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## Bonnie G. Colby & Katherine L. Jacobs, Eds., Arizona Water Policy: Management Innovations in an Urbanizing, Arid Region

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**Bonnie G. Colby & Katherine L. Jacobs, Eds., *Arizona Water Policy: Management Innovations in an Urbanizing, Arid Region*, RFF Press, Washington D.C. (1st ed. 2007); 247 pp; \$65.00; ISBN 1-933115-34-3, hard cover.**

*Arizona Water Policy* comprehensively analyzes the state's complex water resource management experience, exploring both its successes and failures, in an effort to provide practical guidance to other arid regions facing rapid development and massive, sustained population growth. Each chapter of this book is a separate article on a relevant facet of Arizona's water management experience, authored by water experts across a variety of different yet intrinsically related fields.

Chapter One frames the discussion of Arizona water law and water management techniques by introducing several themes relevant to the topics addressed in ensuing chapters, including: supply and demand, social concerns, sustainability, the importance of integrating land use decisions with water supply planning, and managing the impact of climate change.

Chapters Two and Three provide a historical overview of Arizona's water management experience. Chapter Two contains a broad survey of water use methods historically employed within the state, as well as modern, innovative practices that have ultimately allowed for rapid development despite a profound scarcity of water.

Chapter Two also points out that Arizona's experience is unique in that its transition from a primarily agricultural economy to a heavily urban area has been relatively free from conflict among traditionally competing interests. The authors posit that water continues to find the highest possible economic use, as housing subdivisions are currently the most economically valuable crop or commodity under production in the state. Chapter Two concludes that water in Arizona is the "consummate shared enterprise," as urban, rural, and tribal communities must coexist and share demand for a scarce and over-allocated resource that, somewhat counter-intuitively, acts as a politically cohesive force among these otherwise disparate interests.

The historical narrative continues in Chapter Three, but focuses specifically on the evolution and impact of state and federal water law in Arizona. Chapter Three covers surface water and prior appropriation; water rights federally "reserved" to the state's numerous Native American tribes by *Winters v. United States*; laws governing groundwater; multi-state appropriation of Colorado River water; and state law innovations in efficiency due to effluent reuse and water transfers. The legal infrastructure related to underground water storage and recovery is of particular importance in Arizona, given the region's natural aridity and its junior priority use on the Colorado River. Chapter Three also finds that Arizona's utilization and innovative management of its

vast aquifer system has greatly enhanced the state's ability to manage supply.

Chapter Four focuses on the sources of water supply within Arizona, taking into account the state's physical and geological features and hydrological climate conditions. Arizona's supply of renewable surface water is limited to precipitation, runoff, and its limited share of water from the Colorado River, delivered via the Central Arizona Project ("CAP"). Moreover, only a small percentage of annual precipitation within the state actually results in runoff, and the available renewable surface water supply is already fully appropriated. Chapter Four concludes that active development of groundwater sources and systematic monitoring of aquifer conditions is a crucial component of Arizona's water management programs and is necessary to sustain the projected pace of population growth and urban development occurring in the state.

Chapter Five engages in a technical discussion of issues related to global climate change and the potential effects of such change in arid or semi-arid regions. Arizona is already in a very tenuous position as its major source of renewable surface water, the Colorado River, is heavily dependant on climatic conditions and weather patterns occurring far from Arizona's borders. This dependence underscores the importance of Arizona's continued reliance on efficient groundwater management practices and regulatory programs.

Chapter Six examines various types of water transactions utilized by the state to manage high precipitation variability, consistent water scarcity, and periodic drought. Surface water rights in Arizona are not subject to significant legal constraints and are readily transferable. However, the system for groundwater transfers implemented by the Groundwater Management Act of 1980 to facilitate groundwater rights transfers within designated Active Management Areas ("AMA") is more complicated, using a mandatory permitting system to account for such transfers. Outside of the AMAs, however, there is very little regulation or monitoring of groundwater rights. This chapter also discusses the different types of groundwater rights, municipalities' innovative attempts to ensure supply through water farming, the Arizona Water Banking Authority ("AWBA"), and the history of water transactions in the state. Ultimately, Chapter Six concludes that voluntary water transactions used to transfer water to different locations and different economic uses can be an effective tool for water managers attempting to combat the state's natural aridity. However, they can also lead to undesirable social and environmental problems which are difficult to resolve.

Chapter Seven discusses the critical state of freshwater biological diversity in Arizona, the most biologically diverse state without a coastline in the United States, which contains the second highest number of plant and animal species endemic only to itself. Existing water use

patterns, based on promoting economic value by facilitating agricultural use and urban development, have resulted in severely altered stream flow regimes. Continuing changes to these altered water use patterns constitute a further threat to riparian habitat and Arizona's native species, which are unable to quickly adapt to changes encountered as a result of human consumption patterns. Consequently, the majority of the state's riparian habitat has either been lost entirely, or is severely threatened. Chapter Seven concludes with lessons for other regions facing similar situations in order to promote a better connection between land use decisions and water policy, primarily by providing landowners with incentives to minimize environmental impact in biologically sensitive regions.

Chapter Eight also addresses Arizona's separate legal treatment of groundwater and surface water, maintaining that this "disconnect between water law and hydrology" detrimentally impacts biological diversity within the state. Specifically, this chapter examines the environmental problems caused by dams and groundwater pumping, stemming from Arizona's separate legal treatment of surface water and groundwater. Despite clear scientific evidence that groundwater and surface water sources are directly connected, Arizona's differing legal treatment of these sources further exacerbates the delicate biological balance in the state's riparian regions and makes the integration of environmentally sensitive water management and land-use solutions difficult to achieve.

Nevertheless, Chapter Eight discusses the various efforts that currently exist to protect riparian habitat within the state, such as the Upper San Pedro Partnership ("USPP"), a multi-jurisdictional, federally funded attempt to promote and implement conservation methods and compensate for continuing aquifer overdraft and its attendant environmental consequences. This chapter concludes that federal environmental protection laws may offer the only means of meaningful environmental protection in Arizona. However, the intermittent application of these laws, which are dependent on highly specific conditions such as the presence of an endangered species, will result in only limited success.

The environmental focus continues in Chapter Nine, which examines Arizona's water quality protection programs. These programs focus primarily on attempts to address long-standing issues related to the salinity of Colorado River water, Arizona's major source of reliable freshwater supply. Specifically, this chapter deals with the federal and state regulatory framework put in place to address water quality and salinity, and the difficulties resulting from the salinity increase in reused and recycled water.

Chapter Ten addresses agricultural use in Arizona, where crop irrigation accounts for 80 percent of freshwater use in the state, although this number is declining in the face of intense competition due to the

robust population growth resulting in an exponential increase in the level of urban demand. This chapter also discusses the effect of federal farm policy on Arizona's water supply, as well as the impact of global trade disputes within the World Trade Organization on agricultural policy. Chapter Ten asserts that federal policy decision-making and global economic trends tend to have a disproportionate impact on water management decisions within the state, making state and regional water planning efforts more difficult.

Chapter Eleven discusses various regulatory programs used to implement urban water management techniques, focusing on the Groundwater Management Act and the designation of five active management areas encompassing most of the urban areas within the state. This program is an innovative approach characterized by legislative flexibility, which allows each AMA to retain unique management objectives, and has allowed urban development in Arizona to proceed at a rapid pace despite the chronic shortage of readily available surface water in the region. A key provision of Act, the Assured Water Supply ("AWS") Program, requires a land developer to demonstrate the availability of a 100 year supply of water, both physically and legally, as a precondition for subdivision.

Despite Arizona's strong regulatory approach within the designated AMAs, groundwater remains essentially ungoverned in the large rural areas of the state. Chapter Twelve discusses the lack of comprehensive water management programs in these rural areas and highlights the weaknesses inherent in such a fragmented approach. For example, outside the AMAs, the adequate water supply rules permit subdivision without a demonstrable 100 year supply, provided that a seller of land notifies the first buyer of any house or lot that a proven supply has not been shown to exist.

Chapter Thirteen details Arizona's efforts to develop groundwater recharge and recovery programs and the importance of these efforts in ensuring a sustainable water supply. This chapter discusses Arizona's innovative permitting and accounting system, which allows for the replenishment of groundwater with surface water or effluent and provides water managers with a great deal of flexibility to manage supply and demand in a relatively cost-effective manner. Chapter Thirteen also discusses the institutions created to administer the state's crucial groundwater storage and recovery programs, both public and private, and their importance in meeting water management goals and setting policy objectives.

Chapter Fourteen addresses Arizona's extensive experience with tribal water rights and the importance of resolving these disputes fairly and efficiently. The authors point out that unsettled tribal claims create uncertainty regarding supply and availability, which in an arid region like Arizona greatly hinders the state's ability to plan and manage future water supplies effectively and efficiently. Moreover, an im-

portant characteristic of Arizona's tribal water settlements, off-reservation leasing provisions for unused tribal water, allow the tribes to generate income from unused water rights while allowing non-tribal lessees to put this water towards a higher economic use - another innovative water planning and management tool.

*Arizona Water Policy* provides a comprehensive overview of Arizona's history and experience developing and administering its water supply. In addition to providing keen insight for other arid regions facing urban development and massive population growth, this book also provides water law practitioners with practical guidance regarding the various aspects of state, federal, and tribal law influencing water use and policy in the state of Arizona today.

*Cameron M. Banko*

**Kenneth M. Murchison, *The Snail Darter Case – TVA versus the Endangered Species Act*, University Press of Kansas (2007); 234 pp; \$15.95, ISBN 978-070061505-6; soft cover.**

Kenneth M. Murchison's *The Snail Darter Case* is part of the Landmark Law Cases & American Society series printed by the University Press of Kansas. The book outlines in detail one of the seminal cases in environmental law, *TVA v. Hill*, a case which pitted the powerful interests of a federal agency against the tiny snail darter and environmental groups opposed to the completion of the massive Tellico Dam in Tennessee.

In *TVA v. Hill*, the United States Supreme Court held that the text of the Endangered Species Act ("ESA") prevented the Tennessee Valley Authority ("TVA") from taking any action which would jeopardize the existence of an endangered species or destroy its critical habitat. This included the completion of the Tellico Dam, a project that the TVA began almost 10 years before Congress passed the ESA and had already cost the TVA close to \$100 million. Although legal analysts often see the case as one of conflicts of techniques of interpretation, the Supreme Court's decision in *TVA v. Hill* was, Mr. Murchison argues, "merely one part of a long struggle; it did not begin or end the fight over the Tellico Dam."

The book begins with a discussion of the historical development of the TVA and its decision to construct the Tellico Dam. Much of Chapter One discusses the broad power of the TVA to justify water resource projects and the dubious factors the TVA employed in determining that construction of the Tellico Dam would have a positive benefit-cost ratio.

Chapter Two outlines the development in the late 1960's and early 1970's of new environmental protections that permitted challenges to development projects. First, there was an increase in judicial sensitivity to environmental challenges to development projects. Second, Con-