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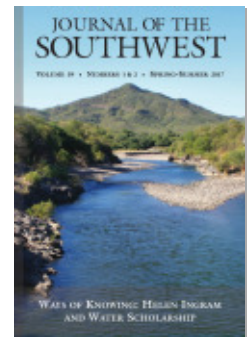
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The Shape of Groundwater Law: California's New Sustainability Act

JOSEPH F. C. DIMENTO¹

Helen Ingram's contributions to understanding the challenges of equitable water management and to offering ways of improving it are unequaled. They have made a difference in policy, not only in scholarship. Helen and Joseph Sax—another extraordinary water scholar and dear friend, also of Helen's—are the inspiration for my trying to add a bit to the analysis of what we can do to increase the probability that California's Sustainable Groundwater Management Act and other law and policy options will meet the goals of fair and effective groundwater law and policy.

Building trust in one another and developing institutional rules that are well matched to the ecological systems being used are of central importance for solving social dilemmas.²

Our objective is to keep groundwater management at the local level and not at the State Water Resources Control Board, or in many cases by the guys in the black robes through the judicial process.³

INTRODUCTION

A. Water and Its Disappearance: A Scenario

Several families in the town of Dry, which relies heavily on groundwater for its needs, have been told that if the already historically long drought continues in their area, within months they will have no running water; land in their community will continue to sink, destroying existing infrastructure; wildlife that use degrading wetlands for habitat will

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disappear; and fish in the shrinking streams will not survive. Authorities further informed Dry residents that even if this drought mitigates in severity, the long-term prospect in the face of climate change is for periodic massive water shortfalls and saltwater intrusion into their drinking water and other supplies of water. Companies in and around Dry have been drawing groundwater in a business-as-usual manner and they have no intention to stop. These users claim historical rights to draft from the underground water sources, some of which are transboundary with a neighboring nation-state. Some say they are overlayers; some claim prescriptive rights; others say they are appropriators; and a few even claim pueblo priority. Although they are feuding among themselves as to how much they should pull from the aquifers, they are steadfast in their commitment to maintain their uses until “nature fills in the wells or until the water is gone.” Several of the users engage in activities that pollute the existing groundwater. Families in Dry have no other source of water.

The above scenario, a collage of circumstances not commonly found together, is nonetheless not fanciful. In the most recent drought in California impacts described were stunning, affecting everyone, rural and urban, agricultural and industrial, with costs calculated in the billions on the macro level and individual cases of parched communities and families needing to carry in bottled water to drink and bathe, making these costs graphic.

GROUNDWATER MANAGEMENT

What Is Groundwater?

Although it seems natural to begin an article on groundwater with a definition of what it is, in the California case it is more than a descriptive introduction. Part of the reason why California has had limited groundwater management is because of deep-seated and fiercely argued and litigated differences on what is and what is not groundwater.⁴

Groundwater has been curiously and sometimes humorously misunderstood throughout history. Just over a hundred years ago it “was considered ‘occult’ ”⁵ and its “existence, origin, movement, and course... secret...and concealed...or mysterious.”⁶ While now scientifically well understood, that knowledge has not been disseminated broadly to the

public or to policy makers. It's also true, however, that unlike a surface-water stream or lake, it is difficult for people to tell where a groundwater basin is and where it starts and ends without expensive investigations. Groundwater is water that is located over common basins, but not always common legal jurisdictions or property boundaries. It is water from rain and rivers that migrates through the ground and is stored in porous soils and rocks. Groundwater is found in vast quantities filling the spaces between grains of soil or rock; it slowly flows through aquifers; it connects with rivers, streams, lakes, and wetlands; it feeds trees and vegetation.⁷ Groundwater is water in common basins, saturated strata, reservoirs, or underground reservoirs. The complexity of groundwater management derives in some part from "hydrological heterogeneities."⁸ Water moves and the same water over time may be groundwater and surface water and elsewhere on its way in the water cycle. In California, traditional reasoning had distinguished it (usually called "percolating groundwater"), not regulated, from surface streams and "subterranean streams" both subject to permitting and regulation.⁹

Approaches to Groundwater Management

The approaches to groundwater management in the United States are almost as varied as the states themselves. (There is a background and potentially increasingly important federal authority over groundwater through the federal government's paramount power over navigable waters and its strong environmental law.¹⁰ And there is international law influence over groundwater.¹¹ However, for the purposes of this analysis our focus is on state law.)

Some states base groundwater allocation on reasonable use (the American Rule), some on beneficial use, some on prior appropriations ("first in time, first in right"), some on reasonable use and correlative rights, and some on absolute ownership or the Rule of Capture.¹² Some states settle disputes over the water through state courts; some depend on state agencies; some use special water courts; some combine dispute resolution authority between departments and courts.¹³ Some employ groundwater conservation districts; some use groundwater management areas; some rely on county jurisdiction.

THE CALIFORNIA CASE

Background

In California several entities are involved in some aspect of groundwater management in the state's more than 500 basins. These include special districts, special act districts, cities, and counties. California was the last western state to adopt a comprehensive statewide groundwater management regulatory system.¹⁴

Whether it was either fair or professional to call California groundwater law a “mess,” that is the way it has been characterized, even in serious legal analyses. *Laissez-faire* is a less normative descriptor.¹⁵ Part of that description comes from the variety of rights that water users or would-be water users claim under the state's complex law. Pueblo rights are rights of a municipal successor to a Spanish Mexican pueblo to reasonable and beneficial use of the water underlying the historic pueblo. Overlying rights are those to pump the water beneath one's land; correlative rights modify this right as overlying users hold in common the right to use the groundwater for reasonable and beneficial use of the aquifer's safe yield.¹⁶ If users take more than the safe yield, then all overlying users must reduce their use to a fair and just proportion relative to the other overlying users. Appropriation rights are rights to extract groundwater that is surplus to that needed by overlying users and transport it to land that does not overlie the groundwater basin from which it was extracted. Prescriptive rights are those gained by pumping continuously for the prescriptive period when prior rights holders have notice and there is no surplus water in the basin. There is a fifth category relevant in many but not all basins in the state—to pump return flows of water imported to the basin.

The priorities among these rights are these: Pueblo first, and then: Among overlying users, no temporal priority exists. If there are shortages each is entitled to a reasonable share. Among appropriators there is temporal priority; the rights of a pumper first in time are senior to those of a later appropriator and the use is limited to the amount of surplus water in the groundwater basin. As between overlying users and appropriators, overlying users have priority. Prescriptive users can quantify their rights as against both appropriators and overlying users under formulas that the courts have developed.¹⁷ The priority of pump return rights is not settled.

The California Case, Contemporary: The Sustainable Groundwater Management Act

After years of concern over the need for new law to address California's multiple challenges of rising population, federal involvement through environmental laws, climate change, and a messy mixture of laws, rules, and institutions governing groundwater, in 2014 the state passed groundwater management law. The regime is much like California's response to other environmental and governance challenges. It adopted an approach that requires, over a considerably long time horizon, local entities to engage in creating plans to meet generally articulated sustainability goals; a state backup role comes should they not do so. In some ways the sustainability act is similar to the approach used in California in Senate Bill (SB) 375 on the links between climate change mitigation, local land use comprehensive plan law, and state-mandated greenhouse gas emission limits—this itself a specific case within the general approach to local comprehensive planning found in the state planning law. The massive lobbying potential of local governments and private interests provides a considerable obstacle to more direct state regulation.

Three bills make up what is commonly called the Sustainable Groundwater Management Act, SGMA—also referred to as SIGMA. These are SB 1168, Pavley; Assembly Bill (AB) 1739, Dickinson; and SB 1319, Pavley. Fran Pavley and Roger Dickinson both had strong credentials in groundwater concern and their friendly competition (later cooperation and collaboration), alongside a supportive Governor's Office along with a focus on soliciting stakeholder input, created a supportive environment for new law, one that went beyond individual district applicability and volunteerism.¹⁸ Commitment of state funds to assist in groundwater management planning increased the possibility of passage.¹⁹

1. The Main Provisions

By June 30, 2017, SGMA requires the formation of locally controlled groundwater sustainability agencies (GSAs) responsible for developing and implementing a groundwater sustainability plan. GSAs are one or more local agencies that will implement the new act. By January 1, 2020, high- and medium-priority basins in critical overdraft must have groundwater sustainability plans (GSPs). High- and medium-priority

areas which are not in critical overdraft must complete their plans by January 21, 2022. These priorities were determined in response to earlier California legislation that lead to CASGEM, the California State-Wide Groundwater Elevation Monitoring Program.²⁰

There are 127 such basins. Exempted are 338 basins categorized as low or very low priority and all adjudicated basins and three pending adjudications. (Alternate plans are possible in limited circumstances. Orange County, for example, has submitted its 2015 plan as its GSP.) Sustainable groundwater management is the “management and use of groundwater in a manner that can be maintained during the planning and implementation horizon without causing undesirable results,” which include chronic lowering of groundwater levels; significant and unreasonable reduction of groundwater storage; significant and unreasonable seawater intrusion, degraded water quality, and land subsidence; and depletions of interconnected surface water that have significant and unreasonable adverse impacts on beneficial uses of the surface water.

Upon completion of a plan the groundwater sustainability agency must submit the plan to the Department of Water Resources for review. Then, until 2040, every five years each groundwater sustainability agency must re-certify that it is making progress toward achieving groundwater sustainability. By January 1, 2040, each high- and medium-priority basin shall achieve its sustainability goals.²¹ If plans are late, inadequate, or not followed the State Water Resources Control Board can put an area on probation. Absent compliance in the probationary period the board can implement an interim plan until local area compliance is achieved. The law requires a local agency to determine sustainable yield for a groundwater basin in coordination with other applicable local agencies whose service areas overlie the groundwater basin. The law provides that funding may come in part from fee imposition by agencies.

A groundwater sustainability plan may be any of the following:

- A single plan covering the entire basin developed and implemented by one groundwater sustainability agency.
- A single plan covering the entire basin developed and implemented by multiple groundwater sustainability agencies.
- Subject to Section 10727.6, multiple plans implemented by multiple groundwater sustainability agencies and coordinated pursuant to a single coordination agreement that covers the entire basin.²²

By June 1, 2016, the California Department of Water Resources (DWR) had to develop guidelines for evaluating groundwater sustainability plans and groundwater sustainability programs. Guidelines identify necessary plan components and other information that will help local agencies to develop and implement groundwater sustainability plans.²³ Best management practices for sustainable groundwater management were to be published by the DWR by January 1, 2017.

2. Brief Legislative History

Our search found over two dozen substantive hearings that mentioned SGMA including hearings from many committees.²⁴ In a Senate Floor Analysis the legislative intent to have groundwater basins sustainably managed by local entities pursuant to adopted sustainability plans was noted. In various places and ways organized interest groups and others made their positions known about the legislation. Like many water and environmental laws SGMA was controversial and hotly debated. In general, Republican lawmakers and Central Valley Democrats and some farmers and growers and their industry associations opposed the law for a variety of reasons. The latter category reads like a cornucopia: associations of almonds, beans, blueberries, peaches, grain and feed, pears, raisins, tomatoes. Environmentalists, urban water suppliers, nonpartisan policy institutions, scientific organizations, some Indian tribes, and some water agency associations promoted the bill.

Those in support, sometimes with requests or demands for amendments, included the Association of California Water Agencies, which applauded several elements of SGMA: local control, access to a suite of new tools and authorities, and the limited backstop role of the state.²⁵

On the Assembly floor Dickinson urged support for AB 1739, saying it was crafted over nine months with extensive input from stakeholders: “This bill is built on local control....It is an opportunity for local entities to decide how to approach and devise a plan to get to groundwater sustainability.” The consequences of inaction had to be addressed: “What are the consequences if we fail to act....If not now, then when? If not us, then who?”²⁶

In opposition to the new law, the California Farm Bureau Federation, the Sacramento Suburban Water District, counties in the Central Valley, and agricultural-related businesses in various hearings focused on what

they characterized as the broad scope of the law and the fiscal impact— noted as potentially up to many millions of dollars. The adverse impact on groundwater rights and the agricultural economy was emphasized.²⁷ In their letter calling for a veto of SB 1168 the California Aquaculture Association and the California Farm Bureau Federation said that the bills would significantly hinder growth of aquaculture and agriculture industries in California; were too hastily written and were overbroad; will be costly; and will create greater uncertainty for famers and rangers. The bills “may come to be seen as ‘historic’ for all the wrong reasons by dramatically harming food production. We believe groundwater must be managed locally/regionally and that overlying property rights are protected to avoid a taking.”²⁸

Other interest groups wanted changes in, not a veto of, the bill package. Some parties wanted extensions of deadlines. Republican Assembly member Frank Bigelow called for SGMA deadlines, which he considered unrealistic, to be extended to June 30, 2017, if there is no groundwater sustainability agency and no local agency has submitted an alternative. Calling for more aggressive deadlines was Pablo Garzo of the Nature Conservancy, stating that “earlier action would be a better way to go,” citing “the fact that groundwater overdraft is so well documented in many areas of the state and also in the context of this drought.”²⁹

Ellen Hanak, a director of the nonpartisan Public Policy Institute of California Water Policy Center, addressed the benefits of the approaches to groundwater protection and accessibility which SGMA offered. SGMA helps favor getting more water under the ground: “In order to get that water under the ground, it should be in places where people feel confident that they’re going to be able to get it out again, especially if there’s a drop—that’s where the groundwater management comes in....If you can get it to seep into the ground it can be more cost-effective” than using fence drivers and other technologies.³⁰

Although considerations for new groundwater law were a long time in the making the unprecedented drought and concerns over overuse of groundwater for certain agricultural products were also influential in moving rapid consideration, writing, and passing of SGMA. Small farmers were concerned about their ability to compete with large water users, some of which were “flipping” land for high-cost crops such as almonds. And the drought was front-page daily news.³¹

Prospects for Successful Implementation

Will the new law reach its objectives? Will California move from the ignominious status as the lone western state without comprehensive groundwater management law to one with an effective regime? A preliminary inquiry is how to define effectiveness. Perhaps most ideal is a result wherein planning is done, it is done on time, it includes scientifically accepted meanings of sustainability, it helps settle existing and possible future conflicts over access to groundwater, and, ultimately, safe levels of groundwater are maintained over the long run. A less ambitious definition might be: Areas (districts, counties...) agree on who should undertake plans, attempts to define sustainability are undertaken, planning is done, deadlines are met, and the state backup role is not needed.

Based on the most stringent definition of effectiveness SMGA faces a large set of challenges. Among these are political, legal, and a mix of both, as well as apolitical, that is, operational: the daunting task of moving from a state without required management to an entity with 37 million people and hundreds of water districts acting to sustain what some consider a common pool and ever-changing resource.

It remains to be seen how areas will respond to the requirements to plan and implement plans. Some predict chaos in the short run but a long-term accommodation and contribution to California water management.³² A first step, which one Southern California water district board member described as “dancing with porcupines,”³³ is establishment of groundwater sustainability agencies. These are not new independent entities but self-elected/self-decided agencies. They may be an existing local agency or a combination of federal, Indian, and private entities through memoranda of understanding. The California legislature expressly designated 15 agencies as able to designate themselves the GSAs within their boundaries if they affirm this situation or they may act to not accept the responsibility. In the approach to governance encapsulated in SGMA several uncertainties arise: Will the county boards of supervisors assume the role of the groundwater sustainability agencies? Will existing water districts assume that role? Will local entities disagree on the jurisdiction of self-elected/self-decided agencies?³⁴ Will there be joint powers agreements such as in cases where county boundaries do not correspond with groundwater basins? As of this writing many GSAs have submitted GSA formation notices.³⁵

1. Approaches to Implementation

Of great interest is choice of tools which a GSA employs to achieve sustainability. That choice or those choices may influence the nature of responses of those affected, including the legal response. A number of ideas have been suggested, and tried in other settings.

A standard regulatory approach may be chosen. Sometimes called command and control, I will avoid that term here because it suggests a degree of top-down unresponsive management that is not inherent to well-designed regulatory regimes. These include or are characterized by participatory planning by all interested stakeholders small and large, public and private; needs assessments; anticipation of existing and possible areas of conflict and identification of alternative dispute mechanisms to address those conflicts; realistic time frames laid out for implementation; and transparent assessment of required fees.

Some GSAs may look to greater use of groundwater rights trading. There is considerable interest in creating markets under the SGMA where rights can be sold and traded. Markets in groundwater have been established in many jurisdictions worldwide. The most successful seem to be characterized by several elements.³⁶ First, successful markets are guided by transparent and explicit rules that clearly establish the ways in which water can and cannot be used, and how these restrictions adapt to changing environmental circumstances. This allows stakeholders and potential participants in the market to understand the structure of the market, reducing uncertainty around potential trades. These rules must be consistently enforced, or markets will not seem like the most attractive option for stakeholders. Second, regulations must be flexible enough to allow a variety of trading instruments in the market, such as option contracts, derivatives, and groundwater banking. This further reduces the risk and uncertainty in markets, which are inherently prone to seasonal shocks in the case of groundwater. Third, potential third-party impacts from trading (such as environmental damages or reduced agricultural activity resulting from the reallocation of groundwater) must be addressed directly in the design of the regulations. Finally, harmonizing groundwater regulations across basins will allow for greater reallocative efficiency from trading as participants from different districts will be able to move water to where it is most valuable. (Fundamental, of course, is the resolution of what water rights a participant possesses.)

In their present state, California groundwater institutions are slow to adapt. Groundwater management is complicated, and will continue to

be this way even after the implementation of SGMA. Implementing appropriate markets for groundwater with the aim of improving sustainability and efficiency may be difficult. Even in countries or regions with progressive and harmonized water management regimes, implementation of these kinds of markets has been halting. Very successful and robust markets have only been established on very small scales, while larger-scale markets lack participation and have not increased as efficiently and quickly as desired.

Markets may help in the SGMA implementation process if they are carefully and thoughtfully designed and paired with strong, well-enforced restrictions on groundwater use, elements of effective management of commons resources that are addressed below.

Challenges to Successful Implementation

Whatever the choice of implementation mechanisms and tools, challenges to SGMA are probable.

As the implementation phase arrives and those not involved in the legislative process become aware of requirements under SGMA, arguments similar to those reflected in the legislative history are likely to reappear.³⁷ They will include various kinds of political attacks on the elected officials in the planning entity: They are nonresponsive, nonrepresentative, insensitive, incompetent (make decisions on groundwater based on insufficient data and information), unjust, unlawful in imposition of fees. Whether or not merited generally or in specific cases, this stage of real or feigned ignorance of the new law can slow down activities that eventually will be undertaken.

Another challenge is resources. The tasks needed to complete the goal of developing sustainable groundwater management plans may be beyond the reach of some groundwater sustainability agencies. Some state assistance is available and it is possible that programs such as those of the Environmental Defense Fund which are geared toward consulting with local districts to find acceptable approaches may assist in implementing the law. But likely GSAs will employ private consulting firms for plan development. GSAs will probably look to rate payers for financial resources. This will mean that GSAs will also confront the effects of two California propositions that address requirements of voter approval for raising fees. Proposition 218 addresses service fees which are subject to notice and hearing and majority protest requirements and Proposition

26 mandates a two-thirds vote in the California State Legislature to pass certain fees, levies, charges, and tax revenue allocations. Previously these could be enacted by a simple majority vote. Thus activities that may be required by a sustainability focus still face voter sentiment regarding their funding.

An additional challenge may be in the identification of the boundaries of the managed area: “Any effective system of groundwater management.... will also require a comprehensive system to define which areas fall in which groundwater basins....the Department of Water Resources is working on regulations that define the situations in which the boundaries of groundwater basins may be modified....there are two main kinds of basin boundary modifications: scientific and jurisdictional.” Scientific modifications are based on geologic or hydrologic data.³⁸ So, for example, “if a geological survey reveals that a particular basin is larger or smaller than had been previously thought, a scientific modification of the basin’s boundaries might be in order. Jurisdictional modifications are based on the practical governmental and bureaucratic necessities of effectively monitoring and regulating groundwater usage. And, if the geological boundaries of a single basin encompassed two different cities, a jurisdictional modification might be made to split the legal boundaries of that basin up into two separate basins, or divide it into subbasins.”³⁹ The SMGA itself has a process for addressing areas of GSA overlap, but the step may take time. To assist, SMGA has a process for requesting revisions to basin boundaries. Local agencies submitted several requests to change boundaries, citing scientific or jurisdictional reasons—or both. In October 2016, DWR approved 39 out of 54 basin boundary modification requests.⁴⁰

Threatened in the hearing stages of SGMA, several theories of illegality have been identified.

1. Legislative Authority

Is the law a usurpation of powers usually deemed to be those of local control? The answer is fascinating and complicated and requires some background. California Water Code Section 1200 states that “whenever the term stream, lake or other body of water, or water occurs in relation to applications to appropriate water or permits or licenses issued pursuant to such applications, such term refers only to surface water, and to subterranean streams flowing through known and definite channels.”

Later in Code Section 1221 the legislature declared: “This article shall not be construed to authorize the board to regulate groundwater in any manner.” What effect does SGMA have on these declarations?

Professor Joseph Sax tells a fascinating story about the history of attempts to discern whether the legislature intended to preclude the regulation of groundwater.⁴¹ The story involves several contradictory California Supreme Court opinions, one of which effected “both a hydrogeological and public policy fiasco”⁴² by distinguishing water underground that was subject to regulation and other water underground that was not. In short, by creating a distinction between “subterranean stream” and groundwater, California legal analysis maintained the notion that the latter was amenable to absolute ownership giving pumpers unlimited ability to take “groundwater” and not to be regulated. If that were the case legally, attempts to impose groundwater management of certain kinds would be a violation of code law. In fact, absolute ownership is not and was not the law of percolating water in California; California groundwater is governed in part by the correlative rights doctrine.⁴³ Professor Sax concluded that the State Water Board had the authority to regulate all groundwater hydrologically connected to surface-water streams or that violated constitutional or common law prohibitions, such as those against waste or unreasonable use.⁴⁴ This was not an uncontroversial conclusion.⁴⁵

2. Local Control

Might it be argued by local governments that they maintain authority to address groundwater management in their own way, not responsive to state requirements? At one point this was a reasonable argument—even with the early California provisions on special statutory authority to regulate in a district (for example, Orange County) and voluntary groundwater management enabling described earlier in this article. In short, this argument goes, in the absence of preemption, local districts can choose to do what they please in managing groundwater.

SGMA, however, has now seemingly preempted the groundwater regulatory field and it is local government in the high- and medium-priority basins that lacks authority to treat groundwater management other than under SGMA. The local-control position will likely fail, in part because of the broadness of the act’s language and the considerable authority given to the state if counties do not act to satisfactorily implement SGMA.⁴⁶

3. Relationship to Adjudication

What is the (new?) relationship between activities under SGMA and the adjudication process in California? The question may need to be legally resolved. Although SGMA does not apply to adjudicated basins, adjudication may be sought in some GSAs. Does SGMA change at all the potential reach of adjudication? It does not, after all, provide for establishing groundwater rights.

Adjudication is a legal process to determine who has a valid water right, how much water can be used, and who has priority during shortages. In California it is currently the only definitive and legally binding way to make these determinations. Under the process, persons claiming a right to use water petition a local superior court. Adjudications can range in size and scope from small (such as the rights of two water rights holders with respect to one another) to large (such as a river basin which covers thousands of square miles). Adjudications can aim to settle all rights in a particular water system (a “general adjudication”). They can include surface water, groundwater, or both. The process has been employed in California with variable success.⁴⁷

“Courts can assign specific water rights to water users and can compel the cooperation of those who might otherwise refuse to limit their pumping of groundwater. The court typically appoints a Watermaster to ensure that pumping conforms to the limits defined by the adjudication.”⁴⁸

In most adjudications, the court quantifies the water rights of the parties by awarding water users an annual base groundwater production right or a percentage of the basin’s safe yield. The court retains continuing jurisdiction. Solutions may entail the purchase of supplemental imported surface-water supplies, such as from the California State Water Project or from the Colorado River. Parties who exceed their annual allotment under the court’s judgment are assessed a fee to cover the cost of importing the supplemental water.⁴⁹ Safe yield is “the annual amount of water that can be taken from a source of supply over a period of years without depleting that source beyond its ability to be replenished naturally in ‘wet’ years.”

Under adjudication, if successful, ownership interests are more certain and definite. When an extractor quits pumping he or she can sell or lease the right instead of forfeiting it. Adjudication can tailor remedies, through the judge, to the unique attributes of the basins and their users. When done well, adjudication can prevent overdraft and depletion of

groundwater supplies. Following the “reasonable and beneficial use” mandate of the California Constitution, only rights to proportionate use should be determined by adjudication. Allocating absolute rights will only exacerbate the groundwater commons tragedy.

One of the characteristics of the move to adjudication is that individuals have little incentive to sue until a basin is overdrafted. This situation arises in part because the common law correlative rights doctrine does not restrict the overlying owner’s share until the basin is overdrafted, and adjudication can be a costly process.⁵⁰

As noted earlier, adjudicated basins are exempt from inclusion under groundwater sustainability plans (GSPs) but at least in theory adjudication can work hand in hand with the SGMA. SB 226, Pavley authorizes state involvement in adjudication.

SB 226 and AB 1390 “provide some procedures for comprehensive groundwater adjudications: SB 226 is placed within SGMA’s statutory framework in the California Water Code. AB 1390 appends a chapter to the Code of Civil Procedure (CCP) that adds the method and procedure for comprehensive groundwater adjudications. The bill defines ‘comprehensive adjudication’ as ‘an action filed in superior court to comprehensively determine rights to extract groundwater in a basin,’ and overall seeks to streamline groundwater adjudications. In addition, SB 226 amends the California Water Code to provide legislative guidance to ensure the consistency of groundwater adjudications with SGMA objectives.”⁵¹

Since under SGMA or any other groundwater management system public-private partnerships are unlikely to promote sustainable practices until groundwater ownership is clearly defined,⁵² one possibility is to adjudicate all California groundwater basins along with engaging the SGMA. This has been argued in the literature.⁵³ It is an unlikely possibility but theoretically it is clean and consistent with the steps of successful state groundwater management. Still necessary will be confronting the court’s historical inability to change priorities among the water rights holders or eliminate vested rights in applying a solution without first considering them in relation to the reasonable use doctrine and then integrating water rights systems for surface water and groundwater.⁵⁴ However, courts may craft changing understandings of what is reasonable in times of emergency, massive climate change, population increases, and other extreme changes in a world whose rules were set when California was a much different (less populated, less urban) place.

Can adjudication respond to the continuing concern about the SGMA over what can feasibly be done in the face of preexisting water rights? It

is unclear whether allocations should be determined on the basis of historical extraction records, vested water rights, land ownership, current use, or other tangential metrics, or whether priority should be given to one factor over another: “In reality...it is difficult to reconcile...legislation that grants GSAs the overarching authority to establish groundwater management plans that may very well conflict with traditional common law rules of groundwater rights in California that have, for centuries, hinged on the historical principle of ‘first in time, first in right’ and the priority of overlying owners as to the groundwater under their land.”⁵⁵

4. Takings

Sometimes referred to as the full employment law of property-oriented environmental and land use lawyers, the takings doctrine no doubt will be employed to challenge solutions reached under SGMA. Under the 5th and 14th Amendments of the United States Constitution and, somewhat broader in application, under Article 1, Section 19, of the California Constitution, private property may not be taken for public use without just compensation.

This simple phrase has been the basis for almost countless takings cases in land, environmental, and water conflicts. How the doctrine will be employed and whether it will prevail in the courts for SGMA challenges remains to be seen. There are already strong positions being formulated on both sides; threatened lawsuits may have chilling effects on reasonable management activities. On one end of the continuum is the position that even minor adjustments of expectations in water rights will require that just compensation be paid to the affected landowner or water rights asserter. On the other end of the continuum: Government is obligated to manage water resources in a way that protects health and safety and the environment. Groundwater management may affect what some holders consider fee simple ownership of groundwater and permanent property rights therein.

Fundamental to resolution of takings cases are notions of property rights in groundwater. This in turn requires an understanding of whether there is a distinct entity of groundwater over which individuals may have property rights. This is in contrast to surface water, which the state can and historically has regulated. Among his contributions to modern jurisprudence, Professor Joseph Sax added his interpretations of groundwater law, which help in analyzing how groundwater might be

understood, including for property takings considerations. In a seminal report undertaken for the State Water Resources Control Board, he concluded that Water Code Section 1200 should be read to grant the board authority over “subterranean streams flowing through known and definite channels when the extraction would have ‘an appreciable and direct impact on a surface stream.’”⁵⁶ Sax’s reasoning called upon the California Supreme Court analyses and interpretations of legislative history and of the waste and unreasonable use and the public trust doctrines. Distinctions between water at a precise moment in the stream and at another moment about to enter or leave the stream (surface water, percolating groundwater, and subterranean streams flowing through known and definable channels) “do not accord with scientific understanding and distribution of water on and in the earth.”⁵⁷

“Indeed, these water law terms [underflow, subflow, subterranean streams, and percolating groundwater] are geographic conceptions fundamentally at odds with science’s understanding of water’s movement...from a hydrogeological perspective, such geographical categories are inapt, and efforts to fit water into the law’s categories by using these technical-sounding classifications give the enterprise a somewhat daffy air.”⁵⁸ An alternative understanding, which correlates with a more hands-off approach to governmental management, is that because groundwater, at least when actually groundwater, moves so slowly, it can be characterized as the fee simple property of an estate and therefore is not subject to special regulatory control.⁵⁹

Whatever the conclusions as to the above positions, the takings challenge may be more of a threat than a viable cause of action. Some commentators downplay the importance of groundwater management takings challenges. Professor Dave Owen, for example, has concluded in a careful and thorough analysis: “American courts have traditionally treated groundwater rights as property rights subject to constitutional protection, but also have almost always allowed government to regulate groundwater use without paying compensation.”⁶⁰

Whether a regulatory action is considered an unconstitutional taking is also a question of whether the activity regulated falls within background principles of nuisance or property law.⁶¹ So, whether groundwater is declared to be part of the public trust for which the state has a special obligation to protect and not alienate (without meeting criteria that create a high bar to alienation) may also be very influential to the success of takings challenges.⁶² Finally, application of market-based implementation

approaches may mitigate the takings challenge if they allow for transfer of development rights (TDRs), which create value in regulated property.

CONCLUSION

The California Sustainable Groundwater Management Act is an important step in the wise management of a critically important resource in California. Whether it will be sufficient to address, in the next quarter century, a challenge with potentially gigantic implications for the state's growth and environmental protection remains to be seen.⁶³ For California confronts an environmental and social challenge with multiple levels of complexity and several choices of strategies available for addressing it. In the former complexity are varying understandings of hydrology and the physical interconnectedness of waters; an inventory of water rights recognized or argued with different interpretations of each; a slew of political positions, played out at many levels of legal and political jurisdiction; and quite variable economic and sociological conditions. In the latter complexity (of choices of strategies) is an inventory of plans, markets, and regulatory and other strategies—to be implemented by one or more institutions. Linking these variables in a successful manner, and there is probably no one successful way, is a complex task.

More directly, part of the answer to whether the SGMA will be successful relates to the willingness and ability of a large number of interested entities to work together on a problem, recognized by some (but only by some) as requiring cooperation. That willingness may in turn be related to property owners' and other interest groups' understandings of the existing rights they hold in what, for good or not, has been understood as groundwater.⁶⁴

Successful implementation of SGMA must confront the facts that groundwater management is a political issue, like many issues of allocation, and that there are important, multidimensional, and distinct community values for water that are at stake. Use of science will be articulated but in some regions not determinative.

Perhaps it is also realistic to conclude that SGMA's new approach may work well in some regions and be less than welcomed and successful in others. Use of groundwater fits somewhat well into a commons problem analysis. In such situations non-top-down approaches such as those advocated by Helen Ingram and Bill Blomquist⁶⁵ may work best when

characteristics of the user groups are of a certain kind. Elinor Ostrom has summarized several and they ring particularly relevant to the groundwater case. Among the conditions affecting the level of cooperation: “Communication is feasible with the full set of participants.... Reputations of participants are known....High Marginal per capita return [is recognized]...low cost entry or exit capabilities...longer time horizons....Agreed upon sanctioning capabilities.”⁶⁶ This is a high order for California.

Success of the new law may also turn in part on policy makers’ and stakeholders’ openness to a range of approaches of implementation. In the mix might be both market mechanisms and regulatory regimes, despite the likelihood that ideologues will reject one or the other outright. Notwithstanding the appreciation that some conceptions of markets are unconcerned with equity and social justice, markets are typically subject to regulations. These come, for example, through allocating rights or schedules of trading, and imposing restraints on trading that build in consideration of social and environmental justice. A wide range of cases in water markets confirms this. In modern practice regulation, too, is often understood pejoratively: It is “command and control,” the guys in the black robes, inflexible and dictated from above. In fact, modern regulation can be participatory, open to variability in local conditions, based on negotiation, inclusive, and adaptive.⁶⁷ A Rawlsian approach to management of groundwater would likely be a hybrid of rules and markets.⁶⁸ John Rawls, in his seminal contribution to distributive justice, might put us in an original position: There is water underground needed by all—who should have access to it with knowledge that natural disasters or environmental change may affect its quantity and quality? Perhaps a just result would be found. ❖

NOTES

1. I wish to acknowledge the support of the University of California Multicampus Research Project headed by Professor Gary Leibcap, UC Santa Barbara, for support of research that is the background for this paper and for the valuable insights of its members. Ann Tran, JD candidate at UCI Law School, and Tyler Boston and Deba Priyachakraborty, PhD candidates in economics, provided invaluable research assistance to the project. Extremely valuable readings of an earlier draft were provided by Dr. Esther Conrad, Stanford; Professor William Blomquist, Indiana University; and Sonya Ziaja, PhD candidate and the

California Energy Commission; and two anonymous peer reviewers. Expert library research was provided by Ellen Augustiniak and Jackie Woodside. Lisa Payne of UCI Law contributed important editorial assistance.

2. Elinor Ostrom, “Beyond Markets and States: Polycentric Governance of Complex Economic Systems,” *Transnational Corporations Review*, Vol. 2. No. 1, 2010, www.tnc-online.net. Some of Professor Ostrom’s early work involved study at California water sources.

3. David Orth, general manager of the Kings River Conservation District. <http://Westernfarmpress.com/irrigation/new-california-law-seeks-cap-groudwater-overdraft>.

4. www.sachee.com/drought/article31396805.html.

5. See Sanjaya Raj Joshi, “Comparison of Groundwater Rights in the United States: Lessons for Texas,” A Thesis in Civil Engineering, Texas Tech University, August 2005.

6. [http://www.stpra.org/resources/Documents/5%20CH%20Mace\(1\).pdf](http://www.stpra.org/resources/Documents/5%20CH%20Mace(1).pdf), accessed May 2, 2016.

7. <http://www.groundwater.com.au/pages/what-is-groundwater>.

8. See Sanjaya Raj Joshi, “Comparison of Groundwater Rights in the United States: Lessons for Texas,” A Thesis in Civil Engineering, Texas Tech University, August 2005.

9. Joseph L. Sax, “We Don’t Do Groundwater: A Morsel of California Legal History,” 6.U. Denv. L. Rev. 269, 2002.

10. The potential importance invokes application of the Commerce Clause and the Property Clause of the U.S. Constitution and a number of federal statutes including the Endangered Species Act and the Clean Water Act and federal common law. See John D. Leshy, “The Federal Role in Managing the Nation’s Groundwater,” *Hastings West-Northwest Journal of Environmental Law and Policy*, Vol. 11, Number 1, Fall 2004.

11. See Rosario Sanchez, Victoria Lopez, and Gabriel Eckstein, “Identifying and Characterizing Transboundary Aquifers Along the Mexico-US Border: An Initial Assessment,” *Journal of Hydrology*, Vol. 535, pp. 101–119, 2016.

12. The Restatement (Second) of Torts § 858 states: “§ 858 General Principle: Where a possessor of land, in using the subterranean water therein, causes harm to a possessor of other land through invasion of such other’s interest in the use of subterranean water in his land, the rules for determining liability are the same in principle as those...for determining liability where one riparian proprietor’s use of water in a watercourse or lake harms another in his use thereof.”

13. See Sanjaya Raj Joshi, “Comparison of Groundwater Rights in the United States: Lessons for Texas,” A Thesis in Civil Engineering, Texas Tech University, August 2005.

14. The emphasis here is “statewide.” Orange County, in the face of alarming drops in the water table in the district, managed to have special legislation passed in the 1950s which allowed authorities to do many of the things which SGMA

is attempting. The authorities provided for in SB 91 “included estimating the sustainable yield of the basin, registering groundwater production facilities, measuring withdrawals, charging fees to manage and replenish a basin, and having enforcement authorities to insure compliance.” See Tina Cannon Leahy, “Desperate Times Call for Sensible Measures: The Making of the California Sustainable Groundwater Management Act,” 9 *Golden Gate U. Envtl. L. J.* 5, p. 13, 2016. <http://digitalcommons.law.ggu.edu/gguelj/vol9/iss1/4>. Other districts could have made use of special legislation but, for the most part, chose not to. Among the districts that were created with similar authority: Santa Clara Valley Water Agency, Antelope Valley-East Kern Water Agency. Regarding regulation required management, in 1992 Assembly Bill 3030 provided a means for existing local agencies to develop groundwater management plans but this decision is voluntary, Cal. Water Code 10753-10753.11. And SB 1938 linked Department of Water Resources funding to preparation of groundwater management plans meeting certain characteristics but “there were several core problems with AB 3030 and SB 1938. Neither included an enforceable standard mandating sustainable use of a basin or a clear fee mechanism to support basin management.” Tina Cannon Leahy, “Desperate Times Call for Sensible Measures: The Making of the California Sustainable Groundwater Management Act,” 9 *Golden Gate U. Envtl. L. J.* 5, p. 22, 2016. The history of efforts is long and goes back several decades. It includes approaches based on adjudication, joint powers agreements or local ordinances, and local agency management granted by California statutes. See Bulletin 18, Chapter 2, Groundwater Management in California: http://www.water.ca.gov/pubs/groundwater/bulletin_118/california's_groundwater_bulletin_118_-_update_2003_/bulletin118-chapter2.pdf. Also see William Blomquist, *Dividing the Waters: Governing Groundwater in Southern California*, The Center for Self Governance, San Francisco, 1992. There were, for example, important initiatives undertaken in San Francisco, Orange County, and Los Angeles County. Several approaches used in these efforts have been incorporated into SGMA. Furthermore, activities and strategies required under these management plans have relevance to implementation plans under SGMA.

15. <http://www.waterworld.com/articles/print/volume-31/issue-5/features/california-s-water-woes-a-deeper-look-at-the-sustainable-groundwater-management-act.html>.

16. *Katz v. Walkinshaw*, 141 Cal. 116, 74 P.766. 99, Am. St. Rep. 35, 1903, applying “reasonable and beneficial use” to groundwater.

17. “The Mojave Desert as Grounds for Change: Clarifying Property Rights in California Groundwater to Make Extraction Sustainable Statewide,” 9 *Hastings W.N.W. J. Env. L & Pol’y* 31.

18. See note 14.

19. A readable history of the law’s evolution is found in Cannon Leahy in note 14 and a video version is available at http://ats.ucdavis.edu/ats-video/?kmid=0_g99p00pp. Pavley’s Senate Bill focused on the definition of sustainability, agency formation, and elements of groundwater plans. Dickinson’s Assembly Bill addresses enforcement and fees. Pavley’s second bill, the third in

the package, addresses a probationary period for certain basins.

20. http://www.water.ca.gov/groundwater/casgem/pdfs/CASGEM_BasinPrioritization_Statewide.pdf.

21. www.mojavewater.org/files/summarysb1168ab1739_3.pdf.

22. CAL WATER CODE §10727(b).

23. As of publication of this article the department had released Proposed Groundwater Sustainability Plan (GSP) Emergency Regulations (May 11, 2016) which address technical and reporting standards, sustainable management criteria, monitoring, evaluation and assessment, and plan amendments. These were presented to the California Water Commission in May 2016, and were approved: https://cwc.ca.gov/Documents/2016/06_June/May2016_Minutes_Final.pdf. Once the emergency regulations are adopted the Notice of Proposed Emergency Rulemaking will be distributed and posted on the DWR's website and submitted to the Office of Administrative Law. The proposed GSP Emergency Regulations are available at <http://water.ca.gov/groundwater/sgm/gsp.cfm>.

24. Assembly Water, Parks and Wildlife, Assembly Appropriations Assembly Judiciary, Senate Environmental Quality, Senate Natural Resources and Water, Assembly Appropriations, Senate Budget and Fiscal Review, Assembly Subcommittee No. 3 on Resources and transportation.

25. www.acwa.com/sites/default/files/post/groundwater/2014/04/news-release_acwa-releases-groundwater-recommendations-4-7-14.pdf.

26. www.acwa.com/news/groundwater/historic-groundwater-package-approved-legislation.

27. See, for example, Assembly Floor Analyses of 8/18/14.

28. www.caaquaculture.org/2014/09/08/california-aquaculture-association-caa-asks-industry-members-to-urge-governor-to-veto-sb-1168-pavley-ab-1739-dickinson-and-sb-1319-pavley-statewide-groundwater-regulation/.

29. For a list of groups in support and opposition see <http://www.grac.org/opposition-to-AB1739.pdf> and <http://mavensnotebook.com/wp-content/uploads/2014/07/What-People-Are-Saying-About-Protecting-California%E2%80%99s-Groundwater-.pdf>.

30. Senate Budget and Fiscal Review hearing, 2/12/15.

31. Tina Cannon Leahy, UC Davis, video presentation, http://ats.ucdavis.edu/ats-video/?kmid=0_g99p00pp.

32. Bill Blomquist, UC Davis Symposium, http://ats.ucdavis.edu/ats-video/?kmid=0_28xojl1.

33. Southern California director, personal interview with author, May 2016.

34. "If two or more local agencies separately decide to become GSAs in all or a portion of the same area of a basin area then none of the GSAs will become exclusive GSAs until the overlap is resolved." See SGMA §10723.8(c) and GSA Formation Notifications: http://www.water.ca.gov/groundwater/sgm/gsa_table.cfm.

35. As of December 23, 2016, 146 separate GSA notices have been submitted; 68 have overlap in one of more basins, requiring resolution; 58 are “Exclusive GSAs” in one or more basins. Around two dozen are incomplete, under review, withdrawn, or have an active 90-day period in one or more basins. Also, 85 basins have GSAs of which 54 are high or medium priority and 31 are low or very low priority. Thirty counties have GSAs. Source: Status of GSA Formations, http://water.ca.gov/groundwater/sgm/gsa_table.cfm.

36. The literature is voluminous. The University of California Multicampus Research Project (see note 1) is analyzing it for relevance to the California situation. For examples see the appendix at the end of the article.

37. And those noted then may be more forcefully made. See Ashley Mettler, “Reducing Overdraft and Respecting Water Rights Under California’s 2014 Sustainable Groundwater Management Act: A View from the Kern County Farming Sector,” 9 Golden Gate U. Envtl. L. J. 239, 2016.

38. Draft Basin Boundary Regulations, Ca.gov, http://www.water.ca.gov/groundwater/sgm/pdfs/SGMA_Draft_Basin_Boundary_Regulations.pdf.

39. Comments, discussion, personal communication at University of California Multicampus Research Project, “Markets,” 2016. Note also the possible value of developing models of the hydrogeological system as a whole rather than for individual groundwater basins or sub-regions within them. See Tara Moran, “Projecting Forward: A Framework for Groundwater Model Development Under the Sustainable Groundwater Management Act,” <http://waterinthewest.stanford.edu/sites/default/files/Groundwater-Model-Report.pdf>, November 2016.

40. Esther Conrad, Janet Martinez, Marcelle DuPraw, David Ceppos, and William Blomquist, “To Consolidate or Coordinate? Status of the Formation of Groundwater Sustainability Agencies in California,” Stanford Law School, December 2016. The authors offer strategies for supporting the complex and challenging process of GSA formation. These include: “Identify a convening entity....Establish a process to consider governance options....Provide a constructive forum to discuss representation....Identify the resources and capacity that will be required. Discuss potential coordination mechanisms in basins with multiple GSAs....Leave room for learning” (at pp. 31 and 32). On the one hand, these seem aspirational and highly ambitious. On the other hand, without some version of these strategies it is difficult to imagine how GSAs will form and operate effectively.

41. See Joseph L. Sax, “We Don’t Do Groundwater: A Morsel of California Legal History,” 6 U. Denv. L. Rev. 269, 2002, p. 278.

42. *Ibid.*

43. *Katz v. Walkinshaw*, 141 Cal. 116, 74 P.766. 99, Am. St. Rep. 35, 1903.

44. As summarized in Tina Cannon Leahy, “Desperate Times Call for Sensible Measures: The Making of the California Sustainable Groundwater Management Act,” 9 Golden Gate U. Envtl. L. J. 5, 2016.

45. See “Groundwater Management in California: The Sax Report and Beyond,” July 2002, California Water Law & Policy Reporter, <http://www>.

downeybrand.com/Resources/Publications/106212/Groundwater-Management-in-California-The-Sax-Report-and-Beyond, accessed May 25, 2016.

46. Personal communication and presentation at University of California Multicampus Research Project, “Markets,” 2016.

47. There have been a couple dozen groundwater adjudications in California, 15 of which have limited groundwater use for all of the parties involved. Major cases described as successes include the Raymond Basin, *City of Pasadena v. City of Alhambra*, 33 Cal. 2d 908, 207 P.2d 16, 1949, and the San Gabriel Basin, *Upper San Gabriel Valley Municipal Water District v. City of Alhambra*, Superior Court, Los Angeles County, 1972 (amended 1989), No. 924128. See Philip Laird, “Overdrafting Toward Disaster: A Call for Local Groundwater Management Reform in California’s Central Valley,” 47 U.S.F.L. Rev. 759, 2013. In general on the intersection between adjudications and SGMA see Russell M. McGlothlin and Jena Shoaf Acos, “The Golden Rule of Water Management,” 9 Golden Gate U. Envtl. L.J. 109, 2016. <http://digitalcommons.law.ggu.edu/gguelj/vol9/iss1/8>.

48. www.watereducation.org/aquapedia/groundwater-adjudication.

49. Alfred Smith, “Water Rules: California’s Sustainable Groundwater Management Act Provides a Comprehensive Set of Tools for Local Agencies to Implement Groundwater Management Plans,” *Los Angeles Lawyer*, February 2015, www.nossaman.com.

50. There are other weaknesses of adjudication. Litigants may have trouble ascertaining all of the proper parties. Those parties who participate have little incentive to reach stipulated judgments because those who do not agree can independently litigate their claims. They are not bound by the court’s physical solution. The process can be costly and expensive. Judges may not engineer solutions to account for changes in hydrologic condition and impacts on water sources. “The Mojave Desert as Grounds for Change: Clarifying Property Rights in California Groundwater to Make Extraction Sustainable Statewide.” 9 *Hastings W.N.W. J. Env. L & Pol’y* 31.

51. Interior footnotes omitted; Ruth Langridge, Abigail Brown, Kirsten Rudestam, and Esther Conrad, “An Evaluation of California’s Adjudicated Groundwater Basins,” State Water Resources Control Board, UC Santa Cruz, 2016 (retrieved from <http://escholarship.org/uc/item/71n7v525>). In their excellent report, Langridge and her colleagues made several findings that may give pause to the suggestion that adjudications can work with SGMA to meet the goals of sustainability. Among those: “Groundwater adjudication is fundamentally not about the sustainable management of a groundwater basis.... Adjudication is usually about the needs and interests of the individual parties with respect to water rights.... Adjudications focus on the past more than on the future.... Environmental uses and the hydrologic links between surface and groundwater are rarely incorporated into the physical solution.... Water rights can be based on California water law, or on other factors that include past pumping or what is perceived to be the needs of individual parties.... Water rights

often became concentrated in a small number of users in the years after the adjudication....Adjudication often does not resolve conflict in a basin....Small groundwater users and disadvantaged communities are rarely included in the physical solution....Most adjudicated basins rely on imported water as the key strategy to manage overdraft and/or to provide for future water needs.... Approaches to reduce demand are only required in some basins....Approaches to determining safe yield, overdraft, and groundwater trends vary considerably.”

52. All sustainable management schemes in California came about only after rights to use the groundwater were adjudicated.

53. See, for example, “The Mojave Desert as Grounds for Change: Clarifying Property Rights in California Groundwater to Make Extraction Sustainable Statewide,” 9 *Hastings W.N.W. J. Env. L & Pol’y* 31.

54. Philip Laird, “Overdrafting Toward Disaster: A Call for Local Groundwater Management Reform in California’s Central Valley,” 47 *U.S.F.L. Rev.* 759, 2013.

55. <http://www.waterworld.com/articles/print/volume-31/issue-5/features/california-s-water-woes-a-deeper-look-at-the-sustainable-groundwater-management-act.html>.

56. As summarized in “Groundwater Management in California: The Sax Report and Beyond,” *California Water Law & Policy Reporter*, July 2002.

57. *Ibid.*

58. Joseph L. Sax, “We Don’t Do Groundwater: A Morsel of California Legal History,” 6 *U. Denv. L. Rev.* 269, 2002, p. 273.

59. A particular scientific understanding is essential to the distinction. That view concludes that “hydraulic interconnection is a necessary but not sufficient condition to treat groundwater as yet another form of surface water.” “Groundwater Management in California: The Sax Report and Beyond,” *California Water Law & Policy Reporter*, July 2002, www.downsybroundbrand.com/Resources/Publications/106212/Groundwater-Mangement, accessed April 2016.

60. Noting a significant exception in *Bragg v. Edwards Aquifer Authority* (Fourth Court of Appeals, San Antonio Texas, No. 04-11-00018-CV), which held that a groundwater regulation could be so restrictive as to constitute a taking (and that a landowner has property rights to groundwater below the land). Dave Owen, “Taking Groundwater,” *Washington University Law Review* 91(2), 253–307, 2013. Owen recognized the potential significance of a 2012 Texas groundwater takings case wherein the Texas Supreme Court used a balancing test in a groundwater taking challenge: “In sum, the three Penn Central factors [referring to a leading U.S. Supreme Court opinion on the approach to taking challenges] do not support summary judgment for the Authority and the State. A full development of the record may demonstrate that ...[the] regulation is too restrictive of Day’s groundwater rights and without justification in the overall regulatory scheme.” Supreme Court of Texas, *The EDWARDS AQUIFER*

AUTHORITY and The State of Texas, Petitioners, v. Burrell DAY and Joel McDaniel, Respondents, No. 08–0964. Decided: February 24, 2012.

61. Lucas v. South Carolina Coastal Council, 505 U.S. 1003, 1992.

62. See Dave Owen, “Taking Groundwater,” *Washington University Law Review* 91(2), 253–307, 2013, at 296, and, of course, the seminal work by Joseph L. Sax, “We Don’t Do Groundwater: A Morsel of California Legal History,” *6 U. Denv. L. Rev.* 269, 2002. A California Superior Court case has concluded that the public trust doctrine protects navigable waters from harm caused by groundwater extraction. For purposes of protecting the public trust the difference between non-navigable surface streams (addressed in the seminal 1983 Mono Lake case) and groundwater is one “without a legal distinction.” *Environmental Law Foundation v. State Water Resources Control Board*, No: 34-2010-80000583, California Superior Court, County of Sacramento, July 15, 2014. In May 2016 the court denied three competing claims for declaratory relief regarding the State Water Resources Control Board’s authority to regulate groundwater extractions that adversely affect public trust uses in the Scott River and other navigable waterways and denied summary judgment on the three motions (*Environmental Law Foundation et al. v. State Water Resources Control Board and County of Siskiyou v. State Water Resources Control Board*, CAs No. 34-2010-800000 583, May 13, 2016). See also the deceptively titled (given the analysis) Milan D. Smith Jr., “A Blast from the Past: The Public Trust Doctrine and Its Growing Threat to Water Rights,” *Environmental Law* 46(3), 461–480, 2016. Judge Smith is a member of the Court of Appeals for the Ninth Circuit.

63. Herein I have emphasized obstacles to successful implementation in the spirit that while doing so does not guarantee successful implementation, it assists in identifying dynamics that need to be addressed for SGMA to make a significant difference on the ground and under it.

64. I do not think that the importance of determination of legal rights in groundwater can be overstated. If, for example, the resource is considered a common pool resource, approaches to its successful management have been addressed in a sophisticated way. Elinor Ostrom, for example, has identified a number of characteristics linked to successful management of this type of resource; SGMA seems to include all of them except a conflict resolution process within the agency formation and planning processes: Elinor Ostrom, “Beyond Markets and States: Polycentric Governance of Complex Economic Systems,” *Transnational Corporations Review* Vol. 2. No. 1, 2010, www.tnc-online.net. See David Aladjem and Dr. David Sunding, “Marketing the Sustainable Groundwater Management Act: Applying Economics to Solve California’s Groundwater Problems,” *Nat Resources & Env’t* 30(2), 2015. However, when the issue is whether the resource is common pool the challenge is of a different sort. The challenge may have been less daunting if our approach to groundwater were only a tragedy of the commons.

65. Helen Ingram *Reflections on Water* (Cambridge: MIT, 2001) and John Whiteley, Helen Ingram, and Richard Warren Perry, *Water, Place, and Equity* (Cambridge: MIT, 2008). Helen Ingram, “Patterns of Politics in Water Resources

Development,” *Natural Resources Journal*, Vol. 11, No. 1 (January), pp. 102–118, 1971; Helen Ingram, “The Changing Decision Rules in the Politics of Water Development,” *Water Resources Bulletin*, Vol. 8, pp. 1177–1188, 1972; Helen Ingram, “The Political Economy of Regional Water Institutions,” *American Journal of Agricultural Economics*, Vol. 55, No. 1, pp. 10–18, 1973; Helen Ingram and Cy Oggins, “Water, the Community, and Markets in the West,” *Western Water Policy Project Discussion Series Paper No. 6*, Boulder, CO, Natural Resources Law Center, 1990; Helen Ingram and Cy Oggins, “Politics, Markets, Society and Water Resources,” *Halcyon*, Vol. 14 (April), 1992; Helen Ingram and Cy Oggins, “The Public Trust Doctrine and Community Values in Water,” *Natural Resources Journal*, Vol. 32, No. 3 (Summer), pp. 515–537, 1992. Bill Blomquist, “SGMA and the Challenge of Groundwater Management Sustainability,” *California Water Blog*, May 16, 2016, <https://californiawaterblog.com/2016/15/sgma-and-the-challenge-of-groundwater-management>.

66. Elinor Ostrom, “Beyond Markets and States: Polycentric Governance of Complex Economic Systems,” *Transnational Corporations Review*, Vol. 2. No. 1, 2010, www.tnc-online.net. See also Sarah Hughes and Stephanie Pincetl, “Evaluating Collaborative Institutions in Context: The Case of Regional Water Management in Southern California,” *Environment and Planning C: Government and Policy*, Vol. 32, pp. 20–38, 2014 (noting that trust and long-term interaction are essential for success of new institutions and that new institutions may facilitate change “or make change more laborious” (p. 36).

67. How that converts to a scale encountered in California is unknown but the California Department of Water Resources has undertaken impressive efforts, through advisory groups, public meetings, and webinars, to engage a broad public in sustainable planning. But note the general conclusion that “small farmers, the Hispanic/Latino community, and the general public are often excluded from groundwater decision-making groups and practices due to unawareness, mistrust, and insufficient resources.” See Abigail Brown, Ruth Langridge, and Kirsten Rudestam, “Coming to the Table: Collaborative Governance and Groundwater Decision-Making in Coastal California,” *Journal of Environmental Planning and Management* 59(12), 2016.

68. John Rawls, *A Theory of Justice*, Harvard University Press, Cambridge, MA, 1971.

APPENDIX: SAMPLING OF LITERATURE ON WORLDWIDE GROUNDWATER MARKETS

In Australia

Bjornlund, H., and McKay, J. (2002). “Aspects of Water Markets for Developing Countries:

Experiences from Australia, Chile, and the US.” *Environmental and Development Economics*, 7: 769–795.

Grafton, R., Landry, C., Libecap, G., and O'Brien, R. (2010). "Water Markets: Australia's Murray-Darling Basin and the U.S. Southwest." NBER Working Paper No. 15797.

Grafton, R., Libecap, G., McGlennon, S., Landry, C., and O'Brien, B. (2011). "An Integrated Assessment of Water Markets: A Cross-Country Comparison." *Review of Environmental Economics and Policy*, 5(2): 219-239.

Wheeler, S., Bjornlund, H., and Loch, A. (2014). "Water Trading in Australia: Tracing Its Development and Impact Over the Past Three Decades." In *Water Markets for the 21st Century: What Have We Learned?* Easter, K., and Huang, Q., eds. Springer Science and Business Media: Dordrecht.

In Canada

Nicol, L., and Klein, K. (2006). "Water Market Characteristics: Results from a Survey of Southern Alberta Irrigators." *Canadian Water Resources Journal*, 31(2): 91-104.

In Chile

Hearne, R., and Donoso, G. (2014). "Water Markets in Chile: Are They Meeting Needs?" In *Water Markets for the 21st Century: What Have We Learned?* Easter, K., and Huang, Q., eds. Springer Science and Business Media: Dordrecht.

In China

Grafton, R., Libecap, G., McGlennon, S., Landry, C., and O'Brien, B. (2011). "An Integrated Assessment of Water Markets: A Cross-Country Comparison." *Review of Environmental Economics and Policy*, 5(2): 219-239.

Wang, J., Zhang, L., Huang, Q., Huang, J., and Rozelle, S. (2014). "Assessment of the Development of Groundwater Markets in Rural China." In *Water Markets for the 21st Century: What Have We Learned?* Easter, K., and Huang, Q., eds. Springer Science and Business Media: Dordrecht.

In India

Saleth, R. (2014). "Water Markets in India: Extent and Impact." In *Water Markets for the 21st Century: What Have We Learned?* Easter, K., and Huang, Q., eds. Springer Science and Business Media: Dordrecht.

In Oman

Zekri, S., Powers, D., and Al-Ghafri, A. (2014). "Century Old Water Markets in Oman." In *Water Markets for the 21st Century: What Have We Learned?* Easter, K., and Huang, Q., eds. Springer Science and Business Media: Dordrecht.

In South Africa

Grafton, R., Libecap, G., McGlennon, S., Landry, C., and O'Brien, B. (2011). "An Integrated Assessment of Water Markets: A Cross-Country Comparison." *Review of Environmental Economics and Policy*, 5(2): 219–239.

In Spain

Bakker, K. (2002). "From State to Market?: Water Mercantilización in Spain." *Environment and Planning A*, 34: 767–790.

Rey, D., Garrido, A., and Calatrava, J. (2014). "Water Markets in Spain: Meeting Twenty-First Century Challenges with Twentieth Century Regulations." In *Water Markets for the 21st Century: What Have We Learned?* Easter, K., and Huang, Q., eds. Springer Science and Business Media: Dordrecht.

In the United States—California:

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