Multi-level Collaborative Governance of California's Water Resources: Emerging Lessons from the Integrated Regional Water Management Program

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Abstract

Multi-level, collaborative governance arrangements are often viewed as well suited for addressing complex, multi-scalar environmental problems in managing water and other natural resources. Collaborative governance may provide greater capacity for collective learning about emerging problems, and lead to more creative and integrated response strategies as compared to hierarchical arrangements. However, there has been limited research on how regional collaborations are nested within larger-scale governance structures. Some literature suggests that the trend toward multi-level and collaborative approaches has not eliminated a role for hierarchy and bureaucracy, but that in practice, new governance forms co-exist with the old, embedded within top-down structures.

This paper explores these issues in the context of California's Integrated Regional Water Management planning process. Established in 2002, this system is composed of 48 planning regions, largely self-organized by the diverse stakeholders involved. The California Department of Water Resources (DWR) sets broad guidelines for governance, and interacts with the regions to implement an over $1 billion grant program for integrated water management projects. DWR views this process as central to the future of water management in California, particularly in coping with emerging climate change risks. This paper analyzes the architecture of this multi-level governance arrangement, assessing the balance between hierarchical and collaborative features and their potential role in supporting learning, particularly in the context of the

formation of regions and the inclusion of climate change in regional plans. Results indicate that rules set by DWR appear to spur deliberation within regional-level collaborations, but that this depends upon rules being designed and implemented in a manner that allows for regional autonomy while still maintaining public accountability. Further, DWR's efforts to build capacity at the regional level, and its willingness to adjust guidelines based on input from the regions, have been crucial in enabling deliberation regarding the relatively complex task of planning for the impacts of climate change. While further research is needed to establish linkages between institutional structures and learning at regional levels, this analysis suggests that multi-level governance arrangements that include combine hierarchical and collaborative elements do have the potential to support learning and action on multi-scalar problems arising in the context of global environmental change.

1. Introduction

As awareness has grown over the past several decades about society's dependence upon natural systems, water managers are increasingly called upon to address human water needs while also maintaining ecosystem health and environmental quality (Pahl-Wostl 2007). At the same time, climate change is bringing higher temperatures and changing rainfall patterns, which present a new set of uncertainties (Milly et al. 2008). Integrated water resources management is increasingly viewed as the way forward, rooted in the idea that various elements of a water system are connected and must be managed as an integrated whole (Lenton and Muller 2009). For example, floodplain restoration serves to reduce flood risks, support ecosystem functions, and promote social and ecological resilience to more frequent extreme events, as anticipated due to climate change (Opperman et al. 2009).

While integrated water management has become embedded in water policy discourse in many contexts, it has proved challenging to implement in practice. Long-standing institutional arrangements in the water sector do not typically promote the coordination across diverse interests and knowledge bases that such strategies require. In the United States, water management has been fragmented, involving multiple federal, state and local agencies that rely upon centralized, infrastructure-based strategies to meet their particular goals, guided by norms of risk aversion that have often slowed learning (Lach, Ingram and Rayner 2005, Deyle 1995).

Such challenges are by no means unique to water management. As societies struggle to cope with a range of complex social and environmental risks, there is growing recognition that traditional bureaucratic governance arrangements are inadequate for the task (Innes and Booher 2010, Beck 1992, Dryzek 1990).

In the face of such complexity, new governance forms are emerging in a wide range of policy settings, including that of water management. There is still much we do not understand about these new approaches, but at least two important dimensions have been observed. First, there is a growing emphasis on collaborative approaches to decision-making, in which stakeholder organizations come together to define policy priorities and jointly implement solutions (Ansell and Gash 2007, Kettl 2006). Second, authors have noted the importance of multi-level or polycentric structures, in which decision-making authority is shared across scales, and collaborative and hierarchical modes of governance may co-exist (Pahl-Wostl 2009, Lundqvist 2004). Such multi-level arrangements are thought to provide greater flexibility to address changing circumstances and new kinds of problems, and thus may be particularly well-suited to coping with environmental risks, about which our understanding continues to evolve (Folke et al. 2005, Hooghe and Marks 2003).

In the context of water management, we are witnessing an increasing emphasis on collaborative approaches, and away from fragmentation and top-down planning (Gerlak 2008, van de Meene 2009). Similar trends are being observed in thinking about governance of other complex global environmental challenges (Armitage et al. 2007). However, there remain significant questions about the functioning and effectiveness of these new governance arrangements. In particular, do collaborative arrangements replace or complement hierarchical, rule-based approaches? Research suggests that many of these governance arrangements represent a mix of approaches, retaining some hierarchical features while devolving some authority to regional and local levels (Héritier and Lehmkuhl 2008). How do these hybrid governance arrangements work in practice to achieve this balance?

This paper examines these questions in the context of a multi-level governance arrangement that has emerged over the past decade in California to support integrated approaches to water

management at regional levels across the state. Established in 2002, the Integrated Regional Water Management (IRWM) program has led to the creation of 48 water planning regions across the state, each largely self-organized by a mix of water supply agencies, flood control districts, county and city governments, and environmental organizations. Stakeholders work together to develop an integrated plan for their region, and then become eligible to apply for the over $1 billion in grant funding available through the California Department of Water Resources (DWR), which serves as the program's administrator. Governance at the regional level is largely collaborative, but must comply with a set of guidelines established by DWR, a large and bureaucratic public agency.

The IRWM planning process, designed to encourage the development and implementation of integrated approaches to water management in the state, is a rich case study of how a multi-level governance structure supports or constrains learning. This paper specifically examines the balance between collaborative and hierarchical and collaborative modes, and how this affects the potential for learning within regions. This paper draws upon an analysis undertaken in 2011 of how IRWM regions have incorporated climate change into their regional plans in response to a new requirement to do so (Conrad 2012). This study was undertaken in partnership with DWR and was based upon a review of grant proposals submitted by IRWM regions, and other public documents from DWR and IRWM regions. Additional analysis of regional boundaries was conducted in ArcGIS using datasets from DWR and other sources (see Figure 1).

This paper is organized as follows. The following section provides a theoretical context for this paper, which contributes to the literature on multi-level governance. Section 3 describes the context for the emergence of IRWM in California, and the structure of the IRWM process. Section 4 discusses the process for determining the boundaries of IRWM regions, particularly with respect to the balance between the creation of rules and categories at the state level, and maintaining flexibility at the regional level. Section 5 analyzes the incorporation of climate change into regional plans. This process again illustrates the creation of rules that enable DWR to demonstrate public accountability, while still allowing regions to select their own approaches to address climate change. It also shows that DWR's efforts to build capacity at the regional level, and DWR's willingness to adjust guidelines based on input from the regions, have been

crucial in enabling deliberation regarding the relatively complex task of planning for the impacts of climate change. The final section summarizes key findings, and identifies future areas of research.

2. Multi-level governance to address complex multi-scalar problems

Over the past several decades, a growing literature in the fields of political science and planning has pointed to the increasingly complex problems facing society today, and the inadequacy of current governing arrangements for coping with them (Kettl 2006, Beck 1992, Dryzek 1990). This literature points to the limits of bureaucratic structures, which are designed to implement uniform solutions to clearly defined, separable problems (Innes and Booher 2010). Instead, we are now more aware of the interconnectedness of social and ecological systems, the inherent uncertainties associated with them, and the diverse ways in which problems manifest across space and time (Holling 1978, Walters 1986). This calls for governance arrangements that can integrate diverse kinds of expertise to develop solutions in varying socio-ecological contexts, and which can support learning over time (Norgaard et al. 2009, Folke et al. 2005).

This shift is evident in the context of water management. The negative environmental and social impacts of dams, levees, and the channelization of rivers, the result of top-down, infrastructure-based management strategies, are increasingly recognized (van de Meene 2009). Efforts to restore river ecosystems have led to an appreciation for the greater resilience offered by natural "infrastructure" such as floodplains (Opperman et al. 2009). As water managers grapple with the risks posed by climate change, resilience becomes even more important since higher temperatures and changing rainfall patterns may affect multiple aspects of water systems in unpredictable ways (Pahl-Wostl 2007, Milly et al. 2008). Policy discourse now highlights the need for integrated approaches to water management that account for connections between water supply, quality, flooding, and ecosystem health. Yet, the nature of these interconnections varies across space and time, demanding governance arrangements that support the creation of strategies tailored to specific socio-ecological contexts, and to promote learning as our understanding of the system evolves.

Policy and organizational structures have been evolving in the face of such complexities, and as the limits of top-down, hierarchical structures of public agencies have become more visible (Innes and Booher 2010). Beginning in the 1980s, calls for "new public management" led to market-based strategies to increase efficiency and flexibility, for example by contracting out to private entities to improve efficiency in service delivery (Milward and Provan 2000). Collaborative approaches to governance have also emerged, in which decision-making authority is shared across public agencies and non-governmental actors (Ansell and Gash 2007). In the context of managing water and other common pool resources, collaboration has received increasing attention as an arrangement that provides avenues for sharing knowledge, building trust, and developing solutions with greater stakeholder buy-in (Gerlak 2008, Karkkainen 2003, Innes and Booher 2010). An extensive literature has emerged analyzing experiences with collaborative governance of water and other natural resources in the United States, including the Sacramento-San Joaquin Delta in California, the Everglades, and a range of watershed-based partnerships (Gerlak and Heikkila 2007, Sabatier et al. 2005).

Recently, however, scholars have questioned whether collaborative and other new forms of governance are really replacing hierarchy, or rather are emerging within the context of existing hierarchical structures (Hill and Lynn 2005, Jordan et al. 2005, Héritier and Lehmkuhl 2008). Some have noted the important role that bureaucratic and hierarchical structures play in maintaining accountability in a democratic system, enabling the tracing between laws enacted and their implementation by government agencies (Olsen 2005). While collaborative processes can promote democratic accountability by increasing public dialogue and participation (Leach 2006), public agencies and policy-making processes are not currently structured in this way (Innes and Booher 2010). Thus, recent studies find that current governance modes are hybrid in nature, combining forms of hierarchy, competition, and collaboration, with networks of public and private entities playing an increasingly important role (Olsen 2008).

These hybrid governance arrangements are not easy to characterize, and much remains to be done to understand how they work to balance the need for public accountability while encouraging flexibility and learning at appropriate scales. Literature related to multi-level, polycentric and "experimentalist" governance describes a diverse set of structures that distribute

authority to jurisdictions at different scales and configurations, enabling flexibility to cope with evolving problems while still providing mechanisms for coordination and accountability (Hooghe and Marks 2003, McGinnis 1999, Sabel and Zeitlin 2011). Multi-level structures are particularly relevant in managing complex socio-ecological problems, which often result from stresses that occur at multiple scales (Folke et al. 2005, Dryzek 1987). A number of studies have analyzed the multi-level structure of water management regimes, particularly in the context of the European Union's Water Framework Directive, established in 2000 to promote integrated approaches to river basin management. Some authors note the challenges involved in creating multi-level structures that attend to ecological as well as administrative boundaries. While organizing sub-regions around watershed boundaries allows for planning at appropriate ecological scales, existing administrative boundaries provide the basis for legitimacy and accountability. Lundqvist (2004) and Moss (2006) find that the Water Framework Directive's requirement to organize River Basin Districts along river basin boundaries may not be sufficient to engage the appropriate actors with decision-making authority. Young (2003) describes this tension between the biophysical and institutional characteristics of a system as the need to balance a spatial "fit" with achieving "interplay" among appropriate actors.

A further question relates to how multi-level structures work to promote learning among participating actors, which is essential in order to implement integrated water resources management. Collaborative efforts are recognized as providing significant opportunities for learning at regional and local levels, but more recent work points to the need to understand how learning occurs between regions and across scales (Bulter and Goldstein 2010, Cash et al. 2006). While emphasizing the crucial value of small-scale collaborations that enable stakeholders to work together on specific problems, Dryzek (1987) notes the considerable challenges involved in linking these collaborative approaches to achieve larger-scale learning. Some coordinating entity may be needed to help provide these linkages. In a comparative analysis of eight water management regimes in Europe, Africa and Asia (Huntgens et al. 2011) suggests that decentralized governance needs to be balanced with a top-down structure, in which "a central authority has the responsibility and resources for issues such as facilitation of participatory processes, setting of standards, capacity building, conflict resolution and cooperation across boundaries…[and] to provide information and knowledge that is not available or accessible at

the ‘grass-roots’ level,” (p. 153). Ansell (2011) focuses on the tensions between hierarchical and collaborative modes of governance, and draws upon pragmatist philosophy to identify how these tensions may actually help generate learning, while at the same time maintaining public accountability. Sabel and Zeitlin (2011) describe an “experimentalist governance” structure, in which a central authority and local units work together to establish framework goals and metrics, local units pursue these goals, monitoring takes place through peer review, and goals and metrics are revised. Sabel and Zeitlin note the role that this governance process supports learning by provoking questioning and promoting continual re-adjustment (2011, p. 4). They also suggest that the central authority must take on a new role, providing “the infrastructure and services that support frontline efforts,” (2011, p. 8). In other words, the central authority must provide support and knowledge to local units, helping them to perform their delegated functions effectively, and must also help to facilitate coordination between regions to address problems that may exist at larger scales.

California’s Integrated Regional Water Management process is an example of a multi-level structure that combines hierarchical and collaborative elements. As will be described below, the state government sets rules for participation, in compliance with legislative requirements, but within this framework, regional collaborations determine their own boundaries and participants, choose their governance structure, and select their own water management priorities. This paper will argue that the IRWM process in California matches many of the expectations of theory. As the following sections demonstrate, rules set by the state government for the design of regions and creation of regional plans do appear to spur deliberation within regional collaborations, beyond what would likely occur with complete decentralization of authority. However, the potential for this deliberation depends upon rules being structured in a way that provides scope for regional autonomy, while still maintaining accountability. Analysis of the role of the “central authority” in this case (the California Department of Water Resources) shows that its willingness to adjust its rules based on feedback from regions, and its investment in knowledge-sharing and other support to regions has been crucial in promoting deliberative practices.

This analysis does not seek to conclusively demonstrate these institutional arrangements have led to greater learning by IRWM regions. As defined by Gerlak and Heikkila (2011), learning

involves observing changes in strategies and actions brought about through a learning process involving the acquisition, translation and dissemination of knowledge. Deliberation – here referring to the exchange of ideas in the context of seeking agreement on a particular course of action – might be thought of as a condition of the learning process that is likely to generate learning. This assumption is supported by considerable research on how collaborative governance supports learning (Ansell 2011, Gerlak and Heikkila 2011, Innes and Booher 2010). Thus, governance arrangements that help promote deliberation might be thought of more likely to support learning than structures that do not.

3. Emergence of Integrated Regional Water Management in California

The Integrated Regional Water Management (IRWM) process is a program established in California to promote integrated approaches to water management at a regional level.[1] It emerged in the context of a recent shift in California water planning practice toward more decentralized and collaborative approaches, spurred by increasingly limited large-scale options for coping with water scarcity. California is part of a larger nationwide trend toward more decentralized water governance (Mullin 2009), as well as a growing emphasis on collaborative approaches, particularly in settings where environmental regulations have increased the need for more integrated approaches to management (Gerlak 2008). This section describes the California water planning context, and provides an overview of the IRWM program.

3.1. California Water Planning and the Emergence of Collaborative Approaches

Given the physical and socio-economic context, it is easy to see why water is an intensely contested subject in California. About 75% of the state's water supply originates north of Sacramento, while about 75% of water demand lies to the south (Carle 2009). The state's Mediterranean climate, with high variability in rainfall across seasons and between years, poses further challenges in meeting the needs of its 37 million people and its agricultural sector, which contributes over $40 billion annually to the state's economy (USDA 2012). California relies

[1] The acronym for Integrated Regional Water Management – IRWM – is similar to that of Integrated Water Resources Management, or IWRM, which is often used in the global water management community. In this paper, IRWM refers to the specific program in California described in this section. To reduce confusion, the acronym IWRM is not used here, but is instead referred to as "integrated water management".

heavily upon snowpack in the Sierra Nevada to store water for the dry months, and upon extensive statewide water infrastructure to ensure water is available when and where it is needed. The Sacramento-San Joaquin River Delta (referred to as the Delta), through which the majority of the state's water passes in its journey to the southern parts of the state, is at the nexus of much of the political debate over water, particularly as efforts have grown to sustain this unique and fragile ecosystem (Hanak et al. 2011). However, local government entities have long played an important role in water management, with over half of water being supplied through locally managed projects (DWR 2009a). The actions of local agencies, therefore, have important implications for the overall sustainability of California's water.

During the 1990s, water agencies across the state experienced significant threats to supply reliability as a result of the 1987-92 drought, as well as the imposition of court-mandated requirements to maintain flows in the Delta to meet environmental needs. It became clear that increasing water imports by expanding statewide infrastructure could not be relied upon for meeting growing water demands, particularly in southern California. Large water agencies such as the Metropolitan Water District of Southern California, a wholesaler serving over 18 million people, began to search for additional strategies, through maximizing local and regional water sources as well as implementing water conservation programs. This recognition of the need for more integrated water management strategies was accompanied by a new effort to coordinate with other local and regional entities involved in various aspects of water management. At the same time, in 1994 federal and state agencies launched a new collaborative approach, called CALFED, intended to manage the contentions surrounding the Delta. While the relative "success" of this collaborative approach has been debated, it is clear that this experience influenced the thinking of the many participants in CALFED, paving the way for a growing emphasis on collaboration (Innes and Booher 2010, Norgaard et al. 2009).

Beginning in the 2000s, this shift toward more collaborative approaches to water management began to be reflected in California's statewide water planning process, led by the California Department of Water Resources (DWR). The 2005 Water Plan Update marked a "fundamental transition in how we look at water resource management in California…[and] in the way state government needs to be involved with local entities and interest groups to deal with water issues

in the state," (DWR 2005, p. 2). At the same time, the plan began to emphasize the need for integrated approaches to water management, and the need for regional partnerships in order to "efficiently solve water management problems," and "consider multiple resource issues," (p. 10). It was in this context that Integrated Regional Water Management was established to promote the "application of integrated water management (IWM) principles on a regional basis," (DWR 2012). The emphasis on a regional approach to achieving integrated water management continues to be emphasized in the 2009 update to the Water Plan, and in the 2013 plan that is currently in preparation. The 2009 plan particularly emphasizes the importance of IRWM for addressing problems such as climate change, stating: "IRWM provides an effective forum and a critical framework for actions to address the uncertainties presented by climate change as well as other risks to California's water future" (DWR 2009a, p. 20).

3.2. California's Integrated Regional Water Management Program

The IRWM process was established by the state legislature in 2002 through the Integrated Regional Water Management Planning Act (California Water Code §10530 – 10550). It created a new collaborative, regional-level water planning process in which local agencies work together to develop integrated plans for their region's water resources, and thereby become eligible for certain state funding for water projects. The Act does not establish a regulatory requirement to undertake regional planning; the system is entirely voluntary, incentivized through a grant program supported by over $1 billion in bond funds, approved by voters through California's proposition process in 2002 and 2006. The Act lays out the basic requirements of the planning process, and authorizes the California Department of Water Resources (DWR) to develop guidelines for the development of integrated regional water management (IRWM plans), and to manage IRWM grant programs.

The core requirements of the Act relate to the creation of "regional water management groups," (RWMGs) and the development of "integrated regional water management plans," (IRWM plans). The Act requires regions to follow "an integrated, collaborative, multibenefit approach to selection and design of projects and programs," (CWC 10541 (e)(5)). There is considerable flexibility in how RWMGs can be formed and governed. A RWMG is defined in the Act as a group of "three or more local agencies, at least two of which have statutory authority over water

supply or water management," that come together to form an IRWM plan under a "joint powers agreement, memorandum of understanding, or other written agreement, as appropriate, that is approved by the governing bodies of those local agencies," (CWC 10539). The Act also requires that in developing an IRWM plan, RWMGs must consult with a wide range of stakeholder groups, including government entities responsible for water supply, wastewater management, flood control, and other municipal government entities and special districts, as well as environmental organizations, disadvantaged communities, and Native American tribes (CWC 10541(g)). Within these parameters, the original version of the Act allowed local agencies to entirely define their region, its participants, and their governance structure. In 2008, additional requirements were added, leading to the creation of a "regional acceptance process," in which DWR reviews the boundaries proposed by regions and assesses whether the spatial extent and participation in a RWMG is appropriate for enabling "integrated" approaches to water management. This process is discussed in greater detail in Section 4 of this paper.

In addition to establishing a RWMG, each IRWM region must develop an integrated regional water management (IRWM) plan in order to be eligible for project funding. The IRWM Planning Act lays out a set of requirements that IRWM plans must meet, such as identifying regional water management objectives, following an integrated and multi-benefit approach, and considering the water needs of disadvantaged communities. DWR implements these requirements through guidelines describing the specific elements regions should include in their plans, referred to as "standards." These are topics that must be addressed in a plan, such as a "Region Description," "Objectives," and "Stakeholder Involvement," (DWR 2010). The IRWM plan standards are an expression of the bureaucratic element of the IRWM process. In creating "standards," DWR is seeking to demonstrate accountability to the public for implementing the required elements of a law. Such standards help ensure consistency of practice across all regions, and provide a basis for assessing whether participants are treated equally and fairly in a grant process. However, depending upon how they are designed and implemented, they can also reduce flexibility to deal with specific local needs and contexts.

The IRWM standards are fairly broad, covering topics that are relevant to almost all regions of the state. However, complying with these standards does require significant effort. IRWM plans

are substantial documents, typically several hundred pages in length and involving considerable research and analysis. It is very common that IRWM regions hire a consulting firm to prepare their plan, and in many cases consultants also prepare grant applications. Of the 34 IRWM plans adopted as of late 2011, at least 22 were prepared by consulting firms. Thus, the IRWM process very much reflects the trend toward the "hollow state," in which taxpayer-funded government services are provided through private or non-profit agencies (Milward and Provan 2000).

To date, 48 RWMGs have been created across the state, diverse in size and composition, and utilizing a combination of watershed, groundwater, and administrative boundaries (see Figure 1). These regions now cover 87% of the state's area, and 99% of the population (DWR 2012). They operate within widely varying socio-economic contexts and face quite different water management challenges. Rural and urban regions differ significantly. Some rural regions are quite large geographically – such as the Inyo-Mono region in the Eastern Sierras, which covers 12% of the state – but have very small populations, and local water management agencies are correspondingly small. In contrast, urban regions such as the Bay Area and Los Angeles have millions of people and numerous and high-capacity stakeholder agencies within a relatively limited geographic area. Some regions, rely on surface water imported from elsewhere, while others depend heavily upon groundwater supplies. Concerns related to water quality and environmental stewardship vary depending upon the context.

The governance and organizational structures of IRWM regions are also diverse. Regions have different balances of stakeholder involvement, with some dominated by urban water suppliers or irrigation interests while in others, environmental groups play a significant role. Some IRWM regions have formed their own organizations, while others have signed memoranda of understanding with one organization serving as an administrator and fiscal agent. Many regions carry out much of their work through sub-regional groups focused on particular topics or geographic areas. According to the Act, decision-making procedures must be collaborative, but this takes different forms, ranging from a requirement for full consensus to a majority vote. Some regions have retained facilitators to support their collaborative processes. Most regions have very limited staff responsible for coordinating among regional participants and instead rely heavily on consultants for many functions, including coordinating and writing an integrated

regional water management plan, conducting technical analyses, writing proposals, or carrying out project activities. Some regions have developed formal processes for collaboration with neighboring regions, such as memoranda of understanding as to how joint projects will be developed. Others operate in a more competitive mode with respect to their neighbors.

There has been very limited research so far to understand the functioning of the IRWM process and whether it is effective in supporting the development of integrated strategies for water management. The few papers published to date are somewhat skeptical of the program's impacts (Lubell 2010, Thompson 2011). A recent report by the Public Policy Institute of California (PPIC) on future directions for California water management suggests that the IRWM regions be replaced with nine existing regions following hydrologic boundaries, mostly larger than the current IRWM regions (Hanak et al. 2011). Yet, these assessments have been based on very limited study of the governance arrangements of IRWM regions, and their actual performance in generating new, integrated strategies for managing water resources. The IRWM process is receiving increasing emphasis in the statewide water planning process. At the same time, its future is somewhat uncertain, since the bond funding that has incentivized the establishment of the regions will end in 2014. Thus, an analysis of IRWM governance in California is timely, in addition to contributing to a theoretical understanding of how multi-level structures work to support learning.

Much research is needed to develop an understanding the institutional architecture of the IRWM process. This paper seeks to illuminate how hierarchical and collaborative components of its structure work together to enable learning. The following two sections show that hierarchical elements have played an important role in the functioning of the IRWM process, with state guidelines leading to greater deliberation about the meaning and practice of integrated water management at the regional level. However, this deliberation is not accomplished by requirements alone. The knowledge and support provided by the Department of Water Resources to regional water management groups has been crucial to enable regions to respond to requirements in a manner that promotes learning, rather than in a "check the boxes" type of compliance. Two examples are discussed. Section 4 analyzes the process for determining regional boundaries, which are proposed by regions and approved by DWR. Section 5 discusses

how regions have been addressing climate change in the development of their regional plans in response to a legislative requirement to do so.

4. The Regional Acceptance Process: Negotiating Spatial Expressions of Integrated Water Management

Defining the boundaries of a planning region is a crucial element in the design of a multi-level governance structure, shaping which agencies participate in regional decision-making, and the scale and focus of planning and projects they propose to undertake. Key international policy documents related to integrated water management, such as Agenda 21 emerging from the 1992 Rio Conference on Environment and Development, have emphasized the importance of conducting planning at a watershed scale (see Agenda 21, Chapter 18.9). Indeed, the European Water Framework Directive has taken this approach, mandating that planning units be formed along water basin boundaries (Moss 2006). However, political boundaries are not always organized around natural ones, and a watershed-based entity may lack engagement from agencies with relevant decision-making authority, such as cities or counties. Lundqvist (2004) finds that the creation of five new District Water Authorities in Sweden along major watershed boundaries, with further subdivisions along smaller catchment areas, may have limited effectiveness due to problems with legitimacy and participation.

The approach taken in California's IRWM process differs from the European Water Framework Directive in two ways. First, in California the choice of boundaries is largely – although not completely – delegated to the regions themselves, rather than being determined by the state. Second, boundaries are not restricted to watersheds or other biophysical units. The way in which decision-making about regional boundaries is shared across state and regional levels offers interesting insights into the nature and role of these rules, and how they balance dual purposes of maintaining accountability while also leading to greater deliberation among stakeholders. In this context, we see that the rules for what kinds of boundaries are acceptable for an IRWM region have been sufficiently flexible as to provide a forum for DWR and IRWM regions to negotiate the meaning of integrated water management in a particular regional context, taking into account both ecological and social boundaries.

In the initial phases of the IRWM process, local agencies were free to choose their own boundaries and partners in developing a regional plan, as long as the group met the minimum requirements of the IRWM Planning Act of involving at least three agencies and consulting a broader set of stakeholders. Local agencies across the state formed regions in order to access the first round of funding, and DWR received 54 applications, 33 of which were awarded funding to develop IRWM plans. These regions then became eligible to receive much larger grants to undertake water management projects, identified in accordance with their IRWM plans. It was at this point that DWR appears to have recognized that some degree of control had to be exercised in the formation of regions in order to achieve the goal of integrated management. DWR had $150 million available to fund projects, but received 50 applications totaling $1.4 billion. In addition to posing a serious challenge in making funding decisions, DWR viewed this as evidence that regions were not proposing strategies that were sufficiently integrated, both in terms of achieving multiple goals and involving multiple stakeholders. Since it had no authority at the time to determine regional boundaries, DWR used this situation as an opportunity to encourage regions to consolidate. In a letter to all regions, DWR indicated, "The opportunity clearly exists for even greater collaboration and coordination within and between regions and *for regions, rather than the State*, *to define regional priorities,"* and urged regions to merge with their neighbors or integrate their proposals (email to IRWM regions, DWR 2005, p. 1, emphasis added). In response, some regions did consolidate, such as the Watershed Coalitions of Ventura County (WCVC), which was created through a merger of the Calleguas Creek Watershed Planning region with the Ventura Countywide IRWM Planning region (WCVC RAP Application, 2009).

In 2008, the IRWM Planning Act was updated by the state legislature to include a requirement that DWR develop a process to approve IRWM regions before they receive funding (CWC§10541(f)). Initiated in 2009, the Regional Acceptance Process (RAP) requires regions to submit an application to DWR that describes the rationale for regional boundaries, the region's participants and governance structure, and water planning objectives. In the RAP guidelines, DWR defines an IRWM region as "a contiguous geographic area encompassing the service areas of multiple local agencies" that is designed to "maximize the opportunities to integrate water

management activities," (DWR 2009b, p. 1). The guidelines specifically discourage using only administrative boundaries to define IRWM regions (p. 3), but do not completely mandate following watershed boundaries. The guidelines state, "an IRWM region is not based solely on geographic considerations or characteristics. It is also defined by water management issues, its stakeholders, and water-related conflicts. An IRWM region must be designed or configured to diversify and strengthen the regional water management portfolio," (p. 2). In other words, the guidelines suggest two critical criteria for assessing whether integrated water management is taking place: 1) strategies that seek to achieve multiple water management goals, and 2) management processes that involve diverse stakeholders.

DWR's Regional Acceptance Process includes several steps. A formal application is submitted by a region, and reviewed by DWR. Regional representatives also meet in person with DWR staff, including a presentation of the rationale for the region and an "interview" with DWR staff, in which DWR may raise any concerns about the region's boundaries or approach. DWR then issues a draft recommendation regarding whether or not it plans to accept a region into the program, and requests public comments before the decision is finalized. Two levels of regional acceptance are possible. Full acceptance means that a region is eligible to apply for all types of grant funds. "Conditional" acceptance means that DWR does not fully agree with the regional boundaries or approach, and will only permit the region to access planning grant funds until these issues are resolved (DWR 2009b).

Two RAP rounds have been held, one in 2009 and another in 2011, and have resulted in the approval of 48 IRWM regions covering over 85% of the state and encompassing 99% of the population (DWR 2012). Two out of the 48 regions are conditionally accepted, and 46 are able to fully participate in IRWM funding opportunities. An analysis of regional boundaries indicates that most regions are defined by a combination of watershed, groundwater and/or county boundaries (see Figure 1). Eight regions are defined entirely by watershed boundaries, two are defined solely by groundwater basins, and five regions are defined only by county or other administrative boundaries. Thus, the spatial expression of integrated water management in California is much different from that in Europe, in which water basin districts are defined solely along water basin lines.

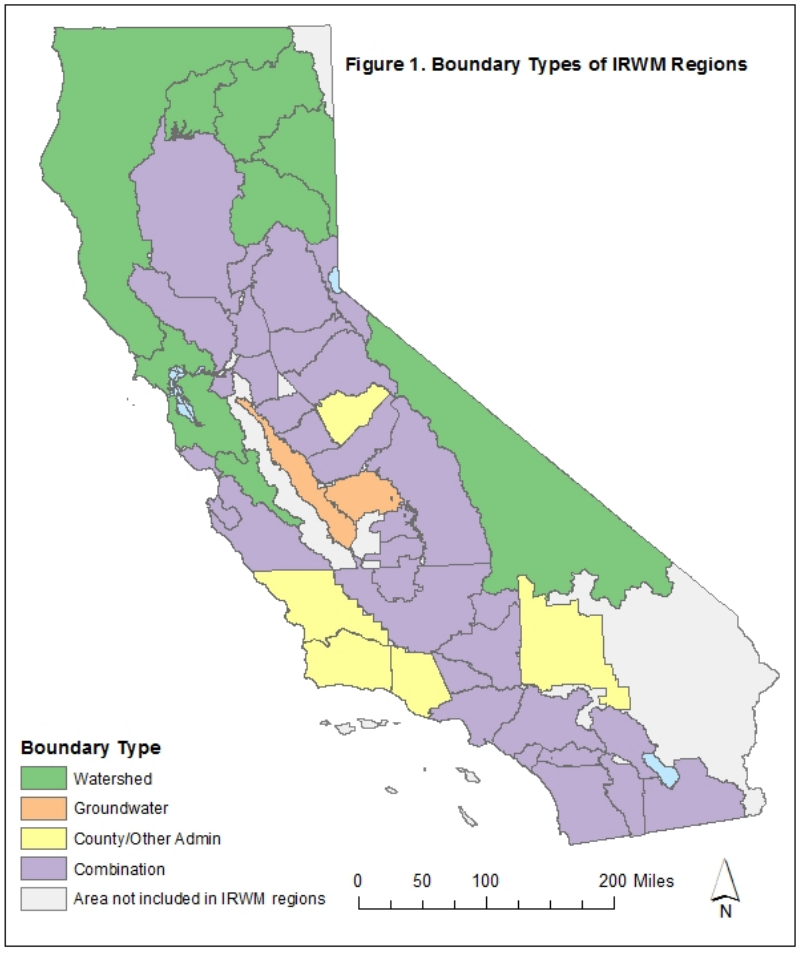

Figure 1 shows 2011 IRWM regional boundaries. Analysis of boundary types conducted in ArcGIS using data from DWR (IRWM boundaries and groundwater basins), USGS (Watershed Boundary Dataset) and Cal-Atlas (county boundaries).

More research is needed to determine the relative effectiveness of this configuration of regional planning for achieving integrated water management. However, there is evidence that the Regional Acceptance Process has increased the degree of deliberation about the specific opportunities for integrated water management across the state. In many cases, DWR's approval of a region is accompanied by recommendations for collaboration with neighboring regions regarding specific water resource issues. This is particularly the case for IRWM regions that follow only county boundaries. For example, in its approval of the San Luis Obispo County IRWM region, DWR recommends that the region coordinate with its neighbors in managing four different watersheds and one groundwater basin (DWR, San Luis Obispo RAP Summary 2009, p. 1). The Madera County IRWM region applied in the 2009 RAP process, and was granted only conditional approval since DWR did not fully agree with its organization only along county

lines. It urged the region to contact its neighbors. Madera applied again in 2011, and DWR noted that the region had made efforts to discuss collaboration, and accepted the region even though its boundaries remained the county line (DWR, Madera RAP Summary, 2011). The Merced IRWM region also applied in 2009 and 2011, and was fully accepted in 2011 after adjusting its regional boundaries and signing letters of agreement with its neighbors (DWR, Merced RAP Summaries, 2009 and 2011).

In this sense, the RAP process allows for a balance between DWR and regional viewpoints on the most effective configuration of regions. Although DWR has the final authority to accept or deny a region, the regions take the initiative to propose their preferred options. DWR provides feedback and recommendations for improvement, and appears to remain somewhat flexible in what it will consider. For example, DWR has accepted five regions that exactly match county or other administrative boundaries, despite specifically discouraging this practice in the RAP guidelines. This suggests that DWR is willing to show some flexibility in its application of its guidance in consideration of region-specific needs.

5. Incorporating climate change into IRWM plans

The IRWM plan guidelines were updated in 2010 to incorporate revisions made to the IRWM Planning Act in 2008. The most significant change to the guidelines involved the addition of a new "standard" requiring that IRWM plans consider the impacts of climate change on their water systems, and account for greenhouse gas emissions (GHGs) in their project planning. DWR's issuance of new guidelines in 2010 meant that regions with existing IRWM plans had to revise them to meet the new standards and remain eligible for project funding. Funding for updating the plans and developing new ones could be obtained by applying for Planning grant funds from DWR. An examination of the process of updating IRWM plans shows that the introduction of a requirement to address climate change has led to increased dialogue at regional levels regarding the potential impacts of climate change on water resources. However, achieving this appears to have been made possible, at least in part, by DWR's efforts to design requirements in a way that allows flexibility for regions to take their own approach, while at the same time providing resources that help regions, particularly those with low technical and organizational capacity, organize and implement their approach to climate change.

The requirement to include climate change in IRWM plans forced IRWM regions to begin addressing an issue that they were yet not explicitly considering. Prior to the 2010 guidelines, only 7 out of 34 existing IRWM plans mentioned climate change, mostly in a cursory manner. Only two of these seven plans contained specific objectives to address climate change (Conrad 2012, p. 9). The introduction of climate change has led all regions to include climate change in their planning. This fact itself is not surprising, since regions have a considerable incentive to comply in order to remain eligible for funding. However, there are indications that in many regions, the inclusion of climate change has not been just a cursory effort, but has led to new regional-level analyses of impacts, and expanded dialogue among water stakeholders about this issue.

In the first round of Planning grant proposals, 37 regions applied for funding to update their plans. Of the $21 million awarded in grants to 30 regions, approximately $1 million (5% of the total) was dedicated to analysis of climate change impacts within the region and consideration of GHG emissions. Based on the proposals submitted, these funds (averaging $77,208 per region, including matching funds) are being used to conduct an analysis of regional impacts, and either involving a review of existing studies or a new study specific to the region. Although many analyses are being carried out by consultants hired by IRWM regions, 24 out of the 37 proposals received indicated plans for involving stakeholders and/or the general public in pursuing their climate change analysis. This might involve creating a specific Technical Advisory Committee or workgroup on climate change, composed of IRWM region stakeholders with relevant interests and expertise, holding a public workshop focused on climate change, or conducting other kinds of public outreach. In addition, 18 regions listed specific universities, non-profit organizations, federal, state and local agencies, or foundations as partners in their climate change analysis. Finally, 16 IRWM regions indicate plans to explore collaboration with neighboring IRWM regions related to planning for climate change impacts (Conrad 2012).

All of this suggests that in a number of regions, consideration of this issue is being carried out with some degree of deliberation among participating stakeholders. This is important, because capacity to address complex, multi-scalar challenges such as climate change is one of the

expected advantages of multi-level forms of governance (Pahl-Wostl et al. 2009). Indeed, the impacts of climate change are likely to be very different across different socio-ecological regions of California, and adaptation measures will require engagement from diverse stakeholders. Allowing regions the autonomy to evaluate and identify the most critical impacts of climate change – such as decreased reliability in supplies dependent upon snowpack, or increased flooding risk in particular areas – enables more targeted responses. Perhaps most importantly, these discussions enable learning about an issue that is relatively new to water managers, and which involves significant uncertainties. DWR's 2010 Guidelines themselves emphasize that continual learning will be needed over time as knowledge improves about climate change.

However, this apparent increase in regional-level dialogue about climate change impacts did not come about solely through DWR's addition of climate change to the 2010 guidelines. The process involved considerable debate between IRWM regions and DWR regarding what degree and type of analysis should be required, leading DWR to create specific resources to support IRWM regions in addressing climate change, and to revise climate change requirements in 2012, allowing regions more flexibility in their approach to this issue.

The 2010 guidelines require the following steps to meet the new climate change "standard": 1) evaluate climate change risks in the region, 2) consider adaptation strategies in water projects; and 3) consider greenhouse gas emissions. However, the guidelines acknowledge that methods for assessing climate change risks at a regional scale are not clearly established, stating that "tools to properly assess the risk of any one effect of Climate Change on a region are currently not well developed," (p. 71). Thus, the guidelines indicate that IRWM regions should start with a general assessment of climate change impacts, and that these should become "more region-specific" through the use of "quantitative tools for vulnerability analysis," which will be required in future grant solicitations (p. 74). Overall, the guidelines urge regions to follow an "adaptive management approach," and to continually update plans based on the latest knowledge about climate change impacts in the region (DWR 2010).

In general, IRWM regions had two main reactions to this requirement. First, many regions expressed concern that they did not have sufficient knowledge about how to assess regional

climate change risks, and urged DWR to provide additional guidance on appropriate methods. DWR embarked upon a major effort to develop the Climate Change Handbook, an over 200-page document that contains detailed descriptions and case studies of a different approaches to analyzing climate change impacts in the context of regional water planning (EPA/DWR 2011). DWR had also recently established and funded its own Climate Change Program, which consists of 10 staff members, including four specialists located in DWR's regional offices. A major focus of the Climate Change Program's initial efforts was the creation of resources to assist IRWM regions in addressing climate change (Conrad 2012). Thus, DWR responded to regional calls for assistance with a considerable investment of staff and budgetary resources. In general, this support is valued by IRWM regions. In a recent letter to DWR's director, an informal consortium of 43 IRWM regions expressed their appreciation for the assistance they have received from DWR related to climate change (Roundtable of Regions, letter to Mark Cowin, November 13, 2012).

A second reaction from the regions involved clarification of the specific expectations of DWR in the level of analysis required by the 2010 guidelines. Although the guidelines acknowledged that there is no single correct approach to assessing impacts, it expressed a preference for more quantitative methods, indicating that over time, DWR's expectations in this regard would increase (p. 74). This expectation is also embedded in the Climate Change Handbook. For example, the section entitled "Measuring Impacts" contains the statement, "Planners are encouraged to use methods that are as quantitative as possible," (p. 5-12). As described in the handbook, these quantitative approaches almost always involve the use of outputs from global climate models (GCMs): "Currently, the most rigorous and readily available data source for [future climate change projections] comes from downscaled GCM projections," (p. 5-9). However, conducting quantitative analyses of climate change impacts using downscaled GCMs requires considerable time and expertise. Further, some scholars have suggested that the use downscaled GCMs may not always be necessary for some adaptation decisions, particularly given significant uncertainties in projections at small scales (NRC 2010, Dessai et al., 2009). In Round 1 Planning grants, 14 out of 37 regions proposed some form of quantitative analysis of climate change impacts. However, in interviews conducted by DWR climate change staff in 2011, some regions expressed concern about the implication that quantitative analyses were

favored by DWR. IRWM regional representatives indicated that such detailed analyses were beyond the capacity of many regions, and would require hiring consulting firms at considerable expense. They were not convinced that this would be an appropriate use of resources (Conrad 2012, p. 24 and p. 38).

This concern appears to have been addressed in the revised version of the climate change standard. In 2011, DWR began the process of revising the climate change standard. A preliminary draft was issued, and IRWM regions were invited to discuss this and other issues in a series of "process improvement workshops" held across the state in December 2011 to obtain feedback on the functioning of the IRWM process. The draft described three steps for addressing climate change impacts in an IRWM plan, which do not imply that quantitative analysis is required:

- A climate change vulnerability assessment for the region, which at a minimum should follow a qualitative checklist outlined in the Climate Change Handbook
- A list of prioritized climate change vulnerabilities based on the assessment
- A plan, program or process for gathering data and analyzing prioritized vulnerabilities

This new guidance, incorporated into the final IRWM plan guidelines issued in December 2012, is the product of dialogue between regions and DWR. Thus, although the climate change "standard" is a rule established to ensure accountability for a legislative requirement, the nature of the rule has been negotiated and revised through interactions between DWR and IRWM regions, and compliance has been supported through resources offered by DWR to assist regions in conducting their own analyses. Without the requirement, dialogue about this issue at regional levels would be unlikely. At the same time, DWR's capacity building efforts and willingness to adjust guidelines appear to have made a difference in allowing this dialogue to take place. While this does not tell us whether learning is occurring – this would require investigation of specific changes strategies and practices as a result of deliberation – it suggests that institutional elements may be in place to support learning.

6. Conclusion

Multi-level governance arrangements often involve complex combinations of governance practices, blending hierarchical, collaborative and competitive modes, and are intended to enable the creation of policy solutions tailored to regional or local contexts. Thus, local units in such structures vary greatly in their practices, and this diversity makes it even more challenging to understand and analyze governance arrangements. In examining California's IRWM process, this paper provides only a glimpse into the complex array of relationships and meanings that comprise this multi-level structure. Much more research is needed to understand the institutional arrangements of the IRWM process, the outcomes they generate in terms of the development of integrated approaches to water management, and lessons this system might hold for the governance of multi-level and complex problems.

However, this paper does provide some initial clues. First, it finds that the IRWM process does indeed involve a combination of hierarchical rules, geared toward assuring accountability to legislative requirements, and collaborative practices, which engage a range of stakeholders in deliberation over regional water management priorities. This confirms the indications in recent literature that current governance arrangements are hybrid entities (Olsen 2008, Hill and Lynn 2005, Jordan et al. 2005, Hértier and Lehmkuhl 2008). Examination of the process of determining regional boundaries (Section 4) and of incorporating climate change in regional plans (Section 5) provides some insight into the interplay between these collaborative and hierarchical modes, and begins to identify how this might support increased deliberation, and potentially learning. Rules set by DWR, acting as the "central authority" in this multi-level structure, have resulted in greater dialogue within and between regions in negotiating the boundaries of IRWM regions, and in assessing the impacts of climate change on water resources. However, in both cases, this was enabled not only by the existence of rules, but the manner in which rules were designed and implemented. Instead of implementing rules in a "top-down" manner by simply requiring that regions use a single approach for determining boundaries or analyzing climate change, DWR has allowed regions to follow multiple approaches, and has been willing to change its guidelines based on feedback from regions. Further, DWR has invested in the development of resources that support regional capacity in determining their

priorities and approach. The result has been diverse choices in regional boundaries, combining watershed, groundwater, and administrative lines depending upon stakeholder participation in a particular region. With regard to climate change, regions are pursuing multiple approaches with varying degrees of reliance on quantitative analyses, and with considerable opportunities for stakeholder participation.

These findings suggest that the combination of flexible rules and investment in supportive services for local units can provide an environment for deliberative practices among regional stakeholders, a crucial ingredient for learning. Again, this confirms some of the findings of literature on experimental and multi-level governance, particularly Sabel and Zeitlin (2011)'s description of the supportive role played by a central authority. However, additional research is needed to determine what learning is taking place in IRWM regions, and the specific role that hierarchical and collaborative structures play. Further analysis is particularly needed on how the participation of consulting firms in the IRWM process affects learning. While consulting firms often bring valuable expertise, whether or not learning occurs in a region may depend upon how the relationship between the firm and the IRWM participants is negotiated. If reliance on consultants leads to the development of plans that are largely the product of a consultant's research, plans may be written to comply with the rules but with limited opportunity for deliberation and reflection on the part of water stakeholders. On the other hand, a region with a governance process with significant stakeholder engagement might greatly benefit from the additional expertise that a consultant can bring to bear. Thus, the relationship of a consultant with stakeholders may be a crucial factor in determining the effect of rules and standards in promoting learning. In this area as well as others, further study of the IRWM process in California may yield important lessons for understanding and evaluating the complex forms of governance we encounter today.

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Sources

All IRWM program-related documents cited in this paper can be found on DWR's website at: http://www.water.ca.gov/irwm/grants/index.cfm

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