Trends in Non-Indian Agricultural Water Use[1] Within the Phoenix Active Management Area

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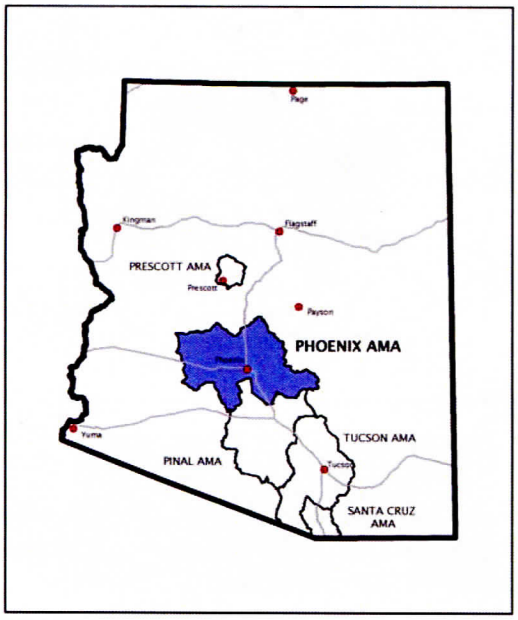
Introduction

The 1980 Groundwater Management Code (Code) established a groundwater management system that limits the withdrawals of groundwater and mandates certain conservation requirements for agricultural, municipal, and industrial water users within Active Management Areas (AMA). Figure 1 shows the location of the state's five AMAs. It should be noted that the Code does not regulate water use on Indian reservations.

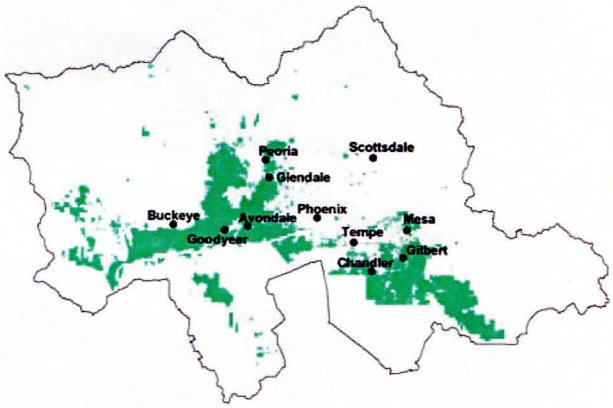
Figure 1.



For the agricultural sector the Code prohibits the irrigation of any land that was not irrigated between January 1, 1975 and December 31, 1979. Land that was irrigated during this time period was eligible to receive an Irrigation Grandfathered Right (IGFR).

Within the Phoenix AMA, approximately 389,000 acres were granted IGFRs. Figure 2 shows the location of IGFRs within the Phoenix AMA as of 2001. Because of the limitations on the ability to irrigate new lands, it was expected that as lands urbanized, agricultural water use would decrease. In addition, the Code established maximum annual groundwater allotments for individual IGFRs that generally decline over time.

Figure 2.



Phoenix Active Management Area
Irrigation Grandfathered Rights, 2001

The use of water for irrigated agriculture is dependent upon many factors including, but not limited to: the number of acres cropped; the availability and cost of water; agricultural market conditions; the cost of other agricultural inputs such as labor, capital, and energy; regulations; and available technology and management.

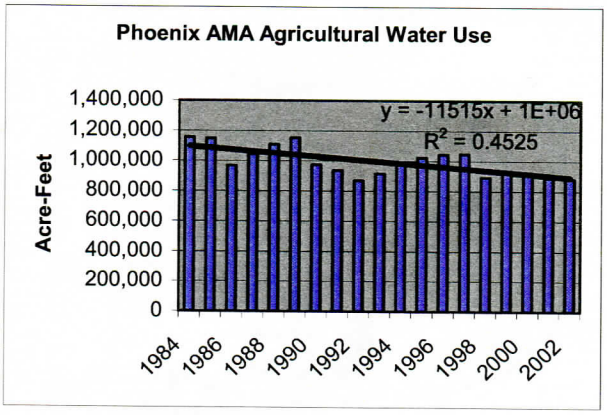
The purpose of this paper is to describe trends in agricultural water use within the Phoenix Active Management Area including water use trends within selected irrigation districts (districts). Differences and similarities between water use trends at the AMA and at the district level will be highlighted.

[1] Water use data used in the paper are from the Arizona Department of Water Resources and represent aggregated data, at the Active Management Area level and at the irrigation district level, from individual Irrigation Grandfathered Right annual reports.

Phoenix Active Management Area

Within the Phoenix AMA agricultural water users rely upon a variety of supplies including locally available surface water (Salt, Verde, Gila, and Agua Fria Rivers), imported surface water (Colorado River), effluent and groundwater. Total water use by non-Indian Agricultural within the Phoenix AMA is shown in Figure 3.

Figure 3.



There is an overall decreasing trend in water use during this time period. Although there are yearly variation in water use, the overall trend shows a decrease in water use of approximately 11,500 acre-feet (af) per year. Yearly variations in water use are likely the result of farm economic conditions and the availability of water supplies.

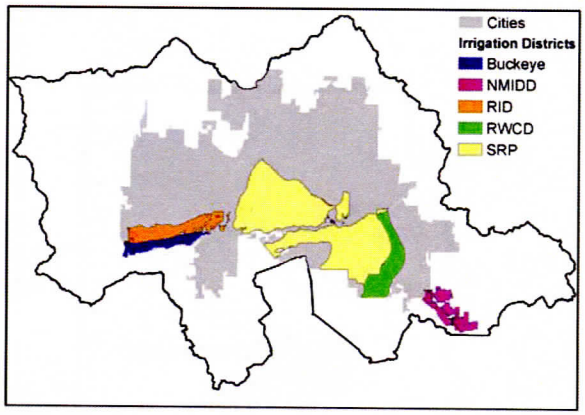
In general, a trend of decreasing water use during this time period was expected to occur because of the urbanization of agricultural lands, the prohibition on the irrigation of new lands, and conservation efforts by farmers.

Total agricultural water use within the Phoenix AMA represents an aggregation of individual water users and may overshadow variations related to types of available water supplies and their location within the AMA.

Irrigation Districts

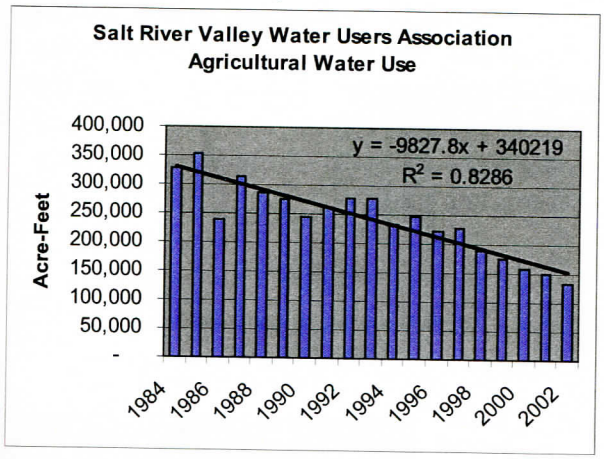
Irrigation districts within the Phoenix AMA potentially experience different water use trends due to their proximity to urbanization, and the availability and cost of water supplies. To illustrate these differences in water use five irrigation districts were examined: Salt River Valley Water Users Association (SRP), Roosevelt Water Conservation District (RWCD), Roosevelt Irrigation District (RID), Buckeye Water Conservation and Drainage District (Buckeye), and New Magma Irrigation and Drainage District (NMIDD). Figure 4 shows the location of the five irrigation districts relative to incorporated cities and towns within the Phoenix AMA.

Figure 4.



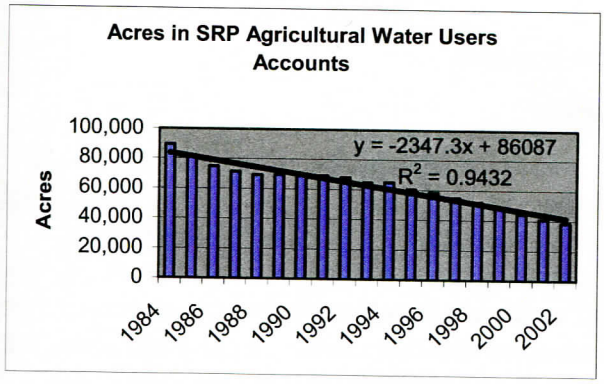
SRP is an irrigation district with water supplies primarily consisting of surface water from the Salt and Verde Rivers, and groundwater. Agricultural water use within SRP from 1984 through 2002 (Figure 5) clearly shows a significant decrease in water use. The rate of reduction in agricultural water use during this time period was approximately 9,800 af per year.

Figure 5.



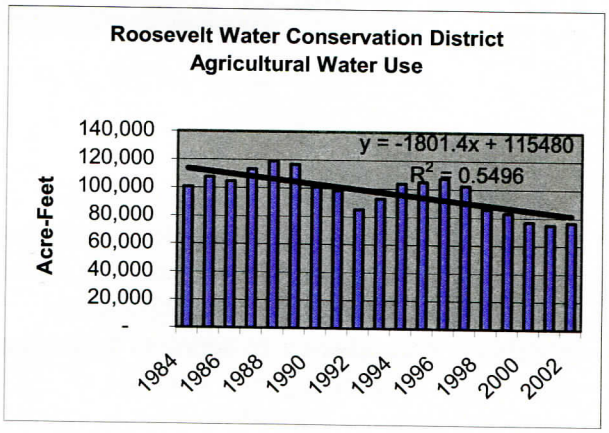
Urbanization of agricultural lands is a large factor for why agricultural water use in SRP has declined. As shown in Figure 4, SRP is located within the central part of the Phoenix metropolitan area. To illustrate the rapid reduction in agricultural lands within SRP, Figure 6 shows the number of acres in agricultural water delivery accounts from 1984 through 2002. The amount of agricultural land has decreased by more than 50% since 1984. The reduction in agricultural acres has resulted in a decrease in agricultural water use.

Figure 6.



Another irrigation district that is located close to the center of the Phoenix metropolitan area is RWCD (Figure 4). Like SRP, RWCD utilizes surface water from the Salt and Verde Rivers and groundwater are the primary supplies. Annual agricultural water use within RWCD is displayed in Figure 7.

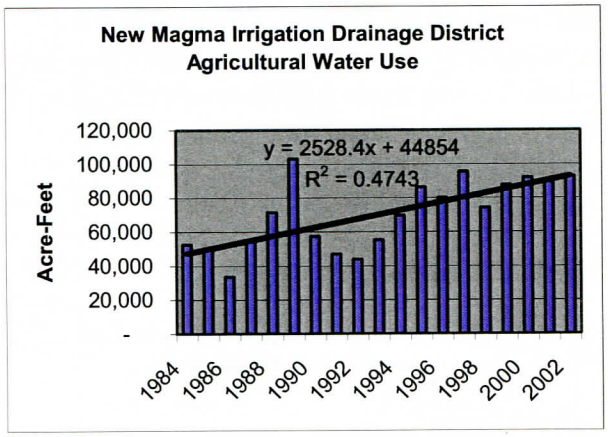
Figure 7.



The trend in water use within RWCD is similar to SRP, though the reduction in use is not as significant. RWCD has experienced development of agricultural lands because of its location within the central part of the Phoenix Metropolitan area.

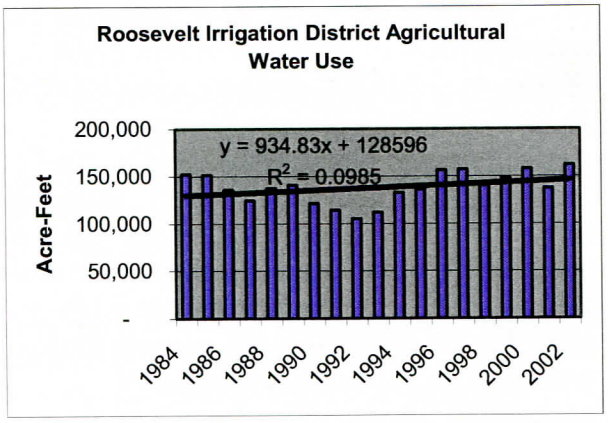
Three districts that are further away from the central Phoenix Metropolitan area are NMIDD, RID, and Buckeye. NMIDD is located in the southeastern portion of the Phoenix AMA (Figure 4). NMIDD's primary water sources are groundwater and Colorado River water. Agricultural use within NMIDD from 1984 through 2002 is shown in Figure 8. Unlike the trend of decreasing water use for the AMA, SRP and RWCD, water use in NMIDD has tended to increase. The increase in water use is likely related to the availability of Colorado River water and the increased utilization of agricultural lands to offset the reductions in agricultural production resulting from urbanization.

Figure 8.



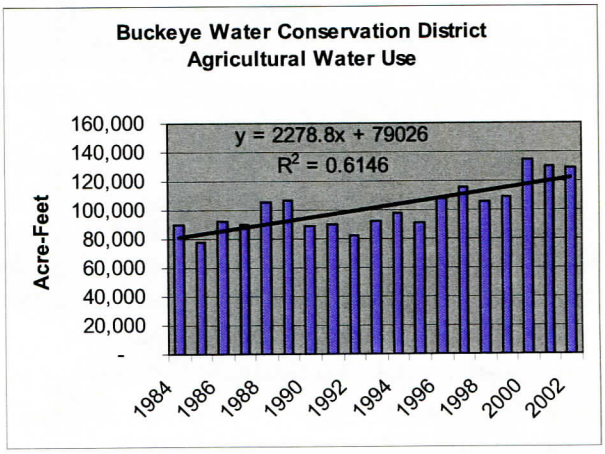
Both RID and Buckeye are located on the margins of the Phoenix metropolitan area, but unlike NMIDD, are on the western side of the AMA (Figure 4). Historically, RID relied entirely on groundwater to serve its agricultural water users. In recent years, RID has contracted with the City of Phoenix to use effluent. Figure 9 displays RID's agricultural water use from 1984 through 2002. During this time period, RID's water use has shown no significant trend. The principal reasons for this likely include the increased availability of effluent, increased utilization to offset reductions from urbanization, and changes in crop types.

Figure 9.



Buckeye is located in an area that is water logged and requires drainage pumping to farm these lands. The primary water supplies for Buckeye are groundwater, surface water from the Salt and Gila Rivers, and effluent. Figure 10 contains a graph of Buckeye water use from 1984 through 2002.

Figure 10.



As with NMIDD, water use within Buckeye has been increasing and like the other districts it is likely the result of increased utilization of farmland to offset reduced agricultural production due to urbanization in other areas of the AMA and changes in crop types.

Discussion

As expected, agricultural water use within the Phoenix AMA has generally been decreasing. However, the water use trend at the AMA level is not necessarily representative of what is occurring at the irrigation district level. Review of water use trends at the irrigation district level indicates that there is tremendous variation that is likely dependent upon the location of the district relative to urban growth, the availability of water supply sources, and changes in crop types.