

**Project Name:**

Improving crop yield and soil salinity by cost-effective integration of microbial community, hydrology, desalination, and renewable power

Project Dates:

2019 - 2024

Organization(s):

University of North Texas; New Mexico State University; Colorado State University; National Science Foundation

**Project Lead
Name and Title:**

Miguel Acevedo (PI), Regents Professor, University of North Texas

**Project Abstract
(750 word limit):**

This project aims to contribute innovative solutions to the problem of increasing salinity in agricultural soil and irrigation water, which affects food production worldwide. The solution sought integrates water and energy provision, with regenerative agriculture using a systems approach tackling all Food-Energy- Water (FEW) systems. Our goals are to improve irrigation water quality using renewable energy and less energy intense methodologies to decrease water salinity, and improve water quality, restore soil fertility and reduce synthetic nutrient amendments through regeneration of the plant and soil microbiota's beneficial interactions. We propose a smart innovative integration of technologies and biology to enhance efficient use of existing resources. Importantly, all major components (soil salinity, renewable power, desalination, crop production, soil microbial community) are interrelated; therefore, their combined implementation as is a clear example of a FEW solution. For a geographical focus, we select two representative and contrasting areas: the Tularosa basin in the semi-arid environment of the southwest USA, where surface water resources are scarce, and limited to brackish groundwater; and the Lower Arkansas River Valley in southeastern Colorado, where agricultural practices have caused salinization of the soil and selenium contamination.

**Short Bio of
Project Lead
(150 word limit):**

Miguel Acevedo has over 40 years of academic experience, the last 27 of these at the University of North Texas (UNT) where he is currently a Regents Professor. His career is interdisciplinary at the interface of science and engineering. He has served UNT in the department of Geography, the Graduate Program in Environmental Sciences, and the Electrical Engineering department. Before joining UNT, he was at the Universidad de Los Andes, Venezuela, where he served in the School of Systems Engineering, the graduate program in Tropical Ecology, and the Center for Simulation and Modeling. He obtained his PhD in Biophysics and MS in from the University of California, Berkeley and MS degrees in Electrical Engineering and Computer Science from Berkeley and the University of Texas at Austin. He has published several textbooks and numerous journal articles, book chapters and proceeding articles. His research interests focus on environmental systems and sustainability.

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