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The evolving role of government in the adaptive governance of freshwater social-ecological systems in the western US

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ABSTRACT

The role of government within the western United States is shifting, as government command and control policies inadequately address freshwater management complexity. As growing human and environmental needs intensify water resource governance challenges, government is increasingly combining existing regulatory structures with collaborative exchange mechanisms, such as Investments in Watershed Services (IWS). We explored the changing role of government through IWS in the west, a region that holds one of the highest concentrations of IWS globally. Through a survey, we collected and analysed information on the influence of government in IWS. All 48 identified IWS contained some form of government presence: as program participants, regulation drivers, or land managers, and in both voluntary and regulatory contexts. Government influence on IWS varies across water issue (in-stream flow, water quality, and source water protection), and level of government (local, state and federal). Our work demonstrates how the government is expanding its roles and responsibilities, moving beyond historic command and control roles to support and facilitate new mechanisms. Although most government presence in early IWS was regulatory, local, state and federal governments are increasingly participating directly in IWS. State government have expanded regulatory structures for instream flow, and federal and local government are collaborating in source water protection. We found that government is reactionary, pragmatic, and incremental in their responses to water management. Our work provides the first government-specific analysis of IWS in the western US, and provides insights into the evolving role of government in adaptive governance of freshwater resources.

1. Introduction

Sustaining the quality and quantity of freshwater resources to meet environmental and societal needs is one of the most vexing governance challenges affecting the globe (Pahl-Wostl et al., 2010). The asymmetric distribution of water, growing social demands for both human uses and environmental protection, and changing climate change are intensifying water resource governance challenges (Pahl-Wostl et al., 2010). The western United States (US), an area with a history of water conflicts, is no exception, particularly as growth and development stress ecological systems (Fahlund et al., 2014).

Authority to set standards, enforce rules, and arbitrate the use of freshwater resources has historically rested with local, state and federal levels of government (Gerlak, 2006). The fluid nature of the resource, and mismatch between political boundaries and water basins often results in water management implemented by multiple entities working across different scales and in various arenas, with policy responses often motivated by crisis (Gerlak, 2006).

The past three decades have seen a shift in the role of government within the United States, as an increasing awareness grows among water managers and users that government command and control policies are not sufficient to address the complexity of natural resource issues, such as freshwater concerns (Scholz and Stiftel, 2005; Sabatier et al., 2005). As water sustainability concerns grow, existing water governance systems and historically common engineering responses are proving environmentally and economically inadequate, resulting in a shift towards more economically efficient strategies for managing water needs, and new governance approaches (Debaere et al., 2014; Gunderson et al., 2016). Similarly, there is a growing recognition that policy makers and tools must adapt to fit new contexts for governing water resources in the face of increasing social and ecological complexities (Gallaher et al., 2013; Gunderson et al., 2016).

Recent decades have seen government agencies combining regulatory or quasi-regulatory structures and rules with a variety of voluntary, collaborative market-type exchange mechanisms to support ecosystem services (Wayburn and Chiono, 2010). In this way,

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government actors and institutions can influence environmental management (Koontz and Newig, 2014; Scarlett and Boyd, 2011) through the 'powerful hammers' of federal law enforcement, and by acting as facilitators of restoration and collaborative efforts (Gerlak, 2006, p. 247). Federal and state regulations around water issues have the potential to induce decentralized or bottom-up approaches, facilitating the participation of a broad range of stakeholders.

This range of political, economic, social, and administrative processes in place that influence and respond to conditions in a system (Pahl-Wostl, 2009 from UNDP, 2000 definition), (e.g. water resource concerns) is defined as governance. How governance systems deal with complexity in a time of increasing ecological change is critical; however, existing literature on natural resource governance, performance and dynamics is still limited (Pahl-Wostl, 2009). These changes in the role of government in relation to water resource management exhibit characteristics of adaptive governance, which has been identified as a critical response for governing increasingly complex social-ecological systems, especially in times of change (Olsson et al., 2006). Adaptive governance requires networks connecting individuals, organizations and others at multiple levels, bottom up and top down decision making, balancing centralized and decentralized control (Olsson et al., 2006; Chaffin and Gunderson, 2016; Gunderson et al., 2016). Adaptive governance also, "provides the capacity for environmental managers and decision makers to confront variable degrees of uncertainty inherent to complex social-ecological systems (Chaffin and Gunderson, 2016, p 81)", such as freshwater systems. As the paradigm of water management shifts to include more partnerships and collaborative efforts, and government engaging across scales, there is a clear need for an improved understanding of the roles these actors play (Gerlak, 2008; Koontz et al., 2004).

To understand these changes in government roles, we focused on Investments in Watershed Services (IWS), which are incentive-based and problem-oriented investment mechanisms aimed at addressing the provision and enhancement of water-related ecosystem services (Bennett and Carroll, 2014; Huber-Stearns et al., 2015). IWS have been cited as alternative mechanisms for filling gaps in existing regulations for natural resource issues. However, it is no longer about a choice between political decisions and free market approaches; rather, it is about a combination of options (Sommerville et al., 2009). Key to this is understanding *how* the roles of government and policy are changing in the governance of water ecosystem services (Muradian and Rival, 2013).

This paper presents research on these evolving roles of government in IWS in the western US. Through this paper we explore our two research questions around understanding: 1) the roles of government regulation and participation in IWS across the region; and 2) how government influence on IWS varies across water issue (in-stream flow, water quality, and source water), and by level of government (local, state and federal). Our intent was to provide the first government-specific analysis of IWS in the western US, and secondly, to provide insights into the evolving role of government in adaptive governance of freshwater resources, which holds implications for governments around the globe grappling with freshwater governance challenges.

1.1. Government rules and roles in water resource management in the western US

Understanding how and why IWS has developed with government involvement in the study region, is a product of the region's settlement, growth, and development, and has implications for other regions grappling with freshwater management issues. As McKinney and Thorson (2015) note,

> The American West is defined first and foremost by aridity, scarcity, and variability of water resources. In response to this geographic imperative, the region has evolved a robust menu of legal, institutional, and community-based approaches to managing water and conflicts at local, state, and national levels. While far from perfect, this framework may offer lessons to other regions throughout the world that are increasingly faced with water conflicts due to scarcity and variability of water resources. The resulting menu of approaches reflects an adaptive, collaborative, and nested system of governing water resources. (p. 679)

We briefly overview the most relevant parts of water resource management in the Western US for the purposes of this paper, and our analysis, but note that this section is not a comprehensive review of the complex topic of water law. Conservation mechanisms such as IWS fit within existing social, political and ecological contexts, which, in this case, means IWS approaches must adhere to existing national and regional management, which in the United States is federal and state water resource management.

1.1.1. Federal regulation

Federal regulatory authority expanded with federal environmental legislation in the 1970's, most notably the Clean Water Act (CWA), which regulates water discharge and surface water quality (33 U.S.C. §1251, 1972), and the Safe Drinking Water Act (SDWA) which oversees drinking water quality and those water providers supplying drinking water (42 U.S.C. 300f–300j; Gerlak, 2006). Additionally, the Endangered Species Act (ESA) empowers the federal government to regulate human actions affecting threatened or endangered aquatic species listed under the law. This includes designating critical habitat for protection (even on private lands), and specifying standards for protecting and recovering listed species (e.g. water conditions) (16 U.S.C. § 1531). Pursuant to the CWA and ESA, the federal government oversees regulation of water quantity, stream volume and flow rates, all of which link directly to water quality (CWA) and aquatic species habitat conditions (ESA) (Loehman and Charney, 2011).

Water governance in the western US lacks an overarching legal-regulatory framework that governs all aspects of water allocations and as such, is characterized as chaotic, overlapping, reactionary and fragmented (Gallaher et al., 2013; Gerlak, 2008; Scholz and Stiftel, 2005). Multiple agencies across scales oversee various portions of water policy, and individual states create their own systems to manage water quantity within their boundaries (Gerlak, 2006; Loehman and Charney, 2011). Only recently have federal law and regulation been viewed as motivating influences for both government and non-government actors to work collaboratively on shared water concerns (Gerlak, 2008). For example, federal regulations (e.g. ESA and CWA) are increasingly triggered by declining water quality and/or quantity, which affects public, non-profit and private actors alike, typically in cases that regulation alone cannot resolve.

1.1.2. State regulation

Water access and allocation in the western US is based on the prior appropriation doctrine, which is essentially a 'first come, first served' approach (Loehman and Charney, 2011). Each western US state evolved with its own prior appropriation legal and administration system, and water rights are adjudicated under the regulatory oversight of state agencies and water courts (Johnson and DuMars, 1989).

Addressing 21st century water resource challenges using 19th century water governance systems has obvious challenges (Gallaher et al., 2013). Until recently, prior appropriation doctrine typically has not considered water left in a flowing water body ('instream flow') as an accepted use of water rights; water rights are only recognized when a user diverts and applies the water for a legally-recognized 'beneficial' purposes (Anderson et al., 2012). This system induces persistent water diversion, resulting in inadequate water flow for aquatic species and water quality (Landry, 1998), and disincentives for water conservation or sharing.

Awareness of the environmental benefits of instream water flow