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Toward the adaptive governance of transboundary water resources

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Abstract

Transboundary water resources, such as international river basins, pose complex and often contentious management challenges. In response to the failures associated with the state-centric approach to the governance of international waters, discussions on transboundary water resources governance over the last two decades or so have focused largely on public involvement. The need to build resilience into such governance systems has been virtually overlooked. Based on a conceptualization of transboundary water resources as complex social-ecological systems, the manuscript proposes adaptive governance as a unifying framework for informing policies aimed at promoting the conservation of transboundary water resources in an increasingly unpredictable future. The key attributes of adaptive governance satisfy the requirements for good governance of transboundary water resources, as well as preparing the coupled social-ecological system to respond to unpredictable drivers of change.

Keywords

Adaptive; governance; transboundary; water; policy

Introduction

Transboundary waters comprise freshwater resources, such as lakes, rivers, and aquifers that are shared by two or more states (Vollmer et al. 2010). Almost half the land surface area of the earth comprises transboundary river basins, with some 260 watersheds divided by one or more international boundaries (Bernauer 2002). Enhancing the sustainability of international watersheds presents challenges in governance and public policy. The challenge results from the multiple jurisdictions and the unpredictability of the multiple drivers of change (Cosens 2010). Traditionally, the management of international watershed basins has been primarily the responsibility of national government actors (Norman and Bakker 2008). Despite the prominent role of national actors, and top-down, state-centric approaches in transboundary water resources governance, there is growing recognition of a fundamental shift in the interaction among the social, ecological, institutional, economic, and technological components of water resources management (Gleick 2000; Biswas 2004; Pahl-Wostl 2007).

Over the last two decades, a major focus of the literature on transboundary water resources has been on the promotion of public involvement as a means of good governance. These discussions have centered around three principles of good governance: transparency, participation, and accountability (Badenoch 2002; Bruch 2005). According to Lockwood et al. (2010: 993), “transparency refers to (a) the visibility of decision-making processes; (b) the clarity with which the reasoning behind decisions is communicated; and (c) the ready availability of relevant information about governance and performance in an organization.” Transparency in decision-making will be enhanced when institutions provide reliable and timely information about decision processes while publics also have access to such information (Badenoch 2002). Bruch (2005) describes participation of various publics in decision-making processes as the “centerpiece of public involvement” (p. 41). Participation requires that institutions involved in decision-making processes include the diverse interests within their jurisdiction, such as local communities. Thus, it also provides an opportunity for interested individuals and groups to be represented and involved in decision-making processes. Accountability refers to the mechanisms by which the performance of institutions is subjected to public scrutiny in order to ensure that institutions are

responsive to the diversity of interests (Badenoch 2002: 20). Such mechanisms might include electoral systems, effective judiciary, and effective media (Ribot et al. 2006).

Like other forms of common pool resources, transboundary water resources are complex and dynamic social-ecological systems. Enhancing the sustainability of such complex systems requires building resilience. According to Folke et al. (2002: 438), “management that builds resilience can sustain social-ecological systems in the face of surprise, unpredictability, and complexity.” Building resilience into social-ecological systems requires governance frameworks that are “adaptive, multi-level and focused on learning” (Armitage 2008: 15). Thus, the challenge of governing complex social ecological systems, such as transboundary water resources, entails the design of multilevel institutions to engage multiple actors, as well as those able to navigate periods of gradual and episodic change in order to ensure the sustainability of the system (Olsson et al. 2007). While the existing literature on transboundary water resources has been focused on multi-level collaboration, it has to date paid little attention to issues of “uncertainty and change” (Raadgever et al. 2008). As such, it offers only a partial response to the institutional challenges of transboundary water resources governance. To ensure the sustainability of transboundary water resources, there is a need for governance frameworks that address the challenge of engaging multiple actors across levels and facilitate the development of mechanisms for adaptation in a future where globalization and climate change will increase unpredictability.

To fill this void, we adopt the concept of adaptive governance as an organizing framework for informing policies on the institutional dimensions of transboundary water resources governance. Adaptive governance is concerned with the institutional frameworks necessary for navigating complex social-ecological systems through periods of gradual and episodic changes in order to ensure their sustainability. Adaptive governance focuses on the broader social context within which sustainable ecosystem management occurs (Folke et al. 2005). The concept of adaptive governance has often been used inter-changeably with adaptive co-management – a concept that seeks to combine the learning component of adaptive management with the multi-level institutional linkages of co-management (Huitema et al. 2009). According to Olsson et al. (2004), “(a)adaptive comanagement systems are flexible

community-based systems of resource management tailored to specific places and situations and supported by, and working with, various organizations at different levels” (p. 75). Folke et al. (2005) contend that adaptive comanagement represents an operationalized form of adaptive governance. Both concepts relate to multi-level institutional frameworks that facilitate learning and adaptation in complex social-ecological systems. The primary attributes of adaptive governance, including institutional diversity, nestedness, and analytic deliberation (Dietz et al. 2003) are adequate in meeting the requirements for good governance in transboundary water resources, as well as building the resilience of the system against future surprises.

The next section offers a brief survey of transitions from the traditional state-centric approach to transboundary water resources governance, while the following section examines how the concept of adaptive governance is rooted in the evolving study of sustainability and resilience. The subsequent section discusses the key attributes of adaptive governance with reference to transboundary water resources. The next section looks at the policy implications of the transition towards adaptive governance and the conclusion summarizes findings and suggests areas for future research.

Transboundary water resources

Transboundary water resources, like all common pool resources, can be conceptualized as complex systems comprised of dynamic social and ecological elements and institutional arrangements in a dynamic of interconnected reliance across multiple spatial and temporal scales (Janssen and Anderies 2007). The traditional approach to transboundary water resources governance emphasized the state as the appropriate geographical scale of analysis. This emphasis on the state has bounded transboundary water management in three ways. First, as Blatter and Ingram (2000) observe, “most of the literature on transboundary water management in the twentieth century has taken for granted that the governments of nation states are responsible for building institutions of governance for transboundary water resources” (p. 441). The continued importance of the state-centric approach has been attributed in part to the influence of scholars in international relations whose primary research focus is “how do sovereign nations behave

toward each other, and why?” (Karkkainen 2004a: 72). The need to craft state-centric regulatory frameworks to guide this behavior is rooted in a nineteenth century positivism that has in the area of transboundary water management produced “treaty arrangements in which sovereign states undertake mutual, legally binding contractual obligations to exercise their sovereign authority to control specified kinds of environmentally harmful action” (Karkkainen 2005: 75).

Second, the emphasis on the state is grounded in an enlightenment rationality that views the state (and its water resources) as being defined by fixed geographic boundaries (Blatter and Ingram 2000). These boundaries structure problems definition, management options, and potential solutions within a socially constructed reality of what can and cannot be done. The primacy of geographic boundaries in the conceptualization of transboundary water issues can create two types, or levels, of mismatches. From an institutional perspective, scale mismatch arises when the design of human institutions does not match the scale of the resource to be managed either spatially or temporally (Cash et. al. 2006). The contemporaneous processes of globalization and localization foster more fluid conceptions of appropriate boundaries that blur the sharp distinctions among the local, national, and regional scales. The second mismatch is the scale at which nation states manage a shared watershed can be dichotomous, with different oversight structures and management priorities. Further, different institutional arrangements can match dissimilar socio-political systems in asymmetrical relationships, with attendant diplomatic complications, representing different stakeholder constellations and having mismatched powers and responsibilities.

Third, the state-centric approach operated on the false assumption that the state possessed the capacity to deal with complex environmental problems—an illusion that produced cases of “capacity mismatch,” where conventional regulatory approaches prove inadequate in dealing with the complexities of transboundary water resources (Karkkainen 2005: 76). Realization of the disconnect between ecosystem complexity and static rules has encouraged flexibility and experimentation in water resources management. Moreover, the recognition that expert knowledge is incomplete draws attention to the value of traditional knowledge in ecosystem management (Olsson and Folke 2001) and the need for

participatory approaches that seek collaboration among various epistemic communities in the management process.

Alternatives to the state-centric approach, in the literature and policymaking have focused largely on the promotion of collaborative governance of transboundary water resources guided by principles of accountability, transparency, and participation (Bruch 2005). Such policies are inadequate in ensuring the sustainability of transboundary water resources in the face of surprises from natural and anthropogenic drivers of change, such as globalization and climate change. There remains a need for institutional frameworks that explicitly address notions of complexity, fluidity of scale, flexibility of rules, and the use of multiple systems of knowledge in the governance of transboundary water resources.

Resilience and adaptive governance

The long-term sustainability of social-ecological systems as complex as transboundary water resources requires governing approaches, and actual policy choices, that proactively seek to enhance system resilience. Stemming from the seminal work of Holling (1973) in the field of ecology, the use of resilience in social-ecological systems research has three distinct but interrelated dimensions—the ability of the system to absorb a disturbance while maintaining its structure, identity and function; the capacity to reorganize; and the capacity for learning and adaptation (Folke 2006). Together, resilience is the ability of a system to cope, adapt, and transform without losing its critical functions (Folke et. al. 2002). There is a fundamental difference between coping, adaptability, and transformability. Coping and adaptation occur within the existing system parameters, while transformability involves a fundamental alteration of the existing system into a new system when the existing social, ecological, and economic conditions become unbearable (Walker et. al. 2004). More recently, there is growing interest in the ability of systems to transform into better social-ecological systems rather than adapt to existing conditions (Folke 2006).

In natural resource management there has been a shift from traditional sustained yield policies that emphasized yield maximization to ecosystem-based management that aims to build resilience of social

ecological systems (Folke et. al. 2005). Further, management practices are increasingly oriented towards building resilience to sustain social ecological systems in the event of surprise and unpredictability (Folke et. al. 2002; Lebel et. al. 2006). The new emphasis on resilience building implies that traditional approaches to decision making and implementation, characterized by top-down and with a heavy reliance on scientific expertise, are poorly suited for dealing with complex systems (Karkkainen 2005; 2006). More importantly, building resilience or robustness necessitates a rethinking of how natural resources are governed (Anderies et al. 2004; Folke 2007).

These new perspectives have influenced research on common pool resources, characterized by subtractability through use and where excludability of users is difficult (Ostrom et al. 1999). Research on the governance of common pool resources has begun to explore institutional mechanisms that can manage for sustainability of complex ecosystems across multiple spatial and temporal scales (Berkes 2006; 2008). The concept of adaptive governance (Dietz et. al. 2003; Folke et. al. 2005; Anderies et. al. 2006; Olsson et. al. 2006) has emerged at the intersection of research on common pool resources and resilience in social-ecological systems (Armitage 2008). Adaptive governance relies on multi-level institutional mechanisms to act across multiple spatial and temporal scales. The institutional framework for adaptive governance is polycentric (Olsson et. al. 2007). Polycentric institutions are hierarchically nested multi-level institutions with some degree of diversity and autonomy at each level (McGinnis 1999), and are alternatives to the top-down institutional mechanisms associated with rational planning (Blomquist and Schlager 2005: 109).

What differentiates adaptive governance from adaptive management is the functional and geographical scope of institutional arrangements. Adaptive governance makes an explicit connection between the multi-level governance of natural resources as an integral component of the overall institutional mechanisms for decision making and implementation in the larger society. It, therefore, tends to “expand the focus from adaptive management of ecosystems to address the broader social contexts that enable ecosystem-based management” (Folke et. al. 2005: 444). With this broader

jurisdictional and functional scope, adaptive governance appears particularly suited for dealing with the challenges inherent in the governance of transboundary water resources.

Adaptive governance and transboundary water resources

Dietz, et al. (2003), building on the work of Ostrom (1990), have identified three strategies for promoting and achieving adaptive governance in the context of larger multi-level systems—analytic deliberation, nesting, and institutional variety. These strategies, briefly examined below, apply to transboundary water resources and can provide a point of departure for developing at the local and regional level new approaches to managing these water resources. The case of the U.S.-Canadian Great Lakes is used as an example to illustrate the various dimensions of adaptive governance of transboundary water resources.

Analytic deliberation

Dietz and Stern (1998) describe analytic deliberation as “structured discussion among scientists, decision makers, and parties with an interest in a policy” (p. 442). The goal is to ensure that all relevant information, as well as diversity of values is included in the decision process. Analytic deliberation has the advantage of combining scientific analysis with public deliberation in order to inform better policies. As such, it is an appropriate response to the challenges of scientific uncertainty and conflicting social values that bedevil the formulation of policies on complex social-ecological systems, such as transboundary water resources. The open process of communication and discussion entailed in such deliberations can also enhance better understanding among scientists and interested publics (Lebel et al. 2006).

Analytic deliberation offers several useful prospects for the sustainable governance of transboundary water resources. The inclusion of all relevant interests in various stages of the policy analysis process satisfies requirements for participation and transparency. Analytic deliberation can contribute to the resilience of transboundary water governance systems by providing better information about social-ecological interactions in transboundary river basins through the integration of different knowledge

systems from various epistemic communities. Deliberations can also build trust and social capital (Dietz et al. 2003) that is vital for adaptation to future surprises (Folke et al. 2005). Such deliberations can enhance institutional and social learning and help build a collective memory of past experiences that are critical for responses to future surprises. As Berkes (2007) has noted, both social memory and ecological memory are critical for system renewal in the event of a major driver of change. A good example of transboundary water governance regimes that have successfully employed analytic deliberation is the U.S.-Canada Great Lakes that Karkkainen (2004b) describes as “a deeply collaborative transnational effort” (p. 131). Among the comprehensive list of interests represented in on-going efforts to address various environmental challenges are federal agencies, NGOs, business associations, independent scientific community, tribal groups, and municipal authorities.

Nesting

Given the scale-dependent nature of complex social-ecological systems, a key governance challenge is how to enhance the fit between governance institutions and spatial and temporal dynamics of the social-ecological system (Folke et al. 2007). Nesting of institutions is a response that recognizes that the focus on a single level of scale is inadequate in dealing with complex social-ecological systems (Berkes 2006 2008). Marshall (2008) describes nested institutions as co-management occurring at two or more levels and that entail multiple semi-autonomous centers of decision-making authority. As such, nested governance systems are polycentric. Polycentric institutions have multiple centers of decision-making authority with no dominating central authority (Ostrom 1999). Polycentric institutional arrangements are not necessarily hierarchical (Lebel et al. 2006). While the allocation of functions among the various centers of authority are guided by principles of subsidiarity (Marshall 2008), overlap in functions might occur. Although such institutional frameworks are generally inefficient, such overlaps create redundancies that serve as buffers in the event of failure at one level.

Given these attributes, nested institutions are suited for addressing the challenges in transboundary water resources governance across multiple levels of scale from the local to the global, as well as dealing

with the cross scale interactions among these levels. The allocation of decision making and implementation authority at appropriate levels of scale will address the problem of scale mismatch associated with conventional state-centric approaches to transboundary water governance and enhance participation among interested publics. While cross-scale interactions among the various levels of scale can enhance upward and downward accountability, interactions among interested publics and institutions within each level of scale can also enhance accountability horizontally (Lebel et al. 2006). Such interactions also enhance transparency with regard to the flow of information. Nested institutions consequently play critical roles in learning, collective action and resilience building (Marshall 2008, Huitema et al. 2009). Karkkainen (2004b) attributes the success of the U.S.-Canadian Great Lakes to its nested institutional structure that allows for devising of rules and coordinating of management at multiple levels of scale, ranging from local tribal watersheds to the entire basin (p. 132).

Institutional variety

Colfer et al. (2001) have argued that the homogenization of complex social and ecological systems poses the threat of reducing the capacity of such systems to sustain themselves. They posit diversity serves as a form of “insurance policy” for reducing risks. As Berkes (2007) has noted, “The main idea behind diversity is that it provides the seeds for new opportunities in the renewal cycle. It increases the options for coping with shocks and stresses, making the system less vulnerable” (p. 289). With regard to resource governance regimes, institutional variety or diversity refers to the employment of different types of institutions or systems of rules for governing resources. Traditional approaches have focused on the use of state regulatory mechanisms, but increasing attention is being paid to locally evolved social norms, as well as the use of economic incentives as mechanisms for the adaptive governance of complex social-ecological systems (Folke 2007). These institutions include state mechanisms, market-based institutions, and community institutions (Dietz et al. 2003). For example, the employment of state, market, and community institutions in resource management tends to be an effective mechanism for ensuring rule compliance since “innovative rule evaders can have more trouble with a multiplicity of rules than with a

single type of rule” (Dietz et. al. 2003: 1910). Additionally, having a diversity of institutional arrangements is useful for managing against unpredictable futures because the likelihood of all types of institutions failing in response to the same challenge is small. Thus, the simultaneous employment of different resource governance regimes enhances institutional performance in terms of rule formulation and implementation, and also builds the capacity for self-organization.

With regard to transboundary water resources governance, the use of a variety of institutional arrangements as opposed to the dominant use of state regulatory mechanisms promised to address the problem of capacity mismatch as well as offer opportunities for local level participation through the recognition of the importance of local institutions in the multi-level governance of water resources. The interactions among local level institutions and more complex state institutions in a nested institutional framework provides a foundation for the adaptive governance of transboundary resources in response to challenges occurring from various levels of scale. Karkkainen (2004b) describes the governance regime of the U.S.-Canadian Great Lakes as comprising a variety of institutional arrangements, such as sovereign states, sub-national and non-state actors whose interactions are guided by informal and “extra-constitutional” modes of conduct in an attempt to complement the limited state capacity. He contends that these interactions have created “a rolling, experimentalist flavor, as the parties continuously reassess and revise goals, objectives, and management measures in light of lessons learned, newly emerging science, and changing social, political, economic, and environmental conditions within the complex eco-region of the Great Lakes” (p. 133).

Policy Implications of the Transition towards Adaptive Governance

Embracing the adaptive governance of transboundary water resources will mean changes in how problems in water resource governance are conceptualized and how existing policies can be recast and new options created. Governance institutions, for example, may evolve under favorable conditions allowing for incremental change and proactive efforts to test the efficacy of such change. In other cases, institutions may have to be consciously designed to address specific concerns or to achieve evolving goals

(Rosenau 1995; Olsson et al. 2004). The policy challenge in promoting adaptive governance is to create conditions that would facilitate both the creation and evolution of institutions to address specific transboundary water resources governance challenges at appropriate spatial and temporal scales. Folke (2007) has identified three such conditions: the creation of enabling legislation; provision of appropriate incentives, and enhancing the role of bridging organizations that serve as links among diverse institutions across levels and scales.

The adaptive governance approach to transboundary water management is in sharp contrast with the traditional state-centric, top-down approach. The new approach calls for wide-ranging public involvement in a never-ending process of knowledge generation, decision making, and implementation. Enabling policies are required to facilitate such a transition from the old to the new approach. For instance, policies are required to legitimize the rights of all stakeholders, especially marginalized groups, to information, participation in decision-making and policy implementation processes, and access to justice through the courts (Bruch 2005). This is critical for enhancing the process of analytic deliberation.

The success of adaptive governance regimes depends largely on rule compliance (Dietz et al. 2003). The traditional approach to ensuring that rules are followed is through the use of “command and control” environmental regulation. More recently, the use of economic incentives, locally evolved social norms, and voluntary approaches to rule compliance are being explored (Dietz et al. 2003). According to Vincent (2007), “Economic incentives are especially important if rapid changes in human behavior are desired” (p. 6). This appears particularly relevant in times of episodic change. Research on the transformation of social-ecological systems also point to the critical role of social capital among networks of dispersed actors (Olsson et al. 2006). The transition from the current dominance of command and control mechanisms in transboundary water resources governance systems toward adaptive governance may require that both economic and non-economic sources of incentives are explored to promote cooperative behavior which is critical for self-organization. The integration of these non-regulatory mechanisms satisfies the requirement of institutional variety.

Bridging organizations play a critical role in connecting actors within and across levels of the institutional scale. They provide the social capital among actors where knowledge and resources are dispersed. These organizations, therefore, facilitate the integration of knowledge within the system as well as its dissemination. They are also critical for mobilizing actors in the system for adaptation to drivers of change (Olsson et al. 2007). The role of bridging organizations is essential in enhancing the cross-scale interactions in the nested institutional framework that is required for adaptive governance.

Conclusion and Recommendations

There is growing consensus that approaches to the governance of transboundary water resources are transitioning from state-centric approaches towards collaborative approaches (Karkkainen 2004b, 2005). But issues of resilience in transboundary water governance have been virtually overlooked (Raadgever et al. 2008). The adaptive governance model, developed as a component of ongoing work on social-ecological systems, offers a positive, intuitive path forward. Grounded in resilience thinking and common pool resources theory, adaptive governance offers promise to 1) build the adaptive capacity of existing social-ecological systems, 2) build the capacity of such systems for learning and adaptation, and 3) transform them into different social-ecological systems when the existing state becomes undesirable. The core strategies of adaptive governance—analytic deliberation, nesting, and institutional variety—blend with recent discussions on transparency, participation, and accountability in the governance of international waters (Badenoch 2002; Bruch 2005). This type of governance framework is appropriate for facilitating the current emphasis on multi-party collaboration among diverse actors in transboundary water resources governance and for preparing the system for both abrupt and incremental change in response to unpredictable social and ecological drivers of change.

Two areas of future research on transboundary water resources appear promising. One is to explore how the patterns of change in transboundary water resources suggested in the literature actually manifest on the ground. The second is to examine the challenges and opportunities that current mechanisms for managing transboundary watersheds present for a transition towards adaptive governance.

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