

LIQUID BUSINESS

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There are plenty of forces pushing water to be the new oil as it becomes scarcer due to climate change and increases in demand as a result of population growth and lifestyle changes. These forces may be unstoppable. In addition to traditional water rights exchanges, water markets include, among others, large multinational conglomerates bidding for our water utilities, investment in water reuse, and specialized investment funds purchasing interests in water-related companies. These lucrative investments in water sidestep traditional water law doctrines aimed at preventing speculation and ensuring that externalities are internalized, are profiting from regulatory gaps, and many perceive them as commodifying and corporatizing an essential and common good—water.

Scholarship on water markets broadly understood is either in favor of free markets or set against any form of market. This article instead offers a portfolio of measures to ensure that water markets are properly regulated. Water markets can be a positive tool for water management ensuring that scarce water ends up in the hands of those who value it the most. This does not need to come at the expense of the fulfilment of the human right to water, the community of origin, or the environment. Among the measures analyzed, there is the joint management of surface and groundwater and the limit on who can hold a water right and how much water can a water right holder be entitled to.

Mark Twain purportedly said that, “Whisky is for drinking and water is for fighting.” Water scarcity will certainly cause fights as there will not be enough water for all users. Markets can help reallocation but law must be the risk that corporate interests may cause efficiency and fairness losses when disrupting current water allocation.

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I. INTRODUCTION ¹

¹ This introduction is a version of the essay published as part of *Environmental Law Disrupted*, 49 ENVTL. L. REPORTER 10038 (2019). Also available as a blog post: Vanessa Casado Perez, *Liquid Business*, ENVIRONMENTAL LAW PROF BLOG (Nov. 13, 2018),

The aphorism water is the new oil² is now truer than it has ever been. While many use the phrase to suggest that water is as scarce and valuable as oil once was, it is also true in another sense: speculation in water markets now rivals speculation in oil markets. Oddly, however, water scarcity has not translated into a higher price for water, as it has done in oil. But this anomaly may be on the verge of changing as international investors start to enter the business of climate change.³ From oil tycoons like T. Boone Pickens⁴ or the Bass brothers⁵ to international hedge funds,⁶ investment in all things water is on the rise. And while many deny climate change, the market does not. Since climate change is widely expected to induce scarcity in water supplies, business investments in the water market are increasing rapidly.⁷

The alarm has gone off. Those who believe markets should not commodify water are appalled by the role that investment moguls play: all the investments in the water business may lead to price increases for water. There is some merit in valuing water as a scarce resource so that we do not misuse it. The more expensive it is, the shorter our showers would be and the more thoughtful the choice of crops and irrigation techniques would be.

https://lawprofessors.typepad.com/environmental_law/2018/11/liquid-business.html

² See Julian Brookes, *Why Water is the New Oil*, ROLLING STONE (July 7, 2011, 11:20 AM), <https://www.rollingstone.com/politics/politics-news/why-water-is-the-new-oil-198747/>; Andrew Ward, *Water set to become more valuable than oil*, FINANCIAL TIMES (March 19, 2019), <https://www.ft.com/content/fa9f125c-0b0d-11e7-ac5a-903b21361b43>; Steven Solomon, *Water is the New Oil*, HUFFINGTON POST (Mar. 18, 2010, 5:12 AM), https://www.huffingtonpost.com/steven-solomon/water-is-the-new-oil_b_380803.html; David Wethe, *Water Is Almost as Precious as Oil in the Permian Basin*, BLOOMBERG (Jan. 24, 2019), <https://www.bloomberg.com/news/articles/2019-01-24/ranch-fetches-33-million-and-proves-water-is-red-hot-commodity>.

³ MCKENZIE FUNK, WINDFALL: THE BOOMING BUSINESS OF GLOBAL WARMING (2014). Nonetheless, the very term “water market” is ambiguous. Those who criticize water markets often conflate trading of water rights with privatization of water utilities. That is a mistake. It is both too broad, in that it encompasses more than trading the water itself, and too narrow, in that water investors look beyond water rights and water utilities to things like water conservation and wastewater. VANESSA CASADO PEREZ, THE ROLE OF GOVERNMENT IN WATER MARKETS, 15-16 (2017).

⁴ Sandi Zellmer, *The Anti-Speculation Doctrine and Its Implications for Collaborative Water Management*, 8 NEV. L.J. 994, 999 (2008).

⁵ Peter Passell, *A Gush of Profits From Water Sale?*, N.Y. TIMES (Apr. 23, 1998), <https://www.nytimes.com/1998/04/23/business/a-gush-of-profits-from-water-sale.html>.

⁶ Abrahm Lustgarten, *A Free-Market Plan to Save the American West From Drought*, ATLANTIC (March 2016), <https://www.theatlantic.com/magazine/archive/2016/03/a-plan-to-save-the-american-west-from-drought/426846/>.

⁷ Zellmer, *supra* note 4, at 995.

Today we do not put a price on scarcity; water bills reflect only transportation costs. Paying water's true value will make everyone more conscious of the choices we make.

But using the market to allocate water also gives rise to, among others, the following concerns: the affordability crisis for low income populations, the disregard for the environment, and the inability to capture certain intangible values, mainly the communitarian values water embeds, in a single monetary price.⁸ The first concern is often answered by saying that the amount of water needed to satisfy our basic needs is around 1% of the total water used so we could let the market deal with the rest and figure out how to allocate the 1% cheaply.⁹ Environmental regulations, such as water quality or minimum instream flows, could partly address the second. Protection of areas of origin has imperfectly answered the third.¹⁰

While the answers to these concerns may not be reassuring, we should take comfort in the fact that water rights markets are heavily regulated to prevent externalities and that water is somewhat speculation-resistant,¹¹ at least compared to oil. Not only is water expensive to transport, but water regimes have built-in mechanisms to prevent speculation.

Water rights can be traded in the Western United States and in other jurisdictions such as Australia or Chile. Trade includes leases and sales of water rights that give the buyer the right to use water if it is available. Transactions are often subject to the approval of an administrative agency and are not approved if they injure third parties or the environment. Water rights are defined across several variables, including the point of diversion and the type of use. A transaction will normally imply a change in either or

⁸ Vanessa Casado-Pérez, *Missing Water Markets: A Cautionary Tale of Governmental Failure*, 23 N.Y.U. ENVTL. L.J. 157, 164 (2015).

⁹ Vanessa Casado Perez, *Go with the Flow: Lessons from Water Management and Water Markets*, in GOVERNING ESSENTIAL RESOURCES IN ACTION 241 (2016). See also Buzz Thompson, *Water as a Public Commodity*, 95 MARQUETTE L. REV. 17, 38 (2011).

¹⁰ Lawrence J. MacDonnell & Charles W. Howe, *Area-of-Origin Protection in Transbasin Water Diversions: An Evaluation of Alternative Approaches*, 57 U. CO. L REV. 617 (1985)

Dan Tarlock, *Reconnecting Property Rights to Watersheds*, 25 WM. & MARY ENVTL. L. & POL'Y REV. 69 (2000).

¹¹ Zellmer, *supra* note 4, at 997-98.

both of those variables. Before a transaction takes place, a water agency ensures that those changes will not affect other users or the ecosystem. A common transaction might be one between an agricultural right holder and an urban consumer, because the latter often has a higher willingness to pay and a less elastic demand curve. In the Western United States, these types of transactions have brought flexibility to water allocation systems, where the majority of water rights were allocated when agriculture was the main economic activity and large cities and suburban areas with luscious lawns had not developed. Those transactions should make the farmer realize the opportunity cost of using water. But as a result of the review procedure these exchanges imply high transaction costs. Those transaction costs are even higher when water, inherently a local good, needs to be transported. Thus, speculators may be dissuaded.

Another barrier against speculation, and more relevant for the purposes of speculation, is the forfeiture provision included in all prior appropriation states and many other jurisdictions. Forfeiture of unused rights is based on the idea that we allow private parties rights over what is a common resource, water, only for productive purposes and sitting on your rights to increase your profit is not a productive purpose under this reasoning. These forfeiture provisions mandate that holders of water rights use the water. If they do not use it for a certain period, usually around five years, they may lose the water right.¹² So unlike with real estate or stocks and bonds, where owners can wait for the market to peak and then sell their assets, in water markets, owners cannot engage in this kind of wait-and-see. That said, if water becomes valuable enough, investors may find a way around these rules. One company, Water Asset Management, is taking that route by considering land as an accessory. It focuses on water itself but to get to it, it buys land and it tries to make use of the land to break even.¹³

These constraints in water markets have driven investments toward related industries, such as water conservation technology, water utilities, or reuse. These new investments in water escape the control to which water rights and water rights exchanges are subject in order to prevent negative

¹² Zellmer, *supra* note 4, at 1005.

¹³ Lustgarten, *supra* note 6.

externalities on third parties and making speculation possible. New investments in water are growing and regulation has not kept up. New responses to these new investments are direly needed. This paper offers them.

The literature on exchanges of water rights is divided in three groups, two at the extremes and a policy oriented one. On the one side, free-market environmentalists defend markets for the allocation of any natural resource as a better method than administrative allocation.¹⁴ On the other, there are those who believe that water should never be subject to market rules.¹⁵ In between, there is a third group who looks at markets as one of the tools in the water management toolkit and focus on how to structure them.¹⁶ The literature on water markets broadly understood, which encompass far more than water rights exchanges, is not dominated by legal academics, but it presents a similar division. There are scholars at both extremes—pro-markets¹⁷ and against commodification¹⁸—, but the middle group is

¹⁴ See James L. Huffman, ‘Institutional Constraints on Transboundary Marketing,’ in TERRY L. ANDERSON AND PETER J. HILL (EDS), *WATER MARKETING. THE NEXT GENERATION*, AT 32 (1997); TERRY L. ANDERSON AND DONALD R. LEAL, *FREE MARKET ENVIRONMENTALISM* (2001); TERRY L. ANDERSON AND PAMELA SNYDER, *WATER MARKETS. PRIMING THE INVISIBLE PUMP*, AT 7 (1997). Other works in this trend might be cited, including Huffman; James L. Huffman, *Water marketing in western prior appropriation states: a model for the East*, 21 GA. ST. U. L. REV. 429 (2004); James L. Huffman, *Markets, Regulation, and Environmental Protection*, 55 MONT. L. REV. 425 (1994); Andrew P. Morriss, *Real People, real resources, and real choices: the case for market valuation of water*, 38 TEX. TECH L. REV. 973, 983 (2006); Rodney T. Smith, *Trading water: An Economic and Legal Framework for Water Marketing* (Council of State Planning Agencies, 1988); Mateen Thobani, ‘Tradable Property Rights to Water. How to improve water use and resolve water conflicts,’ 34 PUBLIC POLICY FOR THE PRIVATE SECTOR 1 (1995).

¹⁵ Norman W. Spaulding III, *Commodification and Its Discontents: Environmentalism and the Promise of Market Incentives*, 16 STAN. ENV’T L.J. 293 (1997); Michael C. Blumm, *The Fallacies of Free Market Environmentalism*, 15 HARV. J. L. & PUB. POL’Y 371, 375 (1992); Joseph W. Dellapenna, ‘The Importance of Getting Names Right: The Myth of Markets for Water,’ 25 WM. & MARY ENV’T L. POL’Y 317 (2000).

¹⁶ Joseph L. Sax, *Understanding Transfers: Community Rights and the Privatization of Water*, 14 HASTINGS W.-N.W. J. ENV’T L. & POL’Y 33 (2008), Barton Thompson, Jr., *Institutional perspectives on water policy and markets*, 81 CAL. L. REV. 671 (1993); Robert Glennon, *Water Scarcity, Marketing, and Privatization*, 83 TEX. L. REV. 1873 (2005) (advocating for a community perspective in water markets in order to channel the potential externalities); see also Robert Glennon, ‘The Quest for More Water; Why Markets are Inevitable,’ Perc Reports (September 2006), <http://perc.org/articles/quest-more-water> (hereinafter, Glennon, *The Quest*).

¹⁷ FREDRIK SEGERFELDT, *WATER FOR SALE* (2005)

¹⁸ MAUDE BARLOW & TONY CLARKE, *BLUE GOLD: THE FIGHT TO STOP THE CORPORATE*

somewhat missing. This paper aims at offering water regulatory tools to fill that middle gap from a legal perspective.

Accordingly, this paper does not try to answer the complex and multi-faceted question on whether water should be a commodity like oil. To an extent, some of the forces pushing water towards commodification are unstoppable. This paper answers the question of whether there is something that water law could do to mitigate the negative externalities that may arise from this new money flowing into water markets and ensure a certain fairness, where fairness is a concern, in the allocation of water. This paper shows how states could use their water law to tackle some of the problems presented by water markets.

In section V, this paper presents a portfolio of water law measures to ensure the internalization of negative externalities and to address some of the distributional concerns. No matter where someone stands on the debate on water as a public commodity, everyone would agree that negative externalities should be internalized. In addition, even though some may advocate for allowing markets to allocate water, as a society, we seem to be wary because we consider water to be different than other commodities because everybody needs it. This view of water is shown in the constitutional broad proclamations that water is of the public or in our acceptance of pervasive subsidies to the agricultural sector and to households.

Regulation of groundwater and wastewater are good examples of the measures the paper proposes to close regulatory gaps and ensure that investors profiting from water do not create third party externalities. Groundwater should be subject to a permit system like surface water is.¹⁹ Investment companies are keen on exploiting lax regulations and have noticed that in many places groundwater may be more readily accessible as an investment.²⁰ The separate regulation of a unique resource, that is, the

THEFT OF THE WORLD'S WATER (2005).

¹⁹ Barton H. Thompson Jr, *Beyond Connections: Pursuing Multidimensional Conjunctive Management*, 47 IDAHO L. REV. 273, 275 (2011).

²⁰ Tate Dwinell, *T. Boone Pickens Invests in Water—Should You?*, SEEKING ALPHA (Jan. 17, 2007, 3:55 PM), <https://seekingalpha.com/article/24410-t-boone-pickens-invests-in-water-should-you>.

separate regulation of surface and groundwater denies the science and makes both, given their interconnection, overexploited. Similarly, wastewater regulation needs to be properly designed. As it stands today, return flow belongs to the user who diverted the water. A city may have a water right and divert water from the river. The city does not consume all of the water. It usually treats the wastewater and sends it back to the river, where downstream users use it. But if a city decided to reuse wastewater before bringing it back to the river, it could do so, leaving downstream users without the water they have relied on for decades.²¹ In some jurisdictions, cities may be able to not only re-use it in their area but sell the water as a commodity because cleaned up wastewater has been considered a new product.²² While incentives to invest in reuse are paramount, water regulations need to better address the effect on downstream users and the ecosystem needs.

To address the fear that water's fate will be decided by a few players, regulators could limit the number of water rights a single entity could accumulate. Concentration in a few players has efficiency and fairness dimensions. Efficiency is compromised if the market is not competitive enough but generally we rely on antitrust regulations to deal with monopolistic practices that harm the consumer. The concern in natural resources is often closely related to the protection of smaller users, such as family farms. It remains to be seen whether a far more distributed allocation has larger social benefits than an allocation between a few large-scale companies. Water law can take a page from other natural resources markets and avoid concentration by limiting the amount of water rights that can be accumulated in the same hands. In fisheries' individual transferable quotas' programs, there are limits on the shares of the total allowable catch that a single ITQ owner can acquire.²³

An adage seems appropriate to close this introduction. Mark Twain purportedly said that, "Whisky is for drinking and water is for fighting." Water scarcity will certainly cause fights as there will not be enough water

²¹ Vanessa Casado Perez, *Inefficient Efficiency: Crying Over Spilled Water*, 46 ENV'T L. REP. 11046 (2016).

²² See *infra* note 219.

²³ Katrina Wyman, *Second Generation Property Rights*, NAT. RESOURCES J. (forthcoming 2019) (on file with author).

for all users. Companies see water as ripe for business and maximizing its value is essential. But the question that lingers is whether water law can put up a fight and reduce the risk that corporate interests may disrupt the water regulatory regime.²⁴ Water markets broadly understood must be regulated markets. Water already is and may continue to be a commodity, but the portfolio of measures presented in this piece should make it a public commodity, recognizing that water is special, essential, and irreplaceable.²⁵

Section II explains the reasons why water has become an attractive commodity. Section III explores the different ways investment is pouring into water, from investing in related industries to investing in water as an asset. Section IV describes the perceived negative effects from the private investment in water, and Section V sketches potential measures that could mitigate those concerns.

II. WHY IS WATER SO ECONOMICALLY VALUABLE?

Water is essential. It is considered an “axis resource” because it underlies all others,²⁶ particularly all the drivers of growth.²⁷ Water is getting scarcer. Water scarcity is a function of supply and demand. While water demands are increasing because of population growth and changes in lifestyle, water supply is dwindling. An average American uses about 100 gallons a day at home,²⁸ however, his water footprint is much larger, up to 2,200 gallons a day²⁹ once we take into account water needed for products he consumes. For example, a pound of beef requires 1,799 gallons of water, and the average

²⁴ Warren identifies this risks of the corporatization of energy markets in Gina S. Warren, *1-Click Energy: Managing Corporate Demand for Clean Power*, 78 MD. L. REV. 101 (2019).

²⁵ Thompson, *supra* note 9, at 17–18.

²⁶ ALEX PRUD’HOMME, *THE RIPPLE EFFECT: THE FATE OF FRESHWATER IN THE TWENTY-FIRST CENTURY* 4 (2012).

²⁷ *Global Water Initiative*, WORLD ECON. F., <https://www.weforum.org/projects/global-water-initiative>.

²⁸ *Water Questions & Answers*, USGS, <https://water.usgs.gov/edu/qa-home-percapita.html> (last updated Dec. 2, 2016).

²⁹ *Water Footprint Comparisons by Country*, WATER FOOTPRINT CALCULATOR (May 22, 2017), <https://www.watercalculator.org/footprints/water-footprints-by-country/>.

American consumes 222.2 pounds of meat a year.³⁰ Furthermore, an average American drinks 167 plastic water bottles a year,³¹ more than 39 gallons of bottled water, making the water bottle business a profitable one. In fact, nowadays, the average American drinks more bottled water than he drinks soda.³² As other countries' lifestyles become more similar to the U.S.,³³ the pressure on already scarce global water resources increases.

On the supply side, people often live in areas where water is not readily available. For a long time, we have relied on large infrastructure projects to ship water from humid areas to dry areas. Supply is threatened both by the quality of that infrastructure and by climate change. Water and wastewater infrastructure have received grades of D³⁴ and D+,³⁵ respectively, in the last scorecard of the American Society of Civil Engineers. This institution estimates that an investment of more than \$1 trillion in water distribution infrastructure is necessary to meet the demand for the next 25 years.³⁶ Water infrastructure provision is one of the areas where the private sector is investing. Furthermore, given the level of capital investment necessary, this is one of the justifications for the water sector to privatize traditional public functions.

Regarding the effects of climate change, the Intergovernmental Panel on

³⁰ Megan Durisin & Shruti Date Singh, *Americans' Meat Consumption Set to Hit a Record in 2018*, SEATTLE TIMES (Jan. 2, 2018, 8:38 PM), <https://www.seattletimes.com/business/americans-meat-consumption-set-to-hit-a-record-in-2018/>.

³¹ Charles Fishman, *Message in a Bottle*, FAST CO. (July 1, 2007), <https://www.fastcompany.com/59971/message-bottle>.

³² *Americans Drank More Bottled Water than Soda in 2016*, CNBC (Mar. 10, 2017, 5:39 AM), <https://www.cnbc.com/2017/03/10/americans-drank-more-bottled-water-than-soda-in-2016.html>.

³³ Marcello Rossi, *Will China's Growing Appetite for Meat Undermine Its Efforts to Fight Climate Change?*, SMITHSONIAN.COM (July 30, 2018), <https://www.smithsonianmag.com/science-nature/will-chinas-growing-appetite-for-meat-undermind-its-efforts-to-fight-climate-change-180969789/>.

³⁴ DRINKING WATER, INFRASTRUCTURE REPORT CARD 1 (2017), <https://www.infrastructurereportcard.org/wp-content/uploads/2017/01/Drinking-Water-Final.pdf>.

³⁵ WASTEWATER, INFRASTRUCTURE REPORT CARD 1 (2017), <https://www.infrastructurereportcard.org/wp-content/uploads/2017/01/Wastewater-Final.pdf>.

³⁶ DRINKING WATER, *supra* note 34, at 1. "\$1 trillion is necessary to maintain and expand service to meet demands over the next 25 years." *Id.*

Climate Change predicts that more people are going to live in water stressed regions of the world in 2050, and in those regions, water supply is going to drop an additional 10% due to climate change related impacts.³⁷ The straightforward impacts of climate change are well known: a raise in temperature translates into more evaporation of water and more droughts because of a decrease in rainfall and snowpack.³⁸ Less obvious is the decrease in available, clean, freshwater as a result of the decrease in water quality.³⁹ Increased precipitation in certain areas will translate to more pollution runoff.⁴⁰ Additionally, raised water temperatures create stress on the ecosystem and allow algae to bloom.⁴¹ The World Economic Forum rated water crisis as the greatest risk we are facing globally.⁴² Furthermore, a rise in sea level increases the amount of saltwater intrusion in our coastal aquifers making groundwater not fit for potable uses unless it is treated.⁴³

While some may deny climate change,⁴⁴ the market certainly has not. Scarce products are valuable and water is no different. Market actors have seized the opportunity and have been investing in all things water as the next section will explain. However, that market allocation must have a role to play in water is not the same as saying it is like oil. Water is renewable but irreplaceable.

³⁷ *Impacts of Climate Change on Water Resources: A Global Perspective*, Table 4.6, IPCC (2001), <http://www.ipcc.ch/ipccreports/tar/wg2/index.php?idp=180>.

³⁸ *Water and Climate Change*, UNION CONCERNED SCIENTISTS, <https://www.ucsusa.org/global-warming/science-and-impacts/impacts/water-and-climate-change.html>.

³⁹ *Id.*

⁴⁰ *Id.*

⁴¹ *Id.*

⁴² Carl Ganter, *Water Crises are a Top Global Risk*, WORLD ECON. F. (Jan. 16, 2015), <https://www.weforum.org/agenda/2015/01/why-world-water-crises-are-a-top-global-risk/>.

⁴³ CAROLINAS INTEGRATED SCIS. & ASSESSMENTS, *ASSESSING THE IMPACT OF SALTWATER INTRUSION IN THE CAROLINAS UNDER FUTURE CLIMATIC AND SEA LEVEL CONDITIONS* 7–8 (2012), https://cpo.noaa.gov/sites/cpo/Projects/RISA/2013/reports/2012_CISAandSCSeaGrant_SalinitySARReport.pdf.

⁴⁴ Mike Murphy, *Trump Tells '60 Minutes' Climate Change Will Reverse Itself and He Doesn't Want to Lose Jobs Fighting It*, MARKET WATCH (October 15, 2018, 9:50 AM), <https://www.marketwatch.com/story/from-climate-change-to-china-to-kavanaugh-heres-what-trump-told-60-minutes-2018-10-14>.

III. THE BUSINESS OF WATER: ALL BUT WATER?

A. “Traditional markets” in water

This idea of water as an essential part of society is often reflected in broad constitutional declarations about water belonging to the public. To a great extent, governmental management logically follows the publicness of water. In an ideal world, it is expected that government will manage water quantity and quality for present and future generations, not excluding the poorest members of society. However, governments have often been unable to allocate water efficiently and fairly. Many have advocated for water markets as a tool to help resolve the shortcomings of the government’s allocation of water rights, particularly in water scarce regions. The government has had a hard time reallocating existing water rights because those property rights are legally entrenched and because, almost everywhere, the political economy disfavors the reallocation. Plenty of water rights were established a long time ago when agriculture was the main economic activity. As such, even today, most water is allocated to the agricultural sector even though the weight of agriculture in terms of gross domestic product has been substantially reduced: from 37.5 in 1869 to 0.8 in 2006.⁴⁵ While it is undeniable that the agricultural sector requires water as an input in most cases, while other sectors do not, the agricultural sector is heavily criticized because it is not always efficient. In the US West, where water is scarce, there are few mechanisms to impose efficient practices on water users. Water rights are defined according to the volume historically diverted and put to beneficial use. Hence, some rights are defined according to the amount of water needed to flood irrigate a field of cereal in 1890. Today we could probably use a center-pivot irrigation system which will require far less water. But farmers who hold old water rights may not have an incentive to do so. Those farmers may have very old water rights and in prior appropriation -a system based on the premise “first in time, first in right”- they will be the first to receive water if there is not enough for everyone. Using flood irrigation today is not considered a violation of the

⁴⁵ J.M. ALSTON ET AL., PERSISTENCE PAYS 11–12 (2010).

beneficial use requirement because farming is still a type of beneficial use and the requirement does not impose a particular irrigation method. What is more, prior appropriation rights are subject to the “use it or lose it” principle which implies that a farmer may be wary of shifting irrigation systems if he is going to use less water because he may lose the water he is not using. While the forfeiture based on “use it or lose it” aims at preventing speculation, the unintended consequence is that it pushes farmers to use all their right even if they could do without some.

Making water rights transferable ensures that farmers have incentives to use less water and sell the rest to whoever values it most. Hence, farmers may shift toward more efficient irrigation practices if either water is too scarce and they don’t get enough or if they can profit from transferring their surplus water. In other words, a market achieves this efficient allocation because it gives incentives to low value users to sell their water to higher-value users because low-value users may get a higher benefit selling the water than using it. The paradigmatic transaction is between the agricultural sector, where historically most water has been allocated, and urban areas, where water is highly valued. Some farmers may fallow their fields and not produce in order to sell water, but others will just invest in efficient irrigation methods or in less water-intensive crops. Some farmers may even innovate in other ways such as producing dry-farming, a technique that withdraws irrigation beyond the seedling stage.⁴⁶

Water rights markets are not free markets, though. They are very different than the markets for commodities, like shoes. The nature of water and the water distribution system implies that a free water market may suffer from failures. The visible hand of government is necessary for a water rights market to work. This intervention translates to rules ensuring that parties to a transaction do not cause negative externalities to third parties or the environment.⁴⁷ Changes in water rights are subject to the no-injury rule.⁴⁸ In addition, government undertakes functions that enhance water markets by

⁴⁶ Ari Levoux, *Is Dry Farming the Next Wave in a Drought-Plagued World?*, NAT. GEO. (Sep. 29, 2016), <https://www.nationalgeographic.com/people-and-culture/food/the-plate/2016/09/can-dry-farming-lead-the-way-out-of-drought/>

⁴⁷ CASADO PEREZ, *supra* note 3, at 66.

⁴⁸ *Id.* at 148.

providing information on transactions or offering a water rights registry. Finally, it is important to note that water markets are a mechanism of adjustment, not the main tool to allocate water rights.

It is important to note that these traditional water markets are inherently local. They are local as a result of the natural characteristics of water and, sometimes, regulation. Water, compared to other commodities, has natural ways to transport itself: rivers. But when those rivers do not connect areas with different valuation of water, we need man made infrastructure. Man-made infrastructure is truly expensive. Water is far more expensive to transfer than energy or gas:⁴⁹ the costs of transporting it 100km represent about 50% of the wholesale cost of water, while the equivalent is 2.5% for natural gas and 5% for electricity.⁵⁰

In fact, transportation costs make some of the deals less attractive. T. Boone Pickens via his company Mesa Inc. wanted to make billions out of the Ogallala by quenching the thirst of the ever growing Dallas – Fort Worth Metroplex and San Antonio, but he could not find buyers. The transportation costs, even after managing to get the Texas Legislature to allow him to create the Roberts County Fresh Water Supply District No.1. via the District, T. Boone Pickens got eminent domain powers to condemn the land it needed for pipelines between the Texas Panhandle and Dallas,⁵¹ were prohibitive. He could not find a buyer even during the 2009 extreme drought Texas suffered. While he claimed to be patiently waiting for the market to peak,⁵² he ended up selling the water rights to the Canadian River Water Authority, lead by the City of Amarillo, for over \$100 million,⁵³ not a bad deal, but not an incredible one either.

Accordingly, water markets are naturally more local. That does not mean that water moguls may not have a role to play. For example, if someone were

⁴⁹ Vicky Waye & Christina Son, *Regulating the Australian Water Market*, 22 J. ENV'T'L L. 431, 438 (2010).

⁵⁰ Alexander Gee, *Competition and the Water Sector*, 2 ANTITRUST 38, 39 (2004).

⁵¹ PRUD'HOMME, *supra* note 26, at 263.

⁵² *Id.* at 265.

⁵³ *Pickens, Texas Water Supplier Sign \$103M Deal*, BEAUMONT ENTERPRISE (June 23, 2011, 4:05 PM), <https://www.beaumontenterprise.com/news/article/Pickens-Texas-water-supplier-sign-103M-deal-1437581.php>.

to find a huge aquifer nearly a growing urban area, she would certainly enter into good deals. However, water markets are also local because, as section V.B. explains, communities are trying to protect the basin and their economic life by restricting how much water can be transferred out of the basin or by making the procedure to get approval to transfer water very onerous. Furthermore, the no-injury rule may make transaction more local since as soon as a transaction sends water far away the potential for environmental and third-party externalities increases. An illustration of this is the transactions that in California required water to pass through the San Joaquin and Sacramento Rivers Delta. These would be most transaction from the humid North to the arid South in the Golden State. All those transactions are subject to a heightened scrutiny.

While traditional water markets are not exempt of problems, water markets understood broadly are much more challenging. While sometimes these water markets just enhance the negative effects predicated of traditional water markets, they also present new challenges as next section will highlight.

B. Privatization of Water Utilities

Following the same line of reasoning that counsels the introduction of water markets, many defend water utilities privatization. Those who defend privatization argue that private actors do a better job than local authorities in ensuring the water supply for urban areas. Governmental entities find access to financing challenging for the large sums of capital needed to update water infrastructure. If public authorities were to embark on such an investment, rates would have to increase considerably. In contrast, a private provider can access funding and provide water more efficiently, and, thus, cheaply.⁵⁴ Furthermore, Privatization is perceived by some as making water policy less subject to corruption and interest group influence.⁵⁵ In contrast, those

⁵⁴ Joseph Dellapenna, *Climate Disruption, The Washington Consensus, and Water Law Reform*, 81 TEMPLE L. REV. 380 (2008).

⁵⁵ JAMES SALZMAN, *DRINKING WATER: A HISTORY* 201 (2013).

PETER H. GLEICK ET AL., *THE NEW ECONOMY OF WATER. THE RISKS AND BENEFITS OF GLOBALIZATION AND PRIVATIZATION OF FRESH WATER* 27 (2002) (hereinafter, GLEICK, *THE*

critiquing it consider that privatization agreements are themselves the result of corruption.⁵⁶

Privatization takes mostly three different forms.⁵⁷ First, complete privatization, a model followed by the United Kingdom, implies full ownership of the delivery and treatment systems.⁵⁸ Second, long-term concessions, like the French model, are schemes where the private company takes over the operation and maintenance of the water delivery and sewage infrastructure. The company is in charge of charging consumers to recover the cost and make a profit.⁵⁹ Last, there is the model where the government contracts a company to run the system for a previously agreed fee.⁶⁰ Privatization has often not met expectations and some cities have backpedaled, such as Paris.⁶¹ The problem may not be privatization but purely implemented one.

Opposition to water privatization rallies people everywhere. In the developing world, the World Bank required privatization of water utilities in order to access the water loans offered by the international organization. There, often, privatization was not well received, as the most well-known example, the Cochabamba water wars,⁶² illustrates. Those fears of the anti-privatization movement, moved by moral values or the endowment effect of

NEW ECONOMY) (reviewing Mexico's corrupt public provision of tinkered water).

⁵⁶ John Vidal, *Water privatisation: a worldwide failure?*, THE GUARDIAN (Jan. 30, 2015).

<https://www.theguardian.com/global-development/2015/jan/30/water-privatisation-worldwide-failure-lagos-world-bank>

GLEICK, THE NEW ECONOMY, *supra* note 55, at 42.

Kate Bayliss, *Privatization and Poverty: The Distributional Impact of Utility Privatization*, 73 ANNALS OF PUBLIC & COOPERATIVE ECON. 619 (2002).

⁵⁷ BARLOW & CLARKE, BLUE GOLD, *supra* note 18, at 89.

⁵⁸ *Id.*

⁵⁹ *Id.*

⁶⁰ *Id.*

⁶¹ Bernard Barraqué, *Return of Drinking Water Supply in Paris to Public Control*, 14 WATER POL'Y 903, 903–04 (2012).

⁶² Tanya Kapoor, *Is Successful Water Privatization a Pipe Dream?: An Analysis of Three Global Case Studies*, 40 YALE J. INT'L L. 157, 163–64 (2015); Timothy O'Neill, *Water and Freedom: The Privatization of Water and its Implications for Democracy and Human Rights in the Developing World*, 17 COLO. J. INT'L ENVTL. L. & POL'Y 357 (2011); Rhett B. Larson, *The New Right in Water*, 70 WASH & LEE L. REV. 2181, 2195–98 (2013).

wanting cheap water as they had always received, were not wrong. In practice, the privatization of utilities has produced uneven results. The promise of lower rates and necessary investment has not been fulfilled. More often than not, rates have gone up. In addition, the need to provide safe drinking water to the low-income population requires cross-subsidization.

It has become a central tenet of the anti-globalization movement.⁶³ For example, the left-wing populist movement 5-stars in Italy had opposition to privatization of water as one of their five pillars.⁶⁴ Closer, in Felton, a town in the California coast, Friends of Locally Owned Water organized bake sales, dances, and marches against the private companies that had acquired control of the town's water system and planned to increase rates to fund infrastructure improvements.⁶⁵

For the United States, a bit of history is illuminating. While in many US cities, private companies were the suppliers of water initially⁶⁶ soon enough local governments took it over. Starting in 1890s, the number of public municipal suppliers became higher than private ones.⁶⁷ Today 33 of 52 states and territories have more public than private water systems and 50 of 52 states and territories have a larger portion of their population served by public water systems.⁶⁸ The pendulum of history swings though. Some cities with public water utilities privatized them only to then have to buy them again when the auspicious expectations of better service were not realized. A well-known case is Atlanta.⁶⁹ In 1999, United Water, a filial of Suez, and Atlanta entered

⁶³ JAMES SALZMAN, *supra* note 55, at 22.

⁶⁴ Dave Keating, *On Energy, Italy's Five Star Movement Could Rock The Boat*, FORBES (Mar. 5, 2018), <https://www.forbes.com/sites/davekeating/2018/03/05/on-energy-italys-five-star-movement-could-rock-the-boat/#2a30a12e6006>.

⁶⁵ PRUD'HOMME, *supra* note 26, at 272–73. See also ALAN SNITOW, DEBORAH KAUFMAN & MICHAEL FOX, THIRST: FIGHTING THE CORPORATE THEFT OF OUR WATER 49–62 (2007).

⁶⁶ NAT'L RESEARCH COUNCIL, PRIVATIZATION OF WATER SERVICES IN THE UNITED STATES: AN ASSESSMENT OF ISSUES AND EXPERIENCE 34 (2002), <https://www.nap.edu/read/10135/chapter/4#33>.

⁶⁷ *Id.*

⁶⁸ Andrea Kopaskie, *Public vs Private: A National Overview of Water Systems*, UNCL. FIN. CTR. (Oct. 19, 2016), <http://efc.web.unc.edu/2016/10/19/public-vs-private-a-national-overview-of-water-systems/>.

⁶⁹ Douglas Jehl, *As Cities Move to Privatize Water, Atlanta Steps Back*, N.Y. TIMES

into a deal. United Water was supposed to manage Atlanta's water system until 2019. In 2003, the city backpedaled.⁷⁰ United could not offer reliable service. The challenge that the disrepair of the system pose were too large for this to be profitable without a huge price spike.⁷¹

While opposition to privatization has been strong. Privatization of some water functions and the public nature of water do not need to be at odds. If they were, even water use rights in the hands of private individuals could be subject to the same critique. Privatization efforts are not going away. The focus, thus, should be on making privatization compatible with the publicness inherent to water,⁷² as a report by the Pacific Institute does.⁷³ This report proposes several requirements for privatization agreements: everyone must receive a certain amount of water because water is a social good, water should be managed based on sound economic principles and, for example, as a result companies need to exhaust all conservation measures before new investment is allowed, ensure public control over water, and public agencies should keep the control.⁷⁴

Beyond those, it is important to recognize that privatization does not necessarily mean competition. It is often said that the market will cure many of the evils of government regulation but for that to happen the market should be a competitive one. Competition keeps companies in check. In none of these privatization models per se guarantee competition beyond the initial competitive bids -assuming there are more than one- for the long-term contracts between local governments and water companies, often water giants.⁷⁵ For that, markets should be open to multiple companies and water

(Feb. 10, 2003), <https://www.nytimes.com/2003/02/10/us/as-cities-move-to-privatize-water-atlanta-steps-back.html>.

⁷⁰ *Id.*

⁷¹ *Id.*

⁷² Some authors may consider that in practice there is no privatized model that can be compatible with water's public value. The work of Maude Barlow is significant in this area. BARLOW & CLARKE, *BLUE GOLD*, *supra* note 18. *See also* MAUDE BARLOW, *BLUE FUTURE: PROTECTING WATER FOR THE PEOPLE AND THE PLANET FOREVER* (2013); MAUDE BARLOW, *BLUE COVENANT: THE GLOBAL WATER CRISIS AND THE COMING BATTLE FOR THE RIGHT TO WATER* (2007),

⁷³ *See in general* GLEICK, *THE NEW ECONOMY*, *supra* note 55.

⁷⁴ *Id.* at 40-42

⁷⁵ According to Veolia's, Vivendi's water branch, 2017 results, it serves more than 100

infrastructure should be regulated as a natural monopoly, as we have done in power markets in some areas, like most of Texas.⁷⁶ In those markets, any company can ship their power or water through pipelines or electric lines that someone else owns without being discriminated against by having to pay higher prices. England and Wales's water markets are open for competition under the monitoring of the independent energy Offwat.⁷⁷ But the British example is the exception more than the rule. Hence, privatization alone cannot bring all the consumer benefits predicated from markets. Without implementing a full-fledged, albeit not unregulated, market, governments should monitor more the performance of the private companies in charge of their water systems. One way to do it is by implementing benchmark regulation where you held a local water company, de facto operating a monopoly, accountable by comparing it with peers.⁷⁸ Benchmark regulation is also a way to fulfill the governmental control that the Pacific Institute's report defends.⁷⁹

C. *New investment in water market: water-related businesses*

At the end of the movie *The Big Short* (2015),⁸⁰ we learned that Michael Burry, who shorted in the financial sector in Wall Street, was moving

million people all over the world. Veolia, Press release: 2017 Annual Results (February 22, 2018), <https://www.veolia.com/en/newsroom/press-releases/2017-annual-results>

⁷⁶ Dylan Baddour, *Texas' Deregulated Electricity Market, Explained*, HOUST. CHRON. (June 8, 2016), <https://www.houstonchronicle.com/local/explainer/article/texas-electric-deregulation-ERCOT-TCAP-7971360.php>.

⁷⁷ Since 2017, large consumers—businesses—can choose their water provider. Before the monopoly. *Water is Open for Business*, OPEN WATER, <https://www.open-water.org.uk>.

⁷⁸ EURÉAU, HOW BENCHMARKING IS USED IN THE WATER SECTOR 2 (2015), <http://www.eureau.org/resources/position-papers/135-benchmarking-october2015/file>.

⁷⁹ GLEICK, *THE NEW ECONOMY*, *supra* note 55, at 37.

⁸⁰ *THE BIG SHORT* (Regency Enterprises 2015).

In fact, “The Big Short” was also the title of a flyer used by those opposing the bill that would have blocked a major groundwater transaction between the farming company Cadiz Inc. in the Mohave desert and Southern California urban centers. The flyer claimed that those favoring the bill and opposing the transaction had only in mind their own profits as they were betting against the company on the financial markets and benefit from the decrease in Cadiz's stock price. Ian James & Evan Wyloge, *Bill Targeting Company's Plan to Pump Desert Groundwater Dies in California Senate*, DESERT SUN (Aug. 31, 2018), <https://www.desertsun.com/story/news/environment/2018/08/31/bill-would-hinder-cadiz-water-project-stalls-california-senate/1158059002/>.

to water. These investments are indeed taking place in 2019. Investment funds, international corporations and wealthy businessmen are making true the aphorism “water is the new oil.”⁸¹ Market actors are profiting from climate change by investing in an asset—water—that is going to become more and more valuable. So far, the investment has focused on all things water but water itself, but this is also changing and investors are trying to invest in water rights.

As a result of water scarcity and the consequent business opportunities, we expect the large, established, international water players to invest in water in the United States. For example, Suez Lyonnaise, the global leader in water, has been a player since 1999 in the U.S. water market when it acquired control of United Water, a water distribution business.⁸² Parallel to this, some companies or wealthy individuals have diversified their portfolio of products to include water business lines. Examples of this diversification are General Electric and oil tycoons, like T. Boone Pickens. Plenty of business sectors are in a position to benefit from climate change. Beyond bottled water and water utilities, companies manufacturing water-efficient appliances or water purification systems are expected to do better thanks to climate change.

Even individual investors are seeking to invest in companies engaging in water-related businesses. These individual investors can invest in traditional international water companies like the well-known French company Suez or the less well-known U.S. company PICO Holdings,⁸³ new entrants in the water business like General Electric, or identify the companies in the specialized indexes like Dow Jones U.S. Water Index.⁸⁴ This index is

⁸¹ Another way to put it is that “blue is the new green.” SALZMAN, *supra* note 55, at 22.

⁸² John Carreyrou & Amy Barrett, *Suez to Buy United Water for \$1 Billion, Making French Firm World's Leader*, WALL STREET J. (Aug. 24, 1999), <https://www.wsj.com/articles/SB935388456565689774>.

⁸³ PICO acquires water rights and water related assets, such as storage rights, in Arizona, Nevada, Colorado, and New Mexico. *PICO Overview*, SEEKING ALPHA, <https://seekingalpha.com/symbol/PICO/overview>; *Business Overview*, PICO HOLDINGS, <http://picoholdings.com/core-businesses.html>.

72% of their shareholders are institutional investors which shows the credibility of the firm. Jodi Pearce, *How Many PICO Holdings Inc (NASDAQ:PICO) Shares Do Institutions Own?*, SIMPLY WALL ST. (Nov. 19, 2018), <https://simplywall.st/stocks/us/commercial-services/nasdaq-pico/pico-holdings/news/how-many-pico-holdings-inc-nasdaqpico-shares-do-institutions-own/>.

⁸⁴ *Dow Jones US Water*, MKT SCREENERS, <https://www.marketscreener.com/DOW->

composed of 29 stocks including Aqua America and California Water Service Group, both water utilities holding companies that operate subject to the regulation by public utilities commissions in several states such as Pennsylvania, Ohio, Texas, California, New Mexico, Hawaii, and Washington State. Another index that we can use as an example is the S&P Global Water Index which traces 50 water utilities and infrastructure companies around the world. S&P Global Water Index⁸⁵ includes water utilities, to a company producing flushing systems and pipes (Geberit Group)⁸⁶ or, to Danaher, a conglomerate which has water diagnosis and purification among its lines of business.⁸⁷

Beyond direct investment, there are some Exchange-Traded Funds—investment funds that are traded in stock exchanges and that hold different company stocks—devoted to water companies. Investors often use these commodity-based funds to hedge their investments in other assets. The most prominent water Exchange-Traded Fund is Invesco Water Resources with \$865 million in assets under management in 2018 with a focus only on U.S. water-related companies, among them Danaher Corporation.⁸⁸ Other funds are Invesco S&P Global Water ETF, which tracks the S&P Global Water Index,⁸⁹ and the Invesco Global Water ETF, which focuses on water conservation and purification companies.⁹⁰

[JONES-US-WATER-454711/components/](https://www.spglobal.com/marketindices/us-water-454711/components/).

⁸⁵ *S&P Global Water Index*, S&P DOW JONES INDICES, <https://us.spindices.com/indices/equity/sp-global-water-index>.

⁸⁶ *Geberit Product Range*, GEBERIT GROUP, <https://www.geberit.com/products/product-range/>.

⁸⁷ DANAHER, <http://www.danaher.com/our-businesses>

⁸⁸ *Invesco Water Resources ETF*, INVESCO, <https://www.invesco.com/portal/site/us/investors/etfs/product-detail?productId=PHO>

⁸⁹ *Invesco S&P Global Water Index ETF*, INVESCO, <https://www.invesco.com/portal/site/us/investors/etfs/product-detail?productId=CGW&ticker=CGW&title=invesco-s-p-global-water-index-etf>.

⁹⁰ *Invesco Global Water ETF*, INVESCO, <https://www.invesco.com/portal/site/us/investors/etfs/product-detail?productId=PIO>.

All this investment has proven wrong the claims about water regulation deterring investment and stifling innovation.⁹¹ In fact, there are even start-ups focused on water innovation.⁹²

D. Investing in water as an asset

1. New forms of water: desalination, reuse

As water becomes scarce, technology once again steps in to save the day.⁹³ For a long time, engineers dominated water policy.⁹⁴ Dams were built everywhere to smooth the annual supply of water by storing winter and spring rains for those times of the year when it rains less. While they did not increase water supply in terms of overall quantity, they did ensure that more of it could be effectively used when needed. Dams are now disfavored given their environmental consequences.⁹⁵ But we are back at often believing that technology will pave our way out of water scarcity by increasing supply, particularly desalination and water reuse technologies.

Desalination is the technique of transforming ocean water into potable water for our everyday uses. Desalination can also be applied to brackish groundwater. Texas, California, and Florida, three of the four states that consume more freshwater, have turned to the ocean to solve their water scarcity problems.⁹⁶ Desalination is not without negative environmental consequences: from the effect on ocean currents, to the high volume of energy

⁹¹ NEWSHA K. AJAMI, BARTON H. THOMPSON JR. & DAVID G. VICTOR, THE PATH TO WATER INNOVATION 2 (2014), http://www.hamiltonproject.org/assets/legacy/files/downloads_and_links/path_to_water_innovation_thompson_paper_final.pdf.

⁹² THE WATER INNOVATION PROJECT, <http://www.waterinnovationproject.com>.

⁹³ Eric Wesselman & Ron Stork, *To Avoid Catastrophe, Don't Build More Dams*, S.F. CHRON. (Feb. 15, 2017), <https://www.sfchronicle.com/opinion/openforum/article/To-avoid-catastrophe-don-t-build-more-dams-10935707.php>.

⁹⁴ *Id.*

See also Dave Owen & Colin Apse, *Trading Dams*, 48 U.C. DAVIS L. REV. 1043, 1052 (2015).

⁹⁵ MICHAEL COLLIER ET AL., DAMS AND RIVERS: A PRIMER ON THE DOWNSTREAM EFFECTS OF DAMS (1996).

⁹⁶ John Duff, Victoria Labate & Anne M. Slugg, *Prospects and Pitfalls of Desalination Development: Insights from Three States*, 22 OCEAN & COASTAL L.J. 130, 131 (2017).

it consumes, to what to do with the brine.⁹⁷ Desalination is still a small part of the water supply,⁹⁸ but it is a growing industry.⁹⁹

Similarly, recycled water is a growing source of water. Although all water is reused given the hydrological circle,¹⁰⁰ water reuse refers to further treating wastewater so that it can be put to potable uses either by subjecting it to, among others, reverse osmosis, filtration, and UV radiation systems,¹⁰¹ or by complementing those with an environmental buffer. The former is direct potable reuse and, the latter, indirect potable reuse because the recycled water is not immediately pumped back into the system, but discharged into a lake, river, or aquifer.¹⁰² For example, in Texas, water reuse is an increasingly important source of water.¹⁰³ The 2017 State Water Plan expects reuse to cover more than 14% of the annual demand of water by 2070.¹⁰⁴

Municipal water suppliers are likely to invest in both desalination¹⁰⁵ and reuse in the near future, particularly as they become price competitive.¹⁰⁶ Companies are likely to invest into making these technologies cheaper and

⁹⁷ *Why Desalination is Not the Answer to the World's Water Issues*, HYDROFINITY (Oct. 16, 2018), <https://www.hydrofinity.com/blog/why-desalination-is-not-the-answer-to-the-worlds-water-issues>.

⁹⁸ U.S. GOV'T ACCOUNTABILITY OFFICE, GAO-14-430, FRESHWATER SUPPLY CONCERNS CONTINUE AND UNCERTAINTIES COMPLICATE PLANNING 19 (2014), <https://www.gao.gov/assets/670/663343.pdf>.

⁹⁹ Rachel Leven, *U.S. Desalination Industry Grows Since 2000; Seen as Essential to Meeting Supply Needs*, BLOOMBERG (Aug. 21, 2013), <https://www.bna.com/us-desalination-industry-n17179876105/>.

¹⁰⁰ NATIONAL RESEARCH COUNCIL, WATER REUSE: POTENTIAL FOR EXPANDING THE NATION'S WATER SUPPLY THROUGH REUSE OF MUNICIPAL WASTEWATER 25 (2012), <https://www.nap.edu/read/13303/chapter/4#25>.

¹⁰¹ NEJLAH HUMMER & SUSANNA EDEN, POTABLE REUSE OF WATER 3 (2016), <https://watereuse.org/wp-content/uploads/2015/01/arroyo-2016-5-6-16.pdf>.

¹⁰² *Potable Water Reuse and Drinking Water*, EPA, <https://www.epa.gov/ground-water-and-drinking-water/potable-water-reuse-and-drinking-water>.

¹⁰³ TEX. WATER DEV. BD., 2017 STATE WATER PLAN 74, 89 (2017), <http://www.twdb.texas.gov/waterplanning/swp/2017/doc/SWP17-Water-for-Texas.pdf?d=4143>.

¹⁰⁴ *Id.* at 90.

¹⁰⁵ Nikolay Voutchkov, *Desalination – Past, Present and Future*, INT'L WATER ASS'N (Aug. 17, 2016), <http://www.iwa-network.org/desalination-past-present-future/> (10 billion dollars from 2016 to 2021).

¹⁰⁶ For desalination, see TEX. WATER DEV. BD., *supra* note 103 (predicting costs to get lower within 5 years and even more within 20 years).

For reuse, see the chart comparing the cost of different water sources in Texas. *Id.* at 89.

more environmentally friendly.¹⁰⁷ These new sources can quench part of the increase in demand. Their presence lowers the value of those investing in existing water rights in groundwater or surface water. Desalination and reuse increase supply, lowering, thus, the price of water. However, reuse can have negative systemic effects as section IV.E.2 will explain.

2. Groundwater

T. Boone Pickens, the Oklahoma-born oil tycoon, has changed oil for water. Pickens has bought 200,000 acres of land in the Texas panhandle to get its correspondent groundwater rights for about \$75 million. His expected return is above \$1 billion by selling it to Texas ever-growing urban areas.¹⁰⁸ But Pickens is not the only one.¹⁰⁹ Groundwater ranching, that is, buying “water from distant rural landowners for the sole purpose of exporting, or piping, water for uses many miles removed from the land” has been practiced for more than 50 years in Texas¹¹⁰ but it has picked up. Groundwater prices in Texas have increased up to 344% from their level in the 2000s.¹¹¹

3. Surface water

Roughly, there are two water rights regimes in the United States. The East follows a riparian system and, the West, a prior appropriation one. In a riparian system, water rights are tied with land ownership. Under this

¹⁰⁷ Sarah Goodyear, *Innovators Are Chasing a Cheaper Future for Desalination*, NEXT CITY (Nov. 12, 2014), <https://nextcity.org/daily/entry/drought-resilience-desalination-plant-california>; Kristin Majcher, *How Can Desalination Become Cheaper?*, MIT TECH. REV. (Dec. 3, 2014), <https://www.technologyreview.com/s/532891/how-can-desalination-become-cheaper/>.

¹⁰⁸ Tate Dwinnell, *T. Boone Pickens Invests in Water—Should You?*, SEEKING ALPHA (Jan. 17, 2007), <https://seekingalpha.com/article/24410-t-boone-pickens-invests-in-water-should-you>

¹⁰⁹ *How to Make a Killing Selling Water Rights*, UNUSUAL INV., <https://unusualinvestments.com/invest-in-water-rights/> (recommending investment in groundwater in Texas).

¹¹⁰ BRUCE LESIKAR ET AL., QUESTIONS ABOUT GROUNDWATER CONSERVATION DISTRICTS IN TEXAS 11 (2002), http://twri.tamu.edu/reports/2002/2002-036/2002-036_questions-dist.pdf.

¹¹¹ *Texas Water Prices*, WATER MKTS. LLC (Apr. 3, 2018), <https://watermarkets.us/tag/texas-water-prices/>.

common law doctrine, the owner of riparian land has “the right to make reasonable use of the water, subject to the equal rights of other riparians on the same waterbody.”¹¹² Thus, riparian water users do not own the water itself but have a usufructuary right to the water.¹¹³ Riparian rights cannot be transferred separately from the riparian land. However, a riparian landowner can grant an easement to access the water to a third party. Such an easement, though, is only enforceable against the grantor.¹¹⁴ In regulated riparianism states, that is, states where users are required to apply for a water use permit before an agency, the permit may be sold but only when title to the riparian land is transferred and only for use in the riparian land.¹¹⁵ Prior appropriation is the system of the West because riparianism was not fit for the challenges of arid climates. Prior appropriation, based on the rules of mining camps,¹¹⁶ grants a right to use water to whoever puts water to beneficial use. There is no requirement to use it in riparian lands.¹¹⁷

Prior appropriation rights are transferable provided the transfer does not harm third parties. This rule applies to old common-law rights as well as rights granted by an agency nowadays. The implementation of the no-injury rule is different though. In the case of old common-law prior appropriation rights, third parties affected are able to challenge a transaction before a court. For permittees, the procedure is a bit more cumbersome. Those who want to transfer the right need in most cases to ensure the approval of a water agency beforehand.¹¹⁸ While in pure prior appropriation systems there are no restrictions on where the water can be used, a change in the place of use as a result of a transfer requires approval as it may harm other users.

¹¹² ROBERT W. ADLER ET AL., *MODERN WATER LAW* 23 (2013).

¹¹³ *Id.*

¹¹⁴ *Id.* at 32.

¹¹⁵ Ronald G. Cummings et al., *Water Rights Transfers: Options For Institutional Reform* 9 (Water Pol’y Working Paper No. 2001-001, 2001). <http://www2.gsu.edu/~wwwenv/waterPDF/W2001001.pdf>.

¹¹⁶ A. Dan Tarlock, *The Future of Prior Appropriation in the New West*, 41 NAT. RESOURCES J. 769, 770 (2001).

¹¹⁷ BRIAN GRAY ET AL., *ALLOCATING CALIFORNIA’S WATER* 7 (2015), https://www.ppic.org/content/pubs/report/R_1115BGR.pdf. There are “area of origin” restrictions in California which may be copied by other states. These restrictions “allow individuals and communities to establish new rights for surface water in their local watersheds. These rights are senior to those of water users who export water from these areas.”

¹¹⁸ CASADO PEREZ, *supra* note 3, at 146–153; ADLER ET AL., *supra* note 112, at 156–57.

Given all these regulatory controls, water agencies have often played the role of brokers.¹¹⁹ But as water markets have grown and become more sophisticated, private companies have also taken on that role,¹²⁰ particularly as large investment in water take place. For example, Waterexchange, a company that offers transaction advice, water rights appraisal, and market information- worked with a customer to execute water transaction for a value of \$100million in Arizona.¹²¹

In Australia, water markets have flourished after the entitlement reform that occurred in that country after the Millennium drought. Two companies have invested directly in water after Duxton Water Ltd.¹²² and Webster, which holds agricultural stock. Water is attractive because it is an asset likely to appreciate in the future as climate change strikes and because it is an asset mostly uncorrelated with other assets. They hold water entitlements to lease them. It is not unthinkable that the same could end up taking place in the US because legislation ensures that leasing water is not against beneficial use. In fact, in order to promote water markets, states, such as California, have enacted provisions clarifying that leasing a water right is not the same as not using it.¹²³ Those provisions aimed at mitigating the reluctance to trading their rights many irrigators felt due to concerns that water agencies would forfeit their water rights if they leased their entitlements. As such, there is no clear legislative impediment in US West water law to a company acquiring water rights and immediately putting them to beneficial use via a lease. It may be worth exploring the possibilities to patch this regulatory gap or soon we may even found someone proudly calling himself a “eater bandit” as David Williams, an Australian who has invested in water rights and gets a capital gain of 20 percent annually.¹²⁴ Up to 8% of the water rights in the Murray-Darling basin is own by water investors.¹²⁵

¹¹⁹ CASADO PEREZ, *supra* note 3, at 87–89.

¹²⁰ *About Us*, WEST WATER RESEARCH LLC, <http://www.waterexchange.com/about-us/>.

¹²¹ *Company Principals*, WEST WATER RESEARCH LLC, <http://www.waterexchange.com/about-us/company-principals/>.

¹²² DUXTON WATER, LTD., <http://www.duxtonwater.com.au>.

¹²³ CASADO PEREZ, *supra* note 3, at 135-137.

¹²⁴ Adam Courtenay, *Water Rights, Trading and the New Water Barons*, IN THE BLACK (Nov. 1, 2017), <https://www.intheblack.com/articles/2017/11/01/water-rights-barons>.

¹²⁵ *Id.*

IV. NEGATIVE EFFECTS FROM THE FLOW OF MONEY INTO WATER MARKETS

Money flowing into the water industry, coupled with the now long-standing privatization of water utilities and the growing interest in the water itself, is setting off the alarms. The opposition to water markets is nothing new. Water markets raise efficiency, in the form of not-internalized negative externalities, and fairness concerns. While everyone from time to time pays to drink from a fancy non-reusable plastic water bottle which has traveled thousands of miles from the spring where it originated,¹²⁶ the commoditization of water is often criticized. Commodification is criticized because water is perceived as so essential and public that its allocation, to the extent possible, should not be subject to market mechanisms. Even when water is subject to those traditional and heavily regulated market mechanisms, that is, water rights exchanges, the concern for the community of origin and for low income populations are always present. Markets are expected to increase water prices and make its allocation efficient, but they may also price out part of the population and take water far away from its natural basin. These critiques are even stronger today when big money is investing in every facet of the water market. Another recently enhanced fear is that fewer players will have the power to decide the fate of our water. Furthermore, while the traditional exchange of water rights is subject to some restrictions and controls, new forms of investment in water are not, often leaving room for negative externalities to third parties. They manage to exploit the gaps in the system. Either these transactions that happen in water markets broadly understood may not be subject to the same scrutiny than traditional water rights exchanges or they benefit from gaps in the regulation. In addition, these new forms of investment bring other types of concerns such as disgust at these companies for investing in water and benefiting from their own misconduct that contributes to climate change.

The following subsection starts with precisely this last concern, the moral

¹²⁶ Christine A. Klein, *Water Transfers: The Case Against Transbasin Diversions in the Eastern States*, 25 UCLA J. ENVTL. L. & POL'Y 249, 258 (2008).

wrong that companies, which contribute to climate change, commit when profiting from a thriving market thanks to water scarcity. Then, it moves to distributional concerns: the struggles of the low-income population to afford more expensive water and the potential concentration in water markets. Finally, it deals with those gaps in the regulatory system that permits some of the profitable exchanges in water markets: the poor regulation of groundwater and the regulation of water reuse. Relatedly, the paper closes by analyzing how some of the transactions skirt a central tenet of prior appropriation while formally complying with the regulations.

A. Profiting from one's own misconduct

The investment of energy companies, such as the defunct Enron through its subsidiary Azurix¹²⁷ or oil tycoons, in water as an asset in itself reminds us of *Riggs v. Palmer*, the English case where a grandson was not allowed to inherit from his grandfather because he had murdered him.¹²⁸ Those who have profited from creating climate change should not be allowed to profit from the business opportunities that its bad consequences open.¹²⁹ A similar statement could be made about those selling water to fracking companies at a high price. While the sellers themselves may not be engaging in major CO₂ producing activities, they are benefiting from the climate change induced high price by oil and gas producers when selling to the same industry,¹³⁰

¹²⁷ Public Citizen's Critical Mass Energy and Environment Program, *Liquid Assets: Enron's Dip into Water Business Highlights Pitfalls of Privatization* (2002), available at <https://www.citizen.org/sites/default/files/liquidassets.pdf>

¹²⁸ *Riggs v. Palmer*, 115 N.Y. 506 (1889). Commented in RONALD DWORKIN, *TAKING RIGHT SERIOUSLY* (1978).

¹²⁹ The aim of this section is not to vilify oil companies. Some European oil companies stepped up their game around the Paris Climate Agreement and formed the [Oil and Gas Climate Initiative \(OGCI\)](#) pledging to reduce emissions and to explore new business models. Georg Kell, *Big Oil And Climate Leadership -- An Oxymoron?*, *FORBES* (SEP. 28, 2018) <https://www.forbes.com/sites/georgkell/2018/09/18/big-oil-and-climate-leadership-an-oxymoron/#4a2754fa624f>

¹³⁰ Maxx Chatsko, *Unexpected Stock That Could Cash in on the Permian Basin Oil Surge* (April 9, 2018), <https://www.fool.com/investing/2018/04/09/1-unexpected-stock-that-could-cash-in-on-the-permi.aspx>

which outbids traditional water users.¹³¹ While selling these companies water effluent¹³² seems better, treated effluent is still the source of water of many users downstream of those cities and thus it creates externalities.

Another transactional behavior that has been frowned upon is that of farmers. For years, they have received subsidized water that makes the desert bloom, and they have not been using that water efficiently. Markets allow them to profit from this past inefficient behavior funded by the taxpayers by selling water to urbanites.¹³³

B. Community externalities

Water markets may be expected to ensure that water ends up in the hands of those who value it more. This means, though, that the communities where that water comes from no longer have access to it and may not have access to the jobs that were making use of that water or to the economic activity depending on farming orders.¹³⁴ These communities lose out on all of this without any decision-making power on their part.¹³⁵ An individual farmer or farm company selling water might not have communitarian preferences¹³⁶ and may only consider her own gain. This type of externalities to the community is not exclusive to the transfer of water rights. Individual Transfer

¹³¹ Russell Gold & Ana Campoy, *Oil's Growing Thirst for Water*, WALL STREET J. (Dec. 6, 2011)

<https://www.wsj.com/articles/SB10001424052970204528204577009930222847246>

¹³²Jennifer Hiller, *Companies try selling effluent water in the Eagle Ford*, MySanAntonio (March 9, 2013), <https://www.mysanantonio.com/business/article/Companies-try-selling-effluent-water-in-the-Eagle-4342096.php>

¹³³ Passell, *supra* note 5.

¹³⁴ The experience of Carson county is illustrative. Before groundwater was exported there were new car-dealers and two farm-equipment providers. After the water was gone, the one farm-equipment provided struggle to make <https://www.texasmonthly.com/the-culture/boone-pickens-wants-to-sell-you-his-water/>

¹³⁵ See in general, Thompson, *supra* note 16 (analyzing the California case for water markets and the interplay between government rules and traditional institutions which tend to be reluctant to transaction with external actors).

See also GLEICK, *THE NEW ECONOMY*, *supra* note 55, at 39.

Cfr. Kyle Emerick&Dean Lueck, *Economic Organization and the Lease-Ownership Decision in Water* 25 (May, 12 2010) (working paper, available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1605523).

¹³⁶ See in general, Thompson, *supra* note 16. Cfr. Emerick& Lueck, *supra*, at 25.

Quotas also raised similar problems in ports where the economy is not diversified and the quotas may translate into unemployment for the crews.¹³⁷

A part of the scholarship rejects these community externalities—also labeled pecuniary externalities—because they believe that the effects on the economy and life of a region beyond the parties to a water transfer is no different from any other economic transaction with winners and losers.¹³⁸ In other words, for them, water being relocated is no different than a manufacturing plant relocating from the Rustbelt to China. In practice, though, compensation for these externalities has occurred. Murphy et al. acknowledge the controversies regarding the definition of pecuniary externalities and accept that it is politically necessary to take them into account, but conceive of compensation in such cases as transitional, that is, funds allocated to mitigate these issues should be temporary in order to encourage efficient behavior.¹³⁹ A transitional remedy might train workers to shift to other business sectors in the area or take the form of general assistance measures directed to improving the economic tissue of the region.¹⁴⁰

The harder effects on communities occur where water sold comes not from a more efficient use of the resource but from the idling of fields. Behind this difference is the idea that if water transferred comes from a more efficient

¹³⁷ Bonnie J. McCay et al., *Individual Transferable Quotas (ITQs) in Canadian and US Fisheries*, 28 OCEAN & COASTAL MGMT. 85, 94 (1995); EUGENE H. BUCK, INDIVIDUAL TRANSFERABLE QUOTAS IN FISHERY MANAGEMENT 12 (1995), <http://dlc.dlib.indiana.edu/dlc/bitstream/handle/10535/4515/fishery.pdf>.

¹³⁸ James L. Huffman, *Water Marketing in Western Prior Appropriation States: A Model for the East*, 21 GA. ST. U. L. REV. 429, 436. (2004).

¹³⁹ James J. Murphy, Ariel Dinar, Richard E. Howitt, Erin Mastrangelo, Stephen J. Rassenti & Vernon L. Smith, *Mechanisms for Addressing Third-Party Impacts Resulting from Voluntary Water Transfers Running Title: Water Markets and Third-Party Impacts*, in USING EXPERIMENTAL METHODS IN ENVIRONMENTAL AND RESOURCE ECONOMICS 91, 110 (J. List ed., 2005).

¹⁴⁰ ELLEN HANAK, WHO SHOULD BE ALLOWED TO SELL WATER IN CALIFORNIA? THIRD-PARTY ISSUES AND THE WATER MARKET 88–94 (2003) (The author discusses the advantages of disadvantages of targeted versus general programs. Targeted programs will devote funds to compensate those who are more directly affected such as unemployed farm workers or farm suppliers. Regarding the first, a claims-based system regarding cash compensation could be envisioned but high administrative costs and the political economy of the affected group disfavor it. Other targeted programs include job search and training programs for laid-off workers. “General assistance might take the form of measures to improve the economic environment of the area, for example, infrastructure investments or reduced sales taxes, or might support specific projects of benefit to area residents.”).

use of water, it involves fewer consequences for other factors employed since production is not curtailed. In contrast, fallowing may entail unemployment for farm workers (direct effects), fewer business transactions for farm suppliers (indirect effects), and broader effects on the rural communities in general (spillover effects).¹⁴¹ All of these combined may produce a “multiplier effect.”¹⁴² Nonetheless, the first lands put to fallow can be expected to be the ones producing low-value added crops and, thus, these tend not to employ much other inputs.¹⁴³ A review of studies regarding the effects of fallowing between 6% and 25% of farmland in an area shows that such actions affect usually less than 1% of the economic activity of the region.¹⁴⁴ Despite this evidence, the Model Water Transfer Act for California suggested taking these costs into consideration when approving the transaction in the review¹⁴⁵ if the water sold comes from land fallowing. Given the harsher effects of fallowing and the heated response we may expect from communities, it should be considered whether public agencies should take this into account either in the review procedure or by establishing some ex-post mechanism.

C. Pricing out low-income population

The negative effect of the market on water allocation for low-income populations is the strongest argument against water markets. Water is a human right and, in economics parlance, it can be understood to be a merit good.¹⁴⁶ In legal parlance, many have categorized it as a human right.¹⁴⁷ A

¹⁴¹ *Id.* at 112.

¹⁴² *Id.*, at 81–82 (reviewing several empirical studies on land fallowing arising from water transfers, other pilot or environmental programs or regulations, and from simulations).

¹⁴³ *Id.* at 124 (presenting the mitigating role that the mere economics on land fallowing have on the potential effects on communities).

¹⁴⁴ *Id.* at 81.

¹⁴⁵ Brian E. Gray, *A Model Water Transfer Act for California*, 4 HASTINGS W.-NW. J. ENVTL. L. & POL'Y 591, 601–02 (§404 (f)) (1996).

¹⁴⁶ C. J. PERRY, MICHAEL ROCK & D. SECKLER, WATER AS AN ECONOMIC GOOD: A SOLUTION, OR A PROBLEM? 6 (1997), <http://ageconsearch.umn.edu/bitstream/61113/2/REPORT14.pdf>.

¹⁴⁷ Erik B. Bluemel, *The Implications of Formulating a Human Right to Water*, 31 ECOLOGY L.Q. 957, 967–77 (2004); Peter H. Gleick, *The Human Right to Water*, 1 WATER POL'Y 487 (1999).

price increase affects those whose disposable income is lower.¹⁴⁸ Privatization, in many instances has meant higher rates.¹⁴⁹ Higher water prices exacerbate other environmental injustices.¹⁵⁰ For example, in a market dominated by private actors, poor communities may not receive reliable water delivery if water gets delivered at all.¹⁵¹

But not only privatization, water rights markets also increase prices. These water rights markets are based on the worthy goal of prices reflecting the true value of water. However, there is a new costly institutional framework composed of brokers and middlemen.¹⁵² What is more, profits also end in the hands of water rights-holders who did not pay for their rights in the first place.

D. Market concentration

Beyond the moral opposition to any sort of private investment commodifying water, the role of big money in water seems troublesome to many. There seems to be an implicit fear that a water market where large companies are investing is a water market with fewer actors. The big multinational corporations, like Vivendi and Suez, which are labeled the General Motors and Ford companies of water,¹⁵³ will dominate. The

¹⁴⁸ ENVTL. JUSTICE COALITION FOR WATER, THIRSTY FOR JUSTICE: A PEOPLE'S BLUEPRINT FOR CALIFORNIA WATER 50 (2005), <https://www.issuelab.org/resources/2885/2885.pdf>.

¹⁴⁹ SNITOW, A., D. KAUFMAN & M. FOX, THIRST: FIGHTING CORPORATE THEFT OF OUR WATER (2007); Jennifer Davis, Private-Sector Participation in the Water and Sanitation Sector, 30 ANN. REV. ENV'T & RESOURCES 145, 166 (2005).

¹⁵⁰ John Gibler, Water for People and Place: Moving Beyond Markets in California Water Policy 4 (2005), https://www.citizen.org/sites/default/files/water-for-people_web.pdf.

¹⁵¹ FOOD & WATER WATCH, WATER=LIFE: HOW PRIVATIZATION UNDERMINES THE HUMAN RIGHT TO WATER 4 (2011), <https://www.foodandwaterwatch.org/sites/default/files/Water%20Equals%20Life%20IB%20July%202011.pdf> (reviewing the case-study of Jakarta, Indonesia, where the private company supplying water prioritized extending the service to wealthier parts of town).

¹⁵² Christine A. Klein, *Water Transfers: The Case Against Transbasin Diversions in the Eastern States*, 25 UCLA J. ENVTL. L. & POL'Y 249, 259 (2008).

¹⁵³ BARLOW & CLARKE, BLUE GOLD, *supra* note 18, at 85.

concentration may trickle to other sectors too, among those, the agricultural one. However, it must be acknowledged that the concentration in related markets is not only the result of the new investment in water but also the long-coming changes in related markets. The agricultural sector is not just composed of Jeffersonian yeoman farmers. Agribusiness leads the way.¹⁵⁴

Setting the related markets issue aside, the question that needs to be asked is what is the harm that comes from having large holders of water rights. Antitrust will supposedly deal with the ripple effects of concentration in other markets. If too few companies produced tomatoes, like some says happens in the case of bananas, and there was no competition from other countries, we expect the Department of Justice to take action. The same shall be true if there was concentration in any natural resource market. However, in natural resources, regulations have tried to prevent the situation from arising in the first place by limiting the amount of a resource anyone or any company can possess. The idea behind such a limit is to ensure that the all-mighty private sector cannot overpower the regulatory agency and that it is not able to put the nation in check by controlling certain key natural resources.

Furthermore, questions may be raised not only because water is in the hands of a few, but because these few are foreigners. All over the world, countries limit foreign private investment.¹⁵⁵ Often the reasons revolve around national security.¹⁵⁶ However the definition of national security is far from homogeneous.¹⁵⁷ In some countries, like Canada, it even includes the

¹⁵⁴ Melanie J. Wender, *Goodbye Family Farms and Hello Agribusiness: The Story of How Agricultural Policy is Destroying the Family Farm and the Environment*, 22 VILL. ENVTL. L.J. 141 (2011).

The average farm size in 1940 was around 175 acres. U.S. DEP'T OF AGRIC., CENSUS OF AGRICULTURE: 1940, (<http://usda.mannlib.cornell.edu/usda/AgCensusImages/1940/03/02/1275/Table-01.pdf>). In 2017 the average was 444 acres. U.S. Dep't of Agric. Economic Research Service, *Average farm size in the United States from 2000 to 2017 (in acres)*, STATISTA, <https://www.statista.com/statistics/196106/average-size-of-farms-in-the-us-since-2000/> (last visited Dec. 3, 2018). Another data point that can be useful is that farms with a single farmer represent 64% of the total family farms but only 51% of the production.

¹⁵⁵ U.S. GOV'T ACCOUNTABILITY OFFICE, GAO-08-320, FOREIGN INVESTMENT: LAWS AND POLICIES REGULATING FOREIGN INVESTMENT IN 10 COUNTRIES 3 (2008), <https://www.gao.gov/new.items/d08320.pdf>.

¹⁵⁶ *Id.*

¹⁵⁷ KATHRYN GORDON & MAEVE DION, PROTECTION OF 'CRITICAL INFRASTRUCTURE' AND THE ROLE OF INVESTMENT POLICIES RELATING TO NATIONAL SECURITY 4 (2008).

idea of cultural policy.¹⁵⁸ Given the threats that water scarcity and water infrastructure pose to national security,¹⁵⁹ logically, investment in this area would be flagged because it affects critical infrastructure. Several countries recognize water infrastructure as key and discriminate against foreign investors in that area.¹⁶⁰ The United States is no exception. The Foreign Investment Risk Review Modernization Act (FIRRMA) passed in 2018 expanded which transactions were covered. Among those covered are transactions involving foreign, non-passive investments in U.S. critical infrastructure.¹⁶¹ Water infrastructure is certainly critical for U.S. national security.¹⁶² Being covered means that the Committee on Foreign Investment in the United States (CFIUS)¹⁶³ will review the transactions and, where appropriate, impose certain changes or deal restructuring. Furthermore, once the CFIUS concludes an investigation, the President could prohibit the investment, although he has almost never done so.¹⁶⁴ In any event, the potential concern about the foreign origin of the private investment should be somewhat reduced. However, the worry by plenty of those who are against water commodification is not necessarily the security threat but the potential harm to consumers and, to an extent, to cultural values that define water as a

<http://www.oecd.org/daf/inv/investment-policy/40700392.pdf>.

¹⁵⁸ U.S. GOV'T ACCOUNTABILITY OFFICE, *supra* note 155, at 3, 8, 10.

¹⁵⁹ HOMELAND SECURITY COUNCIL, NATIONAL STRATEGY FOR HOMELAND SECURITY 1–25 (2007).

¹⁶⁰ GORDON & DION, *supra* note 157, at 7 (18 out of 39 OECD countries surveyed do so).

¹⁶¹ H.R. 5515, 115th Cong. § 1703(a)(5) (2018), https://home.treasury.gov/sites/default/files/2018-08/The-Foreign-Investment-Risk-Review-Modernization-Act-of-2018-FIRRMA_0.pdf. “(5) CRITICAL INFRASTRUCTURE.—The term ‘critical infrastructure’ means, subject to regulations prescribed by the Committee, systems and assets, whether physical or virtual, so vital to the United States that the incapacity or destruction of such systems or assets would have a debilitating impact on national security.”

¹⁶² Gunjan R. Talati, *CFIUS Reform is Here: What the Foreign Investment Risk Review Modernization Act of 2018 Means for Your Transaction*, LEXOLOGY (Aug. 3, 2018), <https://www.lexology.com/library/detail.aspx?g=a9797189-941b-4c0d-a8d6-e8c6a69fc53e>; GORDON & DION, *supra* note 157, at 5.

¹⁶³ Its composition reflects the concerns being targeted. It is composed of—(1) The Secretary of the Treasury, (2) The Secretary of Homeland Security, (3) The Secretary of Commerce, (4) The Secretary of Defense, (5) The Secretary of State, (6) The Attorney General of the United States, [and] (7) The Secretary of Energy. 50 U.S.C.A. app. § 2170(k)(2) (West 2008).

¹⁶⁴ David Zaring, *CFIUS As A Congressional Notification Service*, 83 S. CAL. L. REV. 81, 87 (2009).

commons.¹⁶⁵ As such, their concern would be better captured by regulations recognizing cultural concerns as a reason to discriminate against foreign investment.¹⁶⁶

E. Exploiting regulatory gaps

1. Groundwater

Not all states regulate groundwater and surface water jointly, although they are more often than not interconnected.¹⁶⁷ Groundwater is still ground zero for the tragedy of the commons in many states.¹⁶⁸ There are a myriad of reasons for the duality in water regulation. Among them is that initially there was not much knowledge about how groundwater operated.¹⁶⁹ Today, the situation is probably explained by path dependence and the difficulty of regulating entrenched interests. Investing in a less regulated resource, groundwater is an interesting prospect in times of water scarcity.¹⁷⁰ Furthermore, new investment in water is keen on exploiting these regulatory gaps.

California did not have much of a groundwater regulation until the last drought crisis when finally, the California legislature managed to pass the Sustainable Groundwater Management Act, which delegates the effective regulation of groundwater to new-formed local agencies. In Texas, the rule of capture applies to groundwater.¹⁷¹ Hence, it gives landowners the right to

¹⁶⁵ BARLOW & CLARKE, *BLUE GOLD*, *supra* note 19, at 87.

¹⁶⁶ U.S. GOV'T ACCOUNTABILITY OFFICE, *supra* note 155, at 8.

¹⁶⁷ BARTON THOMPSON JR. ET AL., *LEGAL CONTROL OF WATER RESOURCES* 444–45 (5th ed. 2012). They are less connected in cases of confined aquifers like the Ogallala.

Burke W. Griggs, *General Stream Adjudications as a Property and Regulatory Model for Addressing the Depletion of the Ogallala Aquifer*, 15 WYO. L. REV. 413, 417 (2015).

¹⁶⁸ Richard Frank, *Tragedy of the Commons—California Drought-Style*, LEGAL PLANET (July 13, 2015), <http://legal-planet.org/2015/07/13/tragedy-of-the-commons-california-drought-style/>.

¹⁶⁹ BARTON THOMPSON JR. ET AL., *supra* note 167, at 444.

¹⁷⁰ Ryan Sabalow & Phillip Reese, *You Could Fill Shasta Lake 7 Times with Farm Groundwater Lost During State Drought*, SACRAMENTO BEE (May 17, 2017), <https://www.sacbee.com/news/state/california/water-and-drought/article151099812.html>; Dean Baxtresser, *Antiques Roadshow: The Common Law and the Coming Age of Groundwater Marketing*, 108 MICH. L. REV. 773 (2010).

¹⁷¹ Texas Supreme Court's 1904 ruling in *East. Houston & T.C. Ry. Co. v East*, 81 S.W. 279 (Texas 1904)

pump water below their property—as much of it as they want. Still, in other states while groundwater is subject to rules like reasonable use (American rule) or correlative rights, it is not subject to a regime as thorough as surface water. Some states like Alabama do not follow the New Mexico or Hawaii¹⁷² example of integrating surface and groundwater and require permits for the latter.¹⁷³ Alabama applies a reasonable use for groundwater¹⁷⁴ (or correlative rights) but does require a permit for surface water.¹⁷⁵

Due to the aforementioned lack of regulation, in both Texas and California, there have been discussions about the power of local authorities, be it counties for California or groundwater management districts in Texas, to prevent the exportation of groundwater beyond the jurisdiction where it is pumped from. In California, county legislation preventing exports has a long history.¹⁷⁶ In Texas, groundwater management districts may set the same restrictions for both users within the jurisdiction and those who export, to ensure the sustainability of the resource. These districts may impose export fees, but an outright ban is not possible because they need to treat exporters and those using water within the jurisdiction equally.¹⁷⁷

While the situation is particularly problematic in states like California or

AMY HARDBERGER, TEXAS GROUNDWATER MARKETS AND THE EDWARDS AQUIFER 3 (2016), <https://static1.squarespace.com/static/56d1e36d59827e6585c0b336/t/5805468415d5dbb1ab59a3a9/1476740751543/Texas-Groundwater-Markets-Hardberger.pdf>.

¹⁷² Haw. Rev. Stat § 174C-2(c) (1993).

¹⁷³ Robert Haskell Abrams, *Legal Convergence of East and West in Contemporary American Water Law*, 42 ENVTL. L. 65, 73 (2012).

¹⁷⁴ RACHEL LOUISE CAIN ET AL., GROUNDWATER LAWS AND REGULATIONS: A PRELIMINARY SURVEY OF THIRTEEN U.S. STATES 8 (2017), <https://law.tamu.edu/docs/default-source/faculty-documents/groundwater-laws-reg-13states.pdf?sfvrsn=0>.

¹⁷⁵ DON R. CHRISTY ET AL., A COMPARISON OF SURFACE WATER LAWS AND REGULATIONS FROM SOUTHEASTERN STATES 7 (2005), <https://athenaeum.libs.uga.edu/bitstream/handle/10724/19397/surfacewater.pdf?sequence=1>.

¹⁷⁶ Gregory S. Weber, *Twenty Years of Local Groundwater Export Legislation in California: Lessons from a Patchwork Quilt*, 34 NAT. RESOURCES J. 657, 657 (1994); ELLEN HANAK & ELIZABETH STRYJEWSKI, CALIFORNIA'S WATER MARKET, BY THE NUMBERS: UPDATE 2012 16 (2012), https://www.ppic.org/content/pubs/report/R_1112EHR.pdf.

¹⁷⁷ BRUCE LESIKAR ET AL., QUESTIONS ABOUT GROUNDWATER CONSERVATION DISTRICTS IN TEXAS 27 (2002), http://twri.tamu.edu/reports/2002/2002-036/2002-036_questions-dist.pdf.

Texas, groundwater laws are in general out-of-date and not suited to respond to the challenges that water marketing poses.¹⁷⁸ A full-fledge regulation of water markets, including surface and groundwater, would be the ideal way forward. Markets in water rights can help water to flow to those who value it the most, encourage those who can sell water to be efficient in their water use, and, make expansions in supply through costly infrastructure less necessary.¹⁷⁹

It should be noted that water is always exported because it is embedded in any product produced. This concept is encapsulated in the water footprint idea. For example, your average 8oz glass of milk requires more than 67 gallons of water on average.¹⁸⁰ If milk does not come from cows grazing in grasslands belonging to the same watershed milk is consumed, an export of water occurs every morning someone drinks milk.

2. Water Re-use

Water reuse is not necessarily a win-win situation where supply increases and pollution in our waterways decreases. Before starting to reuse the water, those cities treated their effluent and discharged it into the river. Many of our rivers are overallocated and, thus, downstream users are likely to be relying on these return-flows for decades.¹⁸¹ By reusing the water, the city may be benefiting either by using it to satisfy its growing demand or by selling it. Right holders who divert water and put it to beneficial use in a prior

¹⁷⁸ See Dean Baxtresser, *Antiques Roadshow: The Common Law and the Coming Age of Groundwater Marketing*, 108 MICH. L. REV. 773 (2010). Despite the push for groundwater markets, current laws are ill suited to deal with the shift toward markets deciding who is the high-value user. “Under these laws, the legality of marketing often rests upon an antiquated, and now-arbitrary, legal distinction of whether a given doctrine permits off-tract use.” Instead of relying on out-of-date laws, states should actively regulate groundwater marketing.

¹⁷⁹ Henning Bjornlund & Jennifer McKay, *Aspects of Water Markets for Developing Countries: Experiences from Australia, Chile, and the U.S.*, 7 ENV'T. & DEV. ECON. 767, 769 (2002)

¹⁸⁰ Water Footprint Network, Product Gallery, Milk, available at <http://www.project-platforms.com/files/productgallery-new.php>

¹⁸¹ DAVID H. GETCHES, WATER LAW IN A NUTSHELL 155 (2009); Krista Koehl, *Partial Forfeiture of Water Rights: Oregon Compromises Traditional Principles to Achieve Flexibility*, 38 ENVTL. L. 1137, 1160 (1998). For a general description of what happens when return flows are reduced see Casado Perez, *Inefficient Efficiency*, *supra* note 21.

appropriation state own the return flow. As such, they can decide to discontinue it and use it within the parameters of their right no matter the negative effects on third parties and, perhaps, the reduction of the overall social utility. There is no guarantee that water re-used by the city would create more added value than the same water in the form of return flow being used by downstream users.

3. Going against the core of Prior Appropriation

Prior appropriation has a central tenet: water has to be put to a productive use. This idea is embodied in two rules: the beneficial use requirement and the use-it-or-lose-it doctrine. If a water right holder does not use their water beneficially for a certain period, usually around 5 years, they may lose the water right. So unlike with real estate or stocks and bonds, where owners can wait for the market to peak and then sell their assets, in water markets, owners cannot engage in this kind of wait-and-see. Prior appropriation aims at encouraging productive, rather than speculative investment. That said, if water becomes valuable enough, as it has become nowadays, investors may find a way around these rules. One company, Water Asset Management, is taking that route—considering land an accessory. The company focuses on water itself but to get to it, buys land and tries to make use of the land even if it is not their main goal.¹⁸² This is not such a new endeavor. The Bass Brothers, Texan oil moguls, bought a \$60 million investment in rights to irrigation water largely in the Imperial Valley in California.¹⁸³ In 1999, their company Western Farms and Cattle Company exchanged the land and water rights for \$250 million worth of stock in the United States Filter Corporation, the world's largest seller of water treatment equipment.¹⁸⁴ United States Filter

¹⁸² Abrahm Lustgarten & Propublica, *A Free-Market Plan to Save the American West From Drought*, ATLANTIC (Mar. 2016), <https://www.theatlantic.com/magazine/archive/2016/03/a-plan-to-save-the-american-west-from-drought/426846/>.

¹⁸³ Janet Neuman, *Beneficial Use, Waste, and Forfeiture: The Inefficient Search for Efficiency in Western Water Use*, 28 ENVTL. L. 919, 968 n. 354 (1998); Passell, *supra* note 5.

¹⁸⁴ Passell, *supra* note 5. Since 2004 the company is a subsidiary of Siemens. Matthew Karnitschnig & Taska Manzaroli, *Siemens to Buy Veolia Water Unit For \$1 Billion*, WALL ST J. (May 13, 2004), <https://www.wsj.com/articles/SB108434300038209065>; Neuman, *supra* note 183, at 968 n. 354.

Corporation, then soon to be a subsidiary of the global water company Vivendi and now belonging to Siemens, is pursuing the same endeavor as the Bass brothers did initially. In addition to the Golden State Deal, the company sought a similar deal in Nevada by buying a ranch and water north of Reno.¹⁸⁵

At least, in the case of surface water, there are some restrictions in place that make engaging in speculation more onerous. In groundwater, speculation is easier. Setting aside restrictions against the exportation of groundwater covered in section V.A., groundwater is ripe for speculation. For example, one of California's largest farming corporations, Cadiz Inc., wanted to sell 47 trillion U.S. gallons of water from municipalities in Southern California.¹⁸⁶ Cadiz Inc. is thought of as an agricultural business, but some see it as a natural resources company that wants to make profit out of blue gold.¹⁸⁷ While water infrastructure may be a daunting challenge, as the somewhat failed deal made by T. Boone Pickens illustrates,¹⁸⁸ it is not an impossible obstacle to surmount. Cadiz Inc. managed to get the approval of the pipeline by the Trump administration and clear the environmental review process imposed by the California Environmental Quality Act. However, many still think that the transfer of water outside the desert and depletion of the Fenner aquifer basin would have effects on Joshua Tree National Park and the Mojave Trails National Monument that somehow had been unaccounted for in the pipeline's review. This was expressed in a bill that the California legislature did not manage to pass this past summer.¹⁸⁹ Given that groundwater is subject to a separate property regime than surface water and that California's Sustainable Groundwater Management Act is not yet fully effective, the only control the state could have had related to the environmental effects of the infrastructure.

The enhanced commodification of water that we are experiencing these days seems to run afoul of the very essence of water as public property. Many states declare in their constitutions that water is owned by the people of the

¹⁸⁵ BARLOW & CLARKE, *BLUE GOLD*, *supra* note 18, at 94.

¹⁸⁶ *Id.*

¹⁸⁷ Julia Sizek, *The Trouble with Cadiz*, MOJAVE PROJECT, <http://mojaveproject.org/dispatches-item/the-trouble-with-cadiz/> (last visited Feb. 15, 2018).

¹⁸⁸ *See supra* text accompanying notes 51–53.

¹⁸⁹ [James & Wyloge](#), *supra* note 80; S.B. 120, 2017-2018 Leg. (Cal. 2017).

state.¹⁹⁰ To put that water to use, we allocate water rights over it. Those who obtain those water rights usually do it for free or by paying limited fees. Any commercial transfer of water can be described as a “windfall” profit for those who sell it, be it water itself, or their limited right to use water. Public policy reasons to allow this are that reallocation will put water to a more efficient use and a higher price discourages wasteful use of water, thus allowing the commodification to be described as a giveaway of public resources.¹⁹¹

V. POTENTIAL REFORMS

A. *Impact on communities*

The nested nature of the water management administration has given an avenue for these sorts of community concerns to play a role. Lower administrative levels such as counties in the United States¹⁹² have exercised their power to prohibit the transfer of water that originates from fallowing, even at the cost of preventing transactions otherwise beneficial.¹⁹³ Such extreme measures should not be allowed if a market is to function properly, since these reflect a parochial view of public interest. This resistance needs to be overcome for a water market to operate.

Restricting, albeit not prohibiting, transactions outside a jurisdiction is another mechanism to address community concerns regarding origin, in

¹⁹⁰ Frank J. Trelease, *Government Ownership and Trusteeship of Water*, 45 CALIF. L. REV. 638, 639 (1957). See e.g., COLO. CONST. art. XVI, § 5; WYO. CONST. art. 8, § 1.

¹⁹¹ ITQs have also been described this way. McCay et al., *supra* note 137, at 97.

¹⁹² HANAK, *supra* note 140 at 25–68, app. C (In chapters 3 to 5, Hanak sets out the current practices of countries. These are the basis for the empirical study of Appendix C where the variables that explain why a county adopts export restrictions are tested). Thompson, *Institutional Perspectives*, *supra* note 16, at 723–26, 728–30 (describing the institutional obstacles to interregional trade posed by Californian mutual and water districts).

¹⁹³ HANAK, *supra* note 140 at 73 (Imperial Irrigation District had, as some other local agencies, a policy disallowing fallowing as a source for water transfers).

water¹⁹⁴ and in other resources.¹⁹⁵ It can be interpreted as protection of community life but a justification based on the environmental impact in the basin could also be offered. Victoria in Australia imposed a 4% cap on trade beyond the irrigation district, that is, on the volume of water entitlements that can be traded permanently out of an irrigation district.¹⁹⁶ Fewer workers will lose their jobs or need to find a job in another sector. These caps are similar solutions to the ones for environmental reasons,¹⁹⁷ in part because neither the environment nor communities have clear right-holders who can defend their interests given the organizational problems of atomized groups. An alternative way to achieve a similar result is by reducing transferability and allowing only certain right-holders to trade with certain other defined right-holders. This is how some ITQ frameworks have achieved it.¹⁹⁸

Beyond caps, there have been instances of monetary compensation by taxing transactions. In Butte County, in California, around 2001, a fee (5% which amounted to \$3.75 per acre-foot) was established to compensate for the community loses. In other cases, a lump-sum was assigned to tackle the revitalization of the community. One of the largest and more important transactions, the one agreed in 2002 between the Imperial Irrigation District and San Diego, contained a clause establishing \$20 million to mitigate third party economic effects.¹⁹⁹

There are mechanisms which are not exactly caps like Victoria's 4% or fees, but which impose practical barriers to transferring water over a certain amount out of the jurisdiction. For example, §1745.05 of the California Water Code established a threshold of 20% of the total water supply coming from

¹⁹⁴ See generally BARLOW & CLARKE, *BLUE GOLD*, *supra* note 18, at 89.

¹⁹⁵ Buck, *supra* note 137, at 6.

¹⁹⁶ There is a cap exchange rate that is not fulfilled by the individuals but by the state with its own entitlements to further mitigate potential effects. Hence even if the buyer in Victoria will receive 0.9 m³, 0.09 more will be left in the river (10% of 0.9 is 0.09) by the State from its own endowment. Hence, the water that is actually left in the river is 0.19, more quantity than before in aggregate, even though the flow between upstream and downstream will be reduced. Waye & Son, *supra* note 49, at 444. See *id.* for an account on the inefficiency arising from the cap.

¹⁹⁷ Murphy et al., *supra* note 139 at 92.

¹⁹⁸ Buck, *supra* note 137, at 6.

¹⁹⁹ Richard Howitt & Ellen Hanak, *Incremental Water Market Development: The California Water Sector 1985-2004*, 30 CAN. WATER RESOURCES J. 73, 78 (2005).

fallowed fields in a given year to trigger a public hearing. The same idea underlies the legislative approval requirement in Oregon for water transfers out of the state,²⁰⁰ which obviously implies very high transaction costs and which seems politically guided more than technically guided. The California Water Code's provision or the Oregon requirement are examples of ensuring a right to participation in water governance.²⁰¹

Adapting these cap or fee mechanisms to the challenges that new investments in water pose is not an easy task.

B. Vouchers, tiered pricing: how to provide water for our basic needs

The amount of water that we need for our most essential needs is a small percentage of the overall water market. International organizations, countries, and even a state in the United States, have framed the essential need of water as a human right.²⁰² The proposals on how to materialize that human right take different forms but must often than not, they configurate it as a positive right,

²⁰⁰ O.R.S. §§537.830, .801-.810 (West 2009).

²⁰¹ For an account of a right to participate in water governance, see Larson, *supra* note 62, at 2236–66 (Larson conceives the right to participation in water governance as a better embodiment of the human right to water than a right to the provision of water. The latter implies significant shortcomings in terms of economic and environmental sustainability that the right to participation does not share. His definition of the right of participation in water has much in common with negative rights. However some of the tenets he argues the right of participation, as he conceives it, have plenty in common with the rights of communities in this paper. He describes these participation mechanisms as follows: “Empowering disadvantaged communities and establishing procedural safeguards will facilitate fair and broad stakeholder participation in water--policy development, and mitigate the effect of government corruption on sustainable and equitable water policy.” *Id.* at 2203).

²⁰² *Id.* at 2204. While the human right to water is not explicitly recognized in the Universal Declaration of Human Rights (<http://www.un.org/en/universal-declaration-human-rights/>) or the International Covenant on Economic, Social, and Cultural Rights (<https://www.ohchr.org/en/professionalinterest/pages/cescr.aspx>), it is implicitly recognized in article 25 of the Universal Declaration (the right to a standard of living adequate for the health and well-being of himself and of his family) and articles 11 and 12 of the Covenant (the rights to an adequate standard of living and health). In addition, the United Nations General Assembly passed a resolution in 2010 recognizing the right to water. 124 countries voted in favor but 41 nations abstained. According to Larson, the abstentions are due to the uncertainty on how to implement the human right to water given its configuration as a positive or provision right. *Id.* at 2184; *see infra* notes 193-196; Blumel, *supra* note 147.

that is, each person has a right to receive a certain amount of water and the government has a duty to provide it.²⁰³ Another way to conceptualize it is a right of provision.²⁰⁴

Within this paradigm of the right to water as a right to receive a certain amount of water, it is conceivable to allocate that percentage of our water that would cover basic needs based on principles other than market ones and still have a large market for the rest, contributing, thus, to the efficient allocation of water. In Australia's Murray Darling Basin, the authorities excluded 65% of the water from the market due to environmental concerns²⁰⁵ and Australian water markets are praised as the example to follow in the dry American West.²⁰⁶

The special nature of water is reflected in the tiered-pricing that many jurisdictions have adopted to price household water²⁰⁷ and that if implemented, could mitigate this access concern. For almost any good, the more you buy, the cheaper it is per unit. In water, where tiered pricing is adopted, the first liters of water are relatively cheap but if you want more of it, it steeply becomes more expensive. This protects those consuming just to cover their most basic needs while, at the same time, discouraging large water users who put a strain on scarce water resources.²⁰⁸ Tiered pricing still has some problems because in many jurisdictions it can only be implemented if it reflects the cost of service and discouraging over-consumption may not be allowed. Still, for the purposes of ensuring that those with less income pay less, this is no obstacle.

²⁰³ Larson, *supra* note 62, at 2185–87.

²⁰⁴ *Id.* at 2204.

²⁰⁵ Courtenay, *supra* note 124.

²⁰⁶ See Robert Pilz, *Lessons in Water Policy Innovation from the World's Driest Inhabited Continent: Using Water Allocation Plans and Water Markets to Manage Water Scarcity*, 14 U. DENV. WATER L. REV. 97 (2010); Laura Taylor, *Drought Down Under and Lessons in Water Policy for the Golden State*, 40 ENVIRONS ENVTL. L. & POL'Y J. 53 (2016); WILL FARGHER, RESPONDING TO SCARCITY: LESSONS FROM AUSTRALIAN WATER MARKETS IN SUPPORTING AGRICULTURAL PRODUCTIVITY DURING DROUGHT, <https://www.oecd.org/tad/sustainable-agriculture/49192129.pdf>.

²⁰⁷ ELLEN HANAK ET AL., PAYING FOR WATER IN CALIFORNIA 29 (2014), <https://www.ppwc.org/publication/paying-for-water-in-california/>.

²⁰⁸ Adam Soliman & Henry McCann, *The "Inexact Science" of Water Pricing* (July 15, 2015), <https://www.ppwc.org/blog/the-inexact-science-of-water-pricing/>.

Tiered pricing, to the extent that it is not means-tested as it has not been in its current implementation, will cross-subsidize the necessary water for all, rich and poor. If a more targeted scheme is preferred, vouchers may be the best avenue. The Portland Water Bureau offers households enrolled in the Low-Income Utility Assistance Program one \$150 crisis voucher every 12 months to cover their water bills. The customer must pay a portion of the bill to receive assistance²⁰⁹ Chile also has a full-fledged, means-tested, subsidy program.²¹⁰ This is a means-tested subsidy. This subsidy was established in 1989 by Act to pay for potable water consumption and sewerage service of the waste waters.²¹¹ Individual households need to apply for it through the municipality, but it is funded by the central government. The subsidy takes into account the income of the families and the level of the tariffs, so it varies by region. The subsidy only covers the first 15 cubic meters per month, above that, the household must pay the full price. For those 15 cubic meters the subsidy covers between 25% to 85% of the fix and variable costs. For families in extreme poverty, the level of the subsidy is 100% for the first 15 cubic meters.²¹²

²⁰⁹ EPA, DRINKING WATER AND WASTEWATER UTILITY CUSTOMER ASSISTANCE PROGRAMS 12 (2016), https://www.epa.gov/sites/production/files/2016-04/documents/dw-ww_utilities_cap_combined_508.pdf (This is not the only program that the Portland Water Bureau has. It “also offers a Safety Net Program that provides assistance to residential ratepayers facing a qualifying emergency (such as change in employment, unreimbursed medical bills, or divorce). The Safety Net Program can delay service disconnection, waive delinquency charges, offer interest-free payment plans, and include financial assistance. The duration of temporary assistance is established on a case-by-case basis.”).

²¹⁰ For an academic commentary see Andres Gomez-Lobo, *Incentive-Based Subsidies : Designing Output-Based Subsidies for Water Consumption*, WORLD BANK (2001), <https://openknowledge.worldbank.org/bitstream/handle/10986/11380/multi0page.pdf?sequence=1&isAllowed=y>. See also Andres Gomez-Lobo & Dante Contreras, *Water Subsidy Policies : Comparison of the Chilean and Colombian Schemes*, WORLD BANK (2003), <https://openknowledge.worldbank.org/bitstream/handle/10986/17185/774180JRN020030ter0Subsidy0Policies.pdf?sequence=1&isAllowed=y>.

²¹¹ Law No. [18778, Enero 17, 1989, DIARIO OFICIAL \[D.O.\] \(Chile\)](#).

²¹² Law No. 19949 art. 8, [Mayo 17, 2004, DIARIO OFICIAL \[D.O.\] \(Chile\)](#).

The different options to close the affordability gap can also be seen as a way to fulfill the human right to water or the right to water guaranteed in many constitutions as a provision right, the right to decide a certain amount of clean water.²¹³

C. Closing the gaps

1. Joint management of surface and groundwater

First, even before tackling the connection between surface and groundwater, groundwater needs to be regulated to avoid overexploitation. Otherwise, an aquifer is the paramount example of a site for a tragedy of the commons.²¹⁴

But beyond the regulation of groundwater itself, when groundwater and surface water are connected, the need to manage groundwater and surface water jointly has long been ascertained. In 1973, the National Water Commission, in its final report “Water Policies for the Future” included the need for integrated management of surface and groundwater.²¹⁵ The literature is abundant on this issue.²¹⁶ Under conjunctive management, “surface water and aboveground storage facilities are operated together with groundwater supplies and underground storage as components of a single

²¹³ Larson, *supra* note 62, at 2187.

²¹⁴ Garrett Hardin, *The Tragedy of the Commons*, 163 *SCI.* 1243, 1244 (1968).

²¹⁵ NAT’L WATER COMM’N, *WATER POLICIES FOR THE FUTURE* 232 (1973).

²¹⁶ See e.g., William Blomquist, Tanya Heikkila & Edella Schlager, *Institutions and Conjunctive Water Management among Three Western States*, 41 *NAT. RESOURCES J.* 653, 653 (2001); Frank J. Trelease, *Conjunctive Use of Groundwater and Surface Water*, 27 *ROCKY MTN. MIN. L. INST.* 1853 (1982); Joseph L. Sax, *We Don’t Do Groundwater: A Morsel of California Legal History*, 6 *U. DENV. WATER L. REV.* 269, 270 (2003) (discussing and critiquing California law); Ellen Hanak, Jay Lund, Ariel Dinar, Brian Gray, Richard Howitt, Jeffrey Mount, Peter Moyle & Barton “Buzz” Thompson, *Myths of California Water – Implications and Reality*, 16 *HASTINGS W.-NW. J. ENVTL. L. & POL’Y* 3, 53–57 (2010) (one of the analyzed “legal myths” in California is the idea that groundwater and surface water are two distinct resources).

system (i.e., operated "conjunctively"). Multiple water needs are met by shifting mixes of surface and groundwater supplies determined by their relative availability."²¹⁷ Conjunctive management can occur in some instances even when there is not an institutional framework that oversees surface and groundwater jointly. But without such a system, which usually takes the form of a permit system, conjunctive management is much more expensive and difficult to implement.²¹⁸ Colorado is a good example to follow. Since the 1950s and 1960s the connection between surface water and groundwater has been blatantly clear in the South Platte basin. If individuals start pumping groundwater, senior surface water users cannot receive water. In order to protect senior water right holders, conjunctive management was a must.²¹⁹ The Colorado legislature brought all surface and groundwater within a watershed under the prior appropriation system. This means that older senior water users, which will inevitably be surface water users, will always have priority. This may perpetuate older, less productive uses of water if there is no mechanism to push them toward efficiency. Either regulation or market incentives are ways to attenuate this path-dependence problem. Conjunctive management with a single permit system over surface and groundwater should close the gaps exploited by current water users and new investors.

2. Return flow and recycled water

Any right holder can use the return flow within the parameters of its right. However, if the right holder wants to use it in other areas, like a newly incorporated area, or sell it to third parties, it should go through the approval process that any water transaction goes through because it implies a change in the water right. Accordingly, if a user wants to stop returning its treated wastewater to the river, he is free to do so. In doing so, he may be harming other users who have been relying on its return flow. Many of our streams are overallocated. Therefore, junior users have been allocated water which would not exist but for return flow. In fact, this is informal water reuse. If the user decides to reuse its return flows within the parameters of its original right, other right holders will not be able to object. Both those junior right

²¹⁷ Blomquist, Heikkila & Schlager, *supra* note 216, at 655.

²¹⁸ *Id.* at 683.

²¹⁹ *Id.* at 674.

holders and the environment will be harmed because less water will be available. There is no guarantee that the return flow reused by the city brings about more social benefit than the previous de facto allocation. If the user decided to use its recycled water beyond the place of use defined in its water right or sell it to third parties, he may probably need to undergo an approval process though. Nonetheless, selling recycled water does not always trigger the approval process. In Arizona, recycled water is considered a new product. There right-holders would be able to sell it. The dissent in *Arizona Pub. Serv. Co. v. Long*, puts it very eloquently:

Without question, Arizona's surface water code governs those appropriations, and subjects them to the prior appropriation and beneficial use doctrines. Since the water when taken is subject to beneficial use limitations, the real issue becomes whether, consistent with beneficial use limitations, the water components of the sewage effluent can be sold by the Cities. The majority fails to resolve this basic issue, but rather focuses on the end product, sewage effluent, and treats it without regard to the principles governing the use and disposition of the effluent's groundwater and surface water components. From this premise the majority then concludes that effluent is not subject to regulation under Arizona's groundwater and surface water codes.²²⁰

While it is a problem that prior appropriation allows a city to reuse the water in the same area of its original water rights even though the return flow may be more productive elsewhere, it is important that at least effluent is not treated as a different product so that at least the sale of effluent cannot escape the scrutiny.

However, a system that makes benefiting from recycling water too difficult may discourage investing in these technologies even though they may still provide a feasible source of water. To make both protection of the current de facto allocation and incentives for recycling compatible, the Oregon water conservation statute may offer a model to follow. Conservation

²²⁰ *Arizona Pub. Serv. Co. v. Long*, 160 Ariz. 429, 440–41 (1989).

thanks to efficient irrigation techniques runs into similar problems as the recycling of the return flow. While drip irrigation is more efficient in an agricultural field than flood irrigation, the systemic effects are unclear. Drip irrigation may allow for more dense production in a field consuming more water than the lower production on the same field under flood irrigation did. Under flood irrigation the non-consumed water went downstream to other users. Oregon, acknowledging that, first tried to define conserved water based on the amount of water consumed.²²¹ And, second, and more important for the purposes of properly regulating reused water, it allowed the farmer to keep 75% of the water conserved, while the other 25% is allocated to the state and permitted to continue its course downstream. The 75% might be reduced if the farmer has received public funds to pay for the change in irrigation systems.²²²

3. Further regulations to prevent speculation

a. Limits on how many rights one user can hold

This concern about concentration of rights in a few hands is not exclusive of water and has translated into limits of how many rights someone can hold. This regulation capping the amount of rights any given right-holder can have has taken on a role traditionally set for antitrust law. For example, in the surf clam and ocean quahog in the Eastern United States fishery, there were no caps set because it was believed that antitrust could deal with market concentration.

There are limits on the volume of oil leases that someone can hold on federal lands. There are limits in some fisheries on the number of quotas that someone can accumulate. Similarly, during the homesteading period, there were set limits on the amount of land someone could claim. There could be both fairness and efficiency concerns at play. By distributing the wealth among more people, more people could have their livelihood ensured. It may also be efficient to ensure some base level for everyone if there were not

²²¹ 1987 Or. Laws 411. Casado Perez, *Inefficient Efficiency*, *supra* note 21, at 11055.

²²² *Id.*

economies of scale lost.

In fisheries, Individual Transferable Quotas (ITQs) were first established not only to address the overexploitation of the fishery, but also a problem of overcapitalization.²²³ The overexploitation of fisheries is unquestioned. But before ITQs, in many cases, such as the Nova Scotia's small dragger or the surf clam and ocean quahog in Eastern United States fisheries, limits on the overall capture were already set.²²⁴ They were not distributed between individuals though, so as a result, fishermen invested in large boats to be able to capture as many fish as possible as fast as possible since they were competing.²²⁵ When establishing ITQs, as the next step after setting the cap, there were two particularly controversial issues: the basis to establish the quota and the potential for consolidation. For example, past catch volume could be the criterium chosen to allocate the fishing quotas. In the Nova Scotia fishery, which allocates rights to fish cod among other species, the historical catch criterium was mitigated by including variables regarding the investment in vessels and by weighing more heavily recent years data. The latter was meant to prevent newcomers from being at a disadvantage.²²⁶ Including these criteria shows that efficiency was not the only goal in mind. Under a pure efficiency framework, the distribution of quotas should not matter given their transferability. In fishing quotas, like in many other resources, distributive concerns are at play.

The rate of consolidation was a concern in the Magnuson Act in the United States. Among its standards it sets that "no particular individual, corporation, or other entity acquired an excessive share of such privileges."²²⁷ Furthermore in 2006, the Magnuson-Stevenson Act was revised to hold that all ITQ programs must:

²²³ McCay et al., *supra* note 137, at 89.

²²⁴ *Id.*

²²⁵ *Id.*

²²⁶ *Id.*

²²⁷ National Standard 4 of the Magnuson Act, 16 U.S.C. 1851(a)(4) (West 2007).

Ensure that limited access privilege holders do not acquire an excessive share of the total limited access privileges in the program by—(i) establishing a maximum share, expressed as a percentage of the total limited access privileges, that a limited access privilege holder is permitted to hold, acquire, or use; and (ii) establishing any other limitations or measures necessary to prevent an inequitable concentration of limited access privileges; [Section 303A(c)(50(D))].

Consolidation is targeted by setting a 2% limit in the Nova Scotia dragger fishery: “no person or enterprise could hold more than 2% of the ITQ for a species in a specific management area.”²²⁸ Concentration may be sometimes inevitable because “independent ownership is often a fiction.”²²⁹ There are informal ways of vertical and horizontal consolidation. For example, in Canada, there may be agreements between processors and boat operators.²³⁰ Despite the limits, the dragger fishery in Nova Scotia has experienced consolidation, dominance of a few firms, harder working conditions for the crew in part due to the reduction in the number of vessels, and a geographic imbalance, that is, landings have concentrated in certain ports and away from others.²³¹ While the latter may be explained by the fish stocks,²³² the concentration in the industry is the result of the quotas as the example of fisheries without limits on the number of quotas someone can hold show.²³³ While it may be efficient and while those smaller companies may have been partially compensated thanks to being able to sell their quotas, the goal of the limit on the number of rights has not been achieved. Alaska’s sablefish and halibut fisheries have tackled this problem of consolidation into large companies by creating different types of quotas to different types of vessels

²²⁸ McCay et al., *supra* note 137, at 97.

²²⁹ *Id.* 94

²³⁰ *Id.*

²³¹ *Id.* 103–04.

²³² *Id.* 104.

²³³ *Id.* at 104 (comparing the Nova Scotia fishery with New Jersey ones).

and those shares can only be transferred within the class.²³⁴ Small boat shares cannot be transferred to large ones.

Homesteading is also a good example of limiting the size of individual allocations. Allocation of land, a natural resource, to those who moved West was limited to a certain number of acres. The motivation, once again, seemed to combine efficiency and distributive concerns. The acreage per farm was limited, but it varied depending on the conditions of the lands being allocated.²³⁵ The Homestead Act of 1862 offered 160 acres per farm,²³⁶ but that proved to be too little for Nebraska. As a result, the Kinkaid Amendment of 1904 granted up to 640 acres.²³⁷ Similarly, while the Timber Culture Act of 1873 offered 160 acres per farm,²³⁸ grazing required more. The Stock-Raising Homestead Act of 1916 provided for grants of 640-acre tracts of grazing land.²³⁹ Often these grants required some productive use of the land.

The same is true for oil and gas leases on federal lands. The enactment of the 1920 Mineral Leasing Act shows Congress' intent to prevent concentration in the oil and gas sector by limiting the amount of rights to exploit energy minerals on federal lands individuals could hold.²⁴⁰ Initially the limit was three oil or gas leases in any one state and not more than one lease within the geological structure. The Act had not, however, a limitation on the number of acres. Hence, someone who had three 160 acre-permits was maxed out as was the person holding three 1,000 acre-permits.²⁴¹ This was corrected in 1926. The first amendment to the Mineral Leasing Act included a shift on the limitation from the number of permits to the number of acres. It limited each individual right-holder to 7,560 acres in each state and 2,560 acres on a structure.²⁴² In practice, right-holders managed to work around

²³⁴ Buck, *supra* note 137, at 7.

²³⁵ JON LAITOS, *NATURAL RESOURCES LAW* 267–69 (3d, 2018).

²³⁶ Homestead Act of 1862, ch. 75, 12 Stat. 392 (repealed in 1976).

²³⁷ Kinkaid Act of 1904, ch. 1801, 33 Stat. 547 (repealed 1976).

²³⁸ Timber Culture Act of 1873, ch. 277, 17 Stat. 605, (repealed 1891).

²³⁹ Stock-Raising Homestead Act of 1916, ch. 9, 39 Stat. 862 (repealed in part 1976).

For a discussion, see JAN LAITOS, SANDI ZELLMER & MARY WOOD, *NATURAL RESOURCES LAW* 319 (2d, 2012).

²⁴⁰ Ross L. Malone Jr., *Oil and Gas Leases on Federal Lands*, 14 MONT. L. REV. 20, 28 (1953).

²⁴¹ *Id.* at 25.

²⁴² *Id.* at 26.

these restrictions. Operators managed to control large expanses of land by taking operating agreements from the permittees, rather than assignments of the rights.²⁴³ This practice was accepted by the Department of Interior until 1938 when it established that those operating agreements counted toward the maximum acreage of the operator. In 1946, however, The Mineral Leasing Act was amended again. It expanded the acreage limitation per state to 15,360 acres and abolished the limitations within a single formation.²⁴⁴ Today the Act reads as follows:

(1)“No person, association, or corporation... shall take, hold, own or control at one time...oil or gas leases...on land held under the provisions of this chapter exceeding in the aggregate two hundred forty-six thousand and eighty acres in any one State other than Alaska... In the case of the State of Alaska, the limit shall be three hundred thousand acres in the northern leasing district and three hundred thousand acres in the southern leasing district.”

(2)“No person, association, or corporation shall take, hold, own, or control at one time **options** to acquire interests in oil or gas leases under the provisions of this chapter which involve, in the aggregate, more than two hundred thousand acres of land in any one State other than Alaska, or, in the case of Alaska, more than two hundred thousand acres in each of its two leasing districts, as hereinbefore described. No option to acquire any interest in such an oil or gas lease shall be enforceable if entered into for a period of more than three years...without the prior approval of the Secretary.”²⁴⁵

Translating these examples to water is not straight forward. One potential way to do so is to limit trades to only right-holders. This has the clear problem of discriminating potential new entrants on any market who needed water for their production. Those entrants would have to apply before an agency for a

²⁴³ *Id.* at 26.

²⁴⁴ *Id.* at 32.

²⁴⁵ 30 U.S.C.A. § 184(d) (West 2005).

water right. The process is cumbersome but so is the process of getting a transaction approved. However, a new application may have a harder time being granted because many streams are overallocated already, so the level of externalities is expected to be higher than when the amount of water diverted is not larger but the type of water use or place changes. While imperfect, a middle ground solution could be a thorough review of any water transaction by the agency that requires the company or individual acquiring the water right to actually use the water, perhaps even for a number of years. While this will not eliminate every single strategic behavior, it may discourage some. It may still be worth it to have to use the water right during a period before trading and speculating with it, but it will certainly be more expensive.

b. Establishing restrictions on who can hold a water right

Most natural resources are conceived as public. As such, any individual right over them may be subject to limitations. Among those, there are limitations on who can own those limited rights. Beyond restrictions on foreign ownership,²⁴⁶ it is often the case that regulations reflect the collective will of ensuring that those rights are productive and that windfall profits do not befall those who got a right to use a public resource.

In water, given that these new investors in water rights have managed to go around the forfeiture and the non-use prohibition, restricting who can hold a water right could be an avenue to mitigate the speculation problem. The example of grazing permits may provide a model. The Taylor Grazing Act defines who can hold a grazing permit and the Clinton Rangeland Reform implemented further such definition. The move in the case of water rights would be the reverse than the one taken by Secretary Babbitt who aimed at allowing environmental groups to hold grazing rights so that they would let them rest and ranchlands would recover. The courts struck down the regulations referring back to the original Taylor Grazing Act text that requires the right holder to be engaged in the livestock business. Similarly, in some Canadian fisheries, there are requirements to be a licensed fisherman and a

²⁴⁶ See *supra* text accompanying notes 155–66.

citizen.²⁴⁷ The latter requirement is also found in the Mineral Leasing Act of 1920 still today.²⁴⁸

Still within this idea of limiting who can hold a right, it is worth exploring one of the limitations in the Alaska halibut and sablefish fisheries. In those fisheries, there are prohibitions to discourage absentee-owners such as requiring the quota-holders to be on-board.²⁴⁹

In the case of water, the beneficial use requirement plays a similar role to the one played by “engaged in the livestock business.” Like in the grazing rights or the fishing quotas, the legislation may be sidestepped by clever minds who irrigate the land and produce some low maintenance crops as an excuse or who graze two llamas instead of six cows because they consume less water. While coming up with a restrictive definition of beneficial use may be problematic, regulations could require a certain number of years of a particular type of use before the permit could be transferred to other uses. This will lock water in the agricultural sector but it will at least ensure a lower price given the lower demand for these type of rights for a while, further discouraging speculators.

VI.CONCLUSION

There are plenty of forces pushing water to be the new oil as it becomes scarcer due to climate change and increases in demand due to population growth and lifestyle changes. The question is whether water should be a commodity like oil. Even setting aside the physical differences such as the renewable nature of water, oil and water do not mix. The main difference is that while oil is essential, it is rarely irreplaceable. In contrast, water is imprinted by a sense that without it there is no life and this belief informs the reluctance of many to let markets reign in water.

²⁴⁷ McCay et al., *supra* note 137, at 97.

²⁴⁸ Mineral Lands Leasing Act of 1920, ch. 85, 41 Stat. 437 (codified as amended at 30 U.S.C. §§ 22, 48, 181-287 (1982)).

²⁴⁹ Pacific Halibut Fisheries; Groundfish of the Gulf of Alaska; Groundfish of the Bering Sea and Aleutian Islands; Limited Access Management of Fisheries off Alaska, 58 Fed. Reg. 59,375 (Nov. 9, 1993) (to be codified at 50 C.F.R. pts. 204, 672, 675, 676).

This paper does not claim that we should do away with water markets. In fact, given the myriad of forms that those markets in water take, it is unclear whether we could stop them. Markets can be positive tools for water management if they prompt us to be more efficient in our water use. While in that sense, water is the new oil, a water market must be a regulated one. Investment should not reign unchecked. Water systems and uses are interdependent. As a result, externalities may abound. States should ensure that the investment does not come at the cost of non-internalized negative externalities to other water users or the environment. Furthermore, given that in water, fairness seems to be more important than efficiency for the public,²⁵⁰ this paper has also offered tools for those states that want to go further and correct the potential unfairness of water markets.

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²⁵⁰ Joseph W. Dellapenna, *The Importance of Getting Names Right: The Myth of Markets for Water*, 25 WM. & MARY ENVTL. L. & POL'Y REV. 317, 364 (2000); Victor Brajer & Wade Martin, *Allocating a "Scarce" Resource, Water in the West: More Market-Like Incentives Can Extend Supply, but Constraints Demand Equitable Policies*, 48 AM. J. ECON. & SOC'Y 259 (1989); GLEICK, *supra* note 55, at 36 (on the particularly deep feelings communities seem to have for their water).