

# CHAPTER 1 – INTRODUCTION

## BACKGROUND

Salinity has been recognized as a problem for agriculture in the western United States for many years. City managers and others have recently begun to recognize that elevated salinity levels in groundwater and surface water also pose potentially serious challenges for the urban environment. Central Arizona, which includes Arizona's largest metropolitan areas, is just one western region where the issue of high salinity levels may soon need to be addressed.

Since the mid-1980s, it is estimated that in a typical year nearly 1.3 million tons of waterborne salts are transported into the Phoenix metropolitan area, primarily via the Salt River and the Central Arizona Project (CAP) canal. An additional 140,000 tons of salts are added to the water system from humans through fertilizers, water softeners, industrial waste, commercial waste, and other wastes disposed into the sewer system. Only about 320,000 tons of these salts are carried out of the region via the Gila River each year. Thus, more than 1 million tons of salts build up in the Phoenix metropolitan area every year. CAP officials had recognized this problem and in December 1947 prophetically noted, "Eventually it will become necessary for the users to release enough water from the area to carry out the same amount of salt as introduced annually" (Central Arizona Project, 1947).

Salinity, which for practical purposes is defined as total dissolved solids (TDS), is a measure of the total ionic concentration of dissolved minerals in water. TDS is principally composed of the cations (or positively charged ions) sodium, calcium, potassium, and magnesium, and the anions (or negatively charged ions) chloride, sulfate, carbonate, and bicarbonate (Appendix A). The problems created by salinity are a complex series of interrelated impacts to society that affect virtually everyone in central Arizona.

How much salt is coming into central Arizona? Where are the salts accumulating? What is the economic impact of these salts? What will the future impacts to society be because of this constant inflow of salts? This report attempts to answer these and other questions about the impacts of salinity to central Arizona.

## PROGRAM SUMMARY

The Central Arizona Salinity Study (CASS) is a 4-year study of the salinity problems in central Arizona and a concerted effort to identify possible solutions to those problems. The study was originally initiated through a cooperative partnership between the U.S. Bureau of Reclamation (USBR) and the Sub-Regional Operating Group (SROG), which is a partnership between the cities of Phoenix, Mesa, Scottsdale, Glendale, and Tempe to jointly operate the 91<sup>st</sup> Avenue Waste Water Treatment Plant, located in Phoenix Arizona. After the first year, the following entities joined and financially contributed to the study: Arizona-American Water Company, City of Chandler, City of Goodyear, City of Peoria, City of Surprise, City of Tucson, Town of Buckeye, Town of Gilbert, and Queen Creek Water Company.

## **MISSION STATEMENT**

CASS is a coalition of water and wastewater agencies evaluating salinity issues in central Arizona. The mission of CASS is to provide its members with workable alternatives for a quality, cost-effective, sustainable, and reliable water supply through partnerships and cooperative efforts in regional salinity planning and management.

## **GOALS**

The process goal is to develop a common base of understanding of the issues and options, and develop a consensus plan to address salinity issues in central Arizona.

The outcome goal is to define the salinity problem, identify appropriate uses and reuses of water and associated guidelines for managing TDS, determine where mitigation efforts should be focused, and develop a Central Arizona Salinity Master Plan.

## **CASS**

The study is organized into two phases. Phase I is a 2-year study (Fiscal Year [FY] 2002 and FY 2003) to identify the problems and potential future problems related to importing and retaining large quantities of salts in central Arizona. This report summarizes Phase I research.

Phase II will develop and assess solutions to the problems identified in Phase I. Phase II is also a 2-year study (FY 2004 and FY 2005); a final report will be issued at the conclusion of Phase II.

In October 2001, a cost-share agreement was signed between the City of Phoenix, representing SROG, and USBR. USBR contributes \$300,000 per year in labor, research and direct costs towards the CASS, and SROG matches that amount with similar expenditures.

The study is led by joint project managers, one from USBR and one from SROG. Guidance during the study comes from the Project Management Team (PMT), which consists of one representative from each of the financial contributing partners. The PMT meets on a quarterly basis.

A technical committee (TC), consisting of stakeholders, meets on a monthly basis. TC members contribute to the study by writing papers, contributing personal knowledge and pertinent information, and giving presentations. In addition, the TC critiques the progress and data gathered for the study and reviews written papers and reports. Many other entities, such as Arizona Department of Water Resources (ADWR), Arizona Department of Environmental Quality (ADEQ), consultants, private citizens, and various central Arizona communities have representatives attending the technical meetings. Their collective involvement will ensure that a comprehensive study will be conducted to assess potential salinity issues in central Arizona.

## STUDY AREA

For the purposes of this study, central Arizona is defined as the portions of Arizona supplied by the CAP in Maricopa, Pinal, and Pima Counties. The primary focus areas of this study are the Phoenix and Tucson metropolitan areas. Deciding factors in maintaining this focus are: (1) the majority of the population of Arizona lives in these areas<sup>1</sup>, (2) by far the greatest economic impacts and potential for future impacts from salinity fall in these areas, and (3) access to the necessary data to evaluate salinity trends and impacts is readily available for these communities.

Secondary study areas include portions of the agricultural areas in Pinal County, the Harquahala Basin, the Gila Bend Basin, and on the Gila River Indian Community (GRIC). The thread which unifies these diverse areas is the CAP, which supplies water from the Colorado River to each area either directly or indirectly (Figure 1-1).

Central Arizona is located within the Basin and Range Physiographic Province, an area characterized by low, rugged mountain ranges separated by broad alluvial valleys. The alluvial valley deposits are shallow along the basin margins, but in the central portion of the basins may be several thousand feet thick. These alluvial deposits contain vast aquifers which hold significant quantities of groundwater, a vital source for the communities and farmers in central Arizona. Water quality in these aquifers is variable, ranging from excellent to poor.

The climate in central Arizona is hot and dry, with lowland desert vegetation dominating the region. The most abundant species of plants include creosote bush, palo verde, saguaro, cholla, prickly pear, ocotillo, lotebush, desert hackberry, and mesquite. Rainfall is relatively meager, typically 7 to 8 inches annually in Maricopa and Pinal Counties and slightly more, 11 to 16 inches, in eastern Pima County. Detailed hydrologic and geological data of the study area are presented in Appendices C through G.

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<sup>1</sup> The 2000 census indicates that more than 3 million people live in the Phoenix metropolitan area and an additional 1 million persons reside in the Tucson metropolitan area. More than 75 percent of the current population of Arizona lives within the study area.

Figure 1-1. Central Arizona Salinity Study (CASS) Study Area

