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**ARIZONA WATER MANAGEMENT:
NEW PROBLEMS AND NEW SOLUTIONS**

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**Sustainable Use of the West's Water
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**Arizona Water Management:
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Herb Dishlip

I. INTRODUCTION

A. The Importance of Water

Arizona is known as the Grand Canyon State. Arizonans point with great pride to the Grand Canyon as a representation of what our state is about. It is vast. It is beautiful and majestic. It is both unpopulated and wild, and overcrowded and commercial at the same time. Ancient people lived, hunted and farmed on the canyon's rim. Today millions of modern people from all over the world travel thousands of miles to visit and experience the canyon's wonders. At the very heart of the Grand Canyon is a small ribbon of water, the Colorado River. From the viewpoints on the rim, the River looks more like a small creek than a mighty river capable of carving out such an enormous canyon. However, in Arizona, we have accomplished great things with a relatively small amount of water.

As with the Grand Canyon, water is at the heart of Arizona's economy, environment, and lifestyle for our citizens. The competing demands for water are great. The questions of who has rights to the water and to how much has led to much political debate and seemingly endless litigation. However, while wrangling and suing over water continues, Arizona has also made great progress toward solving problems through cooperative efforts. These efforts have resulted in new and innovative solutions to managing a limited resource. The focus of nearly all of these plans, laws, and regulations has been to find ways to share the limited supplies to preserve the environment and expand our economy in a sustainable manner.

B. Overdraft vs. Sustainability

The importance of the policy of sustainability of water supply has been recognized for a long time, but only recently has Arizona been willing to take the steps to ensure its implementation. For the past sixty years Arizona has not been living within its sustainable

supply. We have been supplementing our renewable water resources with groundwater which is mined from our aquifers. What started as a reasonable water management approach to use well-water to fill in gaps when surface water was unavailable, quickly grew into a significant groundwater overdraft situation. Long term overdraft lowered water table levels, caused land subsidence, and severed the hydrologic connection of the aquifers to perennial rivers and streams. Today, Arizona is facing these problems head on and trying to find new approaches for the future.

II. THE IMPACTS OF GROWTH

Arizona's population has grown dramatically since the end of World War 2. Recent trends have been striking, and growth has not been without associated growing pains. All indications are that growth trends will continue if not accelerate in the future. Adequacy of water supplies for current and future municipal uses have moved to the front of the line as the priority water management issue in the state. Urban growth has led to a variety of issues, from the need to develop and transfer water supplies from rural areas, to the need to increase recreational opportunities.

A. Land Ownership

The availability of private land is one of the key driving forces in urban growth. However, only about 20% of Arizona's land base is privately owned. The result of the land ownership pattern is that most growth is occurring and is likely to remain in concentrated clusters. These cluster areas lead to high population density in the Phoenix and Tucson metropolitan areas, but extremely low densities throughout most of the rest of the state.

B. Economic Drivers

Official population predictions estimate that Arizona will grow from 3,660,000 people in 1990 to 9,400,000 in 2040. Corresponding demands for municipal and industrial uses of water were estimated at 1,332,000 acre feet in 1990, and are expected to nearly double to 2,605,000 acre feet by 2040. Economic growth has been particularly affected through specialization in the resort and tourist industry, semiconductor manufacturing, and the construction of many retirement communities.

C. Dealing with primary impacts

1. Assured Water Supplies

In 1980 the Arizona Legislature came to grips with the problems the state faced from long term groundwater overdraft. The passage of the Groundwater Management Act resulted in the reformulation of the previous Groundwater Code and replaced it with a new approach which had as its focus the achievement of safe yield by the year 2025 in three critical groundwater basins. These basins, which included the major metropolitan areas of Phoenix, Tucson, and Prescott, were designated as Active Management Areas or AMAs. A fourth AMA in the agricultural area of Pinal County was also created, but a safe yield goal was not established there immediately, although the importance of a secure municipal and industrial water supply was clearly recognized.

One critical component of the Groundwater Code was a provision known as assured water supplies. These statutes require that prior to allowing new subdivisions that are located in AMAs to be platted and offered for sale, the developer or municipal water provider must first demonstrate that they identify enough water to meet the needs of the subdivision for 100 years. The critical factor in this demonstration was that the supply sources must be consistent with the achievement of the management goal. This means that only a very limited amount of mined groundwater should be used for new subdivisions. This dramatic change in water management direction is founded on the premise that it is particularly critical to the economy and welfare of the state that municipal uses be based on a sustainable water supply.

In 1995, the Department of Water Resources completed the long arduous steps to implement the assured water supply provisions by adopting new rules. The rules, which are now being implemented, heavily stress the importance of renewable water resources including Salt River water, Colorado River water made available through the Central Arizona Project, and reuse of effluent.

2. Water banks and exchanges

In order to cope with the problems associated with converting municipal users to renewable supplies, the state enacted a number of new laws which focus on making for an easier transition. First, a Groundwater Replenishment District (GRD) was created. The GRD will guarantee that lands which are enrolled in the District will meet the safe yield requirements by committing to replace or replenish any water which the subdivision mines from the aquifers. While the replenishment may not occur in the exact location where groundwater is pumped, it must be in the same AMA and preferably in the same groundwater sub-basin. Second is a comprehensive law dealing with artificial groundwater recharge. Surplus renewable water supplies such as CAP or effluent may be banked for future use by storing the water underground. The storage may either be direct, through facilities such as spreading basins, or indirect, by providing substitute water to a groundwater user who then reduces his pumping on an acre foot for acre foot basis. Third, the state has a comprehensive exchange law which allows the trading of water supplies. This mechanism allows lower quality water, such as effluent, to be traded for a potable supply, such as CAP water. These trades will greatly reduce the cost and increase the access to renewable water supplies.

3. Conservation programs

Water conservation programs have become widespread throughout the AMAs. A major portion of the focus of municipal water conservation has been on new construction - both residential and non-residential. New homes are being built with low flow plumbing fixtures and low water using landscape. These changes are occurring as a result of both incentive programs and regulatory programs. However, conservation standards still recognize that Arizona residents will use water to provide the kind of lifestyle they want to enjoy. For example, in Arizona the backyard swimming pool is a way of life, not a luxury.

In addition to conservation at home, major effort has been placed on non-residential conservation. Especially visible has been landscaping within rights of way for new roads and freeways.

D. Dealing with Secondary Impacts

1. Spillover effect on rural areas

While population growth is occurring primarily in the desert regions near Phoenix and Tucson, that growth is having definite spillover effects on other parts of the state. Especially affected are some of the mountain communities such as Payson, Pinetop, Sedona, and Flagstaff. Demands for second homes in the high country has put stress on those communities to develop additional water resources. Unfortunately, a sustainable water supply is often difficult to obtain both from a physical availability standpoint and from a water rights standpoint. Summertime water rationing has become a frequent problem in many of these areas.

2. Recreational and aesthetic needs

Non-consumptive uses of water have gained increasing importance as the state becomes more urbanized. Water skiing and boating at reservoirs, fishing opportunities, and other outdoor recreational needs have become important considerations for water resources planners. Within subdivisions, aesthetic uses of water for artificial lakes has been an issue. This is one area where the legislature felt that it needed to draw the line on the inappropriate uses of potable water. New subdivision artificial lakes in AMAs may now be constructed only if treated effluent is the water supply source.

3. Energy requirements

Arizona has been fortunate that enough electrical energy has been available to deal with growth in demand. A significant portion of the energy for meeting new demands is being provided by the Palo Verde Nuclear Generation Station west of Phoenix. Palo Verde's water requirements were very large and had the potential to be a significant source of new groundwater overdraft. Instead, the Arizona Public Service Company which constructed and operates the plant, solved their water needs by negotiating a long term contract with Phoenix area cities to purchase surplus effluent. While there has been some controversy over the low contract price Palo Verde was able to negotiate for the water, the water

management benefits of matching a lower quality source to a major water user who could live with a lower quality source has been widely recognized as innovative and positive.

III. NEW PROBLEMS FOR AGRICULTURE

A. Central Arizona Project Problems and Solutions

For decades, the Central Arizona Project was viewed by farmers who were using groundwater as their opportunity to obtain a renewable water supply. Major infrastructure investments were made in distribution systems to make water available. Unfortunately, economic conditions combined with the failure of several irrigation districts to contract for CAP after it was available, left the burden of purchasing CAP on the backs of only a few districts. Faced with high water costs, especially when compared with costs of pumping groundwater, those districts found that they were unable to continue to use the CAP. The benefits of sustainability were quickly outweighed by the practicality of making a profit.

Business and government leaders throughout the state began to appreciate that the farmers' plight had ripple effects on Arizona's economy and on other water users. If the farms did not purchase CAP someone else would have to pay the costs of operating and maintaining the Project. Also, the water management benefits of preserving groundwater for future needs would be lost. Rather than forgo those benefits, a plan was developed which created a tiered pricing structure for agricultural users. The tiered price, which will be offered for at least ten years, was a solution which priced CAP water competitively with groundwater, thereby allowing the farmers to turn off their pumps. While some have argued against the plan as nothing more than a subsidy for farmers, in fact, the price is set to not enhance a farmers profit, but rather to provide incentive to use a sustainable resource rather than a depletable resource.

B. Reacting to Urban Growth

Arizona's farmers have also been affected by urban growth. A great deal of land has been urbanized which reduces the land base for crop production. Because land and associated water conversion was envisioned as an important tool to help reach the safe

yield goal, the Groundwater Code does not allow new irrigated land to be put into production on non-Indian lands in AMAs. On the other hand, farmers have been able to react to increased local demand for specialty crops including fruits and vegetables. Some experimentation has occurred in growing apples in an area where transportation and marketing costs would have formerly made such a venture cost prohibitive. Not to be overlooked is the growing demand to milk and milk products. This demand has resulted in larger and more profitable dairy operations. Dairies in turn require increased levels of alfalfa production, thus diversifying the crop base and providing additional economic security. There has also been an increase in demand for subdivisions which have large lots which allow small pastures and opportunities for horse privileges. These are the signs of the changing nature of Arizona agriculture and how solutions have been developed to keep agriculture viable.

IV. NATIVE AMERICAN WATER RIGHTS AND USES

A. Win\Win Settlements

Arizona contains over twenty Indian Reservations or Communities. The reserved water rights associated with these reservations is potentially substantial, but remains substantially unquantified. Adjudication proceedings have been commenced in the Little Colorado River and Gila River drainages. These lawsuits have proven to be very lengthy and expensive. One of the primary purposes of the adjudications is to clearly define Native American water rights in order to result in greater certainty for the future.

Many of the Native American tribes have recognized that the establishment of large "paper" water rights may not be as beneficial as a smaller right which could be put to use immediately. Negotiated settlements which provided a financial package have been implemented on several reservations. Money has been provided to construct irrigation works and land preparation. In addition, several tribes have chosen to enter into long term lease back arrangements with Arizona municipalities for water that was surplus to the Reservations' current needs. These negotiated agreements have resulted in win\win situations. The Native Americans are provided with a clear establishment of their reserved rights without the time and expense of litigation, money is provided for development of

the rights which results in turning "paper" water into "wet" water, and municipal water providers have been able to augment their municipal supplies through lease-back arrangements.

B. Changing Attitudes Toward Water Uses

Traditionally, Native American communities looked to utilize their water supplies for irrigation. While this continues to be a prime focus for most reservations, many tribes are also recognizing other economic activity potential. Casino gambling has been established on several reservations and there has been a corresponding expansion of economic opportunities. The White Mountain Apaches own and operate the state's largest ski area. Several tribes whose reservations are in mountain areas realize that water used for recreation and wildlife purposes may have more economic benefit than irrigation. Others who are located near the urban centers have encouraged industrial and commercial enterprises on their land and have provided water for these endeavors.

V. PROTECTING THE ENVIRONMENT

A. Focus on Riparian Area Protection

Throughout Arizona there has been an increasing appreciation for the values associated with flowing streams and associated riparian areas. In 1990 Governor Mofford adopted an Executive Order establishing a policy to protect and enhance riparian areas. Several legislative proposals were made to protect riparian areas by establishing instream flow programs and by modifying water laws. Still, there remains a great deal of controversy about the best way to protect riparian areas and how proposed measures may effect existing water users or economic development potential in rural areas.

The Legislature has yet to pass any specific regulatory programs as yet, but it did commission several studies including a comprehensive analysis of the potential impacts of groundwater use on streams by the Department of Water Resources. These reports were presented to a 45 person Riparian Area Advisory Committee for consideration. The Committee, which deliberated for two years, made a series of recommendations and proposals to the Legislature. However, considerable controversy remains over the proposals and no action was taken last session.

B. New Roles for AMAs

One area where recognition of the inter-relationship between groundwater uses and riparian areas has been recognized is in a portion of Santa Cruz County near Nogales. This area was originally included in the Tucson AMA. Local residents felt that the broad basin-wide management approach of the Tucson AMA would not provide adequate protection for the Santa Cruz River which is perennial in that location. They approached the Legislature to separate their region into its own AMA so better local management could be provided. In particular, in this AMA there is recognition that water withdrawn from a well may legally be surface water rather than groundwater, but such water should still be subject to active management area practices and regulations. The expansion of the use of AMAs into environmental protection is a new concept, but one which has considerable benefit and merit.

C. Protecting the San Pedro River

Another area which has been identified as potentially threatened from future groundwater pumping is the San Pedro River near Sierra Vista. This area is so valuable as a riparian area that it has been designated by Congress as a National Riparian Resource Conservation Area. Local interests have investigated options for water management which will allow for additional urban growth and development while still protecting the river. An AMA was considered, but was rejected because it did not provide enough local control over regulation. As an alternative, a legislative proposal was prepared which contained many AMA type provisions but allowed regulatory and incentive policies to be adopted by a local board rather than the Department of Water Resources. This concept had limited support by the general community and did not go forward this session. However, the potential problem of protecting the San Pedro still exists, and efforts will continue to find acceptable water management solutions.

VI. SUSTAINABILITY OR SELF-DESTRUCTION?

Arizona has struggled with the issues associated with living on a sustainable water supply. Groundwater mining has been the supply upon which a great deal of current agriculture and municipal use was founded. Replacing that use with a renewable resource

base is why the state fought so hard to obtain and retain its entitlement to Colorado River supplies. The Central Arizona Project has long been seen as the mechanism to allow a sustainable or safe yield policy to be successful. New assured water supply rules will move toward a renewable supply in the municipal sector. However, the growth in the municipal area will have spinoff effects to rural development, to agriculture, to development of water resources by our Native American Communities, and to protecting environmental values. Thus far, Arizona has committed itself to solving these new problems with new solutions which support a sustainability concept. These new solutions tend to be more expensive than ones which allow mining of groundwater reserves, but state leadership and policy has maintained its commitment to manage water for the long term rather than succumb to short term pressures which may be less expensive, but could ultimately lead to self-destruction.