

BALANCING MULTIPLE GOALS AT THE LOCAL LEVEL: WATER QUALITY, WATER EQUITY, AND WATER CONSERVATION

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INTRODUCTION

Water is essential to life, but that is not what makes it unique. Water is unique for a variety of reasons, including its physical and chemical structure, as well as its geographic distribution throughout the earth. Water can also take many forms. Sometimes it falls from the sky, sometimes it is deep underground, sometimes it is a placid lake, and sometimes it is high waves in an expansive ocean. Water also makes up more than half of the human body.¹ Because it is essential to life, water regulation comes within the purview of the government's fundamental responsibility to provide for people's health, safety, and welfare. While there is a nationwide, overarching federal structure that pursues the goal of clean water, most efforts to provide clean water are seen at the local level. This paper looks at how local governments work to provide clean and safe water supplies while balancing the demands of fairness, justice, and conservation ethics. To examine this balancing effort, this paper will look at the municipality of Chapel Hill, North Carolina.

This paper is organized into three parts. Part I looks at water quality, which is underpinned by two basic federal statutes, the Clean Water Act (CWA) and the Safe Drinking Water Act (SDWA).² Those broad national laws are supplemented and given effect by more refined state and local rules and implementation strategies. Part II, titled Water Equity, will discuss fairness and justice in water availability. Water equity has long been at the core of disputes in a variety of areas, especially agriculture, but Part II will focus on water

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1. *The Water in You*, U.S. GEOLOGICAL SURVEY (Dec. 9, 2015, 12:59 PM), <http://water.usgs.gov/edu/propertyyou.html>.

2. Clean Water Act of 1977, 33 U.S.C. §§ 1251–1387 (2012); Safe Drinking Water Act of 1974, 42 U.S.C. §§ 300f to 300j-26 (2012).

equity among individual consumers. Part III concerns water conservation, not only in terms of environmental ethics but also as it is connected both with water quality and water equity. For example, water conservation may have a long-term benefit of lowering the cost of water delivery while increasing prices for consumers in the short-term.

I. WATER QUALITY

Federal and state laws set the framework for achieving water quality. The Clean Water Act (CWA) is the premier federal statute for achieving water quality. It is a voluminous and complex document that establishes a system which deals with both point source pollution and nonpoint source pollution.³ The CWA requires point sources of pollution, including wastewater treatment facilities and stormwater pipes, to obtain National Pollutant Discharge Elimination System (NPDES) permits.⁴ An NPDES sets standards for effluent quality.⁵ Although the CWA is a federal law, it is premised on cooperative federalism, which is the notion that the states and federal government should cooperatively manage efforts to clean and maintain the nation's waters.⁶ Under the CWA, the federal government typically delegates implementation responsibility to the states.⁷ In North Carolina, the Department of Environmental Quality (DEQ), Division of Water Resources, is responsible for issuing NPDES permits.⁸

Water quality is also regulated by the Safe Drinking Water Act (SDWA).⁹ Under the SDWA, water providers must treat drinking

3. 33 U.S.C. § 1362(14).

4. *Id.* § 1342 (establishing the National Pollutant Discharge Elimination System requiring any facility that discharges pollutants from any point source into the waters of the United States to obtain a permit. Permits are based primarily on technology, but when technology is insufficient to meet standards, then second-level requirements based on water quality may be required).

5. *Id.*

6. *See* *New York v. United States*, 505 U.S. 144 (1992) (“[W]here Congress has the authority to regulate private activity under the Commerce Clause, we have recognized Congress’ power to offer States the choice of regulating that activity according to federal standards or having state law pre-empted by federal regulation. . . . This arrangement . . . has been termed ‘a program of cooperative federalism[.]’”)

7. Will Reisinger et al., *Environmental Enforcement and the Limits of Cooperative Federalism: Will Courts Allow Citizen Suits to Pick Up the Slack?*, 20 DUKE ENVTL. L & POL’Y F. 1, 17–18 (2010).

8. N.C. Gen. Stat. Ann. § 143B-282 (West 2015).

9. *Id.* § 130A-312.

water to ensure that it is up to quality standards, run tests to insure those standards are met, and periodically publish water quality information to the public.¹⁰

A. Structuring Water Management Systems

Under its police powers, the government has the authority to provide for the general health and safety of society.¹¹ Local governments manage water supplies through their police powers. However, local governments manage water supplies in different ways. In some cases a local government will opt out and allow private owners to manage water supplies, but it is often the case that a public entity is at least somewhat involved in providing water and wastewater services.¹²

For example, a municipality may have a water department as part of its general governance.¹³ Other municipalities create a water utility. This is the structure that Chapel Hill, North Carolina, and its partners chose in forming what is called the Orange Water and Sewer Authority (OWASA).¹⁴ OWASA is a public utility that serves 82,000 people in southern Orange County, North Carolina.¹⁵ It manages three reservoirs, which provide water for drinking and for general use, and a wastewater treatment plant.¹⁶ OWASA does not, however,

10. *Id.* § 130A-315.

11. *See* *Gonzalez v. Oregon*, 546 U.S. 243, 270 (2006) (“[T]he structure and limitations of federalism . . . allow[s] the States great latitude under their police powers to legislate as to the protection of the lives, limbs, health, comfort, and quiet of all persons.”) (internal quotation omitted).

12. *See* Helen Ingram et al., *The Importance of Equity and the Limits of Efficiency in Water Resources*, in *WATER, PLACE, AND EQUITY* 1, 7 (John M. Whiteley et al. eds., 2008) (“The experience to date suggests that whether public or private, utilities work best when a strong, accountable municipal government maintains oversight.”); *id.* (“Local governments began to take over water utilities in the 1880s because private owners tended to make initial investments that were too small, neglected maintenance, and failed to provide adequate service to poorer districts where profit margins were nonexistent or even negative.”) (citing Peter Gleick et al., *The New Economy of Water: The Risks and Benefits of Globalization and Privatization of Fresh Water* (2002)).

13. The City of Durham, North Carolina, for example, has a Department of Water Management, which is part of the city government and is responsible for providing drinking water and wastewater treatment. *See* *Water Management*, DURHAMNC.GOV, <http://durhamnc.gov/944/Water-Management> (last visited March 8, 2016).

14. ORANGE WATER & SEWER AUTH., COMPREHENSIVE ANNUAL FINANCIAL REPORT: FISCAL YEARS ENDED JUNE 30, 2015 AND 2014 ii (2015), <https://www.owasa.org/Data/Sites/1/media/about/cafrs/fy-2015-cafr.pdf> [hereinafter OWASA FINANCIAL REPORT].

15. *Id.*

16. *Id.* at iii (“Our water comes from Cane Creek Reservoir, a three billion gallon supply eight miles west of Carrboro; University Lake a 450 million gallon reservoir on the west side of

directly manage stormwater, which is water runoff from rain and other precipitation.¹⁷ Stormwater is managed through a separate utility, discussed below.

Although OWASA is a financial reporting unit of Chapel Hill, it is an independent body run by a board of directors.¹⁸ The directors are appointed to three-year terms by the constituent governments.¹⁹ The board hires an executive director, who is a professional that manages the organization's 130 employees and \$35 million annual budget.²⁰

OWASA does not levy taxes or receive tax revenue from the constituent governments.²¹ Almost all of its revenues are derived from the services it provides to customers, which means that it has to balance revenues and expenses.²² OWASA receives revenues from monthly bills for water and sewer, and by charging new customers a one-time fee to connect to OSWASA's system.²³

The drinking water that OWASA provides is pumped from its three reservoirs to a water treatment plant.²⁴ Once at the plant, the water undergoes chemical and physical processes that remove unwanted particles.²⁵ Chlorine is then added to disinfect the water. The water is then filtered through layers of coal and sand.²⁶ From there it is pumped to holding tanks, and then to end users.²⁷ OWASA

Carrboro; and the 200 million gallon Quarry Reservoir three miles west of Carrboro.”).

17. *Stormwater Management FAQs*, TOWN OF CHAPEL HILL, http://www.townofchapelhill.org/town-hall/departments-services/public-works/stormwater-management/forms-faqs/stormwater-management-faqs#_Toc111015044 (last visited May 16, 2016).

18. OWASA FINANCIAL REPORT, *supra* note 14, at 16. (“Because the Town Council of Chapel Hill appoints a majority of the Authority’s Board of Directors and may remove them without cause, the Authority falls within the definition of a “Component Unit” provided in applicable accounting standards. For this reason, the Authority’s financial data is incorporated into the Comprehensive Annual Financial Report of the Town of Chapel Hill.”).

19. *Id.* at ii.

20. *Id.* at 6 (reporting operating revenue of \$35 million); *id.* at 61 (reporting 128 budgeted employee positions).

21. *Id.* at 6 (“OWASA is not empowered to levy or collect taxes, nor does OWASA receive funding from the taxing authorities within its service area.”).

22. *Id.* at 8.

23. ORANGE WATER & SEWER AUTH., SUMMARY OF RATES EFFECTIVE IN OCTOBER 2015 AND PREVIOUS RATES (2015) (reporting one-time fees, known as a Service Availability Fees, for initial water and sewer system connection with location).

24. *Drinking Water*, ORANGE WATER & SEWER AUTH., <http://www.owasa.org/drinking-water> (last visited March 8, 2016).

25. *Id.*

26. *Id.*

27. *Id.*

treats almost 3 billion gallons of drinking water per year, tests it for quality, and issues an annual water quality report pursuant to the requirements of SDWA.²⁸

Water turns into wastewater when the end user disposes of it. Wastewater flows through sewer pipes and ends up in a wastewater treatment plant called Mason Farm.²⁹ Wastewater is distributed to Mason Farm through 340 miles of sewer lines, some of which rely on gravity and some of which pump water to the plant by one of twenty-one pump stations.³⁰ OWASA is required to obtain and comply with an NPDES permit for its Mason Farm treatment facility before it can discharge treated water back into the natural environment.³¹ In order to comply with the permit, the utility must physically separate liquids and solids, treat the liquid and sludge residue, and then disinfect them.³² The result is treated effluent, which is discharged into Morgan Creek, a tributary of downstream Jordan Lake.³³ The sludge is discharged separately and disposed of on land.³⁴ However, the Mason Farm facility only has a capacity of 14.5 million gallons per day.³⁵ Any wastewater that exceeds that capacity is discharged directly to the tributaries flowing to Jordan Lake without being treated.³⁶

B. Stormwater Management

Stormwater is the rain water (and other precipitation, such as snow) that falls on streets, rooftops, and other areas of a municipality. Stormwater is handled by drainage infrastructure.³⁷ Some local

28. See ORANGE WATER & SEWER AUTH., 2014 WATER QUALITY REPORT (2015).

29. OWASA FINANCIAL REPORT, *supra* note 14, at iv.

30. See 40 C.F.R. § 124 (2016) (setting out requirements for obtaining a permit); 40 C.F.R. § 136.3 (2016) (setting out guidelines for complying with permit).

31. OWASA FINANCIAL REPORT, *supra* note 14, at 41.

32. 40 C.F.R. § 136, App. A (2016).

33. *Wastewater and biosolids management report for July 2014 – June 2015 (expanded version)*, ORANGE WATER & SEWER AUTH., <http://www.owasa.org/new-page-29> (last visited March 8, 2016) [hereinafter *Wastewater and biosolids report*].

34. Sludge is also called “biosolid,” and is regulated under EPA’s Municipal Sewage Sludge Program. 33 U.S.C. § 1345 (2012); see also 40 C.F.R. § 503 (2016) (implementing the Municipal Sewage Sludge Program).

35. *Wastewater Management*, ORANGE WATER & SEWER AUTH., <https://www.owasa.org/wastewater-management> (last visited March 8, 2016).

36. See ORANGE WATER & SEWER AUTH., CAPITAL IMPROVEMENTS PROGRAM: FISCAL YEARS 2015 – 2019 (2014) 75.

37. TOWN OF CHAPEL HILL STORMWATER MANAGEMENT PROGRAM MASTER PLAN, PHASE 1 REPORT 102 (2008) (“[T]he Town operates a local Stormwater Utility which generates funds to run the Stormwater Management Program which includes operating and maintaining the storm drainage infrastructure.”) [hereinafter PHASE 1 REPORT].

governments manage both wastewater and stormwater together, in what are known as combined sewer overflow systems.³⁸ In more modern systems, the two are handled separately in an effort to prevent raw sewage spills into waterways during high-volume precipitation.³⁹ Chapel Hill uses the more modern system.⁴⁰ Chapel Hill manages stormwater through a utility that is part of the general town government.⁴¹ The town established the utility in 2004 with the goals of achieving satisfactory quality and manageable quantity.⁴² The town also created the utility to address new requirements under the CWA that required municipalities like Chapel Hill to obtain and comply with NPDES Phase II rules, which became effective in 2005.⁴³ As discussed earlier, the CWA regulates both point sources and nonpoint sources of pollution.⁴⁴ Point sources, or effluent from a “discrete conveyance” like a pipe that spills into a river, have long been subject to NPDES permits.⁴⁵ Nonpoint sources, which the law defines as including stormwater and other sources of water pollution that are not point sources, have, until recently, been subjected to less stringent requirements than the terms of a NPDES permit would entail.⁴⁶ This is partly due to the practical reality of imposing requirements on a discrete conveyance of pollution versus pollution from disparate, sometimes unknown sources.⁴⁷ However, as efforts to

38. See *State of Washington Department of Ecology's Combined Sewer Overflows*, <http://www.ecy.wa.gov/programs/wq/permits/cso.html> (last visited Mar. 6, 2016).

39. *Id.*

40. *Down the drain? Out with the trash?*, ORANGE WATER & SEWER AUTH., http://www.owasa.org/down_the_drain (last visited Mar. 6, 2016).

41. PHASE 1 REPORT, *supra* note 37, at 9 (“Town leaders . . . adopted a dedicated stormwater utility to fund a comprehensive local stormwater program.”).

42. Chapel Hill, N.C. Town Code ch. 23, art. 1. Pursuant to the enabling statute, the stormwater utility is officially an identified fiscal and accounting fund. N.C. GEN. STAT. ch. 160A, art. 16.

43. See generally U.S. ENVT'L PROT. AGENCY, NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM PHASE II (2005).

44. Clean Water Act, 33 U.S.C. §§ 1370, 502(14).

45. *Id.*

46. See, e.g., *Pronsolino v. Natri*, 291 F.3d 1123, 1125 (9th Cir. 2002) (describing nonpoint sources as “non-discrete sources; sediment run-off from timber harvesting, for example, derives from nonpoint sources”)

47. See Daniel R. Mandelker, *Controlling Nonpoint Source Water Pollution: Can It Be Done?*, 65 Chi.-Kent L. Rev. 479, at 481 (“The problems presented by controls on nonpoint pollution contribute to regulatory difficulties. EPA can regulate pollution from point sources through quantitative effluent limitations because point sources discharge effluent into surface waters at a particular point and because the polluter controls the discharge. Quantitative effluent limitations are difficult to apply to nonpoint pollution because the discharge occurs over the surface of land and not at a particular point. The nonpoint polluter does not control the

clean the nation's waters have evolved over time, there has been increasing concern about nonpoint sources, which gave rise to the Phase II rules that govern Chapel Hill's stormwater utility.⁴⁸ Under the Phase II rules, the town must engage in what are described as "Best Management Practices" (BMP). BMP include public education, public participation, detection and elimination of illicit discharges, construction runoff management, post-construction stormwater management, and pollution prevention practices by the municipality itself.⁴⁹

The stormwater utility charges customers a fee in order to create revenue apart from the property tax,⁵⁰ and also to insure that all properties are required to pay. One difference between property taxes and fees is that some entities are exempt from property taxes but fees apply to all properties within the corporate limits.⁵¹ The annual fee is equitable in that it is based on the area of a specific property's impervious surface.⁵² This fee assessment structure is equitable because the more impervious surface a landowner has, the lower volume of stormwater that can be handled onsite, and therefore the greater volume that will flow through the system.⁵³

Stormwater management has two primary goals: controlling the quality and the quantity of water runoff.⁵⁴ To that end, the utility

discharge, which is produced by rainfall.")

48. U.S. ENVTL. PROT. AGENCY, OFF. OF WATER, GUIDANCE MANUAL FOR DEVELOPING BEST MANAGEMENT PRACTICES (BMP) (Oct. 1993).

49. U.S. ENVTL. PROT. AGENCY, OFF. OF WASTEWATER MGMT., WATER PERMITTING 101 (Feb. 3, 1999), <https://www3.epa.gov/npdes/pubs/101pape.pdf>.

50. *Stormwater Management Utility & Fees*, TOWN OF CHAPEL HILL, <http://www.townofchapelhill.org/town-hall/departments-services/public-works/stormwater-management/stormwater-management-utility-fees> (last visited May 16, 2016).

51. The North Carolina Constitution grants the legislature authority to exempt "property held for educational, scientific, literary, cultural, charitable or religious purposes." N.C. CONST. art. V, § 2(3). For example, churches, UNC, and some other entities in Chapel Hill are exempt from paying property taxes. *Id.*

52. As of 2015, the annual fee is \$26.15 per 1,000 square feet of impervious surface. Town of Chapel Hill, *Public Works Stormwater Management Division* (2016), <http://www.townofchapelhill.org/town-hall/departments-services/business-management/fee-schedules/public-works-stormwater-management-division> (including the definition of impervious surfaces) (last visited Mar. 8, 2016).

53. *See id.*

54. *See* PHASE 1 REPORT, *supra* note 37, at 114 ("This article establishes a stormwater management utility as an identified fiscal and accounting fund for the purpose of comprehensively addressing the stormwater management needs of the town through programs designed to protect and manage water quality and quantity by controlling the level of pollutants in stormwater runoff, and the quantity and rate of stormwater received and conveyed by structural and natural stormwater and drainage systems of all types.").

focuses on impaired water quality in local waterways; flooding; erosion, which may degrade habitat and aquatic life; and reducing nutrient loads in Jordan Lake.⁵⁵ The effect that this has on new and existing development is to require on-site management systems, limitations on impervious surfaces, and retrofitting in some cases.⁵⁶

C. Land Use and Water Connection

Water quality and water quantity are both closely connected to land use. This close connection is exemplified by the deference Congress afforded State and local governments under the Clean Water Act.⁵⁷ Congress deferred to State and local control of water pollution strategies to implement the CWA because detailed dictation of water management would essentially replace local land use controls with federal rules.⁵⁸ In explicating the law, courts have also recognized that Congress's preference for local regulation of water is closely connected to the nation's traditional delegation of zoning and other land use decisions to local governments.⁵⁹ The practical implication of this close connection is that state and local governments are typically responsible for permitting many sources of water pollution, such as residential, commercial, and industrial development, as well as cleaning the polluted wastewater that development generates.⁶⁰

As an example, when a municipality gives a permit to a housing subdivision, the permit not only allows for the creation of residential dwellings that demand potable water and contribute to wastewater volume, but for the creation of streets and sidewalks which create impervious surfaces that contribute to stormwater runoff. Conversely, the decision of a municipality not to extend water and sewer services to an area will have an impact on how densely that land can be developed. Chapel Hill, for example, has agreed with its OWASA partners to draw an urban services boundary (USB) around the municipality.⁶¹ This boundary sets the limits of where water, sewer,

55. *Id.* at 9.

56. *Id.* at 65.

57. 33 U.S.C. §1251(g).

58. *See id.*

59. *See, e.g., Mississippi Comm'n on Nat'l Res. v. Costle*, 625 F.2d 1269, 1276 (5th Cir. 1980) (stating that "the specification of a waterway as one for fishing, swimming, or public water supply is closely tied to the zoning power Congress wanted left with the states").

60. U.S. ENVTL. PROT. AGENCY, OFF. OF WASTEWATER MGMT., WATER PERMITTING 101 (Feb. 3, 1999), <https://www3.epa.gov/npdes/pubs/101pape.pdf>.

61. *See Existing Land Use*, TOWN OF CHAPEL HILL, (Oct. 2012), <http://www.townof>

and other municipal services will be provided. Land outside the boundary does not have access to OWASA services.⁶² In addition, land outside the boundary has restrictive, low-density zoning.⁶³ The result is that not only would it be more difficult to build a residential subdivision (even if the zoning permitted it) because private well water and septic systems would be necessary, but it is not possible to build large commercial developments, such as shopping centers, that require urban infrastructure.⁶⁴ The goal of this USB for Chapel Hill has been to prevent urban sprawl.⁶⁵ This is achieved through an agreement with Orange County and the neighboring municipality, Carrboro, which requires assent from all three parties to change zoning outside the municipal boundaries.⁶⁶ The prevention of urban sprawl also relies on the cooperation of OWASA in declining to extend services to the area outside the boundary. The water services agreement among the entities is embodied in a Water and Sewer Management, Planning, and Boundary Agreement, which is a legally binding contract.⁶⁷

The land connection is also needed to protect water quality.

chapelhill.org/home/showdocument?id=1213 (zoning map) (last visited Mar. 8, 2016).

62. *See id.*

63. *Compare id. with Map of Planning Areas*, TOWN OF CHAPEL HILL, <http://www.townofchapelhill.org/home/showdocument?id=2425> (last visited May 16, 2016).

64. *See, e.g.,* Martha L. Rebein & John Engen, *Draft Resolution*, MISSOULA CITY COUNCIL, (Dec. 3, 2008), <https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&uact=8&ved=0ahUKEwIU3Zz9rrHLAhWF7iYKHW27C5MQFggcMAA&url=ftp%3A%2F%2Fftp.ci.missoula.mt.us%2Fpackets%2FCouncil%2F2008%2F2008-12-08%2FREOLUTION-DevelopmentAgreements.doc&usg=AFQjCNFM0gAncNDYrhUg6466sHSvG8PT5w&sig2=kYvRxJATrY5GUi9Z1e4R3A> (noting the importance of urban infrastructure for proposed commercial development).

65. *Policies & Programs*, TOWN OF CHAPEL HILL, (2016), <http://www.townofchapelhill.org/town-hall/departments-services/planning-and-sustainability/sustainability/policies-programs>.

66. The joint planning agreement among Chapel Hill, Carrboro, and Orange County originated in 1984 and established what is called a “rural buffer” around the municipalities. It is not limited to water, but rather is concerned with zoning land such that there is a clear transition between urban and rural areas. The Agreement was subsequently amended and extended, including most recently in 2015. *See* ORANGE COUNTY, CHAPEL HILL & CARRBORO, JOINT PLANNING LAND USE PLAN 57 (Oct. 1986), http://www.orangecountync.gov/departments/planning_and_inspectons/JPA_LUP_Document_Rev_Dec_2015.pdf; *see also* Memorandum from Gene Poveromo, Development Manager, and Michael Harvey, Development Supervisor, Orange County Planning Board on Text Amendment to the Joint Planning Land Use Agreement to Chapel Hill Planning Board 16 (May 6, 2014), <http://www.townofchapelhill.org/home/showdocument?id=23023>.

67. *Water and Sewer Management, Planning, and Boundary Agreement*, ORANGE WATER & SEWER AUTH., (Oct. 5, 2010), http://www.orangecountync.gov/document_center/PlanningInspections/WASMPBA.pdf (stating an explicit purpose “[t]o provide for limitations on water and sewer service in certain areas, as defined”).

OWASA owns more than 2,500 acres of land in the watersheds around its reservoirs. These reservoirs control land use and protect the water supply from runoff.⁶⁸ OWASA also purchases conservation easements that limit development in the watershed.⁶⁹ For example, the Cane Creek Reservoir collects water from a 32-square mile watershed.⁷⁰ More than 3,000 acres of that land is either owned by OWASA or protected by conservation easements.⁷¹ Because Cane Creek Reservoir is outside the municipal limits, there has not always been an amicable relationship with the neighbors surrounding the reservoir.⁷² Restrictions on the use of land in the watershed, meant to keep the water clean, impose a cost on people who do not have access to the water because they are not in the OWASA service area.⁷³

Efforts to achieve water quality also impact biosolids. Biosolids are the residues that result from the separation of water and solids at a wastewater treatment facility.⁷⁴ These solid residues are treated at high heat so they can be recycled as fertilizer on agricultural land.⁷⁵ Because they contain nitrogen and phosphorous, they are valuable resources, but they also must be tested for pathogens and metals, and the farmland where the biosolids are used has to be able to absorb the quantity that is applied.⁷⁶

Stormwater management is also interconnected with land use because on-site storm management facilities are required whenever land is developed. These engineered water management systems

68. ORANGE WATER & SEWER AUTH., STRATEGIC PLAN: FISCAL YEARS 2014 – 2017 at 4 (Mar. 13, 2014), https://www.owasa.org/Data/Sites/1/media/about/2014%2003%2013-%20adopted%20owasa_strategic%20plan.pdf (“We own more than 2,500 acres of land to help protect our watersheds and to support other parts of our operations.”).

69. For an example of a conservation easement, see *Resolution to Accept Conservation Easement on Parcel in Cane Creek Watershed*, ORANGE WATER & SEWER AUTH., (Dec. 11, 2014), http://owasa.org/Data/Sites/1/media/about/minutes/2014/20141211_bod_minutes.pdf (included as page 4 of meeting minutes). The easement is recorded at Book RB5882, Page 563, Orange County Register of Deeds.

70. See *Drinking Water*, ORANGE WATER & SEWER AUTH., <http://www.owasa.org/drinking-water> (last visited Mar. 8, 2016).

71. See *id.*

72. See Julie Shambaugh, *Water Supply and the Urban-Rural Conflict*, 8 Carolina Plan 29 (1982).

73. *Cane Creek Reservoir*, LEARN NC, <http://www.learnnc.org/lp/editions/nchistrecent/6167> (last visited Mar. 8, 2016) (local residents opposing creation of the reservoir at Cane Creek).

74. The OWASA Mason Farm facility produces about 4.4 tons of biosolids a day. *Wastewater and biosolids report*, *supra* note 33.

75. *Biosolids Recycling Program*, ORANGE WATER & SEWER AUTH., (2015), <http://www.owasa.org/biosolids-recycling-program>.

76. *Wastewater and biosolids report*, *supra* note 33.

range from channels to detention basins to bioretention swales and ponds.⁷⁷ In addition to reducing flooding and moving stormwater, an effective system also attempts to continue recharging groundwater in the area at the same rate as it occurred pre-development.

These various connections between land use and water quality have implications for the structure of a water utility. A disconnect could occur if utility planning is separate from municipal planning. An autonomous water utility could provide water and sewer services in areas where a municipality wants to restrict growth, such as extraterritorial land outside the Chapel Hill USB.⁷⁸ For example, Fayetteville was unable to annex surrounding properties due to a ban the legislature imposed.⁷⁹ The water and sewer utility, however, extended services outside the municipal limits to some but not all areas around the county.⁸⁰ The result was that housing outside the city did not have municipal services, and handled wastewater using 60,000 septic systems and got drinking water from 150 separate water companies.⁸¹ When the city was finally able to annex these properties in 2005, it was faced with the multi-million dollar, extensive, and disruptive effort of retrofitting water and sewer service for 46,000 new residents.⁸²

Another example involves the water quality goals required under the Clean Water Act known as Total Maximum Daily Loads (TMDLs).⁸³ TMDLs serve as a backup plan to achieve clean water when other efforts, such as NPDES permits, are not working.⁸⁴ States set these water quality goals for individual water bodies, based on the

77. See, e.g., *Pascua-Lama: Chilean Water Management System Fact Sheet*, BARRICK <http://www.barrick.com/files/pascua-lama/Chilean-Water-Management-System-Fact-Sheet.pdf> (last visited Mar. 8, 2016); James C.Y. Guo, *Stormwater Detention and Retention Systems*, WATER WORLD, (2015), <http://www.waterworld.com/articles/uwm/articles/print/volume-1/issue-1/features/stormwater-detention-and-retention-systems.html> (discussing detention and retention systems).

78. Similarly, see *Tarbet v. E. Bay Mun. Util. Dist.*, 186 Cal. Rptr. 3d 387 (1st Dist. 2015), where a property owner challenged right of utility district to impose easement requirement when county had platted subdivision without such requirement.

79. Christopher J. Tyson, *Localism and Involuntary Annexation: Reconsidering Approaches to New Regionalism*, 87 TUL. L. REV. 297, 315 (2012).

80. Interview with Roger L. Stancil, Fayetteville City Manager, 1997 – 2006 (Jan. 15, 2016).

81. During his tenure, Mr. Stancil guided growth in Fayetteville from a population of 70,000 to 180,000. *Id.*

82. Matt Leclerq, *New Fayetteville is Just Bigger*, FAYETTEVILLE OBSERVER, Oct. 1, 2005, at 1. According to Roger Stancil, the estimated cost of the retrofit was about \$18,000 per household.

83. Federal Water Pollution Control Act, 33 U.S.C. § 1313 (2000).

84. *Id.* at § 1313(3).

quantity of certain pollutants that can be accepted in the water before the water becomes unsuited for its purpose.⁸⁵ This is important because both wastewater and stormwater contribute to water quality degradation.⁸⁶ As an example, Chapel Hill wastewater and stormwater drain into Jordan Lake.⁸⁷ The lake covers 14,000 acres, serves as a drinking water supply, provides flood control for the Cape Fear watershed, and is relied on for recreational swimming, boating, and fishing.⁸⁸ However, the lake is polluted by excess nitrogen and phosphorous from land in its watershed that stretches through nine upstream counties. This landed Jordan Lake on a list of impaired water under Section 303(d) of the Clean Water Act.⁸⁹

The state adopted the Jordan Lake Nutrient Management Strategy in 2009 to rectify this problem.⁹⁰ The rules were subject to intense debate, in part because of the perceived potential cost to local governments.⁹¹ The rules required local governments to develop stormwater programs that establish specific best management plans for all new developments and identify opportunities for retrofitting existing developments.⁹² Local governments in the watershed were forced to implement riparian buffer programs that establish 50-foot

85. *Id.*

86. TERESA J. RASMUSSEN & HEATHER C. SCHMIDT, U.S. GEOLOGICAL SURVEY, STORMWATER RUNOFF: WHAT IT IS AND WHY IT IS IMPORTANT IN JOHNSON COUNTY, KANSAS 1-2 (2009), <http://pubs.usgs.gov/fs/2009/3103/pdf/FS2009-3103.pdf>.

87. *Summary of the Jordan Lake Rules*, JORDAN LAKE WATERSHED PROJECT, <https://org.elon.edu/jlw/kwy/kyw-jlr.html> (last visited Mar. 8, 2016).

88. *See Jordan Lake Watershed Stage I Adaptive Management Program*, TOWN OF APEX, NC, (Dec. 2009), <https://www.apexnc.org/DocumentCenter/View/647>.

89. *See* The State of N.C. Dep't of Natural Res. Div. of Water Res., *Envtl. Assessment For A Demonstration Project Showing the Impact of Floating In-Lake Long-Distance Circulators in B.E. Jordan Lake 1* (2014); *see also* N.C. Env'tl. Mgmt. Comm'n, *Report of Proceedings on Proposed Rules for Jordan Lake Reservoir Water Supply Nutrient Strategy 1* (May 8, 2008) (executive summary).

90. *Jordan Water Supply Nutrient Strategy*, S.L. 2009-16 (2009).

91. The Environmental Management Commission held 22 meetings over a year and a half, and received over 7,000 written comments. *Executive Summary To The Report of Proceedings on Proposed Rules For the B. Everett Jordan Reservoir Water Supply Nutrient Strategy For the May 8, 2008 Meeting of the NC Env'tl. Mgmt. Comm'n 2* (2008). The wastewater management costs under the new rules were projected to be about \$82 million over the first eight years; stormwater management costs were estimated at \$528 million. *Jordan Lake Rules Update*, Tom Reeder, Division of Water Resources, February 2014. Individual governments also estimated costs. For example, the City of Durham estimated that it would cost the city \$570 million to comply with the rules. Durham, N.C., *Jordan Lake Rules*, <http://durhamnc.gov/1126/Jordan-Lake-Rules> (last visited March 3, 2016).

92. *Jordan Water Supply Nutrient Strategy: Stormwater Mgmt. for New Dev., S.L. 2009-484, 15A NCAC 02B .0265* (2014).

undeveloped areas around many waterways.⁹³ These rules are designed to stop runoff before it reaches the waters, and therefore limit the pollutants that enter Jordan Lake.⁹⁴ The rules also affect wastewater treatment facilities, requiring investment in infrastructure to minimize nitrogen and phosphorous effluent.⁹⁵ Specific goal loads were allocated among 45 wastewater treatment facilities in the watershed.⁹⁶

To comply with the requirements, Chapel Hill enacted laws regulating stormwater management in the Jordan Lake watershed.⁹⁷ The laws apply to all building and land disturbance, and allocate responsibility for maintaining BMPs, including facilities such as detention ponds.⁹⁸ The law specifically requires land developers to design stormwater management facilities that deal with nitrogen and phosphorous runoff, including annual limits of not more than 2.2 pounds per acre of nitrogen and not more than .82 pounds per acre of phosphorous.⁹⁹ It also provides a mechanism that places the burden of permanent financial responsibility for maintaining the stormwater management system on the property owners, not the municipality.¹⁰⁰ This requirement was the result of prior experience Chapel Hill had with detention ponds in neighborhoods.¹⁰¹ While these ponds may have worked initially, over time they were not maintained and ultimately failed, leaving the municipality either to repair and maintain the systems at taxpayer expense, or abandon them.¹⁰²

However, Chapel Hill also has other land use restrictions in place. Specifically, the municipality created a zoning overlay called

93. Jordan Water Supply Nutrient Strategy: Prot. of Existing Riparian Buffers, S.L. 2009-484, 15A NCAC 02B .0267 (2014).

94. S.L. 2013-95, 15A NCAC 02B .0267 § 1 (2014).

95. Jordan Water Supply Nutrient Strategy: Wastewater Discharge Requirements, S.L. 2013-395, 15A NCAC 02B .0270 § 6(b) (2014).

96. Jordan Water Supply Nutrient Strategy: Stormwater Mgmt. for Existing Dev., S.L. 2013-395, 15A NCAC 02B .0266 § 7 (2014).

97. Chapel Hill, N.C. Ord. No. 2012-10-24/O-4, § 5.19 (2012).

98. *Id.* at § 5.19.4(a)-(b).

99. *Id.* at § 5.19.7.

100. *See id.* at §5.19.8(d) (requiring a commitment to maintenance but also requires establishment of an escrow account and annual financial contributions).

101. *Cf.* Heather Vogell, *Homeowners, governments spar over needed flood repairs*, ATLANTA J.-CONST., March 1, 2010, <http://www.ajc.com/news/news/local/homeowners-governments-spar-over-needed-flood-repa/nQckb/> (discussing similar issues with detention ponds).

102. TOWN OF CHAPEL HILL, IMPERVIOUS SURFACES / BEST MANAGEMENT PRACTICES REPORT (Apr. 2001), <http://www.townofchapelhill.org/home/showdocument?id=3009> (last visited Mar. 8, 2016).

the Resource Conservation District (RCD).¹⁰³ Unlike typical zoning rules, which govern set boundaries within a municipality, the RCD is dependent on a land's topography in order to protect water quality and limit water runoff. The RCD protects water quality by ensuring that buffers around waterways do not have impervious surfaces and can serve as natural filtration systems.¹⁰⁴ It affects water volume because unbuilt land can flood without harming persons or property. This allows waterways to safely overflow instead of forcing water to run at high volume downstream. The reach of the district includes not only regular water bodies like lakes and rivers, but also perennial streams, ephemeral streams, and even ditches.¹⁰⁵ Functionally, any land with an elevation up to three feet above the 100-year floodplain is subject to the RCD.¹⁰⁶ Although no building is permitted within an RCD, other low-impact uses are allowed, including gardens, lawns, and similar activities that do not involve land disturbance.¹⁰⁷

Water quality is a complex management issue. It requires gathering water in a reservoir, protecting the land around the reservoir to help maintain quality and act as a natural filter, and treating the water to insure that it is acceptable for human consumption.¹⁰⁸ When water is discharged by the user, it must be delivered to a wastewater treatment facility that treats it to a standard that is clean enough to emit it back into the natural water system.¹⁰⁹ All of this requires a large capital investment, ongoing planning, technical expertise, and excellent management.¹¹⁰

II. WATER EQUITY

The international community has determined that access to water is a human right because it is fundamental to human life.¹¹¹ To

103. Chapel Hill, N.C. Ord. No. 2014-03-10/O-2 § 3.6 (2014).

104. *Id.* at § 3.6.4(f)(3).

105. *Id.* at § 3.6.4(f) and § 3.6.3(h)(3). Each type of water body is defined in the Code. For example, a perennial stream is one that normally has water year-round; and ephemeral stream only has water periodically, usually after a lot of precipitation. *See id.* at app. A (definitions).

106. *Id.* at § 3.6.3(d).

107. *Id.* at § 3.6.3(e) (referencing Table 3.6.3-2: Permitted Uses within Resource Conservation District).

108. *See Encyclopedic Entry: Reservoir*, NAT'L GEOGRAPHIC SOC'Y (Jan. 21, 2011), <http://education.nationalgeographic.org/encyclopedia/reservoir/>.

109. *See* Howard Perlman, *A Visit to a Wastewater-Treatment Plant: Treatment of Water*, U.S. GEOLOGICAL SURVEY (Dec. 2, 2015), <http://water.usgs.gov/edu/wwvisit.html>.

110. *Id.*

111. U.N. Econ. & Soc. Council, Comm. On Econ., Soc. & Cultural Rights, General

satisfy this human right, there must be enough water for domestic needs. The water must also be free from contaminants and accessible, meaning that there are no economic or other barriers to obtaining it.¹¹²

Water equity has different meanings in different contexts.¹¹³ On an international level, the four main goals in achieving water equity are to ensure that water is free of contamination, that it is potable (if used for drinking), that it is reasonably accessible, and that once those three goals are achieved, it is affordable.¹¹⁴ In many parts of the United States, these goals have been achieved.¹¹⁵ However, in certain large municipalities, there are challenges. For example, in Detroit, Michigan, 41% of city residential water customers were past due paying their bill, by an average of \$677.¹¹⁶

On a local level, fairness in water affordability and availability may be an element of environmental justice. Environmental justice is a concept that gained traction in the 1980s and has evolved over time.¹¹⁷ One formulation of the idea defines environmental justice as where civil rights law meets environmental law.¹¹⁸ In an effort to encapsulate this idea, the Environmental Protection Agency has defined environmental justice as “the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and

Comment No. 15 (2002): The right to water (arts. 11 and 12 of the International Covenant on Economic, Social and Cultural Rights) § 1, U.N. Doc. E/C.12/2002/11.

112. *Id.* at § 12.

113. As one author has noted, “Any articulation of the role of equity must recognize the complexity of the concept, and also recognize that if equity is to emerge, it must do so in specific places under particular circumstances – there is no ‘one size fits all’ conception of equity that is workable.” John M. Whiteley, Helen Ingram & Richard Perry, *The Importance of Equity and the Limits of Efficiency in Water Resources*, in WATER, PLACE, AND EQUITY 3 (John M. Whiteley, Helen Ingram & Richard Perry eds., 2008).

114. Symposium, *Environmental Justice: Access to Clean Drinking Water*, 57 HASTINGS L.J. 1367, 1378 (2006).

115. See James Salzman, *A Toast to the Safe Drinking Water Act*, SLATE (Dec. 16, 2014, 8:00 AM), http://www.slate.com/articles/health_and_science/science/2014/12/safe_drinking_water_act_anniversary_how_to_keep_tap_water_free_of_pollution.html.

116. DETROIT WATER AND SEWERAGE DEPT., MEETING AGENDA: FINANCE COMMITTEE MEETING, July 22, 2015 34 (2015), http://www.dwsd.org/downloads_n/about_dwsd/financials/Finance_Committee_Binder_7-22-2015.pdf.

117. Tseming Yang, *Melding Civil Rights and Environmentalism: Finding Environmental Justice's Place in Environmental Regulation*, 26 HARV. ENVTL. L. REV. 1, 4–5 (2002).

118. Kevin C. Foy, *Home Is Where the Health Is: The Convergence of Environmental Justice, Affordable Housing, and Green Building*, 30 PACE ENVTL. L. REV. 1, 9 (2012).

enforcement of environmental laws, regulations, and policies.”¹¹⁹ A prominent concern of environmental justice, however, is the distribution of environmental amenities and disamenities.¹²⁰ In fact, the environmental justice movement originates in disputes over the placement of solid waste facilities, a particular kind of environmental disamenity, in communities with predominantly African-American, low-wealth residents.¹²¹

Water utilities are implicated in water equity when they fail to provide services in a fair manner such as when there are “doughnut holes” of municipal services.¹²² This occurs when a municipality purposely excludes a community from receiving municipal services.¹²³ Water and sewage systems are among essential municipal services. If the exclusion of these services is based on race then it is not only inequitable but unlawful, although proving racial discrimination in municipal decisions presents a high hurdle.¹²⁴

One entity that uses data to provide compelling evidence that low-wealth, minority communities are excluded from municipal services is the Cedar Grove Institute.¹²⁵ Their research highlights water equity problems in areas around the country.¹²⁶ For example, a map of Chapel Hill shows that a predominantly African-American community, known as Rogers Road, has been excluded from

119. U.S. ENVTL PROT. AGENCY, *Environmental Justice* (Feb. 22, 2016), <http://www.epa.gov/environmentaljustice/>.

120. See Dinah Shelton, *The Environmental Jurisprudence of International Human Rights Tribunals*, in *LINKING HUMAN RIGHTS AND THE ENVIRONMENT* 1, 23 (Romina Picolotti & Jorge D. TAillant eds., 2003).

121. See generally Dollie Burwell & Luke W. Cole, *Environmental Justice Comes Full Circle: Warren County Before and After*, 1 *GOLDEN GATE U. ENVTL. L.J.* 9 (2007).

122. Michelle Wilde Anderson, *Cities Inside Out: Race, Poverty, and Exclusion at the Urban Fringe*, 55 *UCLA L. REV.* 1095, 1111 (2008).

123. See, e.g., Robert G. Schwemm, *Cox, Halprin, and Discriminatory Municipal Services Under the Fair Housing Act*, 41 *IND. L. REV.* 717 (2008).

124. See Hayley Carpenter, *Miccosukee v. United States: The Continuing Unwieldiness of Equal Protection in Environmental Justice*, 41 *ECOLOGY L.Q.* 597, 601 (2014) (noting that “only a very small number of environmental justice equal protection claims have gone to trial, and most have dealt with municipalities providing services in an allegedly discriminatory manner.”).

125. Ann Moss Joyner, *Mapping Excluded and Underserved Communities to Support Litigation and Advocacy*, <http://www.cedargroveinst.org/files/MappingExcludedCommunities.pdf> (last visited Mar. 10, 2016); see also *Hawkins v. Town of Shaw*, 437 F.2d 1286 (5th Cir. 1971) (noting Plaintiffs’ reliance on statistical evidence in claim of disparate treatment based on race in delivery of municipal services, including water and sewer).

126. Cedar Grove Institute for Sustainable Communities, *Fighting Institutionalized Discrimination and Exclusion of Minorities*, CEDAR GROVE INST. FOR SUSTAINABLE COMMUNITIES, <http://cedargroveinst.org/discrim.php> (last visited Mar. 3, 2016).

municipal services.¹²⁷ The Rogers Road community has been predominantly African-American at least since the Civil War.¹²⁸ However, the Chapel Hill municipal limits at that time were not near the boundaries of the current neighborhood, since the municipality was much smaller.¹²⁹ In fact, even in the 1970s the municipal limit was miles from Rogers Road.¹³⁰ However, in the 1970s the municipality chose Rogers Road as a waste landfill.¹³¹ There are disputes as to how the landfill site was chosen, with some current community residents insisting that Chapel Hill's mayor at the time promised certain amenities in exchange for an agreement to host the landfill.¹³² These residents also insist that the mayor promised the landfill would close within ten years.¹³³ Although no written evidence of these promises has been produced, it is unlikely that there would be any written documentation because the mayor did not have authority to enter into such an agreement without the consent of other elected leaders on the Chapel Hill Council.¹³⁴ Nevertheless, the landfill was located next to the Rogers Road community, and continued to operate until 2013.¹³⁵ During this time, residents complained repeatedly of water contamination.¹³⁶ None of the residents had access to the public water supply because they were not within the municipal limits.¹³⁷ Residents instead relied on private wells for water and septic systems for

127. According to one study, 88% of neighborhood residents identify as people of color, and about 68% identify specifically as African-American; socioeconomically, almost half live in households that earn less than 50% of the area median income. Marian Cheek Jackson Center, *Historic and Vibrant Rogers Road: Extensive Community Engagement Findings* 10 (October 2014), <http://www.townofchapelhill.org/home/showdocument?id=25227>.

128. ROGERS ROAD SMALL AREA PLAN TASK FORCE, FINAL REPORT: RECOMMENDATIONS FOR THE ROGERS ROAD SMALL AREA PLAN 9 (Oct. 30, 2008), <http://www.townofchapelhill.org/home/showdocument?id=1091>.

129. EMILY EIDENIER PEARCE, ROGERS ROAD 5 (2009) (hereinafter "PEARCE").

130. *See id.* at 71–72.

131. *Id.* at 87.

132. Emily Sloan, Jacqueline Stedman & Saira Butt, *The Orange County Landfill, ENVIRONMENTAL JUSTICE IN NORTH CAROLINA* (last visited Mar. 5, 2016, 1:55 PM), http://sites.duke.edu/docst110s_01_s2011_sb211/rogers-eubanks/the-orange-county-landfill/.

133. *Id.*

134. *See* PEARCE, *supra* note 129, at 69.

135. Taylor Greene, *Orange County Landfill to Close this Weekend*, DAILY TAR HEEL, Jun. 25, 2013, <http://www.dailytarheel.com/article/2013/06/orange-county-landfill-to-close-this-week-end>.

136. PEARCE, *supra* note 129, at 197.

137. *See* Florence Bryan, *Rogers Road Homes to Get Public Water, Sewer Access*, DAILY TAR HEEL, Aug. 18, 2011, http://www.dailytarheel.com/article/2011/08/rogers_road_homes_to_get_public_water_sewer_access.

wastewater.¹³⁸ Both the state and county health departments tested private water wells in the community for contamination, but no results indicated health hazards.¹³⁹ In addition, the landfill operator installed monitoring wells around the landfill site to test for leakage into the groundwater.¹⁴⁰ There were no reports that this ongoing monitoring revealed leakage into groundwater from the landfill, although there were indications that septic systems could be contaminating the groundwater.¹⁴¹

In light of these circumstances, Chapel Hill recognized that it had a responsibility to the Rogers Road community.¹⁴² In fulfillment of this responsibility, they closed the landfill,¹⁴³ built a community center in the neighborhood¹⁴⁴ and installed a public water system.¹⁴⁵ However, several issues arose as these actions were undertaken, illustrating difficulties that water providers may confront. First, even after waterlines are run along the public right-of-way so that a residence can tap on to the system, there is still the matter of actually connecting to the waterline.¹⁴⁶ Under the Orange Water & Sewer Authority (“OWASA”) fee structure, each property owner is charged a water availability fee.¹⁴⁷ This fee can be substantial.¹⁴⁸ In addition, each property owner must pay a meter installation charge, which might cost up to \$3,800.¹⁴⁹

There are similar costs associated with sewer service. Providing sewer service is currently under discussion but has not yet been made available to the Rogers Road community, in part because the

138. *Id.*

139. See PEARCE, *supra* note 129, at 206, 219–20.

140. *Id.*

141. See *id.* at 197.

142. See Jonathan Moyer, *Rogers Road Community Center Breaks Ground*, DAILY TAR HEEL, May 19, 2014, <http://www.dailytarheel.com/article/2014/05/rogers-road-community-center-breaks-ground>.

143. Greene, *supra* note 135.

144. Moyer, *supra* note 142.

145. Bryan, *supra* note 137.

146. *Id.*

147. Orange Water & Sewer Auth., *Schedule of Fees 7*, <http://www.owasa.org/Data/Sites/1/media/customerService/rates-and-fees-schedule-oct-2015.pdf> (last visited Mar. 7 2015) [hereinafter *OWASA Schedule of Fees*] (A water availability fee “is applicable to each new connection to a water main regardless of who may have paid for the installation of the water main to which the connection is made”).

148. *Id.* at 5 (“The one-time fee depends on the size of the waterline and the size of the home, ranging from \$1,265 to \$9,260 for a single-family residence.”).

149. *Id.* This is a fee the utility charges to install a connection between the main waterline serving a residence and the residence itself.

estimated installation cost to local governments is approximately \$6 million.¹⁵⁰ And even if local governments fund installation of a public sewer system, served by OWASA, there is still the matter of sewer availability fees.¹⁵¹ This is a cost to the property owner “to recover a portion of the capital costs of providing sewer system facility capacity.”¹⁵² The fee can range from about \$3,000 to about \$12,000, depending primarily on the size of the single-family residence.¹⁵³

After installation fees, there is a continuing monthly fee for service.¹⁵⁴ The typical customer pays \$70.66/month.¹⁵⁵ By law, OWASA is not permitted to discount the cost of its services to some users and not to others.¹⁵⁶ This creates tension between the ratemaking rules and the basic need to supply water and sewer. It also highlights a barrier to residents in a low-wealth community who find themselves caught between a water supply they suspect is contaminated and a high-cost remedy. As in the Fayetteville example, the cost to Chapel Hill and its partners, and to residents in a neighborhood that must be retrofitted for water and sewer, is very high, especially as contrasted with the cost to provide the services when the neighborhood is built.¹⁵⁷ This contrast is highlighted by a neighborhood adjacent to Rogers Road, which Habitat for Humanity built in 2007 on vacant land that Chapel Hill annexed.¹⁵⁸ Habitat developed a new neighborhood of affordable housing, building fifty-

150. Historic Rogers Road Area Sanitary Sewer Extension Preliminary Engineering and Field Investigations Report, 2 (Mar. 2015), <http://www.townofchapelhill.org/home/showdocument?id=30374>.

151. *OWASA Schedule of Fees*, *supra* note 147, at 9.

152. *Id.* at 11.

153. *Id.*

154. The cost of water is primarily the infrastructure to maintain water quality and the delivery system. The cost of sewer is the infrastructure to manage the wastewater and the treatment facility.

155. Orange Water & Sewer Auth., *Summary of Rates Effective in October 2015 and Previous Rates*, <http://www.owasa.org/Data/Sites/1/media/customerService/summary-of-previous-and-oct-2015-rates-on-11-by-19.5sheet-for-website-pdf.pdf> (last visited Mar. 7, 2015).

156. Although the public utility does not have authority to discount rates to customers based on ability to pay, it has established a voluntary program called “Care to Share,” which invites customers to round up their monthly bill as a way to fund water assistance programs. *See* Orange Water & Sewer Auth., *Care to Share Customer Assistance Program*, <http://owasa.org/care-to-share> (last visited Mar. 10, 2016).

157. *Cf.* Andrew Barksdale, *Annexed residents east of Fayetteville don’t see many city services*, FAYETTEVILLE OBSERVER, May 16, 2015, http://www.fayobserver.com/news/local/annexed-residents-east-of-fayetteville-don-t-see-many-city/article_166b259b-813e-53c1-9068-36cae69b9f4c.html (discussing high costs of retrofitting water lines).

158. *See generally* ROGERS ROAD SMALL AREA PLAN TASK FORCE FINAL REPORT (Sept. 17, 2013), <http://www.townofchapelhill.org/home/showdocument?id=25285>.

two homes served by water and sewer.¹⁵⁹ As part of this planned development, the developer installed infrastructure that included not just roads, sidewalks, gas, and electricity, but also water and sewer.¹⁶⁰ All of this was paid for by the developer.¹⁶¹

Increased property taxes are an additional economic barrier to water and sewer service. In order to supply the Rogers Road community with OWASA drinking water, Chapel Hill could annex the neighborhood, which is now contiguous to its municipal limits.¹⁶² However, while annexation would bring the neighborhood urban services, including police, fire, and bus service, it would also result in higher property taxes for each property owner.¹⁶³

These extra costs illustrate a difficulty that a municipality may encounter in trying to provide equitable water and sewer service. In a cost-of-service model, where users uniformly pay for services without regard to ability to pay, there is the obvious problem that some people may not be in a financial position to pay the initial and continuing costs.¹⁶⁴ But there are also potentially hidden consequences when a traditionally stable neighborhood becomes unaffordable to current residents. One potential hidden consequence is that, in the absence of preemptive safeguards, the neighborhood may become attractive to land developers once the infrastructure and complete array of municipal services are available. While it is possible to preserve the character of the neighborhood in such circumstances, it requires thoughtful safeguards, worked out among the residents and the local government. A Neighborhood Conservation District (NCD) is one potential way to help insure that a community retains some aspects of its traditional character.¹⁶⁵ An NCD is a zoning overlay district that Chapel Hill developed, which permits a community to work collaboratively toward establishing binding development

159. *Id.*

160. *Id.*

161. *Id.*

162. *See id.* at 2, for a map of the community.

163. *See e.g.*, Town of Chapel Hill, *Chapel Hill Facts* (July 2015), <http://www.townofchapelhill.org/home/showdocument?id=27648>. Orange County properties outside the Chapel Hill city limits pay property taxes only to the County. Inside the city limits, property owners pay the Orange County taxes and in addition pay city fees and taxes. The city tax rate in 2015 was 52.4 cents per \$100 of taxable value, for an additional tax of \$1,834 on an average property. Chapel Hill Town Council, *2014-15 Adopted Budget* (June 9, 2014), <http://www.townofchapelhill.org/home/showdocument?id=24725>.

164. *See OWASA Schedule of Fees, supra* note 147.

165. CHAPEL HILL, N.C., CODE OF ORDINANCES, app. A - Land Use Management, SS 3.6.5.

rules.¹⁶⁶ It has been employed in four neighborhoods, including Northside, which is a historically African-American neighborhood.¹⁶⁷ The NCD rules can be crafted to protect unique physical features and other design characteristics, as well as help stabilize property values.¹⁶⁸

A. Vulnerability

Another matter that invokes equity considerations involves a neighborhood's location and its potential vulnerability to flooding.¹⁶⁹ Low lying areas and areas near streams or other water bodies are more susceptible to flooding than areas at higher elevation or more distant from water bodies, which is part of the reason that a zone like the RCD restricts building in water buffer areas.¹⁷⁰ However, since building restrictions based on proximity to water were lacking in the past, there are existing neighborhoods in floodplains that suffer repeated flooding.¹⁷¹ Susceptibility to flooding can lead to a decrease in property values, which may mean that people who are least likely to be resilient after a destructive event like flooding are more likely to experience flooding than other parts of a municipality.¹⁷²

In Chapel Hill, one such neighborhood is Camelot Village. The apartments in Camelot Village were built in the late 1960s in the Bolin Creek floodplain.¹⁷³ This location causes the properties to flood

166. See TOWN OF CHAPEL HILL, QUESTIONS AND ANSWERS ABOUT NEIGHBORHOOD CONSERVATION DISTRICTS 3, 8 (Sept. 2011), <http://www.townofchapelhill.org/home/showdocument?id=7264> [hereinafter NCD Q&A].

167. See Town of Chapel Hill, *Neighborhood Conservation District (NCD) Zoning Overlays* (2016), <http://www.townofchapelhill.org/town-hall/departments-services/planning-and-sustainability/resources/neighborhood-conservation-district-ncd-zoning-overlays>; see also Town of Chapel Hill, *Northside Neighborhood* (2016), <http://www.townofchapelhill.org/town-hall/departments-services/housing-and-community/northside-neighborhood>.

168. See NCD Q&A, *supra* note 166, at 3.

169. Nat'l Flood Ins. Prog., *Glossary*, FLOODSMART.GOV (Feb. 23, 2016), https://www.floodsmart.gov/floodsmart/pages/glossary_A-I.jsp. (A flood is "a general and temporary condition of partial or complete inundation of two or more acres of normally dry land area . . . from one of the following: overflow of inland or tidal waters, unusual and rapid accumulation or runoff of surface waters from any source. . .").

170. Town of Chapel Hill, *Resource Conservation District (RCD)* (2016), <http://www.townofchapelhill.org/town-hall/departments-services/public-works/stormwater-management/regulations-ordinances/resource-conservation-district-rcd>.

171. A floodplain is "[a]ny land area susceptible to being inundated by floodwaters from any source. Glossary, National Flood Insurance Program.

172. See SHIVA POLEFKA, CTR. FOR AM. PROGRESS, MOVING OUT OF HARM'S Way 5 (Dec. 12, 2013), <https://cdn.americanprogress.org/wp-content/uploads/2013/12/FloodBuyouts-2.pdf>.

173. FED. EMERGENCY MGMT. AGENCY, HAZARD MITIGATION GRANT PROGRAM APPLICATION: REQUIRED DATA 4, <http://www.townofchapelhill.org/home/showdocument>

up to three feet during heavy rains.¹⁷⁴ Because of this, the property values in the neighborhood are low compared with similar properties in Chapel Hill. For example, the monthly rent for an average unit is about \$600, which is more than 18% lower than the average fair market rent for a comparable unit in Chapel Hill.¹⁷⁵ The rental price puts Camelot Village in the category of an affordable housing option, something relatively rare in Chapel Hill, which complicates the water equity issue.¹⁷⁶

The complication is that Chapel Hill seeks to promote affordable housing in an effort to be an inclusive, diverse community.¹⁷⁷ Yet the housing at Camelot Village is affordable at least in part because it is prone to flooding, which depresses demand.¹⁷⁸ Chapel Hill was confronted with the decision of allowing Camelot Village to experience continued flooding, or removing the housing units.¹⁷⁹ In 2004, the town concluded that the neighborhood's continuing vulnerability to flooding presented too great a risk to residents, and,

?id=19671 (last visited Mar. 8, 2016) [hereinafter FEMA GRANT APPLICATION].

174. *Id.* at 7.

175. See *Camelot Village Condominiums*, JOE DUVALL PROPERTIES, <http://camelotvillagenc.com> (last visited Mar. 10, 2016) (average rent of comparable unit, at \$737 per month); U.S. Dep't of Housing and Urban Dev., *FY2015 FMR and IL Summary System*, https://www.huduser.gov/portal/datasets/fmr/fmr_il_history/select_Geography.odn (Select North Carolina under "First, Select a State:" then select Orange County under "Then, Select a County:") (last visited Mar. 10, 2016). The HUD data probably understates the average cost of a comparable unit in Chapel Hill because it compiles countywide data, but the town itself is "the highest priced major housing market in the Triangle Region." DEVELOPMENT CONCEPTS, INC., RESIDENTIAL MARKET STUDY FOR THE TOWN OF CHAPEL HILL, Dec. 2010, <http://www.townofchapelhill.org/home/showdocument?id=8819>. That study estimated the average rent for a one-bedroom unit at \$772 per month, about 30% higher than the rent at Camelot Village. *Id.*

176. "Affordable" is defined as serving people who earn less than 80% of the area median income (AMI). See Town of Chapel Hill, *Affordable Rental Strategy* (2016), <http://www.townofchapelhill.org/home/showdocument?id=22547>. AMI is about \$61,000 for a family of four. <http://quickfacts.census.gov/qfd/states/37/3711800.html>. Median income for a single person is about \$37,000. <http://censusreporter.org/profiles/16000US3711800-chapel-hill-nc/>. Housing is affordable when the occupants pay "no more than 30 percent of their gross income for overall housing expenses, including utilities." TOWN OF CHAPEL HILL, CHAPEL HILL 2020 COMPREHENSIVE PLAN 85 (Jun. 25, 2012), <http://www.townofchapelhill.org/home/showdocument?id=15001>.

177. *Id.* at 2.

178. Chris Grunert, *Flooding a Perpetual Problem for Chapel Hill Apartments* CHAPELBORO, Jan. 12, 2016, 1:08PM, <http://chapelboro.com/news/flooding-a-perpetual-problem-for-chapel-hill-apartments>.

179. Tammy Grubb, *Town, county brainstorm ways to ease flooding at Chapel Hill condos*, NEWS & OBSERVER, Jan. 12, 2016, <http://www.newsobserver.com/news/local/community/chapel-hill-news/article54121410.html>.

on balance, the neighborhood's affordability did not outweigh the risk.¹⁸⁰ This conclusion was based on a history of flooding in the county over the prior eight years, with ten events that caused \$7.6 million in property damage.¹⁸¹ At Camelot Village, one structure suffered damages from four separate events, requiring repairs totaling more than \$200,000.¹⁸² As a consequence of the probability of ongoing damage to property and risk to residents, the town proposed purchasing at fair market value and demolishing 36 units, while providing rental relocation assistance to the occupants.¹⁸³ The total cost of this effort was an estimated \$2.2 million.¹⁸⁴ However, despite several years of negotiations with owners of the units, the town was not able to reach an agreement and in 2009 the town abandoned the project.¹⁸⁵ According to the town, some unit owners never responded to requests to discuss the proposal, and although eminent domain could be an option under a municipality's police powers, the town chose not to exercise that option.¹⁸⁶ The result is that the town's policy choice did not take effect, and while the affordable housing stock was not depleted, the neighborhood remains vulnerable to flooding.¹⁸⁷ In fact, ten years later the flooding continues, with more than 30 residences at Camelot Village being evacuated during heavy rains in Chapel Hill during December 30, 2015. But solutions remain elusive,

180. *Id.*

181. FEMA Grant Application, *supra* note 173.

182. *Id.* at 12.

183. Memorandum from W. Calvin Horton on Authorizing a Hazard Mitigation Grant Agreement to Mayor and Town Council (May 23, 2005), <http://townhall.townofchapelhill.org/agendas/ca050523/4g-A%20Resolution%20Authorizing%20the%20Town%20Manager%20to%20Execute%20a%20Hazard%20Mitigation%20Grant%20Agreement%20Involving%20Potential%20Camelot%20Village%20Acquisitions.htm>.

184. TOWN OF CHAPEL HILL, CAPITAL PROGRAM 296 tbl. 2 (2004), <http://www.townofchapelhill.org/home/showdocument?id=99> (Reference No. 71).

185. Letter from Roger Stancil, Town Manager, to Deborah Cooley-Godwin (Feb. 10, 2009), <http://www.townofchapelhill.org/home/showdocument?id=19673>; Grubb, *supra* note 179.

186. *Id.* See also N.C. GEN. STAT. § 40A-2 (2006), http://www.ncleg.net/EnactedLegislation/Statutes/HTML/BySection/Chapter_40A/GS_40A-2.html (defining eminent domain). See generally N.C. GEN. STAT. § 40A (2006), http://www.ncleg.net/EnactedLegislation/Statutes/HTML/ByArticle/Chapter_40A/Article_1.html (describing the municipal power of eminent domain). See generally Will Lovell, *The Kelo Blowback: How the Newly Enacted Eminent Domain Statutes and Past Blight Statutes are Maginot Line-Defense Mechanism for All Non-Affluent and Minority Property Owners*, 68 OHIO ST. L.J. 609 (2007) (discussing why governments will often forgo use of eminent domain as a political choice).

187. Tammy Grubb, *Town, county brainstorm ways to ease flooding at Chapel Hill condos*, NEWS & OBSERVER, Jan. 12, 2016, <http://www.newsobserver.com/news/local/community/chapel-hill-news/article54121410.html> (citing a recent example of continued flooding at Camelot Village).

in part because residents are concerned about losing what one person referred to as “affordable housing, and not only that, it is accessible housing.” By “accessible housing” the resident meant that the residences are close to a shopping mall, banks, and medical offices as well as public amenities like the library and post office.¹⁸⁸

It seems like it would be easy to establish what constitutes fairness when it comes to water, since the four main goals are to provide clean, potable, accessible, and affordable water. However, there are complexities in achieving fairness, such as when it comes to retrofitting an existing neighborhood that has traditionally been comprised of low-wealth and minority residents. Similarly, there are competing goals of affordable housing and vulnerability to flooding that a stormwater management system may not be able to reconcile.

III. WATER CONSERVATION

Conserving water is a goal that may be pursued either as a result of necessity, ethics, or both. Conservation may become a necessity when water is in short supply, either permanently or temporarily. In the western United States, for example, water law generally differs from the law in eastern states because the West has always been more arid.¹⁸⁹ As the population of western states grows, water shortages become more likely. However, even in eastern states, drought is familiar to most communities.¹⁹⁰ Although drought brings challenges, it can also provide an opportunity to create permanent water conservation policies.

For example, a drought in 2001–2002 forced Chapel Hill and its OWASA partners to conserve water, at least during the period of

188. Tammy Grubb, *Chapel Hill takes another stab at helping flood-prone Camelot Village*, NEWS & OBSERVER, Mar. 30, 2016, <http://www.newsobserver.com/news/local/community/chapel-hill-news/article68609052.html>.

189. Shelley Ross Saxer, *The Fluid Nature of Property Rights in Water*, 21 DUKE ENVTL. L. & POL'Y F. 49, 54 (2010). For context on the law of prior appropriation used in western states and how it promotes sustainable water supply, see Lawrence J. MacDonnell, *Prior Appropriation: A Reassessment*, 18 U. DENV. WATER L. REV. 228, 232 (2015) (“Because of scarcity, need, and many competing demands, water in the West is allocated, administered, and surrounded by legal rights, remedies, and restrictions in order to provide stability, security, and flexibility in use of this critical resources. Beneficial use without waste is the operative principle of prior appropriation, a doctrine of sustainability which evolved from local custom.”).

190. NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, PUBLIC FACT SHEET ON DROUGHT (May 2008), <http://www.nws.noaa.gov/os/brochures/climate/DroughtPublic2.pdf> (defining “drought” as a deficiency in precipitation over an extended period, usually a season or more, resulting in a water shortage causing adverse impacts on vegetation, animals and/or people”).

drought.¹⁹¹ But in 2003, the community took conservation further by putting in place a permanent water conservation plan.¹⁹² This plan was based, in part, on encouraging a conservation ethic and in part on planning for the next drought.¹⁹³ Chief among the strategies to encourage conservation was an inverted rate structure.¹⁹⁴ A typical rate structure for a product is to lower the unit price as the quantity purchased increases.¹⁹⁵ On a macro scale, this reflects the distinction between wholesaling and retailing.¹⁹⁶ But in the context of a scarce resource, and with the idea of inculcating conservation rather than consumption, quantity discounting that encourages increased consumption by lowering the incremental price is counterproductive. So OWASA inverted the residential rate structure, such that the first 2,000 gallons of water that a customer uses is the least expensive, and the second 2,000 gallons is more than twice the price.¹⁹⁷ This pricing structure continues as consumption increases.¹⁹⁸ In addition, OWASA charges commercial water users different rates depending on the season (for example, higher rates in summer months when there is less rainfall and more need for water conservation), and OWASA may also impose rate increases in the event of drought.¹⁹⁹

191. TOWN OF CHAPEL HILL, COMMUNITY FACILITIES: WATER AND SEWER 1 (2007), <http://www.townofchapelhill.org/home/showdocument?id=1273>.

192. Orange Water & Sewer Auth., *Water Conservation Requirements*, <http://www.owasa.org/water-conservation-requirements> (last visited Mar. 8, 2016).

193. See Ashley Gunsteens, *OWASA prepared for drought*, REESE NEWS LAB, June 13, 2011, <http://reesenews.org/2011/06/13/owasa-readies-for-drought/16477/>. The next serious drought occurred only a few years later, in 2007 – 2008. See Orange Water & Sewer Auth., *Water Conservation Requirements*, <http://www.owasa.org/water-conservation-requirements> (last visited Mar. 8, 2016).

194. Orange Water & Sewer Auth., *Understanding our bill for an individually-metered residence*, <http://www.owasa.org/residential-bill> (last visited Mar. 8, 2016); See Peiffer Brandt, *Conservative Pricing: An Alternative to Traditional Rate Structures*, in WATER AND WASTEWATER FINANCE AND PRICING: A COMPREHENSIVE GUIDE 245, (George A. Raftelis ed., 2005).

195. This is referred to as a quantity discount. For a formula explaining quantity discount, See Carlton and Waldman, *Safe Harbors for Quantity Discounts and Bundling*, 15 GEORGE MASON L.R. 1231, 1233 (2008) (providing a formula that explains quantity discount).

196. See 29 CFR 779.328 (2010) (distinguishing retail from wholesale); see also 29 C.F.R. § 779.328(b) (2010) (stating that “the sale of goods or services in a quantity approximating the quantity involved in a normal wholesale transaction and as to which a special discount from the normal retail price is given is generally regarded as a wholesale sale in most industries”).

197. ORANGE WATER & SEWER AUTH., SUMMARY OF RATES EFFECTIVE IN OCTOBER 2015 AND PREVIOUS RATES (Oct. 2015), [https://www.owasa.org/Data/Sites/1/media/customer Service/summary-of-previous-and-oct-2015-rates-on-11-by-19.5-sheet-for-website-pdf.pdf](https://www.owasa.org/Data/Sites/1/media/customer%20Service/summary-of-previous-and-oct-2015-rates-on-11-by-19.5-sheet-for-website-pdf.pdf) (showing the first 2,000 gallons costs \$5.26 and the second gallon costs \$12.78).

198. *Id.*

199. See Orange Water & Sewer Auth., *Understanding our bill for an individually-metered*

Other aspects of the permanent water conservation plan include both mandatory and voluntary cooperation on the part of water customers.²⁰⁰ One mandatory requirement is that landscape watering systems must be designed so that water does not flow onto adjacent property or any impervious surface.²⁰¹ Other measures in the conservation plan “strongly encourage and promote . . . voluntary conservation,” such as by operating dishwashers and clothes washers “only when loaded to their maximum capacity.”²⁰² One distinction between the mandatory and voluntary measures is the ability to monitor compliance; this is because the local government has no authority or interest in checking customers’ behavior inside their residences.

The permanent plan is in place at all times, but may get stricter during periods of water shortage.²⁰³ The result of this conservation effort is that the annual quantity of drinking water OWASA sold in 2015 is 24% lower than the volume it sold in 2002, which was prior to the conservation plan.²⁰⁴ During the same thirteen-year time period this drop in consumption occurred, OWASA’s customer base expanded by 15%.²⁰⁵ So the utility is serving significantly more customers while delivering only about 75% of the water volume.²⁰⁶ OWASA expects this trend to continue, and its projections of future water demand are based on increasingly greater conservation efforts on the part of customers.²⁰⁷

A. Reclaimed Water

The conservation plan is enhanced by OWASA’s arrangement with its largest customer, the University of North Carolina at Chapel Hill (UNC).²⁰⁸ Under this arrangement, OWASA and the university

residence, <http://www.owasa.org/residential-bill> (last visited Mar. 8, 2016).

200. ORANGE WATER & SEWER AUTH., OWASA’S WATER CONSERVATION STANDARDS, http://www.owasa.org/conservationstandardsmarch26_2009 (last visited May 16, 2016).

201. Chapel Hill, N.C. Code of Ordinances, ch. 23, art. IV § 23-64(a)(4) (2009), https://www.municode.com/library/nc/chapel_hill/codes/code_of_ordinances?nodeId=CO_CH23WASEDR_ARTIVWACOSTRE.

202. *Id.* at IV § 23-66.

203. *See id.* § 23-67.

204. OWASA sold 6.2 million gallons per day of drinking water in 2015. OWASA FINANCIAL REPORT, *supra* note 14, at i.

205. *Id.*

206. *Id.* at 1.

207. *Id.* at 7.

208. According to OWASA’s most recent financial report, The University of North Carolina at Chapel Hill (“UNC”) accounts for 22% of the utility’s annual water sales,

invested in infrastructure that could supply recycled non-potable water to campus instead of the more expensive drinking water that was typically supplied.²⁰⁹ Using recycled water reduces the demand for drinking water and therefore reduces pressure on water supply.²¹⁰ That, in turn, means OWASA does not need to find new sources of water as the community grows, and does not need to make capital investments in the water supply and treatment infrastructure that would otherwise be required to meet growing demand.²¹¹ From the university's perspective, the benefit is that recycled water costs substantially less than potable water.²¹²

Recycled water is wastewater that has been treated at the Morgan Creek facility.²¹³ Typically, the Morgan Creek facility treats wastewater in a multi-step process that first uses settling tanks to remove solids, then introduces bacteria and other microorganisms that consume pollutants, then filters the water, and finally uses ultraviolet light to disinfect and add oxygen to benefit fish and other biotic life.²¹⁴ The treated water complies with the terms of OWASA's NPDES permit for emission back into natural waterways, but is not treated to the level of potable water.²¹⁵ However, because it is highly

significantly more than its second-largest customer, which purchases 2%. *Id.* at 56. UNC has about 29,000 students and 12,000 faculty and staff. *See* The University of North Carolina at Chapel Hill, *Facts and Figures* (Jan. 2016), https://uncnews.unc.edu/files/2016/01/Facts-and-Figures_January2016.pdf. In addition, the health care system operates a medical center in Chapel Hill with several hospitals and research facilities, including more than 800 beds. *See* The UNC Health Care, *About Us* (2016), <http://www.unchealthcare.org/about-us/>.

209. Orange Water & Sewer Auth., *OWASA, University Sign Reclaimed Water Contract, THE BLUE THUMB*, July 2006, <https://www.owasa.org/Data/Sites/1/media/conservation/blueThumb/2006July.pdf>.

210. *See* U.S. ENV'TL PROT. AGENCY, *WATER RECYCLING AND REUSE: THE ENVIRONMENTAL BENEFITS*, <http://www3.epa.gov/region9/water/recycling/pdf/brochure.pdf> (last visited Mar. 8, 2016).

211. ORANGE WATER & SEWER AUTH., *ANNUAL REVIEW AND UPDATE OF STRATEGIC TRENDS AND UTILITY PLANNING ISSUES* iii (2015).

212. UNC pays \$.60 per 1,000 gallons for recycled water; residential users pay between \$2.63 per 1,000 gallons and \$19.79 per 1,000 gallons for potable water under the block rate structure. OWASA FINANCIAL REPORT, *supra* note 14, at 15. UNC pays \$7.91 per 1,000 gallons of potable water from May through September and \$4.16 per 1,000 gallons in other months. Orange Water & Sewer Auth., *Jordan Lake Water Supply Round Four Allocation Request* 13 (Apr. 30, 2014).

213. Orange Water & Sewer Auth., *Wastewater Management*, <http://www.owasa.org/waste-water-management> (last visited Mar. 8, 2016).

214. ORANGE WATER & SEWER AUTH., *COLLECTION TREATMENT AND RECYCLING OF WASTEWATER AND BIOSOLIDS, ANNUAL REPORT JULY 2014 THROUGH JUNE 2015* at 3 (2015), http://www.owasa.org/Data/Sites/1/media/whatWeDo/wastewaetr%20collection%20and%20treatment/21-owasa-wastewater-report-2015_9_web.pdf.

215. ORANGE WATER & SEWER AUTH., *FINAL ASSET MANAGEMENT PROGRAM* 16 (March 2016).

treated, it is safe to use for irrigating athletic fields, air conditioning cooling tower systems, and football stadium toilet flushing facilities.²¹⁶ The \$14 million system became operational in April 2009, and has since expanded to supply water to a second customer.²¹⁷ OWASA projects that within the next fifteen years, recycled water could account for 15% of total water supplied.²¹⁸ On the other hand, there are risks to the system. One is that most of the recycled water is used in cooling towers, which are susceptible to damage from high alkalinity levels.²¹⁹ It is possible that in order to meet OWASA's nitrogen reduction standards for wastewater in the future, alkalinity of the recycled water could increase to the point that the recycled water would no longer be usable.²²⁰ In that case, the projected 15% of total water would be replaced by potable water, placing pressure on the water supply.²²¹

The reclaimed water system is positive for water conservation, but it presents a potential conflict with water equity. Issues in water equity arise when the utility's largest customer lowers its consumption of potable water, because the fixed costs remain and therefore the price of water to all other customers will increase.²²² OWASA's projections show that the cost of water for its customers will increase significantly, at least in the short run, in part because of the lost revenue from potable water sales to UNC.²²³ The university has lower demand for potable water because it is substituting recycled water for the potable water it formerly purchased.²²⁴

216. OWASA FINANCIAL REPORT, *supra* note 14, at iv.

217. *Reclaimed Water*, ORANGE WATER & SEWER AUTH., <http://owasa.org/reclaimed-water> (last visited Mar. 06, 2016). The second customer is St. Thomas Moore School, which uses reclaimed water to irrigate its athletic fields.

218. ORANGE WATER & SEWER AUTH., OWASA – UNC WATER REUSE SYSTEM PROJECT: A TECHNICAL AND FINANCIAL PARTNERSHIP TO PROMOTE MORE SUSTAINABLE WATER MANAGEMENT 11 (PowerPoint slides on file with Duke Environmental Law & Policy Forum) [hereinafter WATER REUSE SYSTEM PROJECT].

219. *Cooling Tower Wood Maintenance*, General Electric Power & Water, http://www.ge.com/handbook/cooling_water_systems/ch29_maintenance.jsp (last visited Mar. 6, 2016).

220. Letter from Ed Kerwin, Executive Director, Orange Water & Sewer Auth., to Don Rayno, Water Planning Section, *in* ORANGE WATER & SEWER AUTH., JORDAN LAKE WATER SUPPLY ROUND FOUR ALLOCATION REQUEST (Apr. 30, 2014).

221. WATER REUSE SYSTEM PROJECT, *supra* note 218, at 11

222. *Id.* at 15, 19 (“Water customers cover revenue loss.”).

223. *Id.*

224. *Id.* at 17.

B. Jordan Lake Allocation

The Jordan Lake allocation demonstrates another way in which water conservation can be in conflict with other methods of water management. Water from the lake is used by some municipalities, but not OWASA.²²⁵ However, OWASA has the right to withdraw water from the lake.²²⁶ Its current allocation is about five million gallons per day.²²⁷ OWASA has ten million gallons a day available from its reservoirs, and supplies about eight million gallons per day to its customers.²²⁸ It now has a surplus and does not need water from Jordan Lake.²²⁹ But in projecting future water needs, the utility believes it might face a water supply shortage beginning in 2040.²³⁰

Demand projections and the ability to meet that demand far into the future incorporates a variety of assumptions, including historical rainfall patterns, population growth, institutional demand, new water sources, and conservation efforts.²³¹ Some of these projections are based on observable trends, others are based on numbers, such as capital flow for investment.²³² However, one variable that is difficult to predict is the effect of climate change. There are no micro-level studies on the effect climate change might have on OWASA's water supply, but the utility modeled its own scenario and concluded that its reservoirs could see about 30 percent less water inflow.²³³ If that were the case, then the utility would have capacity to supply only about eight million gallons per day, a volume well below projected future demand.²³⁴

In addition to the three reservoirs, OWASA also has interconnections with regional partners, including Durham, which uses water from Jordan Lake.²³⁵ These regional interconnections allow

225. TOM FRANSEN, DIVISION OF WATER RESOURCES, JORDAN LAKE WATER SUPPLY ALLOCATION PROCESS ROUND 4 (Dec. 8, 2011).

226. OWASA FINANCIAL REPORT, *supra* note 14, at iii.

227. *Id.*

228. ORANGE WATER & SEWER AUTH., JORDAN LAKE WATER SUPPLY ROUND FOUR ALLOCATION REQUEST 8, 16 (Apr. 30, 2014) [hereinafter JORDAN LAKE ALLOCATION REQUEST].

229. *See id.* (comparing current water availability with current demand shows a surplus).

230. *See id.* (increasing demand for water will result in a shortage by 2040).

231. *Id.* at 3–14.

232. *Id.* at 3–10.

233. JORDAN LAKE ALLOCATION REQUEST, *supra* note 228, at 19.

234. *Id.* at 244.

235. *Id.* at 21.

OWASA to both send and receive water.²³⁶ However, the regional interconnections are meant to deal with emergencies and are not for general water needs.²³⁷

With these and other potential water constraints in mind, OWASA has consistently acted to preserve its right to the Jordan Lake allocation.²³⁸ Its constituent local governments have been less interested in preserving this right.²³⁹ This is because municipalities are concerned that the extra water supply will take the pressure off conservation efforts, and be used to fuel growth and development not in the best interest of the community.²⁴⁰ For this reason, the local governments have refused to modify the agreement that restricts OWASA's access to Jordan Lake, while the utility continues to make investments and agreements that preserve the right for the future.²⁴¹ Essentially, the Jordan Lake allocation is seen on one hand as a prudent water management resource for the community, and on the other hand as a threat both to water conservation efforts and good growth planning because it would immediately increase water availability by fifty percent.²⁴²

Water conservation can be both an ethical responsibility and an economically rational decision. Chapel Hill has used economic rationality to drive customer behavior, especially by instituting the

236. Memorandum from Alan Rimer, Chair, OWASA Bd. of Dirs., on OWASA's Water Supply for Barry Jacobs, Chair, Orange County Bd. of Comm'rs (Jan. 17, 2013) (on file with the Duke Environmental Law & Policy Forum).

237. *See id.* (existing agreements "allow the exchange of water during relatively short periods of need").

238. *See id.* (referencing the OWASA Board of Directors approval of a resolution requesting "that the North Carolina Environmental Management Commission convert OWASA's existing Level II (future use) Jordan Lake allocation to Level I (current use when needed).").

239. Kirk Ross, *Jordan Lake plans rankle mayor, board*, CARRBORO CITIZEN, Mar. 3, 2011, <http://www.ilibio.org/carrborocitizen/main/2011/03/03/jordan-lake-plans-rankle-mayor-board/>.

240. For a general discussion about how water availability may have an adverse impact on planned growth, see Lincoln L. Davies, *Just a Big, "Hot Fuss"? Assessing the Value of Connecting Suburban Sprawl Land Use and Water Rights Through Assured Supply Laws*, 34 *ECOLOGY L.Q.* 1217, 1245 (2007) ("While many environmentalists have espoused assured supply laws as a way to control sprawl, there is a risk that these measures may have the opposite effect and actually exacerbate unplanned suburban development.").

241. Rimer, *supra* note 236, at 3–4. (referring to the 2001 Water and Sewer Management, Planning, and Boundary Agreement, which requires the approval of Orange County, Chapel Hill, and Carrboro for any extension of lines into Chatham County, which is the County where Jordan Lake is located).

242. *See* JORDAN LAKE ALLOCATION REQUEST, *supra* note 228, at 1, 20 (asserting that the availability of an additional 5 million gallons per day would discourage water conservation efforts).

residential inverted rate structure.²⁴³ This has been successful, and OWASA believes that it may inculcate an ethic that will continue to lead to individual choices to conserve water as a matter of practice.²⁴⁴ But other efforts, such as the recycled water system, are also potential long-term solutions to conserve a valuable resource.²⁴⁵ However, there can be disagreements about what is a prudent precaution in planning for water needs and what is instead an easy way to increase current water supplies and decrease the conservation impetus.

CONCLUSION

Water quality, water equity, and water conservation are interconnected in ways both obvious and obscure. Efforts at achieving one may have an unintended and adverse effect on another. However, all three are goals that local governments balance in trying to manage a water system. Chapel Hill has confronted and managed these goals by collaborating with its neighboring local governments in establishing a semi-autonomous water utility.²⁴⁶ The structure of this utility helps ensure cooperation, so that land use plans and water availability are compatible. The structure also removes water and sewer service as part of the demand on local tax revenues, because the utility is entirely self-sufficient.²⁴⁷ This model provides mechanisms for achieving water conservation, some of which are done in tandem with the municipality, like laws against watering during drought.²⁴⁸ The utility does not have authority to impose such rules through force of law, but the municipality does.²⁴⁹ Other mechanisms to encourage water conservation are in the discretion of the OWASA managers, like the inverted block rate structure that is

243. See ORANGE WATER & SEWER AUTH., SUMMARY OF RATES EFFECTIVE IN OCTOBER 2015 AND PREVIOUS RATES (2015), <https://www.owasa.org/Data/Sites/1/media/customerService/summary-of-previous-and-oct-2015-rates-on-11-by-19.5-sheet-for-website-pdf.pdf> (charging high volume users a higher rate per 1000 gallons of water used) [hereinafter OWASA SUMMARY OF RATES].

244. See *id.* (adopting inverted rate structure to shape consumer behavior).

245. See WATER REUSE SYSTEM PROJECT, *supra* note 218, at 11 (finding that water reuse projects decrease demand for potable water).

246. *History*, ORANGE WATER & SEWER AUTH., <http://owasa.org/history> (last visited May 16, 2016).

247. See OWASA FINANCIAL REPORT, *supra* note 14, at vi (stating that rates, fees, and charges cover all operating costs).

248. See JORDAN LAKE ALLOCATION REQUEST, *supra* note 228, at 11–14 (summarizing OWASA water conservation standards).

249. *Id.* at 11 (“OWASA does not have legislative authority to adopt a water conservation ordinance”).

designed as a disincentive to use increased water quantity.²⁵⁰ However, not all water management issues, such as stormwater, are within the purview of the utility.²⁵¹ Instead, Chapel Hill has established a separate structure to manage this aspect of water management.²⁵² Water equity issues are diverse, even in a relatively small municipality. They range from the price of water and sewer services to the availability of those services, and they also touch on issues of affordable housing.

Because these various water issues are so closely connected to the unique characteristics of each community, the fact that they are primarily the responsibility of local governments is wise. An overarching goal of clean water is a human right, but giving effect to that right requires thoughtful effort by informed and committed local leaders.

250. See OWASA SUMMARY OF RATES, *supra* note 243 (adopting inverted block rate structure to encourage water conservation).

251. ORANGE WATER & SEWER AUTH., *Down the drain? Out with the Trash?*, http://www.owasa.org/down_the_drain (last visited Mar. 9, 2016) (stating that the stormwater drainage system is separate from OWASA's sanitary sewer system).

252. *Id.*