



Agency-Level Incentives and Collaborative Governance: State Mandates and Sustainable Groundwater Management in California

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**Agency-Level Incentives and Collaborative Governance:
State Mandates and Sustainable Groundwater Management in California**

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Abstract

Most studies in collaborative governance examine how system-level variables drive collaboration, yet few have focused on how agency-level incentives shape local governing entities' responses to mandates for collaboration imposed by higher-level governments. By examining the implementation of the Sustainable Groundwater Management Act, a large-scale governance reform experiment passed by the California legislature in 2014, the authors show that various types of local entities diverge in their collaboration choices due to differences in organizational capacity, issue salience, and the interests they represent. Compared with independent water districts, two other types of special districts—community services districts and dependent water districts—are more likely to participate in consolidated governance. By contrast, irrigation districts are less likely to do so, while cities exhibit no differences. Counties are more likely than independent water districts to be part of consolidated governance only if groundwater management is a highly salient issue within their jurisdictions.

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Introduction

A common theme in the collaborative governance literature concerns drivers for collaboration. Several theoretical frameworks exist that examine how various system-level variables—power-resource knowledge asymmetries, prior experience of cooperation or conflict, the presence of facilitative leadership, uncertainty, collaborative risk, transaction costs, interdependence, consequential incentives—drive collaboration among institutional actors (Feiock 2013; Emerson et al., 2012; Ansell and Gash 2008). Few studies in collaborative governance, however, have focused on how various kinds of agencies approach collaboration differently due to the divergence in their missions and the interests they represent. A focus on agency-level characteristics and incentives may help connect research in collaborative governance to the broader literature on collective action and common-pool resource governance, which emphasizes how actors with divergent stakes may differ in their responses to collective-action dilemmas (Ostrom 2005; Shami 2012).

One notable exception in the collaborative governance literature that examines this connection is Thomas (2003), who draws on in-depth case studies in California and examines how unique circumstances of different types of government agency officials drive their approaches to collaborative efforts in biodiversity preservation. He shows, for example, that line managers in agencies are concerned about preserving managerial autonomy, but they are more willing to support interagency collaboration if they believe such efforts can help protect the agency from potential legal challenges by environmental activists. Thomas's work has enhanced our understanding of how agency-level and intra-agency level incentives affect collaborative governance. Questions, however, remain as to what extent concerns for managerial autonomy

may generalize to other policy arenas and how these concerns differ systematically across various types of federal and state agencies as well as local governing entities.

As argued by Mullin (2009), among local governing entities, general-purpose governments such as cities and counties differ systematically from special districts in their functional scopes, representational structures, policy preferences, and approaches to interlocal cooperation. In general, compared with general-purpose governments, special districts may face higher costs in coordinating with other autonomous governing units due to their more limited functional scope and overlapping boundaries with other jurisdictions. Yet, our understanding is quite limited regarding how different institutional structures and related incentives would drive collaboration between special-purpose and general-purpose governments. In addition, as noted by Mullin (2009), “special districts are not all the same” (p. 184). Independent districts, for example, differ from dependent districts in terms of their functional activities, as well as accountability and responsiveness to their constituencies (Mehay 1984). Because of these differences, they diverge in their agency-level incentives to participate in collaborative governance. Theoretical approaches to collaborative governance have yet to account adequately for this diversity of special districts.

Another common theme of the collaborative governance literature is how agencies get to recognize the need to collaborate with each other to solve commons or wicked problems. The implicit assumption is that the collaborative process results from shared concerns about common problems and voluntary participation. But as noted by Emerson et al., (2012) and Tang and Mazmanian (2010), increasingly collaborations among local agencies directly result from mandates from higher-level governments. Varying in their specific requirements and guidelines for collaboration, these mandates are known to have divergent effects on intergovernmental

cooperation. Some scholars focus on the design of mandates and examined how the institutional framework and goal clarity set up by the state may support effective collaborative governance at the local level (Blomquist, Schlager, and Heikkila 2004; Mullin 2009). Other scholars draw on local perspectives and find that the success of mandated collaboration is contingent on such local factors as prior collaborative experience, as well as agencies' financial interests, capacity and process management (Brummel, Nelson, and Jakes 2012; Lewis, Boulahanis, Matheny 2009).

A few scholars have focused on how differences in institutional types shape local agencies' responses to collaboration mandates. Caruson and MacManus (2006), for example, show that cities and counties differ in perceptions on the impacts of state and federal homeland security mandates, with city officials feeling more burden on the financial side and county officials feeling more burden on administrative tasks. They also find that counties form more extensive networks with all types of special districts, while cities selectively choose their special district partners. Their work, however, does not examine specifically how differences in institutional structures among local governments drive their divergent responses to collaboration mandates from higher-level governments.

When these two themes—agency-level incentives and mandated collaboration—are considered together, an important research question is, when collaborative governance emerges among local government entities out of externally-imposed mandates, how do agency-level characteristics drive the incentives and approaches to collaboration? And how do these characteristics map onto different types of local governing entities? In this paper, we argue that with externally-imposed requirements, local government entities are forced to choose collaborative and governing arrangements before a deadline no matter whether they have prior trust and experience in working together. When being forced to make these choices, their instinct

is to focus on their agency-level priorities. If their fundamental interests are at stake, they tend to be more risk-averse and take those actions that they believe would best protect their existing rights. Those who have the highest stake and the most to lose potentially would try to hold off and to preserve their autonomy as much as possible before entering into any long-term collaborative arrangements. But agency instincts for delaying commitments to collaboration can be mitigated by organizational capacity for collaborative engagement and issue salience within each entity's jurisdiction. These agency-level characteristics and incentives can be mapped onto different types of general-purpose and special-purpose governments, thus enabling us to make sense of why various types of local entities approach mandated collaboration differently.

We examine these agency approaches to mandated collaborative governance within the context of a large-scale governance reform experiment that was recently launched and is still going on: the implementation of California's Sustainable Groundwater Management Act (SGMA). Passed in 2014, the legislation requires hundreds of local agencies that are involved in groundwater use and management to form groundwater sustainability agencies (GSAs) by June 30, 2017. Those agencies that fail to form or participate in a GSA face the risk of the state taking over the management of the groundwater basin. Although framed as a mandate with specific deadlines, the legislation also allows for considerable flexibility on how local agencies may fulfill GSA formation requirements and participate in the subsequent planning and management processes that will unfold in the next two decades. Specifically, they can make their own decisions in choosing local agency partners to create an interorganizational GSA at any scale. This ongoing governance reform provides a valuable window for examining how collaborative governance unfolds under the shadow of a state mandate.

Several factors shape local government entities' incentives to participate in forming consolidated governance, which is a more intensive form of collaboration than fragmented governance, to meet the June 2017 filing deadline. Specifically, the more an entity represents concentrated interests in groundwater use and management, the less motivated it is to participate in consolidated governance early on in the process. Local entities with higher organizational capacity for collaborative engagement are more likely to work with others in forming consolidated governance early on in the process. If groundwater use and management is an issue of higher salience within its jurisdiction, the entity is more likely to engage in consolidated governance early on in the process.

Our empirical analysis shows that these factors affect various types of local entities—cities, counties, and different types of special districts—in divergent ways. Compared with independent water districts, two other types of special districts (i.e., community services districts and dependent water districts) are more likely to be part of consolidated governance. This is because the latter set of agencies are more likely to be associated with factors that motivate their participation in consolidated governance early on. In contrast, irrigation districts are less likely to participate in consolidated governance, especially because they tend to serve concentrated interests that are concerned about preserving their existing rights to groundwater. Cities are not different from independent water districts in their responses since groundwater is not a salient issue for cities as they generally lack purveyor rights to groundwater. Counties are more likely than independent water districts to be part of consolidated governance only if groundwater management is a highly salient issue within their jurisdictions. These results show how several inherent features of a local entity may shape its response to the collaborative governance mandate.

In the rest of the paper, we first provide some further details about SGMA. Next, we develop arguments and hypotheses that connect agency-level characteristics and incentives to different types of general and special-purpose governments and their likelihood to be participating in consolidated governance during the initial stage of SGMA implementation. Then we report the results of our empirical analyses. We conclude by discussing how our arguments and findings relate to the broader literature on collective action and common-pool resource governance as well as the implications for public managers.

Mandated Collaboration: California's Sustainable Groundwater Management Act

California has a long tradition in which local actors (i.e., government entities such as cities, counties, special districts, water companies, and other institutional actors) negotiated among themselves and developed self-governing institutions to resolve commons dilemmas in the use of groundwater basins (Blomquist 1992; Ostrom 1990). Under appropriate circumstances, local actors were indeed able to develop long-term solutions to local commons dilemmas without direct interventions from external authorities.

By 2014, however, the California state legislature recognized that more than 20 percent of 515 groundwater sub-basins were facing sustainability crises and that an exclusive reliance on local initiatives would be insufficient to guarantee their long-term sustainability.¹ The legislature passed the Sustainable Groundwater Management Act (SGMA), which mandates local governing entities in the sub-basins that are identified by the California Department of Water Resources

¹ A sub-basin is a governing and management unit for groundwater basins in California by the Department of Water Resources.

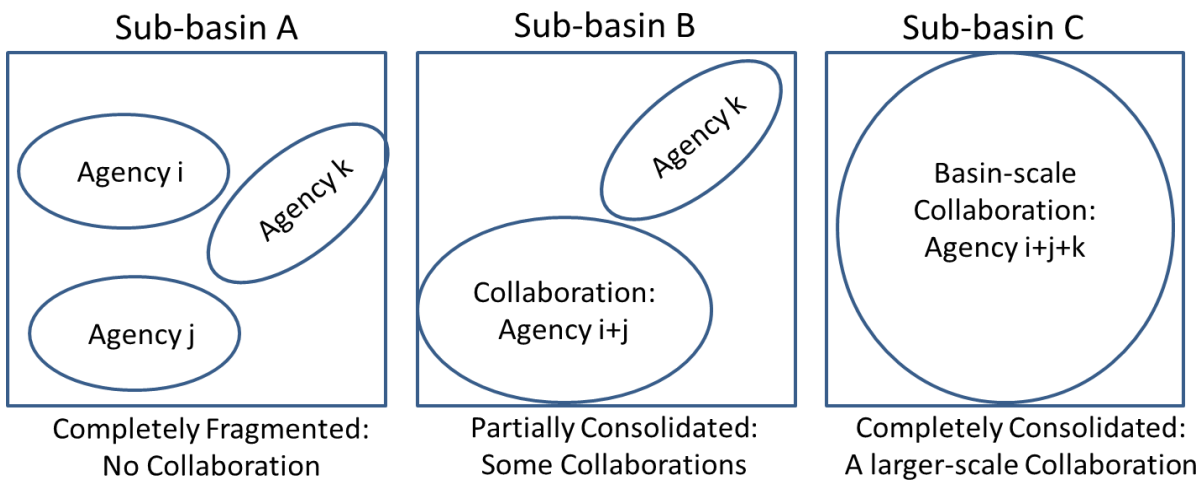
(DWR) as “high- or medium-priority” to form new groundwater sustainability agencies (GSAs) by June 30, 2017 and develop and implement groundwater sustainability plans (GSPs) in subsequent years.

As a top-down mandate, SGMA also allows local governing entities considerable flexibility in their choice of specific responses. For example, boundaries of GSAs are not required to match exactly the boundaries of a groundwater sub-basin. Multiple GSAs are allowed within one sub-basin, but in this case, all the GSAs within that sub-basin are required to work together to produce a single GSP to attain sustainability for the sub-basin. The state would also provide grants to facilitate GSA formation and subsequently processes for developing GSPs. Once a GSA is formed, it is empowered by state laws to implement reporting, monitoring, and pumping-limit requirements on groundwater users. By attaining GSA status, local governing entities may also acquire additional authority that they did not possess before, such as levying new fees on users and requiring the metering of water usage.

In the event that no local entities seek to form any GSA, the state would choose to impose its own rules on the use of water from the groundwater sub-basin. Hence, local entities that fail to participate in forming GSAs risk losing control to those that choose to form one. The state mandate also encourages local entities to consult with a large array of interests, especially those of underprivileged groups, when forming GSAs and GSPs. The June 2017 deadline for GSA formation has now passed. A total of 478 local entities participated in forming 263 GSAs for 143 sub-basins throughout the state. Some entities have formed their own stand-alone GSAs; some have become members of a consolidated GSA shared with other local entities; some have become members of several GSAs. As a result, the governing structures that emerged from the June 2017 deadline vary considerably in degrees of consolidation.

Figure 1 shows three possible collaboration choices. Sub-basin A is the case of a completely fragmented governing structure in which no collaboration through GSAs has occurred. Tracy sub-basin is an example of this choice in which 13 agencies took independent actions and formed 13 separate GSAs. In contrast, in sub-basin B, some collaborations took place and led to the formation of several inter-organizational GSAs, while other agencies maintained their stand-alone GSAs making the overall governing arrangement of the sub-basin partially consolidated. South American sub-basin is an example of this choice in which 12 agencies formed six different GSAs; seven agencies among them created a single inter-organizational GSA, while the remaining five created their own stand-alone GSAs. Lastly, sub-basin C represents the most extensive and largest scale collaboration, as all entities in that sub-basin created a single GSA. Owens Valley sub-basin is such a choice where 11 agencies jointly created one inter-organizational GSA.

Figure 1: Agency’s Collaboration Choices via GSA and Basin Governance Structures



It remains an unanswered question as to whether a consolidated approach or a fragmented approach to governance adopted for the June 2017 deadline will produce better sustainability

outcomes in the long term. Actual long-term outcomes are likely to depend on further collaborative arrangements and boundary modifications that will be adopted subsequent to the June 2017 GSA formation deadline. Non-institutional factors such as size of the basin and heterogeneity of stakeholders may also affect what governance structures are feasible for meeting the June 2017 deadline (Milman et al. 2018; Conrad et al. 2016). Despite these considerations, the adoption of subbasin-wide consolidated governance does indicate that local entities were able to overcome many collective action, transaction costs, and distributive problems early on in the process. Our research question is then, to what extent the inherent interests, concerns, and capacity of individual entities affect their likelihood of participating in consolidated governance early on in the SGMA process. Answers to the question may shed light on how these agency-level characteristics shape subsequent collaborative processes.

Who is More Likely to Participate in Consolidated Governance

Several types of government entities may form or participate in GSAs, including counties, cities and various types of special districts (i.e., independent water districts, irrigation districts, community services districts, and dependent water districts). Several factors may shape the incentives and capability of these government entities to participate in consolidated governance of a groundwater basin. The first factor involves the extent to which an entity represents the interests of a highly concentrated group of stakeholders. When a relatively small and well-defined group of stakeholders exists, this group can get organized and exert considerable influence on the agency's mission and agenda (Wilson 1995).

For example, the Central Valley in California is home to many irrigation districts, whose exclusive responsibility is to manage water supply issues for farmers. Some irrigation districts

may be serving only dozens of medium to large-scale farms. Such entities represent the most highly concentrated interests than any other government entities related to SGMA. In contrast, the county represents the most diffuse interests among all the local entities, as it has multiple responsibilities and faces multiple constituencies, in both urban and rural areas. For entities that have a highly concentrated group of stakeholders, maintaining control of the groundwater basin is a key priority. For these entities, being part of a consolidated governance structure could mean a potential loss of control of their own rights to water from the basin. Each entity's instinct could be to form its own GSA first in order to ensure that it is on solid legal ground in protecting their existing rights in subsequent sustainability planning and management processes.

The second factor concerns organizational capacity. Several elements may contribute to an entity's organizational capacity for collaborative engagement (Agranoff and McGuire 1998; Emerson et al. 2012). In general, larger entities such as counties and cities have larger revenue sources that enable them to support collaborative activities out of the entity's general funds. Many water and irrigation districts have relatively small budgets, funded exclusively by fees paid by water users. They simply don't have the organizational capacity to engage other far-away entities. On the other hand, some special district officials may have extensive social and professional connections with their counterparts in the same area, which can facilitate collaboration among themselves. Yet in comparison with cities and counties, highly specialized districts may be perceived as being parochial in their interests and concerns; thus they are less likely to be recognized by entities that don't share their common interests. Overall, the more an entity has elements that support its organizational capacity for collaborative engagement, the more likely it would be participating in consolidated governance.

The third factor relates to issue salience, that is, to what extent groundwater management is a major concern for the key constituencies of an entity (Epstein and Segal 2000). As suggested by Mullin (2009), if a certain water-related problem is severe and a major policy concern in an area, the responsible governing entity will work harder to find solutions to the problems and to partner with neighboring entities to find solutions. For water and irrigation districts, groundwater use and management is obviously an issue of high salience for their constituencies. The same, however, does not apply to all counties and cities. Some cities and counties may not have any connections to groundwater sustainability issues at all.²

Among the counties that responded to SGMA, the salience of groundwater use and management issues varies. For example, counties in the Central Valley that rely heavily on groundwater for both agricultural and domestic use, groundwater sustainability is a highly salient issue for the county government. For counties that have no substantial use of groundwater, SGMA is not an issue at all. For counties that have limited exposure to groundwater sustainability problems, SGMA is an issue they need to deal with but not highly salient from the perspective of the county supervisors. In general, the more salient is the issue of groundwater use and management in an entity, the more likely it would be willing to work with other entities in groundwater sustainability issues and to participate in consolidated governance.

How do these three factors map onto different types of local entities in shaping their incentives and capabilities in participating in consolidated governance? Table 1 highlights the connections.

² Among the 58 counties in California, 42 of them formed or participated in GSAs. Among the 482 cities in the state, only 115 of them formed or participated in GSAs.

Table 1: Factors Affecting Likelihood of Participating in Consolidated Governance

	Representing concentrated interests	Organizational capacity for collaborative engagement	Issue salience	Compared with water districts, how likely would this type of agency participate in consolidated governance
Independent Water Districts	Medium to high	Low to medium	High	Baseline
Irrigation Districts	High	Low	High	Less
Community Services Districts	Medium	Low to Medium	Medium	More
Dependent Water Districts	Low to medium	High	Medium to high	More
Cities	Low	Medium	Low to Medium	No significant difference
Counties	Low	High	Varies, depending on local conditions	More only if groundwater use is a highly salient issue in the county

As mentioned earlier, 478 local entities participated in the formation of GSAs. Among them, the most numerous type is *independent water districts*, totaling 207. Independent water districts can exist in different legal forms such as joint power authority, general act district, or special act district. They are independent of cities and counties, and have their own boards, whose members may be directly elected or appointed for a fixed term by other related government entities. Water districts have different water-related responsibilities and different names such as Water Management District, Groundwater Authority, Reclamation District, Water and Sewer District, and Flood Control and Water Conservation District. Since their main responsibility is water management, most water districts represent concentrated interests in

groundwater issues. Nonetheless, there are still some variations in the extent of interest concentration among them, as some water districts may be more or less dependent on groundwater, and some may have other responsibilities such as surface water management and flood control.

Independent water districts also vary in their financial capacity, based on the amount of water they control and the fees they levy on their customers. The Metropolitan Water District of Southern California, for example, is a large organization serving over 10 million water users and has considerable organizational resources to support any collaborative engagement as it sees fit. But the vast majority of water districts in the state serve limited numbers of customers and have limited organizational resources for collaborative activities. Yet groundwater use and management is a highly salient issue for water districts. So they have high incentives to form and participate in GSAs. Given that independent water districts are the most numerous among participating entities in GSAs, we use this particular type of entity as the baseline in our empirical analysis.

Among the 478 entities that participated in GSA formation, 55 are irrigation districts. Irrigation districts can be considered as a form of independent water districts, but the former have their unique role in GSA formation, because they usually serve even more highly concentrated interests than other independent water districts do. Irrigation districts generally serve small numbers of farmers who are highly sensitive to losing any current rights to their existing water sources. Some may have an incentive to partner with other local entities to help meet the SGMA mandate and at the same time to protect their water rights. In general, irrigation districts prefer to form their stand-alone GSAs first as a defensive mechanism for protecting their independent voice when the process moves forward to the planning and management phases. Of

course, this does not preclude them from collaborating with other GSAs down the road in the SGMA planning and management process.

H1. Compared with independent water districts, irrigation districts are less likely to participate in consolidated governance.

Another type of independent districts is *community services districts*, which usually provide an array of public and infrastructure services, with water use and management as only one of many services they provide. Hence, both the degree of concentrated interests and salience of groundwater issues are usually lower in community services districts than in independent water districts, which have an exclusive water resource focus. Yet because of the multiplicity of services they provide, they tend to be larger in scale and have greater organizational resources for collaborative activities. They may also be perceived as representing broader societal interests than independent water districts. Only 35 community services districts participated in GSA formation. When they do, they are more likely to participate in consolidated governance than independent water districts.

H2. Compared with independent water districts, community services districts are more likely to participate in consolidated governance.

In contrast to independent water districts that have their own governing boards, *dependent water districts* are more strongly tied to a general-purpose government such as a city or a county. Usually, dependent water districts don't have their own governing boards, and a city council or a board of county supervisors serves as a dependent water district's governing board. In other words, even though they have special district status, dependent water districts function as an extension of a city or county. Yet they are different from a regular city or county

department, as they have a dedicated mission in water-related issues. Dependent water districts can also benefit from being a part of larger personnel, procurement, administrative systems in a sizable governing entity. They tend to have a greater organizational capacity for engaging in collaborative activities. Overall, in comparison with independent water districts, dependent water districts are less enticed to a narrow set of concentrated interests as they ultimately answer to the city or county, which represent broader interests. They have a stronger organizational capacity for collaboration and see groundwater issues as being moderately or highly salient. Only 11 dependent water districts participated in GSA formation. When they do, they are more likely than independent water districts to be part of consolidated governance.

H3. Compared with independent water districts, dependent water districts are more likely to participate in consolidated governance.

Out of California's 482 municipalities, only 115 are involved in SGMA. Cities that have significant numbers of customers who rely on groundwater water sources are motivated to form GSAs or working with other GSAs. Otherwise, cities would not get involved. Cities are usually not water purveyors themselves, but they are users, mostly for domestic purposes. Compared with independent water districts, cities do not have highly concentrated interests in groundwater use and rights, and they have more administrative resources at their disposal to engage in collaborative activities. Considering these factors, one might think that cities would be more likely to participate in consolidated governance. However, groundwater use and management is usually an issue of low to medium salience in cities; on that count, cities may not be highly motivated to take up a leadership role in forming a GSA or coordinating with other public agencies in a GSA. Thus, on balance, the likelihood of cities participating in consolidated governance may not be significantly different from that of independent water districts.

H4. Cities are similar to independent water districts in their likelihood of participating in consolidated governance.

As mentioned earlier, 42 out of 58 counties in California participated in GSA formation. Similar to cities, counties don't usually have highly concentrated interests in groundwater use and management. Being the largest land use authority in a region, a county has the inherent right to form a GSA. The county is likely to declare itself a GSA if no other groups step forward to form one. But if some groups have already done so, the county would seek to work with these groups. Among all local entities, counties usually have the most administrative and technical resources at their disposal if they decide to engage in collaborative activities. Groundwater issues vary in salience across counties, and the issue salience is centered around how much a county uses and benefits from directly pumping groundwater or whether they have constituencies that have strong needs for groundwater. In general, counties that face greater issue salience in groundwater would dedicate more resources to address the problem, and they are also more likely to take leadership in convening various stakeholders for consolidated governance. Other counties that do not perceive high problem severity in groundwater use would not take any political leadership role for such coordination.

H5. Compared with independent water districts, counties are more likely to participate in consolidated governance only if groundwater use is a highly salient issue in the county.

Data and Methods

1) Data

Our primary data were drawn from the SGMA portal database compiled by the California Department of Water Resources. This database tracks all GSA application files from 143 sub-basins that were subject to SGMA regulations. Any agencies that decided to become their own stand-alone GSAs are captured by this data source; however, agencies that jointly created a GSA are not directly listed. In most cases, the portal database allows for users to identify the constituent agencies that are part of such multi-agency GSAs, either in their description files or in their agreement attachments (e.g., JPA, MOA, MOU). For other cases in which the constituent agencies were not clear, we visited each GSA's website or used secondary data sources to compile the agency-level information.³ This data collection process enabled us to identify 478 agencies that participated in GSA formation. Some agencies are present in several sub-basins. Accounting for this fact, our final data lists 674 agency-subbasin observations.

Table 2 lists all GSA-participating organizations by their agency type. Independent water districts comprise 39 percent of all agency-subbasin observations; the number drops to 10 percent for irrigation districts, 6 percent for community services districts, and 4 percent to dependent water districts.⁴ Cities and counties make up 20 percent apiece. Lastly, not many private mutual companies participated in GSAs as formal participants; their sample size is quite low at around 2 percent.

³ It should be noted that the SGMA portal database only lists the agencies that have participated in GSA formation, but not other agencies that haven't. For example, our subsequent phone interviews with several GSA and agency managers indicated that, very small special districts often do not choose to participate in GSAs because of highly limited financial resources they can afford. As such, our data allow us to examine the entities that have participated in the ongoing GSA activities.

⁴ The dependent water districts in our data are essentially county water agencies or flood control and water conservation districts that provide services to the entire county.

Table 2: Number and Percent of Agencies by Types

Agency Type	Number of Observations	Percent	*Unique Number of Agency
Independent Water District	263	39.02	207
Irrigation District	67	9.94	55
Community Services District	42	6.23	35
Dependent Water District	28	4.15	11
City	129	19.14	115
County	132	19.58	42
County without Water Department	61	9.05	21
County with Water Department	71	10.53	21
Private Mutual Company	13	1.93	13
Total	674	100.00	478

* Note: Each agency is counted only once whether they are showing in multiple sub-basins or not. Counties are further divided into two groups based on whether they have water departments or not. The presence of water departments serves as a proxy for the salience of groundwater issues to county services (more on this below).

Looking at the subbasin-scale governing structures, which reflect participating agencies’ preferences on modes of collaboration, table 3 shows that 61 percent of sub-basins are completely consolidated with a single GSA. The remaining 39 percent of sub-basins are either those that are totally fragmented with multiple agencies forming their own stand-alone GSAs (22 percent) or those that are partially consolidated with a mix of multi-agency GSAs and individual stand-alone GSAs (17 percent).

Table 3: Distribution of Sub-basins by Collaboration Choices

Type of Sub-basin	Number	Percent
Completely Fragmented	32	22.38
Partially Consolidated	24	16.78

Completely Consolidated	87	60.84
Total	143	100.00

2) Variables

Our goal is to examine if agency types relate to their likelihood of participating in consolidated governance. Our empirical methods include descriptive analysis such as chi-squared test as well as regression analysis that features binary and ordered logistic regression and linear regression, each of which measures the dependent variable in a different way.

Dependent variables: Our dependent variables measure the extent to which governance of the groundwater sub-basin is consolidated. Three separate measurements were used in our analysis.

1) Binary measurement: The groundwater sub-basins that developed a completely consolidated governing structure are coded 1 and 0 otherwise. This is the measurement explored by Milman et al. (2018).

2) Categorical measurement: As shown in figure 1, this categorical measurement considers the differences between sub-basins that are completely fragmented and those that are partially fragmented/consolidated. Three categories (completely consolidated, partially consolidated, and completely fragmented) are rank ordered such that completely consolidated sub-basins are coded as 3, followed by partially consolidated ones, coded as 2, and completely fragmented ones, coded as 1. This measurement is finer than the dichotomous variable explored by previous research, which only considered whether the sub-basin is completely consolidated or not.

3) Continuous scale: While categorical measurement distinguishes partially fragmented sub-basins from completely fragmented ones, it does not differentiate the level of fragmentation and/or consolidation among the group of sub-basins that are partially fragmented/consolidated. Consider, for example, the differences between Colusa and Eastern San Joaquin sub-basins in which there were 21 agencies respectively. In Colusa basin, these agencies created only two large multi-agency GSAs, whereas, in Eastern San Joaquin basin, seven agencies formed two multi-agency GSAs with the remaining 14 agencies being stand-alone GSAs. Arguably, the latter case is much more fragmented than the former case, however, this difference is not captured by the binary measurement, nor by the categorical measurement; in categorical measurement, both cases are lumped together in the same group of being partially consolidated.

Therefore, a finer measurement ought to capture the degree to which a basin is partially fragmented. To measure fragmentation on a continuous scale, we used the Herfindahl index—a measure of market power concentration.⁵ A value that is closer to 1 indicates the basin is close to being completely consolidated and a value that is near 0 indicates the basin is close to being completely fragmented. In this way, basins that are partially consolidated/fragmented will take any value between the two. According to this approach, the level of consolidation in Colusa sub-basin is 0.51, whereas the corresponding measure in Eastern San Joaquin sub-basin is 0.09. A total of 24 sub-basins in the partially consolidated group were assigned the corresponding values.

Independent variables: Our independent variables are a set of mutually exclusive binaries that measure if the entity is a particular institutional type: 1) independent water district, 2) irrigation

⁵ This index is calculated as follows. $\sum_{i=1}^n (GSA_i)^2$, where i indicates the share of agencies in i_{th} GSA in that sub-basin.

district, 3) community services district, 4) dependent water district, 5) city, 6) county, and 7) private mutual company.⁶ In addition, to test H5, which differentiates counties with high issue salience from those with low issue salience, we characterize counties based on whether they have dedicated organizational structures for addressing groundwater issues. We define counties that have either water departments or water-related divisions as those facing high issue salience. Other counties that have no such organizational arrangements are classified as having low issue salience. The rationale behind this classification is that if groundwater is not a salient issue among many others that a county addresses, the county wouldn't need to have a separate, specialized water department or division. In other words, in areas where groundwater is an important policy issue, the county government would have established water departments or divisions to handle the issue.

3) Methods

We first present descriptive analysis to identify the patterns of governance choices by each agency type. The most basic step is tabulating observed frequencies of three governance choices by all seven agency types and comparing them to expected frequencies, which are calculated under the assumption that the two categorical variables are independent and there is no relationship. Second, we conduct a chi-squared test for each agency type against independent water districts to see if they are statistically different in their associations with three governance

⁶ In distinguishing independent water districts from dependent districts, we follow the definition used both by California Legislative Analyst's Office (2002) and the U.S. Bureau of Census. Operationally, dependent special districts have governing board members who are county supervisors, whereas independent districts have either their board members elected by voters or appointed by city or county legislators. Some independent districts adopt a mix of these governing arrangements.

choices. We also calculate Cramer's V, which measures the strength of association between these categorical variables.

After the descriptive tests, we use a series of regressions for more complete analyses. First, we estimate the likelihood of each entity participating in consolidated governance in the sub-basin, with the binary measurement as the dependent variable. Logistic regression is employed for this analysis. We then estimate the likelihood with three categorical governing structures as the dependent variable; ordered logistic regression is presented for this investigation. Lastly, we estimate the agency's likelihood of participation in *a more consolidated* governing arrangement, using the continuous measurement as the dependent variable. In all these regression models, the omitted, baseline category is independent water districts, which make up a majority of the sample. Hence, the coefficients for each entity are compared with those for independent water districts. Errors are clustered at the agency level since it is the unit of analysis.

Results

1) Descriptive Analysis

Table 4 shows the frequency of three governance choices by seven agency types. One can clearly see a pattern that some agencies are different from others in their participation in completely consolidated governance. Independent water districts, for example, participated in completely consolidated governance less frequently than what is suggested from the expected frequency, and irrigation district participated even lesser on this front. Other agencies show the opposite pattern. Dependent water districts, community services districts, and counties with water departments participated in consolidated governance far more than what the expected

frequencies suggest. In contrast, cities and counties without water departments do not show a marked divergence between observed and expected frequencies, suggesting that they may not have particular preferences for consolidated governance.

Table 5 shows the results of chi-squared test for the association between governance choices and each of the agency type, as compared to independent water districts. Irrigation districts, community services districts, dependent water districts, and counties with water departments are statistically different from independent water districts in their associations with three governance choices. Further, the comparison between observed and expected frequencies in Table A1 in the Appendix indicates that, compared with independent water districts, irrigation districts are less likely to participate in consolidated governance. By contrast, compared with independent water districts, three other entities (i.e., community services districts, dependent water districts, and counties with water departments) are more likely to participate in consolidated governance. Other entities, including cities, counties without water departments, and private mutual water companies are not statistically different from independent water districts in the associations with governance choices (at 0.05 level). Lastly, Cramer's V indicates that the association for dependent water districts is the strongest, followed by counties with water departments, irrigation districts, and community services districts among those that are statistically different from independent water districts for governance choices. Overall, although the results presented in Table 4 and 5 are not direct tests of our hypotheses, they are consistent with them.

Table 4: Tabulation for Frequency of Governance Choice by Agency Type

		Completely Consolidated	Partially Consolidated	Completely Fragmented	Total
Independent Water District	Observed	61 (23%)	157 (60%)	45 (17%)	263 (100%)
	Expected	76 (29%)	139 (33%)	48 (18%)	
Irrigation District	Observed	1 (1%)	51 (76%)	15 (22%)	67 (100%)
	Expected	19 (28%)	36 (54%)	12 (18%)	
Community Services District	Observed	20 (48%)	18 (43%)	4 (9%)	42 (100%)
	Expected	12 (29%)	22 (52%)	8 (19%)	
Dependent Water District	Observed	21 (75%)	5 (18%)	2 (7%)	28 (100%)
	Expected	8 (29%)	15 (53%)	5 (18%)	
City	Observed	40 (31%)	67 (52%)	22 (17%)	129 (100%)
	Expected	37.3 (29%)	68.3 (53%)	23.3 (18%)	
County without Water Dept.	Observed	20 (33%)	26 (43%)	15 (24%)	61 (100%)
	Expected	18 (30%)	32 (52%)	11 (18%)	
County with Water Dept.	Observed	31 (44%)	21 (29%)	19 (27%)	71 (100%)
	Expected	20 (28%)	38 (54%)	13 (18%)	
Private Mutual Water Company	Observed	1 (8%)	12 (92%)	0 (0%)	13 (100%)
	Expected	4 (31%)	7 (54%)	2 (15%)	
Total	Observed	195	357	122	674

Notes: Chi-square: 94.52. Degrees of freedom: 14. P-value: 0.000. Cramer's V: 0.26. Numbers in expected rows represent the frequencies if independency was warranted for the relationship between agency type and governance choice.

Table 5: Chi-squared Test Between Agency Types for Governance Choices

Agency Type	Pearson's χ^2	P-value	Cramer's V
Irrigation District	16.48	0.000	0.224
Community Services District	11.22	0.004	0.192
Dependent Water District	33.62	0.000	0.340
City	2.96	0.227	0.087
County without Water Dept.	5.87	0.053	0.135
County with Water Dept.	20.74	0.000	0.249
Private Mutual Company	5.70	0.058	0.144
Independent Water District	Comparison Group		

Notes: Chi-square for each row (agency type) was calculated compared with independent water district (comparison group) for three categorical governance choices (totally consolidated, partially consolidated, totally fragmented). For details, see Table A1 in the Appendix.

2) Regression Analysis

We now turn to regression analysis. We first describe the results obtained from logistic regression analysis. Largely, we observe two patterns from Table 6. First, there are systematic differences across types of special districts in their likelihood to participate in consolidated governance. In particular, irrigation districts are less likely to participate in consolidated governance than water districts are. In contrast, multi-purpose community services districts and dependent water agencies are more likely to be part of consolidated governance than independent water services districts are. These results are consistent with H1 through H3.

Second, cities are not different from independent water districts in their likelihood of participating in consolidated governance. By contrast, counties are more likely to do so if they have water departments, which indicate that groundwater management is a salient issue in the county. These results lend support to H4 and H5. Finally, private mutual water companies have no legal rights to declare themselves a GSA but may participate in one if invited by other eligible government entities. Their governance choices do not differ significantly from those of independent water districts.

Table 6: Logistic Regression Results with Binary Dependent Variable

	Coefficient	S.E.	z-statistic	P > z
Irrigation District	-2.992	1.018	-2.94	0.003
Community Services District	1.102	0.342	3.22	0.001
Dependent Water District	2.296	0.460	4.99	0.000
City	0.398	0.240	1.66	0.097
County without Water Dept.	0.480	0.309	1.55	0.121
County with Water Dept.	0.943	0.280	3.36	0.001
Private	-1.288	1.051	-1.22	0.221
Constant	-1.197	0.146	-8.20	0.000
Number of Observations	674			
Pseudo R2	0.105			

Table 7 reports the results of ordered logistic regression. By distinguishing sub-basins that are partially fragmented from those that are completely fragmented, we consider three governance choices. The results remain robust with one exception: the coefficient for the counties with water departments is still positive, but it falls short of statistical significance ($p=0.136$). But even this weak relationship is notable as it suggests that as much as counties with water departments—to which groundwater issue is highly important—are willing to spearhead the development of consolidated governance, they are also willing to be part of partially consolidated governance. In other words, if independent special districts such as irrigation and water districts insist on forming their own stand-alone GSAs first to protect their water rights, counties do not have means to force these special districts to yield their local control to consolidated governance. If this is the case, counties will either attempt to form several multi-agency GSAs in parallel with these individual GSAs, or they would have no choice but to form their own stand-alone GSAs as well, especially if every other actor in the sub-basin formed its own first. Therefore, we would expect that counties with high issue salience would be still incentivized to lead the process toward partially consolidated governance even though they have to bargain with self-protective special districts to address their concerns.

Table 7: Ordered Logistic Regression with Categorical Dependent Variable

	Coefficient	S.E.	z-statistic	P > z
Irrigation District	-0.704	0.251	-2.81	0.005
Community Services District	0.968	0.324	2.99	0.003
Dependent Water District	2.129	0.456	4.67	0.000
City	0.241	0.208	1.16	0.247
County without Water Dept.	0.087	0.283	0.31	0.758
County with Water Dept.	0.409	0.275	1.49	0.136
Private	0.009	0.496	0.02	0.986
Number of Observations	674			
Pseudo R2	0.036			

We now report the results of the linear regression model, which is our preferred specification since the dependent variable here is a continuous scale of consolidated governance. Table 8 reports the results that are virtually the same as the findings in both binary and ordered logistic regressions. H1 through H4 are all strongly supported by the results from this analysis. Regarding H5, the analysis supports the hypothesis; the coefficient for counties with water departments is still positive but at a lower level of significance of 0.1. Overall, the analyses suggest that counties that face higher issue salience are more likely to lead and develop *more consolidated* governance than independent water districts are. Also, consistent with our theoretical expectation, counties with low issue salience are not different from independent water districts in approaching their GSA collaboration choices.

Table 8: Linear Regression with Continuous Dependent Variable

	Coefficient	S.E.	t-statistic	P > t
Irrigation District	-0.186	0.051	-3.61	0.000
Community Services District	0.181	0.062	2.90	0.004
Dependent Water District	0.365	0.075	4.89	0.000
City	0.049	0.040	1.21	0.225
County without Water Dept.	0.020	0.053	0.38	0.707
County with Water Dept.	0.087	0.050	1.74	0.083
Private	-0.127	0.107	-1.19	0.233
Constant	0.450	0.023	19.41	0.000
Number of Observations	674			
Adjusted R2	0.069			

Discussion and Conclusion

In the early 1990s, Ostrom (1990) and Blomquist (1992) examined how local institutional actors in California negotiated among themselves and developed self-governing institutions for

resolving collective-action problems in relation to the use of groundwater. Both works showed that, under certain conditions, local actors can overcome commons dilemmas without direct interventions from external authorities. Forward 20 some years to 2014, the passing of SGMA in California signified the recognition that a purely decentralized approach may not suffice to ensure the sustainability of many critical common-pool resources. In her more recent research, Ostrom (2010) reiterated the need “to ask how diverse polycentric institutions help or hinder the innovativeness, learning, adapting, trustworthiness, levels of cooperation of participants, and the achievement of more effective, equitable, and sustainable outcomes at multiple scales” (p. 665). She also called for the need to develop institutions that can “force (or nudge) self-interested individuals to achieve better outcomes” in common-pool resource governance.

Following this spirit, we have examined how a state mandate for collaboration, SGMA, “nudged” local agencies to work more closely with each other than otherwise. We show that various types of local agencies respond to the mandate differently in terms of their willingness to be part of consolidated governance. Their differences in responses can be explained by several factors that shape their incentives for collaboration: (1) the level of concentrated interests represented by a local entity; (2) the level of organizational capacity for collaborative activities; (3) the extent to which the problem is a salient issue within its jurisdiction.

Consistent with our arguments, the empirical analyses of local agencies’ collaboration choices under SGMA include several key findings. Specifically, irrigation districts are the least likely to participate in consolidated governance. Consistent across all three measurements of consolidated governance, this result is likely driven by two inherent characteristics of irrigation districts—highly concentrated interests and low organizational capacity for collaborative engagement—despite high issue salience. In contrast, community services districts and

dependent water districts are consistently more likely than independent water districts to participate in consolidated governance because they are less imbued with highly concentrated interests and have higher organizational capacity. Issue salience turns out to be a major determining factor affecting counties' likelihood of participating in consolidated governance. Being the largest entity with land management responsibilities in any region, counties have high organizational capacity for collaborative activities but would not be motivated to exercise such leadership unless it faces high issue salience within its jurisdiction.

The theoretical and empirical analyses in our research open up avenues for understanding the drivers and dynamics of mandated collaborative governance. Traditional mandates take a rigid, top-down approach without considering local circumstances; the case of SGMA illustrates an innovative approach, which grants considerable flexibility to local agencies on how they may fulfill mandated requirements. The state provides financial support, knowledge sharing, and facilitation for negotiation and collaboration. These supports notwithstanding, our findings suggest that the extant efforts may still be insufficient to foster collaborative governance across a broad range of local agencies and stakeholders. Assistance and incentives from the state need to address local concerns that vary significantly across different types of agencies. Irrigation districts, for instance, are especially concerned about losing their existing water rights; a question for those designing state mandates for collaboration is how to develop a credible framework in which this concern can be adequately addressed. Without such a framework, those agencies may refuse to be part of any long-term collaborative arrangement. For agencies that serve stakeholders with highly concentrated interests, they must be convinced that the long-term benefits of collaboration outweigh potential losses. Otherwise, their instinct is to do whatever they can to only protect their existing rights.

In addition, issue salience affects how local agencies respond differently to the mandate in their collaboration choices. Our analysis shows that despite their high organizational capacity for collaborative engagement, counties do not always exercise such leadership roles. Only those that face high issue salience have spearheaded the collaborative processes among local agencies. State officials need to consider allocating different kinds of resources and technical support to nudge their leadership behaviors.

By examining the effect of agency type that varies by institutional structures and related incentives, the analyses also go beyond the current focus of the literature on system-level factors for explaining the processes of collaborative governance. By doing so, our research helps to link collaborative governance research to the broader literature on collective action and common-pool resource governance, which emphasizes the need to (1) develop ways of building trust among stakeholders and develop institutions that match the ecological system, and (2) explain interactions and collaboration that span across multiple levels and scales (Ostrom 2005; Ostrom 2010; Tang and Mazmanian 2010). The case of SGMA illustrates how the trust-building process needs to address the diverse circumstances, interests, and stakeholders faced by different types of agencies. It also shows how a polycentric system is no guarantee for effective common-pool resource governance. A system of collaboration across levels and units of government is essential for the system to succeed.

Our study also advances our understanding about special districts, which is the type of government entity that has increased the most in number in the past few decades from 12,319 in 1942 to 38,542 in 2017. Despite their proliferation, special districts have drawn scant attention from public administration scholars. Among the few existing studies on special districts (e.g., Burns 1994; Foster 1997; Mullin 2009), no empirical analysis has been devoted to examining

systematically how various types of special districts differ in their incentives, operations, and behaviors. Our study examines not only how special districts differ in their responses to SGMA in comparison with general-purpose governments such as counties and cities; it also compares across different types of special districts. A better understanding of special districts can enrich research on collaborative governance as special districts are key participants in many collaborative processes at the local and regional levels.

Many further research questions can be addressed as SGMA unfolds in the next two decades. First, once additional data on agency and system-level characteristics can be collected in the near future, we can assess the robustness of our results after controlling for these other characteristics. The next stages of SGMA implementation involve the development of groundwater sustainability plans and subsequent management in the coming decades. Future research can track how collaborative arrangements established at early stages affect subsequent planning and management as well as the long-term sustainability of groundwater resources.

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Appendix

Table A1: Chi-square Test Between Each Agency Type and Independent Water District for Their Sub-basin Governing Structure Choice

		Completely Consolidated	Partially Consolidated	Completely Fragmented	Total	P-value χ^2 test	Cramer's V
Independent Water District	Observed	23%	60%	17%	100%	Baseline group	
	Expected	19%	63%	18%			
1) Irrigation District	Observed	2%	76%	22%	100%	0.000	0.2235
	Expected	19%	63%	18%			
2) Community Services District	Observed	48%	43%	9%	100%	0.004	0.1918
	Expected	26%	57%	17%			
3) Dependent Water District	Observed	75%	18%	7%	100%	0.000	0.3399
	Expected	29%	55%	16%			
4) City	Observed	31%	52%	17%	100%	0.227	0.0869
	Expected	26%	57%	17%			
5) County without Water Dept	Observed	33%	43%	24%	100%	0.053	0.1346
	Expected	25%	57%	18%			
6) County with Water Dept	Observed	44%	29%	27%	100%	0.000	0.2492
	Expected	23%	62%	15%			
7) Private Mutual Water Company	Observed	8%	92%	0%	100%	0.058	0.1437
	Expected	23%	62%	15%			

Notes: Each district from 1) to 7) was compared to independent water district (baseline group) for χ^2 (chi-square) test and Cramer's V. The interpretation for χ^2 test and Cramer's V should be made against the baseline group. The tests were done with observed frequencies, not percentages. For convenience, the table only reports the percentages of frequencies. The numbers in expected represents frequencies if the independency was warranted for the relationship between a particular agency and the baseline agency for their association with governance choice.