

# COORDINATION: THE KEY TO INTEGRATED WATER MANAGEMENT

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## INTRODUCTION

The papers in this issue of *Update* cover topics that illustrate the many facets of water policy, and the facet that I will discuss in this paper is coordination. In spite of the fact that "to coordinate" is a commonly understood verb, I believe that the process of coordination is poorly understood in the water policy environment, and that better coordination can help us to resolve a fundamental dilemma that we face in our society. The dilemma is that, in many ways, our struggle over water policy reflects a fundamental question—should things be run by the state or the market? As we are learning, the answer is not either/or but a mixture of both (World Bank, 1997, Grigg, 1995). So, the main point of the paper is how we can break new ground to coordinate better in the water arena, given that issues are always going to involve complex mixtures of state and market actions.

Water policy topics can be arrayed into issues and examples, with some papers in this issue covering both. My own experience is that water issues involve such a degree of complexity that examples or "cases" must be cited if we are to understand each other (Grigg, 1996). Two types of examples are given in the paper. One type consists of a few bulleted lists of situations where coordination involves dependence between water management activities, and the other type consists of brief outlines of actual situations where poor coordination resulted in failed processes.

## INTEGRATED WATER MANAGEMENT

The problems we are trying to resolve in water policy are well-known to UCOWR, and they mainly deal with finding satisfactory ways to allocate resources to balance between diverse and competing objectives of society and environment. See, for example, (Viessman and Welty, 1985) for a discussion of policy issues. The idea of balancing has led to the concept of "integrated water management," which at its core means to blend actions and objectives favored by different players to achieve the

best total result. The blending is what converts "management" to "integrated management." Using the opposite approach, a central authority would make arbitrary decisions, and not seek a balance between activities and goals.

Now, there are many dimensions to integration in water management. Mitchell (1990), for example, wrote that it deals with: "... problems that cut across elements of the hydrological cycle, that transcend the boundaries among water, land and environment, and that interrelate water with broader policy questions associated with regional economic development and environmental management." These phrases are used later in the paper to compare elements of integration with those of coordination.

I made an attempt to probe the facets of integrated water management in Grigg (1996) and listed them as involving political, geographic, functional, hydro-ecological, and disciplinary viewpoints. Later in this paper, I will show how this list is too aggregated to be of much use and suggest a better way to outline the facets of integration.

The American Water Works Association has made an attempt to define a concept called "Total Water Management," and, as I will explain later, I believe that its definition uncovers useful dimensions of integration (AWWARF, 1996). Their definition is:

"Total Water Management is the exercise of stewardship of water resources for the greatest good of society and the environment. A basic principle of Total Water Management is that the supply is renewable, but limited, and should be managed on a sustainable use basis. Taking into consideration local and regional variations, Total Water Management:

- Encourages planning and management on a natural water systems basis through a dynamic process that adapts to changing conditions;
- Balances competing uses of water through efficient allocation that addresses social values, cost

- effectiveness, and environmental benefits and costs;
- Requires the participation of all units of government and stakeholders in decision-making through a process of coordination and conflict resolution;
- Promotes water conservation, reuse, source protection, and supply development to enhance water quality and quantity; and
- Fosters public health, safety, and community good will."

In the next section, I will suggest how this definition can be analyzed to obtain new information about both integration and coordination in water management.

## **COORDINATION IN INTEGRATED WATER MANAGEMENT**

Basically, the term "to coordinate" means "to harmonize," but as society becomes more complex, the concept of coordination has also grown in complexity. To capture this growth in complexity, and in the possibilities for coordination, the Sloan School of Management at MIT has created a Center for the Study of Coordination Science. Although the Center focuses mainly on information technology, their definition, "Coordination is managing dependencies between activities," applies equally well to organizational issues (Malone, 1994).

So, there is a close connection between the concepts of integration and coordination and integration also involves dependencies between activities, and all conceptual terms that describe this attempt to link things point to the conclusion that what water policy should seek is balance between objectives and activities.

Water decisions inherently involve a great deal of interdependence, not only among water management elements, but also between water, land, environment, and ecology. John Muir summed it up: "When we try to pick out anything by itself, we find it hitched to everything else in the universe" (Chesapeake Bay Program, 1994). This interdependence is the central issue in achieving success in the integrated approach that we need so much.

Now, by putting a magnifying glass on AWWARF's definition of Total Water Management, I would like to illustrate how different aspects of coordination leap out, as shown by Table 1 (see page 28).

The table classifies the types of coordination, identifies the phrase from the Total Water Management definition that identifies each one, provides a brief discussion of each category, and gives an effectiveness score which

represents my judgment as to how well each category of coordination works in today's policy environment.

To illustrate the similarity between concepts of integration and those of coordination, Table 2 compares the facets of integration given in Grigg (1996) with those of AWWARF (1996) and of Mitchell (1990) (see page 29). Note that AWWARF's definition contains more clarity and detail. It may not be fair to include Mitchell's definition because it represents just one sentence in his otherwise lengthy treatment of the subject.

## **EFFECTIVENESS SCORES AND POLICY ENVIRONMENT**

I believe that the barriers to integration in water management are primarily those that inhibit success in the categories of coordination shown on Table 1. In that regard, let me now state why I assigned the "effectiveness scores" given in the table.

The first category, coordination between society and environment, is a general goal that has educational value but does not really deal with the practical details of coordination needed in water management. My judgment is that the concept of coordinating society and environment can be mainly used for public relations and educational value and mainly needs work to improve clarity and gain more acceptance. There is no real policy need here.

Coordination through stakeholder involvement is well-known in the water industry, both in planning algorithms such as Integrated Resource Planning, and in public involvement in general. Improvements are necessary, of course, both to improve it and to make successful methods known, but current policy seems adequate to me.

Coordination in watersheds is currently very popular, and in fact, is covered by Pete Loucks' paper in this volume. With today's momentum, it seems certain that improvements will continue. Policy changes are still needed, and Loucks' paper may suggest some.

Coordinating the means of water management requires full consideration of all available options. Good planning and engineering mandate such full consideration, and the needed policy is continuous improvement in education at all levels.

Improving time-wise coordination will require, in my opinion, more appreciation for the value of planning as a coordination tool. In Grigg (1995, 1996), I discussed

how planning as a coordination tool is probably the least appreciated major management function of the water industry. Policy changes are thus needed to increase appreciation at all levels of the need for more effective planning as a coordination tool.

Coordinating water quantity and quality will require, in my opinion, progress in the watershed approach and in implementation of more flexible regulatory tools. Also required will be better science and public understanding of the impacts of human actions in watersheds. This will continue to be a major concern of environmental policy. Local and regional coordination requires new thinking about working together in regional areas. Successful regionalization is one of the most difficult policy issues we face in a number of infrastructure and environment policy arenas. This dilemma is not limited, of course, to the water arena. For example, in the field of urban planning, regionalism is a top issue (Becker and Dluhy, 1997).

Coordinating competing uses is a tough arena that requires equitable approaches to resolving conflicts in the political and legal arenas. Many of the western water conflicts are fights over competing uses, as for example between irrigation and instream flows. Coordination will not completely solve issues like this that involve property rights and deeply held values. Systems for conflict resolution will continue to be needed.

## EXAMPLES

The general statements I have made up to this point should be illustrated with specific examples. Table 3 provides a few illustrations of Water management activities and dependencies that arise with internal and external activities (see page 29). The types of coordination given in the table are those that require policy attention and offer most promise for improvement, in my opinion. The activities selected are common water issues that should be familiar to readers without further explanation.

Now, I would like to present three examples to illustrate shortfalls in coordination in actual situations.

**Time-wise coordination.** The basic issue in this category of coordination is to maintain institutional memory and sustain momentum in projects and programs. Given the long time span of most projects and programs, there are many ways to illustrate this aspect of coordination. The example selected is an estuary program with the goal of preserving water quality in Albemarle-Pamlico Sound

which is situated in eastern North Carolina (Grigg, 1996). In the early 1970's, the State of North Carolina initiated studies of this problem. I was personally involved in the program beginning in 1979, and was amazed that no files or records from earlier investigations were available and that personnel with knowledge of the program had been reassigned without passing along their knowledge. The problem was exacerbated by disagreements between states and federal agencies which also changed personnel, and coordination was, to say the least, difficult. A larger scale Albemarle-Pamlico Estuarine Study was initiated in the 1980's by the Environmental Protection Agency and planning and implementation work continue today, albeit with a continuing change of players. This is certainly a complex case, and is cited here to illustrate the difficulty and need for long term, time-wise coordination of efforts.

**Intergovernmental coordination.** Water managers can cite many examples of difficulty in coordinating different units of government. The basic issue is to harmonize authorities, roles, and responsibilities in getting a job done. The example I will cite is the Two Forks Project, also described in (Grigg, 1996) and (Adams, 1998). Briefly, a large water supply project that had been planned for decades by Denver was vetoed by the Environmental Protection Agency, throwing the water supply planning process into turmoil in spite of an environmental study costing over \$40 million. The conflict, lasting for several years, illustrates the dependence of different sectors of the water industry on each other. Regional cooperation among players is needed as well as cooperation among federal agencies. A few of the unresolved intergovernmental conflicts were: coordination among local water supply agencies, relationship between state governor and federal agencies, relationships between federal agencies, and even relationships between regional and national offices of the same agency. While the proposed project certainly had pros and cons, the case illustrates the friction and lack of coordination in the intergovernmental arena.

**Local-regional coordination.** The issue here is to find a way for local water entities to work together on a regional basis. Few would argue with this goal on a conceptual basis, but making it happen is difficult. The case cited is the West Coast Regional Water Supply Authority, located in the Tampa, Florida area (Adams, 1998). Briefly, Florida's West Coast Regional Water Supply Authority consists of member governments who share the responsibility to provide water supply on a regional basis. Adams describes a continuing planning process, centered on the Authority's Resource Development Plan, which experienced much difficulty

because even when the Authority would decide something, it often could not get approval from the member governments. In other words, local politics interfered with regional cooperation. The scenario, of course, plays out in many locales.

## CONCLUSIONS

I began the paper by pointing out that water management must proceed in a mixed mode between market and state dominance. Given that reality, the central questions are how to make it work better and how can mechanisms for coordination be made more effective?

By analyzing coordination processes and giving examples of how they work, I have tried to show that improving coordination is the most promising route to the conceptual and perhaps utopian vision of integrated water management. The AWWARF definition of Total Water Management was used as a strawman to derive the elements of coordination needing attention. The definition is not perfect, but it was arrived at by a group of experienced water managers and represents a good description of what these managers considered to be the overall management problem. Analyzing the definition led to the identification of nine categories of coordination. The categories are not unique, of course, but they enabled me to formulate judgments about how effective we are in each task of coordination. These judgments can be considered as propositions for a paradigm of improving water policy.

In my judgment, the most challenging and least-developed categories are dealing with competing uses, addressing local and regional concerns, balancing water quality and quantity, coordinating intergovernmental concerns, and maintaining time-wise coordination. These are, of course, old issues, but the starting point of coordination gives us a fresh look at some of them, I hope.

Each of these policy arenas receives attention from angles other than coordination, and some are probably not even mainly coordination issues. This might be true, for example, of competing uses and balancing water quality and quantity, although it might be fair to say that laws and regulations are coordination mechanisms. The aspect of coordination that offers most hope for improvement, is, however, coordination through voluntary means. The categories that seem most amenable to voluntary improvements are local and regional concerns, coordinating intergovernmental issues, and maintaining time-wise coordination.

It is always tempting to say that more research is needed,

and I will say that here too. Certainly, finding ways to improve regional coordination will require more study. I suggest that real world experiments that combine researchers with politicians to find better ways to do business are needed. Adams' (1998) work is a good pilot study and Grigg (1989) also offers some information on the topic.

Coordinating intergovernmental issues has two dimensions-horizontal and vertical. For local government, the horizontal issue is about the same issue as regionalization. The vertical dimension of local-state-federal can be even more challenging, and horizontal problems that involve competing federal agencies, as illustrated in the Two Forks case, is also challenging. Progress in all of these arenas might require legislative mandates. For example, in a local area, a state legislature can set up regional agencies with teeth, not just planning and advising functions, and Congress can mandate cooperation between agencies.

Maintaining time-wise coordination seems mostly an educational issue. Planning and management organizations should improve their processes across the board so that problem-solving does not have to start over and over again whenever personnel changes occur. In other words, institutional memory should be improved.

To conclude, I believe that shedding light on the different facets of coordination in water management can help us to understand where improvements in policy are needed as well as where the paydirt might be. Of all of the suggestions I made, the most promising areas would be, in my opinion, doing better with regional and intergovernmental coordination. Progress in both these arenas would reduce friction in government without interfering with private market or property rights or with people's basic values.

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**Table 1. Types of coordination from Total Water Management definition (AWWARF, 1996)**

Type of Coordination	Phrase from TWM definition	Discussion	Effectiveness Ranking
Society and environment	The exercise of stewardship of water resources for the greatest good of society and the environment	This statement provides a general organizing framework for balancing. It is adequately understood, but needs more explanation	1
Stakeholder	Requires the participation of all ... stakeholders in decision-making through a process of coordination and conflict resolution	Process is known as stakeholder and public involvement. Good and improving. A central issue of democratic government	2
Watersheds and natural water systems	Encourages planning and management on a natural water systems basis	It is recognized and currently popular that water management on a basin or watershed basis is desirable. Further progress will require more effort	3
Means of water management	Promotes water conservation, reuse, source protection, and supply development	This means to coordinate different ways to meet needs and sustaining the environment. A central planning and engineering issue.	4
Time-wise	Through a dynamic process that adapts to changing conditions	This requires valid planning methods to preserve institutional memory and keep processes on track and requires much improvement	5
Intergovernmental	Requires the participation of all units of government .... in decision-making through a process of coordination and conflict resolution	Intergovernmental coordination is given as separate from stakeholders because of the different kinds of authorities that government has	6
Water quality and quantity	To enhance water quality and quantity	This is handled through water quality law and regulation. Many problems still require solution	7
Local and regional concerns	Taking into consideration local and regional variations	This is a difficult issue requiring intergovernmental cooperation in arenas which lack adequate incentives and often cannot be mandated. It is not working too well	8
Competing uses	Balances competing uses of water through efficient allocation that addresses social values cost effectiveness, and environmental benefits and costs	This is handled through state and federal water law, regulations, court decisions, and other institutions. A very difficult arena.	9

**Table 2. Cross-comparison of categories of integration and coordination**

Integration categories (Grigg, 1996)	Coordination categories from TWM (AWWARF, 1996)	Integration categories (Mitchell, 1990)
<ul style="list-style-type: none"> <li>■ Political</li> </ul>	<ul style="list-style-type: none"> <li>■ Stakeholder</li> <li>■ Intergovernmental</li> <li>■ Local and regional concerns</li> </ul>	
<ul style="list-style-type: none"> <li>■ Geographic</li> </ul>	<ul style="list-style-type: none"> <li>■ Local and regional concerns</li> <li>■ Watersheds and natural water systems</li> </ul>	<ul style="list-style-type: none"> <li>■ Regional economic development</li> <li>■ Regional environmental management</li> </ul>
<ul style="list-style-type: none"> <li>■ Purpose or function</li> </ul>	<ul style="list-style-type: none"> <li>■ Competing uses</li> </ul>	
<ul style="list-style-type: none"> <li>■ Hydro-ecological</li> </ul>	<ul style="list-style-type: none"> <li>■ Watersheds and natural water systems</li> <li>■ Water quality and quantity</li> </ul>	<ul style="list-style-type: none"> <li>■ Elements of hydrological cycle</li> <li>■ Water, land, environment</li> </ul>
<ul style="list-style-type: none"> <li>■ Disciplinary</li> </ul>		
	<ul style="list-style-type: none"> <li>■ Means of water management</li> </ul>	
	<ul style="list-style-type: none"> <li>■ Society and environment</li> </ul>	

**Table 3. Examples of activities and dependencies of coordination categories**

Type of Coordination	Examples of Activities	Dependencies and Linkages
Watersheds and natural water systems	<ul style="list-style-type: none"> <li>■ Allocating water supply in watershed during drought</li> <li>■ Managing a stream-aquifer system</li> <li>■ Taking water from storage for a flood flush such as Grand Canyon</li> </ul>	<ul style="list-style-type: none"> <li>■ Limited water supplies mean that entities should share the pain</li> <li>■ Water taken from aquifer does not appear in stream</li> <li>■ Water is taken from other uses for enhancement of stream ecology</li> </ul>
Means of water management	<ul style="list-style-type: none"> <li>■ Developing new supply vs. water conservation</li> <li>■ Building a dam or using artificial recharge</li> <li>■ Regulating a flood plain vs. building flood control storage</li> </ul>	<ul style="list-style-type: none"> <li>■ Conservation measures avoid tapping natural systems</li> <li>■ If artificial recharge is used, a dam may be avoided</li> <li>■ Tradeoffs accomplish same purpose of protecting from damage</li> </ul>
Intergovernmental	<ul style="list-style-type: none"> <li>■ Building a cooperative water supply system</li> <li>■ Establishing interconnections to guard against drought</li> <li>■ Coordinating service areas for water supply</li> </ul>	<ul style="list-style-type: none"> <li>■ Entities can save money by taking collective action</li> <li>■ Entities are dependent on each other for mutual aid</li> <li>■ Different entities must cooperate to determine best way to serve</li> </ul>
Water quality and quantity	<ul style="list-style-type: none"> <li>■ Maintaining low flows for stream quality vs. keeping storage high</li> <li>■ Allowing stream withdrawals when quality is an issue</li> <li>■ Conserving water to reduce wastewater that must be treated</li> </ul>	<ul style="list-style-type: none"> <li>■ Adequate water quantity enables quality to be better</li> <li>■ Poor stream water quality can block rights for withdrawal</li> <li>■ Direct connection between quantity of water used and wastewater</li> </ul>
Local and regional concerns	<ul style="list-style-type: none"> <li>■ Building a regional wastewater plant</li> <li>■ Balancing growth in a region with water supply</li> <li>■ Setting equitable suburban water rates</li> </ul>	<ul style="list-style-type: none"> <li>■ Entities can save by working together to build plant</li> <li>■ Inadequate water supplies constrain growth</li> <li>■ Welfare of region is affected by rate decisions</li> </ul>