

Soil Structure and Chemistry of Brine Water Impacted Soils in West Texas

M. Foust¹, M. Dunlap¹, W. Bond¹, and J. W. Ward¹

¹Angelo State University, Department of Physics and Geosciences

Abstract

The goal of this research is to use geoinformatics, geochemistry, hydrogeology, and soil chemistry to form a multidisciplinary approach aimed at remediating brine impacted soils. The primary research location is a 14-acre “kill zone” located on a private ranch approximately 14 kilometers south of San Angelo, Tom Green County, Texas. The Natural Resources Conservation Service (NRCS) classifies the site soils as part of the Angelo Series, a clay loam derived from limestone. A Geospatial Information System for 3-D soil chemistry modeling which includes measuring for total alkalinity, extractable calcium, chloride, total copper, potassium, magnesium, sodium, total phosphorus, nitrate, pH, SAR, and total nitrogen was compiled from soil sampling over 2015. Average sodium levels exceed 2500 mg/kg, and average chloride levels exceed 5500 mg/kg. This excess of sodium classifies the soils not only as saline soils, but also as a sodic soil. Chemistry data was analyzed by creating ternary diagrams allowing for soil classifications. All data collected are stored in a ArcGIS database for data management, project planning, and various models. Lithologic data manipulated in ArcGIS is transferred to ArcSCENE to create 3-D models of the subsurface. Techniques for remediation that are being investigated include: bioremediation with halophytes, physical soil ripping and furrowing, and using various soil amendments including magnesium sulfate, gypsum, and compost. This research is ongoing and further exploration regarding soil chemistry and forage quality will be analyzed 2016.