

2017

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### Recommended Citation

Persons, Bonnie (2017) "Water Shortage and Water Law: The Impending Crisis in Semi-Arid Climates," *Journal of Comparative Urban Law and Policy*: Vol. 2 : Iss. 1 , Article 9.

Available at: <https://readingroom.law.gsu.edu/jculp/vol2/iss1/9>

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## **WATER SHORTAGE AND WATER LAW: THE IMPENDING CRISIS IN SEMI-ARID CLIMATES.**

**Bonnie B. Persons\***

### **ABSTRACT**

Water is a business driver and a substantial source of both wealth and risk. Water is also under increasing statutory and legislative pressure as jurisdictions strive to manage water resources more holistically by addressing both surface and groundwater together, but on a more decentralized and sustainable basis. The potential collapse of the municipal water system in Cape Town, South Africa serves as a stark alarm for cities in arid and semi-arid, Mediterranean-like environments. This risk is especially true of cities like Marseilles, France and regions like California. By comparing the impacts of the water law in these different jurisdictions, this paper will look to identify the emerging revelations, as well as the common themes that need to be addressed before the problems in Cape Town are repeated and cause similar impacts elsewhere. A review of the challenges facing Cape Town, Provence and California makes clear that any solutions will require that the legal, political and financial frameworks all be addressed in a coordinated fashion.

**KEY WORDS:** Water Management, Water Law, Water Rights, Urban Strategic Priorities, Water Shortage, Drought, Social Responsibility, Sustainable Ground Water, Cape Town, Marseille, California

### **I. INTRODUCTION**

“Water, as a limited resource, lends itself to conflicts over how it should be allocated, managed and prioritized for use.”<sup>1</sup> For centuries, economists pondered what has been referred to as the Diamond/Water Paradox in an effort to explain the differences in perceived values between commodities that are relatively rare and therefore thought to be highly desirable, but which have limited utility (e.g. diamonds—at least historically) and commodities that have enormous value when

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<sup>1</sup> Shafiqul Islam & Amanda C. Repella, *Water Diplomacy: A Negotiated Approach to Manage Complex Water Problems*, 155 J. CONTEMP. WATER RES. & EDUC. 1, 1 (2015).

used, but little or no value when exchanged (e.g. water—without which we cannot live).<sup>2</sup> This “paradox” has been alternatively described as the difference between subjective value of the exchange and the marginal utility/value of the exchange. In other words, when water is abundant, the cost of the next gallon is negligible. The value proposition of water, however, is rapidly shifting. The potential collapse of the municipal water system in Cape Town, South Africa serves as a stark alarm for cities in arid and semi-arid, Mediterranean-like environments. This risk is especially true of cities like Marseilles, France and regions like California.

By comparing the impacts of the water law in these different jurisdictions, this paper will look to identify the emerging revelations, as well as the common themes that need to be addressed before the problems in Cape Town are repeated and cause similar impacts elsewhere. This comparison is broken out in discreet sections. Section II of this paper will provide a brief overview of the situation in Cape Town. Section III identifies the water sources and stakeholders that compete for those resources. This overview will be followed in Section IV by a review of the underlying water law in Cape Town, South Africa and relate it to Northern California, USA and to Marseilles, France. Section V focuses on the reasons for the challenges faced in Cape Town. In Section VI, California and French law is contrasted with South Africa law as a contributing cause that has compounded the challenges facing water resource managers. Finally, Section VII compares the similarities and differences in an effort to identify possible solutions that might help avoid the problems currently facing Cape Town.

Water managers, stakeholders and government have been aware for decades that addressing water scarcity and establishing a sustainable supply are essential to the development and prosperity of these regions with Mediterranean climates. The cost of addressing these problems, however, is enormous and cannot be effectively financed in the absence of a long-term, coordinated legal and political plan. While South Africa has crafted a flexible legal environment to strengthen the authority of its water managers, it has not yet solved its political and financial challenges. France has been a leader in recognizing the need to more effectively manage ground water, including the development of groundwater monitoring and data collection, as an essential part of its water management plan. By contrast, California is struggling to impose new programs to more effectively manage its limited water supply without challenging long standing claims to water rights asserted by private stakeholders. Accordingly, California’s legal framework limits the flexibility necessary to most effectively and efficiently manage its water resources. In addition, California’s legal framework contributes to the financial challenges of improving and expanding the existing infrastructure. A review of the challenges

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<sup>2</sup> See ADAM SMITH, *INQUIRY INTO THE NATURE AND CAUSES OF THE WEALTH OF NATIONS* 34 (1776).

facing Cape Town, Provence and California make clear that any solutions will require that the legal, political and financial frameworks all be addressed in a coordinated fashion.

## II. FACING ZERO DAY IN CAPE TOWN: A WAKE-UP CALL FOR CITIES IN SEMI-ARID MEDITERRANEAN CLIMATE ZONES

South Africa lies in a predominantly semi-arid part of the world and has no real large or commercially navigable rivers.<sup>3</sup> With extremely uneven rainfall patterns across the country and relatively low seasonal flows in few flowing rivers, South Africa is left with highly variable surface water runoff and average annual rainfall of less than twenty inches.<sup>4</sup> There are more than 4,395 registered dams across the country, with 350 owned by the government.<sup>5</sup> With burgeoning populations and shifting weather patterns, the availability of abundant water for established urban centers can no longer be taken for granted. Over-utilization of existing available water resources is creating an uncertain water future.<sup>6</sup>

Severe drought in Cape Town, the second largest city in South Africa and the home to a population of over four million, has lasted three years and threatens to force the shutdown of its municipal water delivery systems.<sup>7</sup> As a result, the theoretical problems and possible solutions are now being explored and tested in the real world with very direct consequences to the resident populations and businesses. While Cape Town may be the first major urban center to reach this point of crisis, the problem is not unique to South Africa. California recently endured a withering, five-year drought that triggered the declaration of a state of emergency in January 2014 as the state sought to assist local authorities confront

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<sup>3</sup> MARTHINUS S. BASSON, WATER DEVELOPMENT IN SOUTH AFRICA 1 (2011), [http://www.un.org/waterforlifedecade/green\\_economy\\_2011/pdf/session\\_1\\_economic\\_instrument\\_s\\_south\\_africa.pdf](http://www.un.org/waterforlifedecade/green_economy_2011/pdf/session_1_economic_instrument_s_south_africa.pdf); see also CHRISTINE COLVIN ET AL., WORLD WILDLIFE FUND, WATER: FACTS AND FUTURES 8 (2016), [http://dtnac4dflyuw8.cloudfront.net/downloads/wwf009\\_waterfactsand\\_futures\\_report\\_web\\_lowres\\_.pdf?17261/Water-Facts-and-Futures](http://dtnac4dflyuw8.cloudfront.net/downloads/wwf009_waterfactsand_futures_report_web_lowres_.pdf?17261/Water-Facts-and-Futures) (explaining that South Africa's rainfall is "half the world average"); DEP'T OF WATER & SANITATION, ANNUAL PERFORMANCE PLAN: VOTE 36 FOR THE FISCAL YEARS 2017/18 TO 2019/20, at 3-4, [https://www.dwa.gov.za/documents/AnnualReports/APP\\_201718%20TO%20201920=150517.pdf](https://www.dwa.gov.za/documents/AnnualReports/APP_201718%20TO%20201920=150517.pdf) (last visited Mar. 31, 2018) (explaining that South Africa shares four of its main rivers—Limpopo, Inkomati, Pongola, and Orange—with its international neighbors).

<sup>4</sup> COLVIN ET AL., *supra* note 3; DEP'T OF WATER & SANITATION, *supra* note 3, at 3.

<sup>5</sup> DEP'T OF WATER & SANITATION, *supra* note 3, at 29.

<sup>6</sup> Islam & Repella, *supra* note 1.

<sup>7</sup> See CITY OF CAPE TOWN, DEP'T OF WATER & SANITATION, WATER OUTLOOK 2018 REPORT 22 (2018), <http://resource.capetown.gov.za/documentcentre/Documents/City%20research%20reports%20and%20review/Water%20Outlook%202018%20-%20Summary.pdf>.

“conditions of extreme peril to the safety of persons and property [that] exist in California due to water shortage and drought conditions with which local authority is unable to cope.”<sup>8</sup> France suffered severe droughts in 2003 and 2015, with climatologist models projecting strong increases in drought conditions across the Mediterranean region.<sup>9</sup> Numerous urban centers around the world which lie in Mediterranean-like arid or semi-arid regions are recognizing that the availability of water is key to the continued vitality of their communities and businesses.<sup>10</sup>

Cape Town has been enduring a severe drought since 2015 and it is impossible to predict when it will end.<sup>11</sup> The City of Cape Town’s Water and Sanitation Department has designated the day that the Department’s dams are holding only 13.5% of their capacity as “Day Zero,” which is the point at which they will be forced to shut down the municipal water delivery system.<sup>12</sup> Except for facilities like hospitals, clinics and schools, the consequence of a shut-down will be that residents will need to collect water manually from approximately 200 distribution points across the city.<sup>13</sup> Under the projected plan, the permitted ration of water for residents will drop from the restricted level of thirteen gallons to only 6.5 gallons per day.<sup>14</sup> In short, the City’s almost total reliance on surface water collection by its dams to support the municipal supply system is not equipped to handle persistent drought conditions.<sup>15</sup>

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<sup>8</sup> See Press Release, Office of Governor Edmund G. Brown Jr., Governor Brown Declares Drought State of Emergency (Jan. 17, 2014), [www.gov.ca.gov/2014/01/17/news18368/](http://www.gov.ca.gov/2014/01/17/news18368/).

<sup>9</sup> See Arthur Neslen, *European ‘Extreme Weather Belt’ Linked to Worst Drought Since 2003*, GUARDIAN (Aug. 27, 2015), <https://www.theguardian.com/environment/2015/aug/27/european-extreme-weather-belt-linked-to-worst-drought-since-2003>.

<sup>10</sup> See, e.g., Joanna Walters, *Plight of Phoenix: How Long Can the World’s ‘Least Sustainable’ City Survive?*, GUARDIAN (Mar. 20, 2018), <https://www.theguardian.com/cities/2018/mar/20/phoenix-least-sustainable-city-survive-water>.

Although it is America’s fifth largest city, Phoenix relies on dwindling groundwater and depleted rivers to supply its continued expansion. *Id.* In short, the available water resources for Phoenix are dangerously overstretched. *Id.*

<sup>11</sup> Justin Brown, *No End in Sight for Dry Spell*, FIN24 (Feb. 11, 2018), <https://www.fin24.com/economy/no-end-in-sight-for-dry-spell-20180211> (noting that historically dry spells have lasted as long as 15 years according to Hannes Rautenbach, the chief scientist for climate change and variability at the South African Weather Service).

<sup>12</sup> See CITY OF CAPE TOWN, *supra* note 7, at 1.

<sup>13</sup> *Id.*; see also Zeeshan Aleem, *Cape Town Is Bracing for “Day Zero”—The Day it Cuts Off Running Water for 4 Million People*, VOX (Feb. 21, 2018), [www.vox.com/world/2018/2/9/16964416/cape-town-water-crisis-day-zero-south-africa](http://www.vox.com/world/2018/2/9/16964416/cape-town-water-crisis-day-zero-south-africa).

<sup>14</sup> Aleem, *supra* note 13.

<sup>15</sup> CITY OF CAPE TOWN, *supra* note 7, at 1. The City of Cape Town is part of the Western Cape Water Supply System which gets its water from a system of dams that supply agricultural and other urban water areas. *Id.* The current system is heavily dependent on rainfall. *Id.*

Predictably, a water shortage creates a profound effect on the local economy. According to Moody's Investor Services, Cape Town's primary industries are agriculture and tourism, which will both be impacted and likely to decline due to the crisis.<sup>16</sup> The decline would mean further job losses (beyond the 84,000 agricultural jobs lost in the first half of 2017), as well as loss of tax and water revenue to the city. Compounding the economic challenges, concerns also include threats to public health from poor sanitation and to social order, in general, in light of marked income inequality within the city.<sup>17</sup>

Cape Town's crisis has occurred despite positive steps taken to promote an adequate and reliable water supply. As early as 2007, Cape Town launched its Water Conservation and Demand Management (WCWDM) Program to stabilize growth in water demand and to promote conservation in recognition of dramatic population growth and unsustainable growth in water demand.<sup>18</sup> The program included the following:

- public promotion of water use efficiency;
- stepped tariffs to encourage water savings;
- free plumbing repair for low income households;
- the promotion of alternative water sources including wells and recycled water for irrigation; and
- a range of technical interventions to minimize water losses.<sup>19</sup>

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<sup>16</sup> Daniel Mazibuko, *City of Cape Town: Cape Town, South Africa's Water Supply Crisis Is Credit Negative*, MOODY'S (Jan. 29, 2018), [https://www.moodys.com/research/City-of-Cape-Town-Cape-Town-South-Africas-water-supply-Issuer-Comment--PBC\\_1110373](https://www.moodys.com/research/City-of-Cape-Town-Cape-Town-South-Africas-water-supply-Issuer-Comment--PBC_1110373); see also Robert Brand, *Cape Town's Water Crisis is Credit-Negative, Moody's Says*, BLOOMBERG TECH. (Jan. 29, 2018), [www.bloomberg.com/news/articles/2018-01-29/moody-s-says-water-crisis-credit-negative-for-city-of-cape-town](http://www.bloomberg.com/news/articles/2018-01-29/moody-s-says-water-crisis-credit-negative-for-city-of-cape-town).

<sup>17</sup> Mazibuko, *supra* note 16.

<sup>18</sup> See DEP'T OF WATER AFFAIRS & FORESTRY, OVERVIEW OF WATER CONSERVATION AND DEMAND MANAGEMENT IN THE CITY OF CAPE TOWN (2007), [http://www.dwa.gov.za/Projects/RS\\_WC\\_WSS/Docs/Overview%20of%20WC%20&%20WDM.pdf](http://www.dwa.gov.za/Projects/RS_WC_WSS/Docs/Overview%20of%20WC%20&%20WDM.pdf) [hereinafter WATER CONSERVATION AND DEMAND MANAGEMENT IN CAPE TOWN]; see also DEP'T OF WATER AFFAIRS & FORESTRY, WATER CONSERVATION AND WATER DEMAND MANAGEMENT STRATEGY FOR THE WATER SERVICES SECTOR 2 (2004), <http://www.dwa.gov.za/docs/Other/WaterUseConservation/WCWDMWaterServicesAug04.pdf> ("Water demand is likely to increase comparatively steeply because of a combination of population growth, the increased proportion of the population that will have access to water services . . . , and the expected improvement in the standard of living that will result in greater per capita water consumption.").

<sup>19</sup> WATER CONSERVATION AND DEMAND MANAGEMENT IN CAPE TOWN, *supra* note 18, at 1, 15–25.

This program was so effective that its dams were full at the end of the winter in 2014 and Cape Town received the prestigious C40 Cities Award in 2015 at its international conference in Paris.<sup>20</sup>

Although the measures taken by Cape Town under the WCWDM Program have reportedly resulted in total water savings of approximately 30%,<sup>21</sup> Day Zero remains an ongoing threat. Three years of drought have completely changed Cape Town's outlook on water. In August 2017, Cape Town had to develop and release its Water Resilience Plan to articulate its plan to augment the municipal water supply through desalination projects, groundwater extraction and water reuse.<sup>22</sup> In response and mindful that governmental response at this point cannot solve the problem alone, private industry began exploring its own remedies to alleviate the potential impacts. These remedies include coordinated conservation measures by industry groups (e.g. film production, landscape and construction), as well as the use of private wells that are separate from the municipal system to supply water for particular properties (e.g. hotels).<sup>23</sup> Naturally, with public and private extractions now competing for the limited subsurface resource, the local government is raising concerns and seeking more legal authority to oversee and control the insertion of new wells and the private extraction of groundwater.<sup>24</sup> Against this backdrop, one

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<sup>20</sup> "C40 is a network of the world's megacities committed to addressing climate change." *About C40*, C40 CITIES, <http://www.c40.org/about> (last visited Mar. 31, 2018). "C40 supports cities to collaborate effectively, share knowledge and drive meaningful, measurable and sustainable action on climate change." *Id.*; see also *C40 Cities Awards 2015*, C40 CITIES, <http://www.c40.org/awards/2015-awards/profiles> (last visited Mar. 31, 2018).

<sup>21</sup> *Cape Town—Water Conservation and Demand Management (WCWDM) Programme*, C40 CITIES, <http://www.c40.org/awards/2015-awards/profiles/64> (last visited Mar. 31, 2018).

<sup>22</sup> *Advancing Water Resilience: Getting to an Additional 500 Million Litres of New Water a Day*, CAPE BUS. NEWS (Aug. 17, 2017), <http://www.cbn.co.za/news/advancing-water-resilience-getting-to-an-additional-500-million-litres-of-new-water-a-day>.

<sup>23</sup> See, e.g., Steve Kretzmann, *Cape Town Businesses Aim to be Free of Municipal Water Supply*, FIN24 (Feb. 18, 2018), <https://www.fin24.com/Economy/cape-town-businesses-aim-to-be-free-of-municipal-water-supply-20180218> (explaining that the film industry coordinates its conservation efforts).

<sup>24</sup> See, e.g., Breede-Gouritz and Berg-Olifants Water Management Areas: Limiting the Use of Water in Terms of Item 6 of Schedule 3 of the National Water Act, 1998 (Act No. 36 of 1998) for Urban, Irrigation and Industrial (Including Mining) Purposes, GN 1394 of GG 41317 (12 Dec. 2017) (imposing administrative restrictions on water use); Breede-Gouritz and Berg-Olifants Water Management Areas: Limiting the Use of Water in Terms of Item 6 of Schedule 3 of the National Water Act of 1998 for Urban, Irrigation and Industrial (Including Mining) Purposes, GN 15 of GG 41381 (12 Jan. 2018) (establishing supplemental water restrictions including imposing administrative restrictions on boreholes); see also Phillip de Wet, *Western Cape—Boreholes Made Illegal*, MAIL & GUARDIAN (Jan. 18, 2018), [mg.co.za/article/2018-01-18-tough-new-regulations-hit-western-cape-borehole-users](http://mg.co.za/article/2018-01-18-tough-new-regulations-hit-western-cape-borehole-users); Leila Dougan, *#CapeWaterGate: Demand for Boreholes Rises as Dam Levels Sink to 35%*, DAILY MAVERICK (Oct. 20, 2017),

must turn to the legal framework to understand what authority and rights exist relating to these water resources.

### III. DEFINING WATER SOURCES AND STAKEHOLDERS

Historically, water was simply delineated between surface water (streams, lakes, wetlands, snow and ice) and subsurface sources (groundwater).<sup>25</sup> As hydrologists have studied the relationship between surface and groundwater, it has become clear that there exists a more complex and extensive interaction between ground water and surface water such as streams, lakes, and wetlands.<sup>26</sup> Legal recognition of this interconnection has only relatively recently begun to become a focal point for legislators. Nonetheless, as water has become more scarce and valuable, communities are looking beyond the traditional approach of focusing solely on the capture and use of surface and ground water. The evolving focus emphasizes regulating conservation, recycling, and reuse of water in the community, as well as legislating a duty to quantify previously unregulated uses (e.g. groundwater extraction).<sup>27</sup> In either regard, a failure to regulate or to delineate legal rights applicable to any particular source will hamper any comprehensive effort to manage and meet the competing demands in a water-scarce environment.

In addition to identifying the various sources available to meet the demand for water, the various stakeholders whose use impacts the available resources must be identified. Stakeholders have a vested and significant economic interest in the rules governing water usage and the allocation among those stakeholders.<sup>28</sup> Although certainly not exhaustive, primary stakeholders typically include public supply (e.g. municipal water supplies), domestic users (e.g. indoor/outdoor uses at residences), irrigation, livestock, industrial users, power generators (e.g. steam turbines, exclusive of hydro-electric uses), aquaculture (farm-raised fish) and

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<https://www.dailymaverick.co.za/article/2017-10-20-capewaterrate-demand-for-boreholes-rises-as-dam-levels-sink-to-35/#.Wo9PKejwZ9M>.

<sup>25</sup> THOMAS C. WINTER ET AL., U.S. DEP'T OF THE INTERIOR, GROUND WATER AND SURFACE WATER: A SINGLE RESOURCE III (1998), <https://pubs.usgs.gov/circ/circ1139/pdf/circ1139.pdf>.

<sup>26</sup> *Id.*

<sup>27</sup> *See, e.g.*, CAL. WATER CODE §§ 10720–10720.9 (West 2018); Level 6B Water Restrictions, PG 7866 (26 Jan. 2018) (curtailing the taking of water from ground water resources for domestic and industrial uses by 45% and for agricultural uses by 60%); Water By-Law, 2010, PG 6847 (18 Feb. 2011).

<sup>28</sup> *See, e.g.*, Lameez Omarjee, *Cape Water Crisis Could Pull Plug on SA's GDP Recovery—Analyst*, FIN24 (Feb. 2, 2018), <https://www.fin24.com/Economy/cape-water-crisis-could-pull-plug-on-sas-gdp-recovery-analyst-20180202>.

mining.<sup>29</sup> Each of these stakeholders is competing for the limited water available and the consequences can be not only economic, but potentially existential. For example, in the Western Cape in South Africa, agriculture represents 23% of the country's total agricultural gross domestic production.<sup>30</sup> The water restrictions resulting from the drought have discouraged farmers from irrigating and, as a result, the agriculture sector shed 84,000 jobs in the first half of 2017 alone.<sup>31</sup>

To manage these competing demands for increasingly scarce water resources, authorities in the various communities and related jurisdictions have enacted a series of laws. All too commonly, however, the legal frameworks provided lag behind the real-world need and continue to evolve as new challenges arise. The following sections look at the legal framework for water management in three separate locales: Cape Town, South Africa; Marseilles, France; California, USA.

#### IV. WATER LAW IN CAPE TOWN

##### A. HISTORICAL CONTEXT

South Africa has a complicated water law history with five distinct geopolitical constructs: (1) the Pre-Colonial period (prior to 1652); (2) the Dutch East India Company period from 1652 to 1806 during which time the Company controlled water rights in its coastal communities and inland along streams to the extent it affected its interests; (3) the British colonial period from 1806 to 1956 as extended by (4) the Afrikaner nationalists which lasted from 1956 to 1990; and finally (5) the current democratic period which began in 1991 and continues to the present.<sup>32</sup> Until the enactment of the National Water Act of 1997,<sup>33</sup> no unified authority or legal framework existed to manage and regulate water issues. Instead, water rights were driven by practical and economic considerations of those in power.

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<sup>29</sup> See, e.g., *Water Questions & Answers: What is Most of the Freshwater in the U.S. Used For?*, U.S. GEOLOGICAL SURV., <http://water.usgs.gov/edu/qa-usage-freshwater.html> (last updated Dec. 2, 2016).

<sup>30</sup> *Id.*

<sup>31</sup> *Id.*

<sup>32</sup> DD Tewari, *A Detailed Analysis of Evolution of Water Rights in South Africa: An Account of Three and a Half Centuries from 1652 AD to Present*, 35 WATER SA 693, 693 (2009).

<sup>33</sup> Water Services Act 108 of 1997 (S. Afr.).

Figure 1: Evolution of Legal Theories for Water Rights in South Africa

|  |   |
|--|---|
| Pre-Colonial Period<br>(Pre-1652)            | Communal / Tribal Control; no individual rights.  |
| Dutch Colonial Period<br>(1652 – 1806)       | Hybrid Approach: Right of Capture - initially colonial ownership of in stream water, but individual rights to water once captured. Eventually, total colonial control to all flowing water (“ <i>dominus fluminis</i> ”). |
| British Colonial Period<br>(1806 – 1956)     | Riparian Rights: State ceded rights to private users adjacent to streams to promote agricultural development.   |
| British Commonwealth Period<br>(1956 – 1990) | Partial retreat from Riparian Rights and the Resurrection of “ <i>dominus fluminis</i> ” including control over groundwater.  |
| Republic of S. Africa<br>(1990 – present)    | Public Trust: State as Trustee over surface and ground water to meet Constitutional goals.  |

**1. PRE-COLONIAL WATER RIGHTS—COMMUNAL WATER RIGHTS.** During the Pre-Colonial period, water rights were not held by individuals; rather, water was a tribal or community asset. Water was deemed to be free and the right to hold or use land was controlled by the local tribal chief. Confrontation occurred only when another tribe or community encroached in a way that created problems for the locals.<sup>34</sup> Even after settlers first arrived in South Africa, the African communities continued to run as separate entities and maintained their existing approach to water rights.<sup>35</sup> Although this separation continued to some extent after the arrival of the Dutch East India Company in 1652, the Dutch introduced a new set of laws to address their own concerns.

**2. DUTCH COLONIAL RIGHTS (1652–1806)—A HYBRID SYSTEM OF WATER RIGHTS.** The Dutch development of water rights in South

<sup>34</sup> Tewari, *supra* note 32, at 694–95.

<sup>35</sup> Leonard Guelke & Robert Shell, *Landscape of Conquest: Frontier Water Alienation and Khoikhoi Strategies of Survival, 1652–1780*, 18 J. SOUTHERN AFR. STUD. 803, 805–06 (1992) (explaining that although notions of private property were foreign to them, the Khoikoi understood that the Europeans were taking their land, which led to a losing war).

Africa occurred in stages as needs dictated.<sup>36</sup> As the foundation, the Dutch adopted a hybrid of the Roman law under which a distinction was recognized between public and private rights to use water.<sup>37</sup> Under Roman law, water in a river or stream could not be owned by individuals, but once taken became private property. Similarly, under Dutch law, water that had potential for communal use was controlled by the state, while water for individual use was considered private.<sup>38</sup> However, as the Dutch colonists began to experience health problems resulting from unsanitary discharges from communities that were upstream of their coastal settlements, they began to expand their assertion of rights to control the use of upstream sources.<sup>39</sup> The Dutch started by banning upstream bathing and laundry in the streams used by the downstream settlements and then later expanded the prohibitions to control diversions for irrigation by upstream farmers.<sup>40</sup> The conflicts that invariably arose from the competing demands for scarce water were managed by the Dutch East India Company which relied on a system of grants that dictated the private rights to use water.<sup>41</sup> In doing so, the Dutch sought to reconcile the farmers needs for water without adversely impacting the commercial needs of the mills. Under this system, land holders who were adjacent to streams did not gain any water rights based on their proximity to the water but were granted the privilege to use small quantities for domestic purposes if the Company did not otherwise need it. In short, the Company (as a proxy for the state) controlled the water rights entirely but did permit riparian owners limited use privileges.

Eventually, the Dutch adopted the principle (known as “*dominus fluminis*”) which provided that the state had an absolute right to all flowing water and that any entitlements given were given only as a privilege that could be revoked at any time.<sup>42</sup> In essence, the state maintained administrative control over water use and managed the competing demands depending on availability.

**3. BRITISH COLONIAL/COMMONWEALTH RIGHTS (1806-1956)—THE RISE OF PRIVATE RIPARIAN RIGHTS.** By the time that the British gained control, increasing population (resulting from immigration and more extensive cultivation of land) shifted the focus from an emphasis on managing scarce water resources to managing relatively scarce land resources. Beginning in

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<sup>36</sup> HUBERT THOMPSON, WATER LAW: A PRACTICAL APPROACH TO RESOURCE MANAGEMENT AND THE PROVISION OF SERVICES 35 (2006).

<sup>37</sup> Tewari, *supra* note 32, at 695.

<sup>38</sup> *Id.*

<sup>39</sup> THOMPSON, *supra* note 36.

<sup>40</sup> *Id.*

<sup>41</sup> Tewari, *supra* note 32, at 696.

<sup>42</sup> CYRIL G. HALL & ALEWYN P. BURGER, HALL ON WATER RIGHTS IN SOUTH AFRICA 2 (4th ed. 1974).

1813, to promote agricultural development, the British proclaimed that ownership of land would be transferred from the state to individuals for every lessee who satisfied the required terms and conditions.<sup>43</sup> Similarly, over time, the state's right to own and control water was ceded as well. The new courts established by the British struggled with the concept of state ownership of water and, in 1856, the Cape Colony's new Supreme Court issued a ruling in *Retief v. Louw* which ignored the established principle of *dominus fluminis*.<sup>44</sup> Instead, the Court articulated a declaration of water rights held by riparian land owners. In this decision, Judge Bell set out a system of riparian water rights based on the "proportionate sharing of the use of perennial streams by riparian owners which was evolved in the [Eastern] United States of America. Further, water use was divided into 3 categories: (1) for support of animal and human life; (2) increase of vegetable life; and (3) for the promotion of mechanical appliances. Water could not be used for a specific category if all the owners along the river did not have enough water for higher category (preferential order of use)."<sup>45</sup>

For nearly fifty years, the concept of riparian water rights was adjusted and refined by the courts until it was formally codified in 1906 through Act 32 of the Cape Colony.<sup>46</sup> In addition to cementing riparian rights, Act 32 further adopted the distinction between public and private water by expressly defining perennial and intermittent rivers as public.<sup>47</sup> In 1912, following the establishment of the Union of South Africa, Act 8 (known as the Irrigation and Conservation of Waters Act of 1912) abandoned the reliance solely on the definition of "perennial" rivers and, instead, established the definition of public streams as those which flowed in a known and defined channel and were suitable for common irrigation.<sup>48</sup> Act 8 also defined normal and surplus flows to address issues arising between upstream and downstream users resulting from low water or drought conditions.<sup>49</sup> Normal flows were defined to be "the perennial flow part of the flow of the river, while surplus flows referred to the irregular flows after heavy rains."<sup>50</sup> Normal flows were

<sup>43</sup> Tewari, *supra* note 32, at 697.

<sup>44</sup> *Id.*

<sup>45</sup> *Id.* at 698 (citing THOMPSON, *supra* note 36).

<sup>46</sup> THOMPSON, *supra* note 36, at 52.

<sup>47</sup> Tewari, *supra* note 32, at 699.

<sup>48</sup> See MARITZA UYS, WATER RESEARCH COMM'N, A STRUCTURAL ANALYSIS OF THE WATER ALLOCATION MECHANISM OF THE WATER ACT 54 OF 1956 IN THE LIGHT OF THE REQUIREMENTS OF COMPETING WATER USER SECTORS (VOLUME I) 332–47 (1996), <http://www.wrc.org.za/Pages/Preview.aspx?ItemID=8202&FromURL=%2fPages%2fDisplayItem.aspx%3fItemID%3d8202%26FromURL%3d%252fPages%252fAllKH.aspx%253f>.

<sup>49</sup> See Irrigation and Conservation of Waters Act 8 of 1912 (S. Afr.).

<sup>50</sup> See Uys, *supra* note 48, at 356–65.

apportioned among riparian land owners.<sup>51</sup> By contrast, surplus flows were available for serviceable exclusive use and private streams or springs were subject to unlimited and exclusive rights to use.<sup>52</sup> The right to use groundwater was deemed to be an absolute property right of the landowner, unless that groundwater was interconnected with a public stream.<sup>53</sup> During this period, the British effectively ceded state ownership and control of water in favor of a system of riparian rights that was based on the categorization of the water sources.

With the growth initially in agriculture and mining (and later agriculture, mining and industry), the British needed to expand the right to use water for irrigation beyond those who owned land immediately adjacent to rivers and streams. This was largely accomplished by diversions and dam projects which further promoted broader settlement of the country.<sup>54</sup> To give effect to this approach, the British acknowledged private water rights to impound and store water.<sup>55</sup> Naturally, permitting extensive storage of water by riparian owners led to conflict with the interests of non-riparian agricultural, mining, and industrial concerns as the country developed.

**4. MODIFICATION OF THE BRITISH COMMONWEALTH APPROACH (1956 TO 1990)—A PARTIAL RETREAT FROM RIPARIAN RIGHTS.** By 1948, the country was facing a political rise in nationalism,<sup>56</sup> as well as the establishment of Apartheid to give formal legal rights to the white population who already owned or controlled much of the country.<sup>57</sup> During this same time, urban populations swelled and the country had developed substantial mining and industrial sectors.<sup>58</sup> The growing demand from these non-agricultural interests

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<sup>51</sup> *Id.* at 259.

<sup>52</sup> *Id.*

<sup>53</sup> Tewari, *supra* note 32, at 701.

<sup>54</sup> *Id.* at 700.

<sup>55</sup> *Id.* at 699.

<sup>56</sup> The National Party came to power in 1948 and institutionalized a policy of segregation (Apartheid) to retain rule by the dominant but minority population of Afrikaners and other whites. *Id.* at 701.

<sup>57</sup> A.R. TURTON, R. MEISSNER, P.M. MAMPANE, O. SEREMO, WATER RESEARCH COMM'N A HYDROLOGICAL HISTORY OF SOUTH AFRICA'S INTERNATIONAL RIVER BASINS, WRC Report No. 1220/1/04 at ii (2004), <http://www.orangesenqurak.com/UserFiles/File/OtherV2/Hydrological%20History%20of%20South%20Africa's%20International%20Basins%20WRC%202004.pdf>; see also WATER LAW REVIEW PANEL, WHITE PAPER ON WATER POLICY, South Africa § 5.1.1 and FUNDAMENTAL PRINCIPLES AND OBJECTIVES FOR A NEW WATER LAW IN SOUTH AFRICA (1996), <http://www.dwaf.gov.za/Documents/Policies/WP3.html#Principles>.

<sup>58</sup> Johann Tempelhoff, *The Water Act, No. 54 of 1956 and the First Phase of Apartheid in South Africa (1948–1960)*, 9 WATER HIST. 189, 190–196 (2017).

created substantial additional and competing demands on the limited water resources available.<sup>59</sup> These demands were at odds with the political base of the ruling Nationalist Party which was historically centered in the irrigation farming sector and which relied on the dam projects and diversions for their agricultural needs.<sup>60</sup> To address these conflicting interests, the Nationalist Party passed the Act No. 54 of 1956, known as the Water Act of 1956.<sup>61</sup>

The stated goal of the Water Act of 1956 was to “consolidate and amend the laws in force in the Union relating to the control, conservation and use of water for domestic, agricultural and industrial purposes.”<sup>62</sup> Among other things, Act No. 54 sought to rein in the excessive claims on the limited water resources by riparian land owners and, in so doing, reconcile the needs of the primary economic sectors: agriculture, mining and industry.<sup>63</sup> To accomplish this, Act No. 54 in part resurrected the principle of *dominus fluminis* by taking control of both public and private water supplies—including groundwater.<sup>64</sup> The Act intended to enable effective water governance through the new Department of Water Affairs, which was empowered to administer a water permit system by which the government could control how and how much water would be distributed to the stakeholders.<sup>65</sup> In addition, the Department was authorized to establish water control areas over which the state would have responsibility.<sup>66</sup> Although riparian land owners were afforded some protections under the Act,<sup>67</sup> they were now required to obtain a permit for that use within any water control areas established by the Department of Water Affairs and for water extraction and storage even outside the water control areas.<sup>68</sup> As part of this realignment of rights, the state took on the responsibility to provide significant amounts of water for irrigation, mining and urban needs by funding major water projects.<sup>69</sup> By taking such extensive control of water distribution, the state also became responsible for assuring water quality of the water that was delivered.<sup>70</sup>

The Water Act of 1956 was a major step toward diversifying South Africa’s economy and to recognizing that the country potentially lacked adequate existing

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<sup>59</sup> Tewari, *supra* note 32, at 702.

<sup>60</sup> *Id.*

<sup>61</sup> Water Act 54 of 1956 (S. Afr.).

<sup>62</sup> *Id.* § 1.

<sup>63</sup> Templehoff, *supra* note 58, at 197.

<sup>64</sup> *Id.* at 196; *see also* Water Act 54 of 1956 §§ 2–3, 27–33.

<sup>65</sup> Templehoff, *supra* note 58, at 197; *see also* Water Act 54 of 1956 § 2.

<sup>66</sup> Water Act 54 of 1956 § 62.

<sup>67</sup> Tewari, *supra* note 32, at 701 (explaining that riparian owners could use a share of normal flows and any surplus flows but for agricultural and urban uses only).

<sup>68</sup> Water Act 54 of 1956 § 9B.

<sup>69</sup> *Id.* § 56(3).

<sup>70</sup> Templehoff, *supra* note 58, at 198.

water resources to meet the demands of all stakeholders. While the Act did not eliminate riparian rights altogether, it took an important step back toward a water rights construct that considered the public's need for water more heavily.

### **B. WATER RIGHTS UNDER SOUTH AFRICA'S DEMOCRATIC PARADIGM (1990 TO PRESENT)—A MORE SUSTAINABLE AND EQUITABLE APPROACH.**

While the Water Act of 1956 and its subsequent amendments represented a partial step to reforming the public's right to water by reducing the role of riparian rights and revitalizing the principles of *dominus fluminis*, South Africa undertook a major change to its entire approach to water rights beginning with the decision to officially end apartheid and to revise the basic rights afforded to its citizens. This new approach reflected the shift in demographics resulting from growing urban demand, desire to address the inequitable distribution of an essential and limited resource, as well as to better manage, conserve, use and develop that resource. In 1996, South Africa approved a new Constitution which revised and recalibrated the basic tenets governing water law in the country.<sup>71</sup> The Constitution was then implemented by the Water Services Act of 1997<sup>72</sup> and the National Water Act of 1998.<sup>73</sup> Finally, this framework has been supplemented by the 2013 revised National Water Resources Strategy<sup>74</sup> and the 2014 Water as Ecological Infrastructure Strategic Integrated Project.<sup>75</sup> Each of these laws is intended to help South Africa address the nearly full utilization of its available surface water sources while assuring equitable and sustainable allocation of water

**1. THE 1996 CONSTITUTION.** Chapter 2 of the Constitution sets forth a lengthy bill of rights. As part of those rights, Section 24 of the Constitution provides that, “[e]veryone has the right to (a) an environment that is not harmful to their health and well-being; (b) to have the environment protected for the benefit of present and future generations through reasonable legislative and other measures that prevent pollution and ecological degradation, promote conservation and secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.” Section

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<sup>71</sup> S. AFR. CONST., 1996.

<sup>72</sup> DEP'T OF WATER AFFAIRS & FORESTRY, WHITE PAPER ON A NATIONAL WATER POLICY FOR SOUTH AFRICA § 8.1 (1997), <http://www.dwa.gov.za/Documents/Policies/nwpwp.pdf>.

<sup>73</sup> National Water Act 36 of 1998 (S. Afr.).

<sup>74</sup> DEP'T OF WATER AFFAIRS, NATIONAL WATER RESOURCE STRATEGY (2d ed. 2013), [www.dwa.gov.za/documents/Other/Strategic%20Plan/NWRS2-Final-email-version.pdf](http://www.dwa.gov.za/documents/Other/Strategic%20Plan/NWRS2-Final-email-version.pdf).

<sup>75</sup> DEP'T OF WATER AFFAIRS, SIP 19: ECOLOGICAL INFRASTRUCTURE FOR WATER SECURITY (2014), [https://www.environment.gov.za/sites/default/files/docs/sip19\\_ecologicalinfrastructure\\_watersecurity.pdf](https://www.environment.gov.za/sites/default/files/docs/sip19_ecologicalinfrastructure_watersecurity.pdf).

27 provides the even more basic right that, “[e]veryone has the right to have access to . . . sufficient food and water” and that the “state must take reasonable legislative and other measures, within its available resources, to achieve the progressive realization of each of these rights.” In short, the Constitution requires that the state develop a water resource management plan that benefits all of its citizens and not only certain preferred segments or sectors of the economy.<sup>76</sup>

To implement these constitutional rights, the new government generated its White Paper on a National Policy for South Africa (White Paper) in 1997 to provide recommendations on how to achieve these goals.<sup>77</sup> In essence, it was a blue print for dealing with the Tragedy of the Commons and social justice issues associated with water use.<sup>78</sup> Among the key proposals to guide water management, the White Paper recommended the following:

- Confirm the nation’s water resources as an indivisible national asset;
- Designate the national government as the custodian of the nation’s water resources which should be held as a public trust;
- Treat all water whether on land, underground or in surface channels as part of the common resource;
- Guarantee as a right only such water as is required to meet basic human needs and to maintain environmental sustainability;
- Recognize all other uses only if they are beneficial to the public interest;
- Abolish the riparian system of allocation;
- Make water allocations only for a reasonable period and enable the transfer or trade of these rights between users;
- Promote the efficient use of water by charging users, on an equitable basis, for the full financial cost of providing access to water including infrastructure;
- Require all major water user sectors to develop water use, conservation and protection policies;

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<sup>76</sup> DEP’T OF WATER AFFAIRS & FORESTRY, *supra* note 72, at 2.

<sup>77</sup> *Id.*

<sup>78</sup> See generally Garrett Hardin, *The Tragedy of the Commons*, 162 SCIENCE 1243 (1968) (explaining by analogy that unrestricted access to a shared resource for private gain will lead to overexploitation of seemingly abundant resources)

- Establish catchment management agencies, subject to national authority, to undertake water resource management in the water management areas.

These recommendations reflect the government's effort to balance "the traditional view that water is a public good and the modern view that water also has a commercial value."<sup>79</sup>

**2. THE WATER SERVICES ACT OF 1997.** The first step toward implementing the key proposals from the White Paper was the passage of the Water Services Act of 1997.<sup>80</sup> As set forth in section 2, this Act seeks among other goals to provide for:

- the right of access to basic water supply and the right to basic sanitation necessary to secure water and an environment not harmful to human health or well-being;
- the setting of a national water tariff system
- a regulatory framework for water service institutions, intermediaries and the establishment of water boards
- the national monitoring of water services
- the promotion of effective water resource management and conservation.

In short, this Act sets forth the institutional mechanisms necessary to manage the scarce water resources and to begin implementation of the Constitutional reforms.

**3. THE NATIONAL WATER ACT OF 1998 AND THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT OF 1998.** Act No. 36 of 1998, known as the National Water Act of 1998<sup>81</sup> (NWA) together with Act No. 107 of 1998 known as the National Environmental Management Act<sup>82</sup> (NEMA), provided the essential reforms contemplated by the 1996 Constitution.

**a. THE NATIONAL WATER ACT OF 1998.** The National Water Act repealed 109 prior water related Acts that had been passed between 1914 and 1995 and replaced them with an integrated national water resource management authority that included the power to delegate management to the regional or catchment level as appropriate.<sup>83</sup> The NWA eliminates the riparian system of rights

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<sup>79</sup> Tewari, *supra* note 32, at 702.

<sup>80</sup> Water Services Act 108 of 1997 (S. Afr.).

<sup>81</sup> National Water Act 36 of 1998 (S. Afr.).

<sup>82</sup> National Environmental Management Act 107 of 1998 (S. Afr.).

<sup>83</sup> National Water Act 36 of 1998.

and replaces it with a licensing system to achieve more flexible and equitable allocation of water. As part of these reforms, the National Water Act established a public trusteeship over all of South Africa's water resources and articulated the parameters of its national water strategy.<sup>84</sup> The key goals of this trusteeship are:

- to eliminate discriminatory practices that have prevented equal access to water and use of water resources;
- to acknowledge the national government's responsibility and authority over the country's water resources to provide for the equitable allocation of water for beneficial use and redistribution of water, as well as to handle international water matters;
- to pursue the ultimate aim of achieving sustainable use of water for the benefit of all users;
- to protect the quality of the nation's water resources and to assure sustainability of the nation's resources; and
- to provide integrated management of all aspects of water resources.

In effect, by eliminating the riparian system of water rights and implementing a system based on the Public Trust Doctrine, South Africa freed itself from the limitations arising from purely private rights to water use. Without these limitations, South Africa is now free to prioritize, allocate and manage water based on those equitable principles that it deems to be in the best interests of the beneficiaries—all interested stakeholders.

To accomplish these goals, the National Water Act provides authority for:

- both the establishment of a national water resource strategy, as well as catchment management strategies;<sup>85</sup>
- protection of water resources including the classification of water resources and resource water quality objectives, the determination of a "Reserve" (minimum amounts necessary for human health and the environment), pollution prevention and control of emergency incidents;<sup>86</sup>
- control of water usage including definitions of permissible uses, the establishment of a licensing system, declarations of stream flow reduction activities and controlled activities;<sup>87</sup>

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<sup>84</sup> *Id.* chs. 1–2.

<sup>85</sup> *Id.* ch. 2.

<sup>86</sup> *Id.* ch. 3.

<sup>87</sup> *Id.* ch. 4.

- financial provisions including water use charges (a pricing strategy for all uses) and financial assistance;<sup>88</sup>
- general powers of the Minister of Water Affairs and Forestry including the power to expropriate property, as well as access to and rights over land;<sup>89</sup>
- the establishment, governance and oversight of catchment agencies, water use associations, government waterworks and monitoring systems, as well as regulations concerning dam safety;<sup>90</sup>
- the establishment and functions of bodies to implement international water management agreements;<sup>91</sup> and
- the establishment of water tribunals and enforcement authority.<sup>92</sup>

b. **NATIONAL ENVIRONMENTAL MANAGEMENT ACT OF 1998.** NEMA is in large measure intended to provide the legal and regulatory framework for making and enforcing decisions concerning water resource and distribution decisions. It also contains, however, a declaration of key principles. Most importantly, NEMA affirms that “the environment is held in public trust for the people, the beneficial use of environmental resources must serve the public interest and the environment must be protected as the people’s common heritage.”<sup>93</sup> In addition, NEMA provides statutory effect to many of the key water resource-related principles set forth in the Constitution.<sup>94</sup> NEMA further provides the Minister of Environmental Affairs and Tourism with the power to expropriate any property for environmental or any other public purpose under NEMA if that purpose is a public purpose or is in the public interest.<sup>95</sup>

The NWA, together with NEMA, are “widely considered to be one of the world’s most progressive water policies on paper.”<sup>96</sup> They give substantive life to the rights declared in the Constitution and resurrects the Public Trust Doctrine to

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<sup>88</sup> *Id.* ch. 5.

<sup>89</sup> *Id.* chs. 6 & 13.

<sup>90</sup> *Id.* chs. 7–8, 11–12, 14.

<sup>91</sup> *Id.* ch. 10.

<sup>92</sup> *Id.* chs. 15–16.

<sup>93</sup> National Environmental Management Act 107 of 1998 § 2(o) (S. Afr.).

<sup>94</sup> *Id.* § 2.

<sup>95</sup> *Id.* § 36.

<sup>96</sup> David Takacs, *South Africa and the Human Right to Water: Equity, Ecology and the Public Trust Doctrine*, 34 BERKELEY J. INT’L L. 55, 81 (2016) (citing Rose Francis, *Water Justice in South Africa: Natural Resources Policy at the Intersection of Human Rights, Economics, & Political Power*, 18 GEO. INT’L ENVTL. L. REV. 149, 162 (2005)).

permit a holistic approach to managing South Africa's water resources for the benefit of all concerned.

**4. THE REVISED NATIONAL WATER RESOURCE STRATEGY OF 2013.** The NWA mandates that a National Water Resource Strategy be developed.<sup>97</sup> The first National Water Resource Strategy was published in 2004 (NWRS) and has been revised with the promulgation of the second edition in 2013 (NWRS2).<sup>98</sup> The purpose of the NWRS2 is to “ensure that national water resources are protected, used, developed, conserved, managed and controlled in an efficient and sustainable manner towards achieving South Africa's development priorities in an equitable manner over the next five to ten years.”<sup>99</sup> The NWRS2 acknowledges that water is scarce and surface water sources are limited with the cost of additional infrastructure becoming prohibitive. Under the NWRS2 and to meet the “huge water demands for equitable allocation for development and economic growth,” South Africa is considering alternative sources including water re-use, desalination, groundwater utilization, water conservation and water demand management measures, rain water harvesting, recovering water from acid mine drainage and the import of water intensive goods. The NWRS2 also prescribes an increased emphasis on reducing water loss (also commonly referred to as “non-revenue water”).<sup>100</sup>

The NWRS2 represents a comprehensive examination of the implementation of the entire range of water resource management issues and the relevant trends. In addition to exploring alternative sources, the NWRS2 focuses on an essential element of the plan which is water conservation and water demand management.<sup>101</sup> The plan notes that, “[d]emands on South Africa's finite water sources are increasing, also increasing the competition between agricultural, industrial, power-generation, mining, commercial and domestic needs. In order to meet these demands in a water-scarce country, all sectors must improve their water efficiency and conserve water.”<sup>102</sup> Interestingly, in Chapter 10, the NWRS2 identifies “the uncertainty in projected water-related climate change impacts as one of the biggest challenges facing water managers.”<sup>103</sup> It further acknowledges the need to reduce the vulnerability and enhance the resilience of communities, people, enterprises and ecosystems, to water related impacts of climate change.<sup>104</sup>

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<sup>97</sup> National Water Act 36 of 1998 ch. 3.

<sup>98</sup> DEP'T. OF WATER AFFAIRS, *supra* note 74.

<sup>99</sup> *Id.* at iii.

<sup>100</sup> *Id.* at iv.

<sup>101</sup> *Id.* at 52–58.

<sup>102</sup> *Id.* at 52.

<sup>103</sup> *Id.* at 75.

<sup>104</sup> *Id.* at 77.

According to Edna Molewa, Minister of Water and Environmental Affairs, the “critical water infrastructure planning will be aligned with government’s vision for urban development of South Africa’s cities and towns.”<sup>105</sup> In other words, in theory, the strategic and structural plan was intended to prepare not only for extending water services to a greater portion of the population to include those who had not historically had access to clean water and balancing the competing demands on the country’s limited water resources, they were also intended to prepare for the drought cycles that could cripple portions of the country.

To the extent that they are addressed, the physical recommendations set forth in the NWRS2 are largely encompassed in the government’s ambitious National Infrastructure Plan which has laid out a series of key strategic integrated projects (SIPs).<sup>106</sup> Many of these SIPs have some impact on water resources, but SIP 18 (Water and Sanitation Infrastructure)<sup>107</sup> and most recently SIP 19 (Ecological Infrastructure for Water Security)<sup>108</sup> are aimed directly at improving South Africa’s water resource quality and quantity. As a show of political will, these SIPs are overseen by a Cabinet-created body entitled the Presidential Infrastructure Coordinating Commission (PICC) to integrate and coordinate the long-term infrastructure build.<sup>109</sup> In essence, each of the legal, planning and oversight tools have been provided to effectively address the water scarcity issues.

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<sup>105</sup> Edna Molewa, *Strategic Solutions to SA’s Water Challenges*, MAIL & GUARDIAN (Mar. 27, 2014), <https://mg.co.za/article/2014-03-27-strategic-solutions-to-sas-water-challenges>.

<sup>106</sup> Infrastructure Development Act 23 of 2014 (S. Afr.); *see also National Infrastructure Plan*, SOUTH AFR. GOV’T, <https://www.gov.za/issues/national-infrastructure-plan> (last visited Mar. 31, 2018).

<sup>107</sup> *See generally* DEP’T OF WATER AFFAIRS, STRATEGIC INFRASTRUCTURE PROJECT 18 (SIP 18): NATIONAL WATER AND SANITATION INFRASTRUCTURE MASTER PLAN, [pmg-assets.s3-website-eu-west-1.amazonaws.com/130416document\\_3.ppt](https://pmg-assets.s3-website-eu-west-1.amazonaws.com/130416document_3.ppt) (last visited Mar. 31, 2018) (providing an overview of SIP 18); *Strategic Infrastructure Projects (SIP) 18 and Related SIPs: Briefing by Department of Human Settlements*, PARLIAMENTARY MONITORING GROUP (Oct. 7, 2013), <https://pmg.org.za/committee-meeting/16437/> (describing a briefing by the Department of Human Settlements on SIP 18).

<sup>108</sup> DEP’T OF WATER AFFAIRS, *supra* note 75.

<sup>109</sup> PRESIDENTIAL INFRASTRUCTURE COORDINATING COMM’N, A SUMMARY OF THE SOUTH AFRICAN NATIONAL INFRASTRUCTURE PLAN 6 (2014), <http://www.economic.gov.za/communications/publications/presidential-infrastructure-coordinating-commission--picc/202-picc-summary-of-sa-national-infrastructure-plan>; *see generally National Infrastructure Plan*, *supra* note 106.

## V. GIVEN THE LONGSTANDING RECOGNITION OF WATER SCARCITY AND LEGAL FRAMEWORK TO SUPPORT SOLUTIONS, WHAT WENT WRONG IN CAPE TOWN?

The South African Government has clearly taken its water resource management and water distribution issues seriously. Starting in 1996 with an overhaul of the Constitutional authority over all water resources, South Africa abolished private ownership of water and declared water to be a public asset that is to be managed by the State as trustee for the Public Trust. These water resource management reforms were then supplemented with specific statutory authority to permit execution and enforcement of the broad principles and enlightened reforms.<sup>110</sup> In 1995, South Africa had already recognized the need to integrate groundwater into the comprehensive management of all water resources when it developed its Aquifer System Management Classification and began the process of quantifying both the volume of the aquifers and the extent of groundwater extractions.<sup>111</sup> South Africa was even fourteen years ahead of the United Nations which waited until 2010 before voting to approve a resolution that declared the right to clean drinking water and sanitation as “a human right that is essential for the full enjoyment of life and all human rights.”<sup>112</sup> In theory, to complete the process, South Africa then developed a list of “Strategic Infrastructure Projects” that identified the priority work. These projects, however, did not prepare Cape Town—South Africa’s second most populous city—for the water shortages that it now faces.

Despite an enlightened and progressive approach, Cape Town faces the potential for complete failure of its water systems. The answer may be driven primarily by political and financial obstacles. To begin with, as part of the Constitutionally mandated reforms, authorities have a mandate to allocate water more equitably to remedy the history of ignoring the more rural and less affluent segments of society.<sup>113</sup> Accordingly, when examining the list of strategic projects, it becomes clear that the vast majority of the work that is either in progress or is scheduled for the short and medium term is directed at water delivery and sanitation problems a long way from Cape Town.<sup>114</sup> This allocation may be legally justified

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<sup>110</sup> See S. AFR. CONST., 1996; Water Services Act 108 of 1997 (S. Afr.); National Water Act 36 of 1998 (S. Afr.); National Environmental Management Act 107 of 1998 (S. Afr.).

<sup>111</sup> See generally ROGER PARSONS, WATER RESEARCH COMM’N, A SOUTH AFRICAN AQUIFER SYSTEM MANAGEMENT CLASSIFICATION (1995).

<sup>112</sup> Takacs, *supra* note 96, at 58.

<sup>113</sup> See S. AFR. CONST., 1996; Water Services Act 108 of 1997; National Water Act 36 of 1998; National Environmental Management Act 107 of 1998.

<sup>114</sup> See NAT’L TREASURY, REPUBLIC OF S. AFR., BUDGET REVIEW 2017 app. D at 147–58 (2017), [www.treasury.gov.za/documents/national%20budget/2017/review/Prelims.pdf](http://www.treasury.gov.za/documents/national%20budget/2017/review/Prelims.pdf).

but is also politically expedient. If politicians can deliver services to their constituents, they can expect to benefit at the polls. It is interesting to note that, even well into the severe drought, the proposed measures emphasized water conservation, demand management, recycling and possible expansion of groundwater extraction from boreholes rather than heavier infrastructure projects.<sup>115</sup> Long term capacity augmentation from desalination plants and additional dams was deemed prohibitively expensive and the City of Cape Town's water resilience plan has delivered substantially less than half of the 500 million liters per day that had been planned.<sup>116</sup>

Commentators have also speculated that the rapid repetition of election cycles incentivizes this political behavior.<sup>117</sup> Rather than allocate budgets for long term planning, it can be expedient to focus on the short-term budgets. The predisposition to focus on the near term is further fueled when the economy is under-performing and tax revenue is falling.<sup>118</sup> When faced with budget shortfalls, the easiest course is to ignore the budget for long term projects or even to recapture funds that had been previously allocated for those projects.

Adversarial politics provides another potential rationale. A review of infrastructure spending reveals that planned infrastructure projects around Cape Town have been minimal when compared with other parts of the country.<sup>119</sup> While this allocation might be rationalized based on the relative affluence of Cape Town and the other communities within the Berg-Olifants Water Management Area, it cannot be ignored that Cape Town is not politically aligned with the national government.<sup>120</sup>

Finally, with all of the effort that has been invested in South Africa's water management model and with the projection of more prevalent droughts in Cape Town's future, it is time to explore new and appropriate funding models. These

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<sup>115</sup> Mandi Smallhorne, *Aquifer Alert: Are We Drilling to Water Disaster?*, FIN24 (Nov. 18, 2017), <https://www.fin24.com/Opinion/aquifer-alert-are-we-drilling-to-water-disaster-20171118-2>

(emphasizing that the rate of groundwater extraction must be balanced against aquifer recharge or it can cause a collapse of the aquifer).

<sup>116</sup> Justin Williams, *Water Resilience Plan Can Deliver Only Half the Expected Water Supply*, CAPE TOWN ETC (Oct. 24, 2017), <http://www.capetownetc.com/water-crisis/water-resilience-plan-half-water/>; see also *Advancing Water Resilience: Getting to an Additional 500 Million Litres of New Water a Day*, CAPE BUS. NEWS (Aug. 17, 2017), <http://www.cbn.co.za/news/advancing-water-resilience-getting-to-an-additional-500-million-litres-of-new-water-a-day>.

<sup>117</sup> Daniel Silke, *Analysis: What Caused Cape Town's Water Crisis?*, FIN24 (Jan. 29, 2018), <https://www.fin24.com/Opinion/analysis-what-caused-cape-towns-water-crisis-20180129>.

<sup>118</sup> *Id.*

<sup>119</sup> See NAT'L TREASURY, *supra* note 114.

<sup>120</sup> Silke, *supra* note 117.

models should permit more rapid and reliable execution of the projects that must be completed to provide the resiliency needed for South Africa's stable and continued urban and business development.

## **VI. BOTH CALIFORNIA AND FRANCE ALSO FACE CHALLENGES OVER WATER SCARCITY**

### **A. WATER SCARCITY IS ALSO TIED TO WATER MANAGEMENT.**

Water scarcity can result from limitations on availability due to physical shortage (e.g. lack of rainfall), the failure of institutions to ensure a regular supply, or due to inadequate infrastructure.<sup>121</sup> The threat of water scarcity is increased as urban populations expand and shifting climate patterns alter the distribution of rainfall.<sup>122</sup> Like South Africa, both California and France experience significant variability in both geography and volume of annual and seasonal rainfall.<sup>123</sup> The absence of adequate localized rainfall, shrinking snowpack and the greater reliance on significant storm events to replenish surface water sources result in the need for more extensive infrastructure to capture and deliver water to users. In the meantime, water managers are relying more heavily on groundwater sources to meet local needs and to buffer supply during periods of drought. As discussed below, contrary to the approach adopted by South Africa which has returned ownership and control of all water in the country to the state and imposed a Public Trust on all water resources, France and California still rely on historical approaches to water resource rights. While many of South Africa's challenges in addressing their water scarcity issues may be related to the focus and allocation of available funding to achieve the mandate to provide access to clean water to the country's historically disadvantaged populations, California and France face challenges more related to ownership and distribution issues.

### **B. BY CONTRAST TO SOUTH AFRICA, LEGAL LIMITATIONS ARISING FROM PRIVATE OWNERSHIP EXIST IN CALIFORNIA AND PROVENCE THAT COMPOUND THE CHALLENGES FACING WATER RESOURCES MANAGERS**

As discussed in Section IV above, South Africa has experimented with a wide range of legal frameworks to govern water rights including the Dutch/Roman hybrid approach, the English system of private ownership through riparian rights and finally a more community-based approach with the Constitutional declaration that all water rights belong to the state as trustee of a

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<sup>121</sup> *Water Scarcity*, UN WATER, <http://www.unwater.org/water-facts/scarcity/> (last visited Mar. 31, 2018).

<sup>122</sup> *Id.*

<sup>123</sup> See, e.g., *Climate of California*, WESTERN REGIONAL CLIMATE CENTER, [https://wrcc.dri.edu/Climate/narrative\\_ca.php](https://wrcc.dri.edu/Climate/narrative_ca.php) (last visited Mar. 31, 2018).

Public Trust for the benefit of all. With this broad authority, South Africa is not restricted by private property rights that might be inconsistent with those water resource management measures they deem most beneficial to the public. The limitations become practical, political and financial.

While California and Provence have adopted some water resource measures that parallel the actions taken by South Africa, California and Provence have additional challenges arising from their retention of historical tenets of water law which have permitted certain water rights to be held as private property rights. While South Africa has fully rejected its historical attachment to private property rights over water, California and France have not. California water law is complex and a full exposition is beyond the scope of this article. The following, however, sets forth some of the key elements relating to these rights.

**1. CALIFORNIA.** In California, water is categorized as surface water (streams, lakes or other bodies of water) or ground water.<sup>124</sup> The two are governed separately.<sup>125</sup> At present, the permit system for allocation of surface water rights is managed by the State Water Resources Control Board, while the management of groundwater has, until recently, been completely left to local agencies, local governments and the courts.<sup>126</sup> With the latest drought (2012–2016), California has now begun to address the need to actively manage groundwater resources on a coordinated basis.<sup>127</sup> This process, however, is in its infancy. While it does include a mandate to balance the extraction and recharge of medium and high priority groundwater basins, the process is still only in the data gathering phase and still relies heavily on the patchwork of local agencies to give effect to the statewide mandate.<sup>128</sup>

Regardless of how the water is managed, Article X, Section 2 of the California Constitution imposes a limitation that requires “all water resources of the State be put to beneficial use to the fullest extent of which they are capable, and that the waste or unreasonable use or unreasonable method of use of water be prevented, and that the conservation of such waters is to be exercised with a view to the reasonable and beneficial use thereof in the interest of the people and for the public welfare.”<sup>129</sup> This provision is supplemented by Section 5 which declares

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<sup>124</sup> See CAL. WATER CODE §§ 1200, 2500 (West 2018) (stating that the State Water Resources Control Board has jurisdiction over surface water, which includes subterranean streams flowing through known and definite channels).

<sup>125</sup> *Id.*

<sup>126</sup> CAL. WATER CODE § 1200.

<sup>127</sup> Sustainable Groundwater Management Act, CAL. WATER CODE §§ 10720–10737.8.

<sup>128</sup> *Id.*

<sup>129</sup> CAL. CONST. art X, § 2; CAL. WATER CODE § 100.

that “the use of all water now appropriated, or that may hereafter be appropriated, for sale, rental, or distribution, is hereby declared to be a public use, and subject to the regulation and control of the State, in the manner prescribed by law.”<sup>130</sup> The California Supreme Court has since clarified that Article X empowers the State, as the trustee of the “public trust,” to retain supervisory control over all water in the State.<sup>131</sup>

This Constitutional limitation provides the State with regulatory authority over both surface and ground water, as well as providing a means to terminate wasteful or non-beneficial uses. Contrary to the approach in South Africa, however, this limitation leaves intact the existing private property rights to use water that have been acquired under California law.<sup>132</sup>

**a. SURFACE WATER RIGHTS.** California has developed a unique combination of surface water rights that include both riparian rights and appropriative rights, as well as some prescriptive rights.

**i. RIPARIAN RIGHTS.** In April 1850, California adopted the common law of England as the decisional law of the state.<sup>133</sup> In so doing, California also adopted England’s tenets of riparian water rights—much like South Africa did in 1856.<sup>134</sup> These rights provided that “[t]he owner of land through which a stream flows, merely transmits the water over its surface, having the right to its reasonable use during its possession.”<sup>135</sup> In other words, the riparian land owner has only the usufructuary right to the reasonable and beneficial use of water on land that physically abuts the waterway.<sup>136</sup> This riparian right derives from

<sup>130</sup> CAL. CONST. art X, § 5; *see also* CAL. WATER CODE § 275 (providing that the Department of Water Resources shall take action to prevent waste including unreasonable use or diversion of water).

<sup>131</sup> Nat’l Audubon Soc’y v. Superior Court of Alpine Cty., 658 P.2d 709, 721, 725–26, 728 (Cal. 1983) (affirming public trust doctrine and authorizing the State to make allocations without being limited by past allocation decisions and applying the public trust doctrine to both navigable and non-navigable waterways).

<sup>132</sup> *See* CAL. WATER CODE § 102 (providing that all water within the State is the property of the people of the State, but the right to the use of water may be acquired by appropriation in the manner provided by law).

<sup>133</sup> CAL. CIV. CODE § 22.2 (West 2018); *see also* THEODORE H. HITTELL, THE GENERAL LAWS OF THE STATE OF CALIFORNIA (VOLUME 1) ¶ 599 (1870), <https://babel.hathitrust.org/cgi/pt?id=hvd.hl3f2f;view=1up;seq=7>.

<sup>134</sup> Mark T. Kanazawa, *Efficiency in Western Water Law: The Development of the California Doctrine, 1850–1911*, 27 J. LEGAL STUD. 159, 163 (1998).

<sup>135</sup> Eddy v. Simpson, 3 Cal. 249, 252 (1853).

<sup>136</sup> Lux v. Haggin, 10 P. 674, 753 (Cal. 1886) (en banc); *see also* Rancho Santa Margarita v. Vail, 81 P.2d 533, 547 (Cal. 1938) (holding that land must be contiguous with the stream and the riparian

ownership of the land, not by virtue of its use.<sup>137</sup> The courts have also declared that the reasonable use of water by a riparian owner requires that such use be exercised so as not to deprive other riparian owners of their proportionate share of the flow from the common waterway—the water must be shared with other riparian owners who hold “correlative rights.”<sup>138</sup> A riparian right to use water, however, does not include a right to store water for seasonal use or to divert water for use on non-riparian land.<sup>139</sup> Finally, riparian rights are generally senior to other types of water rights but may be junior to certain appropriative rights that were recognized as grants under Spanish and Mexican law prior to the formation of California.<sup>140</sup>

**ii. APPROPRIATIVE RIGHTS.** With the onset of the Gold Rush and the arrival of the hordes of ‘49ers, the pressure to facilitate hydraulic mining and to promote irrigation forced the creation of new “prior appropriative” rights to use water.<sup>141</sup> These activities required that water rights be expanded to permit the use of water independent of the limitations of riparian rights (ownership of riparian land and only the right to use water on that riparian land) and reflected the level of water scarcity in California.<sup>142</sup> The doctrine of Prior Appropriation established a right to use water based on a principle of first in time, first in right and requires that the water be put to a beneficial use.<sup>143</sup> Initially, to establish a vested right to appropriate water, the user was required to first post (and record with the county) a notice in a conspicuous place at the point of intended diversion and then diligently complete the diversion.<sup>144</sup> Any new appropriation could only be

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rights extends to the smallest tract held under one chain of title leading to the present owner); Kanazawa, *supra* note 134, at 163.

<sup>137</sup> *Lux*, 10 P. at 753.

<sup>138</sup> CAL. WATER CODE § 101 (West 2018); *Crandall v. Woods*, 8 Cal. 136, 141 (1857); *see also Lux*, 10 P. at 392; *Pleasant Valley Canal Co. v. Borrer*, 72 Cal. Rptr. 2d 1, 24 (Cal. Ct. App. 1998); *Deetz v. Carter*, 43 Cal. Rptr. 321, 323 (Cal. Dist. Ct. App. 1965) (finding that where the total stream flow is insufficient, a riparian owner may use the entire available supply for domestic purposes (including “consumption for the sustenance of human beings, for household conveniences, and for the care of” domestic livestock), before another riparian owner may use water for irrigation purposes or for watering commercial livestock).

<sup>139</sup> *Colo. Power Co. v. Pac. Gas & Elec. Co.*, 24 P.2d 495, 498 (Cal. 1933); *see also CAL. CODE REGS.* tit. 23, § 658 (2018) (defining storage as collection for more than 30 days); *Holmes v. Nay*, 199 P. 325, 327 (Cal. 1921) (finding no right to use water arising from riparian right on non-riparian parcels).

<sup>140</sup> *See Pleasant Valley Canal Co.*, 72 Cal. Rptr. 2d at 23–24.

<sup>141</sup> *See Edwyna Harris, Evolution of Water Rights in the Nineteenth Century: The Role of Climate and Asset Type*, 53 NAT. RESOURCES J. 217, 219–20 (2013).

<sup>142</sup> *Id.*

<sup>143</sup> *Irwin v. Phillips*, 5 Cal. 140, 146–47 (1855); *see also CAL. CIVIL CODE* §§ 1410–14 (Deering 1897) (first enacted in 1872 and since repealed).

<sup>144</sup> *See, e.g., CAL. CIVIL CODE* §§ 1415–18 (Deering 1897) (since repealed) (setting requirements for establishing an appropriation prior to 1914).

used to the extent that it did not impair the availability of water already appropriated by another user.<sup>145</sup> After 1914, the process to establish an appropriative water right was formalized, requiring a permit and empowering the State Board to determine if any unallocated water existed.<sup>146</sup> In addition, the State Board must determine if the proposed use was beneficial and in the public interest.<sup>147</sup>

**iii. PRESCRIPTIVE RIGHTS.** Notwithstanding the establishment of either a lawful riparian or appropriative water right acquired prior to 1914, those surface water rights may be taken by another user asserting a claim of right if that user appropriates the water from the senior right holder in a manner that is open, hostile and adverse (without permission) for five years or more.<sup>148</sup> Because prescriptive rights are not based on ownership of the land, such water can be used in the same way that general appropriative rights may be used—it may be diverted for use on non-riparian land and may be stored for later use. Nonetheless, use of water rights acquired by prescriptive claims must still be reasonable and beneficial.<sup>149</sup>

**b. GROUNDWATER RIGHTS.** Like surface water, groundwater rights can be separated into three different classes: overlying rights, appropriative rights, and prescriptive rights.<sup>150</sup>

**i. OVERLYING RIGHTS.** An overlying right, “analogous to that of the riparian owner in a surface stream, is the owner’s right to take water from the ground underneath for use on his land within the basin or watershed.”<sup>151</sup> The overlying right is associated with the ownership of the land, but it still may be limited to present and prospective reasonable beneficial uses.<sup>152</sup> As a correlative right, the extent of the right is determined by reference to the other overlying right

<sup>145</sup> CAL. WATER CODE § 1702 (West 2018); *see also, e.g.*, CAL. CIVIL CODE § 1413 (first enacted in 1872 and since repealed).

<sup>146</sup> *See* CAL. WATER CODE §§ 1200–1857 (Division 2, Part 2 of the California Water Code was adopted on December 19, 1914); *see also* CAL. WATER CODE § 1702 (providing that vested riparian and appropriative rights may not be impaired by the issuance of new permits to maintain the priority system based on first in time/first in right for appropriative rights).

<sup>147</sup> CAL. WATER CODE §§ 1200–1857.

<sup>148</sup> *Brewer v. Murphy*, 74 Cal. Rptr. 3d 436, 443 n.5 (Cal. Ct. App. 2008) (explaining that it is unclear if a prescriptive right may be asserted against a permitted water right established after 1914). *But see People v. Shirokow*, 605 P.2d 859, 866 (Cal. 1980) (en banc) (finding no prescriptive taking available against California’s authority to allocate its water in the public interest).

<sup>149</sup> CAL. CONST. art X, § 2.

<sup>150</sup> *City of Barstow v. Mojave Water Agency*, 5 P.3d 853, 862–63 (Cal. 2000).

<sup>151</sup> *Id.* (citing *Cal. Water Serv. Co. v. Edward Sidebotham & Son, Inc.*, 37 Cal. Rptr. 1, 6 (Cal. Dist. Ct. App. 1964)).

<sup>152</sup> *City of Santa Maria v. Adam*, 149 Cal. Rptr. 3d 491, 501 (Cal. Ct. App. 2012); *see also* CAL. CONST. art X, § 2.

holders who draw from the same groundwater basin.<sup>153</sup> In the event of a water supply shortage, overlying users have priority over appropriative users.<sup>154</sup>

**ii. APPROPRIATIVE RIGHTS.** Appropriative rights to ground water have similar attributes to those for surface water. Most notably, the right of an appropriator depends on the actual taking of the water.<sup>155</sup> The primary distinction is that the appropriation of ground water has not been subject to the same statutory requirements concerning permits that applied to appropriation of surface water. If the overlying rights do not fully consume the available water in the groundwater basin, the remaining water is deemed to be surplus water and remains available for appropriation.<sup>156</sup> A private land owner may rightly appropriate surplus water for a non-overlying use which can include exportation beyond the basin or watershed.<sup>157</sup>

**iii. PRESCRIPTIVE RIGHTS.** Prescriptive rights in groundwater arise from an appropriation of water which is not surplus and is, therefore, wrongful. Under the principle of adverse possession, this wrongful appropriation can mature into a prescriptive right if the use is “actual, open and notorious, hostile and adverse to the original owner.”<sup>158</sup> This adverse possession must be maintained uninterrupted for five years.<sup>159</sup> An overlying rights holder or a senior appropriative rights holder can interrupt the adverse possession and retain their rights merely by continuing to pump non-surplus waters.<sup>160</sup> Finally, in determining whether prescriptive rights might be warranted, the courts recognize that it is not possible to absolutely ascertain the quantity of water required for future use at any given time and should declare prospective uses paramount to the appropriator’s right.<sup>161</sup>

**iv. LOSING RIGHTS.** While the foregoing provides some insight into the complexity of acquiring rights for the private use of water in California, it is important to remain aware that those rights can also be lost.

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<sup>153</sup> *City of Barstow*, 5 P.3d at 871–72.

<sup>154</sup> *Id.* at 872.

<sup>155</sup> *Id.* at 863.

<sup>156</sup> *Id.* (explaining that prescriptive rights are not acquired by the taking of surplus water).

<sup>157</sup> *Id.*

<sup>158</sup> *Cal. Water Serv. Co.*, 37 Cal. Rptr. 1, 7 (Cal. Dist. Ct. App. 1964).

<sup>159</sup> *Id.*

<sup>160</sup> *See High Desert Cty. Water Dist. v. Blue Skies Country Club, Inc.*, 28 Cal. Rptr. 2d 909, 915 (Cal. Ct. App. 1994).

<sup>161</sup> *City of Barstow*, 5 P.3d at 864 (citing *Tulare Irrigation Dist v. Lindsay-Strathmore Irrigation Dist.*, 45 P.2d 972, 1007 (Cal. 1935)).

- **Ownership-based rights:** Riparian rights to surface water can be lost permanently by severing the connection between the real property and the waterway with which it is contiguous.<sup>162</sup> Riparian and overlying rights cannot be lost by non-use.<sup>163</sup> While difficult to successfully prosecute, riparian and overlying rights can be lost to successful prescriptive claims as discussed above.
- **Appropriation-based rights:** Appropriative rights may be lost through abandonment or non-use of all or any part of the appropriated water for a period of five years at which time it may be reclassified as unappropriated public water.<sup>164</sup> Appropriative rights acquired prior to 1914 may also be lost to successful prescriptive claims as discussed above. In light of the mandatory permit process applicable to appropriative claims after 1914, it is unclear whether it is possible to lose post-1914 appropriative rights to a wrongful prescriptive claim.

**c. GROUNDWATER MANAGEMENT AND REGULATION.** ON average, groundwater provides approximately 40% of the water needed in California for urban, rural and agricultural uses.<sup>165</sup> At the peak of the dry season or during periods of drought, reliance on groundwater can range as high as between 80% to 100% in parts of the state.<sup>166</sup> Nonetheless, despite extensive regulation of surface water through its administrative permit system, California has left groundwater largely unregulated until the recent severe droughts triggered, as discussed below, its first steps to address groundwater regulation.<sup>167</sup>

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<sup>162</sup> *Rancho Santa Margarita*, 81 P.2d 533, 547 (Cal. 1938) (explaining that land must be contiguous with the stream, the riparian right extends only to the smallest tract held under one chain of title leading to the present owner, and land must be within the watershed of the stream). *But see* *Miller & Lux Inc. v J.G. James Co.*, 178 P. 716, 716 (Cal. 1919) (en banc) (explaining that severance of riparian right upon transfer may be avoided if the conveyance specifically reserves the riparian right).

<sup>163</sup> *See, e.g., Lux*, 10 P. 674, 753 (Cal. 1886) (en banc).

<sup>164</sup> CAL. WATER CODE § 1241 (West 2018) (providing that the reversion shall occur upon a finding by the board following notice to the licensee); *see also* *N. Kern Water Storage Dist. v. Kern Delta Water Dist.*, 54 Cal. Rptr. 3d 578, 581, 583 (Cal. Ct. App. 2007).

<sup>165</sup> DEP'T OF WATER RES., STATE OF CAL., CALIFORNIA'S GROUNDWATER: WORKING TOWARD SUSTAINABILITY 10 (2016), [https://www.water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Bulletin-118/Files/Statewide-Reports/Bulletin\\_118\\_Interim\\_Update\\_2016.pdf](https://www.water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Bulletin-118/Files/Statewide-Reports/Bulletin_118_Interim_Update_2016.pdf).

<sup>166</sup> *Id.*; *see also* *Groundwater Management*, CAL. AG WATER STEWARDSHIP INITIATIVE, [http://agwaterstewards.org/practices/groundwater\\_management/](http://agwaterstewards.org/practices/groundwater_management/) (last visited Apr. 1, 2018).

<sup>167</sup> Joseph L. Sax, *We Don't Do Groundwater: A Morsel of California Legal History*, 6 U. DENV. WATER L. REV. 269, 270 (2003).

By 1975, state water managers had already expressed concern about the extent of groundwater use and the potential adverse impacts of overdraft on groundwater basins.<sup>168</sup> Overdraft occurs in a groundwater basin when the volume of water pumped out of the ground over a long period of time exceeds the sustainable yield of the basin.<sup>169</sup> The resulting problems can be substantial including lowering water levels, ground subsidence, loss of aquifer storage, seawater intrusion and degraded quality of remaining groundwater.<sup>170</sup> Although water managers and groundwater users alike all recognized this potential risk and related issues to groundwater overuse, the lack of any statewide authority to manage groundwater combined with individually focused motives of local groundwater users has made meaningful and sustainable groundwater management extremely challenging. This fragmented oversight has been compounded by a lack of useful data, as well as the challenges resulting from the competing demands of those holding rights to use groundwater. Put simply, it is hard to manage the problem without the information about how bad the problem really is. To address the lack of necessary data and to begin to address issues related to the overdraft of groundwater basins, the Water Code has been amended progressively since 1978. Two of the most relevant amendments resulted in the California Statewide Groundwater Elevation Monitoring (CASGEM) Program and the Sustainability Groundwater Management Act (SGMA).

**i. CASGEM.** In 2010, the California Department of Water Resources developed CASGEM in response to the directive that groundwater elevations in all basins and sub-basins be regularly and systematically measured.<sup>171</sup> The Department is required to establish and administer a permanent, locally-managed system to monitor groundwater elevations to demonstrate seasonal and long-term trends in groundwater elevations. This program was designed to extend the existing network of monitoring by encouraging and coordinating with local entities. As the participation of local entities under CASGEM is voluntary, the program authorizes the Department to directly develop monitoring programs for those basins in which no local entities were willing to participate.<sup>172</sup> To encourage participation, the program terminates the eligibility of counties and their local entities to access water grants or loans awarded by the state if they decline to join

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<sup>168</sup> DEP'T OF WATER RES., *supra* note 165, at 17.

<sup>169</sup> *Groundwater Management*, *supra* note 166.

<sup>170</sup> *Id.*

<sup>171</sup> See CAL. WATER CODE §§ 10920–36, 12924 (West 2018) (enacted November 2009).

<sup>172</sup> *Id.* § 10933.5; see also *id.* § 10927 (providing that authorized local entities include watermasters, groundwater management agencies, water replenishment districts, counties, voluntary cooperative groundwater management associations, etc.).

the program<sup>173</sup>. The ultimate goal of CASGEM is to produce and maintain a database of groundwater information that would be available to the public and that could be used in water supply planning and management.<sup>174</sup>

**ii. SGMA.** In 2014, California adopted the Sustainable Groundwater Management Act to address the overuse and depletion of California’s groundwater basins.<sup>175</sup> Although SGMA represents California’s first attempt to comprehensively regulate the state’s groundwater, SGMA declares its intent to preserve the security of water rights in the state—leaving intact the complex web of private rights to use water described above.<sup>176</sup> In passing SGMA, the legislature declared its intended purposes which include:<sup>177</sup>

- To provide for the sustainable management of groundwater basins including minimum standards;
- To manage groundwater basins through the actions of local governmental agencies while minimizing state intervention;
- To increase groundwater storage and to remove impediments to recharge;
- To minimize subsidence and improve data collection;
- To provide local groundwater agencies with the authority, technical assistance and financial assistance necessary to sustainably manage groundwater (including the power to require registration of groundwater extraction facilities [i.e. wells] and the use of water meters);
- To provide a more efficient groundwater adjudication process that protects water rights and furthers the goals of sustainable groundwater management.

Among other measures to support these goals, SGMA directs the creation of groundwater sustainability agencies (GSA) for each basin.<sup>178</sup> The Department of Water Resources is required to rank each of the basins and sub-basins based on the threat to the basin’s integrity.<sup>179</sup> Once ranked, SGMA mandates the adoption of

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<sup>173</sup> *Id.* § 10933.7.

<sup>174</sup> DEP’T. OF WATER RES., CALIFORNIA STATEWIDE GROUNDWATER ELEVATION MONITORING (CASGEM) PROGRAM: PROCEDURES FOR MONITORING ENTITY REPORTING 4 (2010), <https://www.water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/CASGEM/Files/CASGEM-Procedures-for-Monitoring-Entity-Reporting-Final-121610.pdf>.

<sup>175</sup> CAL. WATER CODE §§ 10720–10737.8.

<sup>176</sup> *Id.* §§ 10720.1(b), 10720.5.

<sup>177</sup> *Id.* §§ 10720.1, 10725.6, 10725.8

<sup>178</sup> *Id.* §§ 10723–24; *see also id.* § 10721(j)–(k) (defining “groundwater sustainability agency” and “groundwater sustainability plan”).

<sup>179</sup> *Id.* §§ 10722.4, 10933(b).

groundwater sustainability plans (GSP) for those basins which the Department of Water Resources deems to be medium or high priority.<sup>180</sup> Each GSP must establish a course of action to eliminate overdraft conditions and other undesirable results, as well as to assure the long-term sustainability of the basin within twenty years of the GSP implementation.<sup>181</sup> All basins classified as medium and high priority must be managed pursuant to a GSP by January 31, 2020.<sup>182</sup> To carry out these mandates, SGMA also grants a range of enforcement authority, as well as the power to collect fees and to impose fines to GSAs.<sup>183</sup>

**2. FRANCE.** Unlike California which adopted the English common law with its reliance on judicial decisions, France has relied on a civil law system that is guided by statutes. The legal history of water law in France does not have the same level of historical complexity as South Africa, nor the convoluted combination of different systems as California. Nonetheless, with the adoption of the Code Napoleon in 1804, France did adopt a riparian approach to the right to use surface waters.<sup>184</sup> Groundwater was treated as “Res Nullius” meaning that it had no owner and could be used by overlying owners without regulation.<sup>185</sup>

**a. SURFACE WATER RIGHTS.** The French approach to riparian rights made a distinction between lands adjacent to public streams and non-public streams.<sup>186</sup> Pursuant to Article 538 of the Civil Code, public streams were treated as part of the public domain and were not susceptible to private ownership.<sup>187</sup> In other words, riparian owners of land adjacent to public streams benefitted from a right of access and of view, but otherwise were treated no differently than other non-riparian owners.<sup>188</sup> France did permit a more expansive definition of riparian land than was accepted in California. In France, riparian owners were permitted to acquire additional land that were non-contiguous with their riparian parcel and, thereafter, irrigate these later acquired parcels.<sup>189</sup> The

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<sup>180</sup> *Id.* § 10720.

<sup>181</sup> *See id.* § 10721(u)–(v).

<sup>182</sup> *Id.* § 10720.7.

<sup>183</sup> *Id.* § 10730–32.2.

<sup>184</sup> Ludwik A. Teclaff, *Private Water Rights in France and in the Eastern United States*, 11 AM. J. COMP. L. 560, 561 (1962).

<sup>185</sup> Corentin Girard, *Local Groundwater Management in France and California*, CAL. WATER BLOG (July 31, 2016), <https://californiawaterblog.com/2016/07/31/local-groundwater-management-in-france-and-california/>.

<sup>186</sup> Teclaff, *supra* note 184.

<sup>187</sup> *Id.* at 562 (explaining that after 1910, France developed a list of public streams which was determinative of their characterization).

<sup>188</sup> *Id.* at 563.

<sup>189</sup> *Id.* at 564.

water in non-public streams is not subject to ownership, so riparian owners are only entitled to limited rights.<sup>190</sup>

The French did adopt the natural flow doctrine which requires that water diverted from the stream to riparian land must be returned to the stream and that lower riparian owners have a right “to receive all naturally flowing water from the upper land.”<sup>191</sup> In France, similar to California law, riparian rights can be lost by adverse possession, but cannot be lost by non-use.<sup>192</sup> Finally, to the extent that water is diverted from public streams, such diversions must be authorized by statute.<sup>193</sup>

**b. GROUNDWATER RIGHTS.** Historically, the French civil code did not directly address groundwater.<sup>194</sup> The legal status has been, therefore, inferred from Article 552 of the Civil Code which provides that ownership of soil includes ownership above and below. In essence, landowners could dig wells and extract water for their overlying land. Similarly, under Article 642 of the Civil Code, land owners had a right to the water from springs on their land that did not form into streams.<sup>195</sup> In short, there are substantial similarities between France and California with respect to the overlying landowner’s right to use groundwater.

**c. STATUTORY AMENDMENTS TO IMPROVE WATER RESOURCE MANAGEMENT.** Like California, the unregulated over-drafting of groundwater basins, together with increased concerns over the adequacy of the water supply led to a series of changes to the traditional rules governing rights to use water.

**i. THE 1964 WATER LAW.** The 1964 Water Law established a water management and distribution scheme that focused on river basin management.<sup>196</sup> This act decentralized water management to the river basin level and provided for the formation of an advisory board for each major basin (Basin Committees) and an executive body (Water Agency) to implement the policy.<sup>197</sup>

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<sup>190</sup> *Id.*

<sup>191</sup> CODE CIVIL [C. CIV.] [CIVIL CODE] arts. 640, 644 (Fr.); *see also* Teclaff, *supra* note 184, at 565.

<sup>192</sup> Teclaff, *supra* note 184, at 568.

<sup>193</sup> *Id.*

<sup>194</sup> *Id.* at 571.

<sup>195</sup> CODE CIVIL [C. CIV.] [CIVIL CODE] arts. 642 (Fr.); Teclaff, *supra* note 184, at 571.

<sup>196</sup> Marine Colon *et al.*, *The Evolution of Water Governance in France from the 1960s: Disputes as Major Drivers for Radical Changes within a Consensual Framework*, 43:1 WATER INTL. 103, 116 (2017), <https://doi.org/10.1080/02508060.2018.1403013>; *see also* Xiaoliu Yang *et al.*, *A Comparison of the Water Management Systems in France and China*, 7 FRONTIERS ENVTL. SCI. & ENGINEERING 721, 724 (2013).

<sup>197</sup> Yang, *supra* note 196. at 724.

At the same time, landowners' rights to extract groundwater for anything other than domestic purposes were subjected to administrative supervision.<sup>198</sup>

**ii. THE 1984 FISHING LAW.** The 1984 Fishing Law regulated the habitats for fresh water fishing and fish-farming. The significant impacts of this law relate to the recognition of the need to include the aquatic environment as a consideration to be addressed by dam managers. This law also mandated that "reserve flows" be established to protect downstream aquatic ecosystems.<sup>199</sup>

**iii. THE 1992 WATER LAW.** The 1992 Water Law represented a major reform in that it defined water resources as unique and classified them as the "common heritage of the Nation" – in effect, reasserting the public's right to the water.<sup>200</sup> In addition, Water Management Master Plans were mandated for six national hydrographic basins.<sup>201</sup> This law initiated an administrative procedure directed at annual individual authorizations to control the amount of water withdrawn.<sup>202</sup> Administrative requirements were added as the volume of water withdrawals increased. Moreover, groundwater withdrawals could be limited when excessive extractions resulted in critical lowering of groundwater levels.<sup>203</sup> The law further mandated that meters be installed to measure and record water usage. To enforce any limitations, the State could terminate withdrawal permits without compensation.<sup>204</sup> The goal of this reform was to balance management of each water resource and its drainage basin while giving priority to drinking water and equitably sharing all water (surface, ground, coastal, etc.) among the different user groups (water utilities, agriculture, fisheries, industry, energy, tourism, aquaculture, as well as the aquatic environments). While this law established lofty goals, the lack of adequate financial and human resources for enforcement made it difficult to control and, in practice, enforcement was unrealistic.<sup>205</sup> Moreover, the state was unwilling to lower previously authorized

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<sup>198</sup> Ludwik Teclaff, *An International Comparison of Trends in Water Resources Management*, 7 Ecology L.Q. 881, 887 (1979) (citing Loi 64-1245 du 16 decembre 1964 relative au régime et à la répartition des eaux et à la lutte contre leur pollution [Law 64-1245 of December 16, 1964 Law Concerning the Regime and Distribution of Waters and Protection Against Pollution], BULLETIN LÉGISLATIF DALLOZ [B.L.D.] [LEGISLATIVE BULLETIN DALLOZ], Dec. 16, 1964, p. 674 (Fr.)).

<sup>199</sup> *Id.*

<sup>200</sup> Girard, *supra* note 185, at 2.

<sup>201</sup> Yves Henocque & Bruno Andral, *The French Approach to Managing Water Resources in the Mediterranean and the New European Water Framework Directive*, 47 MARINE POLLUTION BULL. 155, 156 (2003).

<sup>202</sup> Girard, *supra* note 185, at 2

<sup>203</sup> *Id.*

<sup>204</sup> *Id.*

<sup>205</sup> *Id.* at 3.

withdrawals and the groundwater threshold numbers were reached nearly every year.<sup>206</sup>

**iv. THE 2006 WATER AND AQUATIC ENVIRONMENT LAW.** The 2006 Water and Aquatic Law (the “2006 Law”) was passed to address the practical failures of the 1996 Water Law and to implement the environmental goals set forth in the European Community’s Water Framework Directive (WFD) of October 23, 2000.<sup>207</sup> The 2006 Law mandated that water usage balance with water availability at the local level to assure sustainable supply and that environmental objectives could be met at least four years out of five.<sup>208</sup> The 2006 Law further provided that where there were continuing deficits in the water supply and the mandated balance was not being achieved, a maximum volume of extractable water would be determined.<sup>209</sup> This maximum extractable volume is determined and implemented by local water agencies (Commission Locale de l’Eau or “CLE”) comprised of local stakeholders (or by the state, if the CLE failed to act).<sup>210</sup> A similar program is mandated for areas relying heavily on groundwater extraction (e.g. areas with significant agricultural irrigation). To manage the volume of groundwater extraction, Water User Associations (Organisme Unique de Gestion Collective or “OUGC”) were established to limit the collective groundwater extractions below an established maximum extractable volume.<sup>211</sup> To empower the CLEs and the OUGCs, these entities were authorized to establish their own governance structure, as well as to collect fees, to manage claims among members and to set reduced allocations during periods of drought.<sup>212</sup> Inherent in this process of localizing control over water supply management, however, is the imposition of rules limiting the extent to which property owners can exercise their individual (riparian or overlying) right to use water as they deem reasonable.

## VII. SIMILARITIES AND DIFFERENCES

This section discusses the similarities and differences between South Africa, California and Provence in four separate areas: (1) water scarcity; (2) water supply and infrastructure; (3) water demand management and (4) water law. While each of these regions have significant similarities, they differ most substantially in their respective legal frameworks.

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<sup>206</sup> *Id.*

<sup>207</sup> Yang et al., *supra* note 196, at 224 (explaining that the goals included consistency among the member states and a time table to address environmental water quality standards, as well as to plan and manage resources at the river basin level with the open participation of all stakeholders).

<sup>208</sup> Girard, *supra* note 185, at 3.

<sup>209</sup> *Id.*

<sup>210</sup> *Id.*

<sup>211</sup> *Id.*

<sup>212</sup> *Id.*

## A. CLIMATE-RELATED WATER SCARCITY IN CALIFORNIA AND PROVENCE

South Africa, California and Provence (France) all share a semi-arid Mediterranean climate characterized by growing problems with water scarcity. While each of these regions expects modest rainfall, the water scarcity problems in all three regions are augmented by growing urban populations resulting in greater demand from stakeholders and patterns of more frequent and severe droughts.

**1. CAPE TOWN.** As noted above, South Africa receives extremely uneven rainfall patterns across the country with an average of less than 20 inches of precipitation per year.<sup>213</sup> Cape Town, in particular, enjoys a Mediterranean climate and receives an average of only 18.7 inches of rain per year.<sup>214</sup> Despite this long term average, Cape Town is currently experiencing a drought that has already lasted three years and is not yet over.<sup>215</sup> Moreover, climate trend analysis predicts that “a general pattern of a risk of drier conditions” will prevail over the Western Cape province of South Africa increasing the risk of more frequent droughts.<sup>216</sup> To compound this risk, Cape Town’s population has expanded significantly from 1,609,000 in 1980 to 4,004,793 in 2016—a 149% increase.<sup>217</sup>

**2. CALIFORNIA.** Most of California enjoys a moderate, but semi-arid Mediterranean climate typically characterized by a rainy winter season and a dry summer. With the exception of the western slope of the Sierra Nevada Mountains and the northern coastal range, the state averages between 10 and 20 inches of rain per year.<sup>218</sup> As a result, California receives an overall average annual precipitation of approximately twenty-one inches of which 75% falls in the northern California watersheds, while 80% of the water resource demand lies in the southern

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<sup>213</sup> See COLVIN ET AL., *supra* note 3.

<sup>214</sup> See *Rainfall/Precipitation in Cape Town, South Africa*, CLIMATEMPS.COM, <http://www.cape-town.climatemps.com/precipitation.php> (last visited Apr. 1, 2018).

<sup>215</sup> See Brown, *supra* note 11.

<sup>216</sup> See DEP’T OF ENVTL. AFFAIRS, REPUBLIC OF S. AFR., CLIMATE TRENDS AND SCENARIOS § 4 (2013), <https://www.sanbi.org/sites/default/files/documents/documents/ltas-factsheetclimate-trends-and-scenarios2013.pdf>.

<sup>217</sup> See W. CAPE GOV’T, SOCIO-ECONOMIC PROFILE: CITY OF CAPE TOWN 2 (2016), [https://www.westerncape.gov.za/assets/departments/treasury/Documents/Socio-economic-profiles/2016/City-of-Cape-Town/city\\_of\\_cape\\_town\\_2016\\_socio-economic\\_profile\\_sep-lg.pdf](https://www.westerncape.gov.za/assets/departments/treasury/Documents/Socio-economic-profiles/2016/City-of-Cape-Town/city_of_cape_town_2016_socio-economic_profile_sep-lg.pdf).

<sup>218</sup> See, e.g., *Climate of California*, *supra* note 123; see also *Average Annual Precipitation for Cities in California*, CURRENT RESULTS, <https://www.currentresults.com/Weather/California/average-yearly-city-precipitation.php> (last visited Apr. 1, 2018) (based on data from 1981 to 2010 from the NOAA National Climatic Data Center).

two-thirds of the state.<sup>219</sup> Despite these averages, California has experienced extended and severe droughts over the last two decades.<sup>220</sup> Despite the limitations on available water, California’s population has grown from 23.67 million in 1980 to 39.53 million in 2017—a 67% increase.<sup>221</sup>

**3. PROVENCE.** Like both California and Cape Town, Marseilles and the Provence region also benefit from a moderate, but semi-arid Mediterranean climate. While much of France receives abundant rainfall, Marseilles (Provence) receives a modest average annual rainfall of 24.4 inches.<sup>222</sup> France experienced a significant drought from 2016 through 2017 resulting in low to critically low groundwater levels across the country.<sup>223</sup> Even without the impacts of this particular drought on groundwater levels, regional climate projections indicated that “a trend towards reduced winter snow storage and a shift to earlier snow melting.”<sup>224</sup> Although less dramatic than the growth seen in Cape Town or California, the demands on available water resources are also compounded by the population of the Marseilles urban area which has grown from 1,372,000 in 1980 to 1,641,000 in 2018—a nearly 20% increase.<sup>225</sup>

## B. WATER SUPPLY AND INFRASTRUCTURE

All three jurisdictions face challenges arising from inadequate or failing infrastructure that impairs the ability to efficiently and effectively deliver the quantity of water needed.

**1. CAPE TOWN.** South Africa receives highly uneven rainfall with most of the urban and industrial development at significant distances from

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<sup>219</sup> *The California Water System*, CAL. DEP’T OF WATER RESOURCES, <https://www.water.ca.gov/Water-Basics/The-California-Water-System> (last visited Apr. 1, 2018).

<sup>220</sup> For a discussion of climate change consequences, see Carol J. Miller, *Trumping the Environment: For a Lump of Coal and a Drop of Oil (Review of Trump Administration’s 2017 Energy Policies)*, 36 VA. ENVTL. L.J. (forthcoming Spring 2018).

<sup>221</sup> *Golden State Population Trends*, FT J. (Feb. 21, 2017), <http://journal.firsttuesday.us/golden-state-population-trends/9007/>.

<sup>222</sup> See *Rainfall/Precipitation in Marseilles, France*, CLIMATEMPS.COM, <http://www.marseille.climatemps.com/precipitation.php> (last visited Apr. 1, 2018).

<sup>223</sup> Carmen Cracknell, *Groundwater Levels Critically Low*, CONNEXION (July 20, 2017), <https://www.connexionfrance.com/French-news/Groundwater-levels-critically-low>.

<sup>224</sup> John Andrew & Eric Sauquet, *Climate Change Impacts and Water Management Adaptation in Two Mediterranean-Climate Watersheds: Learning from the Durance and Sacramento Rivers*, 9 WATER 126, 132 (2017).

<sup>225</sup> *Marseille Population 2018*, WORLD POPULATION REV. (Oct. 20, 2017), <http://worldpopulationreview.com/world-cities/marseille-population/>.

South Africa's larger river and streams.<sup>226</sup> To capture and transport this surface water, South Africa has more than 4,395 registered dams across the country, with 350 owned by the government.<sup>227</sup> As a result, nearly 100% of the available surface water has already been allocated.<sup>228</sup>

The NWRS2 acknowledges that water is scarce and surface water sources are limited with the cost of additional infrastructure becoming prohibitive. Under the NWRS2 and to meet the "huge water demands for equitable allocation for development and economic growth", South Africa is considering alternative sources including water re-use, desalination, groundwater utilization, water conservation and water demand management measures, rain water harvesting, recovering water from acid mine drainage and the import of water intensive goods. In addition, the NWRS2 also prescribes an increased emphasis on reducing water loss (also commonly referred to as "non-revenue water"). In short, South Africa (and Cape Town in particular) recognizes the need for substantial infrastructure investment to increase water resiliency in times of drought.

**2. CALIFORNIA.** As a result of the uneven distribution of California's rainfall, the state relies on an extensive system of dams, reservoirs, diversions and canals to transport water across the state to meet the localized demands. The state has over 1,400 dams and 1,300 reservoirs which are dominated by three major systems: the State Water Project, the Central Valley Project and the Colorado River.<sup>229</sup> The State Water Project alone is a water storage and delivery system that transports water across more than 700 miles. The federal Central Valley Project is a separate water storage and delivery system that transports water across 400 miles and manages approximately nine million acre-feet of water.<sup>230</sup> Finally, the Colorado River Aqueduct delivers as much as 1.2 million acre-feet of water across 242 miles from Lake Havasu to the Greater Los Angeles Basin.<sup>231</sup>

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<sup>226</sup> Basson, *supra* note 3, at 1.

<sup>227</sup> DEP'T OF WATER & SANITATION, *supra* note 3, at 29.

<sup>228</sup> CHANGING MKTS., ACTIONAID S. AFR., RUNNING ON EMPTY: WHAT BUSINESS, GOVERNMENT AND CITIZENS MUST DO TO CONFRONT SOUTH AFRICA'S WATER CRISIS 17 (2016), [http://www.actionaid.org/sites/files/actionaid/running\\_on\\_empty\\_-\\_water\\_efficiency\\_report.pdf](http://www.actionaid.org/sites/files/actionaid/running_on_empty_-_water_efficiency_report.pdf).

<sup>229</sup> *The California Water System*, *supra* note 219; see also George Skelton, *Does California Really Need More Dams? We're Running Out of Places to Put Them*, L.A. TIMES (Feb. 20, 2017), <http://www.latimes.com/politics/la-pol-sac-skelton-california-water-capture-dams-20170220-story.html>.

<sup>230</sup> *About the Central Valley Project*, BUREAU OF RECLAMATION, <https://www.usbr.gov/mp/cvp/about-cvp.html> (last updated Apr. 18, 2017).

<sup>231</sup> *Imported Sources of Supply*, METROPOLITAN WATER DISTRICT OF SOUTHERN CAL., <http://www.mwdh2o.com/AboutYourWater/Sources%20Of%20Supply/Pages/Imported.aspx> (last visited Apr. 1, 2018).

Although the surface water managed in these systems can be delivered across tremendous distances, the control over and benefit of that water is largely controlled under long-standing California law by private and quasi-public interests.<sup>232</sup> Moreover, in periods of drought, the volume of available surface water drops to the point that many holding junior water rights lose access to the surface water on which they had relied. Accordingly, for those who do not have sufficient rights to water from these systems, the natural recourse has been to extract groundwater as needed. The recent five-year drought from 2012 through 2016, together with the projections of a changing climate which can reduce the essential winter snowpack on which California relies, has water managers and politicians alike exploring how to better manage the state's water resources.

California's infrastructure challenges are compounded by the long-term failure to maintain its water infrastructure.<sup>233</sup> The U.S. Environmental Protection Agency (EPA) has projected that California needs more than 31 billion dollars for water related improvements over the next twenty years for the transmission and distribution of water alone.<sup>234</sup> The EPA projects an additional 20 billion dollars needed for projects to address water treatment, storage, source development and other related needs.<sup>235</sup>

**3. PROVENCE.** With geography that is analogous to that of California, Provence obtains most of its surface water from the precipitation and snow pack in the Alps extending north along the eastern edge of the basin which must then be transported to its stakeholders.<sup>236</sup> Marseilles lies within the Rhone and Coastal Mediterranean River Basin District, which is the second largest in France (covering 120,427 km<sup>2</sup>).<sup>237</sup> Despite being part of such a large River Basin District, Marseilles receives the vast majority of its water from the Canal de Provence (from the Durance River), the Verdun River and the Canal de Marseille. To improve resiliency to water shortages, these systems are interconnected. This network, comprising 700 km of canals, tunnels, and aqueducts, delivers water to

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<sup>232</sup> See, e.g., CAL. CONST. art. X, § 2 (establishing riparian and beneficial use rights).

<sup>233</sup> See e.g. U.S. Environmental Protection Agency: *Drinking Water Infrastructure Needs Survey and Assessment – Sixth Report to Congress* (March 2018), [https://www.epa.gov/sites/production/files/2018-03/documents/sixth\\_drinking\\_water\\_infrastructure\\_needs\\_survey\\_and\\_assessment.pdf](https://www.epa.gov/sites/production/files/2018-03/documents/sixth_drinking_water_infrastructure_needs_survey_and_assessment.pdf)

<sup>234</sup> *Id.* at 36.

<sup>235</sup> *Id.*

<sup>236</sup> Andrew & Sauquet, *supra* note 224, at 7.

<sup>237</sup> EUROPEAN COMM'N, COMMISSION STAFF WORKING DOCUMENT ACCOMPANYING THE DOCUMENT REPORT FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT AND THE COUNCIL ON THE IMPLEMENTATION OF THE WATER FRAMEWORK DIRECTIVE (2000/60/EC) RIVER BASIN MANAGEMENT PLANS 2 (2012), [http://ec.europa.eu/environment/water/water-framework/pdf/3rd\\_report/CWD-2012-379\\_EN-Vol3\\_FR.pdf](http://ec.europa.eu/environment/water/water-framework/pdf/3rd_report/CWD-2012-379_EN-Vol3_FR.pdf).

two million people nearly ninety kilometers away.<sup>238</sup> Although extensive, this network and the resiliency that it provides is still at the mercy of the precipitation and snow pack in its watershed.

### C. WATER CONSERVATION AND WATER DEMAND MANAGEMENT

To differing degrees, water managers in Cape Town, California and Provence are exploring a wide range of measures to augment the available resources and to improve water resiliency. Each of these jurisdictions has launched substantial programs to identify problems and to plan solutions to manage the identified risks. In doing so, each has recognized the need and, to some extent, implemented structural changes to provide more localized planning, management and control to local water users based on more hydrologically sound divisions (e.g. river basin and aquifer level management). In transferring planning and management functions to more localized control, each of these jurisdictions is using financial incentives, as well as the establishment of guidelines and goals as a means of achieving a measure of consistency with the broader policy concerns at the state level.

**1. CAPE TOWN.** To address the scarcity issues, Cape Town has pursued a lengthy list of technical interventions through its Water Conservation and Water Demand Management programs that have included the following: district metered areas, pressure management, treated effluent use, water pipe replacement, active leak detection and repair, water management devices, meter replacement, zone metering and building plumbing retrofits.<sup>239</sup> The savings achieved by these measures have been substantial – reaching as much as 30 million liters per day.<sup>240</sup> Cape Town’s water conservation measures are so comprehensive that they earned the C40 Cities award in 2015.<sup>241</sup> While certainly necessary and helpful, these savings have not been enough to offset the deficits resulting from the prolonged drought, nor the prospect of further impacts from shifts in climate patterns.<sup>242</sup>

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<sup>238</sup> See Robert Arnoux, *Canal de Provence: A Most Precious Resource*, ITER (Nov. 10, 2008), <https://www.iter.org/newsline/57/61>.

<sup>239</sup> Zolile Basholo, OVERVIEW OF WATER DEMAND MANAGEMENT INITIATIVES: A CITY OF CAPE TOWN APPROACH AT 14 (2016), <http://greencape.co.za/assets/Sector-files/water/Water-conservation-and-demand-management-WCDM/CoCT-WCWDm-presentation-Z-Basholo-Western-Cape-Water-Forum-160204-2016.pdf>; see also CAPE TOWN LONG-TERM CONSERVATION AND WATER DEMAND STRATEGY at 84 (2007), <http://greencape.co.za/assets/Sector-files/water/Water-conservation-and-demand-management-WCDM/CoCT-Long-term-water-conservation-and-water-demand-management-strategy-2007.pdf>

<sup>240</sup> *Id.* at 24.

<sup>241</sup> See C40 Cities, *supra* notes 20 & 21.

<sup>242</sup> See Cape Bus. News, *supra* note 22.

2. **CALIFORNIA.** California has approached its water conservation mandates on a more limited basis. For example, during the (2012 to 2016) drought, the state called for a 20% voluntary reduction in use, followed by orders to ban lawn watering within 48 hours after measurable rain, limiting lawn watering to two days per week, requiring hotels to notify guests that they have the option not to have linens washed daily and requiring restaurants to provide water only upon request.<sup>243</sup> When this approach failed to generate the targeted savings of 25%, the State Water Resources Control Board passed Resolution 2015-0032 to promote the use of rates and pricing structures to increase conservation, as well as the implementation of short-term conservation efforts, such as landscape conversions and installation of efficient appliances.<sup>244</sup> The state water board, however, limited the impact of the mandated conservation goals by permitting urban water suppliers to subtract water delivered for commercial agriculture from total potable water production under certain circumstances.<sup>245</sup>

#### **D. THE IMPACT OF WATER RIGHTS ON WATER SCARCITY**

To work toward these goals and find solutions, South Africa, California and France each must face the issues related to stakeholders' legal rights to use water.

1. **CAPE TOWN.** Over the course of its history, South Africa has experimented with and rejected numerous different legal models relating to water rights. As discussed in Section IV above, South Africa has now cleared its path of individual property rights in water by constitutional declaration that such rights have reverted to the state and are all held in public trust. Accordingly, in theory, historical water rights do not represent a limitation on the water managers' authority to equitably distribute an essential and limited resource. Nonetheless, the economic concerns of the well-established stakeholders create significant political

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<sup>243</sup> Paul Rogers, *California: New Mandatory Water Conservation Rules for Lawns, Hotels and Restaurants*, THE MERCURY NEWS (March 17, 2015), <https://www.mercurynews.com/2015/03/17/california-new-mandatory-water-conservation-rules-for-lawns-hotels-restaurants/>.

<sup>244</sup> STATE WATER RESOURCES CONTROL BD., STATE OF CAL., Res. No. 2015-0032 (May 5, 2015), [https://www.waterboards.ca.gov/waterrights/water\\_issues/programs/drought/docs/emergency\\_regulations/rs2015\\_0032\\_with\\_adopted\\_regs.pdf](https://www.waterboards.ca.gov/waterrights/water_issues/programs/drought/docs/emergency_regulations/rs2015_0032_with_adopted_regs.pdf); see also Cal. Exec. Order No. B-29-15 (April 1, 2015), [http://www.waterboards.ca.gov/waterrights/water\\_issues/programs/drought/docs/040115\\_executive\\_order.pdf](http://www.waterboards.ca.gov/waterrights/water_issues/programs/drought/docs/040115_executive_order.pdf).

<sup>245</sup> *Id.* See also STATE WATER RESOURCES CONTROL BD., STATE OF CAL., Agricultural Water Use Exclusion Requirements (imposing reporting requirements, submission of a certification and the imposition of water use reductions on water delivered to its commercial agricultural users as determined locally by the supplier), [http://www.waterboards.ca.gov/water\\_issues/programs/conservation\\_portal/docs/ag\\_exc\\_reqs\\_for\\_m.pdf](http://www.waterboards.ca.gov/water_issues/programs/conservation_portal/docs/ag_exc_reqs_for_m.pdf)

and financial challenges to fully realizing a separation from historical property rights and perceived entitlements over water usage.

2. **CALIFORNIA.** By contrast and as addressed in section VI.B above, California has adapted its legal structure incrementally over time to address the demands of stakeholders in their pursuit of their economic imperatives. While California has a constitutional provision recognizing the public trust doctrine, the state has carefully avoided any action that would challenge the perceived property rights of the stakeholders. Instead, California has relied on crisis management to find the support necessary to begin a more considered approach to water supply management at the basin level. As California confronts the conflict between the assertion of individual stakeholder property rights in water and the need to more efficiently and effectively make use of the limited water supply, the stakeholders are holding fast to their claims. The interim solution being promoted by the stakeholders is to develop a secondary market in water to facilitate private or quasi-governmental transfers of water among stakeholders. In other words, in California, claims of private rights to water remain an impediment to any reallocation based on priorities established by the state.

3. **PROVENCE.** In France, the legal rights in water do not lie at the extremes represented by South Africa or California. As part of the European Community, France is realigning its laws to give effect to the Community's considered guidelines on water issues. As part of this process, France has recognized the need to relinquish direct state level control back to the basin level stakeholders. Nonetheless, the state is mandating that the stakeholders find solutions to meet the overarching goals and competing demands. Although stakeholders have been resistant from a practical perspective, they now are involved in the local level decision making that may infringe on their historical rights to use water.

## **VIII. CONCLUSION**

All three countries face similar problems but face significantly different challenges arising from their unique historical attachment to individual rights to own or use water. Each jurisdiction has provision for a public trust over water, but each has placed a different level of reliance on that doctrine. In the end, all three jurisdictions must find an efficient and effective means to reallocate the limited water supply in way that addresses the priorities as they grow and change over time.

Stakeholder rights to use water represent an additional layer of complexity that further exacerbate the difficult political and economic decisions and priorities that must be faced. All too commonly, however, the legal frameworks provided lag behind the real-world need and continue to evolve as new challenges arise.

While South Africa has been most aggressive in its effort to eliminate the historical legal limitations on its authority to address the inequitable distribution of an essential and limited resource, as well as to better manage, conserve, use and develop that resource, the enlightened legal amendments are clearly not sufficient by themselves. Without these limitations, South Africa is now free to prioritize, allocate and manage water based on those equitable principles that it deems to be in the best interests of the beneficiaries – all interested stakeholders. Despite this apparent freedom to act, South Africa still faces political and financial limitations that have prevented the fully effective implementation of its water resource management goals including expansion of water delivery systems to historically disadvantaged segments of the population. By contrast, California is still heavily constrained by its legal structure around water rights, as well as the political and financial obstacles that constrain innovative solutions. While California has well developed access to water, the state has ignored the aging condition of its water systems.

Commentators have speculated that the rapid repetition of election cycles incentivizes political self-preservation and promotes short-term thinking.<sup>246</sup> Moreover, with elected officials responsible for allocating funding, it is difficult for local water agencies to recommend rate increases and long-term spending plans that are sufficient to meet the long-term needs.<sup>247</sup> To the extent that bond financing is used to fund projects, all associated costs should be factored into the pricing structure of the water used to assure that it is equitably allocated.

It is time to explore new and appropriate political and funding models that prioritize long-term planning and solutions. These models should permit more rapid and reliable execution of the projects that must be completed to provide the water resiliency necessary to meet the water needs during periods of drought and to improve the equitable allocation of a scarce and essential resource. The problems are clearly complex and the solutions will require an integrated approach that addresses not only the legacy legal issues, but also the financial and political dynamics that have restricted long-term and innovative solutions.

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<sup>246</sup> Silke, *supra* note 117; *see also* Water Education Foundation, *A Report on Addressing California's Water Infrastructure Needs* at 39 (2012), [http://www.watereducation.org/sites/main/files/file-attachments/water\\_leaders\\_report\\_2012.pdf](http://www.watereducation.org/sites/main/files/file-attachments/water_leaders_report_2012.pdf).

<sup>247</sup> Water Education Foundation *supra* note 246 at 45.