

Chapter 7

WATER SUPPLY AND MANAGEMENT BEYOND THE ACTIVE MANAGEMENT AREAS

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The Groundwater Management Act (GMA) has provided a sound framework for water management in the Active Management Areas (AMAs). This chapter discusses state, watershed and community-based regulatory and non-regulatory efforts to manage water supplies for municipal and industrial purposes *outside* of AMAs. Water supply availability and other rural water issues also are addressed in this chapter. Beyond the boundaries of the AMAs, there are few regulatory programs addressing groundwater management, very limited opportunities to access imported water supplies and only sporadically reported water use data.

ACCESS AND AVAILABILITY OF GROUNDWATER, SURFACE WATER AND EFFLUENT

From a water supply perspective, access to imported surface water is the major characteristic that distinguishes the central Arizona AMAs (Phoenix, Pinal and Tucson) from the rest of the state, including the Prescott and Santa Cruz AMAs. Many communities and tribes along the Colorado River in western Arizona have Colorado River water contracts and, consequently, their water supply circumstances differ markedly from other parts of the state. For those without contracts or with allocations smaller than their needs, legal access to Colorado River water remains an issue.

Water providers and communities throughout the state are concerned about access to water supplies sufficient for future growth. Although effluent use is prevalent in major municipalities, that source is relatively rare in the rest of the state. Outside of the AMAs, effluent is now a significant source of supply only for Flagstaff, Payson, Sierra Vista and a few smaller commu-

nities, such as Tusayan.

There are two major water supply distribution systems in the state, the Salt River Project (SRP) and the Central Arizona Project (CAP). The watershed of the SRP system extends significantly beyond the AMAs, but the benefits accrue primarily within the Phoenix AMA. SRP, which began operating in 1903, was the first multi-purpose federal reclamation project and currently delivers more than a million acre-feet of water to its water service area of 240,000 acres and other lands in the Phoenix metropolitan area. On average this supply is about two-thirds surface water and one-third groundwater. The CAP system is interconnected with the SRP system, providing maximum flexibility for conjunctive management. This has proven to be extremely beneficial in the context of the recent drought, but does not result in enhanced water supplies outside the AMAs.

Availability of water supplies has multiple components. Physical access to water is the limiting factor in many places where there is no surface water and where groundwater may be either very limited or difficult and expensive to withdraw. Reliability of supply also is important, since some supplies are subject to seasonal or drought-related shortages. In some cases, physical availability is not a problem, but there are legal impediments to the use of the water such as a senior water right holder with a court decreed right to a particular supply. Financial access is the third major challenge. If water supplies are available and water rights issues are resolved, there still may be inadequate financial resources to build the required distribution and/or storage system.

If major new pipelines or canals are constructed in the future to transfer water supplies within the state, financial constraints may require a federal partner in the project. In some cases, the partnership may develop as a component of Indian water settlements. Among the options that have been evaluated is the piping of Colorado River water from Lake Powell south to Flagstaff and then west to Williams and also east onto the Navajo and Hopi Reservations. Multiple other water transfer, storage and exchange options are under consideration, including some that focus on moving groundwater from one location to another. Water transfers generally entail multiple

legal, economic and political issues that may prove difficult to overcome. Currently transfers of groundwater between basins are prohibited except for specific exemptions.

Communities that have considered the need to import water supplies to address expected increased demand include Williams, Flagstaff, Grand Canyon Village-Tusayan, Pine-Payson-Strawberry, Sierra Vista, the Navajo and Hopi Reservations and municipal users inside the Prescott AMA.

WATER MANAGEMENT

Water Adequacy Program

As a consumer protection measure, a statewide water adequacy program has been in place since 1973. The Water Adequacy Program, described in A.R.S. § 45-108 and in rules adopted by the Arizona Department of Water Resources (ADWR) in 1995 (R12-15-715—R12-15-725), requires subdivision developers to obtain a determination from the ADWR regarding the availability of water supplies prior to marketing lots. Developers are required to disclose any inadequacy of supply to potential buyers, but subdivisions can be and frequently are approved in areas where the water supply is inadequate. Furthermore, the disclosure is required only in the initial public report and, therefore, subsequent buyers generally are unaware of the water supply conditions. In many cases, developers do not even submit hydrologic information to request an adequacy statement and simply request that the department quickly issue them their inadequacy letter so they can proceed with the approval and marketing of the subdivision.

Within the AMAs the Assured Water Supply (AWS) Program does not allow new subdivisions if the water supply is inadequate to serve the proposed use for 100 years. However, the Water Adequacy Program is the only regulatory mechanism addressing water supplies for new subdivisions outside of AMAs. Although the authority of the ADWR does not ensure adequacy of water supplies for new subdivisions outside of AMAs, other jurisdictions have even more limited authority to address the connections among land use, population growth and water supply. This situation is particularly frustrating to county land use jurisdictions, which have more

limited powers than cities and towns to deny approval of, or limit the size and density of, new subdivisions. In spite of the limited authorities available to counties, efforts have been made to coordinate land use plans with water supplies (Appendix N). The Water Adequacy Program is clearly an insufficient tool to coordinate water supply with land use and population growth, yet it currently is the only regulatory tool available.

Growing Smarter Water Planning Efforts

An effort to address growth-related issues and urban sprawl resulted in the passage of the Growing Smarter Act of 1998 and the Growing Smarter Plus Act of 2000. Taken together, the Growing Smarter legislation was intended, on the one hand, to provide a framework for comprehensive land use planning and zoning, including the acquisition of open space and, on the other hand, to give residents of Arizona cities, towns and counties some tools to shape growth in their own communities. The legislation includes the right to vote on general plans and restrictions on how general and comprehensive plans can be amended. Growing Smarter Plus requires a water resources element from: (1) municipalities with a population over 2,500, unless they have a population under 10,000 and have an annual growth rate of less than two percent and (2) counties with populations greater than 125,000. There are four counties and 23 communities outside of AMAs that are required to produce a water resources element under these criteria. The legislative language (Appendix O) requires identification based on existing data for:

- Known legally and physically available supplies,
- Future demand for water, and
- How demand will be served by currently available supplies or a plan to obtain the necessary supplies.

In 2003 ADWR circulated a questionnaire that was sent to all cities, towns, counties, Indian tribes and water providers to identify water issues and concerns outside AMAs. The county version of the 2003 ADWR Rural Water Resources Questionnaire included multiple

questions related to the Growing Smarter legislation and its effectiveness. Findings included observations that:

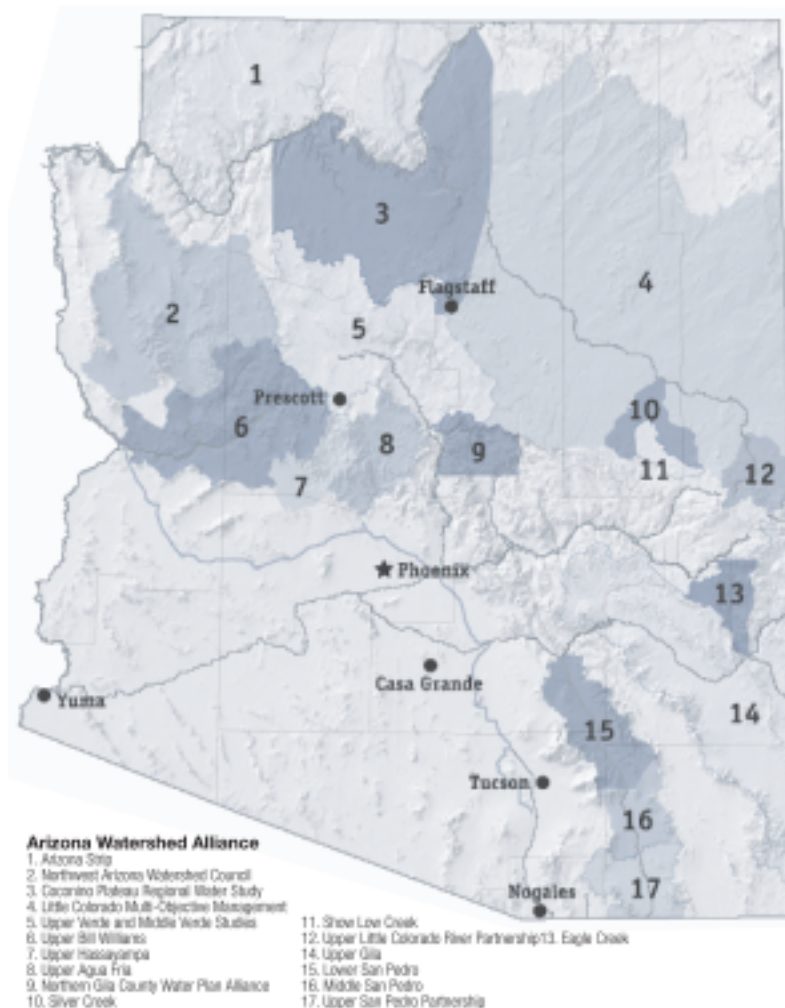
- The Growing Smarter legislation appears to have had a very limited impact on improving the coordination between water management and population growth;
- Although many non-AMA jurisdictions have reported that this was a useful exercise, data are inadequate for meaningful planning, and the lack of enforcement means that the effort will be very uneven at best;
- No new state financial resources have been provided to counties or communities to develop the needed information; and
- Although the legislation appears to give counties some authority in water resource planning, the focus seems to be on looking for water resources to facilitate projected growth and not on considering the impacts of growth on available water resources or developing a “carrying capacity” concept.

Counties have found preparation of the water resources element to be difficult. The requirement is particularly difficult for the many rural municipalities that have no control over the water suppliers within their jurisdictions. This means that the entities that actually run the water systems and decide who to serve are not within the control of the land use planning authority and themselves have no planning requirements. There frequently is little coordination between the water companies and those who must submit the water resources element. The principal benefit of the requirement for a water resources element is that it has made apparent the critical lack of information and coordination in rural areas of Arizona. Within AMAs, the Growing Smarter legislation appears to offer no benefit not already provided by the AWS Program.

Watershed Initiative Efforts

The call for an increasing focus on water issues in the non-AMA portions of the state began to emerge during the mid-1990s. The ADWR encouraged these areas to form regional groups of stakeholders to work towards local solutions to watershed problems. **With technical assistance from the ADWR, 17 watershed groups formed to conduct water resource stud-**

Figure 7.1
Arizona Watershed Alliance



ies and evaluate management options. Figure 7.1 illustrates the Arizona Rural Watershed Initiative participants. Several of the watershed groups were started as part of a water quality planning effort by the Arizona Department of Environmental Quality, while others were initiated in response to the Watershed Initiative effort of the ADWR. The groups vary substantially in terms of resources and staff support, ranging from the Upper San Pedro Partnership that receives significant funding from the federal government, has staff support and a well-articulated mission, to other groups that do not meet regularly, have no staff support and an unclear agenda. Of the 17 watershed groups established through the ADWR Rural Watershed Initiative, 15 are actively

working on regional solutions to water problems with the ultimate goal of developing a comprehensive water resource management plan for each. The Coconino Plateau Water Advisory Council, the Upper and Middle Verde Groups, and the Upper San Pedro Partnership are the most active and have the most resources available to them. The groups formed the Arizona Watershed Alliance in 2000 to enhance coordination and raise the visibility of their issues.

The Rural Watershed Initiative was funded by the Legislature in 1999 at \$1.2 million to assist the groups with development of information to support water resources planning in their areas. Although funding has diminished since then, matching funds from other entities have assisted in keeping key projects funded and moving. The main projects funded by the Initiative are U.S. Geological Survey hydrologic studies in the Coconino Plateau, Upper and Middle Verde, Mogollon Highlands and San Pedro areas. None of these studies has been completed to date, although preliminary work products are available.

Key issues for the watershed groups are: (1) most are entirely volunteer groups, with no paid staff, and thus are severely constrained in their ability to accomplish a cohesive planning effort; (2) inadequate hydrologic data; (3) key players, such as the managers of water companies, are in many cases not part of the conversation; and (4) the multiple water management entities involved have little incentive or ability to forge regional cooperative efforts. The absence of key players makes meaningful planning very difficult. If the development of a readily accessible rural water supply database is to occur, significant investments are needed.

The Watershed Initiative is focused on locally initiated efforts to manage water supplies. The key advantage to this approach is empowering local citizens to find solutions that match the specific problems in their own regions. However, given the strong private property rights sentiment in rural Arizona, it is not clear that all of the watersheds can find meaningful solutions that generally are acceptable to the residents. A key issue is the lack of water management and land planning authority.

In addition to the Rural Watershed groups, there are multiple other water-related groups that address issues in the non-AMA portions of the state. They include the Navajo Nation's

Municipal and Non-municipal Task Forces, the Oak Creek Canyon Task Force, the Mohave County Water Authority, the Yavapai County Water Advisory Council, the Northern Arizona Municipal Water Users Association and the Verde Watershed and Natural Resources Association.

Regional Water Management

There is interest in the non-AMA areas in establishing regional water management entities to oversee the planning and management of water resources within watersheds. This issue was raised as a top priority at the Arizona Watershed Alliance meeting in Globe in December of 2002 and has continued since then to be discussed in various forums, including Representative Tom O'Halleran's "Water Group," an ad hoc group of interested parties. **Many rural entities are concerned that state-level regulatory entities will not develop appropriate solutions to local problems, and that local management would be more acceptable.** However, there are very significant legal, financial and representational issues that need to be resolved if effective regional entities with the legal and financial capability to implement water management solutions are to be established. Experience with one such district, the Santa Cruz Valley Water District within the Tucson AMA, demonstrated that such issues could undermine the structure of the local entity, despite good intentions. The Santa Cruz Valley Water District was begun under provisional authority but was unable to resolve taxation and representation issues and dissolved prior to final establishment (Megdal, 2003).

Land use planning entities, particularly counties, are frustrated that they do not currently have authority to consider water adequacy in approving new subdivisions. Although several counties historically have used inadequate water supplies as a rationale for denying a subdivision plat, the practice is not widespread. New subdivisions are allowed under the Water Adequacy Program outside of AMAs even if the water supply is found to be inadequate by ADWR. The only legal requirement is that the inadequacy finding be disclosed in the public report for the initial owners of lots in such subdivisions. There have been numerous discussions of ways to

resolve this issue so that counties can have discretion to deny subdivision plats without being in conflict with state statute. However, clear Arizona legislative authority for counties that choose to use water supply availability, as determined by ADWR, as a condition of platting or zoning could be an effective tool.

Conservation Efforts

Most potable water conservation efforts to date have occurred within AMAs, though there are notable exceptions such as the Town of Payson, the Upper San Pedro Partnership and the City of Flagstaff. Statewide conservation efforts have been very limited. Governor Napolitano's Executive Order of March 2002 establishing the Arizona Drought Task Force contains a requirement to "[d]evelop and implement a statewide conservation education strategy that emphasizes educational advertising for good water habit development" and to form a work group on Conservation Education to "design an educational advertising plan for use in water conservation education throughout the state, but focused on rural areas." The statewide conservation strategy currently is under development, but some educational programs now are promoted widely throughout the state.

Payson, for example, distributes conservation literature, has a rebate program for conservation investments, adopted conservation-oriented ordinances restricting turf and requiring low water-use landscaping and waterless urinals in public restrooms, has conservation-oriented hook-up policies, applies short-term water restrictions in response to drought and reuses its wastewater for recharge and irrigation. Flagstaff uses all of the same methods except for conservation-oriented hook-up policies and significantly has restricted outdoor watering year round in response to drought.

Conservation opportunities exist outside the AMAs, in particular because many delivery systems are not fully metered. However, potable water use on a per capita basis in the rural parts of the state is relatively low in comparison to the larger urban areas. This is in part due to the lack of available surface water for landscape irrigation. In addition, some parts of the state lack ad-

equate water delivery infrastructure. For example, water users on the Navajo Reservation, where up to 50 percent of the rural residents haul their own water, use as little as ten gallons per person per day. Many rural communities are resistant to the idea of conservation regulations since they witness the higher water use rates within the AMAs. However, the differences in temperature and precipitation throughout the state do result in higher demand for landscape water in the lower desert areas, so these factors need to be taken into account when assessing water use efficiency. Demand reduction is an option in some rural areas, but conservation yields are limited in cases where there is already little discretionary water use.

Conservation opportunities in the non-AMA portions of the state include:

- System improvements to reduce leaks and enhance monitoring,
- Expanding the use of meters,
- Price-related conservation signals, such as rate structures that charge more for higher volumes of water use,
- Ordinances limiting high water-use landscaping and encouraging appropriate landscape irrigation design and scheduling,
- Financial or other incentives for replacing high-water use fixtures with conserving appliances, removing high water-use landscaping, incorporating water harvesting (collection of storm water), gray water (water from sinks and washing machines) and effluent for landscape applications in new developments, and
- Conservation-oriented hookup policies and building code provisions.

Results from the Rural Water Resources Study questionnaire indicated that many water providers in rural Arizona would like assistance with establishing or expanding their conservation programs. There is a high degree of interest in conservation as a water management tool, but it has not been a high priority for many providers who may not have the resources or training to pursue it. A statewide conservation office that would assist with conservation technology and information transfer has been proposed on multiple occasions but has not yet been established.

Local Drought Planning and Mitigation Efforts

Significant impacts of drought outside of the AMAs include: ranchers reducing herd size by two-thirds statewide over the past five years; severe wildfires in the mountains; widespread

bark beetle infestations and die-off of up to two million ponderosa and pinyon pines; forest closures limiting recreation opportunities; and health and safety concerns in many municipal supply systems due to inadequate water supplies. The visibility of this issue has resulted in strong interest in developing a state drought plan in order to limit such impacts in the future, with particular focus on rural areas. Drought response efforts to date have focused entirely on reactive mechanisms, such as hauling water, that may not reduce risk in the longer term.

The Governor's Drought Task Force has focused on the need for drought planning within rural communities because the major metropolitan areas have more water-supply options available. Assessment of vulnerabilities and development of mitigation strategies is expected to be an ongoing process in the hope that the impacts of future droughts will be less substantial. However, the lack of alternative supplies in many rural areas leaves them with a high degree of vulnerability.

Legal limitations on the ability to transfer groundwater across basin boundaries also pose some unique challenges in the context of drought. The 1991 Groundwater Transportation Act was intended to protect rural areas from having their water exported to the AMAs to meet AWS requirements. The Act, along with 1993 amendments, prohibits moving groundwater from one basin to another, with certain specified exceptions. Ironically, it is now the rural areas that seek to move groundwater from one basin to another in order to alleviate severe shortages outside the AMAs. Exceptions to this prohibition have been allowed by ADWR permit, pursuant to annually re-adopted emergency legislation each year, over the last few years of severe drought conditions.

One focus of the Operational Drought Plan is on improved monitoring of climate conditions and impacts as well as on enhancing the reliability of municipal supply systems. However, individual well owners in shallow and fractured rock aquifers, where productivity may be very low, often feel drought impacts. High densities of domestic wells exacerbate the drought impacts in some areas. The ADWR is monitoring public contacts related to individual well problems, but this is a more difficult issue to address than water supplies for larger water systems. The Arizona

Drought Preparedness Plan currently is evolving and the specific structure of the adaptation and mitigation efforts is not final.

Other than the Navajo Reservation, which recently adopted a sophisticated drought plan with assistance from the Bureau of Reclamation and the National Drought Mitigation Center, no communities or jurisdictions outside of the AMAs have officially adopted drought plans. Jurisdictions and water providers that have had specific problems meeting water demand in their areas have instituted drought-related conservation requirements and water use restrictions such as those in Flagstaff and Payson. However, these were not in the context of a long-term drought response or mitigation plan.

Curtailment plans exist for roughly 30 private water providers regulated by the Arizona Corporation Commission (ACC). Some of these plans have been put in place in response to emergency conditions experienced within the provider's service area. Others were implemented as part of a revised ACC standard procedure that requires these plans as part of the implementation of a new rate structure. The curtailment plans are not focused specifically on drought, but instead on any problem that can cause a shortage of available supplies. In addition, they are not focused on adaptation or mitigation options that would prevent the shortage in the first place. Instead they focus just on restrictions of customer use during the duration of the problem. However, once they are in place, they provide the water company with authority to restrict water deliveries to their customers in order to avoid more serious consequences.

A recommendation in the draft Drought Preparedness Plan is that all communities adopt a drought plan for their own community. It is not clear at this time whether this recommendation will become a requirement, and whether resources to support such activities will be available.

OTHER WATER ISSUES

Water Supply and Growth

The connection between water supply problems, drought and growth is complex. A traditional perspective is that water supply availability is an incentive for growth, and that lack of supplies is a significant disincentive. Yet, water is being hauled from standpipes (water supply

valves used for filling tanks) and from larger communities as a regular business practice in much of rural northern Arizona even in the absence of drought. The willingness to haul water may mean that the theory that inadequate local water supplies limit growth does not apply. Still, it is impractical and shortsighted to build communities without access to dependable water supplies. **Many communities, especially in northern Arizona and on the Mogollon Rim, already have hit a threshold relative to their ability to serve new customers.** However, the absence of an enforceable water adequacy requirement means that most of these communities continue to grow even though their water supplies do not. There clearly are health and welfare implications, and state and federal agencies already have been involved in “bail-out” activities, *e.g.*, water hauling, that do not increase the likelihood of the development of a long-term solution.

Exempt Wells and Lot Splitting

“Exempt wells” are domestic wells with a maximum capacity of 35 gallons per minute. They are exempt from regulation statewide, except that they must be registered, a Notice of Intention to Drill must be filed with ADWR and they must be drilled by a licensed well driller in accordance with state well construction standards. Exempt wells are common in rural Arizona and are the primary source of drinking water in many areas, particularly where lots are split without going through the subdivision process. A significant increase in the number of exempt wells being drilled has been documented in every county in the state. In most counties, the number of exempt wells drilled quadrupled between 1997 and 1998, and the high rate of well drilling continued through 2002. There are significant restrictions on the use of such wells, including the requirement to have a water right in order to use them and annual measurement and reporting of water use.

In the ADWR Rural Water Resources Study Questionnaire, virtually all counties indicated that lot splitting and exempt wells were a major concern, though only five water companies indicated exempt wells affected water availability for their company. Under current Arizona real estate law, parcels can be split into up to five lots without requiring subdivision review. This

practice is prevalent in rural, unincorporated parts of the state, and in many cases is the primary source of new residential lots.

Since 1977 there have been efforts by the County Planning Directors to address the issues associated with parcel splitting. Because a significant proportion of growth in rural communities is occurring through this unregulated, unmonitored process, often referred to as “wildcat subdividing,” coordination of land use and water supply availability is needed. Other impacts associated with lot splitting include multiple problems associated with road-building, maintenance and access, inadequate sewer, water, solid waste, electric and gas service, health hazards and erosion associated with dirt roads, inadequate addressing and road systems for emergency response, lack of flood and fire protection and inadequate school facilities.

The primary means of providing water to areas with multiple parcel splits is through exempt domestic wells, and the vast majority of lots are served by septic systems rather than sewer facilities. Installing exempt wells too close to septic systems can result in health hazards. In many cases the water supply for multiple domestic wells that are in close proximity to each other is inadequate. Multiple exempt wells in close proximity to each other may dewater the area if the aquifer is not very productive, leading to the need to deepen wells, drill new wells or haul water. Although those who split lots into multiple parcels reduce their own development costs by not going through the subdivision process, there are substantial taxpayer costs associated with bringing such developments up to county codes when improvements eventually are made. These public costs could be reduced if the services were planned for prior to development and easements for access were provided. The Arizona Department of Real Estate, with responsibility for enforcing the subdivision laws, has limited compliance capability. Illegal lot splits generally are investigated after the fact, and there is little recourse at that point.

Legislative efforts to address the lot-splitting issue occurred in 1978, 1994, 1995, 1997 and 2000. The Growing Smarter Plus legislation in 2000 required an affidavit from the seller to the buyer in a lot-split, disclosing information regarding access, roads, utility availability, wells and septic tanks. The buyer is required to record the affidavit. However, the overall issue is

largely unresolved and in some ways counties are now more restricted than previously in their ability to address lot-split issues. A subdivision was defined as four or more lots prior to 1994. Legislation changing the definition to six or more lots actually exacerbated the problem by increasing the number of lots that can be created without going through the subdivision process.

Inadequate Data and Resources for Planning

Virtually all watershed groups and communities outside of the AMAs are hampered by inadequate hydrologic information, although some basins, such as the Upper San Pedro, have been extensively modeled. Most counties and jurisdictions also have indicated that they have inadequate information with which to plan for future water needs. This was a priority issue at the Arizona Rural Water Planning Conference held in Globe in December 2002. **Groundwater supplies are very difficult to estimate in undeveloped areas.** As more wells are drilled, there are increased opportunities to log the aquifer characteristics and measure water levels. Even in basins that have a significant number of wells, however, there may be inadequate drilling logs.

The AMAs have a great advantage over areas of the state outside the AMAs regarding the availability, amount and quality of information. Since 1984, all water pumped from wells over 35 gallons per minute in AMAs has been required to be measured and reported to the state by the well owners. This has resulted in an excellent database. **There is virtually no annual pumpage information outside of AMAs because metering is not required.** This also limits the ability to encourage efficiency in water delivery systems, since losses are generally not calculated. Without measured pumpage data, it is difficult to correlate changes in water levels with inflows and outflows to an aquifer. A basic inflow-outflow calculation for a basin is key to understanding whether additional growth can be sustained in the area.

Well Spacing

Within AMAs, new large (non-exempt, over 35 gallons per minute) wells are evaluated for impacts on other wells in the vicinity before they are permitted. If the impact of the new well

will exceed ten feet of additional drawdown over a five-year period, the application will be denied unless the impacts are mitigated. Outside of AMAs, there are no well spacing requirements. This is yet another way that rural areas are at a disadvantage, because water users are not protected from impacts of new large wells.

POTENTIAL CHANGES IN INSTITUTIONS, POLICIES AND REGULATIONS

Over the past few years, legislative proposals have been discussed that would address some of the issues described above. These include provisions to allow counties to consider a finding of inadequacy of water supply in platting decisions, requirements for a regional evaluation of water supplies in the context of Growing Smarter water elements, limitations on new exempt wells within municipal water service areas, provisions to control lot splitting and requirements that 100 years of water be available for new developments outside of the AMAs. Though the specifics of these proposals continue to evolve, there is considerable controversy. It is not clear that an AWS provision for areas outside the AMAs could require use of renewable supplies as they do within the AMAs, since there is no CAP supply available and other renewable sources are prohibitively expensive in many areas. To date, there has been resistance to the introduction of any form of assured water supply requirement in the non-AMA areas of the state.

Though watershed groups and local jurisdictions have supported the establishment of regional water management entities, questions remain about how such groups would interface with state regulatory authorities, whether effective programs can be implemented on a voluntary basis, who will have authority to implement and enforce any regulatory provisions and how the efforts would be funded. Legislation passed in 2003 did authorize the formation of voluntary, multi-jurisdictional water infrastructure financing authorities to assist smaller jurisdictions in joining together to fund infrastructure projects.

By establishing different management goals and allowing for the development of AMA management plans, the GMA recognized that water management activities need to be tailored to

local conditions. Aside from major differences in physical water supply availability, communities differ in attitudes about the need for new regulations, potential for access to renewable supplies, acceptability of proposals to transfer water and in ability to pay for technical assistance and new infrastructure. These differences make implementation of a rural regulatory framework challenging and may require an incremental approach.

DRIVERS IN LOCAL WATER MANAGEMENT EFFORTS

Despite the challenges associated with the diversity of water sources, geohydrology, environmental considerations and growth rates, progress toward developing and implementing water plans is being made in some non-AMA areas. Why? Progress can be attributed to the existence of “drivers” or external pressures on the system, as illustrated in the following examples.

The Upper San Pedro Partnership

Key drivers here are the need to maintain water flows for endangered species and to preserve the San Pedro Riparian National Conservation Area, while protecting Fort Huachuca and development in the Sierra Vista area. The futures of the Fort, riparian areas and endangered species all have federal as well as local implications. The combination of these major concerns resulted in the formation of the Upper San Pedro Partnership, historically an organization that was voluntary and consensus based, made up of local jurisdictions, federal and state agencies and environmental interests. They have now been given a federal mandate to produce a plan that would ensure a sustainable water supply, with specific reporting deadlines. Funding for necessary studies has been abundant because of the significant federal interest and the involvement of several members of Arizona’s Congressional delegation. The area has been studied for some time to determine if hydrologic conditions warrant the formation of an AMA. The area also is important to environmental interests due to high biodiversity and bird habitat. Without the high level of concern by various parties, and the financial resources that have been made available, it is unlikely that the Partnership would have been as successful as it has been.

The Upper and Middle Verde Watershed Groups

Key drivers in this region relate to meeting the water needs of a rapidly growing region in a way that does not adversely affect the environment that is largely responsible for the quality of life and economic vitality of the area. Concerns are focused on ensuring continued flows in the Verde River as well as protecting endangered species, while providing for continued growth. Addressing issues in this region is complicated by the fact that part of the watershed falls within the Prescott AMA. There are more than 20 associations and citizen groups interested in addressing these issues, including the Yavapai County Water Advisory Committee that is staffed full-time by the County. Recently a consortium was formed to enhance communication and collaboration. Even though many studies have been done and are underway, more work remains. Recent deliberations regarding the Yavapai Land Exchange, which would exchange federally owned land for private land in disconnected parcels, have engaged Arizona's United States senators in the discussion. Federal legislation has been contemplated, modeled to some extent on the Upper San Pedro Partnership, that would provide financial resources as well as a requirement to develop a plan.

The Colorado Plateau

The Colorado Plateau is an area with diverse populations and geography. The main driver is the need to supply water to meet Indian and non-Indian demands in the face of limited access and/or rights to renewable water supplies. There are concerns about the impact of the Peabody Coal operation on water supplies and important springs across the Hopi and Navajo lands. The City of Flagstaff has successfully used a variety of conservation measures that have reduced per capita water use one percent per year since 1990. Although Flagstaff has made strides in reducing water use, the city and others in the region have yet to agree upon plans for augmenting water supplies. Water rights of the Navajo and Hopi Nations are under consideration by the courts and may ultimately be decided in a settlement agreement with state, federal and local

parties that could result in new imported water supplies, most likely from the Colorado River. However, there are numerous legal obstacles to a solution.

SUMMARY

Water issues outside of the AMAs are challenging, and in some cases ensuring a sustainable water supply may not be possible without importing water from elsewhere. **The impacts of drought are more severe in many areas outside the AMAs because of the limited size of aquifers and the absence of multiple water supply sources, and financial resources are scarce because of the relatively small size of the rural economies.** There are polarized views held by, on the one hand, those whose primary concern is protecting the quality of life that drew them to the area in the first place and, on the other hand, private property rights and development interests. Resolution of the water supply and growth issues will require significant leadership and foresight as well as investments in renewable supplies. Despite these challenges, the likelihood of positive outcomes in the areas listed above seems high because financial resources are available and there is a federal interest in resolution. Also, the magnifying power of drought has helped to reveal the extent of the problem and helped to concentrate the thinking of those involved.