Political Decoupling: Private Implementation of Public Policy

Manny Teodoro
Texas A&M University
mteodoro@tamu.edu

Youlang Zhang
Texas A&M University
zhangyoulang@tamu.edu

David Switzer
University of Missouri
switzerd@missouri.edu

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Abstract

Where policy goals can be achieved through regulation of private firms, private provision of public services allows governments to separate public policies from their political costs by shifting those costs to the private sector. Over the past three decades, financial decoupling has emerged as a regulatory strategy for promoting conservation, especially in the energy sector. Decoupling refers to the separation of a firm's revenues from the volume of its product consumed, and so allows companies to pursue resource efficiency free from financial risk. Similarly, when private firms provide public services, they separate public policies from their political costs. This *political decoupling* allows governments to pursue controversial policies while avoiding their attendant political risks. Applied to environmental policy, this theory implies that potentially unpopular conservation policies are more likely to be adopted and succeed when implemented through private firms. As an initial test of the theory, we analyze California water utilities and their responses to that state's drought from 2015–2017. Analysis shows that, compared with those served by local government utilities, private utilities adopted more aggressive conservation measures, were more likely to meet state conservation standards, and conserved more water.

This article argues that, where policy goals can be achieved through regulation of private firms, private provision of public services allows governments to separate public policies from their political costs by shifting those costs to the private sector. Like private firms, public agencies provide services that are socially or environmentally costly. Unlike firms, public agencies are not profit-maximizers; government actions are determined through a political process, with production and consumption decisions determined according to political preferences. Governments and public administrators thus bear political costs that private firms do not when they are charged with implementation of potentially unpopular policies. Private implementation of public policy reduces those political costs to governments. The result is a *political decoupling* that allows governments to achieve policy goals while insulating officials from their political costs.

Over the past three decades, *decoupling* has emerged in the United States as a regulatory strategy for promoting resource conservation, especially in the energy sector, where electricity is generated mainly by private utility companies. In regulatory economics, decoupling refers to the separation of a firm's revenues from the volume of its product consumed. Private firms generally prefer maximizing revenue by selling more of their product, *ceteris paribus*. Where consumption of that product generates significant negative externalities or causes common pool resource problems, revenue maximizing by individual firms can be collectively inefficient and unsustainable. Promoted by conservation activists, decoupling allows firms to pursue resource efficiency without its usual attendant financial risk. If conservation causes revenue shortfalls that threaten profits, decoupling provides for rate increases in order to maintain revenue for the utility. Decoupling thus insulates firms from the financial risk of conservation.

Environmental protection provides useful examples of political decoupling, too: where citizens and/or their elected officials prefer environmental sustainability, government agencies pursue sustainable policy. However, where a majority of the public prefers greater consumption of environmental resources, conservation policies can be unpopular, and so expose government officials to political risks. Konisky & Teodoro (2016) argue that this political risk is part of what makes government agencies more difficult to regulate than private firms. One implication of political decoupling is that regulated private firms are more likely to achieve politically sensitive public policies than are government agencies, because the latter bear political costs that the former do not.

As an initial test of the concept of political decoupling, the present study analyzes public and private water utilities and their responses to a recent drought in California. In 2015, a severe drought in California prompted the state government to order conservation by 408 of its urban water suppliers based on their past consumption patterns. These utilities vary widely in service populations, ex ante water consumption, and several other characteristics. They also vary in ownership: 84 percent of the utilities subject to the mandate were owned and operated by local governments; the other 16 percent were private firms.

Effective conservation programs reduce water sales, which in turn reduce revenues. For utilities that rely upon sales revenue to fund operations, aggressive conservation programs thus carry potentially severe financial risks for utilities. In principle, both public and private water utility finance are effectively "decoupled" in California: public and private utilities alike can adjust future rates upward to recapture revenue lost due to conservation. Private utilities in California enjoy rate decoupling through a state financial regulatory process, which allows them to recapture revenue lost due to conservation. Local government utilities are self-regulated with respect to pricing, setting their own rates through a local political process. However, water rates often are contentious in California, which exposes local government officials to political risks that private managers typically avoid. Thus, while local governments are formally unconstrained in rate-setting, political costs reduce their willingness to pursue conservation.

Analysis of data from California's recent drought demonstrates patterns that are consistent with our expectations about political decoupling. When the state government ordered water utilities to conserve: a) on average, private utilities adopted more stringent conservation regulations than did local government utilities; so b) private utilities were significantly more likely than their public counterparts to meet the state's conservation mandate; and c) private utilities on average conserved more water than public utilities. Somewhat counterintuitively, then, investor-owned, profit-driven firms were more effective than were local government agencies in achieving the state's conservation goals.

We begin by describing the institutions that govern utility services in the United States and trace the logics that turn financial considerations into conservation incentives (or disincentives) for private firms and public agencies. Against this institutional backdrop we introduce the 2012-2017 drought emergency in California and that state's policy response to it. We then lay out our theory of private implementation as political decoupling, arguing that the institutions governing utility finance in California make the maintenance of revenue associated with aggressive conservation measures politically costlier for public utilities than for their private counterparts. An initial empirical evaluation follows, with analysis of irrigation restrictions and water consumption during the mandate and post-mandate period (2015-2017) of California's drought. We conclude with a discussion of the study's limitations, directions for further investigation, and implications for governance more broadly.

Regulatory decoupling and the institutional logic of conservation

Decoupling has its origins in energy utility regulation. For a host of environmental and economic reasons, governments over the past half-century have sought to encourage energy efficiency through conservation. Although utility companies might support energy efficiency in principle, reduced consumption also reduces revenue in the short term, and so utility companies historically resisted conservation efforts for fear of threats to profitability. The dilemma led to the development of decoupling as a policy strategy to overcome this disincentive for conservation by electrical and gas utilities (Eto, Stoft & Belden 1997)—a topic to which we return later.

A parallel dilemma faces water utilities. Here we introduce the institutions and processes that govern water pricing in the United States, with particular focus on how public and private utilities experience the financial and political costs of conservation.

Utility pricing. As with electricity or gas, drinking water provision is a natural monopoly due to its high fixed costs and enormous economies of scale. The water utilities that serve most Americans are predominantly government-owned: about 85 percent of Americans who receive drinking water utility service are served by local governments, with the remaining 15 percent served by private, investor-owned utilities (Konisky & Teodoro 2016).

In the United States, all but the very smallest water utilities operate on a fee-for-service basis. Utilities charge customers according to price schedules that include both fixed and volumetric elements (Warmath 2015): customers pay a fixed monthly charge for a connection to the system, and an additional charge for each volumetric unit of water consumed. Volumetric pricing can provide economic incentives for conservation, and utilities seeking to reduce overall water consumption frequently use higher volumetric charges, progressive rate schedules, or seasonal pricing pursuant to conservation (Gaur, Matthews and Phan 2015; Mullin 2008).

In order to avoid the economic inefficiencies that typically follow monopoly pricing, utilities in the United States are subject to government price regulation (Breyer 1982; Viscusi, Vernon and Harrington 2000). However, the political institutions that govern privately-owned and government-owned utilities are fundamentally different, and so present utilities with very different financial consequences for conservation.

Private water price regulation: Public Utilities Commissions. In the United States, pricing for privately-owned utilities is regulated by state Public Utilities Commissions (PUCs). The precise names and institutional forms that PUCs take vary, but in California the PUC is composed of five commissioners, who are appointed by California's governor and confirmed by its Senate to serve fixed, staggered six-year terms. The commissioners are supported by a staff of more than a thousand attorneys, economists, engineers, administrative law judges, and others.[1] Like the rest of the US, California's water utility services are primarily provided by the public sector, with private utilities serving about 20 percent and local government utilities about 80 percent of the population (Kenney 2014).

Water rate setting under PUC regulation proceeds under the *cost of service* principle (Breyer 1982). According to this principle, utility companies are limited to recovering their actual cost of providing service, plus a legally-sanctioned rate of return on their capital investment. Because utility revenue under the cost of service principle is a function of capital investments, private companies tend to invest heavily in their utilities, which can lead to economically inefficient over-investment (Averch & Johnson 1962). A significant goal of the PUC process is to constrain pricing and guard against such over-investment.

The PUC rate setting process is technocratic, legalistic, and adversarial. Attorneys representing the utility make a formal case for their rates to the PUC, armed with voluminous economic, engineering, and legal analysis. Utilities' rate proposals are scrutinized by the PUC's

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[1] Along with water, California's PUC regulates pricing for energy, telecommunications, and transportation.

Office of Ratepayer Advocates (ORA), whose own lawyers, economists, and engineers argue for lower rates on behalf of utility customers. Ultimate rate-setting authority lies with the Commission itself. PUC rate processes draw scant media attention, and although its hearings are public, they usually are lightly attended.

Public water utility price regulation: local government. American local governments (including counties, municipalities, and special districts) that own drinking water utilities are essentially self-regulated with respect to pricing (Corssmit 2010).[2] State laws authorize local governments to set their own service rates to cover the costs of providing service, but legally prohibit them from using utilities as profit centers. Beyond this general limitation local governments are responsible for pricing. This "self-regulation" means that public water utility rates are set by local legislatures: county commissions/councils for counties, city councils for municipalities, and boards/commissions for special districts.

Consequently, rate-setting for public water utilities is subject to the political calculations of local government managers and elected officials, who must balance revenue needs against other goals (Glennon 2004; Mullin 2009; Mullin & Rubado 2017; Teodoro 2010). For local government utilities, water customers are also voters who prefer lower rates to higher rates, ceteris paribus (Timmins 2002). Raising water rates can be a "political high-wire act" (Postel 1999, 235) and "a veritable root canal during an election year" (Mehan 2008, 2), often with negative electoral consequences for local politicians who stoke voters' ire through rate increases (Martin, et al. 1984). Unlike the technocratic PUC process, rate-setting for government utilities can be a raucous, contentious affair with extensive public involvement, especially in contexts of extreme water scarcity, income inequality, or infrastructure costs (Brandt, Locklear and Noyes

[2] Two states are exceptions. In Wisconsin, both public and private utilities are subject to price regulation by the Wisconsin Public Services Commission. Publicly owned utilities in Indiana may opt for price regulation by the Indiana Utility Regulatory Commission.

2015). In California the political risks of rate increases are especially pronounced for local government officials, since water rates can be subject to voter approval or rejection under that state's Constitution, following the passage of Proposition 218 in 1996 (Salt 2016). Thus, in addition to the direct costs of service, public officials must also absorb significant political costs when they raise rates as necessary to provide high quality service and meet regulatory requirements (Lindsay 1976; Konisky & Teodoro 2016).

Conservation revenue risk & rate decoupling. Volumetric pricing creates the same conservation quandary for water utilities as it does for electric and gas utilities because reduced water demand results in reduced revenue for the utility (Beecher 2010). Most of a water utility's costs are fixed and unrelated to volume of water consumed: reservoirs, treatment plants, transmission mains, and other infrastructure must be built and maintained as long as demand is greater than zero. Similarly, the personnel costs associated with operating and administering the utility system are mostly fixed in the short-term. Fluctuations in demand due to weather conditions or conservation can cause short-term revenue to fall much faster than fixed costs (Chessnutt & Beecher 1998). This mismatch means that utilities in water-scarce regions face a resource dilemma: reducing demand in the name of sustainability risks significant revenue loss.

Recognizing that such revenue concerns create a strong disincentive for conservation in energy utilities, several state PUCs have adopted a strategy of *decoupling* for electricity and gas over the past three decades (Lewis & Sappington 1992). As noted earlier, "decoupling" refers to the separation of a utility's profit from the quantity of energy delivered to its customers. Promoted by conservation activists, decoupling allows utilities to pursue conservation without fear of financial losses: if the conservation causes shortfalls in revenue, automatic rate increases are imposed in order to guarantee sufficient revenue for the utility. A robust literature in regulatory economics takes up the merits, drawbacks, and empirical results of decoupling (Eto, Stoft & Belden 1997; Lesh 2009; Brennan 2010; Sullivan, Wang & Bennett 2011; Zarnikau 2012; Chu & Sappington 2013). Today about half of U.S. states have adopted rate decoupling for electricity and/or natural gas utilities.[3] For present purposes, the main significance of decoupling is that it eliminates the main financial disincentive for PUC-regulated private utilities to promote conservation. By the same token, decoupling shifts the revenue risk associated with conservation from utilities' investors to their customers.

Decoupling in water. Broadly, there are two ways to incentivize water conservation under a utility model: pricing and non-price instruments. A pricing approach uses rates as a signal to encourage water efficiency, while non-price instruments include subsidies for efficiency and restrictions that proscribe certain kinds of water use. Both approaches are widely used in the United States, and empirical research finds that both can drive conservation (Olmstead & Stavins 2009; Mansur & Olmstead 2012; Wichman, Taylor & von Haefen 2016). However, research on drought response finds consistently that water restrictions are especially effective in driving immediate reductions in water consumption (Reed 1982; Kenney, Klein & Clark 2004; Halich & Stephenson 2009; Robinson & Conley 2017). For present purposes, a key difference between the two approaches is their financial effects: price-based conservation strategies generate revenue while reducing water consumption; water restrictions reduce consumption without generating any new revenue, and perhaps even reducing revenue. Water restrictions are thus potent, but financially risky, instruments for conservation.

In 2008, California's PUC decoupled water sales from water revenue for private utilities with the introduction of a Water Revenue Adjustment Mechanism (WRAM) (Crew & Kahlon

[3] See http://www.c2es.org/us-states-regions/policy-maps/decoupling for a list of states with decoupling policies for energy utilities.

2014).[4] Unsurprisingly, private utilities take advantage of this provision when conservation causes a loss of sales revenue: financial losses associated with reduced sales volumes are recouped in future rate increases through WRAM. In the years since its adoption, California's investor-owned water utilities have regularly invoked WRAM in pursuit of rate increases during drought years (White 2015).

Private implementation as political decoupling

An important implication of the differences in incentives for public agencies and private firms is that private provision of a public service results in a *political decoupling* of a public policy from its political costs to government officials. When democratic governments provide services, elections provide direct accountability to citizens for the cost and quality of those services. Regulated private firms are not so directly accountable; when private firms provide public services, the government serves as a regulatory overseer, not as a producer. When combined with rate decoupling, private provision of a public service shifts to private firms some of the political risks that might otherwise discourage democratic governments from pursuing controversial public policies. In this way, private implementation of public policy creates a kind of "political decoupling" to complement financial decoupling.[5]

In the case of water utilities, effective conservation programs are financially costly, and private firms and public agencies experience those costs in different ways. For private firms, financial decoupling makes the rate-setting process technocratic, and shifts the revenue risk of conservation from utilities' investors to their customers. As self-regulated enterprises, local government utilities also may adjust their rates if conservation measures cause revenue

[4] To date, only one other state (New York) has adopted decoupling for private water utilities regulated under the state utility commission.
[5] Singh (2006) used the phrase "political decoupling" to describe the process of privatizing and liberalizing the electricity sector in India.

shortfalls.[6] However, doing so exposes the utility's leaders to political risk (Beecher, Chesnutt & Pekelney 2001; Mehan 2008; Postel 1999); whatever their attitudes toward sustainability, citizen-customers who reduce water use in the name of conservation are likely to resent the prospect of higher bills when they have used less water.

Financial decoupling and a technocratic PUC process insulate private firms from political costs; the "voices" of ordinary citizens is less immediately relevant for private utilities (Warner & Hefetz 2002), and the PUC absorbs the political risk of rate-setting. For public agencies, the price increases necessary to recoup financial losses lead to political costs borne by politicians, who are accountable to their voters. Anxious to please their citizen-customers, politicians are less likely to pursue those financially costly (and therefore politically costly) measures. The somewhat counterintuitive result is that politically risky policies are more likely to be effective when they are carried out by private firms rather than by public agencies.

Privatization as political decoupling. The recent privatization of the Nassau County sewer system on New York's Long Island, provides a useful illustration of the logic of political decoupling. In 2012, flooding during Superstorm Sandy knocked the county's wastewater treatment plant offline for 57 hours and caused untreated widespread sewage spills (LaRocco & Brodsky 2014). The disaster revealed pervasive problems with the county sewer system that had accumulated over decades of deferred maintenance, repairs, and upgrades. Historically, Nassau County had funded sewer service solely through property taxes, but the $1.5 billion cost of system repairs prompted county leaders to explore privatization of its sewer system and introduction of volumetric fees.

In 2014 the county turned operation of its sewer system over to Suez, an investor-owned

[6] Alternatively, local governments might shift money from other sources to its water utility. In practice, such transfers are rare and in some cities they are illegal.

multinational corporation. Key to the privatization agreement was the introduction of volumetric sewer fees for commercial customers, including potential surcharges for unanticipated capital expenditures (Brodsky 2012). The change from public to private operation of the sewer system allowed officials to frame privatization as a transfer of responsibility and a savings to the government. "This agreement shifts Nassau away from an antiquated sewage treatment infrastructure that was becoming a burden to both the county and its residents," said county legislator Howard Kopel in support of the agreement (Malloy & Schofer 2014). Of course, Nassau County residents ultimately footed the bill for sewer system improvements in the form of increased charges, now paid to a private firm instead of the county agency.

Drought in California: a crisis and policy response

In theory, political decoupling can occur under circumstances where private firms enjoy financial decoupling, politicians face democratic accountability for public policy, and an effective regulatory regime monitors private firm compliance. We now turn to a case in which these conditions apply widely and so provides a useful context for initial exploration of this theory: the 2012-2017 drought in California.

The state of California began experiencing long-term drought conditions as early as 2007, when the seasonal mountain snowpack that many of the state's cities rely upon for water was unusually low. The drought intensified to crisis conditions by 2012, and by the snowpack was just 17 percent of normal levels. In response, California governor Jerry Brown issued a statewide Water Action Plan in January 2014 that called for sweeping reforms to water consumption and management across all levels of government.[7] An official drought emergency was declared, and water utilities were required to report detailed conservation information to

[7]The California Water Action Plan: http://resources.ca.gov/california_water_action_plan/

the state beginning in June 2014. The drought continued to intensify, however; analysis of tree ring data indicates that 2012-2014 was the most severe drought in California for the past 1,200 years (Griffin and Anchukaitis 2014). By early 2015 California's mountain snowpack was effectively gone, leaving the state desperately short of water for urban supply.

In the face of this extraordinary drought, in April 2015 Governor Brown ordered the California State Water Resources Control Board (SWRCB) to impose restrictions on drinking water utilities designed to reduce potable urban water usage by 25 percent statewide.[8] Notably, the order applied only to urban drinking water utilities, which together account for about ten percent of the state's water use (Mount & Hanak 2016).[9] Beginning in June 2015, SWRCB restrictions required California's drinking water suppliers to reduce usage relative to their 2013 levels. The conservation regulation applied to water *suppliers*, not directly to water *consumers.* That is, SWRCB required utilities to cut water use by specified percentages, but left individual utilities to choose the means by which to achieve conservation. Failure to comply with conservation standards was punishable by fines against the utility. The initial order remained in place through February 2016. In March 2016, the SWRCB reduced conservation standards for some utilities in response to increased rainfall in some regions.

The emergency regulation assigned each urban water supplier its own conservation target, with standards ranging from 4 percent to 36 percent reductions relative to 2013 levels. These standards were formulaic, and varied based on utilities' historical average residential water consumption, measured as residential gallons per capita per day (R-GPCD).[10] In the

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[8] Governor Brown Directs First Ever Statewide Mandatory Water Reductions: https://www.gov.ca.gov/news.php?id=18913

[9] On average, agriculture accounts for about 40 percent and environmental management about 50 percent of California's annual water use (Mount & Hanak 2016).

[10] State Water Resources Control Board Resolution NO. 2015-0032: http://www.waterboards.ca.gov/board_decisions/adopted_orders/resolutions/2015/rs2015_0032.pdf

interest of maintaining adequate water use to protect public health, the SWRCB set conservation standards progressively based on historical average residential water consumption: utilities with higher historical R-GPCD were assigned higher conservation targets, while utilities with relatively low historical R-GPCD were assigned less severe conservation standards.[11] Critically for present purposes, the conservation rules applied uniformly to publicly- and privately-owned utilities: conservation standards were assigned based on historical demand patterns and supply considerations, not on ownership or governance. Analysis of these conservation standards (reported in Appendix A) demonstrates that public and private utilities were not subject to significantly different standards.

Hypotheses. Applied to California water utilities and their responses to the 2015 drought regulations, several hypotheses follow from our theory of political decoupling. Thanks to the rate decoupling offered by California's WRAM, private utilities may impose restrictions on irrigation without fear of losing revenue due to reduced water sales. For politicians and managers operating local government utilities, the revenue losses that accompany irrigation restrictions can force politically costly rate increases that are likely to anger voters.

An exhaustive demonstration of these mechanisms would require connecting public or private utility ownership to variation in: 1) irrigation restrictions; 2) water conservation; 3) ratemaking; and 4) electoral outcomes for local government officials. The analysis offered here takes up the first two of these. Although thorough analysis of rates and electoral outcomes is beyond the scope of this article, past research finds that private water rates are, on average, higher than public utilities (Food & Water Watch 2009), and suggests that public utilities' low prices reflect voter preferences (Timmins 2002; Mehan 2008). Moreover, utility-level monthly data on pricing across ranges of water consumption for California utilities are unavailable, so

[11] Appendix A provides more detailed discussion of these conservation standards.

we cannot directly assess the extent to which public and private utility rates varied during the drought. Analysis of electoral outcomes is possible (a point to which we return later). Nonetheless, analysis of irrigation restrictions and conservation outcomes provide useful first-order tests of political decoupling; if they do not vary by utility ownership, then their subsequent effects on rates and elections are moot.

With these goals in mind, our first hypothesis is:

H1—Restrictions: In response to state conservation mandates, private water utilities adopt more stringent irrigation restrictions than public utilities.

Residential water demand in California is strongly associated with non-agricultural outdoor irrigation, especially in the summer season. Many utilities responded to the state's mandate by adopting outdoor irrigation restrictions—most commonly by limiting the number of days per week that customers were allowed to water their lawns and gardens. Facing little financial risk and virtually no political costs, private water utilities can pursue conservation more aggressively, resulting in greater conservation.

Our second and third hypotheses thus follow from the first:

H2a—Compliance: Private water utilities are more likely than public utilities to meet the water conservation mandates set by the SWRCB.

H2b—Conservation: In response to the state's drought declaration, private water utilities conserve more water than public utilities.

Data and methodology

We evaluate these hypotheses by analyzing data from the SWRCB's Monthly Reporting

Archive,[12] which includes monthly observations of 408 utilities for the period during which California's statewide conservation mandate was in effect: June 2015-May 2016. We merged these data with water utilities' information from the Environmental Protection Agency's Safe Drinking Water Information System (SDWIS), drought data from the National Drought Mitigation Center at the University of Nebraska-Lincoln, partisanship information from the California Statewide Database, and community demographic and economic data from the U.S. Census' 2015 American Community Survey's five-year estimates (ACS).[13] This process yielded a dataset of 4,896 utility-months. Our analytical aim is not to model conservation precisely, but rather to evaluate hypotheses related to utility ownership. Thus, we do not attempt to control for all variables that drive water conservation, but rather those for which data are available and might be expected to confound the effects of ownership (see also Appendix B).

Variables. Table 1 provides a descriptive summary of the variables employed in the present analyses. The key independent variable in all three hypotheses is a dummy that equals 1 if a water utility is owned by private investors and 0 if it is owned by a government (either a municipality or special district).[14]

The dependent variable for hypothesis H1 is the stringency of irrigation restrictions imposed by a utility, which we measure as the number of outdoor irrigation days allowed per week. While the statewide mandates were in effect, utilities allowed an average of 2.52 days per week, but restrictions varied considerably, both across utilities and within utilities over time. A

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[12] California State Water Board's Monthly Reporting Archive: http://www.waterboards.ca.gov/water_issues/programs/conservation_portal/conservation_reporting.shtml

[13] The ACS reports demographic and economic data by city, and so matching utilities to demographic data for municipal utilities was simple. To match these data with special district and private water utilities, we used ACS data for the primary city served listed in the SDWIS for the utility.

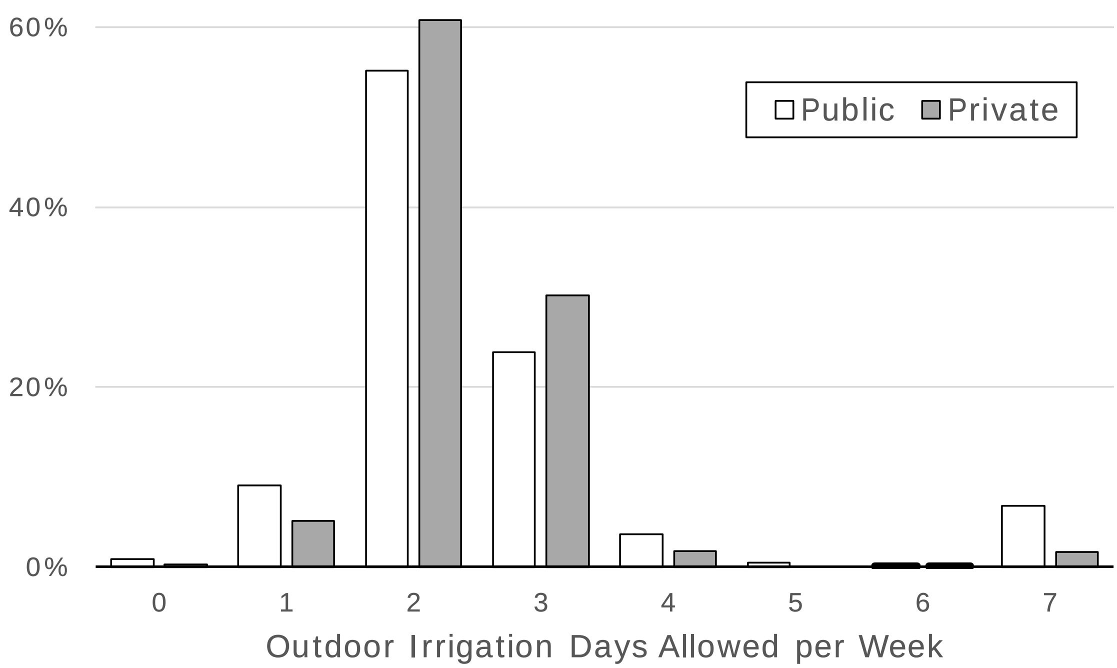
[14] To test for potential heterogeneous effects of local government form on water conservation (Mullin 2008; Mullin & Rubado 2017), we specified additional models (not reported here) with special districts and municipalities designated with separate dummies. We found no statistically significant difference between municipalities and special districts with respect to regulatory compliance or overall conservation.

large majority of utility-months (81.6%) allowed irrigation just two or three days a week during the state's mandatory conservation period, 5.7 percent had no restrictions at all, and 0.8 percent banned outdoor irrigation entirely. Figure 1 depicts the distribution of irrigation restrictions during the drought for public and private utilities. To ease evaluation of Hypothesis H1, we measure the intensity of *irrigation restrictions* for utility *i* in month *t* as:

$$Irrigation\ restrictions_{i,t} = 100 - \left(\frac{Irrigation\ days\ allowed\ per\ week_{i,t} \times 100}{7}\right) \quad \text{(Eq. 1)}$$

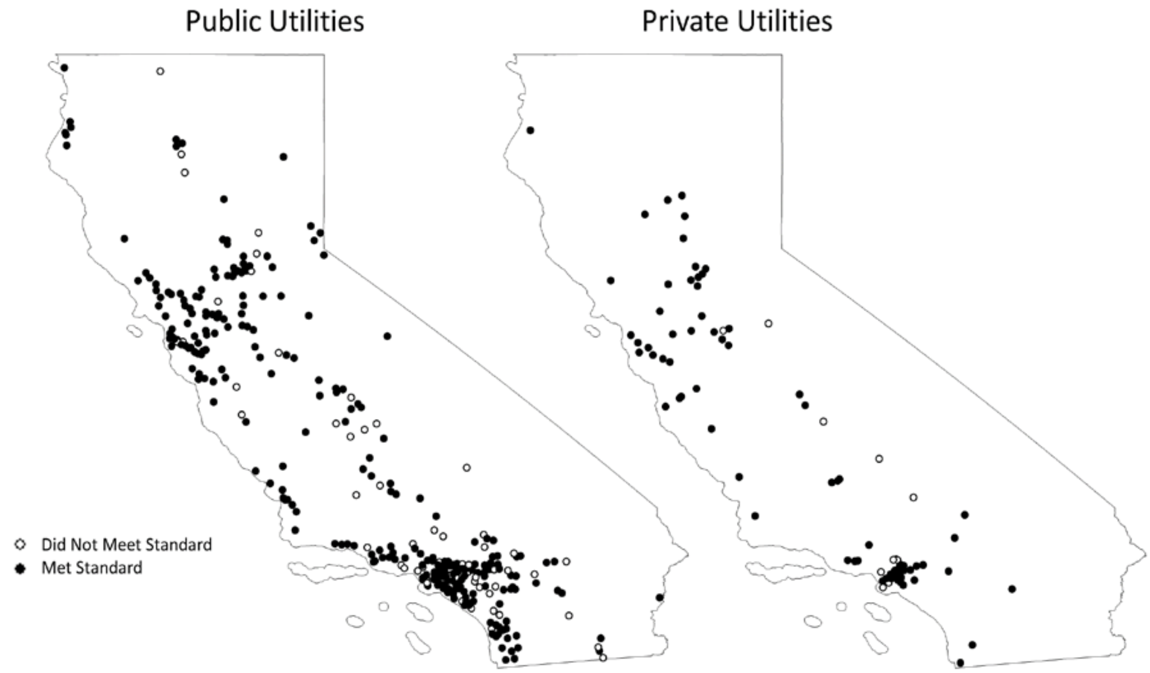
which can be interpreted as the percentage of days when outdoor irrigation is prohibited.

Figure 1. Irrigation Restrictions by Public and Private Utilities, June 2015-May 2016



For hypotheses H2a and H2b, the dependent variables are policy outcomes, which we measure in two ways, reflecting the two hypotheses. The dependent variable for H2a is *compliance* with the conservation targets set by the SWRCB, which we measure as a dummy that equals 1 if a utility meets the conservation standard, and 0 otherwise. Figure 2 shows the geographic distribution of public and private utilities that met the conservation standard by May 2016.

Figure 2. Utility compliance with state conservation standard, May 2016.



For H2b, the dependent variable is each utility's monthly percentage water *conservation* compared to the same month in 2013. This measure of utility i in month t of is calculated as:

$$Water\ conservation_{i,t} = \frac{Water\ Production\ 2013_{i,t} - Water\ Production\ 2015,\ \ 2016{,}2017_{i,t}}{Water\ Production\ 2013_{i,t}} \qquad \text{(Eq. 2)}$$

We include a number of variables to control for the characteristics of each utility in our analysis. First, we control for the percentage *conservation standard* set by SWRCB, which we expect to positively predict irrigation restrictions (H1) and overall conservation (H2b), but negatively predict compliance (H2a) because meeting a higher standard is more difficult. We draw data on drought severity from the National Drought Mitigation Center at the University of Nebraska-Lincoln. The weekly *drought score* is on a 6–point scale ranging from normal conditions to exceptional drought. We then aggregate the weekly measure into a monthly measure. For the weeks that overlapped months, we weight them according to the number of days in each month.

A utility's water source may also affect conservation; because ground water supplies are generally less threatened by drought, utilities that rely on *groundwater* might have less incentive to conserve water. Many California water utilities—including some serving the largest population areas—*purchase* wholesale water supplies from the state's large water projects, including the federal Central Valley Project, the State Water Project, San Francisco's Hetch Hetchy Aqueduct, and the Metropolitan Water District's Colorado River Aqueduct.[15] Utilities that buy water from wholesale supplies may impose lighter restrictions and conserve less because they do not face a direct supply threat, and because decreased revenue from water sales may be offset to an extent by decreased purchased water costs, especially in a drought when some of these imported supplies become constricted.

Community characteristics can also potentially influence the adoption of conservation programs and overall water conservation. To account for their effects, we include controls for the *population* size (logged), *population density* (thousands per square mile), *median household income*, *poverty* rate, and percentages *black* and *Hispanic* population served by the utilities. We expect that minority and/or poor populations might be less likely to meet conservation standards because they might have less discretionary consumption and therefore less potential for relatively easy additional water conservation. By the same logic, we expect median household income to correlate positively with water conservation because wealthier customers might have greater ex ante discretionary water consumption that could be reduced with relatively little inconvenience. On the other hand, more affluent communities might resist

[15] We thank an anonymous reviewer for pointing out this fact.

conservation efforts if they are accustomed to larger homes and intensely landscaped lots.

Table 1. Descriptive summary

Variable	Mean	Std. Dev.	Min	Max
Irrigation days allowed per week	2.52	1.30	0	7
%Monthly water conservation compared to same month in 2013	23.87	11.66	-58.89	77.69
Met conservation standard	0.53	0.50	0.00	1.00
Private	0.15	0.36	0.00	1.00
% State conservation standard	23.85	8.46	4.00	36.00
% Residential Use	69.70	15.28	0.05	100.00
Drought score (0-5)	4.37	0.95	0.00	5.00
Ground water	0.34	0.47	0.00	1.00
Purchased water	0.43	0.49	0.00	1.00
% Democratic Share 2012	75.64	23.97	20.50	99.86
Population density (1000 per square mile)	6.83	23.56	0.00	407.25
Total population served (1000s)	88.45	23.59	0.11	4074.12
%Adult population with bachelor's degree	29.17	16.16	1.86	79.90
%Household below poverty income	15.09	7.53	2.40	41.30
%Black	4.35	5.13	0.00	42.40
%Hispanic	36.31	22.77	4.06	97.49
Median household income ($1000)	67.13	24.28	23.06	229.10
N = 4,896				

Finally, we account for communities' general preferences toward environmental policy by controlling for the 2012 Democratic Party presidential vote share, with the expectation that water conservation will increase as the Democratic vote share increases, owing to that party's general pro-environment stance and local politicians' desire to please their constituents (Switzer 2017).[16] We drew data on partisanship from the California Statewide Database, which contains information on voting and registration at the precinct level for statewide elections since 1992

[16] Full precinct-level election data for 2016 were not publicly available at the time of this analysis. However, given the unusual dynamics of the 2016 election (Donald Trump vs. Hillary Clinton), the more conventional contest between Democrat Barack Obama and Republican Mitt Romney in 2012 may be a more useful gauge of local policy preferences.

(University of California 2017). Using ArcGIS, we aggregated votes for Obama and Romney for each voting precinct overlapping utilities' service areas. For the municipal utilities, we aggregated the election results for the precincts within city limits. For private utilities, we aggregated votes within the cities and census designated places that the utilities serve according to SDWIS. For special districts, we used maps from the California Special Districts Association and utility websites to aggregate the election data (California Special Districts Association 2017). The 2012 presidential vote variable is not meant to reflect political dynamics related to the drought, but rather general community attitudes toward environmental policy that might predict adoption of irrigation restrictions and conservation outcomes.

We employ different estimators to evaluate the three hypotheses. To model the continuous dependent variables in H1 and H2b, we use Ordinary Least Squares (OLS) regression. For hypothesis H2a's binary dependent variable we use logistic regression. All models apply robust standard errors clustered by utility and include month fixed effects to account for unobserved temporal variation. The demographic, partisanship, and utility variables do not vary over time, and so the unique combinations of these variables effectively serve as fixed effects for each utility.[17]

A note on endogeneity. Two concerns about potential endogeneity merit brief discussion. The first is reverse causality: it is possible that supply conditions or relative scarcity might cause public or private utilities to emerge in some communities. However, ownership of the utilities analyzed here was determined decades ago, changes in utility ownership are rare, and none of the utilities in the present study changed ownership during the period of analysis.

[17] Serial autocorrelation may cause biased estimates if, for a given utility, conservation in the past affects the likelihood or level of conservation in current or future periods. As an additional robustness check, we fitted models for H2a and H2b with lagged dependent variables. The effect of private ownership on conservation remains positive and significant when lagged dependent variables are included.

Consequently, reverse causality is not an important challenge in this analysis.

Omitted variable bias presents a more serious potential endogeneity concern if ex ante environmental or community characteristics associated with private utilities may make them more likely to conserve than communities served by public utilities. However, as noted earlier, California's public and private utilities did not face significantly different conservation mandates (see also Appendix A). Moreover, public and private utilities differ significantly in only three demographic or political characteristics: on average, compared with public utilities, private utilities serve communities with a higher percentage Black population, higher percentage residential customers, and lower Democratic vote share. As we will see, the effects of these variables on conservation programs and outcomes are either statistically insignificant or do not change when ownership is included in estimation. As an additional test of robustness against omitted variable bias, we fitted matching models and conducted sensitivity analyses that affirmed the main findings reported here; see Appendix B for a detailed discussion.

Results: public and private utility responses to drought

Table 2 reports our estimates of irrigation restrictions (H1). Table 3 reports our models of compliance with state conservation standards (H2a), and Table 4 shows estimates of overall conservation (H2b). All three tables present specifications with controls only alongside specifications that include ownership; in each case, the *private* ownership indicator markedly improves model fit (Δ AIC -25.2 for Model B; Δ AIC -38.9 for Model D; Δ AIC -51.5 for Model F), indicating that conservation measures and outcomes vary significantly by ownership.

Table 2. Irrigation restrictions, June 2015-May 2016

OLS Regression	Model A		Model B	
DV: Irrigation restrictions (0-100 scale)	Coefficient (Robust SE)	p-value	Coefficient (Robust SE)	p-value
Private			4.01 (1.67)	.02
%State conservation standard	-0.06 (0.13)	.65	-0.04 (0.13)	.77
%Residential Use	0.03 (0.05)	.64	0.02 (0.05)	.70
Drought score	3.82 (0.99)	<.01	3.71 (0.98)	<.01
Ground water	-1.82 (2.41)	.45	-2.08 (2.42)	.39
Purchased water	-3.45 (2.35)	.14	-3.60 (2.35)	.13
%Democratic vote 2012	0.02 (0.04)	.52	0.05 (0.04)	.27
Population density	0.03 (0.02)	.07	0.03 (0.01)	.07
Population served (log)	-1.29 (0.94)	.17	-1.30 (0.94)	0.17
%Bachelor's degree	-0.04 (0.12)	.75	-0.06 (0.13)	.64
%Poverty	-0.04 (0.17)	.82	-0.05 (0.17)	.77
%Black	0.05 (0.13)	.68	0.03 (0.13)	.82
%Hispanic	0.04 (0.05)	.45	0.03 (0.06)	.60
Median household income ($1000)	0.13 (0.07)	.05	0.13 (0.07)	.05
Constant	49.52 (10.39)	<.01	48.93 (10.37)	<.01
Observations	4896		4896	
R-squared	0.06		0.067	
AIC	42272.86		42247.68	
BIC	42435.27		42416.58	

Note: two-tailed p-values. The dependent variable is the intensity of water restrictions measured as percent of days irrigation is prohibited. Robust standard errors clustered by utilities in parentheses. Models also include month dummies not reported.

Table 3. Compliance with state conservation standard, June 2015-May 2016

Logistic regression	Model C		Model D	
DV: Compliance with state conservation standard	Odds Ratio (t-statistic)	p-value	Odds Ratio (t-statistic)	p-value
Private			1.97	<.01
			(3.31)	
%State conservation standard	0.87	<.01	0.87	<.01
	(-12.58)		(-12.41)	
%Residential Use	1.01	.03	1.01	.04
	(2.13)		(2.01)	
Drought score	1.08	.34	1.06	.47
	(0.96)		(0.73)	
Ground water	0.86	.45	0.82	.33
	(-0.75)		(-0.97)	
Purchased water	0.60	<.01	0.58	<.01
	(-3.07)		(-3.25)	
%Democratic vote 2012	1.00	.94	1.00	.31
	(-0.08)		(1.02)	
Population density	1.00	.77	1.00	.80
	(0.29)		(0.25)	
Population served (log)	1.00	.94	1.00	.94
	(-0.08)		(-0.08)	
%Bachelor's degree	0.98	.04	0.98	.02
	(-2.04)		(-2.40)	
%Poverty	1.01	.56	1.01	.65
	(0.59)		(0.45)	
%Black	0.98	.21	0.98	.11
	(-1.26)		(-1.59)	
%Hispanic	0.99	<.01	0.98	<.01
	(-2.90)		(-3.31)	
Median household income ($1000)	1.02	<.01	1.03	<.01
	(3.76)		(3.82)	
Constant	14.76	.01	13.49	.02
	(2.49)		(2.42)	
Observations	4896		4896	
Pseudo R-squared	0.27		0.28	
AIC	4985.4		4946.5	
BIC	5147.8		5115.4	

Note: two-tailed p-values. The dependent variable is a dummy equal to 1 if the utility's monthly water conservation meets SWRCB standard, 0 otherwise. Models also include month dummies not reported.

Table 4. Monthly water conservation, June 2015-May 2016

OLS regression	Model E		Model F	
DV: %Monthly water conservation compared with same month in 2013	Coefficient (Robust SE)	p-value	Coefficient (Robust SE)	p-value
Private			3.01 (0.83)	<.01
%State conservation standard	0.28 (0.04)	<.01	0.30 (0.04)	<.01
%Residential Use	0.05 (0.02)	.02	0.05 (0.02)	.03
Drought score	0.30 (0.37)	.42	0.21 (0.36)	.56
Ground water	-0.69 (1.04)	.51	-0.88 (1.02)	.39
Purchased water	-2.51 (0.82)	<.01	-2.62 (0.81)	<.01
%Democratic vote 2012	0.00 (0.01)	.89	0.02 (0.02)	.25
Population density	-0.02 (0.01)	.81	-0.00 (0.01)	.78
Population served (log)	-0.24 (0.30)	.42	-0.25 (0.28)	.39
%Bachelor's degree	-0.06 (0.04)	.18	-0.07 (0.04)	.10
%Poverty	0.03 (0.07)	.68	0.02 (0.07)	.77
%Black	-0.10 (0.06)	.10	-0.12 (0.06)	.04
%Hispanic	-0.07 (0.03)	.01	-0.08 (0.03)	<.01
Median household income ($1000)	0.10 (0.03)	<.01	0.10 (0.03)	<.01
Constant	16.80 (4.64)	<.01	16.36 (4.59)	<.01
Observations	4896		4896	
R-squared	0.31		0.32	
AIC	36158.59		36107.09	
BIC	36321.00		36275.99	

Note: two-tailed p-values. The dependent variable is the percentage of monthly water conservation compared to the same month in 2013. Robust standard errors clustered by utilities in parentheses. Models also include month dummies not reported.

The results are consistent with all three hypotheses. Private utilities imposed significantly more stringent irrigation rules: Table 2 indicates that, all else equal, private utilities restricted irrigation about four percent more time than did public utilities while state mandates were in effect.

Turning to outcomes, the relationships between private ownership and conservation are consistent across multiple specifications for both the compliance and conservation models. Table 3 shows that private ownership positively predicts the likelihood that a utility met the state's conservation standards during the mandate period. All else equal, private utilities were nearly twice as likely (+97.0 percent) as public utilities to comply with state conservation standards in a given month—a surprisingly strong indication that the state's regulatory regime was far more effective in compelling private owners than government agencies to conserve.

Overall water conservation was also greater for private utilities, according to Table 4. During the mandatory conservation period of the drought, private utilities conserved an average of three percent more water each month than their public counterparts relative to 2013. Although this difference is small in percentage terms, it reflects an enormous difference in absolute volume of water. Three percent greater conservation would have boosted public utilities' restriction compliance rate from 51 to 62 percent. In substantive terms, three percent greater conservation by California's local government utilities during the mandate period would have reduced the state's total potable water consumption by 54.6 billion gallons—enough to supply the City of San Francisco for more than two years.

Utility characteristics generally correlated with irrigation restrictions and conservation as expected. Drought severity and population correlated positively with irrigation restrictions (though not with compliance or actual conservation). Utilities that purchase their water supplies from wholesalers were significantly less likely to achieve conservation targets and saved significantly less water overall, suggesting that strategic concern for water supply sources may have influenced conservation. Residential water use was not significantly correlated with irrigation restrictions, but positively predicted both compliance and conservation.

Some community characteristics yielded notable results, too. Population density positively correlated with irrigation restrictions, but not with conservation outcomes. Racial/ethnic minority populations (measured as percent Black and percent Hispanic population) negatively predicted compliance with the conservation standard and overall conservation. Democratic vote share was not significantly correlated with either irrigation restrictions irrigation restrictions or conservation outcomes. Median household income positively predicted restrictions, compliance, and conservation consistently across all models; poverty levels did not, however. These results may suggest greater relative elasticity of demand among more affluent populations.

Aftermath

Significant rain and snow returned to parts of California in the winter of 2015-2016. By late spring 2016, the state's reservoirs and snowpack had recovered markedly, particularly in Northern California. Noting the improving conditions, the SWRCB lifted the conservation mandate, but encouraged utilities to continue conservation efforts by setting their own targets beginning in June 2016. During the mandatory conservation period the state's utilities cut water consumption 24 percent overall—just short of the SWRCB's 25 percent target (Fears 2016). In April 2017 a triumphant Governor Brown celebrated the state's conservation achievements and declared an official end to the drought emergency.

Table 5. Monthly water conservation, June 2016-April 2017

OLS regression DV: %Monthly water conservation compared with same month, 2013	Model G Coefficient (Robust SE)	p-value
Private	2.72 (0.86)	<.01
%Residential Use	0.06 (0.02)	<.01
Drought score	0.47 (0.28)	.09
Ground water	-0.57 (1.22)	.64
Purchased water	-3.05 (1.02)	<.01
%Democratic vote 2012	0.04 (0.02)	.03
Population density	-0.02 (0.02)	.28
Population served (log)	-0.22 (0.33)	.51
%Bachelor's degree	-0.12 (0.05)	.02
%Poverty	0.11 (0.09)	.23
%Black	-0.15 (0.06)	.01
%Hispanic	-0.10 (0.03)	<.01
Median household income ($1000)	0.15 (0.03)	<.01
Constant	12.79 (5.06)	.01
Observations	4445	
R-squared	0.11	
AIC	34171.73	
BIC	34325.32	

Note: two-tailed p-values. The dependent variable is the percentage of monthly water conservation compared to the same month in 2013. Robust standard errors clustered by utilities in parentheses. Models also include month dummies not reported.

Persistent private conservation. Notably, the public-private disparity in conservation outlived the state mandate. Table 5 reports OLS estimates of overall conservation during the period of voluntary conservation, when the state mandate was lifted but the drought declaration remained in effect (June 2016-April 2017).[18] Records from the California PUC indicate that, by Spring 2018, at least 39 of the 62 private utilities analyzed here had invoked WRAM to raise rates after the drought emergency ended. Many citizen-customers chafed at the rate increases following conservation. “There is a drought and everyone is asked to conserve water, but if you do, you are going to get stuck with a higher WRAM charge next year and pay for water you didn't use,” grumbled an Op-Ed in the *Vacaville Reporter.* “Dixon residents are dammed if they do and damned if they don't.”[19] Largely shielded from the financial risks of conservation, private utilities conserved an average of 2.7 percent more water than public utilities during this phase of the drought.

The political costs of conservation. Conservation successes came at a severe financial cost for many local government water utilities across the state in what a prominent *New York Times* article called “the paradox of conservation” (McPhate 2017). The politics of water conservation in the City of Redlands following the state’s 2015 drought order provides a useful illustration of the conservation order’s local political costs. Redlands is a municipality of about 70,000 in San Bernardino County that owns and operates a public water utility. Following Governor Brown’s emergency declaration the SWRCB assigned a 33% conservation standard to Redlands. The city responded with a series of conservation measures, including restricting outdoor irrigation to just two days per week. Although the city reduced water demand, it achieved only 11.3% conservation and met its conservation standard in just two out of the 12

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[18] See Appendix C for accompanying descriptive summary statistics.
[19] http://www.thereporter.com/article/zz/20141101/NEWS/141107432

months that the state mandate was in effect.

Despite missing its conservation goals, Redlands' reduced water sales caused a revenue loss of about $2 million by early 2016, leaving the city with a financial crisis. Utility staff recommended a 19 percent rate increase to cover the shortfall. More than 3,000 citizens attended a raucous, five-hour City Council meeting to protest the proposal. The council ultimately approved the rate hike in recognition of the financial realities facing the utility. The vote was 4-1, with first-term Councilman John James leading the effort.

Intense opposition followed, with more than 3,000 citizens filing official protests against the rate increases (Emerson 2016a). The two city council seats scheduled for election in November 2016 drew six challengers, at least three of whom campaigned explicitly against the water rate increase (Emerson 2016b). Although his long-serving fellow incumbent survived the challenge, Councilman James narrowly lost his re-election bid. Similar processes played out in cities and special districts across California, with drought-related rate increases prompting public protests and/or legal challenges in Alameda County Water District, East Bay Municipal Utility District, Hillsborough, Los Angeles, Pleasanton, and Yorba Linda, among others.

Discussion

The financial burdens of conservation ultimately fall to customers of utility enterprises with high fixed costs, whether they are public or private. Rate decoupling has proven effective in aligning investor-owned utilities' financial interests with conservation. Free from the revenue risks that accompany reduced consumption, utilities can pursue resource efficiency and meet conservation aims while maintaining profitability and without fear of popular backlash. Although government enterprises do not seek profit, they nonetheless rely on rate revenue and so risk significant financial losses when conservation efforts succeed. Government utilities are legally authorized to set their own rates, but raising rates—however fiscally necessary or environmentally prudent—carries heavy political costs for officials.

These dynamics played out during the recent California drought. Our analysis demonstrates that when the state ordered water utilities to conserve, private utilities adopted more stringent conservation regulations, were much more likely to comply with the conservation mandate, and saved significantly more water than public utilities. Private provision of a public service (in this case, drinking water) decoupled conservation from its attendant financial and political risks. The ironic result was that private firms proved to be more effective instruments of environmental policy than did government agencies, not because private firm managers are publicly-motivated, but because they are largely insensitive to conservation's political costs. These findings reinforce past research on government-regulating-government, which finds that public agencies are more difficult to regulate than private firms generally (Wilson & Rachal 1977), and that government agencies are significantly more likely than private firms to violate environmental regulations in particular (Durant 1985; Davies & Probst 2001; Konisky & Teodoro 2016).

Directions for future inquiry. This initial evaluation provides intriguing evidence for private implementation as political decoupling in water utilities. Future research should investigate the extent to which public and private implementation also predict differences in water pricing and electoral outcomes for local government officials.

More generally, the idea of private implementation as political decoupling can apply to any public policy; we hope future research will examine the extent to which politicians and public managers use private implementation as a means of insulating themselves from political risks. Political decoupling may help explain the rise of private contracting for military and security operations, for example. Where military action risks unpopular casualties, the use of private contractors instead of military personnel partially obscures those risks from the public (Singer 2005). In such instances, private provision of public services may be financially costly but politically expedient for governments that seek to separate policies from their political costs.

Conclusion. The case of public and private water conservation in California offers broader lessons for the politics of implementation. Debates over privatization typically center on efficiency, often with a related concern for democratic governance (Warner & Hefetz 2002). The idea of political decoupling recasts the private implementation of public policy not only as a matter of efficiency and democracy, but also as a matter of policy *effectiveness*. Buffered from the political risks of controversial policies and more responsive to regulatory sticks and carrots, private firms may be more effective than public agencies in implementing controversial public policies, whether or not they are more efficient.

But decoupling a public policy from its political costs through private administration does not eliminate those costs so much as obscure them and/or place them beyond the ordinary citizen's reach. Even assuming that efficient and effective regulatory regimes constrain firm behavior, privatization makes the public policy process more technocratic and less democratic. Engagement with regulatory processes requires a degree of sophistication that privileges professionals and muffles ordinary citizens' voices (Mosher 1968). When the government's role is oversight rather than production, the regulatory process also is prone to political capture by the firms that it is meant to regulate (Stigler 1971; Etzioni 2009; but see Berry 1984). In California's recent drought, regulated private firms were more effective conduits of environmental policy than were government agencies. That private firms proved to be effective partners in California's conservation effort offers important lessons for the implementation of environmental policy. One of those lessons could be that the price of environmental sustainability may be less democratic influence over policy implementation.

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