The City of El Paso was small until the end of the 60’s. Starting at the 70’s, the City began to grow rather rapidly due to infusion of military and expanding manufacturing and trade. Thereafter, there was a period of slow growth due to migration of manufacturing jobs to Mexico and other countries. The City, currently a population of about 700 thousands, is expected to grow. The expansion of the City took place both in upland and in the valley, resulting in 9,000 acres of farmlands conversion to urban uses (Fig. II-1).

How do we provide water for this expanding community? This has been a big question. El Paso Water Utilities (EPWU) has encouraged the use of native plants and minimal use of lawn. Starting the year 1999, EPWU has also provided reclaimed water with elevated salinity (900 to 1200 ppm) to large landscape areas, and this has raised a concern over potential impacts of salinity on landscape. Prior to this project, salt problems in urban landscape were largely disregarded, simply because drinking water has been used for irrigation.

Publication of Soil Resources of El Paso

The preliminary survey of soil salinity status was carried out for the City Park grounds in 1997. This survey indicated severe salinization of athletic fields in the Valley and in a few scattered sites in the Northwest District. When compared to the soil salinity survey conducted in 1978, a large increase in soil salinity was noted in clayey soils. We also conducted a soil salinity survey in irrigated croplands earlier, which also has shown that soil salinity was highly dependent of soil types. Based on these results, a technical bulletin entitled “Soil Resources of El Paso” was published in 2000 along with a soil map (Fig. II-2). This publication has been used extensively.

Foliar Salt Damage Caused by Sprinkling

Reclaimed water with elevated salinity (1200 ppm) began to be distributed in March 1999 to the Northwest Service Area. During the first three months after the delivery of the water, 150 mature trees in a golf course have defoliated (Fig. II-3). This problem was fully anticipated based on our earlier study (Miyamoto and White, 2002, TWRI MP 1202), but was not anticipated by golf course management experts or sprinkler manufacturers. This problem was controlled by the use of low trajectory nozzles (Fig. II-4). In small landscapes, foliar salt damage is controlled by irrigation system conversion to nonsprinkling types and/or through landscape plant selection.

Soil Salinization

Soil salinization is caused, according to a traditional theory, by poor irrigation practices. This is true in highly permeable soils with no drainage impairment. When irrigation is managed by the regional estimate of evapotranspiration, we found that salts tend to accumulate in clayey soils or the soil with a calcic horizon (Fig. II-5). It is also influenced by the compaction of subsoils during construction, and the slope of the top and subgrade. These findings are not commonly known, but are beginning to change the concept of soil salinization in urban landscape.

Reclamation of salt-affected parks and athletic fields can be costly, especially when soil replacement is attempted. We evaluated deep subsoilers to improve water penetration and salt leaching (Fig. II-6). The City Parks and Recreation Department recently purchased a large tractor, and appears to be ready to implement joint recommendations between the Research Center and the Ground Maintenance Division of the department.

Plant Salt Tolerance and Growth

The prevailing thought about irrigation with reclaimed water with elevated salinity is that landscape plants will be stunted with salts unless they are salt-tolerant or irrigated with an ample quantity of water. We evaluated salt tolerance of many landscape plants as documented in a series of publications (Fig. II-7). When soils are permeable, however, we found that most landscape plants except for a few highly salt sensitive plants do well without adding extra-quantities of irrigation water. In some cases, excessive growth becomes a problem, because reclaimed water has elevated levels of nutrients.

Soil and Site Suitability Assessment

Our research has shown that soil properties play a role as significantly as salinity of irrigation water. The success of reclaimed water project or landscape irrigation with water of elevated salinity depends largely on soil suitability assessment for irrigation. We developed a protocol (e.g., Fig. II-8) which was then used for guiding reclaimed water projects in El Paso, resulting in reduced occurrence of soil salinization, and significant savings of city treasuries. We are continuing research to improve soil testing methods and assessment of soil salinization potential of upland soils.