

## Surface and Groundwater Management in Arizona

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### *Introduction*

*With Arizona's water consumption projected to increase as the population grows, the ability to efficiently manage the state's limited water supplies will be critical to securing its future-especially if drought conditions continue.*

*The increasing conflict between population growth and limited water supplies in Arizona is no secret. For the past decade, Arizona and Maricopa County have been consistently ranked among the fastest growing states and counties in the United States. For example, Arizona's total population in 1990 was just under 3.7 million people<sup>1</sup> when we used 6.6 million acre-feet (maf) annually.*

*Today the state's population exceeds 5.4 million. Annual statewide demand for water is about 7.2 maf. (An acre-foot is roughly equivalent to covering a football field with water one foot deep. Residential subdivisions being built today assume .5 acre-feet per single family residence.) By 2015, the population of Arizona could exceed 6.7 million,<sup>2</sup> with water consumption projected to be about 7.5 maf. Yet, the state's surface and groundwater supplies remain essentially unchanged.*

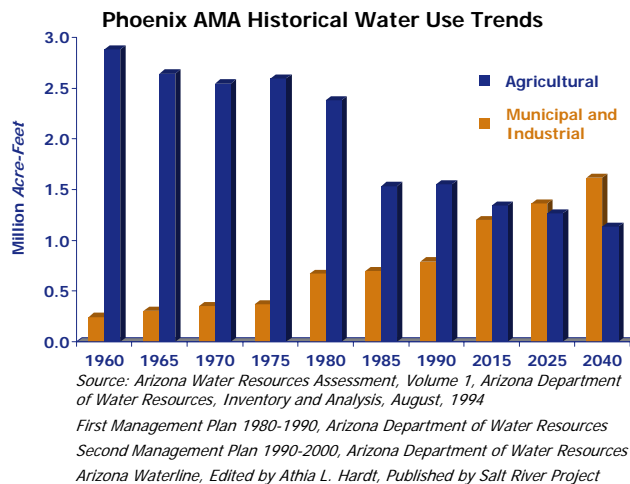
*This is why state, county and local governments now take active water management roles, guiding development and use of the state's water resources. The major challenges confronting these policy leaders include:*

- 1. meeting water demands that will grow and shift among the state's water use sectors;*
  - 2. working cooperatively with the Seven Basin states in the Colorado River Basin to meet the needs of the region's rapidly growing populations;*
  - 3. settling the outstanding Indian water rights claims to local supplies;*
  - 4. identifying and mapping groundwater supplies outside of the state's Active Management Areas;*  
*and,*
  - 5. analyzing and mitigating the environmental impacts of new or expanded water development projects.*
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## ★ Water Sources

Arizona's water supply comes from three major sources: groundwater, surface water from the mainstream of the Colorado River and the Gila River system including its Salt and Gila River tributaries.

Groundwater pumping supplies more than half the state's demand, the remaining demand is met with supplies from the Colorado and Gila River systems. About 70% of the state's water supply goes for agricultural use; down from 90% at the turn of the 20<sup>th</sup> Century. And while groundwater remains the primary water supply in most areas of the state, use of renewable surface water supplies is growing, particularly in Maricopa and Pima counties.



## ★ Regulation of Water Use

### Surface Water

In Arizona, like the rest of the United States, the water supply is considered a public resource regulated by the state through the Arizona Department of Water Resources (ADWR). The quality of the water is regulated by the Arizona Department of Environmental Quality.

ADWR issues water rights and permits to use surface water on land in accordance with the

Prior Appropriation Doctrine which recognizes the senior rights of water right holders before junior right holders in times of shortage. In other words, whoever first puts the water to use has priority rights to it. This becomes particularly important because of the frequent drought periods that can dramatically reduce the state's available surface water supplies.

The legal doctrine of prior appropriation generally does not apply to the state's Colorado River supplies which are governed by federal law developed pursuant to interstate compacts, federal statutes and judicial rulings that apply to the seven states that share the Colorado River: Arizona, California, Colorado, Nevada, New Mexico, Utah and Wyoming. The Colorado River Basin is divided into the Upper and Lower Basins. Colorado, New Mexico, Utah, Wyoming and the northeastern corner of Arizona are in the Upper Basin.

The rest of Arizona is located in the Lower Basin of the Colorado River. The state has rights to 2.8 maf from the 7.5 maf delivered annually from the Upper Basin to the three Lower Basin states: Arizona, California and Nevada. In exchange for federal funding of the construction of the Central Arizona Project (CAP) which delivers Colorado River water to the central and southern parts of the state, Arizona agreed to accept reduced deliveries through the CAP when shortages occur in the Lower Basin. This low priority position creates some risk to CAP customers.

### Groundwater

Access and use of the state's groundwater supplies is also regulated by the ADWR in accordance with the Groundwater Management Act (GMA) adopted in 1980.<sup>3</sup> However, most regulations found in the GMA only apply to the use of groundwater in certain parts of the state known as Active Management Areas (AMAs).

Eighty percent of the state’s population resides in the state’s five AMAs.



*Original Source: Arizona Department of Water Resources Geographic Information System*

The primary goal of the GMA is to assure sustainable use of the groundwater supplies in AMAs. AMA boundaries follow the hydrologic boundaries of subsurface aquifers. Sustainable use of groundwater is achieved by replacing groundwater pumping with surface water and effluent. This is accomplished by creating financial incentives and enforcing regulations that restrict access to groundwater.

***Safe-Yield – Protecting Groundwater Supplies***

“Safe-Yield” refers to the goal of maintaining a long-term balance between the annual amount of groundwater withdrawn in an AMA and the annual amount of natural and artificial recharge. It does not account for impacts on surface water due to diversions, drought or excessive groundwater pumping. Key provisions of the GMA include the prohibition of any new irrigation after 1980, and the requirement that all

new residential development demonstrate a 100-year assured water supply in the AMAs.

***Assuring Long-Term Water Supplies for Residential Development***

The Assured Water Supply program, administered by ADWR, requires all new subdivisions in AMAs to demonstrate that sufficient water supplies of adequate quality are physically, continuously and legally available for 100 years.<sup>4</sup> The new subdivision’s water provider must also prove the financial capability to construct water delivery and treatment systems to serve the proposed development. The entire focus of the Assured Water Supply program is to promote the use of renewable supplies such as effluent and CAP water.

Outside the AMAs, the Department does not have the authority to require a 100-year assured supply of water before a subdivision is built. Instead, ADWR is required to determine whether there is “adequate” or “inadequate” water to serve the subdivision. This statement of adequacy is published in the Subdivision Report issued by the Arizona Department of Real Estate before lots in the subdivision can be sold.<sup>5</sup> It is important to note that ADWR’s determination that a subdivision lacks a 100-year water supply does not prevent construction from going forward.

***Groundwater Replenishment in the AMAs***

Even when groundwater is the only reasonable option for supplying water to a new community in an AMA, the developer is required to purchase and store surface water underground to compensate the aquifer for withdrawn groundwater. An option available to land-owners and developers in the CAP service area (Maricopa, Pinal and Pima counties) is to enroll the subdivision land in the Central Arizona Groundwater Replenishment District (CAGRDR) managed by the operators of the CAP.<sup>6</sup> Homes

enrolled in the CAGRDR will be assessed an annual tax or membership fee based upon the amount of groundwater delivered to their homes each year. The assessment will increase over time as the price of water increases. This option is not available to land outside of the CAP service area or to land that does not have physical and legal access to groundwater within the service area. As a result, future urban development may be easier in those areas in Maricopa, Pinal and Pima counties that are eligible for membership in the CAGRDR.

### *Conserving our Water Supplies*

In addition to the Assured Water Supply Program, ADWR administers an extensive conservation program for the municipal, industrial and agricultural water use sectors in the state's five AMAs. Starting in 1980 and each succeeding decade through 2025, per capita or per acre water use is reduced in a continuous effort to achieve Safe-Yield by 2025. ADWR is authorized to impose civil penalties for failure to comply with the prescribed water duties for each use sector.

### *★ Future Sources of Municipal Water Supplies in Arizona*

By 2030 it is projected that Arizona will have direct delivery demands for all of its Colorado River supplies. This means that any new municipal and agricultural demand will have to rely on groundwater or acquisition of surface water from existing users to meet their needs. In fact, without groundwater pumping, the state currently would experience a shortfall of approximately 3 maf annually. As a result, Arizona is actively engaged in recharging unused Colorado River supplies in aquifers within the CAP service area. This water will be

withdrawn in the future when shortages occur due to excessive demand or drought

Future municipal demand is expected to be satisfied by the purchase and retirement of water rights on farmland. Arizona is fortunate to have substantial amounts of agricultural land surrounding Phoenix and Tucson, the state's major metropolitan areas. In addition, as a result of completed or pending Indian water settlements, some tribal communities may be willing to lease a part of their long-term rights to water supplies to municipalities in the future. One example is the 99-year lease of rights to Colorado River water delivered through the CAP, from the Ak-Chin Indian Community to Anthem, a master planned community in northwest Phoenix.

### *★ Limited Water Supplies Could Change the Pattern of Growth throughout Arizona*

Arizona's water supplies will have to be rebalanced, shared and reshuffled to meet the state's growing demand for water. The state's communities will be faced with difficult choices: limiting urban growth (unlikely), restricting water usage through voluntary and mandatory measures (likely), retiring agricultural uses and transferring the water to urban uses (very likely) or leasing water from tribes to supply cities (occurring today). These choices are not mutually exclusive. Any one or combination of approaches will require careful consideration and planning by local and state leaders, taking substantial amounts of time and money. But with a projected shortfall in the state's water supply by 2030, there's no time like the present to begin the debate to make smart water choices for Arizona's future.





*thinkAZ is an independent, non-partisan research institute dedicated to providing thorough, accurate and impartial information on public policy issues that impact the economic and social well-being of the state.*

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## ENDNOTES

- <sup>1</sup> Arizona Department of Economic Security, Office of the Director. (March 1991). *July 1, 1990 Population Estimates for Arizona's Counties and Incorporated Places.*
- <sup>2</sup> Arizona Department of Economic Security, Research Administration, Population Statistics Unit. (February 1997). *July 1, 1997 to July 1, 2050 Arizona County Population Projections.*
- <sup>3</sup> Arizona Revised Statutes, Title 45, Chapter 2, Laws 1980.
- <sup>4</sup> Arizona Revised Statutes, Title 45, Chapter 1, Article 1, Section 108. See also A.A.C. R12-15-703.
- <sup>5</sup> Arizona Revised Statutes, Title 32, Chapter 20, Article 4, Section 2181.
- <sup>6</sup> Arizona Revised Statutes, Title 48, Chapter 22, Article 4, Laws 1993.