

Chapter 7 ROLES OF CITIZENS AND GOVERNMENT IN WATER POLICY

THE ROLES OF CITIZENS

Over the years citizen groups and individuals have played important roles in setting water policy. People have served on advisory committees such as the City of Tucson's Citizen's Water Advisory Committee, Pima County's Wastewater Advisory Committee and the Arizona Department of Water Resources' (ADWR) Groundwater Users' Advisory Committee for the Tucson Active Management Area (TAMA).

Many non-profit groups have worked hard to support or change policies concerning water over the years. Tucsonans for a Clean Environment worked for cleanup of the TCE problem. In the 1970s, citizen groups such as Arizonans for Water Without Waste, Citizens Against the

CAP and Citizens to Revise Arizona Water Law unsuccessfully opposed CAP, and specifically its use in Tucson. These groups, however, played a role in developing alternative strategies, including support of the 1980 Groundwater Management Act. The Southern Arizona Water Resources Association, on the other hand, was initially established to ensure that Tucson got its fair share of CAP water and eventually developed a much broader purpose, including providing information to the community on a wide range of topics. The Tucson Regional Water Council is another group which supports the CAP but has a broader purpose of working to ensure a long-term water supply for the area.

The importance of the "initiative process" in policy making was demonstrated in the 1995

The route water takes from its source, whether that be an aquifer or the Colorado River, to its eventual flow from a faucet is a complicated journey. Much more is involved in that journey than the canals and pipes that physically convey water from source to destination. Government rules and regulations also have a powerful influence on water flow, and their workings may seem as complicated as any plumbing system, with various levels of government involved in many different water quality and water use issues. This chapter briefly summarizes the major laws and institutions that control and govern water. Some water management issues also are examined, including whether some type of basin-wide water management agency is needed; whether Tucson Water customers who live outside city limits should be allowed to participate in water decisions affecting them; and whether water service should be privatized.

city election when The Pure Water Coalition succeeded in reversing Tucson's policies on CAP water use by persuading voters to approve Proposition 200 and pass the Water Consumer Protection Act (WCPA). The Citizens Alliance for Water Security is following this same tradition in promoting another initiative for the 1999 ballot, which would extend the WCPA. These groups are opposed to direct use of CAP water in the municipal water system, but promote its use for alternate purposes..

Many other citizen groups such as the League of Women Voters, the Sierra Club, the Arizona Native Plant Society and others have been involved in a variety of water issues, from hazardous waste disposal to promotion of low-water use plants in landscaping.



Figure 7-1 The federal government is an important player in determining water policy, especially in water quality matters. Photo: U.S. Library of Congress.

THE ROLES OF GOVERNMENT

Over the past century, various laws and regulations at the federal, state and local levels have impacted how we manage water. In addition, interstate and even international treaties limit the amount of Colorado River water we can take. Finally, various Supreme Court decisions and legal settlements, especially those having to do with Indian water rights, affect our use of water. This chapter describes the most significant laws, regulations and court decisions that affect water decisions in the Tucson area. The annotated bibliography lists sources for more detailed information.

Managing Tucson's Water

No single entity oversees or administers all water use in the Tucson area. A combination of municipal water utilities, private water companies, irrigation districts, school districts, businesses and even individuals provide water in the area. There are 19 water companies with more than 2,000 customers and more than 130 other small water providers. (See Appendix B for a list.) Some water utilities operate within Tucson city limits, and Tucson Water operates both inside and outside city limits. All utilities provide water to customers under rules established by state and federal governments to protect the users and, in some cases, to protect future generations of users. Some laws and regulations

protect people from unsafe drinking water, while others are designed to prolong the water supply. Individuals who pump their own water for domestic use are not subject to most of the rules — domestic wells that pump less than 35 gallons per minute are exempted. Those relying on such wells, however, are not protected by regulations to ensure the health and safety of water consumers. Indian tribes generally are not subject to state or federal rules, but often have their own system for managing water and protecting users.

ADWR has authority over some aspects of groundwater pumping within an area designated as the Tucson Active Management

Area (TAMA). This includes most of the Pima County portion of the Santa Cruz River watershed. (See Preface, Figure 4, which is a map of TAMA.) ADWR performs overall groundwater supply planning for the area. The agency also approves or denies well drilling permits for all wells except small domestic wells and sets conservation requirements for water providers. ADWR cannot, however, regulate pumping to protect riparian areas nor can the agency coordinate the activities of various users or agencies with water responsibilities. (More information about ADWR's powers and responsibilities is provided later in this chapter.)

The Arizona Department of Environmental Quality (ADEQ) and the U.S. Environmental Protection Agency (EPA), are concerned with the quality of groundwater and surface water. Their mandate is to prevent pollution of



Figure 7-2 The Arizona Legislature has authority in various water management areas. Photo: Arizona Department of Library, Archives and Public Records.

Table 7-1 Agencies responsible for water management in Pima County.

	FEDERAL	STATE	COUNTY-CITY	OTHER
Safe Drinking Water Act	EPA	ADEQ		Water providers may set stricter standards for their companies
Clean Water Act	EPA	ADEQ		
Septic Tank Rules		ADEQ	County Health Department	
Landfills	EPA	ADEQ	County and City each operate landfills	
Pollution, Surface Water	EPA	ADEQ		
Pollution, Groundwater	EPA	ADEQ		
Areawide Water Quality Planning			PAG	
Hazardous Materials	EPA	ADEQ	PCDEQ	
Septic Tanks		ADEQ	PCDH	
Groundwater Allocation		ADWR		
Surface Water Allocation	Bureau of Reclamation for Colorado River Water	ADWR		
Water Rates and Rate Structures		ACC regulates private companies and co-ops, but not cities, or irrigation or improvement districts	Tucson, Oro Valley, Marana for their system	Boards for water companies, co-ops and districts
Floodplain and Stormwater Management	EPA and FEMA	ADEQ	County and City FCDs	

Agencies designated in bold below have the primary responsibility. Others have secondary responsibility and/or implement rules of the primary agency. **EPA** - U.S. Environmental Protection Agency; **ADEQ** - Arizona Department of Environmental Quality; **ADWR** - Arizona Department of Water Resources; **ACC** - Arizona Corporation Commission; **FCD** - Flood Control District; **PCDEQ** - Pima County Department of Environmental Quality; **PAG** - Pima Association of Governments.

water supplies to ensure that consumers get safe drinking water.

The Arizona Corporation Commission (ACC) regulates rates charged by private water companies, but not by irrigation districts or municipal utilities. Its role of protecting the water consumer sometimes conflicts with ADWR's role of requiring water conservation or the use of renewable supplies instead of groundwater. For example, ADWR might require that a utility adopt water-saving strategies. To adopt such strategies, a water provider might need to raise water rates to cover the cost. The ACC, however, has rarely allowed the increased rates. ACC has even prevented rate increases to build treatment facilities to improve water quality. A rate increase is only allowed after a facility is actually in place.

WATER QUALITY REGULATIONS

Tucsonans have experienced occasional water quality problems over the past 100 years. A flowing Santa Cruz River once was used as a water supply, and its quality at times was impaired by cattle and human waste. Shallow wells tended to produce alkali-tainted water. Outhouses contaminated the shallow water table.

Tucson was not unique. Throughout the United States in the nineteenth century water-borne diseases such as cholera, diarrhea, dysentery or typhoid were prevalent. Measures were taken to control water quality problems and laws passed to require that water providers adopt such measures. For example, chlorine

was found to be a highly effective disinfectant by the late 1800s, and most major municipal supplies were chlorinated by 1920. A dramatic drop in water-borne diseases in the United States resulted. By the 1950s, however, people began to be concerned about human-made pollutants, especially toxic substances such as DDT. Developing technologies to deal with chemical pollutants took longer than working out solutions to health problems relating to bacteria and viruses. The problem was more complex, with thousands of different pollutants. Recently, concern has focused on parasites found in water supplies, such as cryptosporidium and giardia. These have caused widespread sickness, even death in several cities and are difficult to control by traditional methods.

Various legislative efforts were made to improve water quality. Congress passed the Clean Water Act in 1972 to protect surface waters from pollution. The law initially listed only a small number of pollutants, but more were added to the list as the law was applied over time. The act attempts to maintain water quality by controlling the kinds of wastes that are released to surface waters. In 1974, Congress passed the Safe Drinking Water Act to assure that drinking water supplies were safe. In 1980, Congress passed the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), more commonly known as the Superfund Act. This law is designed primarily to clean up areas that were polluted in the past and to prevent the occurrence of future contamination from hazardous materials. In 1980, the Arizona Legislature passed the Environmental Quality Act which, among other intents and

purposes, protects the quality of groundwater. Other significant laws that protect water quality regulate hazardous materials and disposal of wastes. Most of these laws are discussed later in this chapter. Table 7-1 briefly shows which agencies are responsible for various water management matters.

Surface Water Quality

Federal and state laws and regulations, under the umbrella of the federal Clean Water Act, regulate surface water quality. The state and EPA administer portions of the federal program. States have the right to set their own water quality standards using EPA guidelines. These standards are to be reviewed every three years. EPA then issues permits and, if needed, takes enforcement actions based on the standards. EPA, however, also issues National Pollution Elimination Discharge System (NPDES) Permits.

Point Sources

Point sources of pollution are those sources that come from a discreet location such as a pipe. Point source discharge standards and permits are based on the adoption of the best available pollution reduction technology. Point sources are much easier to regulate than non-point sources – pollutants that come from a wide area, with no discreet discharge point. A local example of a point source is the outflow pipe from the Ina Road Water Pollution Control Facility.

The law requires that the level of water quality necessary to protect existing designated uses be maintained and protected. No degrada-



Figure 7-3 The origins of point source pollution are distinct and identifiable; hence a point source also is called an end-of-the-pipe source. Photo Barbara Tellman.

tion of existing water quality is permitted in a navigable water if the existing water quality does not meet applicable water quality standards. Where existing water quality in a navigable water meets or exceeds applicable water quality standards, the existing water quality must be maintained and protected. A procedure exists, however, for the ADEQ director to allow limited degradation in some cases.

NPDES permit conditions and water quality standards are ultimately based on criteria developed by EPA. These criteria are supposed to accurately reflect the latest scientific knowledge regarding such matters as the effects of pollutants on the health and welfare of humans and wildlife; the effects of pollutants on biolog-

ical communities; and biodiversity for varying types of receiving waters.

An important purpose of regulation is to protect designated uses. An established use is not easily changed to a less protective use. Such a change can be made, however, through the “use attainability analysis” process in which the applicant must prove that the existing protected use does not actually exist in the stream.

Non-point Sources

Non-point source pollution is pollution that comes from several diffuse sources, not through a specific discharge — e.g., grazing. It is usually regulated through Best Management Practices (BMPs), which are guidelines developed through consultation between ADEQ and the affected industry. BMPs are intended to achieve a specific water quality goal, rather than mandating specific prescribed conditions. For example, Arizona has BMPs for grazing. The business or industry then is required to meet performance-based standards.

NPDES Permits.

One section of the law sets requirements on industries and local governments to abate pollution. The EPA issues NPDES permits to

entities that discharge to “waters of the United States.” (This is defined very broadly.) Permit conditions are set according to federal requirements, but with specific requirements often based on local conditions. The permits are for a specified period of time, but are renewable. Sometimes the conditions are changed when the permit is renewed. An example of an entity with a NPDES permit in Pima County is Pima County Wastewater Management Department.

Stormwater Permits

Stormwater runoff from urban areas is a major non-point source of pollution in watercourses. Arizona, with its dry washes and months without rain, experiences special problems with runoff. Pollutants such as oils settle on roads, and the infrequent rains allow pollutants to accumulate. During summer storms, many streets fill with water that rapidly drains to washes and ultimately to rivers, carrying large amounts of pollutants that have collected on the streets. The daily news often contains warnings to drive carefully during the first major summer rain because of oil slicks on the streets. Also insecticides, cleaning fluids and other domestic pollutants might be present in stormwater, as well as industrial pollutants, although these are more carefully controlled than domestic pollutants.

Pollution from urban stormwater runoff is very difficult to control since it comes from thousands of sources and enters washes and rivers in many different ways. As awareness of stormwater quality problems increased, Congress directed EPA to develop regulations requiring large cities to establish programs to

control urban runoff. EPA regulations considered urban population figures to determine which cities needed a NPDES permit. Both Tucson and Pima County fit the criteria for needing a permit. The county submitted a two-part permit application, with the first part submitted in 1991 and the second part in 1993. The city filed a storm water permit application with EPA in 1992 and in 1998. Both city and county permits were approved.

To obtain a NPDES permit, an applicant must address various EPA concerns. Measures must be taken to control such activities as illicit connections and illegal dumping to storm drains and to control runoff of pollutants from municipal landfills, industrial facilities and construction sites. The applicant also must inventory land uses to determine the quantity and quality of discharged water and develop a management plan for stormwater runoff. This plan involves identifying problem areas and working out strategies and practices to reduce the flow of pollutants into bodies of water. As part of the plan, the applicant must describe what already has been done to eliminate pollutants from stormwater runoff as well as what new efforts will be undertaken to further control such pollutants.

Pima County's permit requirements include street sweeping, land development controls, a household hazardous waste program and a stormwater sampling program. The county also advises businesses and construction personnel about stormwater regulations.

The City of Tucson has an ongoing Stormwater Master Plan (TSMP) incorporated into its NPDES permit. The TSMP emphasizes the preservation of naturally vegetated watercourses

to improve water quality and urges residents to harvest rainwater. Retaining stormwater on property reduces runoff flowing over streets and paved surfaces and picking up various pollutants. Other aspects of the permit include conducting site inspections of private developments on five acres or more.

Also, the city will inspect industrial sites that are required to obtain NPDES permits, to ensure they are in compliance. The city also monitors stormwater quality problems in the community to anticipate and prevent problems before they occur. The city also is emphasizing public education or outreach, to make people aware they have a personal effect on stormwater quality.

TREATMENT PLANT FUNDING

Another section of the Clean Water Act provides financial assistance for constructing municipal wastewater treatment plants. The law has been more successful in controlling biological pollutants than in dealing with toxic materials. During the 1980s, Congress provided funding through EPA to build wastewater treatment systems. Most of Arizona's large treatment plants were built at least partially with federal subsidies which helped pay the costs of growth. In the 1990s, these funding sources dried up as Congress cut back on federal spending. The program changed to a "revolving fund" which

provides seed money for loans to communities for wastewater treatment. The loan payments are in turn made available to other communities as loans to continue support for building their wastewater treatment facilities.



Figure 7-4 Rainfall flowing over urban surfaces picks up various constituents and forms urban runoff nonpoint source pollution.

GROUNDWATER QUALITY LAWS

Arizona's Environmental Quality Act is designed to prevent groundwater pollution. Not federally mandated, the act is entirely an Arizona initiative, passed in response to serious groundwater pollution problems. The act called for the creation of ADEQ, to manage water and air quality and solid waste regulation.

The heart of the water quality section of the law is a requirement that anyone who plans water discharges that might reach groundwater must go through the Aquifer Protection Permit (APP) process. This applies to discharges directly to watercourses as well as discharges on dry land overlying a groundwater source. The applicant must show that the discharge will not cause or contribute to a violation of Aquifer Water Quality Standards as defined by regulation. All aquifers are considered to be drinking water aquifers with drinking water standards, unless reclassified for a lesser quality. An aquifer that does not meet drinking water standards for some constituents, but meets the standards for others may have a different level of standard for each constituent. The standard is not necessarily determined at the point of discharge, but may be determined at a point underground and is influenced by existing water quality. If a standard for that groundwater has already been exceeded, the applicant must demonstrate that no further degradation will occur.

Applicants must use Best Available Demonstrated Control Technology (BADCT) to obtain a permit. Certain dischargers, such as agricultural dischargers, which fit into a group sharing common characteristics, do not have to go through the full process. Instead they may be treated as part of the "General Permit" process that already has established rules. Exemptions to the APP requirements include households, stock ponds, mining overburden returned to the excavation site, water transportation systems, community sewer systems, storm water impoundments, water storage facilities and water used for public landscaping (e.g., golf courses).

The law also has a permitting system for recharge and underground storage facilities. ADWR reviews such facilities for water supply concerns and ADEQ reviews the water quality matters. The applicant must meet all APP regulations except BADCT requirements.

Wastewater reuse projects also go through a permitting process. Regulations are stricter when treated wastewater is to be used in areas accessible to the general public (e.g., school yards) than when used in areas that are fenced, with restricted public access (e.g., an industrial site). Edible crop irrigation with effluent is the most strictly regulated.

HAZARDOUS WASTES

EPA has requirements for underground storage tanks, with special emphasis on gasoline tanks. The agency also has a wellhead protection program for discharges in the vicinity of water wells. EPA also regulates hazardous waste sources and landfills and maintains the Superfund or CERCLA, which is designed to clean up hazardous waste sites. The polluter then may be charged for the cleanup. Far more sites have been identified nationally than have been cleaned up under this program. Arizona has 111 official Superfund sites, with few having been cleansed of hazardous materials. A curious feature of the Superfund program is that it exempts oil-based hazardous wastes. Arizona's WQARF (Water Quality Assurance Revolving Fund) helps pay for clean up of polluted sites that do not meet the Superfund definition. Lack of funding has plagued the program.

Wastewater and Septic Systems

If wastewater is released to a surface water source, a NPDES permit is required. ADEQ requires a permit if wastewater is reused, recharged or released into a constructed wetland. County health departments, under ADEQ oversight, administer septic tank permits under state legislative rules.

SAFE DRINKING WATER ACT

The federal Safe Drinking Water Act regulates the quality of water provided to consumers by water companies and municipalities. Under this act, EPA regulates public water systems, defined as those that pipe water to at least 25 people or 15 connections for at least 60 days per year. These systems may be owned by homeowner associations (e.g., Winterhaven), investor-owned water companies (e.g., Green Valley Water Company), cities and towns (e.g., Tucson Water), domestic water improvement districts (e.g., Metro Water), irrigation districts serving domestic customers (e.g., Flowing Wells Irrigation District) and others (e.g., The University of Arizona).

The act does not cover smaller services or individual domestic wells. EPA sets basic standards for pollutants of concern and requires water providers to take certain measures to meet those standards. EPA is supposed to identify the potential pollutants in drinking water, study their possible health effects and set standards for the problem pollutants. The list grows as new problems are detected. New regulations adopted in 1998, for example, require

water providers to control cryptosporidium, a water-borne parasite that poses a public health threat. The law requires testing at regular intervals and consumer notification if standards are not met. Although numerous violations have been recorded in recent years in the Tucson area, almost all those violations were for technical errors, such as failure to report or monitor. Almost no cases were reported of water quality standards being exceeded.

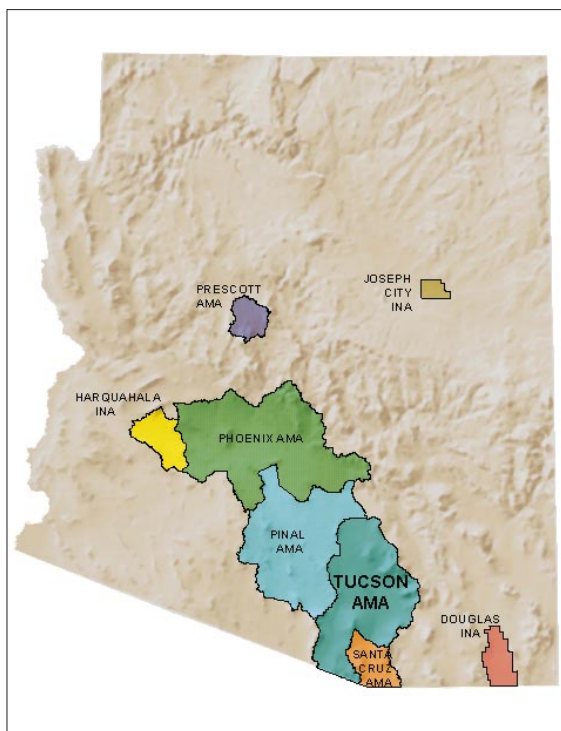
EPA recognizes that small water providers, unlike large utilities, often are unable to afford

certain types of testing and treatment procedures. Variances therefore are allowed based on financial condition and the number of customers served. Smaller companies, however, must still use the best available technology within a certain price range. In addition, funding is available to assist those small companies with the greatest needs. Drinking Water Revolving Funds were created in each state to channel federal money to small water providers. EPA sets requirements for states to follow to maintain eligibility under this program

under Arizona law, surface water and groundwater are generally considered to be separate.

As more people moved to Arizona, the burgeoning urban areas competed with agriculture for groundwater. In 1980, the Legislature passed the Groundwater Management Act (GMA) which sets goals and policies for the most problem-plagued parts of the state. ADWR, which was established to administer the GMA, is responsible for allocation of both surface water and groundwater.

Figure 7-5 Arizona's Active Management Areas and Irrigation Non-Expansion Areas.



WATER SUPPLY REGULATIONS

Our present system of water law grew out of the intense competition for water among early American miners and settlers. People at that time were competing for surface water, and the laws that developed were intended to protect the rights of those who arrived first from the claims of those who arrived later. The law to determine surface water rights is called the prior appropriation doctrine. By the early 1880s, most of the surface water in the Tucson area was claimed for use.

Competition for groundwater developed much later when increasingly powerful pumps enabled pumpers to draw water from beneath lands owned by others. Groundwater laws were passed in the 1950s to protect existing farmers from being pumped dry by new farms. The laws, however, hardly take note of the fact that some groundwater and surface water are actually hydrologically connected. Pumping that affects surface water rights is therefore legal throughout most areas of the state because

GROUNDWATER MANAGEMENT ACT

Central to the GMA was the establishment of four Active Management Areas (AMAs) in areas of the state with the greatest groundwater overdraft problems: the Phoenix, Prescott, Pinal and Tucson AMAs. A fifth, the Santa Cruz AMA, was created in 1994 when it was split off from TAMA. Some other areas were designated Irrigation Nonexpansion Areas (INAs). (See Figure 7-5.) In these areas, new pumping for agriculture is limited, but other pumping is not. Most of eastern Pima County is included within TAMA. There are no INAs within Pima County.

Each AMA must develop five successive plans for reaching its goal over the period 1980 to 2025. The first four plans each cover a ten-year period, while the last plan covers the final five years. The AMAs are currently preparing to enter the third management period, which covers the years 2000 to 2010. TAMA issued its draft Third Management Plan in the fall of 1998.

“PAPER” OR “WET” WATER?

“Paper water” is a term coined to distinguish between actual usable water (“wet water”) and water that exists only as a calculated figure to satisfy certain requirements. A water budget, for example, may include assumptions about how much water will be recharged in a large area, without considering whether the water is in fact available for recharge or, if recharged, whether it can be recovered in an area where it is needed. The budgeted water therefore is a calculated figure and represents “paper water.”

Safe Yield

The management goal designated for all AMAs except the Pinal AMA is that of reaching “safe yield” by the year 2025. Achieving safe yield involves reaching, and thereafter maintaining a long-term balance between the annual amount of groundwater withdrawn and the annual amount of natural and artificial recharge within an AMA. Each AMA has its own criteria for satisfying the requirements. For example, the Phoenix AMA allows 7.5 percent of the annual supply to be mined groundwater. In TAMA, as much as 15 percent can be mined groundwater. The balance must come from renewable supplies – CAP or other surface water. Therefore, even the GMA safe yield requirements allow depletion of groundwater, but over a long period of time. In the Draft Third Management Plan for TAMA, ADWR states that

even with use of CAP water and conservation measures, the safe yield goal will not be met.

The ADWR water budget is calculated by estimating water use based on projected population, probable per capita water use, agricultural and industrial use and Indian use. Supply is based on assumptions about CAP use, recharge and effluent use. Estimating up to 45 years into the future is obviously difficult, and projections are revised in succeeding management plans. For example, population estimates for TAMA in the year 2025 have been revised downward, from 1,693,000 people in the Second Management Plan (SMP) to 1,266,500 in the Third Management Plan (TMP). These figures represent official state projections.

Assured Water Supply

New subdivisions are required to demonstrate that they have an “assured water supply” before being built. What counted as an “assured water supply” originally was very broad and included groundwater withdrawals that would lower the water table by as much as 1,000 feet. An assured water supply also could be demonstrated by contracting for CAP water or subcontracting with an entity that had contracts for CAP water, whether the CAP water ever reached the subdivision or not. Assured water supply rules have been revised and somewhat tightened to include the following criteria:

- Sufficient quantity of water is continuously available to satisfy the water demands of the development for 100 years;
- Water source meets water quality standards;

- Proposed use of water is consistent with conservation standards;
- Proposed use is consistent with water management goals; and
- Applicant is financially capable of installing the necessary water distribution and treatment facilities.

The concept of assured water supply does not assure sustainability for more than 100 years, and the requirements can be met in some ways that do not assure sustainability. Participating in a recharge program or contracting for CAP water can be sufficient to meet the requirement.

Municipal Conservation Programs

AMAs establish conservation goals for each municipal water provider or major agricultural or industrial water user. Large municipal water providers are allowed to choose among four programs to regulate their water use. The total gallons per capita per day (gpcd) program is the base program, under which gpcd goals are set for each provider. If goals are not met, a provider can be fined, although provisions allow water use in very dry years to be balanced with use in wet years. Alternative approaches include:

- **Non-Per Capita Conservation Program**, which allows water providers having resources to implement conservation programs as well as access to alternative supplies, to implement specific indoor and outdoor water conservation measures as well as education programs instead of meeting specific gpcd goals. To be accepted into this program, providers must demonstrate that they have reduced groundwater use.

Table 7-2 The draft water budget for the Tucson AMA.

Third Management Plan Scenario: Projected Future Conditions Assuming Third Management Plan Conservation Goals are Achieved by 2010 and Continue through 2025, Tucson Active Management Area								
SECTOR	1990	1995	2000	2005	2010	2015	2020	2025
Projected AMA Population	655,000	768,000	838,300	921,000	1,005,300	1,092,200	1,179,200	1,266,500
Projected Irrigation Acres	40,000	36,100	35,320	35,750	33,900	30,400	26,400	21,400
MUNICIPAL SECTOR								
Total Demand	130,100	155,500	171,900	186,300	199,800	216,200	230,000	243,100
Total Supply	130,100	155,500	171,900	186,300	212,100	232,000	249,800	267,100
CAP	0	100	8,500	107,000	108,100	119,500	131,700	143,800
Effluent	6,300	7,700	11,600	23,400	32,900	36,000	37,100	37,700
Groundwater	123,800	147,700	151,800	55,900	58,800	60,700	61,200	61,600
AGRICULTURAL SECTOR								
Total Demand	93,800	98,000	104,700	117,700	107,500	97,000	85,000	70,000
Total Supply	93,800	98,000	104,700	117,700	107,500	97,000	85,000	70,000
CAP	0	0	0	10,400	15,800	15,800	15,800	15,800
Effluent	4,000	1,800	3,000	3,000	3,000	3,000	3,000	3,000
Groundwater	89,800	96,200	101,700	104,300	88,700	78,200	66,200	51,200
INDUSTRIAL SECTOR								
Total Demand	48,800	60,200	71,000	72,100	73,300	73,000	74,200	75,400
Total Supply	48,800	60,200	71,000	72,100	73,300	73,000	74,200	75,400
CAP	0	0	0	0	0	0	0	0
Effluent	800	800	1,300	1,700	2,900	3,600	4,200	4,700
Groundwater	48,000	59,400	69,700	70,400	70,400	69,400	70,000	70,700
Evapotranspiration	3,700	3,700	3,700	3,700	3,700	3,700	3,700	3,700
Total Demand	276,400	317,400	351,300	379,800	384,300	389,900	392,900	392,200
Total Groundwater use	265,300	307,000	326,900	234,300	221,600	212,000	201,100	187,200
(Less) Net natural recharge	60,800	60,800	60,800	60,800	60,800	60,800	60,800	60,800
(Less) Incidental recharge	70,300	82,300	80,800	39,600	35,000	34,400	33,600	32,300
(Less) Cuts to aquifer	0	0	5,100	32,900	35,800	37,700	41,400	45,100
(Less) Extinguished credits	0	0	11,700	8,400	7,900	7,600	0	0
Actual Overdraft	134,200	163,900	168,500	92,600	82,100	71,500	65,300	49,000
(Less) Remediation water	0	0	8,400	7,000	6,500	6,500	6,500	6,500
(Less) Allowable groundwater	0	0	10,000	32,200	34,700	36,200	36,400	36,400
Accounting Overdraft	134,200	163,900	150,100	53,400	40,900	28,800	22,400	6,100

NOTE: all units are acre-feet unless otherwise noted.

Source: Arizona Department of Water Resources, Draft Third Management Plan, Tucson AMA, 1998.

ADWR monitors the implementation and results of these measures.

- **Alternative Conservation Program**, which allows providers with an unusually large and growing amount of non-residential water use (e.g., a major new industrial plant) some flexibility in meeting conservation requirements. After limiting annual groundwater withdrawals, providers must meet gpcd requirements for residential users only, while implementing specific conservation measures for non-residential water users. ADWR monitors achievement of residential water use goals and implementation and results of non-residential conservation measures.

- **Institutional Provider Program**, which allows providers serving primarily non-residential users, including prisons, hospitals, military installations, airports, and schools, to meet conservation requirements designed specifically for non-residential use. These conservation requirements usually include specific conservation measures for non-residential uses and a maximum residential gpcd rate.

Small water providers, defined by ADWR as serving less than 250 acre-feet of water per year, generally lack the resources to implement conservation programs, and are exempt from meeting specific gpcd requirements. Small providers are required to meet “reasonable conservation requirements,” as established by the director of ADWR.

ADWR has no authority to enforce conservation requirements directly on water users or consumers, only on water providers. This causes problems for some water companies. Regulated by the ACC, private water companies have to assume the initial costs of conservation programs since they are unable to charge their

customers for the cost of such programs until the program has been proven effective. Also changes in rate structures to encourage conservation have to go through a rate hearing process before the commission. The ACC does not regulate municipally-owned water companies, but such utilities including Tucson Water, Oro Valley Water and Metro Water go through their own public process before changing water rates.

Agricultural Conservation Requirements

The GMA regulates agricultural water use in several ways. First, no new agricultural land can be developed for irrigation within AMAs and INAs. Only lands which were legally irrigated with groundwater in the five years prior to implementation of the GMA in 1980 may continue to be irrigated with groundwater. Such lands received an Irrigation Grandfathered Right. Only holders of the right may withdraw, receive and use groundwater for growing crops on two or more acres of land within an AMA.

Second, farms are given a maximum annual allotment of groundwater to be used for irrigation. The allotment is calculated by multiplying the maximum number of acres irrigated at any time from 1975 through 1979 by an irrigation water duty. The irrigation water duty is calculated from the annual amount of water per acre that is reasonable to apply to produce the crops that were historically grown from 1975 through 1979. This irrigation water duty is reduced over time as increasing water application efficiencies are required.

In order to allow for variations in weather and changing agricultural market conditions, farms are given a flexibility account, allowing them to accumulate credits for the difference between their actual water use and the groundwater allowance, or borrow from the account if their actual groundwater use exceeds their allowance. Accumulated credits can be used in future years, if needed, to meet conservation requirements. There is no limit to the number of flexibility credits that can be accumulated, and farms are allowed to borrow up to 50 percent of their maximum annual groundwater allotment. Annual groundwater allotments were set near the historic peak of irrigated acreage; thus much more groundwater than is needed is legally available to farmers each year. With irrigation efficiencies increasing on farms and significant amounts of farmland out of production, many farms have accumulated large flexibility account balances.

Industrial Water Use

AWDR assigns conservation requirements specific to each category of industrial water use and encourages substitution of renewable water sources for groundwater.

- **Turf-Related Facilities** are given annual water allotments calculated for each facility. Water for golf courses is generally limited to 23.8 acre-feet per hole, or enough water for 5 acres of turf per hole at 4.6 acre feet per acre.
- **Metal Mines** must limit water loss from tailings ponds, recycle water, and reduce water use for dust control.
- **Power Plants** must achieve a specified number of “cycles of concentration” when they

are in full operation. Cycles of concentration is a measure of the degree to which cooling water is recycled. As water is recycled, salt concentrations increase due to evaporation, and fresh water must be added. Maximizing cycles of concentration saves water.

- **Large-Scale Cooling Facilities** must reach specific concentrations of silica or total hardness in the water used for cooling before the water is discharged and new water is used.

- **Sand and Gravel Operations** must recycle wash water and implement two additional conservation measures related to dust control and cleanup activities.

- **Dairies** are given annual water allotments based on assumed water needs. Dairies can alternatively apply to the director of ADWR to be regulated under the Best Management Practices Conservation Program, under which a combination of such practices will be required.

INDIAN WATER RIGHTS

In general, federal environmental laws do not apply to tribal lands. Most tribes have their own environmental and/or wildlife agencies, with regulations often modeled on federal laws. Since tribes control some headwaters of Arizona rivers, actions on tribal lands may significantly affect nontribal areas. Conversely, actions on nontribal lands have affected Indian lands. In some cases, nontribal entities such as mines have been allowed to use tribal lands with fewer environmental restrictions than would apply on nontribal land. Tribes and the

This photo has been removed due to copyright restrictions on the web

Figure 7-6 Tohono O'odham ollas, or clay water jars, from the nineteenth century are reminders of Native Americans' early water rights. Photo: Arizona Historical Society/Tucson.

U.S. Bureau of Indian Affairs have become more cautious in recent years about agreements that might result in polluted waters and have more vigorously enforced their laws.

The settlement of Indian water rights is an issue with broad implications throughout Arizona, not only to the tribes involved but also to non-Indians. Throughout much of U.S. history, Indians, their water rights systematically ignored and violated, have been an aggrieved party. The basis for Indian water rights claims is a U.S. Supreme Court decision (the Winters Decision), which established the principle that when the federal government set aside lands for Indian reservations or to serve other federal purposes, the government also implicitly reserved sufficient water rights to accomplish the

purposes for which the reservations were created. These unrecorded and unquantified Indian water rights therefore were established at the time reservations were created, and so generally predate Anglo, non-Indian water rights. Although the Winters Decision was decided in 1908, only recently have Indian water rights gained serious recognition in the courts.

Settling Indian water rights is very important to Arizona. With 21 Indian tribes controlling about 28 percent of the state's land base, tribal water claims are extensive. Some observers argue that total tribal water rights in the state could exceed Arizona's total surface water supplies. With no new sources of water available to allocate to tribes, water to settle Indian claims could come from present water users. The senior priority dates of Indian water rights means such rights have precedent over later water claims, usually belonging to non-Indians. Some CAP water, however, is presently unallocated and is available for use in Indian water rights settlements.

The state of Arizona presently is involved in adjudications of the Gila River and Little Colorado River watersheds to determine the types, amounts, and priority dates of the rights of all water users in the watersheds. First initiated in 1978, the two Arizona adjudications will eventually determine the water rights of most water users in the state, including Indian tribes and the federal government. Seven tribes have filed claims in the Gila watershed, the principal watershed in Arizona incorporating the state's largest population centers, Tucson and Phoenix. The Gila River adjudication is es-

timated to be the largest lawsuit ever filed in the United States, affecting 60,000 parties, including many in Pima County.

Tohono O'odham Water Rights

Although representatives of state, federal and tribal governments usually negotiate Indian water rights, implications of settlements can greatly affect cities and counties. For example, an understanding of the Tohono O'odham (Papago) water claims is essential when considering Tucson's water future.

Tucson's early growth and development depended upon groundwater found in the Upper Santa Cruz Basin. This aquifer extends beneath the San Xavier District of the Tohono O'odham. As early as 1881, the Tucson Water Company drilled wells east of San Xavier to obtain water. This wellfield developed with the growth of the city, and by the 1970s Tucson pumped approximately 40,000 acre-feet of water annually from wells located just outside the reservation. Having by law to rely on an unresponsive federal government to promote and protect its interests, the tribe was left at a distinct disadvantage.

By 1976, after several court cases that supported and defined Indian water rights, the Tohono O'odham were in a position to claim most of the available water in the Tucson Basin. The implications to non-Indian interests of such a claim were vast, with the possibility that bond ratings would be jeopardized, private loans more difficult to obtain, economic growth halted, and water possibly reallocated from current users to the Tohono O'odham.

In 1975, the federal government, on behalf of the Tohono O'odham, sued the City of Tucson, mining companies and agricultural interests. In brief, the suit claimed the defendants damaged the tribe's water rights by excessive pumping. The tribe had at least two strategies to follow: negotiate a settlement or precede with the suit to its final resolution. In the face of the cost, time and various uncertainties associated with a court case, a consensus developed that a negotiated settlement would be in the best interest of all involved.

Tucson took the suit very seriously as is indicated by an excerpt from an *Arizona Daily Star* editorial at the time: "More than a century of government failure to preserve the Papagos' interests assured the tribe a court victory. And victory for the Papagos could have meant the permanent shutdown of mines and farms and an end to city growth and development." Such dire consequences, however, were unlikely, even with the Indians winning a court case.

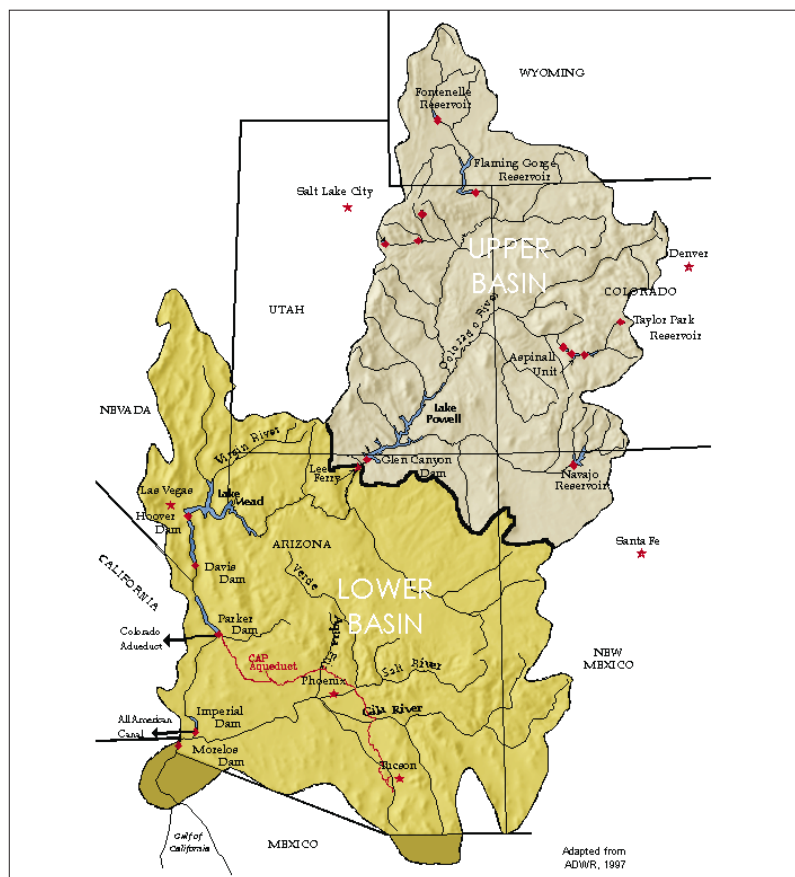
Negotiations took place with the express goal "to develop a fair and reasonable water resources plan which will satisfy the present and future water needs of eastern Pima County," including "a speedy resolution of Papago Indian water right claims." In making the best of a threatening situation, non-Indians used the suit as part of a strategy to benefit their own interests. By claiming that Colorado River water would be needed to negotiate with the Tohono O'odham, non-Indians were building a case for the federal government to complete the CAP canal to Tucson. Whatever settlement was negotiated would need to be financed by federal legislative appropriation.

Southern Arizona Water Rights Settlement Act On October 12, 1982, after agreement was reached by both House and Senate, President Reagan signed into law the Southern Arizona Water Rights Settlement Act (SAWRSA). The act obligated the U.S. Secretary of Interior to deliver 66,000 acre-feet per year to the San Xavier and Schuk Toak districts of the Tohono O'odham Nation. This total is to include 37,800 acre-feet of CAP water and 28,200 acre-feet of wastewater effluent or exchange water, which may be used to exchange for another type of water suitable for agriculture. The tribe has the right to market its negotiated water to users within TAMA or parts of the Upper Santa Cruz Basin not within TAMA. Costs associated with the delivery of CAP water under the sale, exchanges or temporary dispositions are non-reimbursable. The act also established a cooperative fund to pay operations, maintenance and repair charges related to delivery.

A schedule was set for delivering water and developing facilities for its use. Meanwhile a dispute arose among the Tohono O'odham Nation, its San Xavier District, and allottees, individual land owners on the San Xavier District. The dispute was the result of developing opposition to dismissing the U.S. v. Tucson lawsuit and to the terms of the SAWRSA settlement. The dispute spawned two additional lawsuits: Alvarez v. Tucson and Adams v. U.S.

Since about 1990, efforts have been made to negotiate an agreement between the allottees, the nation, the federal government and the major defendants to implement SAWRSA and dismiss the lawsuits. Negotiations are ongoing.

Figure 7-7 The Colorado River Basin.



Meanwhile work which was to be done by the U.S. Bureau of Reclamation to develop the facilities for delivering and using the water on the reservation has been delayed, although construction began in spring of 1999 on a pipeline to take water to the San Xavier District for agricultural purposes. The non-Indian defendants, however, have been more timely in meeting

and Lower Basins, with the river's average annual flow divided equally between the basins. Lees Ferry in northern Arizona marks the boundary between the two basins (See Figure 7-7). According to the compact each basin is to receive 7.5 million acre-feet per year. Arizona is a member of the Lower Basin, along with Nevada and California. A division of the waters of

SAWRSA obligations. Tucson and Pima County have contributed effluent, with funding appropriated by the state and non-Indian interests to set up a trust fund. Until U.S. v. Tucson is dismissed, however, SAWRSA is not fully effective. As of yet, no water has been delivered to the Indian people.

CAP AND THE COLORADO RIVER

Arizona's allocation of Colorado River water is determined by the Law of the River, a collection of legislation, compacts, judicial decisions, international treaties and administrative rules that governs water allocation on the river. The Colorado River Compact of 1922 divided the river into two basins: the Upper

the Lower Basin originally was suggested by Congress in the Boulder Canyon Project Act and upheld in the Arizona vs. California Supreme Court decree in 1964. Arizona was allotted 2.8 million acre-feet of Colorado River water, California was allotted 4.4 million acre-feet, and 300,000 acre-feet was allocated to Nevada. Along with its Lower Basin allocation, Arizona also gets 50,000 acre-feet of Upper Basin water.

Approximately 1.3 million acre-feet of Arizona's allocation of Colorado River water is consumed along the mainstem of the river, mainly for agricultural purposes. This leaves an average of 1.5 million acre-feet per year to be carried to central Arizona via the CAP canal. The canal has a design capacity for delivery of 2.1 million acre-feet per year, which is reduced to approximately 1.9 million acre-feet per year due to the need for routine maintenance. This extra capacity allows Arizona to take water above its annual allocation if a surplus is declared on the river.

CAP deliveries may be interrupted by drought shortages on the river or by the need to repair and maintain the canal. To gain the support of California's delegation for Congressional approval of the CAP, Arizona was forced to agree that, in times of shortage, California's full 4.4 million acre-feet will be delivered before any water will be provided to the CAP. As a result, any shortages in the Lower Basin will be borne first by the CAP. The risk of drought shortage is projected to increase over time. After the year 2025, the probability of shortages affecting CAP water users is anticipated to reach approximately 30 percent. The probabil-

ity that municipal and industrial users will be affected is approximately 5 percent.

The law assigns the highest priorities for delivery of subcontracted CAP water to Indian and municipal and industrial (M&I) subcontractors. The lowest priority is assigned to non-Indian agriculture. This means if scheduled deliveries must be curtailed in any year, deliveries to non-Indian agricultural subcontractors will be cut first.

The amount of water delivered over the year is set, but the amount delivered each day varies greatly over the year, depending on demand. At times of high demand municipal users get first priority, but only for direct delivery. Municipal recharge projects have a lower priority than agriculture. In March 1997, delivery to recharge sites was halted temporarily to meet demands for direct municipal use and agriculture. This reversal of the priority system that normally places agriculture last may require recharge systems be designed to accept larger amounts of water at times when deliveries are high to compensate for the times when deliveries are cut. Possible changes to this policy are being discussed.

Concerns about CAP outages due to drought or maintenance point to the need for some mechanism to enhance delivery reliability. This could be either storage at the end of the aqueduct (terminal storage) or an operational plan that could involve keeping a certain number of groundwater pumps ready to provide water in case of an emergency. Consideration of terminal storage has been delayed indefinitely as a result of Tucson's decision to suspend direct delivery of CAP water.

The draft Environmental Impact Statement relating to terminal storage estimated that Tucson would experience planned maintenance outages of five to 30 days per year. Emergency outages are projected at zero to three times every 10 years. These emergency outages could last up to two months. An emergency outage lasting 48 to 365 days could happen zero to two times every 50 years. Situated at the end of the canal, Tucson is in the position of having the least reliable CAP water supply. Terminal storage options include a 15,000 acre-foot above-ground reservoir, a 15,000 acre-foot per year underground storage and recovery facility, and installation of redundant features to minimize maintenance outages. Cost of the above-ground reservoir was estimated to be about \$100 million. If built as part of the CAP, the costs would be borne by CAP water users in Pima, Maricopa and Pinal counties, with financing by the federal government at a 3.342 percent interest rate over a 50-year period.

CENTRAL ARIZONA WATER CONSERVATION DISTRICT

The Central Arizona Water Conservation District (CAWCD) is a state agency with the primary responsibility of managing the CAP. Voters in Maricopa, Pima and Pinal Counties elect board members generally based on population. The district is concerned with water fees and property taxes for CAP, water allocation, canal operation and maintenance. CAWCD is responsible for repaying CAP reimbursable construction costs to the federal government. The district also works with the Arizona Water

Banking Authority and the Central Arizona Groundwater Replenishment District to implement CAP storage and recovery programs.

PROGRAMS TO PROMOTE RECHARGE

Underground Water Storage, Savings, and Replenishment Program

Administered by ADWR, the Underground Water Storage, Savings, and Replenishment Program (UWS) encourages the use and/or storage of renewable supplies, including CAP water. There are two types of facilities allowed under this program: Underground Storage Facilities and Groundwater Savings Facilities.

Underground Storage Facilities (USFs) involve physical recharge of water through injection wells, infiltration basins, or natural watercourses. Water stored at these facilities can be designated for one of several uses: recovery in the same calendar year (annual storage and recovery), long-term recovery using storage credits, or not to be recovered at all. If the water is recovered, it does not have to be recovered in the same place as it was stored. However, recovery rules are designed to prevent recovery of water in areas where groundwater levels are substantially declining.

Groundwater Savings Facilities (GSFs) usually involve farms which agree to use CAP water rather than pumping groundwater. GSFs are referred to as "in-lieu" recharge facilities because CAP water is used in lieu of groundwater, but GSFs do not involve physical recharge. In a typical GSF arrangement, an entity such as a municipal water provider sells CAP water to a

farm, usually at a price lower than what the farm would pay to pump groundwater. In return, the state grants credits to municipal providers for the amount of groundwater that otherwise would have been used. The municipal provider can use these credits to offset pumping of groundwater in meeting ADWR conservation rules. A majority of the activity under the UWS program to date in TAMA has been through GSFs.

Arizona Water Banking Authority

Arizona cannot currently directly use all its allotted CAP water and does not expect to directly use the full allotment until the year 2030. Since California claims a right to take unused Colorado River water, Arizona has devised a way of keeping as much of it as possible in the state. The Arizona Legislature created the Arizona Water Banking Authority (AWBA) to acquire unused portions of Arizona's allocation of Colorado River water and put it to use for storage underground or, in other words, to recharge it in central Arizona. AWBA is authorized to store water to meet one of four overall goals: to protect municipal uses from possible drought situations or CAP delivery interruptions; to meet Indian water rights claims; to meet local water management objectives; or to facilitate interstate water banking with California or Nevada. AWBA is funded using property taxes, groundwater withdrawal fees in counties with CAP water (Maricopa, Pinal and Pima counties) and money from the state's general fund.

AWBA does not construct recharge facilities, but uses recharge structures built by other

entities, such as Tucson Water or CAWCD. The water flows through the CAP canal to the storage facility, and AWBA pays CAWCD for the water costs. AWBA participating entities then benefit by accruing credits for the water stored and by using the water when needed under certain conditions dictated by state law. Credits earned with money from the general fund are used to benefit cities, towns and water providers along the aqueduct. Water storage credits earned with money from groundwater withdrawal fees are to be used in the AMA where the fees were collected. Credits from the property tax accrue to CAWCD to meet demands of municipal and industrial customers when CAP supplies are interrupted.

AWBA also is allowed to negotiate and enter into interstate water banking agreements with California and Nevada, subject to approval by the director of ADWR and subject to other conditions. Such agreements would allow California and/or Nevada to pay to store unused Colorado River water in Central Arizona. This obviously benefits Arizona as more water is added to our aquifers, but the other two Lower Basin states also would gain from the transaction. In later years, those states can "recover" their stored water under a forbearance agreement, through which Arizona would refrain

from taking a portion of its entitlement of Colorado River water equal to the amount of water to be recovered. The state that had banked the water could then recover the banked water directly from the river. In effect, by paying to store unused Colorado River water in Arizona, California or Nevada can earn the right to later divert portions of Arizona's Colorado River allocation from the river.

The AWBA directly recharged approximately 45,000 acre-feet of excess CAP water in 1997 and approximately 70,000 acre-feet in 1998, of which about 12,000 acre-feet was in Pima County at the Central Avra Valley Recharge Project, the Avra Valley Recharge Project and the Pima Mine Road Recharge Project. The bank also accrued 149,000 in water storage



Figure 7-8 **Decorative fountains raise an issue beyond supply and demand — the aesthetics of water.**
Photo: UA Biomedical Communications.

credits for in-lieu “recharge,” none of which occurred in Pima County.

Central Arizona Groundwater Replenishment District

In 1993, the Arizona Legislature passed a law that provides an alternative method for subdivisions and water providers to meet the rules requiring a demonstrated 100-year supply of water. Entities that couldn’t otherwise demonstrate an adequate physical supply can pay the Central Arizona Groundwater Replenishment District (CAGRDR) a fee for the groundwater that the subdivision or water provider is “mining.” The CAGRDR then takes responsibility for acquiring and recharging water to offset the mined groundwater. Since “replacement” water does not have to be recharged in the same location as the withdrawal, localized groundwater declines may not be prevented by the arrangement. The overall management goal of safe yield, however, is furthered.

Under CAGRDR the fees paid are the same (per unit volume) for each of the contributing “members.” Members that are water providers pay the fee directly to CAGRDR. In the case of

certain subdivisions, each lot owner is a member and the individual pays in the form of an assessment on the property tax bill. One of the consequences of this is that the costs associated with an “assured” water supply are not borne directly by developers. This is one factor for the popularity of the CAGRDR option. To date, approximately 115 subdivisions and eight water providers have applied for, or obtained, membership in the CAGRDR.

LAKES AND POOLS

In 1987, the Legislature enacted a law restricting the use of surface water or potable groundwater in artificial lakes and ponds in

AMAs. A new lake cannot exceed 12,320 sq. ft. — the size of an Olympic-sized pool — unless filled with wastewater or poor quality groundwater. Lakes built before 1987 are exempted, as are lakes in public parks. The size of residential swimming pools also is limited to Olympic size, although the number of pools is not limited.

WATER TRANSFERS

In the 1970s, Tucson Water began buying farmland in the Avra Valley to obtain water rights in the area. Once the courts determined the arrangement was legal under certain conditions, Tucson considered Avra Valley groundwater an important part of its water supply. In the 1980s, other cities went even farther afield in search of water, to rural areas remote from urban centers. For example, Scottsdale bought land along the Bill Williams River in western Arizona. Some people in rural areas became concerned about losing water supplies and property tax base critical for their survival. In response, the Legislature passed a law limiting new transfers of water from non-AMAs. Because of the law, Tucson is not able to import water from outside the TAMA, such as from the San Pedro River.

FEDERAL ENVIRONMENTAL LAWS

Two federal laws that have some impact on water decisions are described briefly below, although they are not primarily water-related.



Figure 7-9 The Endangered Species Act is concerned with the effects of human activity on the natural environment. Above is the federally protected desert tortoise. Photo: Barbara Tellman.

Table 7-3 Largest municipal water providers serving Pima County.

LARGEST MUNICIPAL PROVIDERS	SERVICE AREA POP.	WATER USE (Acre-feet)	TOTAL GPCD
City of Tucson	621,290	115,860	166
Metro Water District	44,153	9,161	185
Town of Oro Valley	23,416	6,503	248
Flowing Wells Irrig. District	15,000	2,945	175
Community Water Co.	14,261	2,249	141
Avra Water Co-op	6,688	935	125
Lago del Oro Water Company	6,461	1,787	247
Davis-Monthan AFB	6,191	1,969	284
University of Arizona	5,695	1,624	255
Ray Water company	4,617	658	127
Green Valley Water Company	4,390	2,318	471
AZ State Prison Complex	4,097	602	131
Hub Water Company	4,078	1,118	245
Arizona Water Company	3,984	366	82
Marana Municipal Water System	3,467	623	160
Las Quintas Serenas	2,388	345	129
Marana Water Service	1,736	337	173
Farmers Water Company	983	373	339
Forty-Niner Water Company	872	833	853

(1997 data. Figures may differ from Appendix B because they represent different years.)

Source: Arizona Department of Water Resources.

National Environmental Protection Act

The National Environmental Protection Act (NEPA) is intended to ensure that significant projects done by the federal government or that use any federal subsidies do not cause environmental damage in the process. Provi-

sions do not apply to private, nongovernmental projects unless they have a federal component such as a housing development that involves federal loan guarantees. When an eligible project is planned, an Environmental Assessment (EA) must be conducted. If this assessment does not indicate that environmental problems are anticipated, the public has the right to comment and either approve or request a more detailed Environmental Impact Statement (EIS). Other federal agencies such as U.S. Fish and Wildlife Service must be given the opportunity to comment on matters under their jurisdiction. The public has the right to comment on the EIS and a public hearing must be held. If troublesome issues arise, a mitigation plan is developed.

Endangered Species Act

The purpose of the Endangered Species Act (ESA), passed in 1973, is to conserve the nation's biological heritage consisting of its animal and plant species. The law enlists all federal agencies and departments in an effort to conserve threatened and endangered species and to promote the purposes of the act. As stated in Section 7 of the act, all federal agencies are "to insure that actions authorized, funded, or carried out by them do not jeopardize the continued existence" of an endangered species or "result in the destruction or modification of habitat of such species." Section 9 of the ESA includes prohibitions against "take" which is defined in the act as "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect or attempt to engage in any such conduct."

The ESA also charges the above agencies to identify and designate "critical habitat" for listed species, based upon the best scientific data available. This is to identify and protect habitat essential to the species' survival and recovery. Critical habitat is the specific areas, within or outside the species' geographical range at the time of listing, which contain essential physical or biological features for conserving the species and which may require special management or protection.

When constructing the CAP canal in the Tucson area special precautions were taken to avoid harming various species. An important deer movement area between the Tucson Mountains and the Schuk Toak District of the Tohono O'odham Nation west of Tucson is crossed by the CAP canal. To minimize disrup-

tion to deer movement and other wildlife in this unique area and to preserve this corridor, the U.S. Bureau of Reclamation buried parts of the canal under six major washes and purchased 4.25 square miles of deer habitat. The corridor will be managed by Pima County as part of the Tucson Mountain Park system and will be protected from future development.

This area also contains important habitat for the kit fox, the endangered Tumamoc globe-berry plant, and three potential endangered species: the desert tortoise, the Gila monster and the Thornber's fishhook cactus. The corridor will protect about 27,000 Thornber's fishhook cactus. Obviously any construction projects involving the movement and storage of water must proceed especially carefully to anticipate ESA concerns.

Even now, with the CAP system essentially completed, the ESA continues to impact water resource planning. Along with water, the CAP brings fish and other aquatic species from the Colorado River. Some aggressive, non-native fish pose a potential threat to Arizona's native fish species, all of which are listed as endangered or threatened. The concern is that during periods of high precipitation or snowmelt, when normally dry rivers are flowing, the CAP canal might provide a water link allowing non-native fish to reach the headwaters of streams, invading the habitat of native species. Eliminating such hazards can require building expensive fish barriers or other obstacles to non-native fish, resulting in water project delays and additional costs.

REGULATION OF WATER COMPANIES

The 19 largest municipal water providers within the Tucson area are listed in Figure 7-3. (See Appendix B for a list of all water providers in Pima County.) Tucson Water, the largest, serves about 80 percent of the total population. About 12 percent of the population is served by private domestic wells and a large number of very small companies.

Different regulations regarding water rates apply to different types of water providers. Elected officials and the mandate of the electorate control municipal water companies. This can lead to disenfranchisement when the boundaries of the water company and the municipality are different. Also voters within the Tucson city limits who receive water from utilities such as Flowing Wells Irrigation District have the right to vote on Tucson Water issues. Both of these situations prevail in Tucson. Tucson Water's service area extends far beyond city limits, and private water providers operate within city limits. Municipal water companies can approve increased rates, and they may float bond issues, spreading capital costs into future years.

Private water companies and water cooperatives, on the other hand, are regulated by the ACC. Raising or restructuring rates requires ACC approval in a rate hearing. Private companies generally are not allowed to raise rates to recover future costs. For example, if ADWR requires conservation programs, the ACC may refuse a rate increase to cover the costs until after the money has been spent and the program proven to be effective. Similarly, a small water

company cannot increase rates to build a new well or a treatment system. Instead, it must build the well or the treatment system, then recover the costs. Also ACC does not allow water companies to recover CAP holding costs. These are costs for CAP water rights not presently being used.

As a result, private water companies and water cooperatives may find themselves in a regulatory bind. ACC's goal is to keep rates low to benefit consumers; the ADWR goal is to conserve water within AMAs; and an ADEQ goal is to ensure safe drinking water quality. A private water company confronting these varied regulatory goals may have problems initiating conservation programs. Without the power to borrow money or float bonds, a small water company's very survival may be threatened when major capital improvements are needed.

The ACC does not regulate irrigation districts, regardless of whether they actually provide irrigation water (e.g., Flowing Wells) or water improvement districts (e.g., Metropolitan Domestic Water Improvement District). These districts are responsible solely to their boards and members. ADWR regulates all water providers regarding water supply (assured water supply and safe yield) and water use issues (conservation), with EPA and ADEQ regulating water quality issues.

REGIONAL WATER QUALITY PLANNING

The Pima Association of Governments (PAG) is responsible for coordinating water quality and transportation planning as well as

regional population projections. Each local government entity, regardless of its size, has one vote on PAG decisions. An Environmental Planning Advisory Committee and its Water Quality Subcommittee, which is made up of government staff and local residents, study and make recommendations on such matters as new wastewater treatment facilities, water reclamation and pollution cleanup. PAG votes on their recommendations to determine whether they become policy.

FLOODPLAIN MANAGEMENT

Both Pima County and the City of Tucson are involved in flood control and the development and enforcement of floodplain ordinances. Pima County's flood control district (FCD) is governed by the Board of Supervisors acting in its capacity as Pima County FCD managers. Established by state statute in 1978, county flood control districts work to reduce the risk of flood loss, minimize the impact of floods on human safety, health and welfare, and restore and preserve the natural and beneficial values served by floodplains. Established as political taxing subdivisions of the state, FCDs have the power to levy taxes to support flood-control projects. Their area of jurisdiction may include incorporated and unincorporated areas.

Legislation also allows an incorporated city or town within a county to assume responsibility for its floodplain management. Tucson maintains its own floodplain management program within Pima County. Pima County FCD is mainly concerned with areas outside city limits. Intergovernmental agreements (IGAs) have

been signed with the city, however, for the district also to be responsible for waterways within certain incorporated areas. IGAs are likely to be worked out for regional watercourses that have significant flow during 100-year flood events, such as the Rillito Creek and the Santa Cruz River. Pima County therefore maintains the major watercourses in the area, although the city may be responsible for sections of them. Finally, floodplain maps are under the jurisdiction of the Federal Emergency Management Agency (FEMA) which administers the national flood insurance program. Communities that do not comply with FEMA rules are not eligible for federal flood insurance.

POWERS OF COUNTIES AND CITIES

Counties generally have only those powers granted to them by the state, unless they have adopted charter government. Counties are required to look after the "health, safety, and welfare" of their residents. As a result, they maintain health departments, building codes, etc. Counties do not currently have the authority to operate water systems. Pima County has a department of environmental quality which is primarily involved with air quality and hazardous waste. County health departments have some water quality responsibilities related to human health; e.g., they regulate septic tanks. County zoning decisions may be based on the ability of government to provide services such as wastewater treatment. In at least one case a massive rezoning was denied on the basis of an

insufficient water supply, the lack of which could have been a serious health problem.

Cities have varied levels of involvement in water management. Some cities (e.g., Tucson) operate water companies, and many cities operate wastewater facilities (e.g., Show Low). Many cities have water conservation programs (e.g., Phoenix).

Cities and counties may assess fees on new development (impact fees) to recover the cost of providing services to the new area. Such services include water and wastewater facilities. Both cities and counties operate under state and federal water quality and quantity laws.

City and County Ordinances

Cities and counties also have their own laws, referred to as ordinances. In general, these ordinances may be stricter than state or federal ones, but may not be less strict. Thus a city cannot opt out of following the Safe Drinking Water Act, but it can decide to meet more stringent standards, such as the tighter THM standard that the City of Tucson has imposed on itself. On occasion, however, the state government has preempted this right.

Water Consumer Protection Act

The Water Consumer Protection Act (WCPA), a ballot proposition passed by City of Tucson voters in 1995, (See page 139) had three major goals:

- prohibit Tucson Water from directly delivering CAP water unless the salt content was substantially reduced;

- prohibit delivery of water from polluted sources, including treated TARP water (See page 66); and
- compel the city to offset groundwater withdrawals with recharge, including recharge of CAP water.

Other goals included:

- encourage the city to trade and sell its CAP allotment;
- avoid recharge in areas of known landfills; and
- prevent disinfection byproducts such as THMs from being introduced into the aquifer through treatment and direct injection recharge. The WCPA did not deal specifically with corrosivity.

In 1997, Proposition 201 was on the ballot but failed to pass. It would have repealed many of the provisions of the WCPA, substituting less restrictive goals.

Tucson Xeriscape Ordinance

This ordinance applies to new multifamily, commercial and industrial developments. Its goal is to conserve water by applying xeriscape principles. These principles include using drought-tolerant plants, maintaining limited grass areas and applying mulch and soil improvements. Landscaped areas must be designed to take advantage of storm water run-off, and water-conserving irrigation systems are required.

City and County Plumbing Codes

Both city and county require that water-efficient fixtures be used in all new residen-

tial and commercial construction. Toilets must be ultra-low flush (i.e., 1.6 gallons per flush or less) and faucets must not exceed 2.5 gallons per minute. The code also applies to replacement of old fixtures. Requirements also are established for evaporative coolers, air conditioners, decorative fountains and waterfalls.

Water Waste Ordinance

Since 1984 it has been illegal for people within the City of Tucson to let water flow off their property onto public areas or other property. A “water cop” can fine individuals, property managers and landscape contractors who are guilty of this infraction. Tampering with water meters also is illegal.

Golf Course Water Use

Tucson and Pima County have ordinances requiring the use of CAP or effluent for new golf courses where feasible. (See Chapter 5 for more information.)

Emergency Water Conservation

Upon declaring a water emergency because of problems with water supply, the Tucson City Council may prohibit or restrict non-essential uses of water. Examples of restricted activities are outdoor irrigation except areas using reclaimed water, washing of sidewalks, outdoor water-based play, automatic water service in restaurants, misting systems, filling swimming pools and spas, and washing of vehicles except at facilities with recirculation systems. Exceptions can be allowed for reasons of public health, safety or economic hardship.

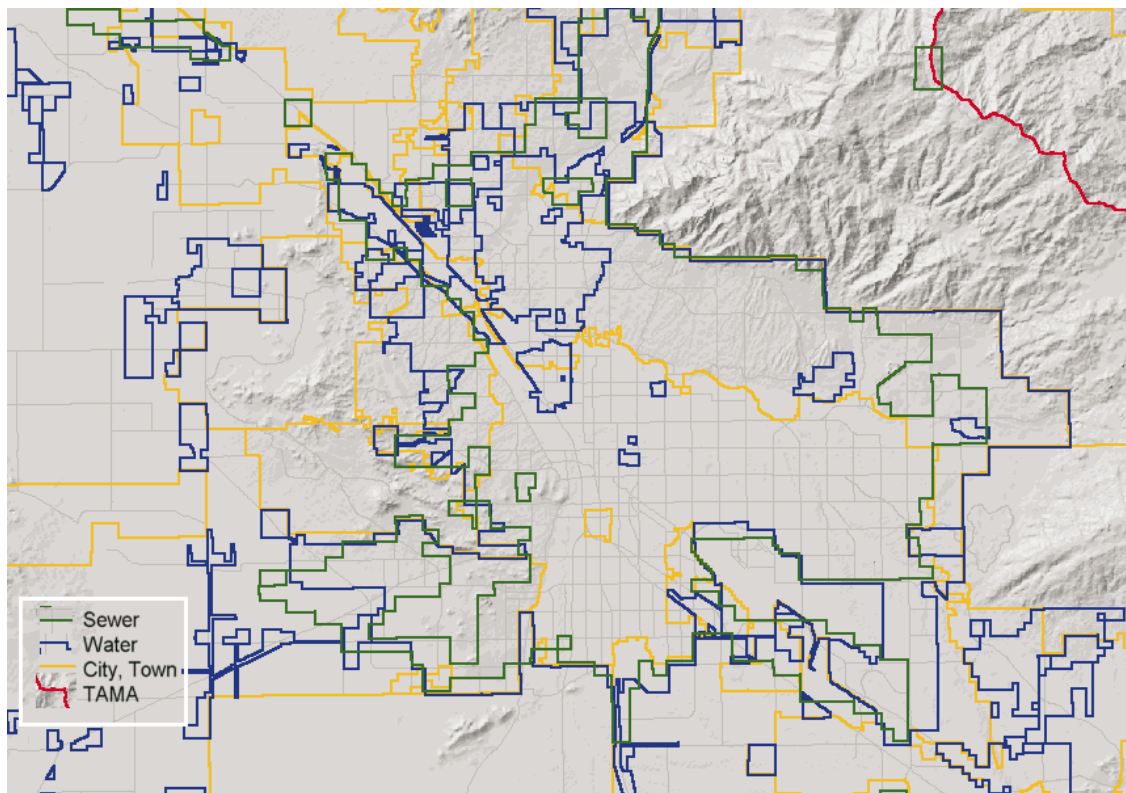
MANAGING WATER AND WASTEWATER

Tucson operates the largest water system in the area, serving about 600,000 persons an average of about 97 million gallons of water daily. The city serves customers both inside and outside city limits. Since Tucson Water is managed by the Tucson City Council, people who are not city residents have little say on city water decisions, even though they receive city water. Approximately 16 other water providers serve another 155,000 customers in the area. The remaining 81,000 water users are served by very small water companies or have their own wells. Some of these water companies are within the city limits of Tucson, Oro Valley or Marana. The cities do not regulate the activities of these water providers and cannot require their compliance in such activities as water conservation programs.

Water providers that are not municipal water departments, on the other hand, have little or no say in certain city decisions that affect them, such as rezonings and conservation ordinances. ACC regulates rates and some procedures of private water companies, but not municipal utilities or irrigation districts. ADWR can require all three types of water utilities to implement conservation measures and meet sustainability goals but has no jurisdiction over water users themselves. At times, ACC and ADWR rules conflict.

Pima County handles most wastewater in the region, with treatment plants at Roger Road and Ina Road, next to the Santa Cruz River. Pima County also runs several small treatment plants outside the metropolitan area.

Figure 7-10 Jurisdictional boundaries.



Sources: Pima County Technical Services, Arizona Department of Water Resources.

Because of an intergovernmental agreement between Tucson and Pima County, Tucson has rights to most of the effluent that comes from wastewater treatment facilities throughout Pima County. A few neighborhoods have their own treatment facilities, and some people have septic tanks or other kinds of individual treatment systems. Some subdivisions with golf courses, such as El Conquistador, use treated water

from their local community for watering the golf course.

COORDINATING WATER MANAGEMENT

Despite, or perhaps because of the many laws and rules, no one agency has legal authority to coordinate water use area-wide. This is to the detriment of efficient water management.

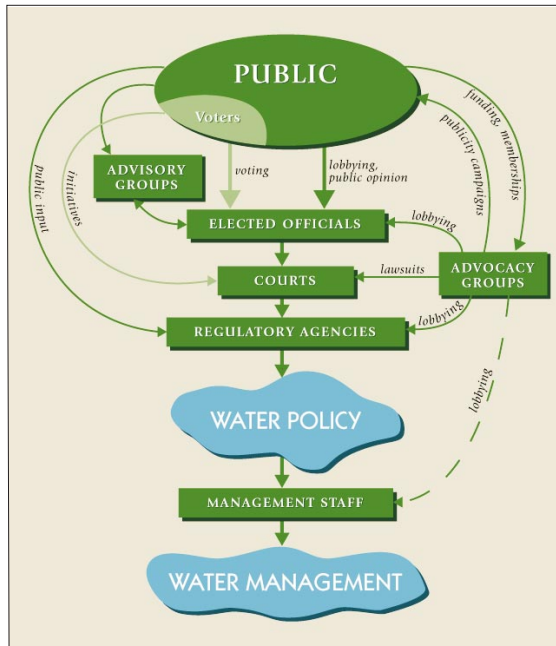
TAMA and the Pima Association of Governments (PAG), however, address some basin-wide issues that were previously discussed. The following further characterizes water management in the Tucson area:

- No agency has the authority to require water users to take a particular kind of water, such as effluent or CAP water. Some people believe mines and farms should use lower quality water and leave the groundwater for drinking purposes. But the type of water that businesses and water companies use is generally determined by the market place or historical accident. In other words, they generally use the cheapest water source, which often is groundwater. Also, individuals have the right to pump groundwater for their own domestic use, and over 24,000 private wells exist in the Tucson area. The only limiting factors are well spacing regulations and the cost of drilling and operating a well.

- No agency can mandate that all categories of water users shall contribute to help pay for solutions to water problems. For example, no agency can require businesses that use groundwater to pay a fee to support CAP activities in an effort to prevent the water table from declining. While some local taxes and pumping fees are charged, the funds do not help pay Tucson Water's cost of using CAP water.

- No agency can require individuals to conserve water. ADWR can set per capita goals that water providers must meet, but those providers in turn have no authority to require water savings of their customers. The City of Tucson could pass an ordinance limiting water use, but it would not apply to people living outside city limits and probably not even to customers of other water providers within city limits.

Figure 7-11 Generalized model of municipal water policy.



- Elected officials often make land use decisions without worrying about long-term water supplies. Rezoning within established water service areas certified for assured supply may proceed, although new developments outside such areas must go through the approval process. In 1999, a rezoning for the Canoa Ranch near Green Valley was denied partly because of water supply issues. This, however, was the exception, and other reasons existed for opposition to this rezoning.

BASIN-WIDE WATER MANAGEMENT

Local water management is characterized by a complex web of overlapping, and occasionally conflicting political and geographical jurisdictions. Overlapping jurisdictions in the Tucson area are shown in Figure 7-10. Figure 7-11 provides a generalized model of municipal water policy management. Though attention tends to be focused on elected officials, many other “players” are involved. The public, particularly the voting public, has the ultimate say in most policy matters and has several avenues for influencing water policy (rules, laws and guidelines) and water management (implementation of policy).

Coordinated and comprehensive basin-wide management has been advocated at various times. Such “watershed management” has several obvious advantages, and a few more subtle disadvantages. The most compelling reason cited for watershed management is the ability to treat water resources as part of an integrated system. In its most optimistic implementation, decisions such as land use, transportation and population growth all would be evaluated in terms of their basin-wide impact on water resources.

Critics of the existing situation note the difficulty in establishing long-term plans when so many of the critical decisions are split among different agencies and groups. Moreover the responsibility to meet long-term demands is often unevenly distributed. For example, while developers are required to demonstrate a 100-year assured water supply, they are not required to consider the basin-wide impacts of

their development. This raises some thorny hydrologic issues as well as concerns about relative inequity. In another example, some have complained that the costs of renewable supplies like CAP water have been disproportionately borne by Tucson Water customers.

The expectation is that stronger basin-wide management would reduce disparities and promote true sustainability. Promoters also note that a watershed management authority could reduce some of the political and economic inefficiencies inherent in the current situation.

The splintered nature of local water management can be counted as both a cost and a benefit. The inefficiency that results from multiple jurisdictions also can provide some measure of control against a single entity having too much authority. A watershed authority could make it easier to implement ecologically sound policies, but it also could be an efficient mechanism for mischief.

Some people have argued that the Tucson region should have a government agency with powers to buy and sell water throughout the region and to determine who uses which kinds of water. There could still be private water companies under the larger umbrella agency. The Tucson City Council vetoed establishing an agency with some of these powers when it voted against establishing the Santa Cruz Valley Water District in 1993. This agency would have had some of the responsibilities of the Central Arizona Groundwater Replenishment District for this area.

Benefits of area-wide management include reserving the highest quality water for municipal use while lower quality water would be used for industry and agriculture. Also the costs of

augmenting the supply could be distributed more fairly throughout the region. The managers could either be elected directly by the voters or appointed by the county and cities in the region. One argument against this approach is that the managers would have enormous power. If they were appointed, with one vote per city (like PAG), Tucson city residents would be unfairly under-represented. If they were elected, it might be difficult to adequately educate voters about the qualifications of these managers with highly technical responsibilities. People who generally support less government are opposed to increasing government power over water. A change in state law would be required to create such an agency as well as approval of local governments and the voters. For this agency to acquire private water companies a company would either have to be willing or be acquired through condemnation. This approach, while having some benefits, has generally not been considered politically feasible.

TUCSON WATER OPERATIONAL OPTIONS

Some people have argued that private water companies should provide all water service in the area, and that Tucson (or any government) should not be in the water business. They argue that Tucson Water should privatize its operations because this would distance a professional service from political decision-making. They point out that Tucson Electric Power provides power very effectively as a stockholder-owner corporation and that Tucson Water could do the same. If it were a private water company,

the ACC would oversee water rates, not local politicians. Opponents argue that customers are better protected by officials they elect directly and that a profit-making company would probably have to charge higher rates. They also argue that if the company had to go through costly rate hearings, they would have to charge more for water.

Others note that water is fundamentally different from electricity, natural gas and other utilities in ways that argue for public ownership. Water has public health, aesthetic, and environmental aspects that the others lack. The public may be willing to pay more for water supplies that are purer or sustainable, or to subsidize certain public uses or water. Thus, the private sector may not be the best provider.

Another option is to leave Tucson Water under city control, but have a private management company operate the facilities, rather than city employees. The City Council would continue to set policy, but would contract for services as it does with its public transit system. The benefits are that the council would be less involved in operational details, leaving that to outside professional management which would provide the services as contracted. Such a major transition, however, could create problems in water service, without necessarily improving it.

Another option is for Pima County to become the regional water provider, at least for the water service area now served by Tucson Water, as it is now the primary regional wastewater provider. This would require a change in state law to enable the county to take on this new charge. The principal advantage would be the enfranchising of Tucson Water customers outside city limits. This has generally

been considered politically infeasible as Tucson likely would be unwilling to give up this power.

Still another option is one that was pursued for years by Tucson Water; i.e., establish Tucson Water as the only municipal water provider in the region. During the 1960s and 1970s, the city acquired numerous small water companies with the goal of providing unified water management both inside and outside city limits. Officials believed that one consolidated water system could better distribute water and costs fairly among customers, perform more effective water conservation programs and assure adequate water for fire protection in all areas. All companies were acquired through voluntary purchases. One drawback of this system is that it would serve a greater number of people who, because they live outside city limits, cannot vote on water matters that affect them.

ENFRANCHISING NON-RESIDENTS

Because the voting public has such an important influence on water decision making, having the right to vote on water matters is important. Only Tucson city residents, however, may vote for City Council and mayor or cast ballots in water bond elections, water initiatives and referendums affecting Tucson Water. Many people who live outside city limits object to this disenfranchisement. Meanwhile city residents who do not receive water from the city have the right to vote on Tucson Water matters.

If the city continues to be the major municipal water provider in the area, is there some

way to enfranchise non-residents? Various bills to deal with this issue have been introduced in the Legislature. The most recent one would give ACC responsibility for approval of water rates for people outside city limits. Opponents point out that water rates could be very different inside and outside the city, with rates outside probably increasing to cover the cost of going

through rate hearings. Current state law forbids a municipality from charging substantially more to customers outside its limits; modest rate differences must be based on higher costs to deliver the water.

Most people would not consider it fair or legal for non-residents to vote for city officials since most decisions made by those officials are

unrelated to water matters; e.g., decisions that impact city taxes and services. Should all water customers vote on water bond issues, since water bonds are repaid not by taxes but by water service revenues? Should they be able to vote on water initiatives and referenda? An argument can be made for these rights, but a change in state law probably would be required to enable a city to have an election outside city limits.