Paradoxes, Possibilities, and the Obstacles to Integrated Water Resources Management:

Lessons from the Institutional Rational Choice Literature

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Mark T. Imperial, Ph.D.
Department of Public and International Affairs
University of North Carolina Wilmington
601 S. College Rd.
Wilmington, NC 28403-5607
imperialm@uncw.edu

Contact:
Mark Imperial, Associate Professor & Director
Master of Public Administration Program
Department of Public & International Affairs
University of North Carolina at Wilmington
601 S. College Road
Wilmington, NC 28403-5607, USA

Phone: (910) 962 – 7928
Fax: (910) 962 – 3286
imperialm@uncw.edu

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Abstract

As we move into the 21st Century, integrated water resources management (IWRM) with its emphasis on coordinated development and management of land, water, and related resources is in widespread use around the world. This paper argues that participants in IWRM should think holistically about water resources, but that it is also a strategic endeavor with practical limits on how much any collection of policies and programs can or should be "integrated". Strategic decisions must be made about time, space, actor, and issue dimensions. Similarly, while problems should be viewed holistically, choices also have to be made about who to involve in the decision making processes used to frame problems and solutions. This involves strategic choices about the member and strategy rules that shape the boundary of the watershed partnership. It also involves choices about the decision and coordination rules used to manage the interactive processes utilized by IWRM.

It is also clear that context matters. A water resource's physical, political, socioeconomic, and institutional environment, its local culture, and situational history (i.e., previous efforts to integrate policies and programs) will all influence these strategic choices and help determine whether IWRM is a useful strategy for enhancing watershed governance. The paper proposes using the eight design principles proposed by Ostrom (1990) to identify institutional settings conducive to IWRM. However, many water resources (e.g., watersheds, river basins, catchment areas) differ in significant ways from the relatively simple CPR systems investigated in the literature. Kauneckis and Imperial (2007) term these institutional systems "complex environmental commons" and propose five additional design principles to identify settings appropriate for IWRM.

The paper concludes by examining some of the potential paradoxes associated with the factors that allow watershed partnerships to endure over long time periods. One basic tradeoff is stability versus change. Stability is not a symptom of "bad" management but actually reflects well-designed organizational systems. Thus, organizations involved in IWRM are likely to resist changes to their core strategies, structures, and processes while researchers recommend adaptive approaches to IWRM. Another tradeoff is reliability versus change. Organizations must reproduce their structures reliability and they do so by institutionalizing a set of rules. While stability reduces transaction costs, it also makes them resistant to adaptation and change. Accountability is also a "two-edged" sword. Watershed partnerships must account rationally for their actions but too much accountability creates disincentives for participation in collaborative processes. Finally, some minimum level of legitimacy is needed to acquire the resources needed to survive. Legitimacy often depends on choices related to the membership, strategy, decision, and coordination rules used in IWRM. But it also depends not just on whether an organization participates, but which member participates (e.g., opinion leaders, importance within the organizational structure, etc.) and what role key organizations have in decision making.

What this suggests is that institutions matter and that there is no one "best" way to organize IWRM. Thus, water resource managers should give careful consideration to the strategic choices they make when designing and managing the interactive processes associated with IWRM.

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Introduction

As we move into the 21st Century, integrated water resources management (IWRM) with its emphasis on coordinated development and management of land, water, and related resources is in widespread use around the world in various physical, socio-economic, cultural, and institutional settings. While IWRM programs vary considerably in their scope, design, and administration, they often share some common characteristics including:

- Approaching problems from an integrated or systems perspective;
- Having a stronger scientific basis behind policies and programs;
- Public participation that involves key stakeholders in planning and government decision making; and,
- Integrating and coordinating policies and programs to improve performance (Imperial 1999a).

There are many reasons why the shift to a broader perspective of IWRM has taken root in government programs. Much has been learned about how hydrological systems function and the interconnected nature of water resource management problems. There is also widespread acceptance that context matters when addressing complex water resource management problems (Imperial & Hennessey 2000). Problems like nonpoint source (NPS) pollution and habitat protection are hard to address through centralized government solutions because land use decisions are often made at lower governmental levels (John 1994; Durant et al. 2004; NAPA 2000). Other water resource management problems are complex or "wicked" in that they are difficult to frame due to competing values and interdependencies such that tradeoffs are required to address the problem (Rittel & Webber 1973). The utility of IWRM is its reliance on collaborative approaches to decision making that emphasize crafting place-based solutions that recognize tradeoffs among problems and the unique physical, socio-economic, cultural, and institutional settings associated with a water resource (e.g., watershed, river basin, catchment area, etc.).

Another reason for IWRM is the tendency for policies and programs to accumulate around important social problems over time (Elmore 1985). This is certainly true for many water resources where the size, scope, and breadth of these programs has gradually expanded since the 1970s at both national and sub-national levels of government (e.g., state and local governments) as the capacity for addressing environmental problems has expanded (V. Ostrom, 1994, 1989; Wright, 1988; Elazar, 1987). Programs tend to adopt parochial solutions that rely on the policy instruments over which they have control. As a result, policies and programs are specialized by medium, geographic location, statute, or function (e.g., permitting, enforcement, public education, installing BMPs, issuing grants). Watersheds also span political, geographic, and

ideological boundaries. Consequently, there are competing views about how a watershed should be "managed" (Imperial 2005; Wondolleck & Yaffee 2000). Unfortunately, this interlocking system of parochial solutions operating at multiple levels of government often fails to protect and manage water resources effectively.

Accordingly, an important feature of IWRM is its strong institutional orientation. As Bressers, O'Toole, and Richardson (1995) observe, it is not uncommon to find that:

> no organization of government possesses sufficient authority, resources, and knowledge to effect the enactment and achievement of policy intentions. Instead, policies require the concerted efforts of multiple actors, all possessing significant capabilities but each dependent on multiple others to solidify policy intention and convert it into action. Indeed, it is often difficult for any one actor, or group of actors, to manage, or manipulate, the flow of problems and solutions onto the political agenda in the first place. (p. 4)

Thus, the challenge is to find ways to improve the integration of the governance system for water resources given that problem solving capacity is widely dispersed and few programs can succeed by acting alone (Teisman & Klijn 2002; Milward & Provan 2000; Mandell 1989). Governance refers to the means for achieving direction, control, and coordination of individuals and organizations with varying degrees of autonomy in order to advance joint objectives (Lynn, et al., 2000; Frederickson, 1996). It involves more than the configuration of governmental and nongovernmental organizations. Governance includes enabling statutes, organizational and financial resources, programmatic structures, and administrative rules and routines. It also includes the formal and informal rules, social norms, and structures that govern relationships between organizations (Lynn, et al., 2000; Milward & Provan, 2000; Frederickson, 1996).

Thus, politics, bargaining, negotiation, and compromise are critical governance mechanisms in IWRM. Participants remain relatively autonomous and must be convinced to work together because they cannot be compelled to do so (Phillips, et al., 2000). Their interactions are guided less by formal authority structures than they are by social relationships that are the product of repeated communication, mutual interests, and reputation (Powell, 1990). An important by-product of these relationships is the shared values, norms, and trust that emerge (Jeffries & Reed 2000; Leana & Van Buren 1999; Wicks, et al. 1999; Peters & Pierre 1998; Tsai & Ghoshal 1998; Zaheer & Venkatraman 1995; Granovetter 1985). Indeed, there is much research highlighting the important role that collaborative processes play in watershed governance (Imperial 2005a, 2004; Leach, et al. 2002; Leach & Pelkey 2001; Born & Genskow 2001; Imperial & Hennessey 2000; Wondolleck & Yaffee 2000; Cortner & Moote 1999, 1994).

This study examines the challenge of integrated water resource management (IWRM) by utilizing an institutional perspective to highlight the fact that institutions matter. The central argument is that while IWRM emphasizes viewing problems holistically, in practice it is a strategic endeavor involving numerous choices that impact the design and performance of the institutional arrangements used to govern water resources. The paper begins by exploring the concept of integration in order to reveal some of the basic strategic choices associated with efforts to improve watershed governance. It is also clear that some institutional settings are more

amenable to integrated approaches to water resource management than others. The paper builds on the work of Ostrom (1990) and Kauneckis and Imperial (2007) to identify design principles to aid in the identification of institutional settings appropriate for IWRM. Once the decision is made to utilize IWRM, there are also numerous strategic choices related to the design of collaborative processes used to make decisions about how to improve watershed governance. The paper presents a framework that draws attention to the formal and informal rules developed (intentionally or unintentionally) to structure these collaborative processes. The paper concludes with a discussion of some of the potential paradoxes associated with IWRM.

What is "Integrated" Water Resource Management?

The attraction of an "integrated" approach to water resource management is that it encourages practitioners to holistically address problems rather than functioning along traditional programmatic boundaries. This lets managers look beyond their particular program, acknowledge the interrelationships among problems, and craft changes in the governance system to better address these interdependencies. Therefore, IWRM is as much a challenge of improving watershed governance as it is a question of science and designing effective policies. While scientific research helps define problems and set priorities, ultimately IWRM reflects the participants' values, ideologies, constituencies, turf, power, and ego (Bardach 1998).

Viewed from this institutional perspective, "integration" in water resource management occurs in a variety of ways including modifying policies, changing the structure of institutional arrangements, improving coordination between organizations (public, private, and nonprofit), and finding ways for organizations to collaborate and work together (Imperial 2005, 1999). However, politics bargaining, negotiation, and compromise impose practical limits on how much "integration" is possible or desirable. Moreover, while excessive fragmentation and duplication of authority can be costly, they are not always "bad" in terms of the structure of a governance system. Fragmentation may reflect technical specializations that take advantage of the resources possessed by different organizational members. It can also create economies of scale that lower the cost of service delivery (Imperial 1999; Blomquist 1992). Functional specialization may improve the quality of scientific information incorporated into decision making because centralized, bureaucratic systems often have difficulty collecting, acting upon, and communicating information and are vulnerable to information distortions (Blomquist 1992, 344). Thus, centralized institutional arrangements can have higher information costs than polycentric or decentralized structures.

Overlapping authorities also help guarantee that a wide range of interests are considered and deliberated. This may be more "democratic" than simply giving one agency the authority to impose its will on the others (V. Ostrom 1989, 1994; Imperial 1999). Duplication of authorities can also stimulate a competition of ideas that stimulates policy change, learning, and the diffusion of new approaches to solving complex water resources problems (Sabatier & Jenkins-Smith, 1999, 1993; Rogers 1995). Organizing a collaborative process around narrow issues also makes it possible to include only those actors directly affected by decisions. Important information about preferences is included while extraneous information is excluded. This can lower the transaction costs associated of these interactive processes (Imperial 1999; Blomquist 1992). Thus, while improving integration is often desirable, there are many cases where policy

fragmentation and duplication of authorities and responsibilities has its advantages. Moreover, policy integration and coordination does not require the direct supervision of a centralized coordinator. Coordination can occur through mechanism such as mutual adjustment as well as the standardization of work processes, outputs, worker skills, and shared values (Tompkins 2005). Watershed partnerships can facilitate all of these coordination functions (Imperial 1999).

Arild Underdal's (1980) framework for examining integrated marine policy can readily be adapted to draw attention to the strategic choices associated with "integrated" water resource management. Underdal (1980, 159) argues that integrated policies must meet three basic requirements: comprehensiveness (scope); aggregation; and, consistency. *Comprehensiveness* is viewed in terms of the interrelated dimensions of time, space, actors, and issues (Underdal 1980, 160). *Time* implies a long-range view of the consequences of policies and programs and their ability to collectively solve water resource problems. *Space* refers to the geographical scale of the watershed, river basin, or catchment area. The *actor* dimension refers to the proportion of actors (government agencies, interest groups, land owners, etc.) whose perspective is included in the problem framing and consideration of policy alternatives. The *issue* dimension includes the proportion of interdependent issues (or components of issues) that is subsumed under a common IWRM framework.

Aggregation is the extent that problems and policy alternatives are framed from an 'overall' perspective rather than from that of particular actors (e.g., lead government agency, funder, etc.) (Underdal 1980, 161). In IWRM, some sort of participatory process involving stakeholders is used to aggregate preferences. However, there can be considerable variation in the structure of these processes and their level of involvement. For example, it might employ shared decision making based on consensus among stakeholders or use advisory committees and other forms of public participation where formal decision authority rests in the hands of a small subset of policy actors (Imperial & Hennessey 2000).

Thus, IWRM involves choices about how to "integrate", particularly when it comes to choices about time, space, actors, and issue dimensions and the structure of interactive processes used to make decisions about how to improve watershed governance. As the scale of the IWRM effort increases in size, the scope of potential actors and issues will also increase. This will exacerbate transaction costs associated with decision making and complicate the aggregation dimension. Maintaining a long-term focus also has process implications because it implies institutionalizing some sort of decision making process. Thus, it is common to find watershed partnerships and other organizational structures that are formed to monitor implementation processes and encourage the types of collaboration among governmental and nongovernmental organizations needed to improve water resources (Imperial and Koontz 2007; Imperial 2005).

Underdal (1980, 161) further argues that an integrated policy is one whose components are in accord with each other. But these components (policies, programs, agencies) are often located at different levels of government or in different agencies. It can also include policies and programs of nongovernmental organizations (nonprofit and private sectors). *Consistency* of a policy across different levels is viewed in terms of two dimensions: horizontal and vertical. *Horizontal consistency* refers to the desire to have all organizations at a particular level pursuing the same policy. For example, all local governments in a watershed may have the same priorities

for habitat restoration. *Vertical consistency* refers to the degree to which agencies at different levels of government have consistent policies. For example, does a national habitat restoration program fund projects consistent with local priorities or does it direct resources in sub-optimal ways when viewed from the perspective of an IWRM program. Accordingly, the "integration" of policies is not synonymous with the "centralization" of authority at any one level of government. The two concepts are conceptually distinct and policies can be integrated but be implemented through decentralized or polycentric institutional arrangements (Imperial 1999a).

From a practical standpoint, enhancing the horizontal and vertical consistency of policies may be the most challenging aspect of IWRM. Even the most imaginative practitioners will be constrained when a governance system allocates budgetary and statutory responsibilities in ways that place organizations in conflict with one another. It is also common to find an underlying tension as to whether federal, state, regional, or local priorities should govern decision making. Limits also exist with respect to whether organizations can or should be willing to sacrifice their policies and priorities or those of their constituencies, no matter how noble the goal. Thus, for some organizations strategies like unilateral action, litigation, legislative intervention, increased reliance on markets, and attempts at hierarchical control may be preferred even if they lead to inconsistent policies.

Moreover, even when an organization's formal rules do not conflict, its behavioral norms, professional values, knowledge, experience, autonomy, and abilities may limit participation in IWRM (Wondolleck & Yaffee, 2000; Chisholm, 1995). Organizations possess different capacities for action (e.g., regulatory authority, technical expertise, policy responsibilities and priorities). Altering these capacities for action may come at great political cost and increase demands on limited organizational resources. Sharing information and coordinating programmatic efforts can also be time-consuming and require a significant commitment of organizational resources. Unless agency officials perceive there are benefits associated with these costs, coordination efforts are likely to meet resistance (Imperial 1999a). Finally, no amount of creativity can overcome the shortage of resources (e.g., staff, money, etc.) that often creates important obstacles to collective action (Bardach, 1998).

An Institutional Perspective on IWRM

One way to better understand the institutional challenges associated with IWRM is to employ the techniques of institutional analysis developed by Elinor Ostrom (1999, 1990) and her colleagues (Imperial & Yandle 2005; Koontz 2005; Andersson 2004; Lam 1998; Gibson et al. 2000). Their institutional analysis and development (IAD) framework has proven to be a useful means of systematically examining the structure and performance of institutional arrangements used to manage a wide range of common-pool resources (CPRs), including various water resources (e.g., Kauneckis & Imperial 2007; Imperial & Kauneckis 2003; Imperial & Hennessey 2000; Imperial 2006, 2005a, 2005b, 1999a, 1999b; Lubell 2004a, 2004b, 2000; Lubell, et al. 2002; Sabatier, et al. 2005; Margerum & Born 2000; Blomquist 1992). Institutional analysis draws attention to the interconnectedness of the physical characteristics of a watershed, how decisions are made, who makes them, the rules used to allocate and distribute resources, rules governing the behavior of the various actors, and monitoring and enforcement procedures (Imperial 1999a, 1999b).

Institutions are defined as "enduring regularities of human action in situations structured by rules, norms, and shared strategies, as well as by the physical world. The rules, norms, and shared strategies are constituted and reconstituted by human interaction in frequently occurring or repetitive situations (Crawford & Ostrom 1995, 582)." Thus, institutions include families, churches, government agencies and most *organizations* since they are defined by rules, norms, and shared strategies (Ostrom et al. 1993, 6). Institutions promote socially beneficial outcomes by helping actors resolve "social dilemmas" resulting when individually rational actions aggregate to produce socially irrational outcomes (Firmin-Sellers 1995, 203). Institutions are essentially the rules that define and structure strategic interactions among different policy actors.

What differentiates institutional analysis from other forms of organizational analysis is the focus on rules. Rules are implicit or explicit attempts to achieve order and predictability among humans (Ostrom 1999, 1986). Rules are prescriptions that forbid, permit, or require some action or outcome and the sanctions authorized if the rules are not followed (Crawford & Ostrom 1995, 584). Rules can be formal (e.g., laws, policies, regulations, etc.) or informal (e.g., shared understandings). These informal rules are sometimes referred to as "rules-in-use" because they are the rules that individuals refer to when asked to explain and justify their interactions with fellow participants (Ostrom et al. 1994, 39). Rules also tend to be nested in another set of rules that define how the first set of rules can be changed (Kiser & Ostrom 1982). Rules can therefore operate configurationally in that the way one set of rules functions depends upon the way it interacts with other rules. Thus, hierarchical (centralized or decentralized), polycentric, and nested rule structures are common (Kiser and Ostrom 1982; Ostrom 1999, 1986; Firmin-Sellers 1995; Imperial 2005a).

Identifying Institutional Settings Conducive to IWRM

The institutional rational choice literature provides a wealth of guidance for indentifying institutional settings conducive to "integrated" approaches to water resources management. One clear finding from the literature is that context matters when it comes to IWRM (Imperial & Hennessey 2000). The design and performance of institutional arrangements is influenced by their physical, political, socioeconomic, and institutional environment as well as local culture and situational histories (e.g., previous IWRM efforts, history of trust or conflict, etc.) (Imperial & Hennessey 2000; Imperial 1999a; 1999b, Ostrom 1999). Accordingly, any approach to IWRM must be tailored to the institutional setting's unique characteristics. It is also reasonable to assume that some institutional settings are more conducive to "integrated" approaches to water resource management than others.

While there have been many attempts to identify factors that contribute to the successful management of CPR systems (e.g., Agrawal 2000), A useful starting point is whether the water resource satisfies Ostrom's (1990, 90) eight design principles for long-enduring common pool resource (CPR) systems (Kauneckis & Imperial 2007; Anderies, et al. 2004). Ostrom's first three principles identify situations where it is possible to solve core problems related to free-riding and resource use. Two types of boundaries are important for successful CPR management; those defining the resource boundaries and those defining the resource users (Ostrom 1990). Watershed research reaches similar conclusions that a watershed's physical

boundaries and size influence program development and implementation (Born & Genskow 2001; Leach & Pelkey 2001; Lubell, et al. 2002). Ostrom (1990) also argues that CPRs are more successfully managed when appropriation and provision rules are locally determined and fit local conditions (Ostrom 1990; Ostrom, et al. 2002). Appropriation rules manage the use of a resource, whereas provision rules specify the inputs necessary for maintaining resources. Ostrom's (1990) third design principle argues that individuals affected by operational rules need to be able to participate in modifying rules. This includes mechanisms for direct participation in decision-making and for aggregating the preferences of policy actors.

Design principles four, five, and six provide mechanisms for continuously interpreting rules and imposing sanctions while promoting information sharing and agreement. Research demonstrates that effective monitoring is a critical component of successful management of CPRs (Ostrom, et al. 1994; Ostrom 1990; Ostrom, et al. 2002). Effective monitoring involves actively auditing conditions of water resources and appropriator behavior to ensure they are accountable. However, monitoring is meaningless without sanctions applied to prevent unauthorized resource use so Ostrom's (1990) fifth design principle recognizes the importance graduated sanctions when appropriators violate rules. Long-enduring arrangements also have low cost local arenas to resolve conflicts among appropriators, the sixth design principle (Ostrom 1990).

The seventh design principle recognizes and legitimizes the rights of those who self-organize. Ostrom (1990) argues that in long-enduring CPRs, individuals (or organizations) retain the right to organize around collective interests and should have the ability to change institutional arrangements to address shared resource management problems. This lets the actors adapt to changing definitions of problems and new information. For CPRs that are part of larger, more complex institutional systems, Ostrom's (1990) eighth design principle argues for necessity to organize appropriation, provision, monitoring, enforcement, and conflict resolution around the multiple layers of nested enterprises that participants cannot change.

Complex Environmental Commons

Ostrom's (1990) eight design principles provide an important framework for identifying institutional settings where IWRM may lead to enduring changes in a watershed governance system. However, many water resources (e.g., watersheds, river basins, catchment areas) differ in significant ways from the relatively simple CPR systems investigated in the literature. Kauneckis and Imperial (2007) term these "complex environmental commons." Complex environmental commons (CEC) are defined by three principle characteristics. First, there is a complex organizational network responsible for rule-making within the governance system. Second, there is a high diversity in the perceived value and appropriate uses of the resource. Third, there are multiple, interrelated resources requiring intervention in order to address the problems facing a principle resource of interest.

In a complex environmental commons (CEC), the organizations that design the rules governing resource use are not necessarily comprised of the individuals who directly use the resource (termed "appropriators" in the IAD framework). CPR theory typically focuses on the incentives and rules created by appropriators themselves in managing locally governed commons

(Bromley 1992; Ostrom 1990). However, in a CEC, rules are crafted by formal institutions acting at higher levels (e.g., Congress, state legislatures, and county and town councils, courts, regulatory agencies, and civil society actors), rather than local resource users. The additional complexity compounds the number and types of policy dilemmas that actors face in overcoming the basic CPR problem (Kauneckis & Imperial 2007, 508).

Watersheds, for example, are typically governed by multiple organizations with different jurisdictions responsible for making the decisions that influence distribution, allocation, and resource use (Imperial 2005a). Whether a public agency or an interest group, any single organization represents, at best, only a subset of basin interests. Consequently, in the aggregate the governance arrangement will be comprised of many overlapping rules generated by different organizations that, in many cases, represent competing policy interests. The organizations responsible for designing institutions are located at different levels of government (i.e., local, regional, state, or federal) and include nongovernmental organizations operating at various scales (i.e., local, state, national or international). Governance of a CEC will require a broad set of rules that coordinates the actions of multiple organizations with different jurisdictions, responsibilities, missions, and policy goals. Accordingly, the establishment of effective rules to manage a CEC requires long periods of negotiation with high coordination costs (Kauneckis & Imperial 2007, 508 - 509).

The second characteristic of a complex environmental commons (CEC) relates to aspects of the resource itself. Because environmental resources provide diverse goods and services, they are valued differently by policy actors. In situations where the fundamental dilemma is to design rules to manage the sustainable use of a single resource (e.g., fishery, forest, ground water, etc.), the rule structure is typically directed at finding the correct harvesting or consumption level that maintains the resource at a sustainable level. For a simple CPR, rules are designed with a shared understanding of the use and underlying resource value. However, when other uses and values of the resource come into play, then policy actors must negotiate the tradeoffs between problems and solutions (Kauneckis & Imperial 2007, 509). The greater the diversity of values and uses that can be assigned to a resource, the more difficult it is to design governance arrangements. It is easier to reach a shared understanding of the problem and craft solutions among competing groups when there is a common understanding of the characteristics of the good in question, a characteristic lacking in many CEC's (Kauneckis & Imperial 2007, 509).

The final characteristic of a CEC is that it includes multiple, interrelated resources that span different environmental media. Managing a water resource involves decisions about land use, forestry, wetlands, development, hydrological systems, and even atmospheric deposition. There are multiple environmental media and natural resources involved, each of which has its own common-pool characteristics. A rule structure designed to manage only one resource, may serve to exacerbate the problems caused by a second (Kauneckis & Imperial 2007, 510). For example, installing sewers to prevent groundwater contamination from onsite sewage disposal systems can result in increased development that destroys habitat (Imperial & Hennessey 2000). The rule structure necessary for managing a CEC requires institutional arrangements that are complex enough to deal with multiple media but can adapt to changing information.

Design Principles for CECs

Kauneckis and Imperial (2007) propose five additional design principles to explain the emergence of integrated approaches to the management of complex environmental commons (CEC). The first design principle is the development of *trust* across organizations involved in watershed governance (Kauneckis & Imperial 2007, 530). Trust is essential to cooperation because it lowers the transaction costs associated with negotiating and implementing rules. A diverse body of research documents the importance of trust in facilitating cooperation and collective action (Ahn & Ostrom 2003; Cook 2001; Leana & van Buren 1999; Tsai & Ghoshal 1998; Fountain 1994). Watershed research has reached similar conclusions about the importance of trust (Imperial 2005a; Imperial & Kauneckis 2003; Leach, et al. 2002; Lubell 2005; Lubell, et al. 2002; Wondolleck & Yaffee 2000).

By definition, a CEC has nested institutional arrangements that produce a complicated series of multiple, overlapping network interactions. In order to develop and maintain mutually agreed upon rules, these relationships must produce the level of trust needed for competing basin interests to modify institutional arrangements in ways that reflect shared policy objectives. Trust is a complex process because it is both a precursor to and product of interactive processes. Thus, a "virtuous circle" of mutually reinforcing trust and cooperation can develop if initial IWRM efforts are effective (Sabatier et al. 2005; McCaffrey, et al. 1995). While there is no magic recipe for developing trust, repeated interactions (formal or informal relationships) are an important ingredient (Axelrod 1984; Imperial & Kauneckis 2003; Ahn & Ostrom 2003; Cook 2001; Lubell, et al 2002).

Trust facilitates the interactive processes needed in IWRM because people have a preference for transacting with familiar individuals and organizations. Shared norms and trust also lower transaction costs by promoting smooth and efficient resource exchanges because participants are more likely to make commitments when they do not fear being taken advantage of by others. Relationships based on trust likewise facilitate the flow of information, since information from a trusted source is presumed to be both more reliable and accurate. However, participants in an IWRM are cautioned that once trust and relationships between organizations is established, it must be nurtured and maintained. New participants must be socialized to the norms, values, and routines of interactive processes (Leana & Van Buren, 1999). Otherwise, trust and relationships will erode, especially when there is a high staff turnover, changes in agency leadership, and new organizations join the effort. Moreover, while trust builds slowly over time, it is often destroyed quickly by negative experiences (Imperial 2005a; Imperial & Kauneckis 2003; Leana & Van Buren 1999; Axelrod 1984). This suggests that policy actors should avoid interactive processes with a high risk of failure. Instead, they should be strategic, focus on problems that are manageable, look for opportunities where there is strong political support, and focus on efforts where the likelihood of success is high. Trust developed through these smaller efforts can then be parlayed into more ambitious efforts to integrate the governance system (Imperial 2005; Imperial & Kauneckis 2003).

One of the factors distinguishing a CEC from a simple CPR is that it contains interrelated resource management problems that span different environmental media. Thus, a second prerequisite for designing successful institutions in a CEC is that the members of the multiple,

overlapping networks develop a *shared definition of the underlying problem* that motivates collective action (Kauneckis & Imperial 2007, 532). While IWRM often addresses a series of interrelated water resource management issues, there are typically one or two interrelated focal problems that motivate participants and drive interactive processes. The ability of policy entrepreneurs to frame the focal problem and find acceptable solutions is dependent on a fundamental agreement that the problem exists in the first place, and that there is some shared understanding of its general causes and the benefits associated with changing the policies and programs that address them.

Problems must also be framed in ways that *recognize mutual interests* and avoid win-lose situations. In essence, participants in an interactive process must be willing to work together on some issues, and be willing to agree to disagree on others while respecting these differences in order to maintain cooperative working relationships (Kauneckis & Imperial 2007, 534; Imperial 2005; Imperial & Kauneckis 2003). Since participation in an IWRM effort is often voluntary, policy actors are more willing to participate when the decision situation reflects win-win or at least a win-no lose games (i.e., positive sum games). When IWRM is framed in terms of win-lose situations, policy actors on the losing side may exercise unilateral strategies that seek to maximize their own policy goals at the expense of others. Thus, while IWRM encourages public managers to view water resources holistically, the cooperative, interactive processes employed are inherently strategic and are more likely to succeed when the focal problems motivating collective action have the potential to generate win-win or at least win-no-lose solutions (Kauneckis & Imperial 2007; Wondolleck & Yaffee, 2000). Consequently, IWRM may be an inappropriate strategy for addressing controversial problems framed in terms of win-lose situations (i.e., zero sum games).

The fourth design principle for CECs is that cooperation is more likely when there is a *balance of power* among policy actors, at least within the confines of the aggregation mechanism used to make decisions pertaining to IWRM (Kauneckis & Imperial 2007, 536; Imperial & Koontz 2007). A balance of power encourages competing interest groups to seek negotiated solutions. This is consistent with findings suggesting that a balance of power contributes to successful negotiation when each party has sufficient power or can exercise some sanction over others (Amy 1983; Burkardt, et al. 1997). If there is an imbalance of power within the confines of the aggregation mechanism, this may cause policy actors to exit the process and employ their best alternative to a negotiated agreement (BATNA). In some cases, a balance of power may also exist outside the aggregation mechanism when the policy actors have the ability to block action by others, but actors lack the authority to compel others to pursue their desired course of action. When the status quo is unacceptable, cooperative solutions may also be pursued because the conflict-oriented strategies are perceived to be too costly or are ineffective (Kauneckis & Imperial 2007; Imperial & Kauneckis 2003). In these situations, policy actors effectively have no alternative to a negotiated agreement (NATNA) if they want to address mutual problems.

Kauneckis and Imperial's (2007, 537) final design principle is that cooperation is more likely when a *wide range of policy instruments is used* to address shared problems. This enlarges the range of policy alternatives available to participants involved in IWRM. Policy actors tend to prefer different policy instruments. Enlarging the range of instruments increases the potential opportunities for organizations to work together to advance common interests. Diversifying

policy instruments can also increase the likelihood that competing interests will find some course of action that creates a positive sum game. For example, while basin actors may be unable to reach agreement on a regulatory policy, there may be a wide range of nonregulatory policy instruments that can be agreed upon (Kauneckis & Imperial 2007, 537).

Examining the Structure of Watershed Partnerships

These design principles help identify institutional settings that are conducive to "integrated" approaches to water resources management. Once the decision is made to utilize IWRM as a strategy for improving watershed governance, there are numerous implicit or explicit choices associated with designing the institutional arrangement used to make decisions. Researchers use various concepts and terminology to describe the preference aggregation processes used in IWRM (participatory planning, interagency decision making, consensus decision making, collaborative management, etc.) (Cortner & Moote 1999, 1994). One reason for this difference in terminology lies in the fact that these interactive processes are organized in a wide variety of ways and vary in their formality and procedures. Typically, some form of interactive process involving an autonomous group of rational actors is used to make decisions. This process is structured by shared rules, norms, and organizational structures (Imperial 2005a, 1999; Wood & Gray, 1991). In some cases, the participants will even begin making joint decisions and form a new organization whose membership includes other organizations and possibly individuals (e.g., representative of an affected stakeholder group) (Imperial & Koontz 2007; Imperial 2005a; Imperial & Hennessey 2000).

It is also common to find that the structure of a participatory planning process is ill-suited to demands associated with implementing the plans or agreements produced by the process. For example, Imperial and Hennessey (2000, 1996) find that it is common for estuaries in the EPA's National Estuary Program (NEP) to change the structure of their partnerships when moving from planning to implementation. Moreover, when one examines a watershed governance system over time, it is not unusual to uncover a variety of "partnerships" that have been created, died, and were replaced by subsequent efforts to integrate the watershed's governance system (Genskow and Born 2006; Imperial & Kauneckis 2003; Imperial & Hennessey 2000; Born & Genskow 2000). As Born and Genskow (2000) have noted:

> Watershed partnerships, particularly with regard to the non-governmental and citizen dimensions, generally do not have the comparatively enduring and stable character of governmental agencies and unites . . . they are dynamic and nonlinear; they ebb and flow, become dormant or extinct, and resurface with old and new participants under new names and organizational forms. Furthermore, the balance of responsibility within the watershed partnership between governmental and non-governmental participants can shift markedly during the evolution of the partnership and the execution of its programs . . . (from Genskow and Born 2006, 59).

Thus, it is important to recognize that IWRM is a dynamic and evolutionary process whereby institutions continuously adapt and change to each other as well as to changes in society and the

environment. There is also a path-dependent quality whereby certain choices will constrain subsequent change efforts.

Therefore, an important challenge associated with IWRM is the design and administration of a rule structure that guides the interactive processes in these partnerships. Imperial & Koontz (2007) building on the work of Ostrom (1999, 1990) and others propose a useful framework for systematically describing the structure of watershed partnerships that draws attention to the important choices facing participants in an IWRM effort. This is important because as Moore and Koontz (2003) and Imperial (2005a) observed, there is considerable variation in the structural properties of watershed partnerships with little understanding of which structural properties allow them to endure over sustained periods of time (Imperial & Koontz 2007).

Imperial & Koontz's (2007) framework views watershed partnerships as structured systems of routines and competencies, which refers to the repetitive patterns of activities by individuals and groups (Amburgey, et al. 1993, 52; Nelson & Winter 1982; Hannan & Freeman 1984; Levitt & March 1988). These routines are structured by formal and informal rules and norms that direct the commitment, mobilization, and allocation of resources by members of the partnership. A change in a routine leads to a different organizational outcome and therefore requires the institutionalization of new rules and norms to reproduce the new routines.

Efforts to "integrate" water resources management will vary in formality (Imperial 2005a; Moore & Koontz 2003). At the formal end of the spectrum are partnerships where important elements of the rule structure are embodied in statutes or legally binding documents like a charter, by-laws, or articles of incorporation (Imperial 2005a; Moore & Koontz 2003). They might also be embodied in a formal document that creates a sense of legitimacy and identifies the distribution of important rules. For example, the estuaries in the EPA's National Estuary Program adopted a management conference agreement that specified the members and committee structure overseeing the planning process (Imperial & Hennessey 2000, 1996). In the middle of the spectrum, certain aspects of the rule structure might be contained in a formal document like a plan or a website might contain a roster of partners or describe how the partnership operates. At the informal end of the spectrum would be organizations where the rules are embodied entirely in informal norms and social agreements. This is common during the earliest stages of the partnership while rules are still being developed and formalized (Imperial 2005a; Moore & Koontz 2003). Regardless of their level of formality, a common characteristic of this organizational form is that there tend to be no formal hierarchies among the members, even though outside the partnership there may be significant differences in power and authority (Huxham 1996).

Boundary Rules

The structure of a watershed partnership can be described in terms of the different rules that operate configurationally and give rise to a structural pattern of relationships between its members and the rules that guide routines. The two most important sets of boundary defining rules are *member rules* and *strategy rules* (Imperial & Koontz 2007). Watershed partnerships tend to be formed for specific purposes to address specific problems. The combination of

purposes and problems shapes the membership (Bonnell & Koontz 2007; Koontz et al. 2004). Conversely, a given subset of policy actors is limited in terms of what they can do by their resources, authorities, and competing ideas and positions on policy matters. Accordingly, the selection of the membership in a watershed partnership will influence and constrain its strategy (Bonnell & Koontz 2007; Koontz et al. 2004; Imperial & Kauneckis 2003; Koontz 2003). We term these boundary rules because the combination of rules helps distinguish the watershed partnership from other organizations in the watershed governance system. Membership and strategy rules are important because they add to the watershed partnership's legitimacy or illegitimacy. The presence or absence of members and the problems addressed by the partnership may influence whether it is viewed as a legitimate or illegitimate response to watershed problems, which in turn may influence its ability to attract members or resources.

Member rules pertain to who can or cannot be a member of a watershed partnership. They establish different types of members (e.g., voting vs. nonvoting). Some have restrictive membership while others are more inclusive (Imperial & Hennessey 2000). While representatives of governmental and nongovernmental organizations typically comprise the membership, there can be provisions for citizens or interest group representatives to serve as members (Imperial 2005a; Moore & Koontz 2003; Bardach 1998). Membership can either be voluntary or mandated by some higher-order set of rules (e.g., articles of incorporation, charter, state statute). In either case, membership generally caries some set of duties, responsibilities, or obligations. For example, partners may be expected to adhere to shared policies, some which might be significant departures from normal organizational behavior. Membership may also require sharing information or other organizational resources (e.g., money, equipment, staff, etc.). As the organization evolves, it typically creates rules pertaining to the addition of new members and how that process occurs. Similarly, rules may be crafted to specify how a member is expelled from the partnership.

Strategy rules pertain to the watershed partnership's underlying purposes in terms of what it will do and how it aims to acquire the resources needed to accomplish these tasks (e.g., its clients, products, goods, services, etc.). The rules specify the problem or set of problems that are within the domain of the watershed partnership. More importantly, the strategy represents a shared definition of the problems that shape collective action among the partnership's members.

Strategy rules also specify what responses to problems are legitimate or appropriate; in other words, the role of the watershed partnership in addressing water resource problems. Roles include such strategies as serving as a convener, catalyst for action, information provider, advocacy, organizer, funder, technical assistance provider, capacity builder, partner, dispute resolver, facilitator, or it may even develop and implement projects and programs (Imperial 2005a; Himmelman 1996). The rules also specify what roles are illegitimate. For example, a watershed partnership that serves as an educator and information provider may provide information to help inform a policy debate. However, lobbying on behalf of a specific position may be viewed as inappropriate or might even be illegal if the partnership was established as a nonprofit organization.

Strategy rules also define the watershed partnership's relationship to other organizations in the watershed governance system. For example, some watershed partnerships have been

delegated the ability to make binding decisions or deliver services on behalf of another organization (Koontz, et al. 2004). Others advise government agencies, audit decision processes, provide information to network members, or even serve as a member in another interorganizational partnership (Edelenbos & Klijn 2005, 421, 432). Thus, strategy rules define the boundaries and constraints on the design of the watershed partnership's core processes. The strategy rules also help define the parameters associated with how the partnership's resources will be acquired and allocated.

Decision Rules

While the member and strategy rules interact to create the watershed partnership's boundaries, the *decision rules* shape the processes by which organizational members make decisions and craft new rules. Interactive processes are not self-executing. There are a multitude of ways to design a process and the importance of a well-managed process should not be underestimated (Imperial & Hennessey 2000). There is also a constant interplay between process management and the decision rules until agreement emerges on the substance, participation and rules of the game associated with the process (Edelenbos & Klijn 2005, 426). In some cases, the group initiating the interactive process and crafting the original agreement with respect to the boundary and decision rules is actually quite distinct from the group in charge of implementing the agreement and undertaking the decision process (Imperial & Hennessey 2000; Sobrero & Schrader 1998, 586). In these instances, the boundary and decision rules may undergo further modification once members begin implementing the agreements.

During the partnership's initial stages, decision rules are likely to be highly informal with consensus decision making as a norm or simple preference aggregation rules like majority voting serving to resolve impasses or gauge the level of support. Over time, the decision rules are likely to grow in complexity and specificity. One of the most important types of decision rules pertains to *preference aggregation* or the means by which the watershed partnership makes decisions (Imperial & Koontz 2007). Watershed partnerships often, but not always, rely on consensus rules to make decisions about priorities, plans, and activities particularly during their formative stages (Bardach 1998). Consensus has also been described as a valuable means to develop a shared vision and spur cooperative action, but it also may lead to "least common denominator" decisions that are ineffective (Leach & Pelkey 2001; Imperial & Hennessey 2000; Coglianese 1999). However, as the watershed partnership grows in complexity, voting procedures are often employed as a back-up in case consensus is difficult to achieve and to reduce transaction costs and make decision making more reliable and reproducible.

As the structure becomes more specialized and differentiated there is often growing complexity in the decision rule structure. There may be a *distribution of power* within the watershed partnership (e.g., voting or nonvoting members). Another common form of distributing power is by creating a governing board or executive committee to concentrate power and decision authority in order to simplify some forms of organizational decision making. There may also be a *distribution of roles or responsibilities* among members (e.g., establishing officers, sub-committee membership, etc.). As organizational sub-units are created (e.g., a work group or sub-committees), rules will be crafted that determine the membership and strategy of the sub-unit and specify their decision rules and relationship to the larger organization. There may also be a

distribution of participation in organizational decision making. One way to examine the distribution is by examining width and depth of participation in decisions. Width is the degree to which each member of the watershed partnership is afforded the opportunity to participate in each decision. Depth is the degree to which the participants have the opportunity to determine the final outcome of the process (Edelenbos and Klijn 2005, 428). For example, input could range from informing, consulting, advising, co-producing, to co-deciding depending on how the process is designed (Edelenbos and Klijn 2005, 429). As a result, some decisions might require greater agreement among the members than others. For example, a change to the by-laws, adoption of the budget, or expelling a member might require a super majority. Other issues might be handled by the executive board or a sub-committee and members have little input to the decision other than by monitoring the actions of this sub-set of organizational members (Imperial & Koontz 2007).

Coordination Rules

As the organization evolves, preference aggregation rules typically give rise to a more structured set of *coordination rules* that define the mutual exchange of rights among the parties involved in the relationship (Sobrero & Schrader 1998, 586 - 587). *Exchange rules* set up the operating procedures to govern exchanges of resources between the member and the watershed partnership. Essentially, exchange rules specify the rights, duties, obligations, and expectations of benefits associated with membership, some of which might entail significant departures from their normal behavior outside of the partnership. Exchange rules are important because participation in a watershed partnership is typically voluntary and there are costs associated with participating in developing this new organizational form. Thus, exchange rules align incentives or disincentives in a manner that encourages sustained participation (Sobrero and Schrader 1998, 590). However, not all organizational members follow through on their commitments. They may fail to attend meetings regularly, fail to commit agreed upon resources (time, money, information), or act in ways that fail to advance the watershed partnership's strategy. Thus, *monitoring rules* may be created to help govern the exchange process and ensure that members follow through on their commitments. Conflicts that occur among members may be resolved through *dispute resolution rules* that specify the process used to resolve conflicts within the collaborative organization (Sobrero and Schrader 1998, 587). *Enforcement rules* could even be created that apply sanctions to members in the case of noncompliance with other rules (e.g., suspend voting privileges, fines, expulsion, etc.). However, a great deal of enforcement arises simply from the social norms and peer pressure that develop through monitoring processes.

Paradoxes Complicating IWRM

Unfortunately, while there is a growing body of research examining IWRM, there is little agreement on the factors contributing to the effectiveness of these efforts or their ability to endure over long time periods (e.g., Leach et al. 2002; Leach & Sabatier 2005; Steelman & Carmin 2002; Born & Genskow 2000; Imperial & Hennessey 2000; Wondolleck & Yaffee 2000; Koontz & Johnson 2004; Thomas 1999; Koontz 2003). Leach and Pelkey's (2001) review of 37 such empirical studies with 210 "lessons learned" concluded that there is a general lack of knowledge accumulation. Sabatier et al. (2005) discuss similar limitations and note that theory development explaining how variables interact is only beginning to emerge. Thus, it is not

possible to discern from previous watershed research whether certain configurations of boundary, decision, and coordination rules are more effective than others. There are also potential paradoxes that further complicate the use of IWRM as a strategy for improving watershed governance.

Stability vs. Change

Organizational theorists argue that organizations with high reliability, low variance in performance, high accountability, and a high ability to account rationally for organizational actions are favored by selection processes in organizational populations (Hannan & Freeman 1984). This suggests that as watershed partnerships evolve, their rule structures are likely to be institutionalized to improve reliability, accountability, and reproducibility. Formalization of these rules further strengthens the institutionalization process. None of this should imply that all or most rules will be codified into some formal document. Informal rules and social norms embodied in various organizational routines will play an important role even in organizations with a highly formalized set of rules. Rather, the argument is that there will be an increasing level of formality associated with the age and complexity of organizational structures.

This does not imply organizations never change. Instead, it suggests that organizations respond relatively slowly to threats and opportunities that encourage adaptation and change. It also suggests that changes in core strategies, structures, and processes will be more difficult to achieve than minor changes to peripheral aspects of organizations. It also does not imply that this inertia (i.e., resistance to change) is a symptom of "bad management". Rather, it is the result of a well-tuned organizational architecture (Kim, et al. 2006, 705). In essence, organizations, particularly those reflecting bureaucratic structures, are designed to be stable and resist change.

This has some important implications for IWRM. As a watershed partnership evolves, it is likely to develop its own inertia and become resistant to change. As Hannan and Freeman (1984, 152) observe, "there appears to be a strong tendency for organizations to become ends in themselves and to accumulate personnel and an elaborate structure far beyond the technical demands of work." Thus, the maintenance of an IWRM program may become the primary objective rather than viewing it as a means to improving watershed governance. The importance of stability also raises important questions about whether adaptive management of natural resources is achievable because not only will the structure of an IWRM program be resistant to change but so will the organizations participating in the effort (e.g., Smith et al. 1998; Gunderson et al. 1995; Holling 1995, 1978; Lee 1995; 1993; Lee and Lawrence 1986; Walters 1986).

While change may ultimately prove adaptive and beneficial, it can also be disruptive and even threaten an organization's survival. Thus, policy actors involved in IWRM are likely to be predisposed to resisting changes to their core strategies, structures, and processes. This creates an important obstacle to integrating policies and programs. While changes associated with integrating policies and programs may prove effective over the long-term, the short-term disruptive aspects of change can have dire consequences for some organizations (Amburgey, et al. 1993, 53; Hannan & Freeman 1984, 159). Since organizations learn to change by changing, some policy actors are also likely to be more amenable to change than others. This suggests that the probability of enacting a change increases with the number of prior changes of the same type.

It also implies that the types of changes made in the past will be easier to repeat in the future while novel changes to core strategies, structures, and processes will be more difficult to enact (Amburgey, et al. 1993, 54 - 55).

Reliability & Institutionalizing Rule Structures

The modern world also favors organizations that demonstrate a capacity for *reliable* performance. Organizations must have the ability to produce some good or service of a given quality repeatedly and reliably (Hannan & Freeman 1984, 153). Extending their argument to IWRM, reliable performance requires a watershed partnership to continually *reproduce* its structure – it must have nearly the same structure tomorrow that it had today (Hannan & Freeman 1984, 154). Thus, the rules, distribution of authority, and communication systems must be reproducible. While a structure can be continually reproduced by negotiation and consensus decisions, this would have high transaction costs (Williamson 1985). Instead, the members in a watershed partnership reproduce their structure by institutionalizing a set of rules, routines, and procedures that determine what it will do (or not do) and how it will do it. Institutionalization lowers transaction costs because participants no longer need to question the strategy, decision process, or other aspects of its organizational existence. Conversely, institutionalization produces inertia because the very system that enhances the reproducibility makes it resistant to adaptation and change.

Thus, institutionalization is a "two-edged sword". On the one hand it promotes stability and enables the watershed partnership to endure and survive such things as changes in leadership and staff. On the other hand, revisions to established routines, communication patterns, reshuffling work groups, hiring new employees to staff the organization, changing organizational leadership, changing the individuals representing the members, and most importantly adding entirely new partners can reduce the reliability of performance. Since organizational change disrupts internal routines and external linkages, it can interfere with reliability making change hazardous (Amburgey, et al. 1993, 52). In essence, core changes in membership, strategies, and organizational processes rob the organization of its history, decrease its short-term effectiveness, create new organizational challenges, and possibly increase its chances of death (Amburgey, et al. 1993, 53; Singh, et al. 1986, 589; Hannan & Freeman 1984, 160).

Accountability

The modern world favors organizations that *account* rationally for their actions (Hannan & Freeman 1984, 153). A watershed partnership must be able to document how resources are used and be able to reconstruct the series of organizational decisions, rules, and actions associated with a set of outputs or outcomes (Imperial 2005a). Accountability is a critical issue, particularly during the early stages of a watershed partnership. Potential members, resource contributors, and stakeholders that provide other forms of support continually test the watershed partnership's accountability, particularly during the early stages of its creation. If it fails these tests, it is unlikely to sustain the resources and commitments needed to survive. Accordingly, all else being equal watershed partnerships with high accountability are more likely to survive (Hannan & Freeman 1984, 153-154; Amburgey, et al. 1993).

However, Imperial (2005a, 2005b, 2004) observes that too much emphasis on accountability and poorly designed monitoring systems can create disincentives for members to participate in a watershed partnership. There is a constant tension in watershed partnerships between organizational autonomy, accountability to other members of the partnership, and the partnerships accountability to society. On the one hand, monitoring processes help enforce agreements and reduce strategic behaviors such as rent seeking and shirking. In fact, peer pressure often plays an important role in encouraging adherence to shared goals and measures in watershed partnerships. Conversely, excessive monitoring and enforcement creates powerful disincentives because potential partners may be unwilling to join the IWRM effort when they fear reprisals and criticism. Thus, developing effective accountability mechanisms is a tricky endeavor. One common approach is to design performance management systems so the partners share credit for success and failure and focus on collective goal achievement rather than on the actions agencies need to take to achieve goals (Imperial 2005b, 2004).

Legitimacy

All organizations must have some minimum level of external legitimacy if they are to mobilize sufficient resources to survive (Hannan & Freeman 1984, 158). In watershed partnerships this means the public or political support (e.g., politicians, stakeholders, or the general public) that encourages potential members to join and contribute resources. Potential members must also view the watershed partnership as a legitimate response to problems or they may allocate resources to competing efforts or develop their own response to water resource problems.

Developing external legitimacy is a critical issue for watershed partnerships, particularly during the early stages of their development. Internally, the watershed partnership may enhance its legitimacy through choices associated with member, strategy, decision, or coordination rules (Imperial & Koontz 2007; Singh, et al. 1986, 590; Meyer and Rowan 1977; DiMaggio and Powell 1983). Similarly, who participates in the partnership can shape the legitimacy of the partnership in the broader community, and such legitimacy can, in turn, encourage or discourage additional membership (Sabatier, et al. 2005; Singh, et al. 1986, 189). However, it is not only important which organizations are represented but also which member represents the organization (i.e., opinion leaders, directors versus staff, etc.) in these process. The participation of opinion leaders or high level officials will signal the importance that the partner attaches to the effort. While increasing the scope of membership may improve legitimacy, leaving out a critical policy actor could also destroy legitimacy. Similarly, legitimacy may hinge not just on who is a member but on how much influence key policy actors have on decisions. Finally, legitimacy will change over time. As the partnership grows older, it is likely to develop stronger exchange relationships, become part of the power hierarchy, and have its actions endorsed by powerful actors in the governance system. Thus, older watershed partnerships are likely to be viewed as more legitimate than younger efforts (Singh, et al. 1986, 173). While this process of external legitimation takes time, it is extremely important to the survival of any organization (Hannan & Freeman 1984, 158).

Summary & Conclusions

While the positive virtues of integration are highlighted throughout the paper, it is important to acknowledge that it is not a magical cure for all watershed governance problems. Nor should integration be viewed as an end in and of itself; it is a means to an end. It should be valued in so far as it produces better organizational performance or lower costs than can be achieved without it. To extend Bardach's (1998, 17) sage advice, we should not be impressed by the concept of integration per se. While it may be nicer sounding and make people feel better than indifference, conflict, or competition is beside the point. The struggle for greater integration can be costly, time-consuming, and divisive and sometimes the benefits are limited.

Fortunately, when IWRM highlights common values and interests, participants often find productive ways to improve policy integration in ways that generate greater public value than can be achieved by organizations working alone. The gradual and continued accumulation of policies and programs around water resource problems suggest that integrating complex watershed governance systems will remain a central concern. In many respects, the tendency to respond to the integration challenge by creating a new watershed partnership is a striking example of the challenge. While the watershed partnership may improve the integration of policies and programs over the short-term, if the partnership endures as a new organization it adds to the governance system's complexity, thus becoming another entity that organizations have to coordinate with in the future.

It is also clear that for IWRM to succeed, participants must find ways to collaborate and work together for sustained periods of time to maintain the level of "integration" that is achieved. Governance systems are dynamic, with institutions continuously evolving and changing. Some changes are intentional and are made by actors internal to the watershed governance system in response to policy-oriented learning by policy actors, societal changes, and changing environmental conditions (horizontal level). Others are imposed on the watershed governance system by external actors (e.g., federal government passes a law requiring action by state and local governments) (vertical level). Other changes are emergent in character and reflect the natural processes by which organizations mutually adjust to each other's behavior. While some changes will enhance horizontal or vertical integration, others will have the opposite effect. The complex behavior that emerges as a result of these interactions has important implications for IWRM. This behavior is unlikely to be dictated, controlled, engineered, regulated, or coordinated by a central "watershed manager". Rather, all watersheds are managed to some degree by the collection of decisions made by individuals and organizations that impact water resources. Therefore, to understand how the watershed is "managed" you have to understand how the whole portfolio of policies and programs operates and interacts.

Thus, while participants must think holistically when framing water resource problems and solutions, IWRM is inherently a strategic endeavor because there are practical limits to how much any collection of policies and programs can or should be "integrated" at the horizontal or vertical level (Imperial 2006). Strategic decisions must be made about the time, space, actor, and issue dimensions noted by Underdal (1980). Similarly, while problems should be framed holistically, choices also have to be made about who to involve in the processes used to make

decisions. Since participants are likely to focus on policies and programs over which they have the ability to change, IWRM often focuses more on achieving horizontal integration. Improving vertical integration is much more challenging because the policy actors involved in IWRM often lack the authority to change these rules. Moreover, since the changes in vertical rules will then apply to other water resources, there is no guarantee that changes to improve integration in one watershed will not cause policy integration problems in other watersheds. Therefore, some inconsistency is inevitable and IWRM has to find ways to improve horizontal integration given constraints imposed on them from higher-order institutions outside the watershed (e.g., federal government).

Participants in an IWRM effort would also be wise to avoid wasting valuable resources trying to change what may be difficult or impossible to change. The prospective gains of any institutional change must be weighed against its potential costs. For example, interactive processes used in IWRM can impose high transaction costs (information, coordination, strategic) associated with crafting, implementing, monitoring, and enforcing agreements as well as adapting institutions to new procedures (Imperial 1999a; Ostrom 1999). There are also risks associated with renegotiating existing agreements because there is always a possibility that policy actors will decide to pursue their BATNA, which might actually reduce integration. Thus, it is important to consider whether the sub-optimal level of integration may actually reflect a desirable situation because the transaction costs to move to an alternative institutional arrangement may be too high.

When enhanced integration of some aspect of the watershed governance system is desirable, the question then becomes whether the institutional setting is one that is conducive to the IWRM approach. Ostrom's (1990) eight design principles for long enduring CPR institutions provide some general guidance to help identify institutional settings where IWRM may be successful. They represent the principles of self-organization necessary for policy actors to self-organize and reach agreement on the institutional changes needed to improve the integration of water resource policies and programs. Kauneckis and Imperial's (2007) five design principles for CEC's go a bit further in helping identify institutional settings where IWRM may be appropriate.

Even if the institutional setting is conducive to IWRM, there is no substitute for well-designed preference aggregation process. This requires careful consideration of a wide range of strategic choices related to the rules governing membership and the strategy of a partnership. The interaction and combination of these rules is the level of aggregation that Underdal (1980) refers to. But a number of strategic choices also have to be made about the decision and coordination rules that will structure the interactive process used to guide decisions and actions.

This suggests that institutions matter. There is no one "best" way to organize the interactive processes associated with IWRM. Creating several smaller, targeted, or overlapping efforts organized around the interconnected aspects of a single focal problem might prove to be more effective than trying to develop one IWRM that tries to address every problem in a watershed. Thus, water resource managers should give careful consideration to the choices associated with organizing the interactive processes involved in IWRM.

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