



## Public Policy Review

by Sharon Megdal

### Obtaining, Interpreting Water Use Data is Complex Task



In developing the program for the April 28 Water Resources Research Center's conference, "The Future of Agricultural Water Use in Arizona," it seemed unwise to spend precious conference time providing statistical information on historical use of water by agriculture. But gaining perspective on what the future might hold in store usually requires some understanding of the past and present.

Plus, a look at water use trends over time and across regions within the state can be interesting and informative. So, I asked a few water professionals on and off campus to assist in preparing some written materials on agricultural water use to distribute at the conference.

This exercise highlighted a particular challenge, namely determining what we mean by water use. Often people report simple pie chart numbers on the percentage of water used by agriculture in Arizona. But, what do these numbers on water use by the different water using sectors in the state, most notably agricultural, municipal and industrial, tell us? In mid-March, an article appeared in the *Arizona Republic* on water use numbers for the state, as reported by the United States Geologic Survey. These numbers indicated that Arizonans withdraw more than 6.7 billion gallons — or almost 20,500 acre feet — of surface water and groundwater daily. The article reported that about 80 percent of the water is withdrawn for agricultural purposes, with 16 percent going toward municipal uses.

Note that a few different words were employed in the above paragraph. Although I first expressed the question in terms of water "used," I then wrote of "water withdrawal numbers." Water use is not the same as water withdrawn. Think of your own homes. Much of the water used to wash clothes drains through and is piped into the wastewater treatment plant (or for a very few of you a graywater system). The effluent or treated wastewater may then be used, perhaps even by another water-using sector. Some of the water used to irrigate your trees seeps into the ground and recharges the aquifer incidentally. Not all the water delivered to your home is therefore used by you. Similarly, not all water withdrawn by agriculture is used by agriculture.

I consider myself pretty good with numbers. But, when it comes to water, nothing is simple. At one point during the process of trying to understand just what the numbers were reporting, I asked for help. A series of emails from some very knowledgeable people followed regarding water "use" versus "demand" versus "consumptive use" versus "withdrawals." Incidental recharge and return flows were also discussed. We later met to discuss the difficulties of developing the pie chart referenced above.

Developing what might seem like a simple pie chart is not so simple at all. In many parts of the state or for some users, water use is not metered and/or reported. Reporting of groundwater withdrawals is required only in the Active Management Areas. Data indicate that groundwater is the source water for over 40 percent of

the water used in Arizona. How accurate is that number? We don't really know. Consequently, we don't really have accurate statewide data for water withdrawn by any of the water using sectors.

Despite the difficulties in obtaining and understanding water use data, we do have good data on water used in the AMAs, including the heavily populated Phoenix and Tucson areas. And data on the Colorado River and other surface water withdrawals are generally good. The number of harvested acres, which may be a good proxy for agricultural water use, is clearly declining in parts of the state. George Frisvold, my colleague from the University of Arizona's Department of Agricultural and Resource Economics, has worked with me on sorting through the definitional issues discussed above and the data across counties. Data from the *Arizona Agricultural Statistics Bulletin* on harvested acres show that non-Indian agricultural activity has generally declined over the past 20 years in the Central Arizona AMAs but has increased in the Yuma area. Ken Seasholes of the Arizona Department of Water Resources has prepared a short write-up on the difficulty in estimating water usage and, with the assistance of Saied Tadayon

of the USGS, has produced a map showing the distribution of agricultural activity over the state. A short paper written for the conference by John Hetrick and Dave Roberts of Salt River Project shows that water used by non-Indian agriculture in the Phoenix AMA has declined by approximately 11,500 acre feet per year since 1984, which amounts to 1 percent to 1.5 percent per year, although some individual irrigation districts show increases in water use over the same period. In fact, it is interesting that if you look at 1984-2002 water use by non-Indian agriculture aggregated by the ADWR across the state's AMAs and Irrigation Non-expansion Areas, which do not include Yuma, there is no discernable trend (down or up) in agricultural water use. However, like in the Phoenix AMA, the geographic distribution, as well as cropping, has changed.

Lack of accuracy does not eliminate our ability to document important trends. Although agricultural activity is declining in some areas of the state, it remains robust and is growing in other areas. Municipal and industrial demand for water will continue to grow. We are in a drought and water conservation, while always important, is more important than ever. Exercises like the one we've gone through will enhance our understanding of our state's demand for water resources and assist us as we plan for the future. ■

Water use pie chart ingredients are data and pie. The data, however, is often too complex to neatly fit as segmented pieces of a pie.

