Management of Urban Waterways using Saltgrass to Improve Water Quality and Aesthetics

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Abstract

Water resources in the arid Southwest U.S. region have become of increased importance as population increases and drought conditions continue to persist. In the Lower Rio Grande Basin, the exotic and invasive phreatophyte saltcedar dominates riparian communities, changes the biodiversity of riparian ecosystems, and consumes large amounts of water through evapotranspiration (ET) per year. Saltgrass, along with a diverse implementation of other native species, may be a solution to mitigate problems such as soil erosion, pollution from agricultural and urban runoffs, and proliferation of invasive species associated with the ecologic alteration of riparian zones. A feasibility study of saltgrass establishment was conducted in a riparian area located in Sunland Park, NM along the Nemexas Drain formerly dominated by saltcedar and later removed by mechanical means.

The scope of this study was to measure soil and water physical and chemical properties at this site, as well as to transplant individual saltgrass specimens to evaluate the feasibility of establishing them as a re-vegetation strategy along the waterway. Further studies will be undertaken to investigate the capabilities of saltgrass to act as a barrier to limit the germination of saltcedar, to entrap sediment, and to filter contaminants from runoff. The specific objectives were to: (1) measure environmental conditions of the site that would affect saltgrass establishment and growth; and (2) establish saltgrass along the bank of a peri-urban drain.

In order to successfully determine the feasibility of saltgrass at the study area, literature on the optimal environmental growing conditions of saltgrass was reviewed, and water and soil physical and chemical properties were measured. Once this was completed, a total of 140 saltgrass individuals were transplanted from the Caballo Reservoir, NM region with similar climate to the study area and monitored to determine their survival rate. The time of year when this study occurred was the summer months of June and July of 2013. Water samples collected from the drain at three different dates, and one sample of soil during the period of study revealed that the salinity of the study sites was at the lower end relative to the various tolerance ranges found through other studies conducted on the growth of saltgrass.

Based on the data collected and analyzed to date, it was found that high salinity is not a limiting factor of the establishment and development at the particular sampling sites measured. However, the effect of low salinity still needs to be investigated since saltgrass is a halophyte well adapted to saline soils. The fine sand and loamy soil texture reported for the area of transplanted saltgrass compared well with soil textures from other studies where saltgrass was observed to grow with excellent cover. Since during the time of the study the groundwater levels were elevated almost to the leveled terrace, the soils were saturated providing sufficient moisture for saltgrass to grow. One week after transplanting, the survival rate of the plants was quantified as 74% which may be different than future values since the plants may undergo an acclimatization process before adapting to the new environment.

After analyzing the data collected at the study site, it is concluded that the native saltgrass obtained within the region can survive in the proposed site given the specific climate and ecological conditions, and is suspected that, over time, will become established and begin to colonize adjacent areas. Future research will be directed to quantify the effectiveness of saltgrass to entrap sediment and filter contaminants from agricultural and urban runoff, and to reduce the germination and growth of saltcedar. By impeding the spread of invasive species and increasing the diversity of native vegetation, the water use of riparian vegetation, in theory, can be reduced and aesthetical and functional ecosystems can be developed.

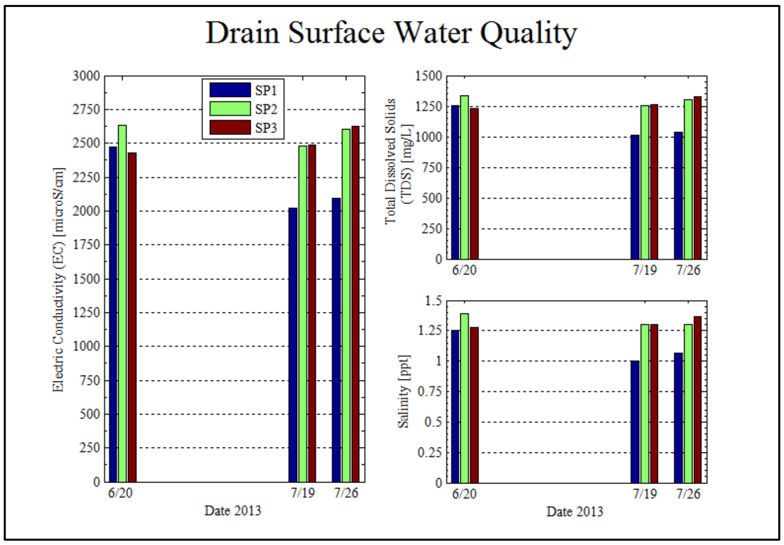

Figure 1. Electrical conductivity (EC), total dissolved solids (TDS), and salinity (ppt) for the drain water measured three times during months of June and July. Sites 1 through 3 are abbreviated as SP1, SP2 and SP3.

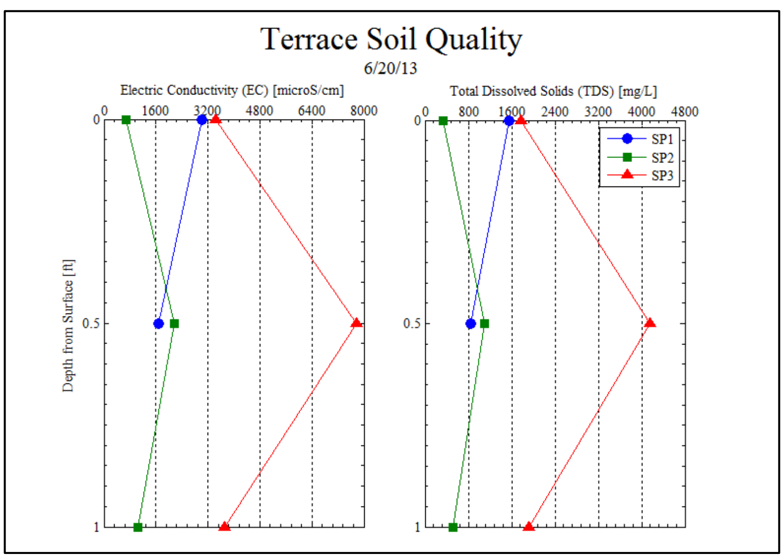

Figure 3. Electrical conductivity (EC) and total dissolved solids (TDS) a soil profile measured at three sites along the artificial terrace by the Nemexas Drain for June 20th, 2013