not only did this need for personal intervention frustrate the court’s attempt to mandate an automatic technological solution, but it also perpetuated one of the original problems: that people from both sides of the dispute were continually drawn into contact and conflict at the actual site of the spill-way. Because the court had given the pueblo responsibility for maintaining the spill-way, the positioning and functioning of these faulty planks could not lawfully be restored by anyone outside the pueblo. The pueblo had apparently delegated this responsibility to ‘Alejandrino Garcia, who lives about 500 yards up the acequia from the spill-way’ and who kept the top two boards in his possession ‘and notified the plaintiffs and those associated with them that he alone was authorized to touch the boards.’ When the planks inevitably fell down in his absence, the plaintiffs ‘tried always to re-set the boards ... and once nailed them in place, but ... were compelled to take the nails out, and leave them loose, or suffer prosecution by said defendants for interfering with said spill-way.’ The plaintiffs argued in their follow-up litigation that this arrangement was not what the court intended because it was not ‘a permanent thing, working automatically, whenever the water should rise in the Acequia to a height where, for safety, it must pass over the spill-way.’ In other words, the prescribed technological solution for the Acequia Nueva intake had defaulted instead to a mode of ditch maintenance common to every acequia system in New Mexico, where an individual person was vested with final authority for controlling the flow of water.

The pueblo’s designated spill-way overseer Alejandrino Garcia may not have been a mayordomo, but he was recognized by all parties involved as individually responsible for the decision of whether to allow any water to flow into the Acequia Nueva.

In responding to this follow-up litigation, Judge McFie agreed that it was problematic for the spill-way to be controlled in this way. He ruled that the planks must be secured in place and not touched for any reason ‘except that when there shall be imminent a storm or flood which may cast a heavy burden of water into the said Acequia Madre, then and in such event, and only in such event, and for the necessities of such case, such head-gate and flash-boards may be with-drawn and taken out of such spill-way.’ Once ‘such storm or flood has spent its force,’ McFie ruled, the gate and boards must be restored to a secure position. Although this was not quite the ‘automatic’ function the court had earlier decreed, it was more automatic and less political than the situation that had developed in the year after McFie’s first ruling.

Within a year, however, the case was back in court, with the San Juan Pueblo now suing for permission to remove the boards. In San Juan Pueblo vs Acequia Nueva and Taoñfio Archuleta, the plaintiffs claimed that the court-mandated permanent installation of flash-boards had essentially converted the spill-way into a dam. As silt and sediments filled in behind the wooden structure, its intended function as an outlet for floodwater was significantly compromised. San Juan Pueblo representatives therefore requested permission to remove the boards for purposes of cleaning out the accumulated silt and returning the channel of the Acequia Madre to its original depth. Additionally, the plaintiffs asked that they ‘be permitted to leave the said flash-boards out, and the said spill-way open, so that the surplus waters of said Acequia Madre which may reach said point may escape, until such time as said Acequia [Nueva] shall be cleaned and deepened so that the bottom thereof may be at as low a level as the bottom of the Acequia Madre at the spill-way, and so that water will flow readily down the said Acequia Nueva, and not rise and back up into the said Acequia Madre at such time as the said flash-boards shall again be replaced.’ In other words, the pueblo representatives re-asserted their original point that the Acequia Nueva’s intake was too high, and that it was not possible to allow any pooling of water at the point of diversion without causing upstream flooding. They petitioned the judge for relief from his imposed technological solution, arguing that the only way to resolve the problem was by denying Acequia Nueva its water until the ditch was deepened.

This time, the judge finally relented, essentially acknowledging that his technological solution had failed. He ruled that San Juan Pueblo could remove the flash-boards for purposes of cleaning the Acequia Madre and that the Acequia Nueva must clean and deepen their ditch ‘so that the bottom thereof may be at as low a level as the bottom of the spill-way.’ After attempting twice to fix the conflict by mandating water-control technology, he finally made a ruling that dealt with the underlying water rights issue. In decreeing that irrigators dependent on the Acequia Nueva would not get any water unless they deepened their intake channel, Judge McFie essentially ruled that the newer community’s right to water in the main ditch was contingent on its participation in a water- and infrastructure-sharing scheme that fully accounted for the rights of other water users. Although he had seemed unwilling to rule on this issue in the earlier petitions, McFie was forced by the failure of the technological workaround to revert to a pre-Anglo and pre-Reclamation form of dispute resolution in 1905. In this case, then, we can see the ways that local cultural conflict frustrated even a minor attempt at rational-scientific water management in New Mexico.

**Case study: cartographic contingencies in the district court**

In the case of *Acequia de los Garcias vs Acequia del Medio*, flood diversion technology was again at the center of a 1905 dispute between two acequia communities. This time, however, the ditches themselves played a minor role in the conflict. At the confluence of the Rio Grande with its minor tributary, the Rio de las Truchas, in Rio Arriba County, two Hispano settlements spanned the fertile lands on either side of the Truchas channel (see Figs. 3 and 4). Although the Truchas riverbed that divided the two communities was normally dry, it filled every spring with snowmelt descending from the Sangre de Cristo Mountains and every summer with monsoon-driven precipitation flowing downhill to the main stream of the Rio Grande. The imperatives of protecting low-lying...
agricultural lands from these seasonal floodwaters had long induced the users of the left-bank Acequia de los Garcias and the right-bank Acequia del Medio to build ‘breakwaters’ of brush, stone and logs along the Truchas banks to slow and redirect its dangerous waters.40

In the suit brought by the Acequia de los Garcias in 1905, the plaintiffs claimed that Acequia del Medio irrigators had built a new breakwater that cut directly across the channel of the Truchas, re-routing the river’s water across their lands and thus glutting their acequia with sediment deposits. Emphasizing that they had been irrigating their lands from time immemorial (via an acequia derived from the Rio Grande), the plaintiffs asked the court for an immediate injunction to stop any maintenance on the breakwater and to require its removal. Otherwise, they pleaded, the Acequia de los Garcias would be ‘ruined beyond repair’ and their lands would suffer ‘great and irreparable loss and damage’ as the Rio las Truchas carried ‘away their soil … destroying the crops which have been started, and preventing any further cultivation.’41 To support their complaint, the plaintiffs provided a map that showed both rivers, both acequias, both breakwaters, and all of the plaintiffs’ cultivated fields (Fig. 3).

Although this map was probably meant to serve mainly as an illustration of the situation described in the text of the plaintiffs’ complaint, its cartographic veracity quickly emerged as a target in the dispute. One of the first points the defendants from the Acequia del Medio made in their reply to the court was that the direction of the Truchas River’s natural channel had been misrepresented as ‘northwesterly’ by the plaintiffs, when it was in fact flowing ‘from east to west’ where it joined the main channel of the Rio Grande.42 The distinction mattered deeply to both sides, with each party arguing that its own breakwater had been built alongside and parallel to the river, with the other community’s breakwater crossing the channel at an angle sufficient to divert the river’s natural flow. If the dispute hinged on questions of the location and function of diversion infrastructure relative to the direction of the river’s natural channel, cartography must have seemed to the plaintiffs an obvious way to clarify the ‘facts’ of the case for the court.


41 Acequia de los Garcias vs Acequia del Medio, SRCA, Complaint, n.d.

42 Acequia de los Garcias vs Acequia del Medio, SRCA, Defendants’ answer to show cause, 19 April 1905.
The main problem with this approach was that the defendants did not accept the plaintiffs’ map or associated description of the geography in question. As stated in their detailed challenge, ‘Defendants further deny that plaintiffs’ map (plaintiffs’ exhibit ‘A’) is a true and correct representation and description of the Las Truchas river and the property involved in this suit; but defendants aver said map to be a misrepresentation of said river, dams and premises, and ask the court not to consider the same as reliable inasmuch as there is nothing to show when and by whom it was made, nor that the same was made by a competent civil engineer, or surveyor.’ Having already stated some of their geographical objections, the defendants thus attacked the plaintiffs’ map by contesting its cartographic expertise. In the process, they also specified their perception of a reliable mapmaker’s professional characteristics: ‘competent civil engineer, or surveyor.’ In order to meet these stated standards, the defendants then submitted their own map of the area, arguing that ‘defendants’ exhibit ‘A’, is a more reliable guide for the court to follow, for the reason that the same was made by a public competent surveyor, under his official or professional signature, and verified by said surveyor’s affidavit, the same being defendants’ exhibit ‘A’ (see Fig. 4).43

On the defendants’ map, the Río de las Truchas indeed runs east to west, with the defendants’ breakwater paralleling the natural course of the river, rather than jutting out into its channel, as had been claimed in the plaintiffs’ initial complaint. In this cartographic re-inscription, it is the plaintiffs’ claimed ‘breakwater’ that functions

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43 See note 42.

Fig. 4. Map of the same area shown in Fig. 3, as completed by a registered public surveyor. Entered into the court record for Acequia de los Garcias vs Acequia del Medio as Defendants’ Exhibit A. New Mexico Territorial District Court Records; Courtesy New Mexico State Records Center and Archives, First Judicial District, County of Rio Arriba, Case #770.
as a dam or diversion structure, routing floodwater across the defendants’ fields, rather than the inverse scenario. This map was supported by the testimony of witnesses who noted that the plaintiff’s breakwater was frequently destroyed by seasonal floods coming down the natural Truchas channel, thereby prompting continual maintenance and re-building that would not be necessary for a true breakwater. The defendants’ map showed two structures intersecting the left bank of the Truchas channel, with one marked as having been recently destroyed by floods (in 1904) and the second marked as having been recently built as a replacement (in 1905). Both of these structures were shown as extending directly into the bed of the Rio de las Truchas.44

This new map called into question not only the natural channel of the tributary, but also the nature of technological flood-control structures. In court documents presented by both sides, a distinction was drawn between a ‘breakwater,’ which parallels the natural river channel and serves as a kind of berm or levee, and a ‘dam’ or ‘wing-dam,’ which crosses the course of the river and diverts its waters away from the natural channel. In the plaintiffs’ complaint, they referred to their own structure as a breakwater and characterized the defendants’ structure as a dam. The defendants, on the other hand, claimed that the plaintiffs’ structure was actually a wing-dam that rerouted the river toward their neighbors’ lands, thus necessitating the defendants’ subsequent building of a new protective breakwater on the right bank. In this geographical dispute, the defendants claimed the upper hand in that their map had been executed by an engineer, who signed an affidavit stating that his map was ‘a true exemplification of the results of such examination and measurements so far as relates to the points at issue in said cause.’45

In addition, the defendants referred to a previous good-faith effort to solve the problem, in which both sides had agreed to a selection of two men, ‘Alexander Read and Malaquias Martinez, to visit the property in dispute and to decide the controversy existing between plaintiffs and defendants.’ Two months prior, these individuals had visited the confluence area of the Rio Grande and the Rio las Truchas, determining that the plaintiffs’ ‘dam’ should be removed, since it was in fact obstructing the natural flow of the Truchas waters. On this occasion, the plaintiffs had apparently agreed to remove the dam, and the defendants had agreed to help both in the removal of the dam and in the building of a breakwater that would extend all the way to the banks of the Rio Grande. On the next day, however, the plaintiffs announced that they would not go through with the agreement, apparently because one of the acequia members refused to cooperate. The defendants asked the judge to consider that these independent observers had already made a determination of the site geography, that a ‘public competent surveyor’ had come to the same conclusions, and that their perspectives were further verified in the submitted map.46

The Judge John R. McFie brokered an agreement between the two parties ‘that, in order to save costs and delay in the adjudication of this case,’ the judge ‘shall, in lieu of taking testimony in this cause, visit the place in controversy [sic], and the location of the natural objects, rivers, dams, ditches &c, and make a personal view and inspection thereof, and make his conclusion of facts therefrom.’47 After visiting the site on April 24, 1905 in the company of attorneys for each side, Judge McFie determined ‘[t]hat the natural channel of the Rio de las Truchas is as described in defendants’ map’ and ‘[t]hat at the time this suit was brought the channel of the said Rio de las Truchas was as represented by plaintiffs’ map.’48 He resolved these seemingly paradoxical findings of geographical fact by explaining that the Truchas channel had long been diverted from its ‘natural’ channel by the plaintiffs’ breakwater, which was frequently overpowered by spring floods and had to be rebuilt regularly. During those times when the plaintiffs’ breakwater washed away, McFie stated, the river resumed its natural channel and then inundated lands of both plaintiffs and defendants, as they lay lower than the alluvial fan on which the riverbed was perched. He ruled that the defendants’ breakwater did not interfere with the natural channel of the river and was a necessity to prevent diverted waters from inundating lands along the Acequia del Medio. In this sense, he sided with the defendants, who said that their own breakwater was justified as a response to the plaintiffs’ re-routing of the river. The judge also noted, however, that the protection of Acequia del Medio lands via the breakwater came at the cost of a secondary re-routing that then caused damage to the plaintiffs’ fields and acequia. In this sense, he agreed with the plaintiffs that they had been harmed by the actions of the defendants.

With the fundamental geographical questions settled, the judge then decreed that both sides must maintain their own dams and breakwaters in perpetuity, given that both communities were constantly under imminent threat of flooding. Although this threat was partially due to the existence of competing dams and breakwaters in the first place, the judge was not troubled by the fact that his solution mandated a permanent re-routing of the river’s natural flow. He focused instead on a technological solution, suggesting that better dam engineering (on both sides) was the most obvious and fair means of resolving the dispute.49

Unlike in the case study described in the previous section, however, Judge McFie seemed hesitant to embrace a fully technocratic ruling. The decision to go into the field and view the geography for himself, for instance, was most likely a calculated attempt to settle the dispute in a way that was familiar to and would seem more binding with both sides. Independent observers had already made a ruling in this manner, and the judge essentially repeated this action. In so doing, he refused to embrace the surveyor’s executed map outright, treating it as something to be verified by personal observation. Furthermore, McFie referred prominently in his ruling to the correctness of both maps, focusing on their representations of the natural vs. the actual channel. Although the defendants’ surveyed map had been presented as unambiguously more expert than the plaintiffs’ less scientific version, the court refrained from giving it higher authority than personal observation at the site of the conflict.

Judge McFie’s actions in this case indicate that he thought strategically about how to derive a resolution that would be culturally relevant. Although this approach indeed prevented the case from returning to court, there were nonetheless complications after the fact because one of the plaintiffs, Placido Garcias, was actually a member of both acequias, presumably because he owned land on both sides of the river. His southernmost land had been negatively affected by the re-routing of the river and the breaking of the Acequia de los Garcias (thus his participation as a plaintiff in the original suit), but he also had labor and financial obligations to

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44 See structures marked as E.F. and C.D. in the legend of the map submitted as Defendants’ Exhibit A [Fig. 4].
45 Acequia de los Garcias vs Acequia del Medio, SRCA, Defendants’ Exhibit A: affidavit by Robert R. Willison, 17 April 1905.
46 See note 42.
47 Acequia de los Garcias vs Acequia del Medio, SRCA, Stipulation, 21 April 1905.
48 Acequia de los Garcias vs Acequia del Medio, SRCA, Findings, judgment, and decree, 1 May 1905.
49 See note 48.
the Acequia del Medio by virtue of a northerly landholding. After *Acequia de los Garcias* vs *Acequia del Medio* was resolved, Garcias refused to provide his share of the Acequia del Medio’s court costs or maintenance duties for the breakwater structure that the court ordered the acequia to preserve. In a later case, in fact, he sued his own Acequia (del Medio) because the mayordomo had refused him irrigation water until he settled his debt. This kind of complication reinforces the ways in which the reality of the cultural geography on the ground itself challenged neat technological solutions. Judge McFie’s ruling in the 1905 case dealt with the acequias as two different corporations, but they were of course made up of multiple people, some of whom owned multiple plots in different locations. Forced to confront this issue in the later case, McFie acknowledged that individual responsibility for court-mandated technological solutions could not be allowed to trump basic principles such as the common right to water.50

Conclusions

In this sampling of legal disputes involving water technology, the district court records show that the early implementation of reclamation-era management philosophy was a complex and difficult prospect within New Mexico’s northern acequia communities. Even though the courts were staffed by elite Anglo judges and attorneys who would have been expected to support the Territorial goal of reforming resource management in a more rational-scientific mold, the cultural realities of Rio Arriba’s disputant communities presented strong resistance. As shown in the case of George Anton *et al.* vs Juan Bautista Talache *et al.*, technological prescriptions for solving water-sharing disputes foun-dered when they were left to be implemented by community members long accustomed to very different modes of water management. The judge’s preferred technology-dependent solution failed twice, resulting in the disputants returning to the courtroom multiple times and perpetuating a difficult conflict over multiple years. In the end, the dispute was settled only when the judge abandoned his commitment to a technological solution and ruled instead on the communities’ underlying disagreement over water rights.

In the case of *Acequia de los Garcias* vs *Acequia del Medio*, altern-ately, the (same) judge’s method of fact-finding and his eventual ruling refrained from jumping to expert-based conclusions. Perhaps building on lessons learned in the earlier case, the court defaulted to a culturally sensitive mode of dispute resolution that discursively rejected the authority of a surveyed map that was presented as incontestable evidence in the case. The final ruling in fact agreed in every respect with the geographical details presented on the scientifically produced map, but its text strategically legiti-mized other sources of knowledge as a means of ensuring the finality of the decree. Even though this sensitive rendering of an otherwise plainly technological verdict prevented the case from returning to court, however, the judge encountered continuing conflict in the form of a local irrigator who had unintentionally ended up as party to both sides of the case. Again, then, the specific cultural realities of acequia communities and their longstanding tradition of binding water rights and responsibilities to land ownership frustrated the simple solution based on rational-scientific engineering of a flood-prone river confluence.

Although the technology in these cases can be seen as simple and pre-modern — certainly a far cry from the massive water-control structures that the Reclamation Act was meant to enable — it is nonetheless important to examine the ways this elite Anglo judge struggled to apply even minor technological solutions in Rio Arriba County. As these cases indicate, the difficulties of putting new resource management strategies in place had to deal with exactly that: place. In New Mexico, the court system was one of the first ‘sites’ in which Anglo elites tried to implement technological and scientific forms of water management. Upon encountering difficulties like those illustrated in these cases, they eventually turned to more aggressive legislative solutions that created the centralized water permitting and management systems that still exist in New Mexico today. It is important for environmental historians to consider, however, that this legislation did not fundamentally change the historical or cultural geographies of northern New Mexico. Attempts to propose, implement, and mandate science-based reclamation policy were thus constantly forced to confront and negotiate with specific peoples and varied landscapes. By readjusting the historical lens on federal reclamation policy — from the broad scales at which federal and territorial/state legislature were brokered to the local scales at which field-level or ditch-level disputes were resolved — this kind of analysis allows the highly fraught and contingent nature of reclamation’s early implementation to come into much clearer view.

As part of a larger project to examine and characterize water-related cases throughout New Mexico during the early Reclamation years, this brief analysis suggests that a fuller understanding of water governance and policy must consider the legal-scientific cultures that developed around resource management in specific places. This kind of investigation aims not to illuminate the legal importance of these cases, particularly since judges had little legal precedent to follow and because these lower-level cases did not become legal precedents in and of themselves, but rather to illustrate the benefits of a legal-geographic understanding of natural resource conflicts and policy developments. Recent scholarship in science and technology studies has increasingly noted the parallel and connected ways that science and law operate to construct knowledge and truth, with noted ethnogra-pher Latour providing a direct and helpful comparison: ‘both domains emphasize the virtues of a disinterested and unprejudiced approach, based on distance and precision; in both domains participants speak esoteric languages and they reason in carefully cultivated modes; both scientists and judges seem to attract a kind of respect that is unknown in other human activities.’51 Consideration of science-based water policy transitions in Territorial-era New Mexico indicates, however, that the court system itself became a primary arbiter of scientific truth as well as of policy development in the maneuvering over resource management in the American West.52 Science and law are not merely comparable in these cases; they are fully intertwined and equally susceptible to spatial variation.

50 Territory of New Mexico ex rel. Placido Garcia versus David Martinez, Jr., Ramalado Montoya, Pablo Martinez, Commissioners, and the Rube Martinez. Mayordomo of the Acequía Madre del Medio, a corporation. Case 781, New Mexico Territorial District Court, First Judicial District, County of Rio Arriba, Civil Court Cases, Box 12, Accession Number 1973-017, SRCA, Writ of mandamus, 15 July 1905. In the judgment for this case, Garcias won a writ of mandamus stating that the Acequia del Medio mayordomo and commissioners could not refuse water for his five-acre field, even if he did not pay bills for maintaining the acequia-owned breakwater that had damaged his other piece of property.
