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New Thinking about Water Management

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William Blomquist, Edella Schlager, and Tanya Heikkila, eds., Common Waters, Diverging Streams: Linking Institutions and Water Management in Arizona, California, and Colorado *(Washington, DC: Resources for the Future Press, 2004). 205 pp., $70.00 (cloth), ISBN: 189185383X, $30.95 (paper), ISBN: 1891853864.*

Bonnie G. Colby and Katherine L. Jacobs, eds., Arizona Water Policy: Management Innovations in an Urbanizing, Arid Region *(Washington, DC: Resources for the Future Press, 2007). 270 pp., $65.00 (cloth), ISBN: 1933115343, $39.95 (paper), ISBN: 1933115351.*

John T. Scholz and Bruce Stiftel, eds., Adaptive Governance and Water Conflict: New Institutions for Collaborative Planning *(Washington, DC: Resources for the Future Press, 2005). 274 pp., $75.00 (cloth), ISBN: 1933115289, $32.95 (paper), ISBN: 1933115297.*

It is a bit of an understatement to say that the public administration and policy literature on water resources management and development is prolific. The modern field of policy analysis may well have started with the federal requirement, part of the Flood Control Act of 1936, that water projects pass tests for economic feasibility through cost–benefit analysis. The development and study of public policy have paralleled efforts to explain decisions to build water projects and have given rise to a host of concepts that have helped define the policy formulation literature, such as subgovernments, issue networks, policy subsystems, and advocacy coalitions (Ellison 1998). Management concepts have also paralleled and been influenced by the development of water resources management: recently, adaptive management (Hollings 1978), conjunctive management (Blomquist, Schlager and Heikkila 2004, 11–13), and collaborative management (Leach 2006), but more broadly, water resources management has been at the heart of everything from the efficiency and conservation movements (Hayes 1959) to ecosystems management (e.g., Frissell and Bayles 1996).

But then again, these gains in management and policy theories are minor next to the changes that effective water resources management and development brought to America. Teddy Roosevelt justified his signature on the Newlands Act of 1902—which created the Reclamation Service and nationalized water resources development in the western states—with the argument that the unpopulated and underdeveloped West was vulnerable to Japanese aggression (Reisner 1993, 112). It is no accident that Los Angeles, Phoenix, Denver, Albuquerque, Las Vegas, and a host of western cities exist in arid environments. They were intentionally created through massive water projects—sometimes federal and sometimes not, but always part of the same system (Ellison 1995). Similarly, it is no accident that much of the nation's food supply—from lettuce in Arizona, to the fruit and vegetable cornucopia of California, to the sugar beet fields of Wyoming—are grown through irrigated agriculture. And though an accident, many contend that the Bureau of Reclamation's hydropower, essential to aluminum production, was central to the U.S. victory over Germany and Japan in World War II (Reisner 1993, 161–62).

Some of the most important political and cultural divides in America were also created by issues associated with water resources management and development. Perhaps the first modern environmental battle—and perhaps the environmental movement itself—was fought over the construction of a dam and reservoir for the city of San Francisco in the Hetch Hetchy Valley in Yosemite National Park. John Muir and the Sierra Club opposed the dam, which not only violated the promise of the National Park System but also brought national attention to the then preservationist movement (Nash 2001). Ultimately, much of the environmental movement—in terms of interest group and individual activity—was founded on the struggle to prevent the construction of dams and reservoirs in the western United States. Moreover, it has been cheap power, cheap water, and cheap food that have given rise not only to big western cities and sprawl but also to a uniquely western culture that includes everything from popular movies and music to the personal computer and the iPod.

Today we are at a crossroads. The era of big dams and reservoirs, with big hydroelectric plants and irrigation systems, seems to be coming to a close. It is most important, however, to understand why it is coming to a close: not because environmentalists have saved the day but because water in the West has already been stored and put to use. We have dammed almost every river—numerous times—and have mined groundwater at alarming rates to grow crops and build cities. Thus, if urban, suburban, and agricultural development are going to continue in the western United States, we need to find new ways to manage water resources. There is no new water. But water can be directed toward new needs if management approaches and institutional prerogatives can be changed.

The problem is that although we can advance and rethink our management approaches, institutions that were created to advance different preferences do not evolve so easily. To a certain extent, many water resources management and development problems could be addressed by simply changing the law. For example, the Colorado River Compact of 1922, also known as the "Law of the River," has a number of perverse incentives that force water managers and politicians to advocate the construction of odd projects—the Animas-La Plata project is a good example. The construction of that nearly $1 billion project could have been avoided by giving Native Americans the power to market their water out of state. Why can we not change the law? Because it protects developers and farmers and, most importantly, because it is part of the institutional maze that governs western water resources management and development: The Colorado River Water Compact, water rights, the doctrine of prior appropriation, the doctrine of beneficial use, state and federal water development agencies, and state constitutions were all designed to support development in a fundamentally different western United

States. Hence, we have a set of institutional arrangements that are designed to radically favor farmers who grow surplus crops with subsidized water over urban and environmental interests (Reisner and Bates 1990).

These water resources management and development problems are no longer unique to the West. The southeastern states—Georgia, Alabama and Florida, for example—are struggling to solve water quantity and quality issues. Florida, a state known for its abundant water supplies, is struggling with many of the same types of agricultural, urban, and environmental water issues that confront western water managers. Interestingly, in Florida, as in Colorado, California, and Arizona, effective management solutions are possible only if old institutions can be adapted to new problems.

Institutions as Barriers to Effective Water Resources Management

In *Common Waters, Diverging Streams,* William Blomquist, Edella Schlager, and Tanya Heikkila focus on the institutional prerogatives that govern groundwater and surface water management in three states: California, Arizona, and Colorado. They contend that coordination between the principal institutions that govern water resources management—and their clientele—is the key to the production of effective management solutions for water scarcity problems in the West. Indeed, in the first chapter, they describe a water resources management conference at which a group of technical experts was asked to list the obstacles to effective water resources management. The experts agreed that the "10 most significant barriers … concerned the assignment of rights, risks, and responsibilities; the distribution of costs and benefits; and the opportunities and disincentives for interorganizational cooperation and coordination of activities—in short, institutional issues" (15).

In order to discover how institutional issues form barriers to effective management and how innovation can produce solutions, Blomquist, Schlager, and Heikkila focus on conjunctive water management, which "involve[s] the coordinated use of surface water supplies and storage with groundwater supplies and storage" (12). Conjunctive management makes a useful focus for their study because it requires the integration of governing institutions that were developed separately and designed to protect different constituencies. "California and Arizona [for example] generally have distinct legal doctrines governing ground and surface water" (19). Arizona's surface water is governed by a water rights system that allows for the diversion of water by senior appropriators, similar to California and Colorado. But groundwater is subject to the "reasonable use doctrine" that ties pumping rights to the soil, that is, farmers who own land above an aquifer could pump water from it. Most importantly, the institutional context means that the bulk of surface waters go to senior appropriators—that is, traditional water users—whereas groundwater is used to support development and growth.

Under this system, for example, as early as the 1940s, cities purchased large pieces of farmland "governed by the reasonable use doctrine" and began a practice known as "water farming" (80). Water farming was an understandable response to the institutional context because cities were not only concerned with the maintenance of reliable water supplies, but also because the reasonable use doctrine encouraged them to develop and use water rather than conserve it. This system, however, also led to severe depletions in groundwater levels as cities and farmers pumped water faster than aquifers could be replenished. In order to address this problem, and also to shore up federal support for the Central Arizona Project, the state legislature responded with the Arizona Groundwater Management Act of 1980, which "transformed the open access condition of the most heavily used basins to one of limited access and managed use" (78).

Next, the Arizona legislature passed the Groundwater Storage and Recovery Projects Act of 1986, which "allows private and public entities to store surface water in underground aquifers through direct or in-lieu recharge" (80). This legislation created a system of groundwater rights that resembled the state's rules for governing surface water. And in 1996, the Arizona legislature created a water banking system, through the Arizona Water Banking Authority, that gave water users the right to store excess Central Arizona Project water in underground aquifers. Thus, institutional arrangements were created that gave cities and other water users incentives to conserve water and store it in aquifers.

The analysis of conjunctive management in three states gives Blomquist, Schlager, and Heikkila useful insights into the conditions that are needed to reform and integrate institutional arrangements that no longer fit current and looming water scarcity issues, such as the impact of global warming on water supplies, the maintenance of instream flows, and exponential growth in cities such as Las Vegas.

Though *Arizona Water Policy,* edited by Bonnie G. Colby and Katherine L. Jacobs, is subtitled *Management Innovations in an Urbanizing, Arid Region,* it might also be subtitled *A Catalog of Water Scarcity Issues.* This volume includes chapters on a variety of water issues that are analyzed in *Common Waters, Diverging Streams,* but it provides a deeper and more substantive discussion of them. There are entire chapters, for example, on ground and surface water management, urban growth, ecological issues and water, and water rights and Native Americans, written from

the perspective of practitioners and scholars. The book's premise is that Arizona's economic future is dependent on the ability of the state's water managers to maintain sustainable "water supplies in the context of intense population growth pressures and increasing competition for water" (1). And, like the analysis in *Common Waters,* many of the writers describe how water scarcity is forcing managers to either remake institutions or use them in innovative ways.

Water transactions are one mechanism that federal and state water managers can use to address issues related to urban, suburban, and economic development and drought in Arizona. These transactions are made difficult because water management institutions in the West were created to promote and protect certain interests, such as mining and agriculture, that are no longer cost-effective enterprises in urban western states. In western states, for example, most water is dedicated to irrigation, and a good deal of it goes to growing surplus crops. Cities could find vast quantities of water if water rights dedicated to irrigation could be transferred to them. This task is made difficult, however, because farmers do not want to be told that they are no longer cost-effective—who does?—and because state water management institutions are designed to make it difficult to condemn agricultural water rights. Moreover, cities in Arizona demonstrated that they were just as likely to abuse aquifers as farmers when they purchased farmland and built well fields for water farming (79–82).

In Arizona, the completion of the Central Arizona Project (CAP) gave water managers an opportunity to produce a system that allows for the more efficient transfer of water from one type of use to another. Under the CAP system, water is distributed by "municipal water companies, private water companies," and irrigation districts through delivery contracts with the Central Arizona Water Conservation District (83). Water transfers within the system are managed by the Arizona Department of Natural Resources, subject to public review and approval by the Secretary of the Interior. Thus, when CAP was completed and non-Indian farmers found themselves burdened with larger water payments than they had anticipated, many were able to give up their contracts and water rights. This made "CAP water available for other users, including for use in settling Arizona Indian water rights claims" (84).

Finally, John T. Scholz and Bruce Stiftel's edited book brings new dimensions to these discussions about water resources management and institutions. First, their analysis focuses on water resources management and development in Florida—a state known for water abundance rather than scarcity. Second, rather than examining the types of institutions created to "resolve collective action problems among users of a single type (e.g., urban, industrial, agricultural)," they focus on the types of conflicts that emerge when these institutions are successful (1). Thus, when authorities at the local, state, and federal level work together successfully to address water quantity issues, they create problems for authorities that were created to protect water quality or habitat. Scholz and Stiftel call these "second-order collective action conflicts, in contrast to the often simpler first-order conflicts that the specialized authorities were created to manage" (1).

Third, Scholz and Stiftel contend that the resolution of second-order collective action conflicts will require a fundamentally new approach to governance. They argue that resource managers have typically relied on adaptive management to resolve problems in which "a set of analytic and administrative tools let managers utilize the experimental techniques of science to test policy hypotheses during implementation" (5). Adaptive management is particularly useful when there is consensus on "policy goals but not about the appropriate means to achieve" them (5). Unfortunately second-order conflicts, the editors maintain, do not lend themselves to the adaptive management approach because there is no consensus among stakeholders on policy goals. In response, the editors call for a new approach called "adaptive governance," which "involves the evolution of new governance institutions capable of generating long-term, sustainable policy solutions to wicked problems, through coordinated efforts involving previously independent systems of users, knowledge, authorities, and organized interests" (5). Thus, rather than looking for ways to adjust old institutions to new problems, the authors call for the construction of wholly new institutional structures.

After setting the stage for adaptive governance, Scholz and Stiftel present a series of edited chapters that examine adaptive governance and water resources management in Florida. The chapters are divided into nine case studies of water conflicts, followed by commentaries by practitioners and researchers. Most importantly, the editors are able to keep the analyses focused on five challenges that they set out for adaptive governance in the introductory chapter. The analytical chapters also include useful critiques of adaptive governance. Paul J. Quirk, for example, reminds us that traditional water management institutions remain important participants in second-order water conflict (204), and Paul Sabatier warns against undue optimism (203).

What Next?

Scholz and Stiftel's excellent edited volume makes an important contribution to the literature on water resources management and development and, as the editors note, their findings can be generalized to the West: "There is no quarter of the United States in

which water remains an abundant resource with effectively infinite assimilative capacity and the ability to readily satisfy the needs of all other user groups" (3). This is true. But it is also true because economic development and growth drive innovation in water resources management in Florida and the western United States. The simple fact is that people, given the scale of development in the United States, need water. They need water to grow lawns, wash cars, and live in the desert—and now even to live near the Everglades. This is nothing new. Environmentalists have been warning us for years that the demands of development are out of scale with the supply of our natural resources. Still, these books provide useful assessments and analyses of the management issues that water resource developers confront. They are recommended reading for anyone who is interested in these water resource management and development issues today.

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