

ARROYO

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Water Transfer: a Water Source, a Debate

That water, so common, essential and basic, should be a commodity to be bought and sold, marketed and transferred, may seem odd. Yet social and economic conditions in Arizona, and throughout the West, have evolved in such a way that water transfers appear as an attractive option to some. And a controversial issue to others.

Simply stated, water transfer means a change of ownership of the right to use water, usually through a sale. As a result, the water may be transported to another place to satisfy a need of its new owner. More specifically, the water transfer issue in Arizona involves the purchase of agricultural land for its water by urban areas, to support municipal and industrial development.

Arizona municipalities are expanding, especially the Phoenix and Tucson areas. Meanwhile Arizona agriculture, which uses about 80 percent of the state's water, shows declining profits. Is it fair and reasonable to satisfy new and growing water demands by moving water from low-value to high-value uses or, in other words, from agricultural to urban areas? In 1987, 75 percent of water transfers in the Southwest involved moving water from agricultural to municipal and industrial uses.



Additional sources of water may be unavailable or insufficient. Large-scale, federal-supported water reclamation projects are out of favor, with opposition mounting to the environmental and economic costs. And water conservation and reuse may not yield enough to meet the growing demand. With the lack of available options for new water sources, some people view water transfers as an idea whose time has come.

Other developments also seem to encourage water transfers. The 1980 Arizona Groundwater Management Act, which was passed chiefly to control and manage groundwater overdraft, established four Active Management Areas to help achieve its goal. Safe yield or the balance of groundwater withdrawals with total recharge is the goal of three of the AMAs, with growth and development carefully managed to

avoid excessive groundwater withdrawal. As a result, new projects are encouraged to contract for water outside their AMAs, often in rural, agricultural areas.

Further, water transfers become more feasible with the development of the CAP system, which could provide a method to effectively transport water between locations. Along with delivering Colorado River water, the canals could be used to transport water between points inside and outside the AMAs; from rural areas to municipalities.

Because of the above considerations, municipalities are willing buyers in the water transfer transaction. Rural and agricultural interests, however, are often reluctant sellers. They are concerned that, if they sell their water rights, the sale will also be to their advantage, not just to the benefit of municipalities. They perceive certain negative effects of water transfers on the areas of origin, which is the location of their homes, properties and businesses.

Water farm acreage bought by municipalities is removed from the county tax rolls because municipally owned property is tax-exempt. This places a heavier burden on the remaining taxpayers. Also, economic development may be affected because counties would have lost the tax revenues to support the public services that attract new enterprises.

Economic development may be further affected if a county no longer controls an adequate supply of water to attract new businesses and industries.

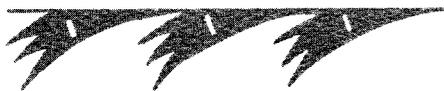
Water, a county's most basic resource, may have been sold to a municipality that will make decisions about its uses without regard to local community interests.

Further, the loss of farm income due to retired farmlands may affect existing businesses in the community. Less agricultural monies earned and spent means less business for seed suppliers, tractor mechanics, accountants and even the local coffee shop. Also, a decline in agricultural employment could cause people to move out of the community.

Also environmental concerns exist. When land is no longer irrigated, revegetation begins with tumbleweeds often quickly taking over the land. Dust and tumbleweeds can become a nuisance to adjacent lands which may include cultivated farmland.

This edition of *Arroyo* discusses water transfers. A current and controversial issue, water transfers affect the growth and development of urban and rural lands, and the well-being of all who live there. ▼

INVITED COMMENT



Water Transfer: an Urban and Rural Perspective

Water transfer is an issue with an urban and a rural perspective. Invited Comment includes statements from each point of view.

Water Transfers: a Rural Perspective,
Gordon C. Henrie
President, Arizona Rural Water Association

Since the West was settled, water has been more precious than gold, and it seems that it still is. Over the years, the use of water has primarily centered around agriculture, and we have gone to great lengths to provide for that use. Recently, however, increased amounts of water have been required for expanding municipal and industrial uses. As a result, we have come to realize that all needs cannot be met with everyone having all the water they want.

The 1980 Groundwater Management Act protects water users in active management areas, but unprotected areas outside the AMAs will be affected by change. For example, agriculture is impacted when water outside an AMA is transferred to enable an area within an AMA to reach its safe-yield goal. The AMA water table remains at a level to allow farmers to pump and profitably farm, but no such protection is available outside the AMA. Eventually its lowering water table will render farming totally unprofitable. This is of particular interest if we consider agriculture presently uses approximately 85 percent of the water used in Arizona.

By protecting AMA water, the Groundwater Management Act has made it necessary for large and growing cities to look outside their AMAs for supplementary water. This has led to "water farming or ranching" which may appear to be a solution to the cities' problems. A deeper investigation, however, reveals many serious and long lasting problems. For example, water farm properties are removed from a county's tax rolls. This reduces revenues and shifts tax burdens to the remaining private citizens. Bonding capacity is also reduced making it difficult to build capital improvements needed to provide public services.

Serious long-term questions also need to be considered. How will future farming or industrial development occur if water is unavailable? How will

development be affected if there is even a fear that sufficient water may not be available to sustain growth in the area? These questions are difficult to answer because we do not know what the future will bring. We do know, however, that 50 years ago Phoenix was not a thriving metropolis. Possibly other areas may have the same potential. We cannot use trial and error to answer the questions. Once water is transferred to the metropolitan areas and people become dependent on it, it will never be stopped.

Today's water transfer issue is only a tool to allow continued growth as we know it today.

Other methods exist to acquire water. More could be done with conservation. Water reuse and recharging water into the aquifer in abundant years would help. Increasing reservoir storage to retain flood waters and weather modification are valid efforts and should be investigated. We need to see water transfers and its implications as an Arizona problem—not a rural or urban problem.

Many decisions face Arizona citizens at this time. The main one is "What lifestyle do we want in our state?" Arizona's growth has been rapid and impressive, but are we squandering the richness of our environment, including our most precious resource, water, to support reckless development? The *Wall Street Journal* gave national attention to this Arizona issue in a feature on November 2.

We face a dilemma. Unequaled growth provides today's profits, but creates future debts. Today's water transfer issue is only a tool to allow continued growth as we know it today. However, no matter what laws are enacted within the next two or three years, in thirty years, under our present growth pattern that supports the expansion of two major metropolitan areas, rural water will have to be transferred. Wouldn't Arizona and its quality

of life be better served if today's growth momentum were channeled through a cooperative state effort to plan and promote the development of six or eight population centers in Arizona? This would mitigate the waste, expense and ecological destruction that goes with supporting just two. ▼

Water Transfers: An Urban Perspective

Roger S. Manning

Executive Director, Arizona Municipal Water Users Association

Once again Arizona water users are embroiled in a dispute over the transfer or transportation of water from an area of origin to an area of use. Indeed, from an historical perspective nearly every groundwater conflict has revolved around this issue. Of particular significance for the current conflict was the 1977 *FICO* decision of the Arizona Supreme Court.

The *FICO* decision created an atmosphere of crisis among many groundwater users in the state. Since certain transfers or transportations could be enjoined as a result of this decision, the potential consequences of the decision were considerable, especially for the mining industry in Pima County and the cities of Tucson and Prescott. In response, the Legislature enacted the 1977 Transportation Amendments to the 1948 Critical Groundwater Code which allowed certain transportations to continue pending enactment of a comprehensive groundwater management code.

The 1977 Amendments also established the Groundwater Management Study Commission to develop a comprehensive groundwater management code. After over two years of study and with the added incentive that continued federal funding of the CAP, especially to Pinal and Pima Counties, was in jeopardy unless Arizona got its groundwater act together, the Commission's recommendations were adopted by the Legislature and signed into law by Governor Babbitt on June 12, 1980.

The 1980 Groundwater Management Act (1980 GMA) dealt directly with

the subject of transportation of groundwater. The 1980 GMA implicitly recognizes that transportation of groundwater will be necessary to meet changing water demands, effectively carry out future groundwater management plans and provide for future economic growth and development. Significantly, and some think most importantly, it establishes the principle that any rules for the transportation of water must be based on hydrological boundaries, not political.

The 1980 GMA implicitly recognizes that transportation of groundwater will be necessary to meet changing water demands...

The driver behind the transfer and transportation of water is the 1980 Groundwater Management Act (1980 GMA). While the 1980 GMA does not specifically require importation, it clearly leaves the cities little choice but to import water to meet the requirements of safe yield and an assured water supply (AWS).

Safe Yield is a goal which seeks to achieve by the year 2025 a balance between the amount of groundwater withdrawn and the amount naturally and incidently recharged. Under safe yield, groundwater in excess of recharge may be withdrawn only during shortages. Thus, the achievement of safe yield requires that future growth be independent of groundwater withdrawn from the Safe Yield Active Management Areas (AMA). In the future, AMA groundwater will be for emergency, not routine use.

The AWS test also necessitates importing water. An AWS means a 100-year water supply for the needs of the proposed development. In addition, the water use must be consistent with achievement of the AMA management goal. Thus the groundwater of a safe yield AMA cannot be used to dem-

onstrate an AWS. It is inconceivable how a proposed use dependent on groundwater mining can be consistent with the achievement of the management goal when the goal demands a cessation of groundwater mining.

Even though driven by the law, the purchase of land by several cities created a firestorm. As a result, the state hired a consultant to conduct a study of the hydrologic, economic and fiscal impacts of water exportation. While the study is incomplete, the preliminary results indicate that the growth potential of the rural counties will not be unalterably damaged as a consequence of water exports. Nevertheless, the prevailing perception is still one of rural pillage.

Consequently, political reality necessitates that the importing cities attempt to correct the perception of rural plunder by participation in the development and implementation of realistic and mutually agreeable mitigative measures or standards that recognize the legitimate economic and social needs of the exporting and importing areas of our state. We are all obliged to be good citizens and good neighbors. Only then will the search for mutually beneficial solutions bear fruit. ▼

LEGISLATIVE NEWS



Legislators Work on Water Transfer Strategy

The water transfer issue is to politics what subsidence is to the land—unsettling and divisive. As a result, water transfer could be a lively political topic during this legislative session. The issue sparks special interest for two reasons. First, it has to do with a perennially important Arizona topic: water and development. Also, the

issue attracts added political attention because of the urban/rural rivalry that is often seen as part of the water transfer movement. This rivalry raises an important political question: Will urban and rural interests conflict or cooperate to achieve efficient and equitable water transfer?

Perceptions vary about how rural and urban water transfer interests will get along in the Legislature. A senate staff member sees a political battle brewing and describes water transfers as a "David and Goliath" issue. However, Sen. Alan Stephens, member of the Joint Committee on Groundwater and Surface Water Exportation, is more optimistic. He feels the situation is changing. "The urban legislators are beginning to understand the issue of equity," he said. "And rural interests are beginning to come around." Sen. John Hays, a co-chairman of the joint committee, is unsure how events will develop. "It remains to be seen what opposition will come from the cities with water farms," he says. "They have a heavy voting block. I won't even venture a guess what might happen."

What is fairly certain, however, is that whatever legislation is proposed will be addressing rural concerns. Under the current situation, cities that would benefit from water transfers do not need legislation to set up and operate water farms. Describing what this means in the legislative process, a house staff member said, "It is going to be a matter of whether the rural folks, who are the most impacted, can build enough of a coalition with some of the urban people to try to get some of their ideas through."

This would indicate that any introduced legislation would most likely focus on individual issues. To attempt to address a wide range of water transfer concerns in a single bill would be divisive, and the bill would not likely gain wide support. "I think we will be looking at pieces of legislation as opposed to one big omnibus bill," a house staff member said. "It is difficult to handle an omnibus bill when so many different issues are involved, with the issues often interpreted differently by rural and urban interests." If this is

to be the process, various organizations that are preparing suggested comprehensive legislative packages will be disappointed.

Several issues have been identified by the joint committee for possible legislative action. The chief issue is taxing and bonding. This is an important concern because rural areas are unable to tax water farms owned by municipalities. This reduces their tax base which, in turn, affects their bonding capacity. Hays identifies the taxing and bonding issue as the concern most likely to be resolved during the next session. Other concerns include the interstate transport of water; a limitation on the amount of water to be withdrawn and transported; third party mitigation; and the consideration of a regulatory structure to oversee the water transfer process.

The issue or issues most likely to receive legislative action, however, are those that don't pose a severe threat to urban water interests or don't threaten to limit the 1980 Groundwater Management Act, which motivates municipal water farming in rural areas. The strategy of the joint committee, which has a 70 percent rural majority, seems to be to avoid a confrontation with the urban-dominated Legislature. Stephens says, "As long as we don't do anything too radical, I think proposals (from the joint committee) will receive general support from most of the legislators."

The issue is defined and sides are drawn, but the situation is not driven by any sense of urgency. Possibly this shows that the potential rural-urban conflict associated with water transfers is not acutely critical, at least to some lawmakers. "There is really no crisis," Hays says. "Nobody is exporting water. Nobody is not paying the taxes. We are all looking down at possible scenarios in the future. Nothing has really happened to harm anybody yet." ▼

RESEARCH NEWS



Research on Water Transfers

Each issue of Arroyo presents brief descriptions of water research projects relevant to Arizona. This issue features several projects devoted to water transfers.

Legislating the Water Transfers Process in Arizona

Gary C. Woodard, Research Specialist, Division of Economics and Business Research, University of Arizona

Bonnie C. Saliba, Assistant Professor, Department of Agricultural Economics, UA

Gary W. Thacker, Extension Agent, College of Agriculture, UA and Elizabeth Checchio, graduate student, Department of Hydrology and Water Resources, UA.

This research project is being conducted in cooperation with the Southern Arizona Water Resources Association for the Joint Legislative Committee on Groundwater and Surface Water Exportation. It covers a broad area, including the background of the water transfer issue in Arizona, effects of water transfers on the area of origin and an identification of interest groups involved with the issue. A summary of the project follows.

Over the past few years, municipalities, developers and speculators have spent well over \$100 million to acquire tens of thousands of acres of land in rural Arizona, not for the value of the land or any structures upon it, but for the apurtenant water. This phenomenon, termed "water farming," has been occurring in other western states for decades. Until recently, however, water farming was relatively unknown

in Arizona. The state's 1980 Groundwater Management Act created a supply of water rights that could be bought, sold and converted from one type of use to another; it also clarified the rights of owners to make inter-basin transfers of water. The demand for water farms arose out of the continued rapid growth of the state's metropolitan areas and the Assured Water Supply provisions promulgated by the Department of Water Resources. It was the CAP aqueduct system, which appears to provide a cheap, reliable means for moving vast quantities of water around within the state, that allowed the supply and demand to meet, touching off a modern-day land rush.

Water farm purchases produce several types of consequences in the areas of origin. Some of these occur when the purchase occurs; others when the water is actually transported out of the area. Fiscal impacts, including the loss of property tax base and bonding capacity, tighter spending limitations and impacts on revenue sharing, occur immediately upon the land being purchased by a municipality or other tax-exempt entity. Environmental and direct economic impacts occur when farmland is retired. Environmental impacts include soil erosion, blowing dust and tumbleweeds. Direct economic impacts include the loss of farm sector jobs and income. Indirect economic impacts occur after that, as businesses that provide goods and services to farmers are affected. These businesses include seed, fertilizer and agricultural chemical suppliers; farm equipment dealers; gins; and crop dusters. Eventually, all businesses in the area, including retail shops and restaurants, are affected by the general economic decline. Future economic development in the area of origin is threatened both when the purchase is made and when the water actually leaves the area. When the tax base shrinks, local services decline and when water and land are tied up in water farms, the area of origin becomes unattractive to businesses looking to locate new plants. The overall effect on the area of origin has been termed a loss of local self-determination, as the

future of an area goes beyond the control of its residents.

The Arizona Legislature is currently grappling with the problem of protecting areas of interest from the negative impacts of water farming without denying metropolitan areas necessary water resources. The researchers have assembled a data base of all water farming activities in the state, examined actual and potential impacts on areas of origin, and performed a comparative analysis of how other western states regulate inter-basin transfers. Currently, the effort is focused on compiling all legislative and regulatory alternatives, soliciting views and opinions from all interested parties and evaluating the options.

See the *Resources and Information* section of the newsletter for information on ordering this research report.

Southwestern Water Markets as Indicators of Water Values

Bonnie C. Saliba, Assistant Professor, Department of Agricultural Economics, University of Arizona
William E. Martin, Professor, Department of Agricultural Economics, UA
David B. Bush, Research Specialist, Department of Agricultural Economics, UA.

Water demands in the arid and semiarid Southwest are expanding as urban populations continue to increase at rapid rates. While new water supplies are becoming increasingly difficult and expensive to develop, large quantities of scarce water resources remain in relatively low-valued economic uses. Public policy makers, municipal water resource managers and private industries alike are expressing growing interest in developing opportunities for mutually beneficial market transfers of water from existing to new uses.

Continuing research on water transfers in the southwestern United States evaluates the structure and performance of water markets, the price formation process, and trends in market behavior over time. Results of the first years of this research are discussed in

Water Markets in Theory and Practice by Bonnie C. Saliba and David B. Bush. (See *Publications* section of newsletter.)

Transactions Costs in Regulating Transfers of Water

Bonnie C. Saliba, Assistant Professor, Department of Agricultural Economics, University of Arizona
David B. Bush, Research Specialist, Department of Agricultural Economics, UA.

Wherever state laws and institutions permit water transfers to occur, a network of rules, regulations, and policies exist to prevent these transfers from causing uncompensated injury to other water rights holders. This study evaluates the costs of complying with state legal and administrative procedures for identifying, measuring, controlling, mitigating, or preventing the injurious effects of water transfers on third parties.

Various stages in the transfer application and approval process are analyzed, including who is involved, what is done, how much time it takes, and expenditures involved. Wherever possible, detailed data on transaction costs for specific case studies of water rights transfers are collected and analyzed. The relative efficiency of western state administrative and judicial systems for regulating water transfers is evaluated, and recommendations are developed for modifying these systems to minimize transactions costs. ▼



Ancient symbol for a wave and running water

RESOURCES AND INFORMATION

Water Transfer Information Available

Arroyo features in each edition resources or sources of information of value to people interested in water issues. Since this edition of the newsletter is concerned with water transfers, resources are described that provide information related to the featured topic.

No longer an emerging issue, water transfer is an immediate concern, stimulating discussion and controversy throughout Arizona and the West. As a result, many people seek water transfer information to help understand recent developments and to support positions, policies and actions. Following are some sources of information on this vital concern.

Water Farming: The Promise and Problems of Water Transfers in Arizona is a publication from the Water Resources Research Center at the University of Arizona. Written by Elizabeth Checchio, the paper presents a general review of the issues and concerns relating to water transfers. Interpreted in the political and economic context of the state, water transfer is seen as a complex development that needs careful analysis. Information is also presented on water transfer transactions already negotiated. Of use to professionals, the publication is also intended for a general, nonspecialized audience, with the material presented in a question-and-answer format. With the issue of water transfers gaining prominence, the publication is useful to acquaint people with this important current event. (See *Publications* section of newsletter for information on receiving this report.)

Legislating the Water Transfers Process in Arizona Gary C. Woodard, Bonnie C. Saliba, Gary W. Thacker and Elizabeth Checchio. This report was produced in cooperation with the Southern Arizona Water Resources Association for the Joint Legislative Committee on Groundwater and Surface Water Exportation. The researchers have assembled a database of all water farming activities in the state, examined actual and potential impacts on areas of origin, and performed a comparative analysis of how other western states regulate interbasin transfers. (See *Research* section of newsletter for additional information on this project.)

To be notified about the completion and availability of this report, send a note or business card to: Division of Economic and Business Research, 500 Business and Public Administration Building, University of Arizona, Tucson, AZ 85721, Attn: Gary C. Woodard.

The Arizona Department of Water Resources commissioned Franzoy Corey, an architectural and engineering firm, to prepare a report to study the hydrological and socioeconomic impacts of water transfers. The report was to be submitted to the Joint Legislative Committee on Groundwater and Surface Water Exportation. Two of the study's projected three phases were completed. Phase I described hydrologic and socioeconomic conditions and identified areas within the state for further evaluation; Phase II identified and quantified hydrologic and economic effects associated with water transfers. (Due to criticisms of Phases I and II, Franzoy Corey did not conduct a Phase III study.)

DWR has prepared a Phase III report that identifies options available to the Legislature when discussing water transfers. Also, Franzoy Corey has revised its Phase II report to address concerns and criticisms. Franzoy Corey's revised Phases I and II and DWR's Phase III report are available by contacting Dennis Sunday, Arizona Department of Water Resources, 99 E. Virginia, Phoenix, AZ 85004; (602) 255-1737.

Water Market Update is a monthly newsletter that focuses on the promise and problems of emerging water markets in the western United States, offering timely and practical information on the forces and events shaping this rapidly changing field. Subscription rate is \$180 per year; \$135 per year for nonprofit organizations and government agencies. For additional information contact: *Water Market Update*, Western Network, 1215 Paseo de Paralta, Santa Fe, NM 85701; (505) 982-9805.

Other publications that discuss water transfers are listed in the *Publications* section of this newsletter.

Water transfers are a central concern to the associations that represent rural and municipal water interests. Two Arizona associations, one representing rural interests and the other municipal, are a source of information about water transfers and are described below.

The Arizona Rural Water Association, an educational and lobbying group, is organized to enhance the rights, planning and management of rural water resources in the state to assure present and future rural development. Made up of representatives from rural counties, cities, towns, organizations and businesses, ARWA is involved in activities that include summarizing studies, legislation and agency actions affecting rural water interests. ARWA represents those interests before agencies, commissions and the Legislature and has presented formal comments to the Joint Legislative Committee on Water Transfers and Surface Water Exploitation. ARWA also conducts programs and forums to discuss and promote action on current issues, as well as developing issue papers and proposing legislation on water matters of concern to rural residents. The association is currently working on an issue paper that proposes legislation to address water transfer issues. Speakers are available through the association to talk on various topics, including water transfers. A monthly newsletter is also available, *Rural Resources Report*. For additional information on ARWA con-

fact: Doug C. Nelson, Executive Vice President, Arizona Rural Water Association, 1001 N. Central, Suite 601, Phoenix, AZ 85004; (602) 258-8401.

Arizona Municipal Water Users Association is a nonprofit organization established by the cities of Phoenix, Mesa, Glendale, Tempe, Scottsdale, Chandler, Goodyear and Peoria for the development of urban water policy. Funded by the member cities, AMWUA represents and assists them in areas of water resource management that require a coordinated effort by the cities. Some of these areas include participating in financial arrangements needed to complete the Central Arizona Project, exploring possibilities for artificial groundwater recharge and other water supply augmentation alternatives including water transfers, water legislation, water conservation and coordinated water resource management planning. AMWUA lobbies for urban interests and is active working through the legislature to negotiate an acceptable solution to water transfer problems. Speakers are available to address water transfer issues as they affect urban areas. For additional information about AMWUA contact: Roger S. Manning, Executive Director, Arizona Municipal Water Users Association, 505 N. 2nd St., L'Aiglon Courts, Suite 385, Phoenix, AZ 85004; (602) 256-0999. ▼

PUBLICATIONS



WRCC Publications

The WRRC at the University of Arizona recently issued two publications:

**Central Arizona Project
Water Quality:
An Examination
of Management Options**
*by K. James DeCook
and Marvin Waterstone*

This publication evaluates the relative advantages and disadvantages, strengths and weaknesses, and costs and benefits of various CAP water-quality management methods available to water managers. It is of special use to water managers as they develop a water-quality management approach to prepare CAP water for various uses—municipal, agricultural and industrial. \$7.50.

**Water Farming:
The Promise and Problems of
Water Transfers in Arizona**
by Elizabeth Checchio

The author presents a general review of the issues and concerns relating to water transfer. Of use to professionals, the publication is also intended for a general, non-specialized audience, with the material presented in a question-and-answer format. \$2.00.

Copies of WRRC publications are available from: Librarian, Water Resources Research Center, Geology 318, University of Arizona, Tucson, AZ 85721; (602) 621-1648.

**Arid Lands:
Today and Tomorrow**
*edited by Emily E. Whitehead,
Charles F. Hutchinson,
Barbara N. Timmermann
and Robert G. Varady*

Containing papers by more than 125 experts, this book provides the most comprehensive overview of arid lands research today. The papers represent research underway in 40 countries and cover a broad range of topics on critical arid lands issues, including desert ecology, small-scale water management and water policy. Westview Press, 5500 Central Avenue, Boulder CO 80301. \$85.

**Water Markets
in Theory and Practice**
*by Bonnie Colby Saliba
and David B. Bush*

The authors analyze the complexities and issues surrounding emerging water markets in the southwestern United States. As existing water rights become fully appropriated, and market transfers become more commonplace, water

users and legislators are faced with the challenge of developing equitable processes for the allocation of water and the consideration of new public policy for water transfers. Westview Press, 5500 Central Ave., Boulder, CO 80301. \$32.50.

**Water Marketing in the Southwest—
Can Market Prices Be Used to
Evaluate Water Supply Augmentation
Projects?**

*by Bonnie Colby Saliba,
David B. Bush
and William E. Martin*

Price behavior over time in selected western water markets is observed and assessed as a useful measure of the economic value of water. Market characteristics that may distort prices include imperfect competition, third-party effects, institutional and hydrologic uncertainty, and equity considerations. Nonmarket valuation techniques are useful in supplementing market price information.

Copies of USDA Forest Service General Technical Report RM-144 are available by writing to Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO 80526.

CONFERENCES AND SEMINARS



Xeriscape Conference

*February 19, 1988
Tucson*

Sponsored by the Southern Arizona Water Resources Association, this conference will feature workshops on state and county landscape regulations; the design and use of an efficient irrigation system; and getting started with xeriscape. For additional information contact the SAWRA office in Tucson, (602) 881-3939.

Conference on Southwestern Groundwater Issues

March 23-25, 1988
Albuquerque, New Mexico

For information contact: FOCUS South-
west Conference, Program Coordinator,
National Water Well Association, 6375
Riverside Drive, Dublin, OH 43017

32nd Annual Meeting of the Arizona-Nevada Academy of Science

April 16, 1987
University of Arizona
Tucson, Arizona

Research results from various academic
areas, including hydrology, will be pre-
sented at the meeting. For additional
information contact: Bud Ellis, Depart-
ment of Biology, Glendale Community
College, Glendale, AZ 85302.

The Sixth World Congress on Water Resources

May 29-June 3, 1988
Ottawa, Ontario

The International Water Resources
Association was established as an
international forum to promote inter-
disciplinary communication and
cooperation among industries, business
and social groups, and professionals of
diverse backgrounds. The conference
carries on this mission with papers
devoted to three major themes: policies
and strategies, planning, and operation.

For additional information contact:
The Secretariat, Sixth IWRA World
Water Congress on Water Resources,
University of Ottawa, 631 King Edward
Avenue, Ottawa, Ontario K1N 6N5, Can-
ada; (613) 564-3902; telex 053-3338.

International Conference on Dryland Farming

August 15-19, 1988
Amarillo/Bushland, Texas

The purpose of the conference is to
evaluate past progress in dryland agri-
culture, identify constraints, propose
methods and technologies needed to
alleviate those constraints, propose pol-
icies and programs for more effective
technology transfer, and identify
research needs and priorities for dry-
land agriculture.

For additional information contact:
International Conference on Dryland
Farming, USDA Conservation and
Production, Research Laboratory, P.O.
Drawer 10, Bushland, Tx 79012.

Symposium on Water-Use Data For Water Resources Management

August 28-31, 1988
Tucson, Arizona

This symposium is planned as an
opportunity for water professionals,
lawyers, managers, economists, biolo-
gists and others to learn about and
observe state-of-the-art measurement
and estimation techniques and equip-
ment, as well as a chance to discuss
water-use management strategies and
trends.

For additional information contact:
Marvin Waterstone, University of
Arizona, Water Resources Research
Center, Geology Building, Room 318,
Tucson, AZ 85721; (602) 621-7607.

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(602) 255-4629

Office of Arid Lands Studies
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