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Alternative Methods of Managing and Securing Water for Municipalities

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I. **Introduction**

"*Water is the best of all things*."—Pindar

Historically, cities have secured water from fresh water sources such as surface water (lakes, reservoirs, and rivers) or groundwater (wells). Population growth and repeated droughts have increased demand for alternative sources of fresh water and novel solutions to the problem of scarce water. Several potential alternatives for managing and securing water for municipalities include export/transport of water, water conservation and reuse, and desalination. Each of these approaches and their attendant challenges will be discussed briefly below. No single solution is likely to be sufficient—there is no magic bullet. Instead, municipal water security will depend on attacking the problem of supply from multiple fronts and confronting the challenging legal issues that arise.

II. **The State of Affairs**

"*In a dry and thirsty land…*"—Chief Justice Moses Hallett, *Yunker v. Nichols*, 1 Colo. 551 (1872)

Widespread drought, climate changes, population growth, and increasing regulation are straining U.S. municipal water resources. According to a U.S. Drought Monitor report released August 21, 2012, over 63% of the country is currently experiencing moderate to exceptional drought.[1] July 2012 was the hottest month on record in the United States.[2] This combination of continued low rainfall and high heat—and resulting increased water consumption—takes its toll on municipal water supplies by draining reservoirs and depleting aquifers without adequate recharge. Existing infrastructure and water use regulations are often based on historical assumptions about climate and weather patterns, but history may not be repeating itself. Climate scientists expect drought conditions to increase worldwide due to higher temperatures and shorter periods of rainfall.[3] These weather and climate changes can undermine past planning efforts.

Water supply challenges are exacerbated by ever-increasing populations. Texas is expected to grow approximately 82% to 46.3 million by 2060, while existing water supplies are expected to decrease by 10%.[4] Currently, municipal water use is roughly 9% of state-wide usage.[5] But as a result of population growth in cities and decreasing agricultural use, municipal use is expected to increase to 41% in 2060.[6] Many states –Texas, California, and others in the Southwest, for

[1] *See* https://nes.ncdc.noaa.gov.
[2] *Id*.
[3] J.W. Nielsen-Gammon, *The Changing Climate of Texas* in THE IMPACT OF GLOBAL WARMING ON TEXAS (Jurgan Schmandt et al. eds., University of Texas Press 2d ed.) (2011), available at http://www.texasclimate.org/Home/ ImpactofGlobalWarmingonTexas/tabid/481/Default. aspx.
[4] Texas Water Development Board, 2012 *Water for Texas*, 132 (2012).
[5] *Id*. at 177.
[6] *Id*.

example—are already struggling with shortages in certain areas. According to the Texas 2012 State Water Plan, 470 of the 1,587 municipal water suppliers (30%) would have current supply needs in drought conditions.[7] Others states are projected to have water supply shortages in the near future. The EPA forecasts that even under non-drought conditions, at least 36 states are anticipating local, regional, or statewide shortages by 2013.[8] A recent Natural Resources Defense Council report projected that one-third of U.S. counties are at risk of water shortages by 2050.[9]

The Texas Water Plan makes clear the primary challenge for the future: "We do not have enough existing water supplies today to meet the demand for water during times of drought."[10] Likewise, the Florida Department of Environmental Protection has determined that Florida "cannot meet its future demand for water by relying solely on traditional ground and water sources."[11]

What are communities facing water supply deficits to do? Texas Governor Rick Perry famously turned to prayer during the worst one-year drought in Texas history, as did the governor of Georgia in 2007 while Georgia was in the grips of an historic drought.[12] Perhaps a more tried-and-true approach is to turn, not to the heavens, but to the courts for salvation. Legal disputes abound to secure claims to scarce supplies at the local, state, and international levels. But a more pro-active approach is suggested by a recent op-ed in the New York Times, which advises, "Don't Waste the Drought,"[13] echoing the old advice repeated in 2009 by Rahm Emmanuel: "Never let a crisis go to waste." In other words, now is the time to consider alternative methods of managing and securing water.

III. <u>Surface Water Issues</u>

"*A river is more than an amenity, it is a treasure*"—Oliver Wendell Holmes, Jr., *New Jersey v. New York*, 283 U.S. 336, 342 (1931)

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[7] *Id*.
[8] Environmental Protection Agency, *Water Supply in the U.S.*, available at http://www.epa.gov/WaterSense/pubs/supply.html.
[9] Natural Resources Defense Council, *Climate Change, Water, and Risk: Current Water Demands are Not Sustainable*, available at http://www.nrdc.org/globalwarming/watersustainability/files/WaterRisk.pdf.
[10] TWDB, supra note 4, at 4.
[11] Florida Department of Environmental Protection, *October 2012 Water Resources Fact Sheet*, available at http://www.dep.state.fl.us/water/waterpolicy/docs/factsheets/wrfss-water-use-trends.pdf.
[12]Proclamation for Days of Prayer for Rain, available at http://governor.state.tx.us/news/proclamation/16038/; Kathy Lohr, *In Drought-Stricken Georgia, a Prayer for Rain*, NPR, Nov. 14, 2007, available at http://www.npr.org/templates/story/story.php?storyId=16281915.
[13] Charles Fishman, Op-Ed, Don't Waste the Drought, N.Y. Times, Aug. 16, 2012, available at http://www.nytimes.com/2012/08/17/opinion/dont-waste-this-drought.html.

The crisis of the 1950's "drought of record" in Texas spurred water supply planning efforts and major investments in water infrastructure, particularly reservoirs. The most recent drought has produced a similar focus on new, reliable sources for surface water. There are several sources a city could look to for new surface water, including unappropriated surface water, interbasin transfers of surface water, water supply contracts, and the purchase of existing water rights. The Texas Water Plan relies on a combination of these approaches. The Plan calls for 26 new major reservoirs for storage as well as "other surface water strategies" that involve new pipelines, water supply contracts, and permits for diverting surface water. Together, the proposed surface water strategies make up 51% of the volume of new water provided for in the plan.[14]

A. Reservoirs

A significant challenge in much of the West is the availability of unappropriated surface water. Western rivers are often fully appropriated or even over appropriated.[15] As a result, there are limited viable water sources to fill new reservoirs.[16] Even assuming the availability of sufficient surface water appropriations, water storage projects have been and remain controversial due to their significant impact on the residents and the environment in the affected area. The newly-appointed Chairman of the Texas Water Development Board, Billy Bradford, has criticized the State Water Plan's assumptions regarding additional reservoirs as unrealistic.[17] Bradford mused, "I am not sure another reservoir will be built in Texas."[18]

Reservoir construction slowed to a halt in Texas because of restrictive environmental regulations, lack of cost-effective new sites, and lack of funding options for costly surface water storage.[19] These limitations still exist. Federal environmental regulations continue to pose a significant challenge to new reservoir and storage projects. For instance, new construction projects that involve the discharge of dredged or fill materials in the waters of the United States require a permit from the Army Corps of Engineers under Section 404 of the Clean Water Act. The permit application must comply with EPA regulations that require the proposed project to be the "least environmentally damaging practical alternative"[20] and comply with applicable NEPA procedures, including

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[14] TWDB, supra note 4, at 190
[15] *See David H.* Getches, *The Metamorphoses of Western Water Policy: Have Federal Laws and Local Decisions Eclipsed the States' Role*?, 20 Stanford Envtl. L. J. 3, at 9 (asserting that western rivers became fully appropriated early in the twentieth century).
[16] Ronald A. Kaiser, Solving the Texas Water Puzzle: Market-Based Allocation of Water, Texas Public Policy Foundation Research Report, at 12 (2005) .
[17] *New TWDB Chair Urges 'Realistic' Action to Implement Regional Water Plans*, Texas Water News (WaterPR), May 2012.
[18] *Id*.
[19] *Desalination; The Next Step for Drought-Proofing Supplies in Texas*, Texas Water News (WaterPR), March 2012.
[20] 40 C.F.R. 230 § 404(b)(1).

environmental assessments and environmental impact statements. The project must also avoid interfering with endangered or threatened species in accordance with the Endangered Species Act. Certain federal environmental designations can also interfere with surface water projects. The Wild and Scenic River Act protects certain designated rivers in their free-flowing condition, and the U.S. Fish and Wildlife Service can designate wildlife refuges that can block reservoir planning.

Because of the political and legal difficulties involved, one study concluded that future water storage projects will be feasible only after other strategies are fully explored and implemented to the extent possible. Those projects that are then undertaken will need to be "more innovative, environmentally sensitive, and smaller in scale."[21]

While everyone, including the authors, may not agree that the era of reservoir construction has ended, everyone can agree that it is a long, difficult and expensive process. The time required for all necessary permits, financing and construction of a new major reservoir can easily require 30 years or more.

Other alternative efforts to obtain increased surface water supplies may run into legal issues that restrict their availability. Two such issues are environmental flows limitations and restrictions on interbasin transfers.

B. Environmental Flows

As rivers have approached and surpassed full appropriation, the availability of sufficient instream water to maintain healthy rivers has became a major environmental concern. Under the traditional doctrine of prior appropriation adhered to in the West, water not diverted and used is water wasted. Recognizing the environmental, not to mention recreational, economic, and aesthetic value of instream flows, many states have modified their rules to protect them. Since 1985, Texas law has required review of environmental impacts as part of its permit approval process for new and certain amended surface water rights, and now authorizes the Texas Commission on Environmental Quality (TCEQ) to impose permit conditions to protect environmental flows.[22]

Unlike some Western states, Texas has resisted approving appropriations for environmental flows.[23] In 2000, the San Marcos River Foundation filed an application for an appropriation from the Guadalupe and San Marcos Rivers for instream use. The TCEQ decided it lacked statutory authority to grant water rights for environmental flows; its only authority to protect such flows was

[21] Western Governors' Association, *Water Needs & Strategies for a Sustainable Future*, 7-8 (June 2006).
[22] *See* TEX. WATER CODE §§ 11.147, 11.150, 11.152.
[23] *Cf. McClellan v. Jantzen*, 547 P.2d 494 (Ariz. Ct. App. 1976)

through the permit review process for new appropriations. This produced years-long litigation, which was largely rendered moot by legislative clarification.[24]

In 2007, the Texas Legislature made it a priority to evaluate freshwater inflows and instream flow necessary to maintain the viability of the state's streams, rivers, bays and estuary systems.[25] The legislature prioritized the river basins, requiring the appointed advisory committee to appoint a basin and bay area stakeholders committee for each river basin listed in Texas Water Code § 11.02362(b), and a basin and bay expert science team for each basin.[26] These committees, with the help of the science team, are to develop environmental flow regime recommendations and environmental flow standards for the basin, and submit those to the TCEQ for consideration. The TCEQ is then required to propose and adopt environmental standards for the river basin.[27] Once adopted, new water rights or amendments that increase an existing water right will be required to comply with the flow regimes established by these new rules.[28]

The TCEQ has received recommendations from, and adopted environmental flow standards for Trinity River, San Jacinto River, Galveston Bay, Sabine River, Neches River, and Sabine Lake Bay.[29] The rules adopt a flow regime approach whereby the amount of instream flows and freshwater inflows that are required to maintain aquatic stability vary in an attempt to mimic the natural monthly and yearly variability of river flows.[30] New appropriations in these river basins will be required to pass base flows that will vary with the hydrologic condition and season, a certain number of high pulse flows (flows that are short in duration and high in magnitude), and subsistence flows.[31] The remaining river basins are working through the process, and once completed, rules will be proposed and adopted for the remaining basins listed by the statute.

C. Interbasin Transfers

As put in a legislative report prepared by the Texas Select Committee on Water Policy in 2004, "The sources of water in Texas do not always align with its population."[32] This fundamental misalignment between the location of available

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[24] *San Marcos River Foundation v. Texas Commission on Environmental Quality, Guadalupe Blanco River Authority, San Antonio River Authority and San Antonio Water System*, 267 S.W.3d 35 (Tex. App.—Corpus Christ 2008, pet. denied). The following discussion of environmental flows is derived from Emily Williams Rogers, *Current Issues Involving Surface Water and Cities* (2012) presented at the Texas City Attorney's Association 2012 Summer Conference. The material is used with permission.

[25] TEX. WATER CODE § 11.0235.

[26] *Id.* at § 11.02362.

[27] *Id.*

[28] *Id.* at § 11.147(e-1).

[29] 30 TEX. ADMIN. CODE Ch. 298, Subch. B and C.

[30] *Id.*

[31] *Id.*

[32] The Senate Select Committee on Water Policy, *Interim Report to the 79th Legislature* (2004), available at http://www.senate.state.tx.us/75r/senate/commit/c750/downloads/WP_Final.pdf.

surplus water and the populations who need it has long produced efforts to move water from one basin to another to meet water demands. However, out of concern for the effects of transfers on the basin of origin—e.g., the quantity and quality of stream flow, environmental impacts on habitats, and potential future needs, etc.—most states have limited the authority of water supplies to make interbasin transfers to some degree.[33]

In Texas, the limitations on interbasin transfer have increased over time. The original regulatory framework hearkening back to 1917 required a state permit conditioned on the transfer not operating to the "prejudice of persons and property."[34] The permit requirement was substantially revised in 1997 to include expanded procedural requirements (publication, notice, public hearings), as well as expanded regulatory considerations during the review process.[35] Perhaps most significantly, the 1997 legislation included the "junior priority provision," which made new interbasin transfer authorizations junior in priority to water rights granted before the interbasin transfer application.[36] The effect of the junior priority provision is to render the interbasin water supply unreliable and therefore unattractive. Ten years later, TCEQ had only granted two new interbasin transfer authorizations.[37]

Recognizing the hardship imposed by these "unreasonable restrictions on the voluntary transfer of surface water," the Texas Water Plan calls for legislative changes to make interbasin transfer a feasible option.[38] But, even after acknowledging the need for a legislative remedy, the Plan proceeds to rely on fifteen recommended water management strategies that require interbasin transfer permits.[39]

IV. <u>Groundwater Transactions</u>

"*Whiskey is for drinking; water is for fighting over*."—attributed to Mark Twain

Because of the limited availability of unappropriated surface water and other limitations on storage and transfer, groundwater is often the leading option for acquiring expanded municipal water supply. In fact, after the limitations on

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[33] Ronald A. Kaiser, *Texas Water Marketing In the Next Millennium: A Conceptual and Legal Analysis*, 27 TEXAS TECH L. REV. 183, 216.
[34] TEX. WATER CODE § 11.085. The Texas Supreme Court clarified in an important case that this "no prejudice" standard did not literally mean no prejudice, but rather implied a balancing of the benefits from the diversion and the harm to the basin of origin. Prejudice occurred only when the harms to the origin outweighed the benefits to the recipient. *City of San Antonio v. Texas Water Commission*, 407 S.W.2d 752, 758 (Tex. 1966).
[35] Many of the procedural requirements do not apply to certain except transfers: 3000 acre-feet or less, emergency transfers, transfers to adjoining coastal basins, and transfers from a basin to a county or city or a city's retail service area not within the basin. TEX. WATER CODE § 11.085(v).
[36] TEX. WATER CODE § 11.05(s).
[37] Texas Water Development Board, *Legislative Priorities Report, 80th Legislative Session* (2007)
[38] TWDB, *supra* note 4, at 8.
[39] *Id*. at 241.

interbasin transfers discussed above, Texas witnessed a surge in large groundwater projects, often involving transfer over significant distances.[40] This shift towards groundwater transfer has been aided by the bifurcated regulatory system in Texas, where groundwater, unlike surface water, is not treated as state water subject to prior appropriation.

Instead, Texas follows the twin rules of absolute ownership and capture: groundwater is private property owned and subject to unlimited capture by the owner of the surface estate for use on or offsite, with no liability to neighboring wells for draining water.[41] Certain narrow exceptions limit the rule of capture, including limitations on willful and wanton waste, malicious taking of water to injure others, and subsidence caused by negligent pumping.[42] The resulting ownership interest in groundwater rights, like mineral rights, may be severed and conveyed separately from the surface estate.[43]

Due to limited surface water supplies in some regions, groundwater water supply shortages in high-demand areas (e.g., the mining of the Ogallala Aquifer) and relatively untapped groundwater in rural areas, groundwater rights transfers are increasing. These transactions typically involve the sale or lease of severed water rights in rural areas to thirsty distant cities. Transfer from agricultural use to municipal use is a trend expected to continue as municipal groundwater use increases from 9% to 41% in the next 50 years.[44] This trend towards municipal use of groundwater has raised significant legal issues in Texas concerning groundwater ownership, as well as practical questions for municipalities seeking secure groundwater supplies.

A. Groundwater Ownership

Private ownership of groundwater, perhaps misleadingly called "absolute ownership," does not mean that groundwater is not subject to regulation or that it remains unregulated in Texas. Like other forms of property, groundwater is subject to reasonable regulation under the police power. Indeed, the Conservation Amendment to the Texas Constitution adopted in 1917 makes conservation of the water and other natural resources of the state an obligation and duty.[45] However, the Legislature did not undertake to regulate groundwater systematically outside the rule of capture system until 1949, when the legislature authorized the creation of local underground water conservation districts (now groundwater conservation

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[40] Todd Votteler et al., *The Evolution of Surface Water Interbasin Transfer Policy in Texas: Viable Options for Future Water, Water Grabs, or Just Pipe Dreams?*, 36 ST. B. TEX. ENVTL. L.J. 125 (2006).
[41] *See Houston & Texas Central Railway Co v. East*, 81 S.W. 279 (1904); *Texas Co. v. Burkett*, 177 Tex. 16 (1927).
[42] *See City of Corpus Christ v. City of Pleasonton*, 276 S.W.2d (Tex. 1955); Friendswood *Development Co. v. Smith-Southwest Industries, Inc*., 576 S.W.2f 21 (Tex. 1978).
[43] *See, e.g. Evans v. Ropte*, 96 S.W.2d 973 (Tex. 1936).
[44] TWDB, *supra* note 4, at177
[45] TEX. CONST. art. XVI, § 59(a).

districts, or GCDs) as the preferred method for regulating groundwater.[46] Areas of the state are increasingly covered by these local regulatory bodies—there are currently 98 active districts in Texas covering 174 of 254 counties in the state.[47]

GCDs, which typically follow county lines, have the authority to regulate groundwater by adopting management plans, registering and permitting non-exempt wells, and adopting rules concerning production limits, well spacing, and export of water outside the district.[48] While GCDs may not deny a permit because the water will be exported, they may limit the amount of water a landowner can export and additional export fees.[49]

As GCDs have spread across the state, local GCD regulations have clashed with landowner claims of private property rights in water. These disputes are often, at root, conflicts over the ability of a landowner within a GCD to sell groundwater to municipalities seeking to export water from the GCD. Many local residents are loathe to see local water permitted to distant cities and therefore work through the local GCDs to restrict the sale of groundwater for export out of the district. Conflicts also arise when local residents balk at resulting limitations on their own water permits once large municipalities are granted export rights.[50]

Groundwater disputes such as these recently led the Texas Supreme Court to clarify the nature of groundwater ownership in Texas. While the rule of capture/absolute ownership had consistently been applied by Texas courts for over 100 years, the Texas Supreme Court had never determined directly whether ownership of groundwater vests "in place" or only upon capture.[51] In *Edwards Aquifer Authority v. Day,* the Court confirmed its long-standing commitment to the doctrines of absolute ownership and the rule of capture.[52] By analogy to principles of oil and gas law, the Court clarified that landowners' ownership interest in groundwater is ownership in place--a vested property right entitled to constitutional protection from takings. The regulatory takings analysis set out in *Penn Central Transp.. Co. v. New York City*[53] thus applies to groundwater takings

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[46] TEX. WATER CODE §36.015
[47] http://www.tceq.texas.gov/assets/public/permitting/watersupply/groundwater/maps/gcd_text.pdf
[48] Tex. Water Code §§ 36.113, 36.116. Recent legislative changes have required regional planning and cooperation on the part of the GCDs within Groundwater Management Areas (GMAs) that ideally coincide with aquifer boundaries. Each GMA is tasked with adopting "desired future conditions" for the management area and issuing permits to achieve those conditions based on "modeled available groundwater" information from the Texas Water Development Board.
[49] Tex. Water Code § 36.122(g)
[50] *See Guitar Holding Co v. Hudspeth County Underground Water Cons. Dist. No. 1*, 263 S.W.3d 910,914-915 (Tex. 2008) (holding that in-district users could not convert their protected historical use to new uses, i.e. transport for municipal purposes; the transfer of groundwater outside the district for municipal use is a new use requiring a new permit).
[51] *Barshop v. Medina County Underground Water Conservation District*, 925 S.W.2d 618 (1996).
[52] 369 S.W.3d 814 (Tex. 2012).
[53] 438 U.S. 104 (1978).

challenges. Reasonable, but not over-burdensome regulation is permissible.[54] It remains to be seen whether this fact-specific inquiry will open the proverbial floodgates to takings litigation against GCDs, but more challenges are likely. On the other hand, the threat of litigation may prevent GCDs from imposing burdensome limitations on the sale and export of groundwater, and thus pave the way for easier groundwater rights transfers for the purpose of export for municipal use.

On the way towards confirming ownership in place in *Day*, the Texas Supreme Court recognized the existence of correlative rights in groundwater, or the right of each landowner to an opportunity to produce his fair share of the resource beneath the land. Comparing groundwater to oil and gas regulations, the Court noted that in both areas, these correlative rights have been created by regulation.[55] The Court's explicit recognition of correlative rights may push GCDs to adopt correlative rights management styles that grant landowners a proportional share in the groundwater.

B. Practical Concerns

As suggested by the discussion of groundwater ownership issues, municipalities seeking to obtain water must determine if the proposed land is within a GCD and then determine the applicable local restrictions on the water rights owner's ability to access and produce groundwater. Because of potential acreage or well production limits, or of the growth of correlative rights-style regulations that grant groundwater based on ownership, cities may be pushed towards acquiring a larger amount of land to address their water supply needs. Even in areas not within a GCD, the potential for well-interference inherent in the rule of capture pushes towards larger acreage to protect the investment in groundwater supply. Add to this mix of incentives the increasing demand for supply and speculative ventures like T. Boone Pickens' groundwater grab, [56] and it is likely that municipal groundwater transactions will become complex, large-scale affairs, with all the additional due diligence, cost, and financing considerations that larger size entails. In some instances, regional cooperation might make the most economic sense, though such multi-party arrangements bring their own host of ownership and responsibility issues.

Large-scale multi-party groundwater transfers are not new in Texas. For the past decade, eleven cities in the Texas Panhandle, including Amarillo and Lubbock, have cooperated at the regional level to obtain significant amounts of new

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[54] Factors to consider include 1) the economic impact of the regulation on the claimant, 2) interference with investment-backed expectations, and 3) the character of the government action. *Id*. at 124.

[55] *Day*. 369 S.W.3d at 831.

[56] For a discussion of the legality of the "Pickens Plan" and water marketing more generally under the common law groundwater laws throughout the country, *see* Dean Baxtresser, Note, *Antiques Roadshow: The Common Law and the Coming Age of Groundwater Marketing*, 108 Michigan L. Rev. 773 (2010).

groundwater supply. The member cities compose the Canadian River Municipal Water Authority (CRMWA), a special purpose regional water district created by the legislature. Because its surface water supplies from Lake Meredith on the Colorado River are not adequate to serve its member cities' needs, CRMWA has pursued an aggressive policy of purchasing groundwater rights. CRMWA has purchased over 400,000 acres of groundwater rights, largely with tax-exempt contract revenue bonds supported by member city water supply contracts. As a result, in a relatively brief time, CRMWA has transitioned its water supply from surface water to groundwater and become the largest single groundwater owner in the state.

V. <u>Conservation and Reuse</u>

"*When the well is dry, we know the worth of water.*"—Benjamin Franklin, Poor Richard's Almanac, 1746

In light of the legal, political, and environmental challenges associated with traditional freshwater sources, governments have turned to water conservation management techniques to maximize the potential of their current supply. "Conservation" is a capacious term. In Texas, it encompasses "those practices, techniques and technologies that reduce the consumption of water, reduce the loss or waste of water, improve the efficiency in the use of water, or increase the recycling and reuse of water so that a water supply is made available for future or alternative uses."[57] Conservation can usefully be divided into two broad categories: water efficiency measures and water reuse/recycling/reclamation. Since these two components of conservation raise different issues, they will be addressed separately. Together, these strategies are expected to shoulder the weight of a significant portion of future water supply needs. In Texas, conservation is expected to increase over time, and by 2060 make up nearly 35% of expected water supply (7.2% municipal conservation, 16.7% irrigation conservation, and 10.2% reuse).[58]

A. Conservation

Water conservation as a means of protecting municipal water supply is at the top of most management lists for good reasons. First, increased activism on the part of citizens and interest groups has raised environmental awareness about the need for such things as energy and water efficiency. Second, and related to the first point, federal and state laws have promoted or mandated conservation policies. Third, conservation efforts are the most cost-effective way to extend water resources. For purposes of this paper, we will pass over environmental awareness to focus on the legal impetus for municipal conservation efforts and the cost-effectiveness of those efforts.

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[57] 30 TEXAS ADMIN. CODE § 288.1(3).
[58] TWDB, *supra* note 4, 191.

Significant federal promotion of water conservation efforts began in 1996 when Congress reauthorized the Safe Water Drinking Act. The amended Act required the Environmental Protection Agency to publish water conservation plan guidelines for small, medium, and large public water systems. More importantly, the Act authorized states to require local governments to adopt conservation plans as a prerequisite to receiving loans under the newly-created Drinking Water State Revolving Fund program.[59] In compliance with the Act, the EPA published its Water Conservation Plan Guidelines in 1998.[60] The Guidelines identify several best management practices that have guided local conservation plans ever since.

While federal efforts are important, most water conservation efforts spring from state requirements and incentives. Some states, like Washington, directly mandate adoption of municipal conservation plans with statutorily identified targets. Stopping short of mandatory programs, many states encourage voluntary conservation efforts through a variety of educational efforts, guides, and manuals. However, voluntary efforts typically become mandatory in order to obtain new or amended water rights or to obtain funding from state and federal programs.

Texas has adopted a mixture of these approaches. The Texas legislature created the Water Conservation Implementation Task Force in 2003 to develop voluntary best management practices in order to achieve specific goals for municipal conservation and efficiency.[61] The guide established a long-term municipal target of 140 gallons per person per day, and encouraged annual decreases of one-percent in use.

While these are voluntary guidelines and planning policies, the Texas Commission on Environmental Quality requires all (with certain limited exceptions[62]) applicants for new or amended surface water rights to submit a water conservation and drought contingency plan meeting the administratively required conservation standards, including specific, quantified 5-year and 10-year targets for water savings and evidence of implementation of past plans.[63] TCEQ may require certain conservation efforts as part of the approval process.[64] Furthermore, applicants are obligated to evaluate the viability of conservation as an alternative to the proposed appropriation. Like the TCEQ, the TWDB requires applicants for all financial assistance programs to provide evidence of an effective water conservation plan.[65]

While unfunded state mandates can often be burdensome, conservation efforts have the benefit of being the most cost-effective method to extend water resources. Conservation programs do contain up-front costs, but the costs do not

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[59] 42 U.S.C. 300j, §1455(a).
[60] http://www.epa.gov/WaterSense/pubs/guide.html.
[61] See http://www.savetexaswater.org/.
[62] 30 TEX. ADMIN. CODE §295.9.
[63] TEX. WATER CODE § 11.1271(c); 30 TEX. ADMIN. CODE § 288.30
[64] TEX. WATER CODE § 297.50(c).
[65] 31 TEX. ADMIN. CODE § 363.15.

approach those of infrastructure projects. Indeed, cities like San Antonio have found a return on that initial investment: spending $1/person on conservation saved $4-$7/person.[66] And if structured properly, these changes may be self-funding. San Antonio, for instance, dedicates funds from certain charges on the highest users and meter fees on commercial locations to its conservation efforts.[67]

However, even with these incentives for conservation, municipalities have had mixed success in implementing effective conservation strategies. A study of 18 Texas municipal water conservation plans revealed that not all plans are equal. Some plans are aggressive, targeted, and use a variety of conservation methods; others did not take advantage of the wide range of potential conservation policies available.[68] Effective water conservation requires a mix of methods. Some of the approaches include the following:

- education and outreach—ad campaigns, bill inserts, school programs
- conservation pricing—increasing block rates, seasonal rates, emergency conservation rates
- home/landscape water audits
- retrofit/replace inefficient fixtures—toilets, showerheads, dishwashers, washing machines
- rebates, grants, loans, and giveaways
- xeniscaping-- native, water-smart plants
- leak detection and repair
- universal metering
- reduced water pressure
- ordinances—day/time restrictions, fugitive water, plumbing codes, landscaping requirements on new buildings
- enforcement—reporting, investigation, notice, sanctions

Conservation is a valuable water management approach and will be vital for the future, but aggressive conservation efforts may carry certain legal risks. Even while state and federal laws have promoted conservation, conservation has presented challenges to existing laws. For instance, in prior appropriation systems, conservation conflicts with the two basic principles of the regulatory regime: "first in time, first in right" and "use it or lose it." The prior appropriation doctrine is intended to maximize the use of resources, not conserve them. Absent sufficient legal guarantees, conservation efforts could run the risk of jeopardizing water rights.[69] In response to this problem, Western states have amended their laws to accommodate certain types of conservation with varying degrees of success, but additional legal changes may be necessary to accommodate evolving

[66] Environmental Defense Fund, Maximizing Urban Water Conservation in Texas, 5 (2008).
[67] *Id.*
[68] *Id*. at 17.
[69] *See* Nevada Water Plan, Section 3.A., "Water Conservation."
http://water.nv.gov/programs/planning/stateplan/documents/pt3-1a.pdf

conservation efforts.[70] Successful conservation may also have unintended negative consequences for holders of downstream water rights depending on historical return flows, and even for the environment in the form of reduced recharge or impacts on habitats for endangered species.

Notwithstanding potential legal issues, because conservation is the most cost-effective solution to stretching water supply, it will continue to garner significant attention. But in most cases, conservation will be insufficient alone to address anticipated municipal needs.

B. Reuse

Reuse of municipal effluent is a form of conservation under the Texas definition, but one that raises legal issues distinct from other conservation efforts. Thanks to tighter controls on the quality of municipal effluent, e.g. the Clean Water Act, reclaimed water is now seen as an important and valuable water source.[71] Reclaimed water can be treated for direct drinking water uses, but this has not yet become socially or politically acceptable due to potential health and safety issues and the perceived general "yuck" factor. More commonly, reclaimed water is used for non-drinking purposes—e.g., irrigation (e.g. golf courses and parks), industrial processes, and even groundwater and surface water recharge where authorized.[72] Reuse is a growing water supply strategy because it both preserves other freshwater supply sources and itself represents a relatively drought-proof source of water.

However, reuse raises many complicated legal issues that remain unsettled in many jurisdictions.[73] The primary legal issues involved in reuse stem from questions about the rights to the effluent and the intended reuse of the water, both of which are matters of state, not federal law.[74] In Texas, the outcome of these issues depends on whether the reuse is direct or indirect. Direct reuse occurs when the wastewater is not discharged to a state watercourse, but is moved elsewhere for use, such as watering parks and golf courses or industrial purposes. From a water rights standpoint, direct reuse is typically straightforward—no new water rights permits are required.[75] However, for public health reasons, direct reuse does require water quality permits for the specific intended reuses.[76]

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[70] For a useful review of the issues and approaches taken, *see* Adam Schepp, "Western Water in the 21st Century: Policies and Programs that Stretch Supplies in a Prior Appropriation World," Environmental Law Institute (June 2009).

[71] Ginette Chapman, *Toilet to Tap: The Growing Use of Reclaimed Water and the Legal System's Response*, 47 ARIZ. L. REV. 773, 776 (2005)

[72] *See, generally*, Nathan S. Bracken, Water Reuse in the West: State Programs and Institutional issues, Western States Water Council, July 2011, available at http://www.westgov.org/wswc/water%20reuse%20report%20(final).pdf

[73] Chapman, *supra* note 65, at 786.

[74] *Id*. at 786.

[75] TEX. WATER CODE §11.046(c).

[76] 30 TEX. ADMIN CODE Ch. 210.

Indirect reuse occurs when water is used, discharged to surface water, and then diverted downstream for use, or, in other words, is stored and transported in surface water. The authorization required, if any, to use such return flows has been a continuing source of controversy in Texas. On one side of the debate are municipalities that desire to avoid the need for a new appropriation. They therefore argue that wastewater return flows are not subject to the permitting requirements for new appropriations, but instead remain the property of the original rights-holder. Under this scenario, return flows are subject to an independent and less burdensome "bed and banks" authorization for "a person who wishes to convey and subsequently divert water in watercourse or stream."[77] On the other side are those who assert the competing common law and statutory rule that once water has been diverted and returned to a state watercourse it becomes state water subject to environmental flow requirements and available for downstream appropriation.[78]

The question regarding the property legal treatment of return flows is a contested issue in the *Application of the Brazos River Authority for Water Use Permit No. 5851* (commonly referred to as the "Brazos System Operation Permit").[79] The Brazos River Authority has requested its new appropriation in part based on the availability of return flows, current and future, from all sources once they are discharged to the watercourse. In the contested proceedings, the Brazos River Authority has argued that return flows from any discharger should be treated as "state water" available for appropriation to the extent those return flows continue to be discharged to the Brazos River Basin as is provided by Texas Water Code § 11.046(c).[80] These return flows would be subject to environmental flow requirements and subject to calls by senior water rights.

The Executive Director of the TCEQ did not view return flows as subject to new appropriation. The Executive Director instead proposed authorizing bed and banks transportation of only the return flow discharges of water supplied from the Brazos River Authority's water rights or from wastewater treatment facilities owned or operated by the Authority.

The Administrate Law Judges concluded that the bed and banks provisions in Texas Water Code § 11.042(c) do not create an independent right to appropriate

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77 TEX. WATER CODE 11.1042(c).

78 *Id*. *See* Tex. Water Dev. Bd., "Water Rights and Wastewater Reuse, prepared by the Reuse Committee of the Texas Water Conservation Association," *Water for Texas 2007* (Doc. No. GP-8-1), at Vol. 1, p. 29 (2007 Texas State Water Plan).

79 TCEQ Docket No. 2005-1490-WR; SOAH Docket No. 582-10-4184. This discussion is largely derived from Emily Williams Rogers, Current Issues Involving Surface Water and Cities (2012), presented at the Texas City Attorney's Association 2012 Summer Conference. The material is used with permission.

80 Proposal for Decision, *Application of the Brazos River Authority for Water Use Permit No. 5851*, TCEQ Docket No. 2005-1490-WR; SOAH Docket No. 582-10-4184, at 137 – 139 ("PFD").

water, but only authorize a permittee to "convey and subsequently divert" water for which it already holds an appropriative right.[81] The ALJs concluded that to divert another person's surface-water-based return flow, a person needs to obtain an appropriative right under Section 11.046(c) and not a bed and banks permit.[82]

At the January 25, 2012 TCEQ Commission Agenda, at which the System Operation permit proposal for decision was considered, the Commissioners expressed concern about granting a right to appropriate future return flows, but were otherwise comfortable with the ALJ's analysis.[83] At this time, no decision has been made on the Authority's permit application. Assuming the Commissioners do not change their position regarding return flows, it appears that, if a city wants to appropriate its surface-water-based return flows, it will need to obtain a new appropriation, the water right will need to comply with the basin's environmental flow requirements, and at most the city will be allowed to appropriate up to the limit of its existing discharge permit. Nevertheless, treatment of return flows is likely to remain a contested issue going forward.

VI. <u>Desalination</u>

"*Water, Water everywhere, / Nor any drop to drink*—Samuel Taylor Coleridge, "*The Rime of the Ancient Mariner"*

Even while governments and municipalities struggle to address water needs, they are surrounded by oceans of saltwater and sitting on or near brackish groundwater and surface water. Texas, for instance, has access to coastal waters and to an estimated 2.7 billion acre-feet of brackish groundwater.[84] From this perspective, the water problem facing Texas, the nation, and the international community is less a water supply problem than a water quality, or more specifically, a salt problem.

Technological advances over the last several decades have made desalination—the process of removing salt and other dissolved minerals from brackish water or seawater—a potentially cost-effective method of securing new water supplies from previously unusable water. Not only does desalination offer a municipality a new water supply, but it also offers a supply that is more reliable and drought-resistant than conventional surface and groundwater—brackish waters are often plentiful[85], and seawater virtually unlimited.

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[81] *Id.* at 149.
[82] *Id.* at 151.
[83] *See* TCEQ Commission Agenda Webcast for January 25, 2012 available at http://www.texasadmin.com/ tceqa.shtml.
[84] John E. Meyer, Matthew R. Wise, and Sanjeev Kalaswad, *Pecos Valley Aquifer, West Texas: Structure and Brackish Groundwater.* Texas Water Development Board, June 2012, available at http://www.twdb.state.tx.us/publications/reports/numbered_reports/doc/ R382_PecosValley.pdf
[85] However, as Jorge Arroyo, Director of the Texas Water Development Board's Office of Innovative Water Technologies, has noted, easy access to source water information for brackish

Interest in desalination to meet municipal water needs has increased as the cost of conventional sources of water has risen and the cost of desalination has fallen. In light of ever-mounting pressures to secure new, more dependable water supplies, desalination may be a viable component of municipal water management strategies in the future. However, desalination raises important legal and regulatory issues that a municipality must address, including environmental issues arising from energy use and the disposal of brine or concentrate.

A. Desalination in the US

There are currently over 300 municipal desalination plants in the United States; Florida, California, and Texas lead the way. Together, they account for over 77% of desalination facilities in the United States.[86] Texas maintains 44 municipal desalination plants (though 4 are idle), including the largest inland brackish groundwater desalination plant in the world: the Kay Bailey Hutchison Desalination Plant in El Paso, which can produce 27.5 million gallons per day of fresh water.[87] The total installed capacity in Texas is 120 million gallons per day, all of which is from brackish groundwater and surface water.[88] The largest, and only, large-scale seawater desalination plant in the United States is the Tampa Bay Seawater Desalination Plant in Tampa, Florida. Several other additional seawater desalination facilities are in various stages of planning in Texas and California, and numerous brackish desalination plants are contemplated across the country.

Desalination Techniques

Several desalination techniques exist to separate salt from water, but the two primary categories are: 1) distillation, and 2) membrane desalting. Distillation, also known as thermal or evaporation desalination, involves boiling salt water and condensing the resulting water vapor to produce fresh water. Membrane technologies involve passing salt water through a semi-permeable membrane to filter out the salt and other impurities to produce pure water. The two main types of membrane desalination are reverse-osmosis (RO), which relies on high

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water aquifers is a large hurdle for pursing desalination. The TWDB has been undertaking a brackish groundwater characterization program, but lacks resources to continue. *Desalination: the Next Step for Drought-Proofing Water Supplies in Texas*, Texas Water News, Volume 11, Issue 2, March 2012. Due to limited availability of data, the TWDB recommends a phased approach to projects to permit continued evaluation of the source water. Texas Water Development Board, *Guidance Manual for Brackish Groundwater Desalination in Texas* (2008)

[86] Mike Mickley, "Major Challenges of Inland Desalination Plants." *World Water: Water Reuse & Desalination* 123 (2011).

[87] Texas Water Development Board, *Desalination Plant Database*, available at http://www.twdb.state.tx.us/apps/desal/default.aspx.

[88] Jorge Arroyo, *Desalination: Where do we go from here?*, Texas Water Development Board. available at http://www.twdb.state.tx.us/innovativewater/desal/doc/2011_0629_desal_whereto.pdf.

pressure pumps to force the saltwater through the membrane, and electrodialysis, which moves the salt water through the membrane with electrical charges. Each desalination technique has its benefits and drawbacks in terms of the required pre-treatment of the source water, the amount of energy required, the effect on other dissolved minerals and microorganisms, the percentage of fresh water recovered, and, correspondingly, the amount of waste produced.

In the United States, RO and other membrane approaches are overwhelmingly favored due to reduced costs of the membranes and energy requirements. A 2008 study determined that all municipal desalination plants in the United States use RO or other membrane systems.[89]

Desalination Costs

Notwithstanding the great improvements in and reduced cost of desalination treatment technology, desalination's higher total cost relative to conventional water supplies and to conservation efforts remains a significant limitation on its use. The cost of desalination is influenced by a variety of local factors—source water (including water rights and permits), distribution systems, the availability and cost of power, available brine disposal options, and permitting requirements.[90] Many of these costs, particularly energy and brine disposal, have not decreased as the desalination technologies themselves have. Since these costs are site-specific, it is difficult to generalize the cost of any particular desalination project or the cost of desalinated water. In some locations, these costs will make desalination prohibitive, while in others desalination will be cost-effective.

After a review of certain Texas desalination projects, the Texas Water Development Board determined that the total per unit cost of desalinated brackish groundwater in Texas facilities, including capital costs and operation and maintenance costs, ranges from $410 per acre-foot to $847 per acre-foot. The projected cost of seawater desalination ranges from $1,168 per acre-foot to $1,881 per acre-foot.[91] At the Kay Bailey Hutchinson Desalination Plant in El Paso, the production costs of desalinated brackish water are 2.1 times more than fresh groundwater.[92]

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[89] National Research Council of the National Academies. DESALINATION: A NATIONAL PERSPECTIVE, 16 (Washington, D.C.: The National Academies Press, 2008).
[90] *Id*.
[91] Jorge Arroyo and Saqib Shirazi, *Cost of Water Desalination in Texas, Analysis Paper 10-02*. Last modified October 16, 2009. http://www.twdb.state.tx.us/innovativewater/desal/doc/Cost_of_Desalination_in_Texas.pdf.
[92] Kate Galbraith, *Texas' Water Woes Spark Interest in Desalination*, TEX. TRIB., June, 10 2012 available at: http://www.texastribune.org/texas-environmental-news/water-supply/texas-water-woes-spark-interest-desalination/.

As a general matter, larger facilities have greater efficiencies and economies of scale that can reduce the unit cost of desalinated water.[93] This is particularly true for seawater desalination; economies of scale are smaller for brackish groundwater, but they do exist.[94] On the other hand, small desalination units may provide relief to rural areas or address short-term needs. The Bureau of Reclamation's Brackish Groundwater National Desalination Research Facility has as part of its mission the development of small-scale desalination units powered by renewable energy sources to provide water to remote areas. The Bureau hopes to develop inexpensive and easy-to-operate units.[95] Likewise, California has studied the issue of deploying mobile desalination units in cases of emergency.[96]

B. Energy

Apart from capital costs, the largest cost component of desalination is energy.[97] Desalination is an energy-intensive process. For brackish water facilities, electric energy costs can range from 11% to over 25% percent of the total cost.[98] Energy costs are significantly higher for seawater facilities due to the higher salinity of the water.[99] Costs for seawater facilities can be in the 30–44% range.[100] The price of electricity can, therefore, have a dramatic impact on the feasibility and the continued viability of desalination. On the other hand, continued gains in energy efficiency and recovery may decrease desalination costs.

In addition to raising cost concerns, desalination's energy requirements raise environmental concerns about greenhouse gas emissions and large carbon footprints. It is possible to link desalination projects with renewable energy sources such as wind and solar to provide renewable energy sources. For instance, the City of Seminole, Texas is nearing completion on construction of a wind-powered brackish desalination plant to reduce pumping from the Ogallala Aquifer.[101] And the El Paso desalination plant is exploring solar energy to power portions of the plant.

C. Concentrate Management

Regardless of the process used, desalination creates a concentrated salty byproduct that may pose an environmental risk. Improper disposal of the

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[93] Allen W. Sturdivant et al., *Economic Implications of Desalination in South Texas,* (2006). *2006.* Paper 106. http://opensiuc.lib.siu.edu/ucowrconfs_2006/106.
[94] National Research Council, *supra* note 82, 140.
[95] *See* http://www.usbr.gov/pmts/water/research/tularosa.html
[96] Fethi BenJemaa, *Logistics for Deploying Mobile Water Desalination Units*, California Department of Water Resources, April 30, 2009.
[97] *Id*.
[98] Sturdivant,*supra* at 86.
[99] Tamim Younos, *The Economics of Desalination*, *132* JOURNAL OF CONTEMPORARY WATER RESEARCH & EDUCATION, 39-45 (2005).
[100] Sturdivant, *supra* note 86.
[101] *See* http://www.twdb.state.tx.us/innovativewater/desal/projects/seminole/.

concentrate could contaminate other water sources or harm aquatic organisms. With increasingly stringent environmental and regulatory programs, disposal of the concentrate can pose one of the most challenging issues in desalination.[102]

There are several different disposal options. However, since large-scale desalination for water supply is a relatively new phenomenon, the long-term effects of these methods are not always clear, and laws and regulations are in the development stages.[103] Site conditions dictate the best disposal technique for any particular project. Inland desalination plants face the most difficulty in finding cost-effective concentrate disposal options. The traditional concentrate management methods and major issues associated with them are briefly discussed below.

Surface water discharge. Discharge of the brine into surface water—oceans, lakes, reservoirs, and rivers—for dilution is the most common municipal practice since it is relatively low cost.[104] But disposal, particularly into surface water other than seawater, raises concerns about toxicity, harm to aquatic life, and other environmental effects. As a result, most surface water discharge is regulated by the Clean Water Act and involves extensive testing and permitting requirements, such as a National Pollutant Discharge Elimination System (NPDES) permit.

Sewer discharge. Discharge of the brine into an existing sewer system for treatment is common practice in the United States. This approach is cost-effective when sewer and wastewater treatment plants are nearby. Like surface water discharge, it is relatively low-cost. If the concentrate is sent to an already-permitted treatment facility able to accept it, then no separate NPDES permit is required, though the desalting plant may require a discharge permit from the treatment plant, and the desalting plant may be subject to pretreatment requirements. For larger desalination facilities, sewer discharge may not be an option because high quantities of concentrate discharge can affect the wastewater treatment plant operation, which operate under an NPDES permit.

Deep well injection. Deep well injection involves injecting the brine into porous subsurface rock formations for storage. Its availability depends on the geological characteristics of the area. Even though routinely used for oil field brine, injection wells for desalination concentrates have high costs associated with permitting (state and federal) and construction to prevent contamination of drinking water. As a result, deep well injection is more often used by larger desalination operations. However, the costs can vary widely depending on the class of injection well required, which is typically either a Class I well for injecting hazardous or industrial waste beneath drinking water sources, or shallower Class V wells for injection of non-hazardous waste.

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[102] National Research Council, *supra* note 82.
[103] *Id.*
[104] *Id.*

Land application. In certain circumstances the brine, either as-is or diluted with other water sources, can be used to irrigate certain salt tolerant plants. However, backup disposal methods are usually required due to the limited availability and seasonality of salt-absorbing vegetation. And an MPDES permit will be required if run-off occurs.

Evaporation ponds. Evaporation ponds are lined basins that rely on the sun to evaporate the water in the concentrate to produce salt crystals, which can then be collected and disposed of. Evaporation ponds can be effective in hot, arid areas with access to the land required for the ponds. Because of the land costs and costs of lining the ponds, evaporation ponds are expensive. However, because they do not involve discharge into other waters, permits are often not required or more easily obtained. This technique is more effective for smaller desalination plants, since there are limited economies of scale available. Pond leakage is the primary environmental concern, which could contaminate aquifers.

Zero liquid discharge. Zero liquid discharge, as the name implies, is a process that involves converting the liquid concentrate into a dry solid that can be disposed in a landfill. The method for producing zero liquid discharge requires repeated treatment and has high capital costs, but might be offset by producing valuable salts that can be sold.[105]

As suggested in the discussion of each concentrate disposal option, an important factor in concentrate management options is the time and cost of obtaining regulatory approval for disposal. A survey of 150 inland desalination plants has reached the same conclusion.[106] A list of federal laws that apply or may apply to disposal of desalination concentrate include the Clean Water Act; the Safe Drinking Water Act; the Rivers and Harbors Act; the Resource Recovery and Conservation Act; the Endangered Species Act; the Solid Waste Disposal Act; the Comprehensive Environmental Response, Compensation, and Liability Act; the Hazardous Materials Transportation Act; the National Environmental Policy Act; and the Toxic Substances Control Act.[107]

State and local regulations may also impose extensive study, testing, and permitting requirements.[108] Increased interest in and experience with desalination may spur reform in some areas. For instance, recent legislation in Texas has expedited the permitting process for Class I injection wells for non-hazardous waste such as desalination concentrate.[109] The TWDB has also proposed expedited permitting for the use of Class II wells, which are granted for oil and gas operations and include desalination concentrate from oil and gas operations,

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[105] Mickley, *supra* note 79.
[106] *Id*.
[107] National Research Council, *supra* note 82.
[108] For review of permitting requirements, see Tamim Younos, *Permitting and Regulatory Requirements*, 132 JOURNAL OF CONTEMPORARY WATER RESEARCH & EDUCATION 19-26 (2005).
[109] TEX WATER CODE § 27.025.

for disposal of municipal desalination concentrate.[110] Streamlining the regulatory process may make desalination more attractive.

D. Funding/Financing

General Considerations

Because of the high initial capital costs of desalination, or of any of the water supply projects discussed above, successful projects rely on some combination of financing through bonded indebtedness (general obligation, revenue, contract revenues, etc.) and state or federal grants and loans. The available funding options will depend on the type of entity, the type of project, and the participants. Major challenges face municipal water suppliers as water supply projects compete with other infrastructure needs for limited budget dollars. The challenges are even greater when faced with a public hostile to taxes and rate increases. Planning, prioritizing, and publicity are all important tools to adequately address present and future water supply needs.

Size Matters

Smaller and rural municipal water systems, which make up the bulk of all municipal water systems, may find financing desalination projects challenging due to the higher costs and complex permitting requirements. However, municipalities may be able to leverage greater borrowing power and achieve economies of scale by working cooperatively with other municipalities and governmental entities in the region to obtain water rights, if necessary, and to finance, own, and operate the desalination facility. Such regional cooperation may require legislative authorization and creation of special regional governmental entities.

In South Texas, for instance, several municipalities and local water districts revived a dormant regional water authority to finance and construct a large regional desalination plant. The Southmost Regional Water Authority (SRWA) now operates a regional desalination plant able to provide 7.5 million gallons per day (now the second largest desalination facility in Texas), which is over 40% of the annual needs of the participating entities. The SWRA financed the facility with tax-exempt bonds secured by contracts with each participating entity. The Brownsville Public Utilities Board uses the lion's share of the facility (93%), but the other, smaller entities were able to take advantage of the cost savings by participating in the larger project. The SRWA realized significant cost savings by building a larger, regional facility—38% savings on RO equipment, 46% on water

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[110] Robert E. Mace et al, *Please Pass the Salt: Using Oil Fields for the Disposal of Concentrate from Desalination Plants*, Texas Water Development Board (2005); Arroyo, *supra* note 81.

storage tanks, and lower total operating and personnel costs for each entity.[111] In addition to cost savings, the regional consolidation of water rights over a large area has the added benefit in areas like Texas that follow the rule of capture of providing protection from well interference or depletion.

The regional approach has its downside. Setting aside the potential need for legislative changes to permit regional cooperation in the first place, the logistics of planning and coordinating among different political entities poses its own challenges. The largest hurdle the SRWA faced in taking a regional approach to its desalination facility was the perceived loss of direct local control over the project. For this reason, one entity ultimately withdrew. Open communication and educational efforts about the benefits of the project are vital to its success.

VII. <u>Conclusion</u>

"*Thousands have lived without love, not one without water*."**—**W.H. Auden

Several trends have combined to threaten the ability of municipalities to meet future water supply needs, including population growth, drought, and legal limitations. To meet those needs, municipalities must be aware of, and likely implement, alternative strategies for securing water. Long-term water security will depend on how effectively a city navigates the myriad planning, permitting, environmental, and funding issues involved in each chosen approach.

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[111] Joseph W. Norris, *Southmost Regional Water Authority Regional Desalination Plant*, Texas Water Development Board, available at http://www.twdb.state.tx.us/publications/reports/numbered_reports/doc/R363/D7.pdf.