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Groundwater Policy in the Western United States

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I. INTRODUCTION

Groundwater management is not the best exemplar of excellence in western water management. The western United States was slow to incorporate groundwater into a legal regime and still has not integrated surface and groundwater use in many states. For most western states the operative question has been how a particular aquifer is related to surface water. Groundwater as a nonrenewable resource has received minimal attention in the political arena, and use and depletion occur as the implicit consequence of water law, rather than as a consequence of deliberate policy decisions. State policies that affect the mining of groundwater largely ignore the questions that any rational citizen would have about the long term implications of exhausting a critical nonrenewable resource.

We assert that policymakers should pay far greater attention to how groundwater is managed in the western United States. The status of groundwater resources across the country is more difficult to portray than that of surface waters because aquifers often are not well characterized. Further, the most relevant question for policy makers is how long an aquifer will last, but the answer is dependent on physical and social factors. For any water policy issue, the particular setting is more

* Denise D.Fort is a Professor, University of New Mexico School of Law. I have studied groundwater policy for many years but in particular wish to note that I am drawing upon a talk at the National Ground Water Association meeting in the fall of 2008. I also wish to acknowledge the contribution of Luke Pierpont (University of New Mexico School of Law 2012).

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important than an abstract quantitative statement.[1] The most relevant question for policymakers is whether reliance on mined groundwater will necessitate outside subsidies. We maintain that policymakers at all levels of government should focus more on this question.

New Mexico groundwater developments illustrate the failures that result from the current regulatory regime. While there are multiple examples of problematic management, here is a short list: the administration of Albuquerque's groundwater; the utilization of federal funding to rescue Gallup, New Mexico from its groundwater mining; and the ongoing reliance on federal and state subsidies for projects designed to rescue jurisdictions from their management failures.

The articulation of policy solutions is far more difficult than listing failures. Many policy solutions to groundwater mining have had unintended consequences that have actually made a bad situation worse. Because groundwater is managed as a private resource, decision making largely is limited to those who have property rights. A better model would be to create a stronger role for the public in decision making over water. The conversation about groundwater mining in arid regions must be moved to broader circles of stakeholders and removed from the exclusive domain of water managers.

II. GROUNDWATER STORIES FROM NEW MEXICO

New Mexico is a state that is highly reliant on groundwater. Indeed, 87% of the state's drinking water is from groundwater.[2] Agricultural users pump groundwater to use for crops such as alfalfa (the dairy industry in New Mexico is the largest water user in the state because of the crops grown for its cattle[3]), pecans, onions, and other crops.[4] There is no charge imposed by the state for the pumping of groundwater. The legal regime is more advanced than other states in that the effect of

1. Many water articles begin with a statement of the volume of freshwater on the globe, a fact that is irrelevant to the water availability in any particular place. The total volume of freshwater in an aquifer must be put in the context of whether an aquifer is being mined, the depth to groundwater, the effect on surface waters, the mobilization of contaminants, and other factors relevant to a specific setting.

2. *See* JOHN W. LONGWORTH ET AL., N. M. OFFICE OF THE STATE ENG'R, TECHNICAL REPORT 52, NEW MEXICO WATER USE BY CATEGORIES, at v (2005).

3. Denise Fort, *Dairies in New Mexico: The Environmental Implications of a New Industry*, VISTA (Natural Res., Energy and Envtl. Law Section of the N.M. State Bar Ass'n, Albuquerque, N.M.), June 2009 at 14, *available at* http://ssrn.com/abstract=1446816.

4. LONGWORTH ET AL, *supra* note 2 at 24 (alfalfa and pecans); *see also* CHRISTOPHER S. CRAMER, N. M. STATE UNIV. COOP. EXTENSION SERV., CIRCULAR 567, NEW MEXICO ONION VARIETIES (2000), *available at* http://aces.nmsu.edu/pubs/_circulars/Circ567.pdf (last visited Mar. 23, 2011); *see also* U.S. Dept. of Agric., *Historical Highlights: 2007 and Earlier Census Years*, *in* 2007 CENSUS OF AGRICULTURE - STATE DATA, NEW MEXICO 8 (2007) (other crops).

pumping on river flows has long been accounted for in some basins.[5] Pumping in every basin in the state is now regulated.[6]

"Rescue" projects are projects where federal funding is given to communities that are unable to procure water with their own resources. Implicit in the concept is the conclusion that the community requires outside assistance, without which a project would not be feasible and a community would be "left dry." New Mexico is awash in federal funding that has been brought in to address communities that have exhausted available groundwater supplies.[7] The state continues to obtain this funding despite changes in party leadership and the nation's fiscal situation.[8]

Each of the examples that follow is a mere sketch of a much more complicated situation; there are other perspectives that are more complimentary of New Mexico's water management practices. Because the state has had such ready access to federal and state funding the hard questions often have not been raised about alternatives to these approaches.

A. The City of Albuquerque

Should Albuquerque's management of its groundwater be called mismanagement? On the one hand, the city has drawn down its aquifer, so much so that it would not support more than a few more decades of use if the city continued at the current rate of pumping.[9] On the other hand, the city recognized the impending problem decades ago, procured federal legislation allowing it to bring in surface water from another basin, raised rates and procured state and federal funding to pay for this new diversion, and is now planning to utilize both surface and groundwater.

Albuquerque is located in the north central part of the state along the Rio Grande.[10] The climate is arid, with low humidity and an annual average precipitation of 8.12 inches.[11] About half of this precipitation occurs in the form of heavy summer thundershowers.[12]

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5. *See, e.g.*, City of Albuquerque v. Reynolds, 379 P.2d 73, 77 (N.M. 1962). In that case, a struggle between Albuquerque and the State Engineer over groundwater pumping ended with the Engineer's triumph. *Id.* at 84.

6. N.M. STAT. ANN. § 72-12-1 (West 2010).

7. *See* U.S. ENVTL. PROT. AGENCY, DRINKING WATER SRF ARRA REPORTING SUMMARY PROJECT LIST 26–27 (2010), http://water.epa.gov/grants_funding/cwsrf/upload/DWSRF-ARRA-Project-List-6-29-10.pdf.

8. *See id.*

9. *See infra* p. 6. The date at which the aquifer effectively would be depleted is obscure, as discussed below. *Id.*

10. *See generally Albuquerque: Geography and Climate*, CITY-DATA.COM, http://www.city-data.com/us-cities/The-West/Albuquerque-Geography-and-Climate.html (last visited Mar. 22, 2011).

11. *Id.*

12. *Id.*

The first locus of settlement was the river. Prior to European contact, the current site of the city was occupied by Pueblo peoples and earlier groups.[13] These early inhabitants used irrigation ditches to provide water to their crops.[14] Some of these ditches may have been in use as early as A.D. 1000.[15] Indeed, the pueblos continue to have a relationship with the Rio Grande, leading to struggles to improve its water quality,[16] and to restoration of the riparian cottonwood forests.[17]

Spanish settlement began to rely on surface water for irrigation and daily use around 1700.[18] Early settlers may have also used shallow wells.[19] The city grew slowly until World War II, when an Air Force base and research into atomic weapons came to the state.[20] The population of the Albuquerque metropolitan area has grown rapidly since World War II.[21] From a population of around 100,000 in 1950, the population more than doubled by 1960.[22] Population of the metropolitan area was over 710,000 by 2000, and rose to over 760,000 by 2005.[23] The population grew 17.6% between 2000 and 2009 to over 800,000 people.[24]

As the city grew and industrialized, the high quality portions of the aquifer below the city were tapped for use. The Middle Rio Grande Basin is part of the larger Rio Grande Rift Valley, into which have been deposited alluvial sediments, which compose the Santa Fe Group.[25] This alluvial deposit ranges from 1,400 to 14,000 feet thick. [26] Santa Fe Group aquifer sediments have an upper, middle, and a lower tier.[27] Most

13. *Albuquerque: History*, CITY-DATA.COM, http://www.city-data.com/us-cities/The-West/Albuquerque-History.html (last visited Mar. 22, 2011).

14. ERNIE NIEMI & TOM MCGUCKIN, WATER MANAGEMENT STUDY: UPPER RIO GRANDE BASIN 8 (1997).

15. *Id.*

16. *See, e.g.*, City of Albuquerque v. Browner, 97 F.3d 415 (10th Cir. 1996).

17. *Bosque Restoration Division*, THE PUEBLO OF SANTA ANA DEP'T OF NATURAL RES., http://www.santaanadnr.org/restoration.php (last visited Mar. 22, 2011).

18. JAMES R. BARTOLINO & JAMES C. COLE, U.S. GEOLOGICAL SURVEY, CIRCULAR 1222, GROUND-WATER RESOURCES OF THE MIDDLE RIO GRANDE BASIN 16 (2002).

19. *Id.*

20. *See id.* at 17; *see also Kirtland Air Force Base History*, KIRTLAND AIR FORCE BASE, http://www.kirtland.af.mil/library/factsheets/factsheet.asp?id=5301 (last visited Mar. 22, 2011).

21. BARTOLINO & COLE, *supra* note 18, at 17.

22. *Id.* at 17–18; *see also US Population History From 1850: 50 Largest Cities*, THE PUBLIC PURPOSE, http://www.publicpurpose.com/dm-usscty.htm (last visited Mar. 22, 2011).

23. *Albuquerque Quick Facts*, ALBUQUERQUE OFFICIAL CITY WEBSITE, http://www.cabq.gov/econdev/whyabqquickfacts.html (last visited Mar. 22, 2011).

24. *Cumulative Estimates of Population Change for Metropolitan Statistical Areas and Rankings: April 1, 2000 to July 1, 2009*, U.S. CENSUS BUREAU, http://www.census.gov/popest/metro/CBSA-est2009-pop-chg.html (follow "Cumulative Estimates of Population Change for Metropolitan Statistical Areas and Rankings: April 1, 2000 to July 1, 2009 (CBSA-EST2009-07)" Excel format hyperlink).

25. BARTOLINO & COLE, *supra* note 18, at 1.

26. *Id.*

27. *Id.* at 47.

water is pumped from the upper and middle tiers, to a maximum of about 2,000 feet.[28]

Faulting has occurred in the Middle Rio Grande Basin.[29] Where fault displacement is greater than the thickness of a sediment unit, there can be lateral discontinuity between permeable and less permeable materials, which can lead to variations in water depth and in aquifer quality.[30]

The aquifer potentially receives recharge from several sources, including the inner valley of the Rio Grande, the Rio Grande itself, from mountain fronts, and Rio Grande tributaries.[31] A 1960-61 groundwater map suggested that water was moving from the river to the aquifer.[32] This may have supported the belief that there was a direct connection between the Rio Grande and the aquifer, and that water returned to the Rio Grande was essentially being returned directly to the aquifer. However, studies in the late 1990s by the United States Geological Survey and others indicated that the Rio Grande is less well connected hydrologically to the Santa Fe Basin aquifer than previously thought.[33] The aquifer receives some recharge from the Rio Grande, mainly during the irrigation off-season.[34] Inner valley recharge also includes infiltration from irrigation canals, applied irrigation water, and septic systems.[35] Results of the groundwater flow model from the same study indicate that mountain front recharge to the Santa Fe Basin aquifer is less than was thought previously.[36]

Where pumping exceeds recharge, levels of aquifer water decline.[37] An estimate of depletion made in 2000 was 95,000 acre-feet per year.[38] However, this estimate was probably based on the now-debunked theory of a direct connection between the Rio Grande and the aquifer, and therefore assumed a higher return to the aquifer than is probably the case.

The first municipal-supply well was drilled in 1875.[39] Municipal wells pump water from the Santa Fe Group aquifer.[40] Around 1950 several of the municipal supply wells pumped dry.[41] However, many in Al-

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28. *Id.*
29. *Id.* at 34.
30. *Id.* at 34.
31. *Id.* at 71–79.
32. *Id.* at 51–52.
33. *Id.* at 110.
34. *See id.* at 4.
35. *Id.* at 76.
36. *Id.* at 110.
37. *Id.* at 3.
38. Celina A. Jones, Note, *The Administration of the Middle Rio Grande Basin: 1956-2002*, 42 NAT. RESOURCES J. 939, 957 (2002).
39. BARTOLINO & COLE, *supra* note 18, at 17.
40. *See id.* at 23.
41. *Id.* at 17.

buquerque continued to believe that the aquifer water supply was equivalent to one of the Great Lakes.[42] By the mid-1990s, however, there were indications that pumping was greater than the amount of recharge to the aquifer.[43] 1936 groundwater maps showed no effects from pumping.[44] By 1995, however, maps showed "well-defined cones of depression" in the Albuquerque area and in the Rio Rancho area immediately adjacent to the city to the northwest, as well as changes in water level contours.[45] The largest declines in groundwater are around municipal wells.[46] Other communities have experienced problems where wells drilled in less productive parts of the aquifer have gone dry.[47]

In the mid-1990s monitor wells were installed in clusters away from the municipal wells.[48] The wells did not all show a uniform decline in water levels.[49] Those near pumping stations show declines, and there are seasonal variations due to the higher use of water in summer than in winter.[50] One reason that it appeared that there was more water available than is actually the case is that most municipal wells in Albuquerque were drilled on the east side of the city, in an area of high hydraulic conductivity.[51] Most municipal wells are in these high-quality areas of the aquifer, which are more limited than previously thought.[52]

The aquifer is under the administrative control of the state. In 1956 the New Mexico Office of the State Engineer, using power granted by the New Mexico Underground Water Law of 1931,[53] "declared" the Rio Grande Underground Water Basin, which brought it under state administrative control.[54] Prior to this, anyone could drill a well without a permit.[55] The belief at the time (and until recently) was that there was a direct connection between the Rio Grande and the aquifer, and that therefore drawing down the aquifer would suck water from the Rio Grande.[56] Because of problems meeting compact obligations to provide water downstream, losing water from the river was a major concern.[57] The State Engineer required that any new groundwater appropriation

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42. *Id.*
43. *Id.*
44. *Id.* at 3.
45. *Id.*
46. *Id.* at 7.
47. *See, e.g.*, Lora Lucero & A. Dan Tarlock, *Water Supply and Urban Growth in New Mexico: Same Old, Same Old, or a New Era?*, 43 NAT. RESOURCES J. 803, 817 (2003).
48. BARTOLINO & COLE, *supra* note 18, at 54.
49. *Id.*
50. *Id.*
51. *Id.* at 58.
52. *Id.* at 119.
53. Jones, *supra* note 38, at 941.
54. BARTOLINO & COLE, *supra* note 18, at 65.
55. Jones, *supra* note 38, at 942.
56. *Id.* at 943.
57. *Id.* at 942.

must be offset by acquiring and retiring rights to surface water,[58] but until 2001, the State Engineer allowed new appropriators to satisfy this requirement incrementally.[59] Under the 2001 guidelines no new appropriations of groundwater are allowed,[60] and pending permits will be granted only if the new appropriator has the offsetting surface rights in hand.[61] However, regulating appropriations by existing users is difficult, as is removing rights from those already appropriating where they have not obtained the surface rights.[62]

Until 2008 groundwater was the only source of municipal drinking water.[63] Per capita water consumption was higher than that for other southwestern cities by the late 1980s, at 250 gallons per person per day.[64] Conservation measures reduced this amount 30% by 2004.[65] Still, conservation measures alone were not enough to protect a limited aquifer supply, especially with continued population growth.

The city's other strategy was to procure water rights from another river basin, that of the Colorado River. Such a transbasin move would be challenging, if not impossible, at the present time, but the city used the substantial heft of the state's congressional delegation.[66] Hence, in an engineering feat characteristic of the 1960s, a tunnel was built to bring water from the Colorado River to a reservoir in New Mexico, from which it was released to the Rio Grande.[67]

The San-Juan Chama Project was completed in 1971.[68] The project was authorized to divert 270,000 acre-feet per year from the San Juan River Basin, limited to a maximum of 1.35 million acre-feet over any ten-year period.[69] Albuquerque contracted for rights to some of this water in 1963, and brought the water into the municipal drinking water supply in late 2008.[70] Other water rights holders continue to pump the

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58. THOMAS C. TURNEY, OFFICE OF THE N.M. STATE ENG'R, MIDDLE RIO GRANDE ADMINISTRATIVE AREA GUIDELINES FOR REVIEW OF WATER RIGHT APPLICATIONS 2 (2000).

59. Jones, *supra* note 38, at 940.

60. TURNEY, *supra* note 58, at 3.

61. *Id.* at 4; Jones, *supra* note 38, at 959–60.

62. Jones, *supra* note 38, at 967.

63. Doug Earp, Jeanne Postlethwait & Jean Witherspoon, *Water: Background and Problems*, ALBUQUERQUE'S ENVIRONMENTAL STORY, http://www.abqenvironmentalstory.org/topics/s5water.html#background-and-problems (last revised June 2006).

64. *Id.*

65. *Id.*

66. *See San Juan-Chama Drinking Water Project: Project History*, ALBUQUERQUE-BERNALILLO COUNTY WATER UTILITY AUTHORITY, http://www.abcwua.org/content/view/31/24 (last updated Jan. 06, 2010) [hereinafter ALBUQUERQUE-BERNALILLO].

67. *Id.*

68. BARTOLINO & COLE, *supra* note 18, at 67.

69. *Id.*

70. *See* ALBUQUERQUE-BERNALILLO, *supra* note 66.

aquifer, such as the Department of Defense[71] and the University of New Mexico.[72]

Whether this story illustrates strong and insightful groundwater management or the contrary is still a question. A pessimist would ask if a city in a region with an average rainfall of approximately seven inches per year, with a declining aquifer, and waters delivered from some hundreds of miles away in a system notoriously affected by drought and climate change, should continue to recruit new development.[73]

Albuquerque's use of groundwater enabled the city to grow to its current size. It doesn't intend to blow away when the aquifer is effectively depleted. Indeed, it intends to continue to increase its population. The alternatives it has and will pursue come with daunting challenges, both physical and political. Whether the city's water situation can be described as "sustainable" reveals the limitations of the term: we simply cannot tell how future generations will live in the city.

It should be noted that, while the focus of this article is groundwater, surface diversions from the Middle Rio Grande have led to near extinction for the Rio Grande Silvery Minnow.[74] The future of the minnow is unknown; the Department of Interior will soon issue a Biological Opinion,[75] the Middle Rio Grande Conservancy District will decide whether to cooperate or force a confrontation over environmental water,[76] and the state's posture towards endangered species under a new Governor is unknown.

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71. *Water Right Summary/Application Status*, N.M. OFFICE OF THE STATE ENG'R, http://nmwrrs.ose.state.nm.us/nmwrrs/waterRightSummary.html (follow "owner name" hyperlink; select "RG (Rio Grande)"for basin; enter "Kirtland Air Force Base" in owner last name field; select "view water rights summary. (Last visited Mar. 24, 2011).

72. *Water Right Summary/Application Status*, N.M. OFFICE OF THE STATE ENG'R, http://nmwrrs.ose.state.nm.us/nmwrrs/waterRightSummary.html (follow "owner name" hyperlink; select "RG (Rio Grande)" for basin; enter "University of New Mexico" in owner last name field; select "view water rights summary") (last visited Mar. 22, 2011).

73. One additional major source remains for the city to tap: the agricultural use of Rio Grande surface water. The Middle Rio Grande Conservancy District irrigates land from north of Albuquerque to Elephant Butte, well south of the city. The emotions are high, but one might prophesize that the wealth of an urban area will eventually overcome the barriers that currently restrict agricultural to urban water transfers. Even this new source comes with the caveat that climate change will reduce surface water flows, and a reduction in irrigation will reduce groundwater storage in the shallow groundwater.

74. *See generally* U.S. FISH & WILDLIFE SERV., RIO GRANDE SILVERY MINNOW (HYPOGNATHOUS AMARUS): DRAFT REVISED RECOVERY PLAN, 3 (2007), *available at* http://www.fws.gov/southwest/es/Documents/R2ES/Rio_Grande_Silvery_Minnow_DRAFT_Recovery_Plan_Jan-2007.pdf (report on the plan to recover the number of Rio Grande Silvery Minnow).

75. *See* Memorandum from the Field Supervisor, U.S. Fish & Wildlife Serv., N.M. Ecological Servs. Field Office, Albuquerque, N.M. to the Area Manager, Albuquerque Area Office, Bureau of Reclamation, Albuquerque, N.M. (July 29, 2010), *available at* http://www.fws.gov/southwest/es/NewMexico/documents/BO/2010-0060_Isleta_HR_Ph2_BiOp_final.pdf.

76. *See* BARTOLINO & COLE, *supra* note 18, at 66 (explaining the founding and functions of the Middle Rio Grande Conservancy District).

B. The Navajo-Gallup Water Supply

The groundwater level for the city of Gallup, New Mexico has been dropping at a rate of approximately 20 feet per year due to groundwater mining.[77] Gallup is a regional trade center in northwestern New Mexico with a population of around 23,000 in the city, and with a relationship to the surrounding population of approximately 100,000 people.[78] Gallup is entirely dependent on groundwater that receives very little recharge relative to pumping withdrawals.[79] Since the 1970s the level at the city's Ya-ta-hey Well Field has declined 800 feet.[80] The city has gone from fifteen to nine producing wells, and the declining water levels have led to increased pumping costs as well as water quality issues.[81] In addition to the water problems that Gallup is expecting in the near future, the current water infrastructure on the surrounding Navajo reservation is presently inadequate to serve the existing, much less the projected population in the area.[82] More than 40% of Navajo households currently haul water for daily domestic use.[83] The poverty rate on the reservation is over 50%.[84]

The Omnibus Public Lands Management Act of 2009 provided the authority for the construction of the Navajo-Gallup Water Supply Project.[85] The Navajo-Gallup project will help to resolve longstanding water rights issues between the state of New Mexico and the Navajo Nation and supply a "secure water supply" to Gallup and the Navajo Nation.[86] The project entails building a 260-mile pipeline, twenty-four pumping stations and two water treatment plants, at an estimated cost of $864,000,000.[87] Under the Navajo-Gallup Water Supply Project the pipeline will withdraw 37,376 acre-feet from the San Juan River for delivery to Gallup, the Navajo Nation, and the Jicarilla Apache Reservation.[88] Gallup thus has benefited from its relationship to the Navajo Nation in receiving federal funding for a rescue project that might otherwise have had to rely on local and state monies.

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77. *See* U.S. BUREAU OF RECLAMATION, 1 NAVAJO-GALLUP WATER SUPPLY PROJECT: PLANNING REPORT AND FINAL ENVIRONMENTAL IMPACT STATEMENT, at II-11 (2009).
78. *Id.* at II-2.
79. *Id.*
80. *Id.* at II-11.
81. *Id.*
82. *See id.* at II-2.
83. *Id.*
84. *Id.*
85. Omnibus Public Lands Management Act of 2009, Pub. L. No. 111-11 § 9103 (2009), *available at* http://www.gpo.gov/fdsys/pkg/PLAW-111publ11.pdf.
86. Press Release, Dep't of the Interior, Salazar Signs Decision on Navajo-Gallup Water Supply (Oct. 2, 2009), *available at* http://www.doi.gov/news/pressreleases/2009_10_01_releaseA.cfm [hereinafter *Salazar*].
87. *Id.*
88. *Id.*

C. Eastern New Mexico Rural Water System

The cities and towns of eastern New Mexico of Clovis, Portales, Melrose, Texico, Grady, and Elida overlie the western edge of the Ogallala aquifer.[89] Studies conducted by the cities of Portales and Clovis predicted that their usable groundwater resources will be exhausted between 2033 and 2040 if they continue to mine the aquifer at the current rate.[90] The New Mexico State Engineer only recently closed the High Plains Aquifer in the Curry-Portales Underground Water Basins in March of 2009 to new permits for irrigation, industrial, commercial, or municipal use (small uses are excluded from the closure).[91] New Mexico American Water (NMAW), the water utility for Clovis, currently uses fifty-nine wells to produce the same amount of groundwater as twenty-eight wells produced one decade ago.[92] In 2009, NMAW spent $2.18 million to convert irrigation wells to municipal use to meet the needs of the existing water customers.[93] Senator Bingaman came to the rescue of groundwater pumpers in the Omnibus Public Lands Management Act of 2009. Title IX, § 9103 of the Act provides the authority for the Eastern New Mexico Rural Water Association (ENMRWA) to cooperate with the Bureau of Reclamation for the engineering and construction of the Eastern New Mexico Rural Water System.[94] The system will consist of a 180 mile-long pipeline from Ute Lake on the Canadian River south to Portales.[95] Ultimately the ENMRWA will deliver 16,450 acre-feet of water per year from Ute Lake to the participating communities.[96] The Act anticipates that the federal government will provide a 75% share, not to exceed $327 million.[97] The State of New Mexico is projected to pay 15%, and the ENMRWA members to pay 10% to cover the balance of the cost of the project.[98] The project is estimated to meet the future needs of the region through 2060, except for those of the City of Portales, which will continue to rely largely on groundwater pumping.[99] Thus far the Bureau of Reclamation has not given serious consideration to the purchase and

89. BUREAU OF RECLAMATION, U.S. DEP'T OF THE INTERIOR, EASTERN NEW MEXICO RURAL WATER SYSTEM ENVIRONMENTAL ASSESSMENT (DRAFT), at iv (2009), *available at* http://www.usbr.gov/uc/albuq/envdocs/ea/eastNM/ea.pdf [hereinafter ENMRWA ENVIRONMENTAL ASSESSMENT].

90. *Id.* at 7.

91. *Id.* at 6–7.

92. *Id.* at 7.

93. *See id.*

94. OPLM Act of 2009 § 9103.

95. Greg Cunningham, *Ute Lake Water Project on Track*, AMARILLO GLOBE–NEWS, Mar. 19, 2005, http://amarillo.com/stories/2005/03/19/new_1527136.shtml.

96. ENMRWA ENVIRONMENTAL ASSESSMENT, *supra*, note 89 at iv.

97. OPLM Act of 2009, *supra* note 85.

98. Jerold Widdison, *Eastern New Mexico Rural Water System (Ute Pipeline Project)*, WATER MATTERS! (The Utton Transboundary Res. Ctr., Univ. of N.M. School of Law, Albuquerque, N.M.), Dec. 15, 2010, at 3, *available at* http://uttoncenter.unm.edu/pdfs/WM_Eastern_NM.pdf.

99. ENMRWA ENVIRONMENTAL ASSESSMENT, *supra*, note 89 at 11.

retirement of agricultural water rights in the aquifer, an alternative that could provide enough water to meet municipal needs at a fraction of the cost of this project.

Each of these communities has a very different relationship with water and the aquifers they overlie.[100] One could easily conclude that each is deserving of rescue. Nonetheless, as the aquifers of the west are drained, the solution for these communities is not self- evident. The current approach in which groundwater is used freely, until the end is in sight, clearly is not good public policy, although entirely understandable.

III. THE PUBLIC INTEREST IN GROUNDWATER

Traditionally at law schools we discuss water law primarily from the perspective of a private rights holder. This is, after all, the origin of water law and the perspective of the most interest to future members of the bar. But there is an uneasy fit between the successful establishment and protection of private rights and the long term public interest. One need look no further than the jurisdictions that have mined their groundwater, with each rights holder doing so legally, to recognize the limitations of using a system created to protect private rights to protect civic interests.[101]

As we consider what society's interests are in how groundwater is used, broader concerns are raised than occur in that raised by a single permit holder.

Groundwater management affects the sustainability of communities: decisions over mining have consequences for future generations.[102] These consequences may include environmental degradation and land subsidence,[103] higher costs for water, or potentially even the abandonment of the region. Less dramatically, the drawdown of aquifers will cause increased pumping costs for all users.[104] In many formations, salinity and naturally occurring contaminants occur deeper in aquifers and treatment costs will increase.[105] Saltwater intrusion from groundwater pumping is a concern in coastal communities.[106] The remedies, such as groundwater recharge, can be costly for the community.[107]

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100. *See* at 38–40.

101. *See* ROBERT GLENNON, WATER FOLLIES: GROUNDWATER PUMPING AND THE FATE OF AMERICA'S FRESH WATERS 213–15 (2002).

102. *See id* at 212.

103. *See id* at 33–34.

104. *See id* at 32.

105. *See id* at 32, 73.

106. *Id.*

107. SYDNEY T. BACCHUS, ADVERSE ENVIRONMENTAL IMPACTS OF ARTIFICIAL RECHARGE KNOWN AS "AQUIFER STORAGE AND RECOVERY" (ASR) IN SOUTHERN FLORIDA: IMPLICATIONS FOR EVERGLADES RESTORATION, at ii (2005), *available at* http://www.thethirdplanet.org/pdf/ASR_tp_Ex_Sum_tc_91805.pdf.

A. Policy Reflections

It would be fair, would it not, to say that on the whole we have done an abysmal job of managing groundwater? In fact, we likely could agree that we have done an abysmal job of managing our relationship to the environment generally, with consequences that are staggering to the human mind.

We cannot give up: we must do what we can to rebalance our relationship to nature and to give future generations opportunities to thrive in this region and to enjoy the diversity of nature that we enjoy. The laws and institutions that have gotten us to this point seem unlikely candidates to lead fundamental changes in direction, so it falls to us to design better ones.

We focus here on groundwater policies, but with a recognition that how we treat groundwater is tied to how we treat surface water, which is tied to population, our willingness to reduce our carbon emissions, what the world does about carbon, what happens to our economy, what we eat, and a host of other factors that would overwhelm the largest computers in the world, not to mention our minds and time.

Environmentalists have always urged policy makers to think in terms of systems and interconnectedness. The world of professional water managers is particularly resistant to being part of such conversations: as (mostly) engineers, they are excellent at defining a discrete problem and solving it. We cannot afford to define the problem as "a water shortage" or we will get more water importation projects, energy intensive water recycling and desalinization, and we will find ourselves in a deeper hole than we are already in. Thus, we need to recognize "water shortages" as a fact, but bring far more perspectives to the table than simply finding new water.

What should our goals be with respect to nonrenewable groundwater? We find it very difficult to advocate for a single rule or principle about the use of nonrenewable groundwater.

The simplest and most intuitive would be a canon that mining is wrong: that public policy should prohibit the use of mined groundwater. The argument is easily made from the principle of sustainability: we should not impair or leave the next generation with less than we have. If there were readily available alternative water supplies, the next generation would not be impoverished, but there should be no question that most new water comes from another equally challenged region.

But the notion that groundwater aquifers should be drawn down only to the extent that they are replenished flies in the face of the reality of the 100th meridian. In the western United States, the population of several major cities is sustained by unsustainable groundwater.[108]

108. *See, e.g.*, Ronald Kaiser & Frank F. Skillern, *Deep Trouble: Options for Managing the Hidden Threat of Aquifer Depletion in Texas*, 32 TEX. TECH L. REV. 249, 278–81 (2001).

The Los Angeles basin long ago depleted its aquifers, but now recharges them with imported surface water.[109] Not even an ivory-tower-residing professor would propose that the western United States could stop using mined groundwater.

We offer more modest proposals that federal and state policymakers should not provide subsidies for new water supplies when local ones are exhausted, and that communities should be given better access to decision-making about their water resources, with groundwater managed with the same attention as surface waters.

B. Rescue Projects

The obvious effect of federal rescue projects is to relieve local and state policy makers from the consequences of mismanaging resources. With the likelihood of federally subsidized support for new water, groundwater aquifers can be mined regardless of the future costs, because an outside entity will bear those costs.

The political rewards of exceeding native water supplies are depressingly obvious. In a region where groundwater is being mined, there is no political benefit to urging higher prices for water, cessation of certain uses, or discouraging new population growth. Indeed, there is no political benefit to demonstrating that a region is running out of water, unless the crisis can be seized upon to bring in federal funding. If a rescue project is identified and a campaign begun for local employment in constructing a replacement project, local officials can gain credit for their roles in averting the crisis. (Even federal representatives can gain as they "bring home the bacon" and fund the project).

But before asking how Congress might step back from these projects, the first question is whether it should. What should be done for a region that has exhausted its groundwater? The question will become more salient as the factors of climate change, population, and decades of usage, coincide in the West.

We believe that the nation should not provide rescue projects for these communities. There is a federal interest in subsidizing water.[110] After all, substantial economic investments have been made in the arid west, and substantial dislocations will occur from leaving regions on their own. On the other hand, the magnitude of funding that will be required over a long term in response to water shortage suggests reasons

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109. Theodore A. Johnson, *Ground Water Recharge Using Recycled Municipal Waste Water in Los Angeles County and the California Department of Public Health's Draft Regulations on Aquifer Retention Time*, 47 GROUND WATER 496, 496 (2009).

110. *See CBO's Comments on H.R. 1071, a Bill on Subsidizing New Desalination Facilities before the Subcomm. on Water & Power, Comm. on Resources, U.S. H.R.*, 109th Cong. (2005) (statement of Douglas Holtz-Eakin, Director, Congressional Budget Office), *available at* http://cbo.gov/ftpdocs/63xx/doc6371/05-24-Desalination.pdf.

for federal caution.[111] Thus, better decisions will be made if there is a fit between the affected region and the fiscal responsibility for action. Approaching water resources, along with other natural resources, at the state political level provides more accountability (smaller units of government than the federal) and better signals to those who live in communities about the sustainability of the community. Even at the state level, there is less accountability than there would be if water projects were bonded at a local level.[112]

If Congress were to pledge an end to water subsidies, the dynamics that drive groundwater mining would change. Is it possible that Congress would pull back? The role of the federal government in funding water projects has not been the subject of much discussion. One exception, where piercing insights are expressed in understated prose, is in the research papers published by the Congressional Research Service of the Library of Congress. There, researchers have traced federal funding over the years and noted that municipal water is generally the purview of local governments, not the national government.[113] From the perspective of a member of Congress, the authors would have conceded that there is little reason to forgo water projects when others continue to procure them. A very few public policy organizations raise cautions about these projects, such as environmental Non-Governmental Organizations and Taxpayers for Common Sense. The new opposition to earmarks will lessen funding for some rescue projects, at least in the short run.[114]

C. Provide for Better Governance

The governance of water in the West has been a contentious issue since, say, John Wesley Powell's challenge to the national association of irrigators.[115] The use of groundwater is formally determined by state

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111. *See* Denise D. Fort, *Keep Your Money: Let the West Pay for its Own Water Projects*, 27 PUB. LAND & RESOURCES L. REV. 15, 17–18 (2006) (discussing the western water crisis and the need for sustainable, local solutions to it).

112. Denise Fort has been a member of New Mexico's Water Trust Board for eight years. The Board provides severance tax funding for water projects. The funding comes from taxes on severed minerals. While local governments are expected to contribute to project costs, the primary use of the fund is to provide small amounts of funding to "match" federal expenditures. *See Water Trust Board*, NEW MEXICO FINANCE AUTHORITY, *available at* http://www.nmfa.net/NMFAInternet/NMFA_web.aspx?ContentID=15.

113. BETSY A. CODY & NICOLE T. CARTER, CONG. RESEARCH SERV., R40573, 35 YEARS OF WATER POLICY: THE 1973 NATIONAL WATER COMMISSION AND PRESENT CHALLENGES 7 (2009).

114. *House Republicans Adopt Earmarks Ban in New Congress*, CBS News Political Hotsheet, November 18, 2010. http://www.cbsnews.com/8301-503544_162-20023236-503544.html (last visited Mar. 24, 2011).

115. GLENNON, *supra* note 101, at 19. Actually, it would be problematic to date the beginning of controversy and resolution of water disputes in arid regions. In New Mexico, we are acutely aware of water institutions brought by Hispanic conquerors and overlaid on existing Pueblo people. Powell was the father of the U.S. Geological Survey and the more recent history of the region's water disputes. *Id.*

water law,[116] or occasionally at a sub-state level, if it is regulated at all. Rights are established between the state and a private applicant, occasionally with the participation of other affected parties.[117] Surface water rights were initially handled in much the same fashion, but a much richer array of interests has been recognized in surface water.[118] Thus, private rights are affected by environmental interests, compact obligations, tribal rights, funding for infrastructure to deliver water, etc. While "basin management" remains an aspiration of many water experts,[119] there are some aspects of water management where a multitude of interests are represented and participate in decision making. Decision making over groundwater is not typically the province of multiple stakeholders. There is no venue for the Ogallala Aquifer that is comparable to decision making on the Columbia River, for example.[120]

The Congress could establish basin commissions for interstate aquifers, with a variety of interests represented on the commissions. A commission could be charged with regulating drawdown rates, ensuring water quality, and perhaps even charging fees for water withdrawals. States could do the same for larger aquifers.

For better governance to work, better information is also needed. The programs of the United States Geological Survey now provide access to multiple interests about stream flows, water quality, and historic records.[121] Groundwater data are much more difficult to make transparent because of the nature of the resource (adequately characterizing an aquifer can be expensive; surface water connections may be poorly understood, etc.), the lack of information about water use (states do not necessarily require metering of groundwater withdrawals), and the uncertainty about how the resource will be used or conserved in the future.[122]

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116. *See, e.g.*, IDAHO ADMIN. CODE r. 58.01.11 (2011).

117. *See, e.g.*, *id.* r. 58.01.11.002.

118. *See generally* Joe Gelt, *Managing the Interconnecting Waters: The Groundwater-Surface Water Dilemma*, ARROYO (Water Res. Research Ctr., The Univ. of Ariz., Tucson, Ariz.), Dec. 1994, *available at* http://ag.arizona.edu/azwater/arroyo/081con.html.

119. *See, e.g.*, Denise D. Fort, *The Western Water Policy Review Advisory Commission: Another Look at Western Water*, 37 NAT. RESOURCES J. 909 (1997).

120. *Compare* OGALLALA AQUIFER MGMT. ADVISORY COMM., DISCUSSION AND RECOMMENDATIONS FOR LONG-TERM MANAGEMENT OF THE OGALLALA AQUIFER IN KANSAS (2001), *available at* http://www.kwo.org/reports%20&%20publications/ogallala_mac_rpt.pdf, *with* U.S. DEP'T OF ENERGY, TPA AGENCIES PROPOSE EXTENDING A GROUNDWATER BARRIER TO FURTHER PROTECT THE COLUMBIA RIVER (2010), *available at* http://www.columbiariverkeeper.org/public/documents/DOE%20fact%20sheet%2007.10.pdf (showing the different interests being discussed and asserted in the two regions).

121. *See Maps, Imagery, and Publications*, U.S. GEOLOGICAL SURVEY, http://www.usgs.gov/pubprod/ (last modified Jan. 28, 2011).

122. *See* Gloria Hicks, *Getting at Groundwater with Gravity*, NASA EARTH SYS. SCI. DATA & SERVS. (Oct. 9, 2007), http://nasadaacs.eos.nasa.gov/articles/2007/2007_gravity.html.

IV. CONCLUSION

The West should not build its future on the mining of groundwater. We have yet to find a substitute for water, and the hauling of water from one region to another seems a dubious strategy for long term sustainability. We are likely to use our groundwater, but the purposes for which it is used and the time period over which it is used should be a decision shared among many more people.