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# Designing Effective Groundwater Sustainability Agencies:

## CRITERIA FOR EVALUATION OF LOCAL GOVERNANCE OPTIONS

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Cover image by Leigh Bernacchi. Drilling new groundwater well. Planada, California, October 2015.

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## ABBREVIATIONS AND ACRONYMS USED IN THIS REPORT

| | |
|---|---|
| **Board** | California State Water Resources Control Board (also, "SWRCB") |
| **CEQA** | California Environmental Quality Act |
| **CLEE** | Center for Law, Energy and the Environment, UC Berkeley School of law |
| **Department** | California Department of Water Resources (also, "DWR") |
| **DWR** | California Department of Water Resources (also, "Department") |
| **EPA** | U.S. Environmental Protection Agency |
| **GSA** | Groundwater Sustainablity Agency |
| **GSP** | Groundwater Sustainabilty Plan (note, these documents are distinct from groundwater sustainability programs, which are also defined in SGMA) |
| **NEPA** | National Environmental Protection Act |
| **SGMA** | Sustainable Groundwater Management Act of 2014 |
| **SWRCB** | California State Water Resources Control Board (also, "Board") |
| **UC Water** | University of California Water Security and Sustainablity Research Initiative |

# Executive Summary

With the passage of the Sustainable Groundwater Management Act (SGMA)[1] in 2014, California took a historic step towards managing the state's groundwater resources. SGMA adopts a state policy of managing groundwater resources "sustainably for long-term reliability and multiple economic, social, and environmental benefits for current and future beneficial uses."[2] Although these ambitious goals are critical to California's future water security and sustainablility, major questions remain about how to achieve them.

Designing institutions for sustainable groundwater management is one of the most pressing challenges for SGMA implementation. Local entities in medium- and high-priority basins must establish Groundwater Sustainability Agencies (GSAs) by June 2017. GSA design and structure will play a critical role in meeting the sustainability goals required by SGMA. Because designing new institutions for good governance is not easy, the need for information and guidance is acute.

### SUSTAINABILITY

**Sustainability** is a key goal of SGMA, but the statute describes sustainability only in general terms.[3] *Sustainable groundwater management*, according to the statute, is that which can be maintained without causing *undesirable results*. These include *significant* and *unreasonable* depletion of groundwater supply, reduction of groundwater storage, seawater intrusion, degraded water quality, land subsidence, and impacts on beneficial uses of surface water.

SGMA leaves great latitude for local decision making. Primary responsibility for groundwater governance lies with GSAs, to be established by local entities in groundwater basins or sub-basins. SGMA does not specify the details for institutional design of GSAs, nor what specific governance actions must be taken to achieve sustainable groundwater management. Instead, the legislation provides an array of regulatory and non-regulatory tools—mostly optional—from which GSAs can choose. Those tools, in addition to existing authorities already available to local agencies, will provide the basis for groundwater governance in each basin. The relatively short timeline for GSA formation requires local governments and other stakeholders to analyze available options and decide, quickly, how to form novel agencies. These agencies should be armed with the tools necessary to meet current and future groundwater challenges.

While no governance solution is ever perfect, GSAs will have a greater chance of governing fairly and effectively if their design anticipates some common challenges of shared resource governance.

The primary purpose of this document is to assist stakeholders and decision makers in evaluating the design of GSAs. It aims to empower them to think critically about whether proposed GSAs will meet their needs now and in the future, and—if not—which tools may help to achieve these goals. The framework presented here draws on experience in other natural resource management contexts and on research on governance and institutional design to provide lessons learned and illustrative examples.

We propose that local agencies and participating stakeholders use nine criteria to evaluate newly forming GSAs (Table 1). These are: ***scale, human capacity, funding, authority, independence, participation, representation, accountability, and transparency.*** We group these criteria into two general categories: criteria most closely tied to the efficacy of a GSA, and criteria that primarily bear on the **fairness** of its decisions.

The criteria we define are inter-related, overlapping, and mutually supportive (see Section VI). They should help those involved in GSA formation and development to think proactively and design more effective organizations.

**Efficacy** is the ability of a GSA to achieve its goals in the face of inevitable challenges. In order to achieve efficacy, GSAs will need to address the following five criteria.

## INSTITUTIONAL DESIGN, GOVERNANCE AND MANAGEMENT

**Institutional design** is the process of choosing structures and rules which will in turn influence management—it is the design of governance structures.[4]

**Governance** refers to the full set of processes, mechanisms and organizations that enable public policy decisions to be made and implemented.[5] Governance includes laws and regulations; administrative and organizational structures; as well as formal and informal norms and practices.[6]

**Management** refers to the specific actions that determine how resources are used and protected.[7] GSAs will define their governance frameworks, which will in turn give them the structure to manage groundwater.

**Organizations,** including GSAs, are important elements of governance. Carefully designed organizations can enable effective management of natural resources.

- *Scale* is the geographic extent of a GSA's jurisdiction relative to the resource being managed. Ideally, the scale of governance would reflect the natural resource itself. Where jurisdictional and resource boundaries do not align, GSAs will need to think carefully about coordination among multiple entities.
- *Human capacity* is the ability to successfully carry out tasks that enable a GSA to achieve its mission. Human capacity is a product of the people who work for or with a GSA, their expertise in groundwater management, and the resources they bring to bear. Managing groundwater requires a wide variety of skills and capabilities, ranging from monitoring and modeling to legal analysis to community outreach and enforcement. GSAs should carefully consider the capabilities they will need to perform necessary functions and ensure they are able to draw upon sufficient resources. Human capacity can come either directly from staff or by accessing reliable external resources.
- *Funding* is financial resources for capital expenditures such as acquisition of land, facilities, or water rights, as well as ongoing expenditures such as salaries, facility operations and maintenance, and other costs. A GSA should consider whether it will have adequate funding to carry out all aspects of its mandate throughout its life cycle. GSAs should ensure they will have sufficient authority to raise additional funds in a fair manner as they become necessary.
- *Authority* is power delegated by the state and accepted by a GSA that enables the GSA to execute the tasks necessary to carry out its mission. Authorities will include those already in place in addition to new ones granted by SGMA. GSAs will need to exercise authority consistent with the challenge of implementing and enforcing an effective groundwater sustainability program.
- *Independence* is the ability of a GSA to operate freely within its defined purview, protected from external pressures that could divert the GSA from achieving its fundamental goals. Independence includes the ability of a GSA to make decisions that support sustainable groundwater management, even when those decisions are costly or unpopular.

**Fairness** is the GSA's ability to perform its actions in a manner that is both distributionally and procedurally equitable. Distributional equity refers to the benefits and costs of groundwater management. Procedural equity refers to fair mechanisms for decision making. SGMA does not clearly define how costs and benefits should be distributed, either within a basin or between basins, nor does it specify components for procedural fairness. Fairness matters not only for its own sake, but also because a GSA that operates unfairly is unlikely to retain the stakeholder support necessary to carry out its mission.[8] Therefore, GSAs should address the

following four criteria to design institutions that can achieve sustainability with fairness.

***It is crucial to understand that while we discuss these criteria as primarily focusing on fairness, they all impact the durability of decisions, reduce conflict, and ease implementation, and as such contribute strongly to efficacy as well as fairness.***

- *Participation* is direct, meaningful stakeholder engagement in the decision making process. Local governments should develop effective mechanisms for substantive participation by a broad stakeholder base during GSA formation, as well as during subsequent planning and implementation phases (Table 2). Specific mechanisms and support may be needed to ensure that residents from disadvantaged communities can meaningfully engage.

- *Representation* is when elected or appointed leaders bring the interests of stakeholders into a GSA's decision making process. Representation is complementary to participation, offering an additional indirect pathway of engagement. Fair representation gives voice to people with a diversity of interests likely to be affected by a GSAs decisions. Procedures for election or appointment of representatives should be carefully scrutinized, as should decision making processes, conflict of interest rules and other elements of governance.

- *Accountability* is when GSAs are held responsible for their decisions and actions, and are answerable for their results, including whether or not groundwater sustainability plans (GSPs) are effectively implemented. GSAs will be accountable to both communities they represent and to the state. GSAs will be formed from local public agencies whose governing boards are subject to local public elections. State oversight will play an important role in achieving accountability, but monitoring and enforcement activities by GSAs themselves will also be critical.

### WHO HAS A STAKE IN CALIFORNIA GROUNDWATER?

Arguably, all Californians have a stake in the management and sustainability of California's groundwater. In this report, we use the term "stakeholders" to include all those who may want to have a say in a GSA's decisions. These will include groundwater and surface water users as well as those affected by water use, such as environmental and environmental justice interests, and representatives of cities, agencies, or mutual water companies.

- *Transparency* is operating openly and accessibly, such that stakeholders and agencies with responsibility for oversight can effectively observe, understand, and weigh in on the actions a GSA is taking, its process for decision making, and its progress toward meeting sustainability goals.

SGMA is more than a novel experience for California. It is a grand experiment in the design of institutions for groundwater governance. Arguably, implementation of SGMA has the potential to transform the state from having a system of groundwater management that is among the most deficient in the country to having a set of locally inclusive governance systems that will achieve long-term groundwater sustainability. The consequences of poor design choices for GSAs—choices that aren't optimal for a particular jurisdiction, or result in undesirable outcomes—could be severe. Some problems may not become apparent before substantial and irreversible harm is done, or before it is exceedingly difficult to course correct. Therefore, for the long-term success of SGMA, stakeholders and decision makers need to think carefully now about what factors contribute to good governance, and how to incorporate those factors into new institutions (Table 1).

# I. How to use this document

The intent of this report is to help stakeholders engage productively in the process of Groundwater Sustainability Agency (GSA) formation and to support development of effective GSA governance systems for sustainable groundwater management.

For **local government officials and staff**, this report offers guidance for the process of designing groundwater governance institutions. Since individual basins and subbasins will always have different needs, this document does not provide a detailed blueprint. Rather, this report provides a checklist of key issues to address and a conceptual orientation to possible solutions.

**Stakeholders outside of local government** should actively participate in deliberations on GSA formation and weigh in during the GSA formation process. This report will help stakeholders identify key issues to consider when systematically evaluating GSA formation.

This document can also help **state agencies**, who play important roles in groundwater governance and have ultimate responsibility for the success of implementation, consider their own roles in supporting GSAs. Because institutional design will influence whether sustainability is achieved in practice, attention from state leadership to GSA governance options is appropriate and necessary, although its authority may be limited.

Ultimately, the **essence of our discussion** is represented in Table 1. We hope that the questions in Table 1, and the content of the report, will inform institutional design, governance, and oversight of GSAs and will influence more effective implementation of SGMA.

## Evaluating GSA Governance

The condensed set of questions in this table reflects the criteria for evaluating the GSA governance options developed in this report. This list can be used as a starting point for decision makers and stakeholders to engage in discussions about GSA formation.

**TABLE 1:** EVALUATING GSA GOVERNANCE: BASIC QUESTIONS ABOUT GSA GOVERNANCE FOLLOW FROM THE NINE CRITERIA IN THIS DOCUMENT.

| | |
|---|---|
| Scale | • How do the boundaries of the GSA (or coordinated GSAs) compare to the boundaries of the groundwater basin or subbasin?<br>• What plans are in place to deal with gaps in coverage, aquifers shared with other GSAs, or overlap with other related entities?<br>• What plans are in place to address connections between groundwater and surface water?<br>• How will the GSA and GSP coordinate with land use planning and regulatory agencies within and outside the basin on issues like well permitting and aquifer recharge?<br>• What mechanisms will ensure effective coordination with neighboring GSAs? |
| Human capacity | • What skills and expertise will be required during the GSA formation, GSP development, and GSP implementation phases defined in this report?<br>• Will these capacities exist in the proposed GSA? If not, how will these capacities be developed or accessed? |
| Funding | • How much and what types of funding will be needed for the GSA to fulfill its functions over time?<br>• What access to funding is available from the existing entity or entities considering GSA formation? How does this align with projected resource needs during all phases of SGMA implementation?<br>• Is the GSA planning to exercise the authority to collect fees granted by SGMA? If so, via what mechanism(s)?<br>• How will the GSA balance the needs to integrate agencies representing disadvantaged communities and to ensure that they are not unduly burdened financially? |
| Authority | • What powers and authorities is the GSA planning to assume from those available under the law, and under what circumstances will it exercise them?<br>• What is the rationale for, and what are the likely consequences of, not assuming or exercising certain authorites?<br>• How will the GSA ensure its authority is not duplicative of or conflicting with pre-existing authorities, and coordinate effectively with other entities with relevant authorities?<br>• How will the GSA enforce its decisions on groundwater users if they fail to provide required information or violate other requirements, like pumping restrictions? |
| Independence | • What mechanisms will ensure the GSA is capable of making difficult decisions necessary to achieve sustainable groundwater management in the basin, even in the face of pressure from competing interests? |

| **TABLE 1** *(continued):* EVALUATING GSA GOVERNANCE: BASIC QUESTIONS ABOUT GSA GOVERNANCE FOLLOW FROM THE NINE CRITERIA IN THIS DOCUMENT. | |
|---|---|
| Participation | • How will the GSA ensure meaningful participation by a broad spectrum of groundwater users and other affected stakeholders in its decision making?<br>• What capacities do stakeholders have, and what additional support do they need, to participate effectively in all phases of GSA activities? |
| Representation | • How will representatives be chosen?<br>• How will the GSA ensure adequate representation of diverse stakeholder groups among GSA decision makers?<br>• What role will representatives play in evaluating governance options? |
| Accountability | • What mechanisms will the GSA put in place to ensure that its employees and consultants do good work?<br>• What mechanisms will the GSA put in place to ensure effective oversight and enforcement of fees, extraction limits, and other requirements it adopts?<br>• How will the GSA measure progress toward sustainable management?<br>• How will the GSA be accountable to groundwater users and other stakeholders for the success of its management actions?<br>• How will the GSA engage with DWR and the Board in their oversight and enforcement roles? |
| Transparency | • How will the GSA ensure transparent decision making?<br>• What information will be disclosed, what information withheld, and why? From which stakeholders, decision makers and community groups?<br>• How will assumptions, data, and modeling results be communicated to the public?<br>• How will the GSA track and communicate progress toward meeting sustainability goals? |

# II. Groundwater management challenges

The importance of the Sustainable Groundwater Management Act (SGMA)[9] for the future of California's water is difficult to overstate, but its implementation raises new questions. Governance is a key unresolved topic—local entities are scrambling to understand how to establish Groundwater Sustainability Agencies (GSAs), and to do so under a tight timeline, as required by the act. Because governance plays such a critical role in the potential for GSAs to achieve their goals, governance itself should be viewed as an essential element of sustainability. Indeed, because of its importance, the need for information and guidance on governance is acute.

## SGMA BASICS

When the California legislature passed SGMA in 2014, it created the first statewide requirement to sustainably manage groundwater resources.[10] SGMA emphasizes local planning and management[11] while providing for state intervention if local agencies are unable or unwilling to carry out their responsibilities. For a summary of SGMA's state intervention provisions, see **Local and state roles in groundwater governance**.

***Definition of sustainable management:*** SMGA defines sustainable groundwater management as "management and use of groundwater in a manner that can be maintained during the [50-year] planning and implementation horizon without causing undesireable results."[12] The six undesirable results are: significant and unreasonable (1) depletion of supply, indicated by chronic lowering of groundwater levels; (2) reduction of groundwater storage; (3) seawater intrusion; (4) degraded water quality; (5) land subsidence that substantially interferes with surface land uses; and (6) adverse impacts on the beneficial uses of interconnected surface water due to depletions.[13]

***The role of GSAs:*** To avoid state intervention, new or existing local agencies in medium- or high-priority or critically overdrafted basins must form GSAs, then develop and implement effective groundwater sustainability plans (GSPs). [14] A GSA can be a city, a county, a special district, or some combination of these agencies organized via a legal agreement.[15] GSAs must self-identify by June 30, 2017.[16] If multiple local agencies notify DWR of their intent to form a GSA in the same area, the agencies must reach an agreement on how to proceed.[17] SGMA offers GSAs a broad array of authorities to help them carry out their responsibilities (see Table 5) and leaves them substantial flexibility in how to do so (see "**May vs. Shall**").

***GSP planning and implementation requirements:*** SGMA sets deadlines for planning and plan implementation. All groundwater basins designated as medium- or high-priority and identified as subject to critical conditions of overdraft must be managed under one or more GSPs by January 31, 2020.[18] The deadline is two years later (January 31, 2022) for other medium- or high-priority basins.[19] If GSAs develop multiple GSPs to cover a particular basin, they must jointly submit the plans to DWR for evaluation and coordinate their implementation.[20] GSPs must include measurable objectives with interim milestones designed to achieve operation within the basin's sustainable yield (avoiding undesirable results) within 20 years of plan implementation.[21]

***Alternatives to GSPs:*** Instead of forming a GSA and developing a GSP, a local agency in a medium- or high-priority basin can submit an alternative that satisfies SGMA's objectives for that part of the basin.[22] Alternatives include plans developed under other laws that authorize groundwater management, management under an adjudication, and a demonstration that the basin has been operating within its sustainable yield for the last 10 years or more.[23]

SGMA BASICS, *continued*

***Requirements for adjudicated basins:*** SGMA's requirements for GSA formation and GSP development and implementation do not apply to adjudicated portions of basins listed in SGMA.[24] Instead, for these areas, the local agency or watermaster must submit copies of judicial orders or decrees and any subsequent amendments to DWR, annual reports of groundwater data, and any annual reports submitted to the court.[25] Basins undergoing adjudication actions are not exempt from GSA and GSP requirements, but a court-approved judgment can be submitted for evaluation as an alternative, as described above.[26]

## Groundwater governance is difficult[27]

Groundwater is one of California's most important natural resources. Much of the state's population depends at least partly upon groundwater, and during dry periods like the current drought, it serves as a crucial water source. Of the 50 States, California depends most heavily on groundwater to satisfy freshwater demand, as a percentage of total use.[28] Yet groundwater use in California has been largely unregulated, with no statewide groundwater use laws and substantial areas without significant local regulation. Without regulatory constraint, groundwater has been heavily, and unsustainably, pumped in many areas, and statewide use of groundwater greatly exceeds natural recharge. This report is motivated by a basic premise: Good governance for groundwater is crucial, but the design of governance arrangements for sustainable groundwater management is challenging because the problems are so complex. In particular:

- *Groundwater is a shared resource.* Groundwater is a common pool resource that is accessed by many and controlled by no single user.[29] A well on one property may draw water from an aquifer that extends beneath neighboring lands. Without a system to impose accountability on its many users, groundwater may be susceptible to domination by a limited range of interests, and difficult or impossible to manage sustainably.

- *Many aquifer boundaries are poorly known and subject to conflicting interpretations.*[30] This makes it difficult to determine the size and distribution of the available resource. Extensive hydrogeologic studies are needed to identify the key factors influencing storage capacity and movement of water through an aquifer and to ensure that monitoring wells intersect important geological units. Even when the shape and boundaries of an aquifer are well understood, flows vary greatly from place to place.[31] As a result, data are often inadequate for determining and tracking changes in groundwater storage.

- *Groundwater and surface water are physically, though not legally, interconnected.*[32] Groundwater extraction can reduce interconnected surface flows, generating conflicts between surface water use and groundwater use, and between in-stream flows and consumptive water uses. These conflicts can be exacerbated by a legal system that treats groundwater separately from and differently than surface water.

- *Groundwater inflows and outflows are difficult to observe; most cannot be measured directly.* Extraction (pumping) rates are the easiest groundwater flows to quantify, but have not been measured or recorded across much of the state during California's history. Other important flows that are more difficult to measure include groundwater recharge, baseflow to streams, and discharge from aquifers to the ocean. Thus, groundwater budgets often contain large uncertainties making

it difficult to determine if extraction rates are sustainable and complicating decision making by managers and stakeholders alike.

- *Groundwater management requires the use of specialized tools.* In some basins, complex computer models exist that can be used to forecast future conditions and test management options. Developing an effective model, and keeping it updated, is an expensive and a data- and labor-intensive process that requires the collection and sophisticated application of geologic, hydrologic, and land-use information.

- *Groundwater conditions can vary on multiple timescales.*[33] For example, a local response to pumping from a well might occur within hours, regional aquifer response to pumping patterns may take years, and climatic variability might influence an aquifer over decades to centuries. Similarly, groundwater depletion or degradation of quality may require decades or centuries to mitigate. The lag time between management changes and large-scale aquifer response can deter commitments necessary for effective management.

- *Groundwater use can pit present needs against future needs.* High rates of pumping relative to recharge can satisfy demand in the short term, but will leave less water available for the future. Further, excessive pumping can result in irreversible impacts such as land-surface subsidence, the loss of groundwater dependent plants and animals and permanent loss of storage capacity. In addition, simply maintaining a water balance over the long term does not necessarily equate to sustainability.

Because of these challenges, stories of groundwater mismanagement are distressingly abundant.[34] Management failures underscore the importance of careful institutional design, since effective governance can enable better management. Indeed, in some places—as described later in this report—government entities have successfully addressed challenges and managed groundwater effectively. These examples of success can help to define terms for establishment and operation of new GSAs.

## SGMA leaves unanswered questions about groundwater governance

The California Legislature passed SGMA to respond to fundamental challenges to California groundwater, and to begin reversing the impacts of decades of groundwater overuse. In some ways, the statute sets forth a clear vision for addressing those impacts. Most importantly, SGMA envisions a central role for GSAs, which will take the lead in developing, implementing, and updating groundwater sustainability plans (GSPs).[35] SGMA adopts a state policy of managing groundwater resources "sustainably for long-term reliability and multiple economic, social, and environmental benefits for current and future beneficial uses."[36] Those outcomes, the Act states, are "best achieved locally through the development, implementation, and updating of plans and programs based on the best available science."[37]

In service of those aims, SGMA strives to find a balance between statewide consistency, regional coordination, and diverse local needs. In doing so, the act provides basic requirements, but little explicit guidance, on the structure of groundwater governance.[38] The law does provide for periodic review of GSPs by DWR.[39] DWR is also developing regulations that will influence GSAs. These regulations that will dictate the components of their GSPs, the parameters of their water budgets, the scope of annual reports and the expectations of successful performance.[40] But SGMA does not specify exactly how GSAs should govern local groundwater resources to achieve sustainability goals, nor does it provide details on the interplay between state and local actions. SGMA also charges DWR with developing and publishing non-binding best management practices for sustainable groundwater management on its web site by January 1, 2017,[41] but, overall, it leaves great latitude for local decision-makers.[42]

### "MAY" VS. "SHALL"

Careful consideration of institutional options under SGMA is important because many of the provisions of SGMA grant GSAs the option of adopting and exercising various powers (see Table 5), but do not *require* them to do so. This flexibility may be quite useful if it allows local entities to construct GSAs designed to be particularly responsive to local conditions. But it also creates the danger of ineffective GSAs. If a GSA chooses to use its discretion to emphasize unobtrusive and voluntary mechanisms, groundwater use might continue largely unrestrained. Reliance solely on voluntary mechanisms is unlikely to lead to sustainability, or may result in the need for state intervention.

That latitude extends to the structures of GSAs themselves. The law specifies that GSAs will self-organize,[43] and can be comprised of "any local agency or combination of agencies overlying a groundwater basin."[44] Possibilities include counties, cities, existing special districts (like water districts or irrigation districts), or new special districts (created by legislation). Multiple agencies can use a legal agreement, including a joint powers agreement or memorandum of agreement, to join together to form a GSA.[45] And while SGMA empowers GSAs to take on a variety of authorities, it does not require them to do so (see "**May" vs. "Shall**"). Instead, the agencies that create GSAs will have many choices about how to structure themselves and what powers to assume.

There are several prominent exceptions to this theme of broad local discretion, some of which have yet to be clearly defined. The first is the role of the DWR in generating regulations to guide development and assessment of GSPs,[46] and in evaluating the plans themselves.[47] The second is the Board's role in oversight and intervention.[48] Third, while SGMA is California's first comprehensive groundwater management law, it is not the only law to affect the activities of local governments that manage natural resources. Instead, GSAs will operate within a legally complex landscape, with environmental laws like the California Environmental Quality Act,[49] the state and federal Endangered Species Acts, open government laws,[50] water rights law, and local land use policies, all constraining their policy discretion and decision making processes. Other government agencies have implementing responsibility for some of these other laws, and GSAs therefore will sometimes need to collaborate with, comply with regulations issued by, or obtain approvals from, other agencies. This includes the requirement that city and county governments and GSAs share information while developing both general plans and GSPs.[51]

## Near term decisions will have long run consequences

The timeline for decisions on the design of institutions for groundwater basins is relatively short—GSAs must be in place for all medium- or high-priority basins by June 30, 2017 (see SGMA Basics).[52] That means local governments will need to decide, quickly, how to create agencies that can comply with SGMA's mandates. In contrast, the timeline for achieving sustainable groundwater management is relatively long.[53] SGMA requires unprecedented communication and collaboration around water management at local and state scales. Further, once GSAs are formed, they will be difficult to change. Governmental forms, once created, tend to display structural inertia.[54] Together, this suggests the importance of working to develop robust institutions for groundwater governance from the start. California decision makers at all levels should pay careful attention to institutional design as GSAs form.

## LOCAL AND STATE ROLES IN GROUNDWATER REGULATION

Groundwater management is framed as primarily a local challenge under SGMA. This is appropriate insofar as groundwater development has important implications for local economies, communities, and ecosystems. Most groundwater consumption occurs locally, yet in California all water is ultimately the property of the state. Water development has important implications for the state-wide economy, for public trust resources under the state's care, and for nationally important environmental resources.[55] The potential exists for tension between state and local goals, particularly where local officials face heavy pressure to prioritize short-term economic goals over long-term social and environmental ones. Although the state is not immune to the same dynamic, it is generally better positioned to deflect localy-focused political pressures.

Although SGMA envisions local agencies as the primary groundwater managers, it creates a state backstop through oversight and intervention roles for the DWR and the Board. DWR must review notifications of GSA formation for completeness before posting them online.[56] DWR is also responsible for developing regulations to govern basin boundary revisions and GSP evaluation.[57]

If GSAs are unable or unwilling to carry out their duties under SGMA, the Board can put basins on probation and develop interim plans.[58] Additionally, the Board will directly collect extraction data from probationary basins and areas not covered by GSAs.[59] The Board will be required to recover the costs of administering its SGMA oversight and intervention by instituting a series of fees, some of which may be directed at groundwater pumpers while others could be assessed to the GSAs themselves.[60] Furthermore, the Board can issue cease and desist orders to anyone violating its intervention-related decisions and orders.[61]

These provisions notwithstanding, it remains unclear exactly how the Board will or will not exercise its backstop. The Board needs to decide exactly how and when it will intervene, and what exactly the consequences of these interventions will be. Until it does so, and unambiguously signals its intent to GSAs, the threat of intervention remains a vague one.

## Governance needs will change over time

In addressing these challenges, it is useful to consider SGMA implementation as three major phases: Phase 1, GSA formation; Phase 2, GSP development; and Phase 3, GSP implementation.[62] Although the three phases may overlap with one another in practice, some of the core functions of each phase will place different institutional demands on GSAs.

The capacity to form a GSA is not the same as the capacity to plan or the capacity to turn a generalized plan into specific, enforceable controls and implement them. Consequently, the three phases described here may require different governance functions.

Table 2 provides examples illustrating how governance needs may differ between these three phases.

Further, SGMA requires GSAs to periodically evaluate and adjust their GSPs.[63] As GSAs learn more about their groundwater resources, certain elements of their plan may need to change. The implementation process will likely reveal the need to rethink existing GSPs and related management actions. Thus, GSPs and their implementation procedures should be designed to enable adjustments over time. Employing principles of adaptive planning[64] and adaptive governance[65] may help GSAs to change their capabilities with changing needs—details on these concepts and their application will be surveyed in future reports.

## PLANS AND REGULATIONS

Implementing the provisions of a GSP is how a GSA will make tangible progress towards groundwater sustaninablity (Table 2). As some provisions of GSPs may engender local opposition, enforceabilty will be critical. For this reason, GSAs should tie formal regulations to their GSPs. A plan alone may not ensure that changes in management occur, as experience with other planning documents in California water has demonstrated.[68] Simple regulatory language that references and lends formal authority to GSP implementation will be an important driver of action in some cases.

GSAs have the authority to develop regulations,[69] and should use this authority in Phase 2 and Phase 3.

During the first phase of SGMA implementation one, or several GSAs coordinated by a legal agreement, will be formed for each medium- or high-priority basin (see **SGMA Basics** and Table 2).

In the second phase, a GSA's primary task will be to develop a GSP by 2020 (for medium- or high-priority basins designated as subject to critical conditions of overdraft) or 2022 (for other medium- or high-priority basins).[66] A GSP is a document that describes how the groundwater basin will be governed over the coming decades in order to achieve sustainable groundwater management.[67]

During the third phase of SGMA implementation, GSAs will need to develop specific policies, guidance, and regulatory requirements to implement and operationalize GSPs. While current attention is focused on DWR's efforts to develop regulations for evaluating GSPs,[70] SGMA also authorizes GSAs to develop their own rules, regulations, ordinances, and resolutions to carry out their duties.[71] Translating a GSP into clear, enforceable regulatory requirements and management actions will be a critical step in turning the aspirations of plans into on-the-ground and under-the-ground reality. For example, GSAs can develop reporting requirements, set pumping limits and schedules, and impose fees to support their activities (see **Authority**). Where a GSP is sufficiently detailed, regulatory requirements and management actions can draw directly on its language. In essence, this phase bridges the gap between the GSP and an effective governance program by developing specific actionable and enforceable requirements, fleshing out important policies, and creating effective stakeholder guidance. GSAs will need to fund their activities, monitor compliance with requirements, provide compliance assistance, and bring enforcement actions against violators. Funding options are more straightforward for this phase than for Phase 1 and 2, which are not clearly called out by SGMA's fee provisions (see **Funding**).

## Much can be learned from collective management of other natural resources

As the preceding discussion makes clear, local governments have a challenging task ahead of them. Governing groundwater isn't easy, and local governments have broad discretion in deciding how to tackle that challenge—except that they must act quickly to form GSAs and develop GSPs. Fortunately, local governments are not acting in a vacuum. Many examples exist that GSAs can draw upon as they confront these groundwater management challenges. Design of institutions for effective governance is recognized as an essential element of successful natural resource management. Most notably, Nobel Prize winning scholar Elinor Ostrom and her colleagues define an entire academic field about the governance of shared resources.[73] Indeed, some of Ostrom's most famous work involved groundwater.[74] This research identifies characteristics of governance systems that enable systems to be effectively managed over the long-run.[75] Further empirical testing has expanded and validated Ostrom's institutional design principles.[76]

**TABLE 2:** PHASES OF SGMA. SGMA CAN BE THOUGHT OF AS A PHASED PROCESS, IN WHICH GSA ACTIVITIES AND GOVERNANCE NEEDS WILL CHANGE OVER TIME.

| Phase | Examples of necessary GSA functions and capacities |
|---|---|
| **Phase 1:** GSA formation | • Consider GSA functions and capacities as described in this report (Table 1).<br>• Secure funding for Phase 1 and explore funding options for the following phases.<br>• Engage stakeholders—including education, outreach, facilitation, and negotiation—to ensure broad participation and enhance understanding of diverse interests and basin needs.<br>• Develop a process for local dispute resolution.<br>• Enter into intra- and/or inter-basin coordination agreements as needed. |
| **Phase 2:** GSP development | • Secure funding for Phase 2 and explore funding options for Phase 3.<br>• Expand and continue stakeholder engagement.<br>• Characterize basin history and baseline basin conditions.<br>• Develop groundwater model and evaluate planning scenarios.<br>• Evaluate alternative governance and management approaches.<br>• Identify sustainability goals and thresholds, methods to monitor progress toward those goals, and steps for implementing them.<br>• Enter into intra- and/or inter-basin coordination agreements as needed. |
| **Phase 3:** GSP implementation | • Secure ongoing funding (generate revenue, finance debt, etc.).<br>• Expand and continue stakeholder engagement.<br>• Develop specific policies, guidance, requirements and regulations that are both actionable and enforceable[72] to operationalize the GSP.<br>• Monitor basin conditions and stakeholder compliance.<br>• Analyze data and modeling results, assess status and progress towards goals.<br>• Investigate non-compliance and carry out enforcement actions.<br>• Revisit planning and regulatory tasks as new information indicates. |

Concurrently, research on socio-ecological resilience,[77] political ecology,[78] and natural resources management[79] has examined additional examples from around the world for understanding of how effective governance systems can address both social and environmental change as well as equity considerations. The criteria below for evaluating governance draw upon many of the key insights from these fields of research.

The most important finding from research on collective management of natural resources is a general one: shared resources can be, and in many cases have been, effectively managed. GSAs face significant challenges in managing groundwater, and the risk of failure is significant. However, as many other governance institutions have demonstrated, success is attainable. The following sections of this report identify past successes, and synthesize key components of those successes into nine criteria for evaluating governance options under SGMA.

# III. Criteria for evaluating governance options

The core of this document is a set of considerations for creating sound groundwater governance, expressed as a set of mutually supporting criteria.[80] We use the term **criteria** in the sense of "principle[s] or standard[s] by which something may be judged or decided,"[81] rather than in the sense of specific legal requirements.

We group these criteria into two general categories: criteria most closely tied to the **efficacy** of a GSA, and criteria that primarily bear on the **fairness** of its decisions.

Each criterion is addressed individually in a section that includes a definition along with a discussion of its implications, importance, and ideal. Each also includes an illustrative example or examples to ground the discussion in experience from other natural resource management contexts.

The criteria defined in this document are meant to synthesize important governance concepts. They do not reflect natural law, but rather are illustrative constructs, which should be used to seed consideration and creative thinking, not constrain it. As such, many criteria are overlapping and interrelated. Nevertheless, we believe that they offer useful perspective.


**Figure 1:** Governance criteria. A successful path to groundwater sustainability will require governance that is both fair and effective. GSAs will need to carefully consider the criteria shown here in their institutional design, each of which is necessary to achieve both fairness and efficacy in groundwater management.

# IV. Efficacy criteria

Efficacy is the ability of a GSA to achieve its goals in the face of inevitable challenges. In addition, efficacy is necessary for an agency to validate its credibility as an effective organization on an ongoing basis in the eyes of stakeholders and the public.[82]

Efficacy stems from having access to and exercising appropriate authorities and resources, the most important of which can be assessed using the criteria described below. Our five efficacy criteria, scale, human capacity, funding, authority, and independence, are described in the following sections.

## Scale

*Definition:* Scale is the geographic extent[83] of a GSA's jurisdiction relative to the resource being managed.[84] Scale also relates to state jurisdictions, where planning and enforcement occur for groundwater at the local level and for surface water at the state level.

*Implications and importance:* Scale mismatches increase the potential that management decisions in one GSA will affect those in another, and thus the need for coordination between adjacent GSAs as well as between state and local entities. This increases transaction costs and can generate conflicts. A GSA also will likely be less effective managing a groundwater resource that falls partly outside its jurisdiction, such as where the area of a basin is larger than that of the GSA.[85]

*Ideal:* Ideally, the scale of governance would reflect the scale of the natural resource itself. GSA boundaries should correspond to the physical boundaries of the groundwater basins or subbasins they are meant to manage.[86] Boundaries would ideally also reflect the degree to which groundwater in adjacent basins is actually physically separated, and the relationship between groundwater basins and source water areas in upper watersheds. Where this is not feasible, GSAs should explicitly consider strategies for managing scale mismatch, and should be prepared to incorporate these strategies into their GSPs.[87] In addition, mechanisms will be needed for coordinating and resolving disputes beyond the GSA. Since surface water use is regulated at the state level, this is especially true where groundwater and surface water interact or when interbasin transfers are involved.

Unfortunately, scale mismatch is inevitable in California. DWR has subdivided large basins into a series of subbasins separated by geologic barriers, hydrologic barriers, or institutional boundaries.[88] Source areas from which recharge water originates frequently do not coincide with groundwater basin boundaries – where upland recharge areas are outside GSA boundaries, coordination with other land use authorities will be necessary, and often challenging. Further, physical basin boundaries may be unknown or subject to differences in interpretation, based on lack of consistent data. Given these issues, SGMA requires GSAs to coordinate and integrate with their neighbors.[89]

### Illustrative example #1: Palouse Basin Aquifer

The state line between North Idaho and Eastern Washington divides the Palouse Basin Aquifer. The aquifer is shared between the two states – this jurisdictional mismatch enabled depletion of the collective resource because neither state alone was willing to halt depletion as long as the other pumped at will. As a result, the aquifer relied on by the communities in the region has been declining at a rate of 1.5 feet/year for approximately 100 years.[90]

In 1989 the Palouse Basin Aquifer Committee (PBAC) was formed via an intergovernmental agreement among the cities of Pullman Washington, Moscow Idaho, Whitman County Washington, Latah County Idaho, the University of Idaho and Washington State University with membership appointed from each of these entities. The mission of PBAC is to develop a long-term plan for the coordination of groundwater use and conservation planning and to jointly develop the necessary scientific studies. In 1989 PBAC entered into a Resolution of Understanding with the Idaho Department of Water Resources and the Washington Department

of Ecology in which the state water resource entities agreed to provide technical support to the Committee. PBAC meets on a regular basis and uses funds from the communities involved and the state for scientific studies. The 1992 PBAC Groundwater Management Plan set targets for conservation among the communities and universities sharing the aquifer. The goal of the conservation target is to achieve stabilization of the aquifer and thus may change as new information and data to improve modeling becomes available. Compliance with conservation targets is voluntary, but substantial progress has been made in reducing the rate of decline. The states' water resources agencies entered into a joint resolution to manage the aquifer in accordance with the 1992 plan, although to date they have not exercised the option to intervene, and have been challenged on the issuance of new groundwater permits and change applications within the region. To enhance citizen involvement and knowledge, PBAC holds an annual Palouse Basin Summit in which progress on achieving the goal of stabilization, any new scientific data, and emerging examples of successful water management from around the nation are presented.[91]

*Lessons:* While the Palouse Basin Aquifer Committee is an excellent example of how to establish and implement cooperation across a jurisdictional boundary, it also provides a cautionary lesson. Should the communities on the Palouse be unsuccessful in stopping the decline of the aquifer through voluntary cooperation, there is no fall-back mechanism for enforcement or apportionment across the boundary. In addition, the perceived failure of the state agencies to act in accordance with the plan has been detrimental to its legitimacy.

### Illustrative example #2: Chesapeake Bay water pollution

Problems of geographic mismatch between institution and resource boundaries are not unique to groundwater. Indeed, these challenges recur throughout natural resource governance. One particularly challenging example of this problem is water pollution in Chesapeake Bay. The Bay's watershed includes parts of six states, and pollution runoff from those states combines to create persistent water pollution problems.[92] In responding to those problems, the states have been hamstrung by collective action problems including free rider issues: each state has been reluctant to impose the controls necessary to clean up the bay because it is unsure that its neighbors will do the same.[93]

To resolve that problem, the states have turned to an entity with broader geographic boundaries: the federal government. The United States EPA—which has worked closely with each of the basin states—recently published a sweeping "total maximum daily load" document for the entire bay, and that document offers a broad blueprint for pollution control and restoration, including specific targets for each state.[94] By relinquishing some—though not all—of their discretion, the states have gained some assurance that if they follow through on their obligations, their neighbors will as well. The TMDL has been controversial, and litigants have challenged its legality. But none of the participating states have supported that claim.[95]

*Lessons:* The point of this example is not that the federal (or state) government needs to resolve transboundary resource management challenges. Using an entity whose geographic jurisdiction encompasses all of the resource is one solution, but it is not the only one. But the Chesapeake Bay story does illustrate the challenges associated with transboundary resources, and the reality that smaller jurisdictions will often need to give up some of their discretion and independence, and instead work collaboratively with their neighbors, if the resource is to be effectively managed. If each GSA within a shared basin operates in isolation, sustainability goals are less likely to be met, and the entire basin may be listed as probationary.

## Human Capacity

*Definition:* Human capacity refers to the skills and expertise a GSA needs to perform its functions. GSAs will need to take specific technical, legal, communication, financial, and management actions to achieve specific objectives. A GSA will have in-house capacities, but the ability to leverage external[96] resources will also be important.

*Implications and importance:* A GSA will need sufficient human capacity to implement its responsibilities. Without adequate staffing, the GSA is unlikely to be able to perform its most basic functions. Without sufficient technical capacity, the GSA may not be able to develop sufficient understanding of the groundwater resources being managed. Without legal expertise, the GSA will struggle to translate SGMA's requirements into an effective GSP. The lack of capacity can thus results in a struggle to operationalize planning goals as specific, enforceable controls. Effective communication ability in a GSA will be essential for explaining what it is doing and why. Even before this, a GSA needs to understand public preferences and priorities, including technical stakeholder concerns. Finally, without effective leadership, the GSA may not be able to change behaviors that threaten sustainable use of the resource. Most existing agencies, like water supply districts, that take the lead as GSAs will have some, but not all of the necessary expertise. Local capacity building will be important.

*Ideal:* The ideal GSA would have (1) technical experts who are capable of understanding the physical scope of groundwater resources, modeling the range of consequences of different management regimes, and interpreting monitoring data; (2) legal and policy experts who can work with technical staff to develop resource management plans and turn those plans into effective regulatory controls; (3) communication staff who can facilitate effective interactions with regulated groundwater users, other agencies, and other members of the public; and (4) leaders and managers who can run the organization effectively. The GSA would also possess the physical and financial infrastructure to allow these people to do their jobs, like functional work space, appropriate computer hardware and software, and adequate operating budgets (see **Funding**). Ideally, every GSA would have access to the range of needed expertise, either in-house or through external sources. For some GSAs, hiring staff and consultants who can fulfill all of these roles may be prohibitively expensive. Further, turning too readily to consultants results in missed opportunities to develop and nurture local capacity. Sometimes GSAs will need to be able to draw upon external support. Such support may come from DWR, from arrangements whereby experts are shared among multiple GSAs, or from consultants. GSAs can also help place themselves in a better position for success by joining together several local agencies during the GSA creation phase through JPAs or MOUs.[105] The resulting economies of scale may provide opportunities to share staff or resources. Neighboring GSAs can coordinate in similar ways to share staff in the development of technical documents or review.

State agencies can play important roles in providing technical support for GSAs that have limited resources and in ensuring that effective approaches developed by some GSAs become widely known. They can develop (or fund the development of) model GSPs, regulations, and modeling programs and can help supply standardized data management platforms and software, saving local entities from needing to reinvent systems that have already been developed elsewhere in the state. Direct guidance, training, and financial assistance will also be crucial, particularly for disadvantaged communities who may not have the capacity to apply for or administer grants. In October 2015, DWR and the Board compiled a summary of current state funding opportunities related to SGMA (identified in Table 4).[106] DWR must "use its best efforts" to provide technical assistance requested by a GSA in developing and implementing a GSP.[107] Additionally, SGMA requires the agency to publish an estimate of the water available for groundwater replenishment and best management practices for sustainably managing groundwater on its website by the end of 2016.[108] Currently, DWR's website includes a variety of resources that may be useful to local agencies and other stakeholders.[109]

**TABLE 3:** HUMAN CAPACITIES. A VARIETY OF CAPACITIES WILL BE NECESSARY FOR GSAS TO SUCCESSFULLY ACHIEVE GROUNDWATER SUSTAINABILITY, AS ILLUSTRATED BY THESE EXAMPLES.

| Capacity | GSAs may need to… |
|---|---|
| Technical | • Access appropriate technical expertise, either in-house, through consultants, or via technical assistance from other agencies.<br>• Conduct and/or oversee monitoring, data collection, and reporting.[97]<br>• Develop a water budget[98] and identify sustainable yield.[99]<br>• Assess basin history and potential paths to sustainable management.[100]<br>• Remediate / oversee remediation of polluted groundwater.[101] |
| Legal | • Conduct education and outreach.<br>• Support long-term community outreach and stakeholder engagement processes to keep stakeholders informed of ongoing and future developments.<br>• Share scientific and technical knowledge about the basin in accessible ways.<br>• Collect input/feedback from diverse stakeholders on potential future actions and past or ongoing actions.<br>• Communicate, and potentially collaborate, with other GSAs and other local and state agencies. |
| Communication | • Secure ongoing funding (generate revenue, finance debt, etc.).<br>• Expand and continue stakeholder engagement.<br>• Develop specific policies, guidance, requirements and regulations that are both actionable and enforceable[72] to operationalize the GSP.<br>• Monitor basin conditions and stakeholder compliance.<br>• Analyze data and modeling results, assess status and progress towards goals.<br>• Investigate non-compliance and carry out enforcement actions.<br>• Revisit planning and regulatory tasks as new information indicates. |
| Management | • Administer contracting, audits, human resources, and other standard operational functions.<br>• Engage, cooperate, and negotiate with other GSAs within a basin[102] and other agencies,[103] including those responsible for land use decisions and other aspects of water management.<br>• Identify and engage diverse stakeholders.<br>• Secure support and confidence from stakeholders.<br>• Mediate conflicts between stakeholders. |
| Financial[104] | • Develop funding sources and mechanisms.<br>• Expend capital for new physical assets like recharge faciliites, pipelines, recycled water systems, groundwater measurement and monitoring equipment, property, etc.<br>• Pay for operation and maintenance expenditures, including staff wages and benefits and consultant fees.<br>• Assess fees. |

## Illustrative example: Air quality planning in California

In the United States, air quality planning occurs through institutional arrangements analogous to those envisioned by SGMA. The federal government sets national ambient air quality standards, but the states develop "implementation plans" for achieving those standards.[110] The plans are subject to EPA review and approval, but the states bear primary responsibility for actually doing the planning. In California, a second layer of delegation occurs. The California Air Resources Board (CARB) is ultimately responsible for the state's air quality plans, and also sets state air quality standards, but regional air quality boards such as the San Joaquin Valley Air Pollution Control District do much of the planning and implement programs.[111] Many Air Pollution Control Districts are comprised of locally elected officials (e.g., County Board of Supervisors, City Councilors). The system, in short, looks much like SGMA, with decentralized planning and implementation to achieve legislated goals balanced by state standards and regulatory oversight. Air quality is also reminiscent of groundwater because of its technical complexity, including the practical need for sophisticated computer modeling, and the necessity of interbasin coordination and planning.

To make this system work,[112] state and regional agencies have needed to develop capacity. The regional air pollution control agencies have grown their

### INFORMATION AND DATA MANAGEMENT ARE CRUCIAL FOR EFFECTIVE GROUNDWATER MANAGEMENT

GSAs will require development and management of substantial datasets to be successful,[115] including technical data about the groundwater resource, projections of anticipated demand, and an understanding of stakeholder preferences. SGMA defines some types of information that GSAs can collect,[116] and others are implicit in the legislation.[117] Some of this information already exists, but GSAs will need to generate new information and update existing information over time. Key elements of information will include those that bear directly (e.g., records of well locations, completion depths, pumping history, streamflow) and indirectly (e.g., land use and changes over time, ecological health, zoning restrictions, streamflow) on undesirable results that could result from unsustainable management.

In addition, GSAs will also need to develop capacity to organize, synthesize, provide quality assurance, display, archive, and distribute data to many stakeholders, having a variety of technical and experiencial backgrounds. This will be important both to achieve day-to-day operational goals, and to develop and maintain transparency and trust. Some of these data are multidimensional in nature, making graphical representation a challenge. For example, aquifer property data sets are four dimensional, comprising X-Y-Z locations in space at which multiple parameters define aquifer properties and conditions. Some of these parameters change with time, making them five dimensional, which will require development of datasets that represent specific periods in history or projections for future conditions. Many datasets will require translation to lay terms for diverse stakeholders.

Constituents increasingly expect to have direct access to basic information, so data services will be an important part of information management by GSAs. In addition, an easily accessible graphical interface will facilitate both access and verification of data, and could be useful for uploading and incorporating new datasets as they become available. GSAs will also have to spend time developing and maintaining metadata (data about data) as part of quality assurance, and so that technical users can confirm accuracy and stakeholders can develop confidence in GSA activities and decisions.

in-house expertise by employing staff with a wide diversity of technical backgrounds, as do CARB and EPA.[113] Public air quality planners also draw upon external expertise, using consultants and advisory boards to supplement the input they receive through traditional administrative notice-and-comment periods.[114]

*Lessons:* The whole system for air quality planning involves combining substantial in-house expertise with substantial leveraging of external resources.

GSAs face similar challenges, and will need to develop similarly robust and diverse capacities.

## Funding

*Definition:* Funding is money that enables a GSA to carry out its responsibilities.[118] Funding includes the ability to raise and spend money for capital expenditures such as acquisition of land, facilities or water supplies, as well as ongoing expenditures such as staff salaries and facility operations and maintenance.

**TABLE 4:** FUNDING OPTIONS. OPTIONS FOR FUNDING A GSA'S SGMA IMPLEMENTATION ACTIVITIES ARE LISTED BY ENTITY WITH PRIMARY ADMINISTRATIVE AUTHORITY. MOST OF THE FUNDING OPTIONS WILL BE AVAILABLE TO GSAS THEMSELVES.

| Authority | Funding options |
|---|---|
| GSAs | • Regulatory fees.[119]<br>• Property-related fees[120] or assessments.<br>• Local taxes.[121]<br>• Local general obligation bonds.[122]<br>• Contributions from member agencies. |
| SWRCB[123] | • Technical Assistance Program for small disadvantaged communities.<br>• Clean Water or Drinking Water State Revolving Fund loans.<br>• Storm Water Grant Program.<br>• Water Recycling Funding Program grants or loans.<br>• Small Community Wastewater Grants. |
| DWR/ California Water Commission[124] | • Facilitation Support Services Program.<br>• Technical assistance for developing and/or implementing a GSP.[125]<br>• Sustainable Groundwater Planning Grant Program.<br>• Proposition 1 Water Storage Investment Program.[126]<br>• Integrated Regional Water Management (IRWM) Grant Program.<br>• Water Use Efficiency Grants Program.<br>• Water Desalination Grant Program. |
| Other[127] | • Infrastructure State Revolving Fund Program.<br>• Rural Development Water and Waste Disposal Program.<br>• Community Development Block Grant Program.<br>• WaterSMART Grants.<br>• Foundation Grants. |

*Implications and importance:* Funding is a foundational resource for effective groundwater governance. GSAs will need to carefully consider their funding needs, how to support their programs, and the constraints associated with potential funding sources. For example, California's Propositions 218 and 26 impose constitutional restrictions on new or increased fees[128] charged by local governments (see **Legal ambiguity surrounding the use of fees as a funding mechanism**).[129] Adequate funding will be needed to support both basic human capacities (see Human capacity, above) and physical assets. Regardless of funding challenges, the state has indicated that lack of funding is not sufficient grounds to avoid state intervention.[130] Unlike many statutes that encompass a cost-benefit calculation or some other measure of economic feasibility, economic considerations are conspicuously absent from the statutory language in SGMA.

## LEGAL AMBIGUITY SURROUNDING THE USE OF FEES AS A FUNDING MECHANISM

SGMA specifically authorizes GSAs to impose two types of fees—regulatory fees and property-related fees—via ordiance or resolution.[131] However, unsettled legal questions could potentially affect the political feasibility of one or both.

***Regulatory fees authorized by SGMA:*** After a public meeting, a GSA may impose regulatory fees—including permit fees, groundwater extraction fees, or fees on "other regulated activity"—to fund costs related to, for example, developing and updating a GSP, program administration, compliance oversight, compliance assistance, and enforcement.[132]

***Property-related fees authorized by SGMA:*** A GSA that adopts a GSP may impose property-related groundwater extraction fees to fund the costs of groundwater management in accordance with Proposition 218's procedures and requirements.[133] Examples of acceptable costs include: "(1) Administration, operation, and maintenance . . . . (2) Acquisition of lands or other property, facilities, and services. (3) Supply, production, treatment, or distribution of water. (4) Other activities necessary or convenient to implement the [GSP]."[134] Proposition 218 requires the agency to provide written notice of the amount of and basis for a proposed fee to each affected parcel owner and to hold a properly noticed public hearing on the proposed fee.[135] If the majority of parcel owners protest the proposed fee in writing, the agency is barred from imposing it.[136] The fee amount imposed on a parcel must be proportional to the cost of the service attributable to that parcel.[137] Fee revenues cannot exceed the amount required to provide the property-related service and cannot be used for other purposes.[138]

The boundaries between the two types of fees is somewhat fuzzy, and conflicting case law fuels the potential for confusion about when one or the other is appropriate. Specifically, there is active disagreement among California courts about whether or under what circumstances groundwater extraction fees should be considered regulatory fees or property-related fees. Similarly, courts have not yet settled whether some property-related groundwater extraction fees might run afoul of Proposition 218—increasing the likelihood they could be considered taxes under Proposition 26 (and therefore subject to voter approval requirements).[139] In 2015, two cases decided by different appellate districts came to very different conclusions about the nature of groundwater extraction fees. In Great Oaks Water Company v. Santa Clara Valley Water District, the Sixth Appellate District concluded that a groundwater extraction fee was a property-related fee for water service under Proposition 218 that do not need to be submitted for voter approval (a Proposition 218 requirement that applies to fees for most other property-related services).[140] In the other case, City of San Buenaventura v. United Water Conservation District, the Second Appellate District concluded that a groundwater extraction fee was a valid regulatory fee and that it would not pass muster as a property-related fee.[141] This case is currently under review by the California Supreme Court.[142] Although the case involves fees imposed before SGMA's passage, its resolution should shed considerable light on the appropriate use of regulatory and property-related fees under SGMA.

*Ideal:* A GSA should have adequate funding to carry out all aspects of SGMA's mandate and to fully implement its GSP. Where a GSA intends to facilitate aquifer recharge or acquiring substitute water supplies, it should ensure sufficient funding. Such expenditures could include purchasing the land and/or water required and to build, operate, and maintain recharge or water distribution facilities. For example, SGMA authorizes GSAs to impose various fees (but see Table 4 and **Legal ambiguity surrounding the use of fees as a funding mechanism**). Bond funding and state or federal grants and loans are more appropriate for covering targeted projects (like capital improvements) than for ongoing expenses.

### Illustrative example: Stormwater utility fees

Throughout the country, managing stormwater runoff is a major challenge.[143] Although federal and state regulations are major drivers behind local stormwater management,[144] minimal federal or state funding is available to actually implement it.[145] Instead, the primary financial burden often falls upon local governments.[146]

To meet this burden, hundreds of communities have introduced stormwater fees to support dedicated stormwater utilities.[147] The basic concept is simple: each property owner pays a fee based on the property's contribution to stormwater runoff (for example, the amount of impervious cover on his property), and the fees fund local stormwater management programs.[148] These systems create incentives for private stormwater management if property owners can reduce their fees by reducing impervious cover or treating runoff.[149] They also create a pool of money that can be used to implement the highest-return, lowest-cost stormwater management projects.[150] Although, stormwater fees sometimes meet resistance—opponents often label them "rain taxes"[151]—the number of stormwater utilities in the United States is large and growing, and many experts agree that stormwater utilities are one of the best ways to fund stormwater management.[152]

*Lessons:* Ideally, a similar model holds promise for groundwater: GSAs could self-fund through fees linked to groundwater extraction and its impacts on undesirable results. Such a funding model would be equitable, because people would pay in proportion to their contribution to resource impacts, and it would provide GSAs with a steady (albeit somewhat variable) revenue stream. It would likely arouse some resistance—most people do not like to pay fees or be regulated, and paying fees to fund regulation will strike many people as particularly distasteful. But GSAs will need to be funded somehow, and this particular model is the most straightforward option.

The suggestion of this model comes with a caveat: Proposition 218 will present significant hurdles (see **Legal ambiguity surrounding the use of fees as a funding mechanism**).

## Authority

*Definition:* Authority is power delegated by the state—and accepted by a GSA[153]—that enables the GSA to execute the tasks necessary to carry out its mission.[154] Some of that authority comes directly from the state, for example the authorities granted by SGMA.[155] GSAs will also bring existing authorities to the process that have not heretofore been used to manage groundwater. Two examples include counties' land use and well permitting authority that may be instrumental in GSPs but have rarely been employed. Table 5 describes some authorities relevant to groundwater management under SGMA.

**TABLE 5:** RELEVANT AUTHORITIES. GSAS CAN DRAW ON A NUMBER OF AUTHORITES FOR THEIR LOCAL ROLE IN GROUNDWATER MANAGEMENT UNDER SGMA.

| Authority | A GSA can . . . |
|---|---|
| General | • Do anything "necessary and proper" to carry out SGMA's purposes.[156]<br>• Adopt rules, regulations, ordinances, and resolutions.[157]<br>• Use any other authority it has to apply and enforce SGMA requirements.[158] |
| Information gathering | • Require registration of groundwater extraction facilities.[159]<br>• Require measurement and annual reporting of groundwater extractions.[160]<br>• Conduct investigations of surface or ground water and related rights.[161]<br>• Inspect property and facilities to determine compliance.[162] |
| Regulating groundwater extraction | • Minimize well interference by imposing well-spacing requirements on new wells and reasonable operating regulations on existing wells.[163]<br>• Establish groundwater extraction allocations.[164]<br>• Authorize within-GSA transfers of groundwater extraction allocations.[165] |
| Property acquisition and management | • Acquire property, including groundwater and surface water rights.[166]<br>• Make physical improvements to real property.[167]<br>• Acquire, conserve, store, transfer, or exchange water.[168]<br>• Manage wastewater, stormwater, and seawater for subsequent use.[169] |
| Financial | • Impose regulatory fees on groundwater extraction or other regulated activity or property-related fees on groundwater extraction.[170] |
| Enforcement | • Sue to collect delinquent fees, interest, or penalties or order extraction stopped until delinquent fees are paid.[171]<br>• Pursue civil penalties for extraction exceedences.[172]<br>• Pursue civil penalties for violations of SGMA-related rules, regulations, ordinances, or resolutions.[173] |

*Implications and importance:* Authority enables a GSA to compel action where reliance on voluntary measures may not be sufficient. GSAs will need to exercise a range of available authorities. For example, because existing patterns of groundwater use in many parts of California are unsustainable, some form of restrictions on groundwater pumping will be essential to ensure groundwater extraction stays within the basin's sustainable yield.[174] But while SGMA allows GSAs to assume a variety of kinds of authority, it does not specify which regulatory tools, if any, they are required to use. SGMA provides incentive for GSAs to assume a strong regulatory approach since failure would invite SWRCB invervention, but the nature of this intervention is not yet clear. Consequently, there is potential for creating paper tigers that lack the ability or will to compel sustainable groundwater use.

*Ideal:* GSAs should accept and exercise authority that is commensurate with the challenge of implementing and enforcing an effective groundwater sustainability program. To reduce the risk of creating agencies that are too weak to achieve their goals, GSAs should in most cases choose to take on all available authorities, whether or not they plan to exercise them in the immediate future.

While we recognize the utility of fully empowered GSAs, tradeoffs will arise from the creation of a powerful new agency or expansion of the authority of an existing one. Actions necessary to achieve sustainable groundwater management may affect the use of other resources, like land and surface water, that are already regulated by existing entities.[175] Stakeholders will need to discuss how best to balance the exercise of a GSA's authorities with those of existing entities. The key questions are what authority the GSA needs to do its job, and what authority it has been given by the full legal landscape (Table 5).

### Illustrative example: CALFED

In the late 1990s, California and the federal government initiated CALFED, a major initiative designed to bring constructive resolution to conflicts over the use of the Sacramento-San Joaquin Bay-Delta.[176] A huge variety of competing interests placed demands upon the Bay-Delta's waters, and the resulting conflicts had persisted, and intensified, for decades. But by the mid-2000s, CALFED was widely viewed, on the whole, as a failure (though most observers also agree that CALFED's participants came up with some good ideas and did some things well). Conflicts over the Bay-Delta persist to this day.

CALFED's many post-mortem analyses[177] have identified a wide variety of causes that contributed to its failures, none more important than the degree of difficulty of CALFED's assigned tasks. But one recurring focus of the CALFED critiques relates to authority. The CALFED participants created new institutions, but they relinquished hardly any authority to those institutions. Consequently, when competing agencies had conflicting policy priorities, the only institutions that could resolve the disputes were the courts. And many of the key questions faced by CALFED were resolved not at the agency level, but instead through litigation.

*Lessons:* CALFED offers a cautionary tale for GSAs. There may be temptations for a GSA to exert limited authority, particularly if the authority they take on must be relinquished by some other entity. But resolving resource disputes generally requires strong authority, and GSAs will struggle to fulfill their mandates if they are not sufficiently empowered.

## Independence

*Definition:* Independence refers to the ability of a GSA to operate freely within its defined purview, protected from external pressures that could divert the GSA from achieving its fundamental goals. For our purposes, independence also refers to the ability of a GSA to make decisions that will support sustainable groundwater management even when those decisions are costly or unpopular.

*Implications and importance:* If a GSA cannot act independently, it may find its mission subordinated to the agenda of other private or public entities. If a GSA becomes dominated by surface water users or the districts who supply them, for example, it may adopt policies that are unfair to established groundwater users. Similarly, if groundwater users come to dominate a GSA with an agenda for near-term resource use, the GSA may struggle to achieve sustainable management.

GSAs will need a clear and unambiguous mandate to achieve sustainable groundwater management consistent with SGMA. A GSA's mandate must be built on a sound technical foundation with broad public participation. A GSA should have independence from other public or private entities that have conflicting priorities, missions, purposes, and constituencies. Independence, in other words, helps GSAs make difficult decisions and implement them. Without the capacity to make tough decisions, it will not be adequate to fulfill the challenge of sustainable groundwater governance.

Independence also has less positive implications. Just as it can provide a GSA with latitude to make unpopular decisions that are necessary to achieving its goals, independence potentially gives a GSA latitude to make decisions that are misguided, arbitrary, or unfair. And if public or private entities do not feel meaningfully included in a GSA's decision making process, they may seek adjudication as an alternative management strategy. Independence therefore can be a double-edged sword, and people involved in forming and working with GSAs will need to think carefully about how they balance the need for independence against the threats it potentially poses.

*Ideal:* Since achieving groundwater sustainability will require difficult and potentially politically contentious decisions, GSAs should have substantial independence. That independence can be achieved in a variety of ways:

- GSAs should generally be independent agencies, rather than subdivisions of existing governmental entities, particularly if those governmental entities have agendas that might conflict with sustainably managing groundwater;
- GSAs should have independent funding schemes and staff resources, so they cannot be threatened with funding cutoffs in retaliation for making tough decisions;
- If the governing body of a GSA is comprised of locally elected officials, rather than delegated to non-elected managers, then measureable objectives, interim targets and GSPs should be adopted through board actions, which in turn will be subject to the Brown Act;
- If a GSA board is comprised of appointed members, the terms should be lengthy, fixed terms with staggered end dates, with termination allowed only for good cause. Job security will provide members with some insulation from the political pressures of the moment. However, this may result in the lack of accountability of appointed members.
- GSA board members and staff should be subjected to clear conflict of interest rules to guard against covert representation of regulated entities.

### Illustrative example: The Minerals Management Service

Prior to 2011, the Minerals Management Service, a federal agency, bore primary responsibility for regulating offshore oil drilling. But MMS's mission also included promoting offshore oil drilling, which produces revenues for the federal government, as well as some states. Because of these conflicting mandates, MMS's regulatory programs were often weak, as the Deepwater Horizon spill tragically and catastrophically revealed.

After the spill, MMS was divided into three separate agencies, one of which—the Bureau of Safety and Environmental Enforcement (BSEE) —now holds much of the regulatory responsibility that once went underutilized within the MMS. The goal of these reforms is to give the new BSEE sufficient independence to carry out its regulatory mission.

*Lessons*: Similar independence may be necessary for GSAs. Regardless of the fact that under SGMA counties are the default entity to become a GSA, a GSA that is housed within a municipal or county government, or comprised of an existing water district, is likely to subordinate its mission to the goals of that larger entity. That may mean that the GSA regulates groundwater use only to the extent that such regulation does not interfere with development plans or with surface water use, just as MMS tended to subordinate environmental enforcement to the promotion of oil drilling.

## Illustrative Example: The Regional Fishery Management Councils

The United States regulates fisheries—which are shared, open-access resources somewhat like groundwater—through a system similar to that envisioned by the SGMA. Congress, through the Magnuson-Stevens Fishery Management and Conservation Act, has set the overall goals of fishery management, but fishery management plans and quotas come from entities called "Regional Fishery Management Councils." Participation on these councils is not governed by conflict-of-interest rules.

In a 2003 study found that participants on these fishery management councils overwhelmingly came from the fishing industry and closely related businesses.[178] They also found that those participants generally viewed their role on the councils as representing the interests of their businesses, rather than fulfilling an independent governmental mission. And the authors also found that the councils had consistently selected plans and quotas that prioritized short-term yields over long-term sustainability, often choosing quotas that were higher than the maximum levels recommended by their scientific advisors.

*Lessons:* Similar dynamics could easily occur with GSAs. Groundwater users are likely to be particularly interested in GSAs, and particularly likely to want to participate in them, either as board members or as part-time staff. There are obvious benefits to their participation; most importantly, they will bring essential local and historical knowledge to the table. But there is a real possibility that groundwater users will want to use GSAs to advantage their own interests at the expense of competing users, or to favor higher short-term levels of pumping at the expense of sustainability. Since GSAs will typically be formed from existing public agencies, such as water districts, it may be impossible to separate the interests of the agency from the interests of the GSA. Clearly articulated and enforced rules governing conflict of interest may be necessary to guard against such interest conflicts.

# V. Fairness criteria

SGMA does not clearly define how the costs and benefits of achieving sustainability should be distributed, either within or between basins. GSAs will have to make choices on the use of limited groundwater resources to achieve sustainability. Consequently, the results will impact some parties more heavily than others. That unequal distribution of impacts might be unfair, and it almost certainly will be perceived as unfair. Perceptions of unfairness, besides being a problem in their own right, could ultimately undermine the social and political capital of the GSA,[179] or lead to adjudication or other litigation. Therefore, GSAs can benefit from fully understanding the implications of the distribution of costs and benefits of their actions. This will help decisions about groundwater management reflect long term community values, and in turn help the GSA be more effective.

This section describes criteria for evaluating whether a GSA will operate fairly. Before explaining those criteria, however, we start with a brief discussion of what we mean by fairness. Though concerns and complaints about fairness are omnipresent in water management, and in governance more generally, the concept of fairness is quite difficult to define, and perceptions of fairness often include a large element of subjectivity. The explanations that follow will not eliminate that vagueness or subjectivity, but we hope they will at least help readers understand the conception of fairness reflected in this report.

**TABLE 6:** SUBSTANTIVE FAIRNESS. DIFFERENT NORMS ILLUSTRATE THE RANGE OF WAYS IN WHICH PEOPLE CONCEIVE OF SUBSTANTIVE FAIRNESS.[180] WHILE THERE IS NO SINGLE, UNIVERSAL DEFINITION OF A FAIR OUTCOME, FAIRNESS CONCERNS ARE INHERENT TO THE TYPES OF DECISIONS GSAS WILL BE MAKING TO IMPLEMENT SUSTAINABLE GROUNDWATER MANAGEMENT.

| Substantive Fairness Norm | Definition |
|---|---|
| Equality | Each party receives an equal share. |
| Equity | Parties that have had historial injustice receive redress; alternatively, parties investing more inputs such as time or money receive more than those contributing less. |
| Power | Parties with greater authority or status receive more. |
| Need | Parties with greater resource needs receive more. |
| Responsibility | Parties with the greatest existing portion of resources share with those who have less. |

**TABLE 7:** PROCEDURAL FAIRNESS. PROCESS IS IMPORTANT IN ITS OWN RIGHT, AND IT CAN HELP ENSURE FULL CONSIDERATION OF DISTRIBUTIVE FAIRNESS ISSUES IN GROUNDWATER MANAGEMENT.

| Procedural Fairness Norm | Definition |
|---|---|
| Participation | Direct stakeholder involvement in the decision making process. |
| Representation | How the interests of stakeholders are directly and indirectly carried into the decision making process. |
| Accountability | Responsibility by an entity for its decisions and actions, including being answerable for the results. |
| Transparency | Operating with openness about decision making processes, actions taken, and reasons for taking them. |

When considering fairness, people are typically concerned with both process and outcomes.[181] A fair outcome (see Table 6) means an equitable resolution of a problem, and a fair process (see Table 7) gives all interested participants—even those who do not eventually receive the outcome they want—appropriate opportunities for their perspectives to be presented and heard. In reality, the two types of fairness can be difficult to separate. Sometimes people will evaluate the fairness of a process based on whether it produced what they consider a fair outcome.

We acknowledge that defining and specifying distributional outcomes under SGMA will be challenging (see Table 6). A few examples illustrate how fairness will come into play:

- In hydrogeologically heterogeneous basins, pumping in some areas may need to be restricted more than in others.
- Depending on how fees or assessments are imposed, different populations may benefit or carry a higher burden. For example, GSA-imposed fees will burden low-income extractors or those growing lower value crops more heavily.[182] Similarly, non-de minimis low-income extractors will experience larger relative burdens if GSAs require universal operation of metering devices.[183]
- Water quality can also cause different distribution of costs and benefits. In some basins, some stakeholders will desire higher quality to sustain certain crops or to protect the health of vulnerable populations, while others will prefer a lower standard because it is cheaper or easier to maintain. It will not always be possible to find physical solutions that meet all needs and preferences within a basin.
- Some users who access groundwater through shallower wells may suffer more impacts than those tapping the same aquifer with deeper wells, even if the basin as a whole is deemed sustainable.

Although questions about the substantive fairness of the benefits and burdens of groundwater management decisions will be critically important as SGMA implementation progresses, in this report we focus primarily on elements of procedural fairness relevant

to GSA formation and institutional design. Thorough analysis of potential substantive outcomes is beyond the scope of this paper. To the extent that the details of how substantive outcomes will be decided are fundamentally based on values, other venues are more appropriate for that discussion. It is important to note, however, that California has declared as state policy the right of "every human being . . . to safe, clean, affordable, and accessible water adequate for human consumption, cooking, and sanitary purposes," and DWR and the Board must consider this policy when developing regulations, oversight and enforcement policies, and grant criteria related to SGMA implementation.[184]

As alluded to above, a process that has qualities of procedural fairness is likely to produce more substantive fairness than a process that is procedurally unfair. From this process perspective, we view participation, representation, transparency, and accountability as essential elements of fair decision making processes. The following discussion considers each in turn.

## Participation

*Definition:* Participation is direct stakeholder engagement in the decision making process.[185] For GSAs, participation might occur through comment letters, public meetings, or other mechanisms.[186] Participation differs from representation in that it does not occur through the election or appointment of intermediaries to a governing body. Instead, residents, businesses, and advocacy groups bring their own voices directly into the GSA's decision making processes.

*Implications and importance:* Broad and meaningful[187] participation brings several benefits. First, it is legally required under several of SGMA's provisions.[188] Second, the absence of participation can create a sense—often justified—that decisions are being made in secret.[189] Third, participation builds capacity by bringing useful information to government decision makers. Even if a decision making body has a good range of representatives, that range will almost always be imperfect, and the people who serve as representatives won't know everything. Often, public participants can raise issues that agency decision-makers had not anticipated, and thus can help the agency avoid creating unnecessary problems or causing needless harm. Opportunities to help shape specific decisions—for example, identifying sustainability goals and measureable objectives—will be particularly important during the development and implementation of GSPs.

SGMA includes several provisions directly relevant to public participation in GSA decision making. Before deciding to form a GSA, a local agency (or agencies) must hold a public hearing in each county overlying the basin.[190] A GSA must "consider the interests of all beneficial uses and users of groundwater," defined to include those with groundwater rights, municipal well operators, public water systems, local land use planning agencies, environmental users of groundwater, users of surface water that is hydrologically connected to groundwater, the federal government, California Native American tribes, disadvantaged communities, and entities that monitor and report groundwater elevations in the basin.[191] Any person can request to be placed on a GSA's list of persons interested in receiving notices about GSP preparation, meeting announcements, and the availability of relevant documents.[192] GSAs must notify the public how interested parties can participate in GSP development and implementation.[193] A federally recognized Indian tribe can participate in the development or administration of a GSP.[194] They can create advisory committees composed of interested parties.[195] Before adopting or amending a GSP, a GSA must hold a public hearing.[196]

*Ideal:* Local governments would have effective mechanisms for ensuring broad participation in GSA formation,[197] and GSAs would seek to facilitate broad participation in the decision making process as they develop and implement GSPs. They would encourage that broad participation by:

- Conducting outreach to identify all beneficial users of groundwater and other affected parties in the basin;
- Building relationships with these parties;
- Providing appropriate and timely education / training to ensure that stakeholders have access to and understand relevant legal and policy issues and scientific information so that they can participate effectively; key information could be translated into languages spoken by a significant percentage of the local population;
- Providing "intervenor funding," financial support that helps stakeholders to effectively participate in agency proceedings[198];
- Actively seeking meaningful stakeholder input by providing meaningful opportunities to define and communicate their interests and needs and to engage about potential or proposed actions;
    - » Formalizing this participation through the creation of one or more stakeholder advisory groups may be helpful.[199]
- Increasing the accessibility of public meetings by, for example, holding meetings at times and in places accessible to working people, parents with small children, etc.

### Illustrative example: Native American Tribal Water Rights in Montana

The unquantified nature of the water rights held by Native American Tribes under U.S. law poses an impediment to protection and development of the rights of the tribes, and introduces substantial uncertainty in the rights of other water users.[200] Over the past five decades numerous states have engaged in general stream adjudications, in part to quantify these vaguely defined rights.[201] In that process, settlement has become the preferred process for states, Tribes, and the United States.[202] This necessitates defining the state's role in the negotiations and balancing the interests of a wide range of local stakeholders.

Montana has a bipartisan, politically appointed commission that negotiates with the United States and each of the Montana Tribes to settle reserved water rights.[203] The commission uses a number of approaches to ensure that public involvement is a two-way dialogue:

- public meetings provide information, identify issues, and identify community leadership;
- commission staff attend meetings of local water-related entities;
- commission staff identify interested parties that have not been present at meetings and contact them specifically to seek their engagement;
- commission staff work more closely with local leadership to try to address their interests in positions taken during negotiations; and
- where small groups will be affected by a particular issue, commission staff meet individually to discuss, for example, interests and potential conflicts, even going so far as to visit individual stakeholders' homes.[204]

In this process, the Commission speaks for the State as a whole. Its mandate is to work toward an equitable agreement, but it is empowered to make hard decisions when individual interests deviate from its principles. Nevertheless, the locally focused process involves continual contact throughout negotiations. It results in tailored settlements that address many local issues that State representatives would not otherwise be aware of, and a strong sense of involvement among participants.[205]

The process chosen by the State of Montana has been held up as a model for the equitable treatment of Native American water rights and for its recognition of tribal sovereignty. It is also an excellent example of a robust process for public engagement.

*Lessons*: Public engagement takes significant time and resources. Developing agreements is often challenging. Some controls may be warranted to prevent participants from gaming the system and to bring

public input to conclusion in a reasonable amount of time. Nevertheless, it may pay off in more effective implementation. A key lesson is the value of clear articulation in law of the role of the state as a mediator and facilitator of diverse and changing interests.

## Representation

*Definition:* Representation describes how the interests of stakeholders are indirectly carried into the decision making process of a GSA. Fair representation can be defined as a system that gives voice, as much as is practically feasible, to the full range of interests that will be affected by the decision to be made, including interests not backed by money or power. Direct voting in elections is one element of representation. More frequently, representation is likely to occur through representatives—that is, individuals standing in for a broader population and making decisions on their behalf.

*Implications and importance:* Fair representation[206] is essential for creating durable decisions. For example, inadequate representation could result in allocation of the benefits and costs of GSA actions in ways that disproportionately benefit some parties and burden others. Such actions could lead to unjust outcomes, unsustainable outcomes and the exercise of backstop power by the Board,[207] or extended and costly litigation, all of which would ultimately undermine the goal of local control. At a finer level, decision mechanisms can influence outcomes—majority votes can result in different outcomes than consensus requirements, for example. Governance mechanisms can, however, be crafted to broaden representation.

*Ideal:* GSAs would ideally represent and fairly consider the interests of all stakeholders.[208] Public discussion of representation should be an explicit part of GSA formation. Without it, GSAs may disproportionately empower some interests at the expense of others. Concrete elements of proper representation for each GSA should include:

- Neutral facilitation during GSA formation can help to enable development of structures for broader representation.
- Conflict of interest rules that require disclosure from representatives who could be in the position of regulating their own groundwater withdrawals. Such conflicts will be pervasive in many basins, but transparency is nevertheless useful for fair representation.
- Balanced representation requirements that ensure active representation of diverse stakeholders. SGMA directly enumerates relevant groups,[209] and further discussion of representation and participation can be found in recent reports on these topics.[210] Procedures for election or appointment of representatives should be carefully scrutinized, as should voting[211] and conflict of interest rules.

### Illustrative examples: The Regional Fishery Management Councils

In our discussion of independence, we provided regional fishery management councils as a cautionary example. The composition of RFMCs also illustrates some of the problems that can arise from skewed representation.

By law, the membership of RFMCs must be balanced between commercial and recreational fishing interests.[212] But federal fisheries law does not require participation from environmental groups, consumer groups, or any other interest that might care about fisheries, and in practice, the people appointed to RFMCs are overwhelmingly likely to come from some part of the fishing industry.[213]

The results have not been fair to these other interests- or to future participants in fishing industries. The RFMCs have tended to choose fishing plans and quotas that maximized short-term harvesting of fish, often to the detriment of achieving sustainable yields, protecting the environment, and providing consumers with abundant wild fish at affordable prices.[214] This has

led to cycles of crashing populations, declining fishing economies, and increasing regulatory stringency, though with tighter regulations often emerging too late to save the fishery with anything less than drastic restrictions.[215] In recent years, fisheries regulators have begun to break this vicious cycle, and overall trends for the United States' fisheries look increasingly positive.[216] But Congress has helped achieve that positive trend partly through a series of statutory amendments that constrains the discretion previously available to the RFMCs.[217]

*Lessons:* GSAs can learn from the RFMCs' experiences. They illustrate how imbalanced representation can lead to outcomes that are counterproductive and unfair. While more balanced representation might lead to more contentious decision making processes, and to tougher decisions, in the short-term, it also might produce more long-term fairness.

## Accountability

*Definition:* Accountability is responsibility for one's decisions and actions, including being answerable for the results.[218] Accountability can function at multiple levels and on many fronts, but ultimately accountability will be achieved only if measures are put in place to ensure that it exists.

*Implications and importance*: Accountability is needed to ensure that GSAs act in accordance with statutory requirements and with appropriate awareness of public preferences (Table 8). At its root, any organization depends upon the people who work and make decisions under its umbrella. Accountability begins with having a GSA formally adopt sustainability goals and policies through a public process. Having clear policy direction will help ensure that GSA staff will align activities with organizational mission. Similarly, accountability measures can help organizations recognize and reward people who are doing good work that advances organizational goals.

At a broader level, accountability mechanisms are necessary to identify GSAs that are functioning in problematic ways, those that need reforms, as well as those that are succeeding and could serve as models for imitation. Those mechanisms also support institutional credibility; members of the public are unlikely to support an agency they view as unaccountable. Indeed, accountability is essential for reconciling governance by unelected administrators with the basic precepts of representative democracy.[219]

*Ideal:* At the most basic level, GSA staff will need to be accountable for doing competent work. At a more policy-oriented level, GSAs will need to be accountable for making decisions that are consistent with the SGMA and other governing laws, common sense, and basic principles of fairness. GSAs will also need mechanisms for ensuring that regulated entities are accountable to the GSA, and to each other.

Effective GSAs will have both internal and external accountability mechanisms. Internally, the GSA will need procedures or mechanisms for ensuring that its employees and consultants are doing their work properly and effectively. For a GSA to be externally accountable, it must be answerable to another entity or entities, such as other local or state agencies and the public.

A number of mechanisms are commonly used under environmental law to establish accountability:

- Requiring managers to achieve a defined performance standard (e.g., water quality standards under the Clean Water Act). In the case of SGMA, measureable objectives and interim milestones should be quantitative and progress should be publicly reported[220].
- Requiring documentation that proper procedures were followed prior to action (e.g., NEPA or CEQA). Under SGMA, DWR should hold GSAs to specific standards for the GSPs they produce, as well as for public participation and other procedural requirements.

- Requiring independent oversight and review of decisions (e.g., EPA review of state water quality standards). Under SGMA, DWR should hold GSAs accountable for having adequate GSPs, taking actions to achieve sustainability, and whether interim milestones are met. SWRCB should exercise its intervention authority.
- Authorizing external auditors or investigators, like independent review boards, to review agency performance.
- Requiring gathering and public disclosure of data on actions taken and outcomes produced. Annual reports and interim milestone reporting requirements should clearly disclose such data to the public.

A common theme is that these mechanisms set benchmarks for performance, require managers to document whether they are meeting those benchmarks, reward success, and establish sanctions for failing to meet those benchmarks. Stakeholders should carefully consider the extent to which GSAs, DWR, SWRCB and other agencies adhere to these responsiblities to ensure accountability.

### Illustrative example: Clean Water Act permitting and enforcement

Under the federal Clean Water Act, facilities that discharge water pollution from "point sources" must obtain National Pollutant Discharge Elimination System (NPDES) permits. Those permits require dischargers to meet specific, numeric pollution limits, and they also require dischargers to monitor the composition of their discharges and to report their monitoring results.[221] The reports are publicly available, and they may be used to support governmental enforcement actions or private lawsuits.[222] The result is one of the most effective accountability systems in all of environmental law. Violations are self-reported and so are easily discerned, and dischargers have good mechanisms for finding out about pollution problems and for fixing them promptly when they occur. Not coincidentally, the NPDES program has generated major reductions in pollution discharges, and many environmental lawyers view it as one of the most effective programs in environmental law.[223]

*Lessons:* The SGMA reporting requirements will be more effective if they adopt an accountability model analogous to the NPDES program. This represents a change for many groundwater users, most of whom are not accustomed to monitoring obligations, reporting requirements, and regulatory limits. But at least some elements of that model are likely to be necessary if GSAs are to hold groundwater users accountable to each other and to the public, and if GSAs themselves are to be accountable for their regulatory actions.

### Illustrative Example: Inspectors General

At the federal level, many agencies contain a department responsible for conducting internal investigations. EPA, for example, has an Office of Inspector General, which is responsible for investigating reports of fraud, abuse, inefficiency, or other regulatory problems within EPA.[224] The Office has a hotline for soliciting information about problems, and it also responds to requests from Congress and the public. Its reports, many of which are highly critical of the agency, and most of which also suggest specific reforms, are publicly available.

*Lessons:* Most GSAs will probably be too small to support an independent investigatory department. But GSAs, DWR, and the Board might consider working together to create an ombudsman that would review the work of GSAs across the state, reporting on problems, suggesting ideas and solutions, and recommending improvements.

**TABLE 8:** ACCOUNTABILITY. SOME MECHANISMS FOR ACCOUNTABILTY ARE BUILT INTO SGMA.

| Issue | Accountability mechanism |
|---|---|
| Fees | • People can challenge GSA fees.[225] |
| Information | • Monitoring, reporting, and enforcement provisions strengthen accountability.<br>• GSA decisions should be made in public meetings subject to the Brown Act. |
| Judicial review | • GSAs' actions are subject to judicial review.[226] |
| Other agencies | • SGMA does not limit the authority of other agencies.[227] |
| DWR | • DWR prioritizes basins and adjusts basin boundaries.[228]<br>• DWR develops regulations for evaluating GSPs.[229]<br>• DWR periodically reviews GSPs for SGMA compliance.[230]<br>• DWR (in consultation with SWRCB) can determine that a GSP is inadequate or is not being implemented adequately.[231] |
| SWRCB | • SWRCB can put basins on probation.[232]<br>• SWRCB can develop interim plans for probationary basins.[233]<br>• SWRCB can conduct investigations to determine compliance.[234] |

## TENSION BETWEEN ACCOUNTABIITY AND INDEPENDENCE

While accountability is important, it also can conflict with independence. In some circumstances, mechanisms for accountability can diminish an agency's ability to make unpopular decisions, even if they are entirely consistent with statutory mandates or goals. In other cases, tension and accountability are mutually supportive—sometimes the prospect of an audit or performance review allows a government staff member to fend off unwanted external influences. Similarly, GSAs are accountable to the state as well as to local constituencies. To the extent the state can play a strong role and set clear expectations, accountability to the state may foster independence from local poltitical pressure.

There is no way to avoid this tension entirely, and GSAs will just need to manage it carefully. Their basic goal should be to ensure accountability mechanisms that promote careful, fair governance in accordance with statutory goals without using accountability mechanisms to undermine GSAs' abilities to carry out their mission. Transparency (see below) can be helpful here. The ultimate lesson is that the GSA should be accountable to the appropriate constituency, but independent from undue or inappropriate influence.

## Transparency

*Definition:* Transparency is operating with openness, so that stakeholders and authorities with responsibility for oversight can observe the actions a GSA is taking, its reasons for taking those actions, and its process for decision making.

*Implications and importance:* Transparency enables stakeholders to understand and respond to the actions of an agency in several ways.[235] First, it enables stakeholders to be well-informed, which facilitates more meaningful participation in democratic governance. Second, it assists accountability and guards against corruption—"sunlight is said to be the best of disinfectants."[236] Third, it is a key ingredient for enabling trust among agencies and stakeholders.[237] For example, transparency can help reassure regulated entities that they are not being singled out for harsher treatment, or that they are the only ones complying with a regulatory mandate. Finally, transparency is a legal requirement (Table 9).[238]

*Ideal:* GSAs will be more successful at achieving substantive and procedural fairness if they favor open disclosure of information.At a minimum, that means complying with the mandates of SGMA and of open government laws. But GSAs should go further. By posting data on groundwater withdrawals, observational data, regulatory actions, and rules and regulations, GSAs could help other agencies and members of the public understand what they are doing and why, and can facilitate review by researchers who hope to discern trends in and suggest reforms for groundwater management.

Ideally, disclosures also will be tailored to audiences with a range of levels of sophistication. Some sophisticated audiences will be able to review large databases and understand and critique the assumptions and code in groundwater simulation models. For these audiences, disclosure of large amounts of data may be quite useful. But many audiences will need explanations, which often will need to be written in terms accessible to lay audiences. Similarly, language accessibility will need to be addressed in many basins. That diversity of needs creates multiple potential roles for DWR. First, DWR could help GSAs and the public by setting up common platforms for recording and disseminating data. DWR might also publish reports on aggregate trends in groundwater management. And DWR may be able to provide technical assistance to GSAs that wish to take complex information and convey it in ways that are accessible to broad audiences.

Groundwater is technically complex, and perfect transparency will always be an unattainable goal. But efforts toward transparency are important to help assure regulated entities, other agencies, and members of the public that the actions of a GSA are justified and fair.

**TABLE 9:** TRANSPARENCY. MECHANISMS EXIST TO ENSURE TRANSPARENCY UNDER SGMA AND OTHER STATUES RELEVANT FOR GROUNDWATER MANAGEMENT IN CALIFORNIA.

| Mechanism | Relationship to transparency |
|---|---|
| SGMA requirements and limitations | • Before becoming a GSA, a local agency must provide public notice, hold a public hearing, and submit complete notification to DWR, and DWR must post the notification on its web site.[239]<br>• A GSA must keep a list of those interested in receiving notices about GSP preparation, meeting announcements, etc.[240]<br>• DWR must conduct three public meetings and publish a draft version before adopting GSP regulations.[241]<br>• A GSA must provide notice and hold a public hearing before adopting or amending a GSP.[242]<br>• A GSA must submit annual reports on basin conditions to DWR.[243]<br>• A GSA must give notice and hold a public meeting before imposing or raising regulatory fees and must follow constitutional requirements for imposing property-related fees.[244] |
| Other state groundwater laws | • Well completion reports are now publicly available.[245] |
| Open meeting provisions | • GSAs are local agencies that must provide notice of and allow public attendance at meetings consistent with the Brown Act[246] |
| Records requests | • GSAs must provide access to information consistent with the California Public Records Act.[247] |
| Information provision | • Internet-accessible data has been increasingly used by resource agencies in the state to enable accountability and analysis by researchers and stakeholders. |
| Audits | • Reviews such as those conducted by DWR could be disclosed to the public and the response from the GSA could be made by the governing board at a public meeting. |
| Conflict of Interest Rules | • Conflict of interest rules enable important disclosures about members of governing bodies.[248] |

### Illustrative example: Montana Open Meetings Laws

The Montana process for settlement of Native American water rights (described above) is also a useful example of transparency. Montana open meetings laws are among the most liberal in the United States.[249] The commission established to negotiate water settlements with Tribes may not meet behind closed doors. All negotiations require notice, disability accommodation, and room for public attendance. The result has been that the public is not surprised by anything in the final agreement and is far more educated on the difficult tradeoffs made.

### Illustrative example: Texas Groundwater

In 2005, Texas thoroughly revised its approach to groundwater planning. After decades of local management by groundwater conservation districts, a new law[250] required that regional groundwater management areas define the "desired future conditions" (DFCs) of their aquifer and submit them to the Texas Water Development Board (TWDB). Desired future conditions are the quantified conditions of groundwater resources (such as water levels, water quality, spring flows, or volumes) at a specified time or times in the future. In essence, a desired future condition is a management goal that reflects the social and environmental goods and services for which the aquifer will be managed. The TWDB requires[251] an explanatory report that must:

- identify each desired future condition;
- provide the policy and technical justifications for each desired future condition;
- include documentation that specific factors[252] were considered by the districts, and a discussion of how the adopted desired future conditions impact each factor;
- list other options for desired future conditions considered, if any, and the reasons why those options were not adopted; and
- discuss reasons why recommendations made by advisory committees and relevant public comments received by the districts were or were not incorporated into the desired future conditions.

The law[253] established a regional planning process for groundwater and requires several opportunities for public input. Individuals can protest DFCs through a petition process.[254] Once approved, TWDB takes the desired future conditions for each aquifer and runs open-source groundwater models that convert those management goals into a quantified estimate of availability called the modeled available groundwater (MAG). The MAG is the amount of groundwater extraction, on an average annual basis, that can be allowed while still achieving the desired conditions. An important change in the 2005 legislation is that regional water planning groups are now required to use—not just consider—the MAG estimates provided to them by TWDB as determined by the districts' desired future conditions.[255] The TWDB works with individual groundwater management areas to run different scenarios, using the open-source model.

*Lessons:* If Texas can do it, so can California.Texas does not have the same mandate to manage for sustainability that California now does, but that mandate arguably makes transparency of this sort even more important.

# **VI.** Critera are inter-related and messy, but important

As stated above, the criteria defined in this document are designed to be illustrative concepts. Many criteria are overlapping and interrelated. To pick just a few examples that readers may already have considered: human capacity as defined here is highly dependent on funding; the need to find a balance between accountability and independence creates a tension; and transparency could, if implemented poorly, impact independence and efficacy more generally.

In practice, that means it will be very difficult for GSAs, their partner agencies, and the public to consider some of these criteria without also considering others. And it will not always be necessary, or even helpful, to consider any of these criteria in isolation. But treating these criteria as a kind of checklist (see Table 1) will help people think through the challenges that GSAs will face, and evaluate whether GSAs are constituted in ways that will help them meet those challenges.

The messiness of this conceptual framework reflects the tangled reality of natural resources governance, but does not diminish the importance or the utility of individually addressing each element in our framework. Rather, the conceptual challenges spelled out here should add to the urgency for prospective GSAs and stakeholders to put effort into thinking clearly and explicitly about the tradeoffs in decisions about the institutional design of GSAs. In many cases, the simplest solutions for near term institutional design may in effect put off challenging decisions until later.

# VII. Conclusions

This report argues that while SGMA has created an unprecedented opportunity for local leadership towards sustainable groundwater management in California, this opportunity has its pitfalls. Institutional design that creates GSAs capable of good governance is one of the key opportunities. The challenge is to consider clearly, and balance carefully, the multiple competing functions a GSA will need to consider, and to do so on a tight timeline with high pressure and large stakes.

Local stakeholders and state agencies can use the nine criteria defined in this report to evaluate the institutional design of newly forming GSAs. These criteria support **efficacy** and **fairness**, two foundational elements of good governance. The criteria—**scale**, **human capacity**, **funding, authority**, **independence**, **representation**, **participation**, **accountability**, and **transparency**—form the basis for conceptual guidelines from which arise key questions that stakeholders and agencies can use to test the potential for a GSA to govern for groundwater sustainability.

The intent of this framework is to support newly forming GSAs and their stakeholders as they break new ground in sustainable governance of a crucial resource. The conceptual framework in this report can guide thinking about institutional design of GSAs. If the reader takes only one thing from this document, it should be the suggested questions contained in Table 1. These questions offer the basis for a richer dialogue, more rigorous evaluation, and ultimately more robust institutional design for the GSAs that will stand on the forefront of California's foray into sustainable groundwater management.

This report surfaces some tradeoffs GSAs may have to make. GSAs have an opportunity to address the tradeoffs early, at which point they may be able to inform institutional design, rather than later, at which point options may be limited and will include state intervention. With careful consideration of institutional design during the coming formative months, GSAs can hew to the spirit of local control that underlies SGMA. Attention to the design criteria described above may provide an opportunity to ensure effective and fair progress towards sustainability, and enable GSAs to retain local control and independence over the long term.

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# Review

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Although the reviewers listed above have provided many constructive comments and suggestions, they were not asked to endorse the conclusions or recommendations, nor did they see the final draft of the report before its release. All review comments were carefully considered, and we are grateful to all the reviewers for their efforts. Naturally, responsibility for the final content of this report rests entirely with the authors.

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# About CLEE

**The Wheeler Water Institute** develops interdisciplinary solutions to ensure clean water for California. Established in 2012 at the Center for Law, Energy & the Environment (CLEE) at Berkeley Law, the Institute conducts projects at the intersection of law, policy and science.

**The Center for Law, Energy & the Environment** (CLEE) at Berkeley Law educates the next generation of environmental leaders and develops policy solutions to pressing environmental and energy issues. The Center's current initiatives focus on reducing greenhouse gas emissions, advancing the transition to renewable energy, and ensuring clean water for California's future.

**University of California Water Security and Sustainability Research Initiative** (UC Water) assembles water researchers from across the UC system to address water resources issues through research and outreach on information, institutions and infrastructure.

# Endnotes

[1] SGMA was passed in 2014 as three related bills: S.B. 1168, A.B. 1739, and S.B. 1319. 2014 Cal. Legis. Serv. ch. 346 ["S.B. 1168"]; 2014 Cal. Legis. Serv. ch. 347 ["A.B. 1739"]; 2014 Cal. Legis. Serv. ch. 348 ["S.B. 1319"]. The Act went into effect January 1, 2015. A set of bills that cleaned up or clarified SGMA language and addressed the interaction of SGMA and groundwater adjudication actions went into effect January 1, 2016. The amendments were included in four bills: S.B. 13, A.B. 617, A.B. 939, and S.B. 226. *See* 2015 Cal. Legis. Serv. ch. 255 ["S.B. 13"] (cleaning up and clarifying language in several sections of SGMA; adding reference to mutual water company participation in joint powers agreements; changing GSA formation notification requirements); 2015 Cal. Legis. Serv. ch. 666 ["A.B. 617"] (adding provision regarding agreements with private parties to aid GSP implementation; miscellaneous amendments); 2015 Cal. Legis. Serv. ch. 667 ["A.B. 939"] (increasing the time public data must be made available before a public meeting on imposing or increasing fees; etc.); 2015 Cal. Legis. Serv. ch. 676 ["S.B. 226"] (adding provision regarding the interaction of SGMA with adjudication actions and amending various provisions to include mentions to adjudication). Separate legislation passed in 2015 established procedures for comprehensive groundwater adjudication in superior court. *See* 2015 Cal. Legis. Serv. ch. 672 ["A.B. 1390"].

[2] Cal. Water Code § 113 (West 2015).

[3] § 10721.

[4] *See, e.g.*, Institutional Design (David L. Weimer ed., 1995).

[5] *See, e.g.*, Elinor Ostrom, Governing the Commons: The Evolution of Institutions for Collective Action (1990); Thomas Dietz et al., *The Struggle to Govern the Commons*, 302 Science 1907 (2003); Louis Lebel et al., *Governance and the Capacity to Manage Resilience in Regional Social-Ecological Systems*, 11 Ecology & Soc'y art. 19 (2006); Maria C. Lemos & Arun Agrawal, *Environmental Governance*, 31 Ann. Rev. Env't & Resources 297 (2006).

[6] Gretchen Helmke & Steven Levitsky, *Informal Institutions and Comparative Politics: A Research Agenda*, 2 Perspectives on Pol. 725 (2004) (defining informal institutions as "socially shared rules, usually unwritten, that are created, communicated, and enforced outside of officially sanctioned channels," and arguing that informal institutions are often quite strong and influential). Governance is broader than government and encompasses the non-governmental organizations, private sector entities, communities, and private individuals who will be important participants in SGMA implementation. Governance is political, and can influence, and be influenced by, social and economic relationships.

[7] Margot Hill, Climate Change and Water Governance: Adaptive Capacity in Chile and Switzerland (2013).

[8] *See, e.g.*, Robert D. Putnam et al., Making Democracy Work: Civic Traditions in Modern Italy (1993) (discussing the role that networks of social engagement play in creating trust and cooperation). Putnam argues that this "social capital" plays an important role in healthy democracy. *Id.*

[9] *See supra* note 1.

[10] Previous legislation allowed, but did not mandate, local groundwater management. With A.B. 3030 in 1992 (also known as the "Groundwater Management Act"), the California legislature authorized any local agency that provides water service to develop and implement a groundwater management plan. *See* 1992 Cal. Legis. Serv. ch. 947, § 2 (codified at Cal. Water Code §§ 10750–10755.4 (West 2015)). In 2002, the legislature amended the Groundwater Management Act to make funding from DWR for groundwater projects contingent upon groundwater management plans containing basin management objectives, a suite of monitoring components, and other requirements. *See* 2002 Cal. Legis. Serv. ch. 603 (S.B. 1938). In 2011, the legislature introduced further amendements, specifying that S.B. 1938's requirements apply to funding for "projects that are part of an integrated regional water management program or plan" and imposing additional requirements related to mapping and describing groundwater recharge areas. *See* 2011 Cal. Legis. Serv. ch. 572 (A.B. 359). The legislature also created a number of special act districts that address groundwater management. *See* Water Educ. Found., The 2014 Sustainable Groundwater Management Act: A Handbook to Understanding and Implementing the Law 1 (2015), http://www.watereducation.org/sites/main/files/file-attachments/groundwatermgthandbook_oct2015.pdf (identifying fourteen special act districts "created by the Legislature" with "powers . . . customized to the problems and solutions of a particular groundwater basin" prior to 2015).

[11] *See* Cal. Water Code §§ 113, 10720.1 (describing the primary role of local management).

[12] *See* §§ 10721(r), (v); *see also* §§ 10721(u), (w)–(y) (defining related terms).

[13] § 10721(x).

[14] *See* §§ 10721(k), 10723.

[15] *See* § 10723.6(a).

[16] *See* §§ 10724, 10735.2(a)(1).

[17] *See* § 10723.8(c).

[18] *See* § 10720.7(a). GSPs are optional for low- or very-low-priority basins. *See* § 10720.7(b).

[19] *See* § 10720.7(a). GSPs are optional for low- or very-low-priority basins. *See* § 10720.7(b).

[20] *See* § 10733.4.

[21] *See* §§ 10727.2(b), 10721(u)–(x).

[22] *See* § 10733.6(a).

[23] *See* § 10733.6(b).

[24] *See* § 10720.8.

[25] *See* § 10720.8(f).

[26] *See* § 10737.4; *see also* § 10737.8 (barring a court from "approv[ing] entry of judgment in an adjudication action for a basin required to have a groundwater sustainability plan under this part unless the court finds that the judgment will not substantially impair the ability of a groundwater sustainability agency, the board, or the department to comply with this part and to achieve sustainable groundwater management.").

[27] For useful general background on groundwater, see Thomas Harter & Larry Rollins, Watersheds, Groundwater and Drinking Water: A Practical Guide (2008); Marcus Wijnen et al., Managing the Invisible: Understanding and Improving Groundwater Governance (2012), http://documents.worldbank.org/curated/en/2012/06/16587662/managing-invisible-understanding-improving-groundwater-governance; Thomas C. Winter et al., Ground Water and Surface Water A Single Resource (1998), http://pubs.usgs.gov/circ/circ1139/; Steven M. Gorelick & Chunmiao Zheng, *Global Change and the Groundwater Management Challenge*, 51 Water Resources Res. 3031 (2015); Katharine L. Jacobs, K. & James M. Holway, *Managing for Sustainability in an Arid Climate: Lessons Learned from 20 Years of Groundwater Management in Arizona, USA*, 12 Hydrogeology J. 52 (2004).

[28] Joan F. Kenny et al., U.S. Geological Survey, Estimated Use of Water in the United States in 2005 (2009), http://pubs.usgs.gov/circ/1344/pdf/c1344.pdf.

[29] Ostrom, *supra* note 5; Dietz et al., *supra* note 5; Kaveh Madani & Ariel Dinar, *Cooperative Institutions for Sustainable Common Pool Resource Management: Application to Groundwater*, 48 Water Resources Res. W09553 (Sept. 2012).

[30] *See, e.g.*, Anita Milman & Isha Ray, *Interpreting the Unknown: Uncertainty and the Management of Transboundary Groundwater*, 36 Water Int'l 63 (2011).

[31] Graham E. Fogg, *Groundwater Flow and Sand Body Interconnections in a Thick, Multiple Aquifer System*, 22 Water Resources Res. 679 (1986).

[32] Winter et al., *supra* note 27.

[33] John D. Bredehoeft et al., *Groundwater: The Water-Budget Myth*, *in* Nat'l Research Council, Studies in Geophysics: Scientific Basis of Water-Resource Management 51 (1982).

[34] *See, e.g.*, Leonard F. Konikow & Eloise Kendy, *Groundwater Depletion: A Global Problem*, 13 Hydrogeology J. 317 (2005); Yoshihide Wada et al., *Global Depletion of Groundwater Resources*, 37 Geophysical Res. Letters L20402 (2010).

[35] *See* Cal. Water Code §§ 10727–10728.4 (West 2015).

[36] § 113.

[37] *Id.*

[38] For a digestion of the administrative steps necessary for GSA formation, see Cal. Dep't of Water Res., Actions for Local Agencies to Follow When Deciding to Become or Form a Groundwater Sustainabilty Agency (GSA) (2015), http://www.water.ca.gov/groundwater/sgm/pdfs/GSA_Notification_Requirements_2015-10-27.pdf.

[39] SWRCB can designate probationary status for a medium- or high-priority basin under the follow circumstances:

- after June 30, 2017, if one or more GSAs are not in place for the entire basin and no alternative has been submitted;
- for basins subject to critical conditions of overdraft, after January 31, 2020, if one or more GSPs (or alternatives) (1) has not been adopted for the entire basin, (2) is determined to be inadequate or is being implemented in a manner unlikely to achieve the sustainability goal;
- for other basins, after January 31, 2022, if one or more GSPs (or alternatives) (1) has not been adopted for the entire basin or (2) is determined to be inadequate or is being implemented in a manner unlikely to achieve the sustainability goal and the basin is determined to be "in a condition of long-term overdraft";
- for other basins, after January 31, 2025, if one or more GSPs is determined to be inadequate or is being implemented in a manner unlikely to achieve the sustainability goal and the basin is determined to be "in a condition where groundwater extractions result in significant depletions of interconnected surface waters."

§ 10735.2(a). Beginning 90 days after the Board designated probationary status, groundwater extractions must be reported directly to the Board, unless certain exclusions apply. *See* § 5202. The Board can develop an interim plan for a probationary basin, usually after a substantial waiting period. *See* §§ 10735.4–10736.

[40] More on SGMA regulations, still in development at the time of publication, can be found at *Introduction*, Cal. Dep't Water Resources, http://www.water.ca.gov/groundwater/sgm/ (last updated Jan. 20, 2016).

[41] *See* § 10729. The Department may incorporate these best management practices into its GSP regulations, but is not required to. *See* § 10733.2(b)(1).

[42] *See, e.g.*, §§ 10720.1(h), 10725–10726.9.

[43] *See* § 10723.

[44] § 10723(a); *see also* §§ 10721(j), (n) (defining "groundwater sustainability agency" and "local agency"). A "local agency" is a local public agency with water supply, water management, or land use responsibilities in a groundwater basin. § 10721(n). "Within 30 days of deciding to become or form a groundwater sustainability agency, the local agency or combination of local agencies shall inform the department of its decision and its intent to undertake sustainable groundwater management." § 10723.8(a). Although the county is the presumed GSA for unmanaged areas, § 10724(a), if it notifies DWR it will not be the GSA for an area or fails to notify DWR it will be the GSA by June 30, 2017, then groundwater withdrawals must be reported directly to the Board starting July 1, 2017. *See* §§ 5202, 10724(b).

[45] *See* § 10723.6(a). Note that some private entities ("water corporation[s] regulated by the Public Utilities Commission" and mutual water companies) can participate in a GSA formed by collective legal agreement. *See* § 10723.6(b) (noting, however, that SGMA "does not confer any additional powers to a nongovernmental entity"); *see also* Valerie Kincaid & Ryan Stager, Know Your Options: A Guide to Forming Groundwater Sustainability Agencies 4–5 (2015), http://californiawaterfoundation.org/wp-content/uploads/2015/09/CF_GSA_Guide_09.30.15_web.pdf (describing options for non-public agency representation).

[46] *See* § 10733.2 (requiring adoption of plan-related regulations by June 1, 2016). The Department is marking its progress on its website. *See Groundwater Sustainability Plan Regulations*, Cal. Dep't Water Resources, http://www.water.ca.gov/groundwater/sgm/gsp.cfm (last updated Dec. 18, 2015). SGMA also requires the Department to develop regulations to govern requests for basin boundary revisions. *See* § 10722.2 (requiring regulations by January 1, 2016). The final basin boundary regulations went into effect November 16, 2015. *See Basin Boundary Modifications*, Dep't Water Resources, http://www.water.ca.gov/groundwater/sgm/basin_boundaries.cfm (last visited Nov. 16, 2015).

[47] *See* §§ 10733.4(d), 10733.8.

[48] *See* § 5202 (requiring those extracting groundwater in probationary basins and areas of basins not covered by a GSA to annually report their extractions to the Board); § 5204 (allowing the Board to investigate non-reporters); § 10735.2 (defining the Board's authority to designate probationary basins, described in more detail at §§ 10735.4–10736 and *supra* note 39. (regarding the Board's authority to develop interim plans); § 10736.6 (allowing the Board to order submission of "technical or monitoring program reports" related to investigations or intervention). Note that the Department of Water Resources also plays a role in determining when some forms of probationary designation are appropriate. *See* §§ 10735.2(a)(3), (5) (making probationary designation in some circumstances dependent on "the department, in consultation with the board, determin[ing] that a groundwater sustainability plan is inadequate or that the groundwater sustainability program is not being implemented in a manner that will likely achieve the sustainability goal.").

[49] *See* § 10728.6 (stating that, although CEQA "does not apply to the preparation and adoption of plans pursuant to this chapter," it does apply to "a project that would implement actions taken pursuant to a plan adopted pursuant to this chapter.").

[50] *See supra* pp. 43–45 (discussing "Transparency").

[51] *See* § 65352(a)(8).

[52] *See* § 10735.2(a)(1). If the priority of a basin is elevated to medium or higher in future, it will have two years from that point to establish a GSA. § 10722.4(d).

[53] *See* § 10727.2(b) (requiring sustainability goals to be achieved "within 20 years" of plan implementation).

[54] Michael T. Hannan & John Freeman, *Structural Inertia and Organizational Change*, 49 Am. Soc. Rev. 149 (1984).

[55] The federal government has an interest in groundwater governance because groundwater pumping can affect federal resources and water rights. *See, e.g.*, Cappaert v. United States, 426 U.S. 128 (1976); Envtl. Law Found. v. State Water Res. Control Bd., No. 34-2010-80000583, 2014 WL 8843074 (Cal. Super. July 14, 2014).

[56] *See* § 10723.8(b) (requiring DWR to post "all *complete* notices" (emphasis added) to its website within 15 days of receipt, necessitating review of whether each notice is complete). A notification must include the following information, as applicable:

(1) The service area boundaries, the boundaries of the basin or portion of the basin the agency intends to manage pursuant to this part, and the other agencies managing or proposing to manage groundwater within the basin.

(2) A copy of the resolution forming the new agency.

(3) A copy of any new bylaws, ordinances, or new authorities adopted by the local agency.

(4) A list of interested parties developed pursuant to Section 10723.2 and an explanation of how their interests will be considered in the development and operation of the groundwater sustainability agency and the development and implementation of the agency's sustainability plan.

§ 10723.8(a)(1). For DWR postings of GSA Formation Notifications, see *GSA Formation Notifications*, Cal. Dep't Water Resources, http://www.water.ca.gov/groundwater/sgm/gsa_table.cfm (last updated Jan. 5, 2016). The boundaries of the area each agency intends to manage are shown on an interactive map. *See GSA Interactive Map*, Cal. Dep't Water Resources, http://www.water.ca.gov/groundwater/sgm/gsa_table.cfm (last updated Dec. 2, 2015).

[57] DWR adopted Basin Boundary Modification Regulations in October 2015. *See Basin Boundary Modification*, Cal. Dep't Water Resources, http://www.water.ca.gov/groundwater/sgm/basin_boundaries.cfm (last updated Dec. 31, 2015). The agency is still working on developing GSP regulations. *See Groundwater Sustainability Plan Regulations*, Cal. Dep't Water Resources, http://www.water.ca.gov/groundwater/sgm/gsp.cfm (last updated Dec. 18, 2015).

[58] *See supra* notes 39 & 48 and accompanying text.

[59] *See* § 5202.

[60] The Board must adopt a schedule of fees via emergency regulation to recover the costs of administering SGMA oversight and intervention, including costs related to investigations, facilitation, monitoring, holding hearings, enforcement actions, and administration (including costs related to report receipt and management). §§ 1529.5, 1530. The Water Rights Fund can be used for purposes of SGMA implementation, but the Board must set fees at a level that covers "all costs incurred and expended" from it. *See* §§ 1529.5(c), 1552(c).

[61] *See* § 1831(d).

[62] For an interactive timeline of SGMA requirements, see Nell Green Nylen, *California's New Groundwater Law: An Interactive Timeline*, Legal Planet (Oct. 8, 2014), http://legal-planet.org/2014/10/08/californias-new-groundwater-law-an-interactive-timeline/.

[63] *See* § 10728.2.

[64] *See* S.B. 1168, § 1(a)(11) ("Climate change will intensify the need to recalibrate and reconcile surface water and groundwater management strategies."); *see also* Craig A. Arnold, *Adaptive Watershed Planning and Climate Change*, 5 Envtl. & Energy Law & Pol'y J. 417 (2010).

[65] Adaptive governance is a type of governance of natural resources that allows flexibility as circumstances change. Adaptive governance is observed to be an emergent phenomenon and as such, cannot be mandated through law. Nevertheless, scholars working on understanding the type of legal framework most likely to facilitate its emergence are using criteria similar to ours. *See, e.g.*, Brian C. Chaffinet al., *A Decade of Adaptive Governance Scholarship: Synthesis and Future Directions*, 19 Ecology & Soc'y art. 56 (2014); Thomas Dietz et al., *supra* note 5; Lebel et al., *supra* note 5; Carl Folke et al., *Adaptive Governance of Social-Ecological Systems*, 30 Ann. Rev. Envtl. Resources 441 (2005); Dave Huitema et al., *Adaptive Water Governance: Assessing the Institutional Prescriptions of Adaptive (Co-)Management from a Governance Perspective and Defining a Research Agenda*, 14 Ecology & Soc'y art. 26 (2009); *Social-Ecological System Resilience, Climate Change, & Adaptive Water Governance*, Nat'l Socio-Envtl. Synthesis Ctr., http://www.sesync.org/project/water-people-ecosystems/adaptive-water-governance (last visited Feb. 2, 2016).

[66] *See* Cal. Water Code § 10720.7 (West 2015).

[67] § 10727.2 (describing plan requirements); *see also* § 10721 (defining key terms). Note that SGMA provides for alternative ways for GSAs to meet the GSP requirement. § 10733.6.

[68] *See, e.g.*, Claire O'Connor & Juliet Christian-Smith, Nat. Res. Def. Council, Implementation of the Agricultural Water Management Planning Act: A Review of Agricultural Water Management Plans (2013), http://www.nrdc.org/water/files/ca-agricultural-water-planning-IP.pdf.

[69] *See* § 10725.2(b).

[70] *See Groundwater Sustainability Plan Regulations*, Cal. Dep't Water Resources, http://www.water.ca.gov/groundwater/sgm/gsp.cfm (last visited Nov. 16, 2015).

[71] *See* § 10725.2(b).

[72] *See id.* ("A groundwater sustainability agency may adopt rules, regulations, ordinances, and resolutions for the purpose of this part").

[73] *See* Kenneth J. Arrow et al., *Elinor Ostrom: An Uncommon Woman for the Commons*, 109 Proc. Nat'l Acad. Sci. 13,135 (2012).

[74] *E.g.*, Ostrom, *supra* note 5.

[75] *E.g.*, *id.*

[76] Michael Cox et al., *A Review of Design Principles for Community-Based Natural Resource Management*, 15 Ecology & Soc'y art. 38 (2010).

[77] Lebel, *supra* note **5**.

[78] Derek Armitage, *Governance and the Commons in a Multi-Level World*, 2 Int'l J. Commons 7 (2008).

[79] Michael Lockwood et al., *Governance Principles for Natural Resource Management*, 23 Soc'y & Nat. Resources 986 (2010).

[80] See also related concepts developed by the Adaptive Water Governance project at *Social-Ecological System Resilience*, *supra* note 65.

[81] *Criterion*, Oxford Dictionaries, http://www.oxforddictionaries.com/us/definition/american_english/criterion (last visited Oct. 12, 2015).

[82] *See, e.g.*, Jason Prno & D. Scott Slocombe, *Exploring the Origins of "Social License to Operate" in the Mining Sector: Perspectives from Governance and Sustainability Theories*, 37 Resources Pol'y 346 (2012) ("A social license can be considered to exist when a . . . project is seen as having the ongoing approval and broad acceptance of society to conduct its activities.").

[83] *See* Clark C. Gibson et al., *The Concept of Scale and the Human Dimensions of Global Change: A Survey*, 32 Ecological Econ. 217 (2000).

[84] Scale also has a time dimension, which relates to how management actions do or do not align with the rates of change in a resource.

[85] Tanya Heikkila et al., *The Role of Cross-Scale Institutional Linkages in Common Pool Resource Management: Assessing Interstate River Compacts*, 39 Pol'y Studies J. 121 (2011); W. Neil Adger et al., The political economy of cross-scale networks in resource co-management, 10 Ecology & Soc'y art. 9 (2005); Diana Liverman, *Who Governs, at What Scale and at What Price? Geography, Environmental Governance, and the Commodification of Nature*, 94 Annals Ass'n Am. Geographers 734 (2004).

[86] The ideal boundaries for a GSA also depend also on how groundwater basins are defined by DWR. See Cal. Dep't of Water Res., Bulletin 118: California's Groundwater 89–90 (2003), http://www.water.ca.gov/pubs/groundwater/bulletin_118/california's_groundwater__bulletin_118_-_update_2003_/bulletin118_entire.pdf. Note that Bulletin 118 was not developed for groundwater management and is based on dated information. Since many or most local agencies will be unable to achieve consensus before GSA formation and request basin boundary changes, there will often be areas that are part of a physical groundwater basin, but outside of the basin defined by Bulletin 118 basin.

[87] *See, e.g.*, Tara Moran & Dan Wendell, Stanford Woods Inst. for the Env't, The Sustainable Groundwater Management Act Of 2014: Challenges and Opportunities for Implementation (2015), http://waterinthewest.stanford.edu/sites/default/files/Woods%20SGMA%20Report%20Whitepaper%20v03%20WEB.pdf.

[88] *See Groundwater Basin Maps and Descriptions*, Dep't Water Resources, http://water.ca.gov/groundwater/bulletin118/gwbasins.cfm (last visited Nov. 16, 2015). For example, the Central Valley and western Sierra Nevada could be considered a single hydrologically connected unit, but a single large-scale GSA for this area would probably not be politically or administratively feasible.

[89] *See* Cal. Water Code § 10727.6 (West 2015).

[90] Allyson Beall et al., *Sustainable Water Resource Management and Participatory System Dynamics. Case Study: Developing the Palouse Basin Participatory Model*, 3 Sustainability 720 ( 2011).

[91] *Palouse Basin Aquifer Committee (PBAC)*, U. Idaho, http://www.webpages.uidaho.edu/pbac/ (last visited Feb. 2, 2016).

[92] *See* Am. Farm Bureau Fed'n v. U.S. Envtl. Prot. Agency, 792 F.3d 281, 287–88 (2015).

[93] *See* Oliver A. Houck, *The Clean Water Act Returns (Again): Part I, TMDLs and the Chesapeake Bay*, 41 Envtl. L. Rep. News & Analysis 10,208 (2011).

[94] *See Chesapeake Bay Total Maximum Daily Load*, U.S. Envtl. Prot. Agency, http://www2.epa.gov/chesapeake-bay-tmdl (last visited November 6, 2015).

[95] *See* Water Env't Fed'n, *States, D.C. Back EPA in Chesapeake Bay TMDL Litigation,* Stormwater Report (May 15, 2014), http://stormwater.wef.org/2014/05/states-d-c-back-epa-chesapeake-bay-tmdl-litigation/.

[96] *See* Cal. Water Code § 10729(a)–(d) (West 2015).

[97] S.B. 1168, § 1(b)(3).

[98] *See* Cal. Water Code § 10721(x) (West 2015).

[99] *See* § 10721(v).

[100] *See* § 10722.2(c)(1)–(3).

[101] *See* § 10726.2(e).

[102] GSAs "shall coordinate with other agencies preparing a groundwater sustainability plan within the basin" § 10727.6. SGMA requires a coordination agreement if multiple GSPs will govern a single basin. *See* § 10727(b)(3).

[103] GSPs shall include "efforts to develop relationships with state and federal regulatory agencies, § 10727.4(j), and "processes to review land use plans and efforts to coordinate with land use planning agencies." § 10727.4(k).

[104] Note that managing the finances of an agency is related to, but distinct from, obtaining reliable sources of funding. For more on this topic, see *supra* pp. 27–30 (discussing "Funding").

[105] *See* Kincaid & Stager, supra note 45.

[106] *See* Cal. Dep't of Water Res. & State Water Res. Control Bd., Funding Programs for California's Sustainable Groundwater Management Act (SGMA) 9, 12 (2015), http://www.swrcb.ca.gov/water_issues/programs/gmp/docs/sgma/sgmafunding_brochure2015oct.pdf [hereinafter Funding Programs].

[107] Cal. Water Code § 10729(b) (West 2015).

[108] *See* §§ 10729(c), (d); *Best Management Practices*, Cal. Dep't Water Resources, http://www.water.ca.gov/groundwater/sgm/bmps.cfm (last updated Dec. 2, 2015).

[109] *See, e.g., Sustainable Groundwater Management: Introduction*, Cal. Dep't Water Resources, http://www.water.ca.gov/groundwater/sgm/index.cfm (last updated Dec. 21, 2015) (linking to a webinar on Basin Boundary Modification Request Requirements and Procedures, a webinar on amendments to SGMA by S.B. 13, webcasts and presentations from information meetings on GSP draft regulations, and other materials); *Sustainable Groundwater Management: Resources*, Cal. Dep't Water Resources, http://www.water.ca.gov/groundwater/sgm/resources.cfm (last updated July 27, 2015) (linking to DWR groundwater publications, a SGMA timeline, etc.); *Sustainable Groundwater Management: Related Links*, Cal. Dep't Water Resources, http://www.water.ca.gov/groundwater/sgm/links.cfm (last updated Nov. 16, 2015) (linking to resources developed by "[s]tatewide and regional foundations, academic institutions, nonprofit organizations," and other groups).

[110] Clean Air Act, 42 U.S.C. § 7410 (2012).

[111] *See* James D. Fine & Dave Owen, *Technocracy and Democracy: Conflicts Between Models and Participation in Environmental Law and Planning*, 56 Hastings L.J. 901, 946–49 (2005).

[112] Even with these efforts, the system faces major challenges, including the limited ability of state and local regulators to control emissions from mobile sources. Mobile sources generate most of the air pollution in California, but many potential forms of state and local regulation of mobile source pollution are preempted by federal law.

[113] *See, e.g.*, S. Coast Air Quality Mgmt. Dist., *Offices and Executive Management*, http://www.aqmd.gov/home/about/offices (last visited Nov. 6, 2015). While CARB and EPA are formally responsible only for reviewing, approving, and enforcing plans, they also assist in plan development, both by providing guidance and technical support documents and by offering themselves as resources to respond to specific questions and challenges. *See* Fine & Owen, *supra* note 111, at 947–48.

[114] *See* Fine & Owen, *supra* note 111, at 948–49, 951–52.

[115] *See* S.B. 1168, § 1(a)(10) ("Information on the amount of groundwater extraction, natural and artificial recharge, and groundwater evaluations are critical for effective management of groundwater.").

[116] *See infra* notes 159-162 and accompanying text.

[117] *See, e.g.*, Cal. Water Code § 10725.2 (West 2015) ("A groundwater sustainability agency may perform any act necessary or proper to carry out the purposes of this part.").

[118] *See* S.B. 1168, § 1(a)(8) ("Local and regional agencies need to have the necessary support and authority to manage groundwater sustainably.").

[119] *See* Cal. Water Code § 10730 (West 2015). Such fees may fund costs related to, for example, "preparation, adoption, and amendment of a groundwater sustainability plan, and investigations, inspections, compliance assistance, enforcement, and program administration, including a prudent reserve." § 10730(a). GSAs may conduct investigations "[t]o propose and update fees. § 10725.4(a)(3).

[120] *See* § 10730.2.

[121] While cities and counties can levy general or special taxes, special districts can levy only special taxes which must be approved by two-thirds of voters. *See* Cal. Const. art. XIII C, §§ 2(a), (d).

[122] General obligation bonds issued by local agencies must be approved by two-thirds of voters. *See* Cal. Const. art. XVI, § 18(a).

[123] These funding programs are discussed in Funding Programs, *supra* note 106, at 5, 9, 12. The Board also administers additional funding sources for addressing groundwater contamination, including the Proposition 1 Groundwater Sustainability Program, the Non-Point Source Grant Program, and the Site Cleanup Subaccount Program). *See id.* at 7, 8, 9.

[124] Unless otherwise indicated, funding programs are discussed in Funding Programs, *supra* note 106, at 3, 12.

[125] *See* Cal. Water Code § 10729(b). DWR can also provide technical assistance for those that extract or use groundwater aimed at promoting water conservation and protecting groundwater resources. *See* § 10729(a). Additionally, SGMA requires DWR to provide more general technical assistance by estimating water available for replenishment and developing best management practices for sustainably managing groundwater. *See* §§ 10729(c), (d).

[126] *See* §§ 79750, 79751(b), (c); *see also Proposition 1 Water Storage Investment Program*, Cal. Water Comm'n, https://cwc.ca.gov/Pages/PublicBenefits1.aspx (last visited Oct. 30, 2015). How much of these funds will be spent on groundwater storage activities and conjunctive use as opposed to surface storage projects has yet to be determined as of this writing.

[127] These funding programs are discussed in Funding Programs, *supra* note 106, at 9, 10.

[128] *See* Cal. Const. art. XIII D, § 6 (added by Proposition 218 in 1996, imposing proportionality and other restrictions and voter-approval requirements for many property-related fees and special assessments, including fees for most water-related services); *id.* arts. XIIIA, § 3, XIIIC, § 1 (added by Proposition 26, redefining many fees as taxes and adding additional restrictive language).

[129] *See id.* art. XIII C, § 2; (added by Proposition 218 in 1996, clarifying that general local taxes require approval by a majority vote and special local taxes require approval by a two-thirds vote and imposing proportionality and other restrictions and voter-approval requirements for many property-related fees and special assessments, including fees for most some water-related services) *id.* art. XIII D, § 6 (same); *id.* art. XIIIA, § 3 (added by Proposition 26, redefining many fees as taxes and adding additional restrictive language); *id.* art. XIIIC, § 1 (same).

[130] Correspondence with Erik Ekdahl, State Water Res. Control Bd. (Dec. 7, 2016).

[131] *See* Cal. Water Code § 10730(c) (West 2015).

[132] *See* §§ 10730(a), (b).

[133] *See* § 10730.2; *see also* Cal. Const. art. XIII D, §§ 6(a), (b).

[134] Cal. Water Code § 10730.2(a) (West 2015).

[135] See Cal. Const. art. XIII D, § 6(a).

[136] *See id.* art. XIII D, § 6(a)(2).

[137] *See id.* art. XIII D, § 6(b)(3). The service must actually be used by, or be immediately available to, the property owner. *Id.* § 6(b)(4).

[138] *See id.* art. XIII D, §§ 6(b)(1), (2).

[139] Proposition 26, approved in 2010, defines fees imposed by local governments to be taxes unless they meet one of seven exceptions. *See id.* art. XIII C, § 1(e). Valid property-related fees are one such exception. *See id.* § 1(e)(7). Proposition 218 requires general taxes to be approved by a majority vote and special taxes to be approved by a two-thirds vote. *See id.* art. XIII C, § 2.

[140] *See* Great Oaks Water Co. v. Santa Clara Valley Water Dist., 196 Cal. Rptr. 3d 171, 185 (Cal. Ct. App. 2015) (concluding that groundwater extraction fee was property related and citing *Griffith v. Pajaro Valley Water Management Agency*, 163 Cal. Rptr. 3d 243, 251 (Cal. Ct. App. 2013), for the proposition that "the *indirect* delivery of water to groundwater extractors—whether by replenishment of the groundwater basin, or by measures reducing demands on it—was conceptually indistinguishable from the direct delivery of water" and holding the groundwater extraction charge at issue "was exempt from the requirement of voter ratification"; suggesting that regulatory fees related to groundwater management would need to be "designed predominantly not to secure revenues but to directly regulate the burdened activity—in essence, to deter excessive consumption—through price signals"); *see also* Cal. Const. art. XIII D, § 6(c); Pajaro Valley Water Mgmt. Agency v. Amrhein, 59 Cal. Rptr. 3d 484, 501–02 (2007) (concluding that groundwater extraction fees "assessed on all persons extracting water . . . on the basis . . . of estimated or presumptive use" were property related, but suggesting that groundwater extraction fees charged on the basis of metered extractions "might well be justified on regulatory grounds, as bringing the actual cost of groundwater nearer its true replacement cost and thus subjecting it to the regulation of the marketplace"). The property-related fee provision in SGMA requires such fees to"be adopted in accordance with subdivisions (a) and (b) of Section 6 of Article XIII D of the California Constitution" but not subdivision (c), which imposes voter approval requirements for new or increased property-related fees for services other than "sewer, water, and refuse collection." *See* Cal. Water Code § 10730.2(c) (West 2015); Cal. Const. art. XIII D, § 6(c). For the purposes of Article XIII D, "water" is defined as "any system of public improvements intended to provide for the production, storage, supply, treatment, or distribution of water from any source." Cal. Gov't Code § 53750(m) (West 2015); *see also Griffith*, 163 Cal. Rptr. 3d at 251 (holding that "the augmentation charge at issue . . . is for water service within the meaning of Proposition 218" and "[a]s such, it was expressly exempt from the fee/charge voting requirement.").

[141] See City of San Buenaventura v. United Water Conservation Dist., 185 Cal. Rptr. 3d 207, 211, 223–25 (Apr. 15, 2015) (as modified on denial of rehearing), *review granted and opinion superseded sub nom.*, City of San Buenaventura v. United Water Conservation Dist., 351 P.3d 328 (Cal. 2015). The superseded opinion concluded that volumetric groundwater pumping fees charged for non-agricultural purposes at a higher rate than for agricultural purposes, as required by statute, were not taxes or property-related fees but "valid regulatory fees because they are fair and reasonable, and do not exceed the District's resource management costs." *Id.*

[142] The opinion granting the petition for Supreme Court review limited "[t]he issues to be briefed and argued . . . to the following: (1) Do the District's ground water pumping charges violate Proposition 218 or Proposition 26? (2) Does the rate ratio mandated by Water Code section 75594 violate Proposition 218 or Proposition 26?" City of San Buenaventura v. United Water Conservation Dist., 351 P.3d 328, 328 (Cal. 2015). Proposition 26 defines fees imposed by local governments to be taxes unless they meet one of seven exceptions, including (1) charges "imposed for a specific benefit conferred or privilege granted directly to the payor that is not provided to those not charged, and which does not exceed the reasonable costs to the local government of conferring the benefit or granting the privilege" and (3) charges "imposed for the reasonable regulatory costs to a local government for issuing licenses and permits, performing investigations, inspections, and audits, enforcing agricultural marketing orders, and the administrative enforcement and adjudication thereof." *See* Cal. Const. art. XIII C, §§ 1(e)(1), (3). The Second District concluded that the pumping charges fell within these exceptions. *See City of San Buenaventura*, 185 Cal. Rptr. 3d at 225–27. Proposition 26 requires fees to be "no more than necessary to cover the reasonable costs of the governmental activity" and requires "that the manner in which those costs are allocated to a payor bear a fair or reasonable relationship to the payor's burdens on, or benefits received from, the governmental activity." Cal. Const. art. XIII C, § 1.

[143] Urban development changes the composition and flow of stormwater, and the secondary consequences typically include increased pollution of local waters, intensified floods, lost groundwater recharge, and physically degraded streams. *See* Christopher J. Walsh et al., *The Urban Stream Syndrome: Current Knowledge and the Search for a Cure*, 24 J. N. Am. Benthological Soc'y 706 (2005).

[144] *See* Dave Owen, *Urbanization, Water Quality, and the Regulated Landscape*, 82 U. Colo. L. Rev. 431 (2011).

[145] *See* Ellen Hanak et al., Pub. Pol'y Inst. of Cal., Paying for Water in California 11 (2014), http://www.ppic.org/main/publication.asp?i=1086.

[146] *See id.*

[147] *See* U.S. Envtl. Prot. Agency, Funding Stormwater Programs (2009), http://water.epa.gov/infrastructure/greeninfrastructure/upload/FundingStormwater.pdf.

[148] *See id.*; *see also generally* Avi Brisman, *Considerations in Developing a Stormwater Utility*, 26 S. Ill. L.J. 505 (2002).

[149] *See* U.S. Envtl. Prot. Agency, *supra* note 147, at 5.

[150] *See* Dave Owen et al., *Collaboration, Clean Water Act Residual Designation Authority, and Collective Permitting: A Case Study of Long Creek*, 1 Watershed Sci. Bull. 25 (2010).

[151] *See* Black & Veatch, 2014 Stormwater Utility Survey 17–19 (2014), http://bv.com/docs/default-source/management-consulting-brochures/2014-stormwater-utility-survey; U.S. Envtl. Prot. Agency, *supra* note 147, at 5.

[152] *See* U.S. Envtl. Prot. Agency, *supra* note 147, at 3 (showing growing numbers).

[153] Two types of authority will be relevant for GSAs: authority granted by SGMA or other statute (authority given by the state) is distinct from authority based on the governance structure put in place for a given GSA or the authorities that GSAs choose to actually take on (authority accepted by local entities).

[154] Cal. Water Code § 10725.2(a) (West 2015) ("may perform any act necessary or proper to carry out the purposes of this part").

[155] *See* S.B. 1168 , § 1(a)(8); *see also* S.B. 1168, § 1(b)(1) (describing the legislature's "intent . . . to provide local and regional agencies the authority to sustainably manage groundwater").

[156] Cal. Water Code § 10725.2(a) (West 2015).

[157] § 10725.2(b) (noting that any applicable procedural requirements must be followed).

[158] § 10726.8(a).

[159] § 10725.6.

[160] § 10725.8 (noting also that the owner or operator of the extraction facility must bear "[a]ll costs associated with the purchase and installation of [a required] water-measuring device"). De minimus extractors, defined as those pumping less than two acre-feet per year, are excluded from this provision. *See* § 10725.8(e).

[161] § 10725.4. The purposes of investigations may include (1) "determin[ing] the need for groundwater management," (2) "prepar[ing] and adopt[ing] a groundwater sustainability plan and implementing rules and regulations," (3) "propos[ing] and update[ing] fees," and (4) "monitor[ing] compliance and enforcement." § 10725.4(a). Additionally, entities within a GSA's service area must report diversion of surface water to underground storage. *See* § 10726. In effect, this gives GSAs information on one element of conjunctive use.

[162] § 10725.4(c).

[163] § 10726.4(a)(1). Note that SGMA maintains counties' role as well permitting agencies; however, SGMA requires a county to consider a GSA's request that it forward permit requests to the GSA before approval. *See* § 10726.4(b).

[164] § 10726.4(a)(2). For example, a GSA can regulate, limit, or suspend (1) extractions from individual (or aggregated) wells, (2) new well construction, (3) well enlargement, and (4) well reactivation. *Id.* Note that these actions must "be consistent with the applicable elements of the city or county general plan, unless there is insufficient sustainable yield in the basin to serve a land use designated in the city or county general plan." *Id.* A GSA can "establish accounting rules to allow unused groundwater extraction allocations issued by the agency to be carried over from one year to another and voluntarily transferred, if the total quantity of groundwater extracted in any five-year period is consistent with the [GSP's] provisions." *§ 10726.4(a)(4).*

[165] § 10726.4(a)(3). This authority is only available "if the total quantity of groundwater extracted in any water year is consistent with the [GSP's] provisions" and transfers are "subject to applicable city and county ordinances." *Id.*

[166] §§ 10726.2(a), (b).

[167] § 10726.2(a).

[168] §§ 10726.2(b), (d).

[169] § 10726.2(e).

[170] *See* §§ 10730, 10730.2; *see also supra* 119–120. GSAs can collect interest on delinquent fees. See § 10730.6(b).

[171] § 10730.6(c), (e); *see also* § 10730.6(d).

[172] §§ 10732(a)(1), (b).

[173] §§ 10732(a)(2), (b).

[174] § 10721(v).

[175] Indeed, SGMA specifies limitations to GSA authority, including by specifying the intent of the legislature to "respect overlying and other proprietary rights to groundwater" and "[t]o recognize and preserve the authority of cities and counties to manage groundwater pursuant to their police powers" S.B. 1168, §§ 1(b)(4), (5).

[176] For background on CALFED and its failures, see, for example, Giorgos Kallis et al, *Collaborative Governance and Adaptive Management: Lessons from California's CALFED Water Program*, 12 Envtl Sci. & Pol'y 641 (2009), and other articles in the same Special Issue.

[177] *See id*.

[178] *See* Josh Eagle et al., Taking Stock of the Regional Fishery Management Councils (2003).

[179] *See*, *supra* note 82.

[180] Adapted from Donelson R. Forsyth, Group Dynamics 388–89 (5th ed. 2006); *see also* Nancy Kranich, *Equality and Equity of Access: What's the Difference?*, Am. Libr. Ass'n, (Mar. 3, 2005), http://www.ala.org/offices/oif/iftoolkits/toolkitrelatedlinks/equalityequity.

[181] Substantive fairness includes appropriate distribution of costs and benefits of an action. Procedural fairness refers to the mechanisms and processes that can support substantive, fair outcomes. Fairness has elements of process (participation and representation) and outcome (resulting appropriate distribution). When considering different governance options, it will be important to consider both types of fairness.

[182] GSA's can impose fees on de minimis extractors. *See* Cal. Water Code § 1730(a) (West 2015) (explaining that a GSA can impose regulatory fees on de minimis extractors if "the agency has regulated the users pursuant to this part").

[183] A "de minimis extractor" is "a person who extracts, for domestic purposes, two acre-feet or less per year." *See* § 10721(e). GSAs can require extractors (other than de minimis extractors) to install a satisfactory water-measuring device, measure extractions, and file an annual statement of total extractions. *See* § 10725.8.

[184] §§ 106.3(a), (b).

[185] For a more thorough treatment of stakeholder engagement and related issues under SGMA, see Kristin Dobbin, et al., Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation (2015), http://www.cleanwateraction.org/publication/collaborating-success-stakeholder-engagement-sustainable-groundwater-management-act-impl.

[186] Direct integration into agencies is possible such as where an MOA or MOU gives a group or existing agency an explicit role. *See* § 10727.8. SGMA explicitly gives federally recognized Indian tribes the option for voluntary full participation in preparation or administration of GSPs or GMPs though a JPA or other agreement with local agencies. § 10720.3(c).

[187] Participation is meaningful when power is actually shared with stakeholders such that they can influence decisions. *See, e.g.*, Sherry R. Arnstein, *A Ladder of Citizen Participation*, 35 J. Am. Inst. Planners 216 (1969).

[188] § 10727.8(a) provides that the GSA "shall make available . . . written statement describing the manner in which interested parties may participate in the development and implementation" of the GSP, that the GSA "may appoint and consult with an advisory committee consisting of interested parties,", and that the GSA "shall encourage the active involvement of diverse social, cultural, and economic elements" of the population. SGMA specifically requires that GSAs "encourage the active involvement of diverse social, cultural, and economic elements of the population within the groundwater basin prior to and during the development and implementation of the groundwater sustainability plan." § 10727.8(a). SGMA also provides that GSAs shall "consider the interests of all beneficial uses and users of groundwater"." § 10723.2. Section 10727.8 specifies that GSAs describe the manner in which interested parties may participate in the development and implementation of the GSP and allows GSAs to appoint and consult with an advisory committee consisting of interested parties. § 10727.8.

[189] For example, the Monterey Amendments to the State Water Project, negotiated secretly between DWR and state contractors in 1995, generated significant controversy and were eventually challenged. *See* Planning & Conservation League v. Dep't of Water Res., 100 Cal. Rptr. 2d 173 (Cal. Ct. App. 2000); Antonio Rossmann, *Third District Court Of Appeal Strikes Down Monterey Amendment EIR, Restores Public Role In State Water Project,* 11 Cal. Water L. & Policy Rep. 29 (Nov. 2000), http://landwater.com/wp-content/uploads/2007/07/monterey-eir-strick-down.pdf.

[190] See § 10723(b).

[191] § 10723.2.

[192] § 10723.4.

[193] § 10727.8.

[194] § 10720.3.

[195] § 10727.8.

[196] *See* § 10728.4 (providing that the GSA must "review and consider comments from any city or county that receives notice pursuant to this section and shall consult with a city or county that requests consultation within 30 days of receipt of the notice.").

[197] *See* Dobbin et al., *supra* note 185.

[198] The California Public Utilities Commission, for example, regularly employs intervenor funding. *See* Cal. Pub. Utils. Comm'n, Opinion Adopting Amendments to the Intervenor Compensation Rules and Revising the Intervenor Compensation Program, Decision 06-12-041 (Dec. 14, 2006), http://docs.cpuc.ca.gov/word_pdf/FINAL_DECISION/62975.pdf. For a more detailed discussion of intervenor funding and its rationale, *see* Michael I. Jeffery, *Intervenor funding as the key to effective citizen participation in environmental decision-making: putting the people back into the picture*, 19 Ariz. J. Int'l & Comp. L. 643 (2002).

[199] *See* Kincaid & Stager, supra note 45, at 20 (noting also that there are several "options for involving parties in the GSA decision making process that are not public agencies . . . include[ing] delegating voting power to non-public agencies, creating an associate member arrangement, forming a new public agency, or drafting a legal voting arrangement"); Dobbin et al, *supra* note 185; *see also Sustainable Groundwater Management: Advisory Groups*, Cal. Dep't Water Resources, http://www.water.ca.gov/groundwater/sgm/advisory.cfm (listing a Practitioners Advisory Panel, a Tribal Advisory Group, a Non-Governmental Organization Advisory Group, an Agricultural Advisory Group, and a number of statewide and regional water agency groups); *Sustainable Groundwater Management: Communication and Outreach*, Cal. Dep't Water Resources, http://www.water.ca.gov/groundwater/sgm/outreach.cfm (last modified July 17, 2015) (describing the development of advisory groups "to address questions and concerns about specific topics and milestones of [SGMA]").

[200] Under U.S. law, Native American Reservations hold water rights as necessary for the purpose of the reservation with a priority date of the date of establishment of the reservation. *See* Winters v. United States, 207 U.S. 564 (1908); Arizona v. California, 373 U.S. 546, 600 (1963). For discussion of the Winters Doctrine, see The Future of Federal and Indian Reserved Water Rights: The Winters Centennial (Barbara Cosens & Judith V. Royster eds., 2012). When these rights are not quantified, more junior rights holders may not know how much water is available for their use in a given year and may not be able to plan effectively for times of shortage.

[201] Lawrence J. MacDonnell, *General Stream Adjudications, the McCarran Amendment, and Reserved Water Rights*, 15 Wyo. L. Rev. 313 (2015).

[202] *See Native American Water Rights Settlement Database*, U. N.M., http://repository.unm.edu/handle/1928/21727 (last visited Feb. 2, 2016). The expression of a federal preference can be found in The Criteria and Procedures for Negotiation of Water Rights Settlements set forth in Working Group in Indian Water Settlements; Criteria and Procedures for the Participation of the Federal Government in Negotiations for the Settlement of Indian Water Rights Claims, 55 Fed. Reg. 9223 (Mar. 12, 1990).

[203] Mont. Code Ann. § 85-2-701-708 (2015).

[204] For a series of articles on the settlement and related stakeholder process, including Montana's, see Barbara Cosens, *The 1997 Water Rights Settlement Between the State of Montana and the Chippewa Cree Tribe of the Rocky Boy's Reservation—The Role of Community and of the Trustee*, 16 UCLA J. Envtl. L. & Pol'y 255 (1998); Barbara Cosens, *Farmers,Fish, Tribal Power, and Poker: Reallocating Water in the Truckee River Basin, Nevada and California*, 10 U.C. Hastings, West-Northwest: J. Envtl. L. & Pol'y 89 (2003); Barbara Cosens, *A New Approach in Water Management or Business as Usual? The Milk River, Montana*, 18 J. Envtl. L. & Litig. 1 (2003); Barbara Cosens, *Water Dispute Resolution in the West: Process Elements for the Modern Era in Basin-Wide Problem Solving*, 33 Envtl. L. 949 (2003).

[205] In one specific case, the high level of public engagement has resulted in a continued collaboration among communities and a Tribe to establish a rural drinking water system. *See Home*, Rocky Boy's N. Cent. Mont. Regional Water Supply Sys., http://www.rockyboynorthcentral.com/ (last visited Feb. 2, 2016).

[206] SGMA provides that GSAs shall "consider the interests" of a range of stakeholders . Cal. Water Code § 10723.2 (West 2015). California Water Code section 10720.3(c) explicitly gives federally recognized Indian tribes the option for voluntary full participation in preparation or administration of GSPs or GMPs though a JPA or other agreement with local agencies.

[207] See *supra* p. 16 (discussing "Local and state roles in groundwater governance").

[208] *Supra* note 206.

[209] *See* § 10723.2; *see also* Kincaid & Stager, *supra* note 45, at 17 (discussing delegating voting or board seats in a GSA to non-public agencies).

[210] Kristin Dobbin et al., Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation (2015), http://www.cleanwateraction.org/publication/collaborating-success-stakeholder-engagement-sustainable-groundwater-management-act-impl; Kincaid & Stager, *supra* note 45.

[211] *See*, *e.g.*, Kincaid & Stager, *supra* note 45, at 17 (discussing options for voting rules under JPA agreements).

[212] Magnuson-Stevens Fishery Conservation and Management Act, 16 U.S.C. § 1852(b)(2)(B) (2012).

[213] *See* Eagle et al., *supra* note 178, at 5.

[214] *See id.* at 15.

[215] *See id.* at 17–18; Oliver A. Houck, *On the Law of Biodiversity and Ecosystem Management,* 81 Minn. L. Rev. 869, 946–47 (1997) (describing crashing Atlantic cod populations).

[216] *See* NOAA Fisheries, Status of Stocks 2014: Annual Report to Congress on the Status of U.S. Fisheries (2015).

[217] *See, e.g.,* 16 U.S.C. § 1852(h)(6) (limiting fishery management councils' discretion to disregard the recommendations of their scientific advisors); § 1853(b)(15) (requiring that plans avoid overfishing).

[218] But note that accountability has been described in a number of ways in scholarship on governance. *See* Richard Mulgan, *"Accountability": An Ever-Expanding Concept?*, 78 Pub. Admin. 555 (2002).

[219] Roderick A.W. Rhodes, Understanding Governance: Policy Networks, Governance, Reflexivity and Accountability (1997).

[220] Juliet Christian-Smith & Kristyn Abhold, Union Concerned Scientists, Measuring What Matters: Setting Measurable Objectives to Achieve Sustainable Groundwater Management in California (2015), http://www.ucsusa.org/sites/default/files/attach/2015/09/measuring-what-matters-california-sustainable-groundwater-report.pdf

[221] For more information about the program, *see National Pollutant Discharge Elimination System (NPDES)*, U.S. Envtl. Prot. Agency, http://water.epa.gov/polwaste/npdes/ (last updated Jan. 27, 2016).

[222] *See id.* (providing links to cites with additional information about monitoring and enforcement).

[223] *See* William L. Andreen, *Success and Backlash: The Remarkable (Continuing) Story of the Clean Water Act*, 4 Geo. Wash. J. Energy & Envtl. L. 25, 25–26 (Winter 2013).

[224] *See About OIG*, U.S. Envtl. Prot. Agency, http://www.epa.gov/oig/about.html#Who_What_Why (last visited Sept. 18, 2015).

[225] *See* Cal. Water Code § 10726.6(d) (West 2015).

[226] *See* §§ 10726.6(b)–(e).

[227] *See* §§ 10726.8(a), (c), (f); *but see* § 10726.8(d).

[228] *See* § 10722.2.

[229] *See* § 10733.2

[230] *See* §§ 10733, 10733.4, 10733.8.

[231] *See* §§ 10735.2(a)(3), (5), (b). SWRCB can ask DWR to assess the adequacy of GSPs and their implementation. *See* § 10735.2(b).

[232] *See* § 10735.2.

[233] *See* §§ 10735.4, 10735.6, 10735.8.

[234] *See* §§ 10736.6. This authority applies only to basins that are subject to an investigation or proceeding under Chapter 11 (i.e., after the probationary designation process has been initiated).

[235] For a critical review, including a discussion of ambiguities of the effects of transparency, *see* Stephen Kosack & Archon Fung, *Does Transparency Improve Governance?*, 17 Ann. Rev. Pol. Sci. 65 (2014).

[236] Louis D. Brandeis, *What Publicity Can Do*, Harper's Weekly 10, 10 (Dec. 20, 1913).

[237] Andrew K. Schnackenberg & Edward C. Tomlinson, *Organizational Transparency: A New Perspective on Managing Trust in Organization-Stakeholder Relationships*, J. Mgmt. (Mar. 2014).

[238] *See* Cal. Water Code § 5200 (West 2015).

[239] *See* §§ 10723(b), 10723.8(b). Complete notification includes information about: (1) service area and basin boundaries, (2) "the resolution forming the new agency," (3) "any new bylaws, ordinances, or new authorities adopted by the local agency," and (4) "[a] list of interested parties developed pursuant to Section 10723.2 and an explanation of how their interests will be considered in the development and operation of the groundwater sustainability agency and the development and implementation of the agency's sustainability plan." § 10723.8(a).

[240] *See* § 10723.4.

[241] *See* § 10733.2(e).

[242] *See* §§ 10725.2(c), 10728.4. A GSA must provide notice of the proposed adoption of a GSP on its web site (and via email to those who request it). *See* § 10725.2(c).

[243] § 10728 (requiring data on groundwater elevation, annual aggregated groundwater extraction, surface water used for/available for recharge or in-lieu use, total water use, and change in groundwater storage).

[244] §§ 10730(b), (c), 10730.2(c).

[245] Effective June 24, 2015, S.B. 83 requires well completion reports to be made available to the public upon request. *See* §

13752; *see also* § 13751(a)(2).

[246] *See* Cal. Gov't Code §§ 54950–54963 (West 2015).

[247] *See* §§ 6250–6270.

[248] *See* Eagle et al., *supra* note 178.

[249] Montana's requirements for open meetings are derived from both statutory and State Constitutional sources. Article II Section 9 of the Montana Constitution addresses the right to know, and Article II Section 8 address the right of public participation. These principles are incorporated in Montana's open meetings laws at Mont. Code Ann. §§ 2-3-201 through 2-3-221 (2015).

[250] An Act Relating to the Notice, Hearing, Rulemaking, and Permitting Procedures for Groundwater Conservation Districts, Tex. H.B. 1763, 79th Reg. Sess., ch. 970 (2005) (codified at Tex. Water Code §§ 16.053, 36.001, 36.101, 36.1011, 36.1071, 36.1072, 36.1073, 36.108, 36.109, 36.113, 36.1132, 36.114, 36.116, 36.3011, 36.302, 36.304, 36.3705, 36.401–31.419 (West 2015)) [hereinafter Tex. H.B. 1763].

[251] Tex. Water Code § 36.108(d).

[252] Factors identified in Texas Water Code section 36.108(d) that are to be discussed in the explanatory report include:

1. aquifer uses or conditions within the management area, including conditions that differ substantially from one geographic area to another;
    a. for each aquifer, subdivision of an aquifer, or geologic strata and
    b. for each geographic area overlying an aquifer
2. the water supply needs and water management strategies included in the state water plan;
3. hydrological conditions, including for each aquifer in the management area the total estimated recoverable storage as provided by the executive administrator, and the average annual recharge, inflows, and discharge;
4. other environmental impacts, including impacts on spring flow and other interactions between groundwater and surface water;
5. the impact on subsidence;
6. socioeconomic impacts reasonably expected to occur;
7. the impact on the interests and rights in private property, including ownership and the rights of management area landowners and their lessees and assigns in groundwater as recognized under Section 36.002;
8. the feasibility of achieving the desired future condition; and,
9. any other information relevant to the specific desired future conditions.

[253] Tex. H.B. 1763.

[254] Petitions are accessible online at *Appal of Desired Future Conditions*, Tex. Water Dev. Bd., http://www.twdb.texas.gov/groundwater/petitions/index.asp (last visited Feb. 2, 2016).

[255] Rima Petrossian et al., Balancing the Groundwater Checking Account Through House Bill 1763 (2007), https://www.twdb.texas.gov/groundwater/docs/Balancing_the_Groundwater_Checking_Account.pdf.

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