
Thirst: A Short History of Drinking Water

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INTRODUCTION

Nestled in the Andes, the Bolivian city of Cochabamba lies in a fertile valley astride the banks of the Rocha River.¹ Bolivia is the poorest country in South America, with two-thirds of its population below the poverty line.² As in many developing countries, over forty percent of Cochabamba's 800,000 residents lack access to a water supply network.³ And even those that do have pipes cannot depend on reliable service. The poor often live in squatter settlements on the outskirts of town, relying for their drinking and domestic water supplies on private vendors. In a cruel irony, the poorest end up paying much more for their water than wealthier citizens connected to the city's water mains.⁴

As part of a nationwide project to improve provision of municipal services, the government of Bolivia launched a major privatization reform effort in the late 1990s.⁵ Prompted by financial institutions such as the International Monetary Fund and World Bank, the Bolivian government actively sought out private investor management for Cochabamba's water and sewage services.⁶ Treating drinking water as a priced good under private management, it was widely argued, would improve the water

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1. BOLIVIA WEB *available at* <http://www.boliviaweb.com/cities/cbba.htm>.
2. LATIN AMERICAN BUREAU: BOLIVIA *available at* <http://www.latinamericabureau.org/?lid=1992>.
3. Erik B. Bluemel, *The Implications of Formulating a Human Right to Water*, 31 *ECOLOGY L.Q.* 957, 965 (2004).
4. Elizabeth Peredo Beltran, *Water, Privatization, and Conflict: Women from the Cochabamba Valley*, *GLOBAL ISSUE PAPERS NO. 4*, 13 (Apr. 2004). The water sold by vendors can cost ten times more than water from the water mains. William Finnegan, *Leasing the Rain*, *THE NEW YORKER*, Apr. 8, 2002, at 43, 44-45 [hereinafter Finnegan, *Leasing*].
5. Maria McFarland Sanchez-Moreno & Tracy Higgins, *Special Report: No Recourse: Transnational Corporations and the Protection of Economic, Social, and Cultural Rights in Bolivia*, 27 *FORDHAM INT'L L.J.* 1663, 1748 (2004).
6. *Id.* at 1663.

supply system infrastructure and delivery by injecting much-needed capital, greater efficiencies, and increased attention to customer needs.⁷ A forty-year concession for water and wastewater services in Cochabamba was granted to an international private consortium headed by Bechtel and known as Aguas del Tunari.⁸ In the national law passed to facilitate this transaction, water was declared the property of the state, available for licensing to private companies for distribution.⁹

To cover the costs of laying new pipe, digging a new reservoir, and building a hydroelectric dam, Aguas del Tunari immediately raised the price of water and waste services charged to consumers, with some residents soon spending in excess of twenty percent of their household income on water.¹⁰ Just four months after the privatization scheme commenced in 2000, protests began and soon mushroomed into street demonstrations and violence.¹¹ In the face of property damage approaching twenty million dollars, dozens of injuries, and mass unrest, the government terminated the privatization concession and resumed control over the water supply system in Cochabamba.¹²

During the heady days of protest, grassroots organizations met and jointly issued the *Cochabamba Declaration*. Their view of the conflict was clear—drinking water should not be a market commodity. As the *Declaration* stated, “Water is a fundamental human right and a public trust to be guarded by all levels of government, therefore, it should not be commodified, privatized or traded for commercial purposes.”¹³

This ringing prose contrasted starkly with an international statement, the *Dublin Statement*, published just a few years earlier. The first major recognition of water as a market commodity, the governments represented at the 1992 International Conference on Water and the Environment declared that, “water has an economic value in all its competing uses and should be recognized as an economic good.”¹⁴

Cochabamba was not a unique event. Similar protests over drinking

7. *Id.* at 1664. See Carol M. Rose, Privatization – The Road to Democracy? (Arizona Legal Studies Discussion Paper No. 06-11, 2006) (detailing the political and economic arguments for privatization). Available at

<<http://www.law.arizona.edu/faculty/FacultyPubs/Documents/Rose/ALS0611.pdf>>.

8. Erik J. Woodhouse, Note, *The "Guerra del Agua" and the Cochabamba Concession: Social Risk and Foreign Direct Investment in Public Infrastructure*, 39 STAN. J INT'L L. 295, 311 (2003).

9. Sanchez-Moreno & Higgins, *supra* note 5, at 1761.

10. Bluemel, *supra* note 3, at 966. The local government made construction of an expensive reservoir and hydroelectric facility requirements of the contract.

11. *Id.*

12. WOODHOUSE, *supra* note 8, at 295.

13. THE COCHABAMBA DECLARATION, available at http://www.sierraclub.org/cac/water/human_right/.

14. The Statement was adopted at the 1992 International Conference on Water and the Environment, attended by government-designated experts from a hundred countries and representatives of eighty international, intergovernmental and non-governmental organizations. Available at <http://www.wmo.ch/web/homs/documents/english/icwedece.html>.

water have played out in Paraguay, South Africa, the Philippines, and elsewhere.¹⁵ Cochabamba, however, remains the best-known example and rallying point for opponents of water supply privatization in developing countries. According to the popular recounting of the story, the conflict in Cochabamba served as a globalization morality play of rights versus markets, human need versus corporate greed. This simple dichotomy sounds in the *Declaration's* ringing prose and echoes in many other fora, from international statements to popular demands.¹⁶

While making for sharp rhetoric, this facile dichotomy of rights versus markets is terribly limited, shedding only a dim light on the powerful tensions unleashed on the streets in Bolivia. Nor should this be surprising, for drinking water is a dauntingly complex resource to manage. Indeed, the conflicts in Cochabamba are drawn from the pages of a much larger, much older story. From earliest times, human societies have faced the challenge of supplying adequate quality and quantities of drinking water. Whether limited by arid environments or urbanization, provision of clean drinking water is a prerequisite of any enduring society, but it is a multi-faceted task.

As Carol Rose has long taught her students, to understand a natural resource one must understand its many natures, and drinking water is no exception. Drinking water is most obviously a *physical resource*, one of the few truly essential requirements for life. Regardless of the god you worship or the color of your skin, if you go without water for three days in an arid environment your life is in danger. And water's physical characteristics confound easy management.¹⁷ Water is heavy—it is difficult to move uphill. Water is unwieldy—it cannot be packed or contained easily. And drinking water is fragile—it easily becomes contaminated and unfit for consumption.

Drinking water can also be regarded as a *cultural resource*, of religious significance in many societies. A *social resource*—in some societies access to water reveals much about relative status. A *political resource*—the provision of water to citizens can help justify a regime. And finally,

15. See Neil Ford, *Tanzania: Water Concession Goes Down the Drain*, AFR. BUS., July 1, 2005, at [page number] (describing controversy over and cancellation of water privatization contract in Dar es Salaam, Tanzania); Juan Forero, *Latin America Fails to Deliver on Basic Needs*, NEW YORK TIMES, Feb. 22, 2005, at A1 (describing popular opposition to water privatization in Bolivia, Nicaragua, and Mexico); Kate Joynes, *Paraguayan Government Concedes to Anti-Privatization Protesters*, WORLD MARKETS ANALYSIS, Aug. 20, 2004 (describing opposition to water privatization in Paraguay); *Water Companies in the Third World; No Easy Life*, THE ECONOMIST, Aug. 26, 2004, at [page number] (describing problems surrounding water privatization in Shanghai, Jakarta, Buenos Aires, and Manila).

16. See text surrounding notes 161 and 162.

17. As Carol Rose has often observed, water is difficult to manage with property doctrine as well. See Carol M. Rose, *Canons of Property Talk, or, Blackstone's Anxiety*, 108 YALE L.J. 601, 611 (1998) (noting that Blackstone focuses almost exclusively on land rights and ignores water due to its troubling place in the property hierarchy); Carol M. Rose, *Property as the Keystone Right?*, 71 NOTRE DAME L. REV. 329 (1996) (arguing that if water were our chief symbol for property instead of land, we might think of property rights in a quite different way).

when scarce, water can become an *economic resource*.

As the Cochabamba experience makes clear, managing and mediating these many facets of drinking water is no easy matter. In seeking to understand better how societies manage such a complex resource, this article considers three questions: How have different societies thought about drinking water? How have different societies managed access to drinking water? How have these changed over time? These questions are, of course, interrelated. How we think of water, whether as a sacred gift or a good for sale, both influences and is influenced by how we manage access to drinking water.¹⁸ When management of drinking water fails to reflect popular conceptions and expectations, pressures for transition to a new management regime increase. And, as we saw in Cochabamba, when the new management regime fails to respect popular conceptions and expectations, it will fail.

Asking such questions may seem odd to an American environmental lawyer, for we tend to assume the presence of drinking water and focus on its quality rather than its nature as a resource; we tend to think in terms of quality rather than quantity.¹⁹ This is not surprising for, compared to irrigation water, domestic use is a trickling afterthought.²⁰ And even within the category of domestic use, much less water is used for drinking than for clothes washing, watering the lawn, or even toilet flushing.²¹ In many parts of the world and for much of human history, however, quantity of drinking water has been as important as quality. While not an obvious issue to us in twenty-first century America, management of drinking water as a resource—who gets it, when they get it, and how much they get—matters a great deal.

This article draws on research from an ongoing book project on the history of drinking water.²² In what is admittedly an initial examination of a deep and complex subject, the article presents a series of case studies, briefly exploring drinking water management in societies across five

18. Carol M. Rose, *Rethinking Environmental Controls: Management Strategies for Common Resources*, 1991 DUKE L.J. 1, 34, 38 (arguing that “our laws are not just our controllers, but our teachers. For better or worse, normative or hortatory lessons are embedded in our laws, and we need to think about the education they impart when we adopt legal institutions to manage resources.”).

19. To be sure, much thought has been dedicated to the problems of groundwater depletion and rivers that no longer run to the sea, but not because of drinking water concerns. See generally ROBERT GLENNON, *WATER FOLLIES: GROUNDWATER PUMPING AND THE FATE OF AMERICA’S FRESH WATERS* (2002); MARC REISNER, *CADILLAC DESERT: THE AMERICAN WEST AND ITS DISAPPEARING WATER* (1993). **THIS IS THE CORRECT YEAR.**

20. Agricultural irrigation accounts for over 80 percent of national water consumption. Domestic consumption accounts for six percent. *How We Use Water in These United States*, Fig. 1, at <http://www.epa.gov/ow/you/chap1.html> (last modified March 18, 2003).

21. *Id.*

22. The book will also contain chapters on drinking water and myth, water containers and ancient exploration, the rise of bottled water markets (from medieval holy relics to Perrier), drinking water and terrorism, technological fixes (bulk water shipments, desalination, etc.), watershed protection, and privatization conflicts in developing countries.

continents from 5,000 years ago up through today. Along the route, we will find that a society's management of something as *seemingly* simple as drinking water is no simple matter. Examining how a society recognizes the different natures of this vital resource provides a unique lens on the society's organization, equity, and view of itself.

I. THE RIGHT OF THIRST

Given the critical importance of drinking water to survival, it should come as no surprise that, throughout history, human society and economies have been predicated on ready access to sources of drinking water. Archaeological excavations since the Neolithic time have found a striking correspondence between settlements and water engineering.²³ Cisterns and wells carved from the rock have been found in excavations at Ebla, in Syria, dating from 2350 B.C., and even earlier water storage sites have been found at Jawa, in north-eastern Jordan, dating from the fourth millennium B.C.²⁴ Though half a world away and much later, water storage basins with minimum storage capacities of 10,000 to 25,000 gallons of water have been excavated in the Mesa Verde region of the American Southwest.²⁵ and large collection and storage structures have been uncovered throughout the Maya Lowlands.²⁶

While not a focus of my research, it is important to note that developments in water supply technologies have marched hand in hand with developments in sanitation and water treatment. Any time a community contains enough people to justify public works for drinking water supply, sanitation and water treatment necessarily become priorities as well to ensure source quality.²⁷ Sanskrit writings from approximately 2,000 B.C., for example, recommend water purification methods.²⁸

As a scarce resource, access to drinking water has been governed by

23. Torsten Malmberg, *Water, Rhythm and Territoriality*, 66 *GEOGRAFISKA ANNALER. SERIES B, HUMAN GEOGRAPHY* 73, 76 (1984); Robert Miller, *Water Use in Syria and Palestine from the Neolithic to the Bronze Age*, 11 *WORLD ARCHAEOLOGY* 331, 333 (Feb. 1980); Andrew Sherratt, *Water, Sail and Seasonality in Early Cereal Cultivation*, 11 *WORLD ARCHAEOLOGY* 313, 314 (Feb. 1980). See also C.E.N. Bromehead, *The Early History of Water Supply*, 99 *GEOGRAPHICAL J.* 142, 142 (March 1942).

24. Miller, *supra* note 23, at 335-336. See generally, David Kennedy, *Water Supply and Use in the Southern Hauran, Jordan*, 22 *J. FIELD ARCHAEOLOGY* 275 (Autumn 1995). Archaeologists suspect that such reservoirs were important features of town defenses, providing a secure supply of water in case of siege. Miller, *supra* note 23, at 335.

25. Robert Wilshusen et al., *Prehistoric Reservoirs and Water Basins in the Mesa Verde Region: Intensification of Water Collection Strategies During the Great Pueblo Period*, 62 *AM. ANTIQUITY* 664 (No. 2, 1997).

26. Vernon L. Scarborough and Gary G. Gallop, *A Water Storage Adaptation in the Maya Lowlands*, 251 *SCIENCE* 658 (Feb. 8, 1991).

27. Much as water is needed to supply water for domestic use, it is needed to *transport* waste water away from the site of use as well.

28. Kathy Jespersen, *Search for Clean Water Continues*, available at http://www.nesc.wvu.edu/ndwc/ndwc_DWH_1.html. Pictures of water treatment devices have even been found in the tombs of the Egyptian pharaohs Amenophis II and Rameses II. *Id.* at 2.

rules from the earliest times. Indeed, rules establishing access to water in arid regions may very well have predated property regimes for land.²⁹ It is surprising, then, to find that despite a wealth of scholarship on management of irrigation water, there is a virtual drought of scholarship on drinking water outside the great cities such as Rome, London, and New York.³⁰ Thus the case studies that follow represent what I and the Duke Library staff have been able to uncover. Despite the small number of cases and their wide geographic and historic range, the examples are quite revealing, suggesting that drinking water has a long tradition as a common property resource rather than a traded commodity.

A. Traditional Jewish Water Law

The Old Testament is filled with references to springs and wells, their importance clearly evident from the fact that each was given a special name.³¹ Jewish law regarding drinking water has been traced as far back as 3,000 B.C.³² The basic rule was one of common property. As reflected in the later writings of the Talmud, “Rivers and Streams forming springs, these belong to every man.”³³ Because water from natural sources such as springs and streams was divinely provided, commodification of these waters could be tantamount to desecration—selling divine gifts.³⁴

Not all sources of water were natural, however. Many important sources of water came from wells, where human labor was necessary to gain access to the water. In these cases, drinking water was managed as a common property resource, though not an open access resource. Within each community, Jewish law prioritized access according to use, with highest priority given to drinking water, followed by irrigation and grazing.³⁵ Importantly, however, the very highest priority access was

29. Malmberg, *supra* note 23, at 77.

30. Malmberg, *supra* note 23, at 77 (“Despite its indubitable importance water is sparsely treated in anthropological literature.”). The noted political scientist, Elinor Ostrom, believes this is because the much greater water required for agriculture has made it the scarcer resource. Interview with Elinor Ostrom, Arthur F. Bentley Professor of Political Science, Indiana University at Bloomington (Apr. 29, 2005).

31. Bromehead, *supra* note 23, at 142.

32. Melanne Andromecca Civic, *A Comparative Analysis of the Israeli and Arab Water Law Traditions and Insights for Modern Water Sharing Agreements*, 26 DENV. J. INT’L L. & POL’Y 437 (1998).

33. *As quoted in id.* at 440 (citing DANTE A. CAPONERA, PRINCIPLES OF WATER LAW AND ADMINISTRATION 22 (1992), citing Talmud Bavli Shabbat, 121b; Beitza, 391; Eiruvin, 46a and 48a; Tosephta Baba Qama, 6, 15.) See also Carol M. Rose, *Given-ness and Gift: Property and the Quest for Environmental Ethics*, 24 ENVTL. L. 1, 12 (1994) (describing that, from the “gift vision,” “all gifts may be approached with a special kind of care and respect, and it is in this sense that the vision of the environment-as-gift might help to supply some norms of self-restraint in the use of commons—using the gift, to be sure, but having enough respect not to waste or pollute it.”).

34. DANTE A. CAPONERA, PRINCIPLES OF WATER LAW AND ADMINISTRATION 22 (1992) (“As a consequence of the benefits that water provides to all living creatures, water resources seem to be excluded from private ownership.”).

35. Civic, *supra* note 32, at 440. As Carol Rose describes, “Although the members of a commonly used hunting ground or fishery may treat the resource as a ‘commons’ among themselves,

granted to those in need, *regardless* of whether or not they belonged to the well's community of owners.³⁶ This Right of Thirst provides a nice example of a Rawlsian rule, since any traveler in an arid region could foresee a situation where he or she might need water from strangers for survival.³⁷ The right was not absolute, since villagers' necessary drinking requirements took priority over outsiders'.³⁸ But outsiders' thirst took precedence over local grazing and other uses.

B. Traditional Islamic Water Law

Islamic water law is quite similar to Jewish water law in both substance and significance. Indeed, the Arabic word for Islamic law, "Sharia," literally means the "way to water."³⁹ As the Koran instructs, "Anyone who gives water to a living creature will be rewarded To the man who refuses his surplus water, Allah will say: 'Today I refuse thee my favor, just as thou refused the surplus of something that thou hadst not made thyself.'"⁴⁰ The Right of Thirst reinforced this message. Since water is a gift from God to all people, sharing water is a holy duty.⁴¹ As with Jewish water law, norms governed water usage and users. Priority was given for drinking, then domestic needs, then agriculture and grazing, favoring needs in the community over outside users.⁴² As one scholar has described, "access to water, at least for the purpose of human sustenance, is considered to be a right of all persons, within and without the community, and whether on private or publicly held property."⁴³

Islamic water law was largely adopted into the legal code of the Ottoman Empire. It is still followed by Bedouin in the Negev, where "water to quench thirst is an unalienable right and may not be refused from any water source,"⁴⁴ and by the Berbers in Morocco, where drinking water for humans is "sacrosanct and neither may be denied anyone for any

with respect to the rest of the world that resource is a property [C]ommon property regimes effectively pool access to resources, and for this reason these regimes are particularly adapted to managing risk." Carol M. Rose, *Expanding the Choices for the Global Commons: Comparing Newfangled Tradable Allowance Schemes to Old-Fashioned Common Property Regimes*, 10 DUKE ENVTL. L. & POL'Y F. 45, 48, 66 (1999).

36. Civic, *supra* note 32, at 440. This is an example of what Carol Rose has called a "limited commons," commons within the community but property to outsiders. Carol Rose, *Romans, Roads, and Romantic Creations*, 66 SPG LAW & CONTEMP. PROBS. 89, 107-08 (2003).

37. JOHN RAWLS, *A THEORY OF JUSTICE* (1972).

38. Civic, *supra* note 32, at 440.

39. Available at www.reference.com/browse/wiki/Sharia.

40. As quoted in Civic, *supra* note 32, at 442. As quoted in Dante Caponera, *Water Laws in Moslem Countries*, U.N. Food and Agriculture Organization Development Paper No. 43, March 1954, at 15-16.

41. *Id.*

42. *Id.*

43. Civic, *supra* note 32, at 439.

44. Aaron T. Wolf, *Indigenous Approaches to Water Conflict Negotiations and Implications for International Waters*, 5 INT'L NEGOTIATION 357, 363 (2000).

reason at any time.”⁴⁵

C. Australian Aboriginal Water Law

In Australia, the driest inhabited continent, the need for rules over access to drinking water is self-evident. Given the scarcity of water, no distinction is drawn between water for drinking and other purposes.⁴⁶ Most water sources are sacred parts of the dreamscape and knowledge of their location is vital to a group’s survival (a truly critical example of intellectual property).⁴⁷

Given the variability of rainfall, sharing has played a key role in water management. Researchers describe the dominant access system as “always ask.”⁴⁸ While not an open access resource, in practice those requesting water are given permission to drink. Indeed, as one aboriginal expert has written,

[T]he knowledge that those with plenty today will be supplicants themselves in the future [means that] . . . [s]haring is encoded and embedded within all social relations: trade, marriage, ceremony and others. The code is reciprocity. Not only is the precept ‘always ask’ essential; so too is the fact that people are almost never refused.⁴⁹

D. African and Indian Practices

Clear parallels to the Right of Thirst may also be found today in a number of rural communities in developing countries. A study of communal lands in Zimbabwe, for example, reported that wells and boreholes built for private purposes are still made available for communal drinking. The authors concluded that “Cutting across all the different tenurial systems is the notion that no one should be denied access to safe drinking water.”⁵⁰

This is not to say, however, that it is an open access resource. In times of scarcity, studies show that communities may restrict the amount of water gathered, banning, for example, the filling of large drums or restricting withdrawals to twenty liters per family.⁵¹ Moreover, people

45. *Id.* at 363.

46. Telephone interview with Deborah Rose, Senior Fellow, Center for Resource and Environmental Studies, Australian National University (May 15, 2005).

47. *Id.*

48. Deborah Rose, *Fresh Water Rights and Biophilia: Indigenous Australian Perspectives*, 23 DIALOGUE 37 (March 2004)

49. *Id.*

50. Pinimidzai Sithole, *Environmental Cultures of Development and Indigenous Knowledge: The Erosion of Traditional Boundaries in Conserving Wetlands in Rural Zimbabwe*, at 12, available at http://dlc.dlib.indiana.edu/archive/00001490/00/Sithole_Environmental_040526_Paper148.pdf [hereinafter Sithole].

51. Nontokozi Nemarundwe and Witness Kozanayi, *Institutional Arrangements for Water Resource Use: A Case Study from Southern Zimbabwe*, 29 J. OF SOUTHERN AFRICAN STUDIES 193, 202-204 (March 2003).

must ask permission from the owner prior to using the well. As one person described, “You go to someone you are in good books with.” If they gather too much water, use it for a different purpose than requested, or are unhygienic near the well, then their access rights are limited.⁵² Researchers have documented similar sharing water norms elsewhere in Southern Africa.⁵³

Thousands of miles away, studies of the Bihar in the northeast region of India also reveal a Right of Thirst. Because of the complex social hierarchy, priority of access and management is much more carefully proscribed than in other cultures along social caste lines. As a researcher has written,

Water is believed to be a medium that transmits pollution when in contact with a person who himself is in a ‘state of pollution.’ Hence, the upper and lower castes are expected to maintain distinctness of water sources as the lower castes, especially the “harijans,” are believed to have the potential of transmitting pollution by sharing sources.⁵⁴

As a result, only upper castes may make use of sacred source waters.⁵⁵ The rule of sharing, however, is widely observed and those in need must be given access to water.⁵⁶ At times of water scarcity, even access to an upper caste well is allowed.⁵⁷

One cannot, of course, draw sweeping conclusions from such a small set of examples, but this brief survey suggests two important points. First, while the rules governing drinking water management vary from culture to culture, the examples I have found in the literature present a common twist. Whether expressed through the Right of Thirst in Jewish and Islamic law, as sharing norms in India and Africa, or as “always ask” in Australia, access to drinking water in times of need seems to be a basic right in a wide range of societies.⁵⁸ Aspects of this right can even be found in the

52. *Id.*

53. See Malmberg, *supra* note 23, at 79 (stating that among the San and other pastoralists in South Africa, owners of wells are “obligated to see that no stranger in need was denied access to it.”); Sithole, *supra* note 50, at 7 (finding a similar norm of sharing access to private wells among the Mhondoro in Zimbabwe).

54. Nandita Singh, Water management traditions in Rural India: Valuing the Unvalued, 18th European Conference on Modern South Asian Studies (July 2004) available at <http://www.sasnet.lu.se/EASASpapers/21NanditaSingh.pdf>.

55. *Id.* at 8.

56. A divine gift for all of mankind, sharing water is viewed as a spiritual act of generosity—one of the seven kinds of wealth (the ‘*saptasantanas*’). *Id.* at 5.

57. This social differentiation also plays out in water management. Upper castes are responsible for maintaining the water sources and assign manual labor to the lower castes. *Id.* at 8.

58. As Jewish water law suggests, however, this need not be an absolute right—community members are given drinking access before outsiders. As a recent study concluded, “a culture of free access to water was dominant in most countries during ancient times.” Jose Campos & Ticiana Studart, *An Historical Perspective on the Administration of Water in Brazil*, 25 WATER INT’L 148, 148

United States.⁵⁹

Second, these cases provide clear examples of how drinking water can be managed as a physical resource (through rules over how water sources are maintained), a social resource (rules governing which castes and communities may use particular sources), a cultural resource (with water access regarded as a religious duty) and an economic resource. It is worth noting in this regard that, while drinking water may be sufficiently scarce that norms restrict its use, this does not mean it is a commercial good. Indeed, while there surely will be counter-examples, in the societies covered in the preceding case studies drinking water has *not* been viewed primarily as a priced good with allocation determined by market forces. And even in societies without money, I found no barter systems for drinking water. Perhaps it is too important a resource, too connected with divine beneficence and social identity, to be treated as a fungible item for sale or barter.⁶⁰

Drinking water clearly is a commercial good in many societies today, however, so how did the transition to commodification occur? There is no better place to look for clues than ancient Rome.

II. ROME

Rome is the first great city defined by its management of drinking water. The graceful aqueducts that carried clean water to Roman cities were among the most magnificent structures of the ancient world and some proudly survive today. The water fountains that continue to define the splendor of Rome were important parts of the city's drinking water provision over 2,000 years ago. Rome is also the first major city I have found that managed drinking water as a priced resource.

While aqueducts play a critical part in the story of Roman drinking water, that was not their original purpose.⁶¹ Because of Rome's high water table, there was plentiful water available from local wells and springs.⁶²

(2000).

59. Consider, for example, the water law example of the "Absolute Right" rule in contemporary U.S. riparian rights common law (creating an exception to the reasonableness doctrine for domestic use) and the utility law example of the "Duty to Serve" (requiring utilities to serve all customers in their territories). A. Dan Tarlock, *Law of Water Rights and Resources*, sect. 3:57-3.58 (2005); *Waters and Water Rights*, sect. 7.02 (Robert E. Beck, ed. 1991). Jim Rossi, *The Common Law "Duty To Serve" and Protection of Consumers in an Age of Competitive Retail Public Utility Restructuring*, 51 *VAND. L. REV.* 1233 (1998).

60. "We do not know of any field tax, water tax, or other dues that could be connected with the use of water rights during the Old Babylonian period." Johannes M. Renger, *Institutional, Communal and Individual Ownership or Possession of Arable Land in Ancient Mesopotamia*, 71, *CHI.-KENT L. REV.* 269, 302 (1995).

61. A. TREVOR HODGE, *ROMAN AQUEDUCTS AND WATER SUPPLY* 5 (1992).

62. The great water engineer of Rome, Frontinus, states that "the Romans were satisfied with such waters as they drew from the Tiber, from wells, or from springs. Esteem for Springs still continues." HARRY B. EVANS, *WATER DISTRIBUTION IN ANCIENT ROME: THE EVIDENCE OF FRONTINUS* 135 (1994).

The main reason for construction of the aqueducts was not hygienic but social. Bath houses were an integral part of Roman society and they required large volumes of water.⁶³ Over time, however, as the city's population grew the water of the Tiber became increasingly polluted, particularly because the city's main sewer, the *Cloaca Maxima*, flowed directly into it.⁶⁴ The ready availability of a reliable source of clean water from the aqueducts spurred demands for its water to be used for drinking, fountains, gardens, and even public toilets.⁶⁵

The *Marcia* was the third aqueduct, built in 144 B.C., and much larger than its predecessors. Brought into the city at a great height, the *Marcia*'s waters were distributed throughout the city by gravity and its sweet waters were primarily used for drinking water.⁶⁶ Almost half of the *Marcia* aqueduct's prized water went to private uses and roughly a quarter went to the city's public basins, known as *lacus*.⁶⁷

The *lacus* were used by citizens for gathering water for domestic use. Importantly for our purposes, the water in the *lacus* was free for the taking.⁶⁸ Most residents of Rome collected their water in this way and the *lacus* provided communal meeting places, much as wells continue to do in many rural societies.⁶⁹ Excavations in Pompeii have uncovered their spacing of about 150 feet from one another throughout the city.⁷⁰

Not everyone chose to collect their water from public sources, however, and Roman water finances depended on this demand for private water.⁷¹ Indeed, it is estimated that 40% of all the water delivered within Rome went to private buildings, and not all of this was for baths.⁷² A special water tax, known as a *vectigal*, was charged for people who had pipes running from the main system to their houses or baths.⁷³ Because the aqueduct was free-flowing and the distribution system worked by gravity,

63. HODGE, *supra* note 61, at 6; EVANS, *supra* note 62, at 15.

64. Matthew Keith Malott, *Nomine Caesaris: An Examination of the Propagandistic Functions of the Aqueducts of Rome During the Early Empire* (Classical Ass'n of Canada Essays, 2004) available at <http://www.usask.ca/classics/cac/essays/04Malott.html>.

65. Rome's first aqueduct, the *Appia*, was built in 312 B.C. In all, eleven aqueducts were constructed over approximately 550 years. O.F. ROBINSON, *ANCIENT ROME: CITY PLANNING AND ADMINISTRATION* 98 (1992).

66. Evans, *supra* note 62, at 136-137, 140.

67. *Id.* at 92. When all aqueduct water is considered, 38.6 percent went to private consumers and 13.4 percent went to *lacus*. *Id.* at 141.

68. *Id.* at 11; Nova, *Watering Ancient Rome*, available at <http://www.pbs.org/wgbh/nova/lostempire/roman/watering2.html>, at 4-5.

69. Roger D. Hansen, *Water and Wastewater Systems in Imperial Rome*, available at <http://www.waterhistory.org/histories/rome/>.

70. Nova, *supra* note 68.

71. J. G. LANDELS, *ENGINEERING IN THE ANCIENT WORLD* 49 (2000). HODGE, *supra* note 61, at 120 ("The *lacus* must have been as significant a social institution as the mediaeval village well, and it is small wonder that people of sensitivity, and sufficient financial means, preferred to pay for a private supply.').

72. EVANS, *supra* note 62, at 141.

73. LANDELS, *supra* note 71, at 34.

the water was always running.⁷⁴ Thus the tax was assessed by the size of the supply pipe nozzle rather than the amount consumed.⁷⁵

Piped delivery of water to a private residence was a status symbol, and a common luxury of senators.⁷⁶ It was clearly of considerable value, as well, because a major black market arose in what Frontinus called “puncturing”—attaching secret pipes to main lines in order to draw water illicitly into private residences.⁷⁷ This became such a problem that a section of the Roman law code was dedicated specifically to this type of offense, made punishable by a 100,000 sesterces fine.⁷⁸

Aqueduct construction was obviously a major public works project, funded primarily by the emperor and private donations.⁷⁹ The funds raised by the *vectigal* were used to cover the costs of system maintenance.⁸⁰ The net effect of this water financing scheme gave Roman drinking water a dual nature.

To the wealthy Roman, water in the house (whether for drinking, an ornamental fountain, or domestic uses) effectively was a priced good.⁸¹ To the average Roman resident, however, water in the city was available by right, as free for the taking as water from the Tiber. Each source relied on different rationing strategies for a scarce commodity—use of *lacus* water was limited by the physical effort of carrying water from the basin to the home, use of water in the home was limited by the cost of paying the

74. The amount of water delivered to a Roman household in a day has been estimated as the equivalent of a modern household in Ottawa’s use over two months. EVANS, *supra* note 62, at 19.

75. HODGE, *supra* note 61, at 3.

76. Werner Eck’s study of 288 private pipe owners in Rome found that 47 percent were Senators and 16 percent were of Senatorial order. Christer Bruun, *THE WATER SUPPLY OF ANCIENT ROME: A STUDY OF ROMAN IMPERIAL ADMINISTRATION 77* (1991) (citing Werner Eck . . .). Not all private users were required to pay the *vectigal*, since one could also receive a special dispensation from the Emperor.

While wealthy Romans may have drunk more wine than water, the Romans did drink water on its own and could be as picky as some are about bottled water today. *See generally* TOM STANDAGE, *A HISTORY OF THE WORLD IN SIX GLASSES* (2005). “Just like Romans today, they were connoisseurs. They actually ranked them.” Nova, *supra* note 68, at 2. Pliny, for example, wrote extensively on the qualities for judging drinking water. The emperor Nero apparently demanded that his water be boiled, poured in a glass, and then cooled in snow. GERDA DE KLEIJN, *THE WATER SUPPLY OF ANCIENT ROME: CITY AREA, WATER, AND POPULATION 87* (2001).

77. *See* RABUN TAYLOR, *PUBLIC NEEDS AND PRIVATE PLEASURES: WATER DISTRIBUTION, THE TIBER RIVER AND THE URBAN DEVELOPMENT OF ANCIENT ROME 73-74* (2000). Hansen describes the practice as so widespread that excavations revealed “extensive areas in various places where secret pipes run under the pavement all over the city.” Hansen, *supra* note 69, at 4.

78. Frontinus, quoting the *lex Quinctia*, quoted in Taylor, *supra* note 77, at 73

79. FRONTINUS’ LEGACY: *ESSAYS ON FRONTINUS’ DE AQUIS URBS ROMAE 86* (Deane R. Blackman & Trevor A. Hodge eds., 2001). An inscription found in Apamea, Syria, thanks C. Julius Agrippa, a former ruler, for having “got built a good number of miles . . . of the aqueduct.” *As quoted in* EVANS, *supra* note 62, at 8.

80. LANDELS, *supra* note 71, at 49; EVANS, *supra* note 62, at 9.

81. Strictly speaking, of course, water was free in both private homes and the *lacus*. It was only the service of water delivery that was priced. As a practical matter, however, this is a semantic distinction. Romans who wanted drinking water at home needed to pay for it and would have regarded it as a priced good.

vectigal.⁸² *Lacus* water was, in modern parlance, a completely subsidized municipal service, but it was perceived as much more than that, for water supply had an implicitly political message. Consider that, in the time of Emperor Augustus, the number of *lacus* increased dramatically, from ninety-one to almost 600.⁸³ And many of these were magnificently decorated with 300 bronze and marble statues and 400 marble columns.⁸⁴ These ornate water masterpieces strengthened the tradition of majestic fountains we still associate with Rome. But why were they built?

Classical scholars suggest these impressive public works were intended, first and foremost, as political statements, to remind the common people that they received their water from imperial beneficence in the name of the Emperor, *Aqua Nomine Caesaris*. As Malott has written, following the overthrow of the Republic,

[It is hard to] believe that the addition of 500 public fountains was truly a necessity [for drinking water supply], especially since wells and springs were apparently still frequently used. However, by totally revamping the water system and making it more conspicuous and lavishly decorated, Augustus, and then Claudius after him, wanted to make the people forget that the older aqueducts survived from a time when the Emperor had no power. He wanted to erase the history of the aqueducts before him and suggest that they were his personal possession, and that although they were a free public service, the people still received their water by his generosity and permission.⁸⁵

These beautiful fountains and basins provided water and a clear justification of regime change. The Romans' right to water was acknowledged, ensured, and enhanced *nomine Caesaris*—in the name of Caesar.

The Roman story, then, provides within the same city fundamentally different conceptions of drinking water—as a public good provided by right through imperial beneficence, on the one hand, and as a private good for domestic consumption, on the other. Yet the two depended upon one another, for it was the treatment of drinking water as a priced good that enabled cross-subsidization to ensure its public nature. In order to assess how transferable this model proved with the rise of modern cities, we next turn to New York.

III. NEW YORK CITY

Ever since Peter Minuit's celebrated purchase of Manhattan Island from

82. See Victor Flatt, *Let Us Drink Our Fill*, 18 *YALE J. L. & HUM.* XX, XX (2006) (discussing segmentation of the water market).

83. Malott, *supra* note 64, at 6.

84. *Id.*

85. *Id.* at 5-6.

the natives for beads and trinkets in 1626, the settlement has faced challenges of ensuring adequate drinking water.⁸⁶ While New York is obviously surrounded by large rivers, they open on the ocean and are too salty for drinking.⁸⁷ The first Europeans to live in Manhattan, the Dutch settlers of New Amsterdam, relied on basic technologies to provide drinking water—collecting rainwater in cisterns and digging shallow wells.⁸⁸ Most of the settlement’s water came from a spring-fed, deep freshwater pond covering seventy acres in lower Manhattan, known as the “Kalch-Hook.”⁸⁹ The wells in New Amsterdam were private.⁹⁰ Although there were plans in 1660 to build a public well, the famed regional governor, Peter Stuyvesant, refused to approve the funding. This proved remarkably short-sighted, however, for when British warships sailed up the Hudson in 1664 the Dutch defense was brief. Besieged in a fort, the Dutch realized to their chagrin that the fort had no wells and therefore no water sources. Following a quick surrender, which kept the town’s commercial prospects intact, Stuyvesant justified the loss to his employers as not a particularly serious matter since the lack of fresh water on the island made it impossible to defend and easy to regain.⁹¹

No surprise, then, that one of the first acts of the new British masters, after renaming the city New Yorke, was construction of public wells in the city.⁹² Begun in 1667, these would remain a primary source of water for New Yorkers well into the nineteenth century.⁹³ While regarded as public works projects, few public monies were actually spent. People living on the street where a well had been sited were told to undertake construction on their own. The plan went nowhere, though, with only one brackish well completed.⁹⁴ In 1686, construction of eight wells finally got underway through a combination of public funding and financial assessments of families who would be serviced by the well. People refusing to pay the assessment were threatened with forced sales of goods to make up the shortfall. Local residents were charged with ensuring proper maintenance; indeed, some of the wells later became known by the names of these overseers.⁹⁵

Long into the eighteenth century, most New Yorkers relied on these

86. Michael C. Finnegan, *New York City’s Watershed Agreement: A Lesson in Sharing Responsibility*, 14 PACE ENVTL. L. REV. 577, 586 (1997) [hereinafter Finnegan, *New York Watershed*].

87. GERARD T. KOEPEL, *WATER FOR GOTHAM: A HISTORY 7-8* (2000).

88. Finnegan, *New York Watershed*, *supra* note 86, at 586.

89. CHARLES H. WEIDNER, *WATER FOR A CITY: A HISTORY OF NEW YORK CITY’S PROBLEM FROM THE BEGINNING TO THE DELAWARE SYSTEM 15* (1974). The pond was located just east of where Broadway now cuts between Chambers and Canal Streets.

90. *Id.*

91. *Id.* at 15-16.

92. *Id.* at 17.

93. *Id.* at 17-18.

94. *Id.* at 18-19.

95. WEIDNER, *supra* note 89, at 19.

wells and the “Collect” (the anglicized pronunciation of the Kalch-hook) for free drinking water.⁹⁶ During this period, however, urbanization continued and further industrial and population growth were clearly in store. Sanitation, an ever-present problem in British cities, was becoming unmanageable. Peter Kalm, a Swedish botanist visiting New York in 1748, in a remark Rodney Dangerfield would have loved, observed that the well water was so terrible horses from out of town refused to drink it.⁹⁷ The Collect, once the best source of drinking water on Manhattan, had become polluted from the tanneries and slaughterhouses on its banks.⁹⁸

To those with an entrepreneurial spirit, the poor maintenance of the public wells and the increasingly disgusting state of the Collect posed not a problem, but a business opportunity. People with means began to purchase water from springs outside of town and deeper wells in town.⁹⁹ Water sold from these sources became known as “Tea Water” and was either fetched by slaves or bought from “Tea Water Men” who purchased water directly from the pump owners and then carted it throughout the city for sale in buckets and barrels.¹⁰⁰ By the middle of the eighteenth century, presaging the rise of branded bottled water two hundred years later, sale of Tea Water had become the best source of good drinking water in New York and different pumps were favored over others.¹⁰¹ Indeed, a cottage industry developed around a pump operated by the Hardenbrooks family, popularly known as the “Tea Water Pump,” which apparently was the Perrier of its time.¹⁰² Not everyone could afford to purchase Tea Water, of course, and the public wells remained in use.¹⁰³

The limitations of public wells and the Collect to provide clean water, growing dependence on Tea Water sales, and general concern over the availability of water to fight fires made clear the need for a serious re-thinking of New York’s water supply.¹⁰⁴ Thus, in 1774 the city approved an ambitious plan for a steam engine-powered waterworks that would pump water throughout the city in aqueducts similar to those of Rome. To fund the public works, the city issued “Water Works Money,” the first

96. KOEPEL, *supra* note 87, at 36. In 1695, Dr. Benjamin Bullivant described “many publique wells enclosed & Covered in ye Streetes . . . [which were] Nasty & unregarded.” *Quoted in* KOEPEL, *supra* note 87, at 21, *citing* Wayne Andrewsw, *A Glance at New York in 1697: The Travel Diary of Dr. Benjamin Bullivant*, 40 NEW YORK HISTORICAL SOCIETY QUARTERLY 55-73 (Jan. 1956).

97. *Id.* at 27.

98. *Id.* at 36. It was described by a writer of the day as a “very sink and common sewer.” Finnegan, *New York Watershed*, *supra* note 86, at 587.

99. KOEPEL, *supra* note 87, at 28.

100. *See id.* at 28-36.

101. *Id.*

102. *Id.* at 28.

103. *Id.* at 32, 36. *But see* KOEPEL, *supra* note 87, at 36 (“An observer estimated in 1774 that 3,000 houses received water from Tea Water Men, meaning that every house in the city was taking at least some of its water from the pump.”).

104. KOEPEL, *supra* note 87, at 32, 36.

paper money issued by an American city.¹⁰⁵ Construction commenced, but the timing could not have been worse. As the colonies descended into the Revolutionary War, the British occupied the city and destroyed the waterworks construction.¹⁰⁶

Following the Revolutionary War, water supply plans in the city stumbled along for over fifteen years.¹⁰⁷ Plans were proposed for public waterworks and carefully studied, but none funded.¹⁰⁸ Water from the Tea Water Pump was of increasingly poor quality, nor did the public wells provide an attractive option.¹⁰⁹ A yellow fever epidemic struck New York in 1795 and many blamed the disease on the city's foul water and fouler streets.¹¹⁰ Tea Water price was also a major concern.¹¹¹ With citizens and business leaders demanding action, the city turned to privatization.¹¹²

In an alliance that would seem unthinkable years later, Aaron Burr joined with Alexander Hamilton and other prominent politicians of the day to drive through a public/private solution.¹¹³ In an argument that would echo 200 years later in privatization debates, "Hamilton used his considerable influence to persuade the City Council that the municipality should not build its own water works because it could not raise sufficient capital through loans and taxes."¹¹⁴ Burr then hurried a bill through the state legislature in three days. Authorized by the New York state legislature and the New York City Council, the Manhattan Company, as the new organization would be called, was mandated in its corporate charter to provide New York City with clean drinking water.¹¹⁵

The assumption seems to have been that water would be piped in from the Bronx River, since the water sources on Manhattan Island had come to

105. *Id.* The money featured an illustration of the steam engine that would pump the water surrounded by fountains.

106. *Id.* at 49.

107. *See id.* at 53-72.

108. *Id.*

109. KOEPEL, *supra* note 87, at 66.

110. Finnegan, *New York Watershed*, *supra* note 86, at 587.

111. As a letter to the *New York Gazette* decried in 1798, "I pay for Tea Water Only about Six Pounds Per Annum: which, I think a great tax for one small family . . ." [AU: **you need the citation information for the New York Gazette letter**] *quoted in* NELSON MANFRED BLAKE, *WATER FOR THE CITIES: A HISTORY OF THE URBAN WATER SUPPLY PROBLEM IN THE UNITED STATES* 45 (1956), *citing* Stokes, *Iconography of a Manhattan Island*, V, 1356. By the 1790s, the Tea Water Pump was the dominant source of New York drinking water, with daily sales of 20,000 gallons or more. According to a French visitor, the Tea Water Pump was leased "for a thousand dollars a year and operated by two horses driven by a child; the water was sold for sixteen cents a barrel to twenty-four Tea Water men who distributed it by horse-drawn cart to every house in the city at ninety-six cents a bucket." KOEPEL, *supra* note 87, at 54.

112. KOEPEL, *supra* note 87, at 72. Another motivation for the business community was the concern that other cities, particularly Philadelphia, were making better progress in building water works. Finnegan, *New York Watershed*, *supra* note 86, at 587-588.

113. *Id.* at 76.

114. Finnegan, *New York Watershed*, *supra* note 86, at 588.

115. *Id.* at 86.

be regarded as undrinkable.¹¹⁶ But Aaron Burr had more than water supply on his mind. He directed only ten percent of the Manhattan Company's two million dollar assets toward investments in water works, relying on the Collect as the water source.¹¹⁷ The remainder was invested more profitably in local businesses.¹¹⁸ The company did the bare minimum to maintain its charter, laying only twenty-three miles of pipe in its first thirty-two years.¹¹⁹ Over time, this drinking water company gave up all pretence and developed into the powerful Chase Manhattan Bank.¹²⁰

While few people actually received Manhattan Company water, the company defended its monopoly power over water provision and, as the Manhattan Company's portfolio grew, Tea Water pumps were driven out of business. New Yorkers were thus forced to rely on the increasingly revolting Collect Pond and local wells. People with money turned to imported soda water and well water mixed with liquor.¹²¹ As a historian of the era has described, "As for New Yorkers, drinking no more Tea Water and scant Manhattan, it was once again back to street wells and carted spring water. New York had entered the first American century with less good water than the Dutch had bequeathed to the English."¹²²

It took a series of disasters for the government to finally address water supply head on. In 1828 a large fire caused extensive property damage and a severe cholera epidemic in 1832 killed 3,500 people in New York but only 900 in Philadelphia, which enjoyed reliable public water supply and streets washed down daily.¹²³ Mounting concerns over disease and inadequate water sources to fight fires forced the city's Common Council to revisit the challenge of providing reliable supplies of clean drinking water.¹²⁴ Following the recommendations of a state-appointed commission, a permanent Board of Water Commissioners was created and authorized to raise infrastructure capital and condemn land in order to supply water to the city. Surprising even today, the condemnation authority extended beyond the boundaries of the city, for the water source lay upstream of New York in Croton. By 1838, condemnation of thirty-

116. KOEPEL, *supra* note 87, at 72.

117. *Id.* at 86.

118. *Id.*

119. Finnegan, *New York Watershed*, *supra* note 86, at 589.

120. *Id.* at 91. "By 1804, the Bank of the Manhattan Company was firmly established as one of the nation's most powerful and influential financial institutions, tethered to the single obligation of providing 'pure and wholesome water.'" KOEPEL, *supra* note 87, at 101.

121. *Id.* at 101, 121-122. Alexander Hamilton commented that a companion of his "would drink nothing but water," which resulted in "copious and insipid" conversation. KOEPEL, *supra* note 87, at 34.

122. KOEPEL, *supra* note 87, at 101.

123. Finnegan, *New York Watershed*, *supra* note 86, at 590. Philadelphia developed the country's first municipal waterworks, largely in response to a terrible epidemic of yellow fever in 1793, forcing over 23,000 people to flee the city. The water system was completed in 1801. SAM BASS WARNER, JR., *THE PRIVATE CITY: PHILADELPHIA IN THREE PERIODS OF ITS GROWTH* 102-104 (1987).

124. Finnegan, *New York Watershed*, *supra* note 86, at 590.

five acres of land in the Croton watershed had been completed. The Croton Reservoir was a massive project, supplying ninety-five million gallons daily, yet only satisfied the city's water needs for a decade.¹²⁵ The city then looked even farther north, to the Catskills and Delaware watersheds.

The story of New York's drinking water provides an instructive contrast with Rome. From its early days, New York's drinking water came from private wells, public wells, and the Collect. Faced with declining water quality, water became commodified with the rise of Tea Water. Following the failure to provide public infrastructure after the Revolutionary War, the private supply of drinking water reached its logical next step with responsibility for management of New York's *entire* water supply system granted to the Manhattan Company. Only when the company notably failed to provide even the most basic services for drinking water or fire protection did the city step in and occupy the field.

Construction of the reservoir in Croton marked the end for significant private provision of drinking water for New Yorkers, since it displaced the Manhattan Company. Interestingly, however, it did not mark the end of water as an unpriced good, for with construction of the Croton Reservoir and the Croton Aqueduct came the installation in New York of so-called "Croton Hydrants."¹²⁶ These fire and street hydrants provided water free of charge and proved very popular. As a history of Croton water relates, "Two years after it opened, Croton was primarily a *public* amenity of great fountains and thousands of fire and free street hydrants; most homeowners and landlords had little inclination to install the costly service pipe."¹²⁷ This changed over the next twenty-five years as private pipes became more common,¹²⁸ but the net result bore a fascinatingly strong resemblance to the Roman system of cross-subsidization from private pipes to *lacus* at the time of Caesar.

Space constraints prevent fully recounting the story of London's drinking water here, but it shares many similarities with New York's reliance on private suppliers. Through the Middle Ages, Londoners gathered drinking water from local springs, wells, and the Thames River (the Romans never built aqueducts for London).¹²⁹ By the early nineteenth

125. *Id.* at 591-594.

126. KOEPEL, *supra* note 87, at 279. Philadelphia had also provided hydrants for the city's poor when constructing its system three decades earlier. WARNER, *supra* note 123, at 104-105.

127. *Id.* at 287.

128. In both New York and Philadelphia, once free water (from hydrants) and priced water (piped into homes) became available, it took several decades for piped water to become dominant. Old habits of water gathering die hard. The greatest attraction for piping water into the home likely was not drinking water but, rather, the convenience of domestic uses such as toilets (aptly named "water closets"), washing, and bathing. *Id.* at 287.

129. *Water-related infrastructure in Medieval London*, available at <<http://www.waterhistory.org/histories/london/>>. A 1417 city ordinance forbade owners of wharves and stairs on the Thames from charging for access to the river. British History Online, available at

century the city's water supply was in the hands of nine private companies.¹³⁰ When a terrible cholera outbreak occurred in 1840 (which John Snow linked back to a single contaminated water source and thus founded the field of epidemiology), unlike in New York, the government did not take over supply responsibilities. Instead, in the Metropolis Water Act of 1852, private water suppliers became regulated entities, required to provide piping into private residences.¹³¹ Only in 1902 did municipal water become a public service.¹³²

In a fascinating parallel to the Roman *lacus* and Croton Hydrants, London also provided for free water but did so through charitable acts. During the nineteenth century, the Quakers founded, and later a group of nobility operated, the Metropolitan Drinking Fountain Association.¹³³ This philanthropic society built free public fountains and watering troughs throughout the city. The motivation seems to have been two-fold—in part as a public service for those too poor to purchase drinking water and in large part as a strategy of the temperance movement.¹³⁴ Thus it is no coincidence that many of the fountains were located next to popular pubs, making the point that people could slake their thirst for free with refreshing water rather than paying to drink beer or spirits.

IV. DRINKING WATER IN THE DEVELOPING WORLD

New York and London's shift to municipal water provision provide examples of transition moments, where the management of drinking water changed from private to public. As we saw with the Cochabamba experience, such transitions can prove difficult to manage, yet they are currently playing out in conflicts over the privatization of municipal water supply in developing countries. This section traces the origin of these conflicts.

The facts of drinking water in the developing world are both straightforward and daunting. Over one billion people do not have access to even a basic water supply.¹³⁵ Well over two billion people lack adequate sanitation.¹³⁶ As a result, approximately half of the developing world's inhabitants suffer from illnesses caused by contaminated water supplies.¹³⁷

<<http://www.british-history.ac.uk/report.asp?compid=33691>>.

130. Howard Malchow, *Free Water: The Public Drinking Fountain Movement and Victorian London*, 4 LONDON J. 181, 182 (1978).

131. ROBERT WARD, LONDON'S NEW RIVER 176 (2003); JOHN GRAHAM-LEIGH, LONDON'S WATER WARS 98 (2000).

132. GRAHAM-LEIGH, *supra* note 131, at 105.

133. Malchow, *supra* note 131, at 187.

134. *Id.* at 184, 188.

135. PETER GLEICK, THE WORLD'S WATER, 2004-2005 at 2 (2005).

136. *Id.*

137. Water Partners International, *Water-related Disease Facts*, available at <http://water.org/crisis/disease.htm>.

Many environmental ministers consider this the single greatest threat to their people.¹³⁸

To understand the problem of drinking water in much of the developing world, one must consciously step outside our daily experience. In developed countries, with rare exception we do not even think about drinking water. It is plentiful, clean and easily available. Nor do we give a second thought to the quality or quantity of drinking water. We simply turn on the tap to take a drink or open a bottle of water. Water supply is seen as a government or corporate responsibility.

The contrast with developing countries could not be starker. Neither water quality nor quantity can be assumed. Because water supply infrastructure is not provided in the poorest urban or in many rural areas, obtaining water is regarded as an individual or domestic responsibility. In contrast to the ease of turning on a faucet, lack of infrastructure means a high labor input as someone from the household (generally women and girls) must collect each day's water, whether from a communal pond or well, a tanker, or a kiosk. One billion people do not have water within a fifteen-minute walk of where they live.¹³⁹ The daily average time spent on water gathering in 1997 across East Africa was 91.7 minutes daily, triple the time spent three decades earlier.¹⁴⁰ And in the West African country of Senegal, women spend on average 17.5 hours per week gathering water.¹⁴¹

Where communal or free water sources are too far away or contaminated, the poor purchase their water from street vendors or tanker trucks.¹⁴² Forty percent of those surveyed in an East African study used water vendors.¹⁴³ These prices are always higher than the price of water from municipal supply systems, often twelve times as much, with the tragic irony of the poorest in society paying the most for their water.¹⁴⁴

The resulting social and economic impacts are immense. With a significant proportion of women's time and family income dedicated to domestic water supply, opportunity for productive activities such as education or other employment get squeezed. It is no exaggeration to say that introduction of piped water can transform the social and economic

138. Interview with William Reilly, former Administrator of the Environmental Protection Agency, (Sept. 21, 2005).

139. John Vidal, *10 Questions the West Must Answer*, THE GUARDIAN, Aug. 23, 2003, available at <http://www.guardian.co.uk/water/story/0,13790,1027709,00.html>.

140. John Thompson et al., *Waiting at the Tap: Changes In Urban Water Use in East Africa of Three Decades*, 12 ENV'T AND URBANIZATION 37, 48 (Oct. 2000).

141. Ben Crow & Farhana Sultana, *Gender, Class, and Access to Water: Three Cases in a Poor and Crowded Delta*, 15 SOC'Y & NAT. RES. 709, 714 (2002).

142. Karen Bakker, *Archipelagos and Networks: Urbanization and Water Privatization in the South*, 169 GEOGRAPHICAL J. 328, 333 (Dec. 2003).

143. Thompson, *supra* note 140, at 46

144. *World's Poor Pay Most For Drinking Water, Commission Says*, Aug. 6, 1999, available at <http://edition.cnn.com/NATURE/9908/06/world.water.crisis/>. See also *A Drinking Water Crisis Divides Ghana: Privatization Seen Shutting out Poor*, BOSTON GLOBE, Feb. 9, 2003, at A14 (describing the low profit margin of water haulers in Ghana).

fabric of a community. Yet the trend is worsening. From 1950 to 1985, the percent of the world's urban population doubled.¹⁴⁵ The UN estimates that now over half of all people on earth live in urban rather than rural settings.¹⁴⁶ As a result of growing urbanization, the number of clean communal water sources is decreasing as water and sanitation are put under increasing pressure.

In recognition of these pressing issues, in its Millennium Development Goals the U.N. has pledged by 2015 to "reduce by half the proportion of people without sustainable access to safe drinking water."¹⁴⁷ Given the poor state of water provision in the developing world and the small likelihood of debt-burdened governments making significant public monies available for infrastructure any time soon, what can be done?

This very question was explicitly considered in the 1980s, designated by the international community as the *International Drinking Water Supply and Sanitation Decade*.¹⁴⁸ At the beginning of the decade, the central role of the state in water provision had been taken as a given. By the time 1990 came, however, the influence of Reagan and Thatcher policies was being felt across the globe in a fundamental reconsideration of the state's proper role in the economy, and water was no exception. Rather than the solution to water supply problems, the state had come to be seen as the problem and the private sector, many argued, needed to be part of the solution.

Estimates of the capital investment needed for adequate water infrastructure and sanitation over the next twenty-five years approach \$100 billion per year, yet the weak financial resources of developing country governments prevent them from absorbing the costs of water provision upgrades.¹⁴⁹ The private sector, by contrast, could mobilize the necessary capital. Moreover, echoing many of the privatization arguments sounded in debates over telecommunication, prisons, education, and other service fields, private sector management could make the services less vulnerable to local politics, encourage private investment, ensure efficient management, and reduce potential fraud and corruption.¹⁵⁰ At the heart of all these arguments lies the assumption of state failure.

The privatization arguments go beyond private management, however, to the nature of drinking water itself. The failure to treat water as a scarce

145. Bakker, *supra* note 142, at 334.

146. OECD, GLOBAL TRENDS IN URBAN WATER SUPPLY AND WASTE WATER FINANCING AND MANAGEMENT: CHANGING ROLES FOR THE PUBLIC AND PRIVATE SECTORS 7 (2000)

147. United Nations Millennium Declaration, UN Gen. Ass. Res. A/55/L.2 (Sept. 18, 2000). *See generally* <<http://www.un.org/millenniumgoals/>>.

148. WORLD WATER ASSESSMENT PROGRAMME FOR DEVELOPMENT, CAPACITY BUILDING AND THE ENVIRONMENT: MILESTONES, <http://www.unesco.org/water/wwap/milestones/index.shtml> (Mar. 25, 2006).

149. World Health Organization had this: http://www.who.int/water_sanitation_health/wsh0404/summary/en/

150. Finnegan, *New York Watershed*, *supra* note 86, at 44..

commodity only ensures its inefficient distribution and use. A basic axiom of resource economics is that we over-consume goods that are underpriced. Since the market is more efficient than governments at allocating scarce goods, the argument went, market prices should be charged for water.¹⁵¹ Indeed, the fact that the very poor do pay for water, and pay quite a bit in relative terms, suggested both that they could and would pay for piped water. Thus the principle of “full cost recovery”—charging a price to cover costs and profit—seemed both possible and desirable.¹⁵²

These arguments became official international policy with adoption in 1992 of the *Dublin Statement*. As described in the Introduction, the *Statement* served as the first intergovernmental recognition of water as a market good.¹⁵³ This strategy was adopted in policies of international financial institutions, particularly in the Structural Adjustment Programs pursued by the IMF and World Bank in debtor countries. In Bolivia and other countries, privatization of water supply systems was made a prominent lending condition.¹⁵⁴

Spurred by the *Dublin Statement* and facilitated by international financial institutions, there has been an unprecedented expansion of private sector participation in water supply over the last two decades.¹⁵⁵ Water supply services have been privatized across the globe, from the United Kingdom, Poland and Morocco to Argentina, Indonesia and the Philippines.¹⁵⁶ “Privatization,” of course, can mean many things and these arrangements have ranged from outright privatization of water supply infrastructure to public/private partnerships, management contracts, leases, etc.¹⁵⁷

Turning a profit, however, is far from assured. Water supply generally operates as a natural monopoly. Large-scale delivery of water requires large-scale infrastructure.¹⁵⁸ The initial sunk costs can be massive, not to mention the continuing costs of maintenance and upgrade. This creates a

151. See, e.g., *Privatization Tidal Wave: IMF/World Bank Water Policies and the Price Paid by the Poor*. Available at http://www.thirdworldtraveler.com/Water/Privatization_TidalWave.html [hereinafter Tidal Wave].

152. Bakker, *supra* note 142, at 2.

153. The Dublin Statement on Water and Sustainable Development, available at <http://www.wmo.ch/web/homs/documents/english/icwedece.html>.

154. Finnegan, *Leasing*, *supra* note 4, at 44, 52-53.

155. The global water service market has been estimated at over \$250 billion and growing at an annual 6 percent rate. GLEICK, *supra* note 135, at 45.

156. Finnegan, *Leasing*, *supra* note 4, at 53.

157. GLEICK, *supra* note 135, at 48.

158. It is worth noting that a number of water experts recommend greater reliance on low-tech, low-cost water supply approaches. This is particularly important in rural areas where the low population densities make piped infrastructure even more uneconomical. See, e.g., Cheap Tech Hikes Water Supply: Report argues for rethinking mega-water projects by focusing on low-cost technology, available at <http://www.redherring.com/> (last visited March 13, 2006). [AU: please correct date for this citation]

significant barrier to entry for competition and requires amortization periods that can run several decades. A return on investment also requires general economic, political, and social stability over that period; yet, in many developing countries, this is far from a given.¹⁵⁹ Hence the difficult challenge—privatization may hold its greatest social potential in developing countries because it can inject needed capital, yet it is in precisely such settings where investment returns are least certain.

Seeking a competitive return on investments in developing countries, privatization has often been followed by efforts at full cost recovery. The immediate problem that can arise is one of inequity. If water access is based on ability-to-pay rather than willingness-to-pay, then what are the implications for poor and marginalized communities?¹⁶⁰ Does changing the management regime effectively deny them access to adequate clean drinking water?

Alert to these concerns and as part of the larger anti-globalization wave, a vocal movement has arisen to challenge the growing pressure for water privatization. Its primary demand lies in recognition of a right to water. We saw such a demand expressed in the Introduction to this article in the grassroots *Cochabamba Declaration* and its statement that “Water is a fundamental human right and a public trust.”¹⁶¹ Similar calls for a human right to water may be found in over a dozen international documents and proposed federal legislation.¹⁶²

Fleshing out the proper scope of a human right to water, or whether it even exists under customary international law, lies beyond the scope of this paper.¹⁶³ For our purposes, it is enough to recognize that the enormous challenge of improving developing country water supplies remains unmet while vigorous accusations and equally strident defenses of water privatization continue to rage. Five years since the celebrated uprising in Cochabamba, its residents still suffer from severe deficiencies in water supply and distribution while Aguas del Tunari, the spurned consortium, pursues a twenty-five million dollar claim against the Bolivian

159. Investment in developing countries is described as suffering from “the three lows, low investment, low service standards, and low cost recovery.” Bakker, *supra* note 142, at 332.

160. As Carol Rose has described about privatization more generally, “[p]opular fears are very real that privatization of these enterprises can lead not to the diffusion of power, but rather to the aggrandizement of monopoly power in private hands, and to the victimization of ordinary people.” Rose, *supra* note 7, at 27.

161. See also the Water Observatory Project at <http://www.waterobservatory.org/>. See also Rose, *supra* note 33, at 28 (noting the opposition of much of the environmental community to property concepts, “perhaps because they are presented as appeals to self-interest, and involve the classical economic move of harnessing private interest to the general wealth.”).

162. GLEICK, *supra* note 135, at 206 (providing table listing “international documents, treaties, declarations, and standards recognizing the right to water and related forms of health and human development”). See also Water for the World Resolution, H.R. Res. 120, 109th Congress, (YEAR) (affirming “water as a public trust and global public good that should not be treated as a private commodity where this would limit or deny public access to freshwater resources”).

163. See generally Bluemel, *supra* note 3, at 973.

government in international arbitration.¹⁶⁴

CONCLUSION

The popular recounting of Cochabamba and its fiery *Declaration* fit neatly into the rhetoric of the globalization debates, as does the *Dublin Statement*.¹⁶⁵ Rights-based and market-based access to water are depicted as antithetical, while arguments revolve over whether water supply should be publicly or privately managed. If our survey of drinking water management in different societies has shown anything, however, it's that this popular discourse is both simplistic and distinctly *ahistorical*. While making for powerful rhetoric, treating drinking water access as a binary conflict of rights versus markets, of public versus private management, forces a false choice.

A rights-based water management regime is clearly not a new idea. The Right to Thirst in Jewish and Islamic Law, sharing norms in parts of Africa and India, and the "always ask" custom among Aborigines all depend on a universal norm of access to drinking water by right in times of need. The *Aqua Nomine Caesar* practice in ancient Rome of free water was rights-based, as well—a right of provision from the Emperor.

Treating drinking water supply as a priced resource is by no means a new idea, either. The *vectigal*, a tax on the private consumption of water, funded operation of the Roman water system for centuries. Private water vendors underpinned much of New York and London's water supply through the nineteenth century, and now supply London once more.

Nor are these two identities mutually exclusive. In Rome, water by right and by purchase co-existed; indeed the two openly depended upon one another through cross-subsidization—the *vectigal* largely funded the *lacus*. Though different in detail, a strikingly similar arrangement of private and public drinking water reappeared two millennia later in the form of the Croton Hydrants in New York and open hydrants in Philadelphia. Indeed, these cases show that markets can actually be used to *ensure* fulfillment of rights. This is a fundamental argument used by current proponents of privatization and, in historical terms, they have a point. From a historic vantage, then, we see a range of management regimes for drinking water—some rights-based, some payment-based, and some hybrid.

Turning to the public/private debate, skeptics are right to doubt whether

164. Finnegan, *Leasing*, *supra* note 4, at 52. In January, 2006, Bechtel announced it had withdrawn its claims before the International Centre for Settlement of Investment Disputes. Bechtel, *Cochabamba Water Dispute Settled*, available at <http://www.bechtel.com/newsarticles/487.asp> (Jan. 19, 2006).

165. For the importance of telling stories in framing the contours of rights, see Rose, *supra* note 18, at 33 ("narratives are a way of bridging gaps, creating a community and persuading the members of that community to take certain steps in common").

purely private markets can adequately address the different natures of drinking water, but purely private markets are far and few between. Public management remains the dominant source of drinking water today and takes a wide range of forms, whether through municipally-owned waterworks, regulated private water utilities, or public/private ventures. Put simply, the fact of privatization does not, in itself, tell us whether access to water will be based on full cost recovery rates, targeted subsidies, or some other scheme.¹⁶⁶ Thus the privatization question turns on the more practical questions of how water supply should be supervised, how the transition should be managed, and how access to water should be provided.¹⁶⁷

These obviously are questions that can only be answered in the specific context of particular cities and cultures. A key point worth keeping in mind, however, and perhaps the most consistent finding of my research to date, is the significance of a right to water. While there will surely be exceptions, it *is* striking that in every water management scheme I have come across to date one finds explicit norms for providing the essential drinking water to those in need, even if they are from outside the community or are unable to pay. It may well be that a core feature of any privatization scheme must be an explicit provision for this right of thirst.¹⁶⁸

Moving beyond the simplistic discourse of rights versus markets, public versus private provision, it is striking how little attention has been paid to the more fundamental issue—the natures of drinking water, itself.

166. Carol Rose makes the same point in regard to commons management:

[P]rivate and governmental managers often use techniques that are quite similar in content . . . The public/private divide, taken alone, misses the substantive content of these various techniques or strategies, whereas the focus of this Article is precisely on those substantive characteristics of management, regardless of whether the managers themselves are public or private.”

Id. at 8-9.

167. Despite the vociferous anti-privatization rhetoric, one can point to success stories of water privatization around the globe, and many of these seem to make provision for an implicit Right of Thirst. See Rose Privatization, *supra* note 7, at 27. In Chile, for example, the private water supplier relies on cross-subsidization to provide the equivalent of food stamps for the poor to obtain adequate water, and the system seems to work well. MAUDE BARLOW & TONY CLARKE, BLUE GOLD 217 (2002) (describing the Chilean program). See also Sebastian Galiani et al., *Water for Life: The Impact of the Privatization of Water Services on Child Mortality*, 113 J. OF POLITICAL ECONOMY 83 (2005) (finding that privatization of water services in Argentina coincided with a fall in child mortality of five to seven percent in areas served and dropped twenty-four percent after privatization in the poorest areas surveyed); George Clarke et al., *Has Private Participation in Water and Sewerage Improved Coverage? Empirical Evidence from Latin America*, RES. WORKING PAPER NO. WPS 3445 (World Bank, Washington, D.C.), Dec. 2004, available at <http://www-wds.worldbank.org/servlet/WDSContentServer/WDSP/IB/2004/12/08/000012009_20041208141341/additional/310436360_200500141100001.pdf>. (finding that privatization of water and sewage in Argentina, Bolivia, and Brazil increased connection rates for the poorest households).

168. It will have to wait until another day, but it is interesting to consider why there is so little discussion of a corresponding “right to food” or “right of hunger.” Why is the basic need for drinking water explicitly addressed in so many management regimes while the basic need for food seems qualitatively different?

Drinking water has served as a physical resource, *and* an economic resource, *and* a social resource far more often than any one of these alone. Yet much of the current debate seems to assume the necessity of choosing one identity to the exclusion of others. Effectively managing access to drinking water necessarily requires management across multiple dimensions—expressly recognizing the natures of the natural resource.¹⁶⁹

When viewed from such a vantage, understanding the complex stability of the Roman drinking water system becomes much clearer. For several centuries, drinking water was consciously managed as a physical resource (the aqueduct and distribution system within Rome), a social resource (free water in the communal gathering places of the *lacus*), an economic resource (charging the *vectigal* to underwrite maintenance costs), and a political resource (as a justification of imperial rule). Considering how the different natures of drinking water were deliberately managed reveals much more than asking whether access to Roman drinking water was by market or by right.

Considering the facets of drinking water also frames the Cochabamba story in a different light. There were many issues underpinning the unrest in Cochabamba, but the fundamental problem surely did not lie in treating access to water as a market transaction instead of by right. Water was not free before the uprising in Cochabamba and it is not free now. By granting an exclusive water concession to Aguas del Tinas and requiring that water withdrawals be licensed by the state, the government was perceived as effectively enclosing the “water-commons.” Contemporary accounts suggest that fears over possible metering of water from rain barrels, streams, and wells played a far greater role in people taking to the streets than rising water bills.¹⁷⁰ This failure to consider the popular conceptions

169. In his comments on this article, Richard Lazarus takes issue with treating drinking water as a resource, arguing that this makes no more sense than distinguishing between water based on whether it is in groundwater, surface water, or in wetlands. Richard Lazarus, *Crystals and Mud in Nature*, 18 *YALE J.L. & HUM. [add pincite]* (2006). As a physical matter, this obviously is true—water is water—but as an analytical matter the critique strikes me as misplaced. If the research underlying this article shows anything, it is that time and again throughout human history societies have both considered and managed drinking water effectively as a distinct resource. The *Right of Thirst* clearly demonstrates that water used for drinking is governed *differently* than water used for irrigation or grazing. Drinking water has its own norms, management strategies, and social meanings. Rules and customs for the use of drinking water are clearly linked to the norms governing the physical use of water for irrigation, instream flow, navigation, etc. The legal result is one of *nested* regimes for different water uses, all interacting with one another.

Part of our disagreement over whether drinking water should be termed a natural resource may be semantic, but the significance and analytical power of considering drinking water on its own terms are important. Victor Flatt makes a similar point, observing that “there is a distinction between water that is used for drinking and survival, and water that is used as a market input; that in effect, we might be talking about two different resources, albeit ones that are physically identical.” Flatt, *supra* note xx, at yy.

170. Finnegan, *Leasing*, *supra* note 4, at 47-51; Rose, *supra* note 7, at 32. To be sure, the rapid rise in water prices, caused largely by the local politicians’ demand that Agues del Tinas build a costly new dam, didn’t help matters. But as the title to Finnegan’s *New Yorker* article describing the conflict, “Leasing the Rain,” made clear, more was at stake than water bills.

of resource access proved fatal. By treating drinking water as a *purely* economic resource and focusing on pricing, Aguas del Tinas ignored water's significant nature as a social resource. The mass demonstrations did call for a return to previous water rates but, more fundamentally, a return to previous entitlements. Indeed, when viewed through the refracting prism of natural resource management, the core question of drinking water management expands into how the *different facets* of the drinking water resource are managed.

This brief review of drinking water management through time and space leaves us with more research questions than we started with. Why do we see certain types of drinking water regimes in some societies but not others? How do these evolve over time? What are the triggering events for transitions? The Right of Thirst seems to have shown a remarkable resiliency. If, in fact, this norm has endured across so many different cultures over such a long period of time, it surely needs to be a core aspect of privatization strategies, but how should this right be expressed? These intriguing questions will be the focus of my book research over the next few years.

We started this article with a story, and it's appropriate to end there, as well, because much of the public's discourse over drinking water has consisted of morality tales. Evil transnational companies will commodify our water, warn anti-globalization bards,¹⁷¹ while free marketeers smoothly recount how savior transnational companies bring hope and investment. Whether the story turns on rights versus markets, or public versus private management, each clearly features good guys and bad guys. And these stories have shown a striking persistence despite the fact that they are neither particularly accurate nor helpful.

Among Carol Rose's many contributions to the field of environmental law, perhaps the most important has been revealing the deeper tales *within* commonly accepted stories.¹⁷² Whether exposing the comedy within the tragedy of the commons,¹⁷³ revealing the hidden trails left by the development of property rights,¹⁷⁴ or charting the relative strengths of environmental control instruments,¹⁷⁵ Carol's core message has been that stories matter. They make complicated problems understandable and make us feel good about our choices. Yet these same stories are often limited, incomplete, or even misleading. Her work reminds us of the need to move away from simplistic dichotomies such as rights versus markets, or public

171. See, e.g., Tidal Wave, *supra* note 151.

172. See Carol M. Rose, *Property as Storytelling: Perspectives From Game Theory, Narrative Theory, Feminist Theory*, 2 YALE J.L. & HUM. 37 (1990).

173. See Carol M. Rose, *The Comedy of the Commons: Custom, Commerce, and Inherently Public Property*, 53 U. CHI. L. REV. 711 (1986).

174. See Rose, *supra* note 48.

175. See Rose, *supra* note 18.

versus private management. She also leaves us with an unspoken challenge: If our current stories about drinking water are inadequate, then what should the new story be for the oldest resource of all?