

Title: Small Decentralized Renewable Water Systems (SDRWS) Research Center
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Participating units: COALS, COE, HSC, AgriLife Extension, Bush School
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Executive summary: The United Nations estimates that 1.2 billion people across the world currently live in areas of physical water scarcity, a number which is projected to increase to 1.8 billion by the year 2025. Closer to home, three small towns in Texas, Spicewood Beach, Barnhart, and Robert Lee, have literally run out of water. These drinking water shortages arise from deteriorating quality of existing “freshwater” sources, uncertainties in precipitation associated with climate change, unsustainable water usage, and other factors necessitating radical new paradigms to meet the thirst of our growing population. While large metropolitan cities are able to invest millions of dollars to expand and modernize their water and wastewater treatment plants or tap into alternative sources (e.g. transfer water from other locations), hundreds of small communities in Texas cannot do so due to budgetary, logistical, and technological constraints. Compounding this problem is that more than 2 million Texans are not part of any community water system and rely on individual wells and onsite sewage facilities (i.e. septic tanks). To reliably provide safe drinking water to these small communities, individual homes, and businesses that are not connected to large water/wastewater distribution networks, it is imperative to reuse wastewater and desalinate brackish groundwater locally. Science-based research will be required to develop, deploy, operate, monitor, and maintain innovative yet reliable Small Decentralized Renewable Water Systems (SDRWS). Epidemiological and toxicological research are also needed to ensure the long-term safety and health of the public when renewable water supplies are used to supplement natural water sources. The proposed center will focus on both the technical challenges and public health to holistically deliver innovative technologies compatible with the SDRWS philosophy.

A Game Changer. To date, nearly all the national attention and funding for water/wastewater treatment and reuse has focused on large centralized systems to meet the demands of big cities. In contrast, the SDRWS center will focus on developing and strategically deploying new technologies to facilitate dependable access to water for small towns, businesses, and home owners even during long periods of scarcity. In short, the center’s focus is unique and designed to develop new water sources and to augment existing ones particularly in rural areas. Center researchers will develop novel technologies, quantitatively evaluate existing ones (including treatment and sensors), monitor population health of populations, assess economic and sociological aspects including costs, public acceptance, and concerns associated with renewable water sources.

New Shared Core Facility. The overarching goal of the SDRWS Center is to cultivate a comprehensive program to overcome current barriers to the permanent integration of renewable water resources into Texas’s water infrastructure. This state-of-the-art facility will serve as the focal point for all experimental and computational campus-wide water-related research. It will provide a shared research platform needed for (a) an interdisciplinary advancement of water purification and monitoring; (b) developing new more efficient and robust technologies; (c) building and supporting a network of demonstration projects on TAMU campuses in Brazos County; (d) integrating the SDRWS with the TEEX proposed Water Infrastructure Training Field; and (e) generating data in support of the State’s efforts to promulgate primary and secondary regulatory standards to integrate renewable water sources into its existing water portfolio and infrastructure.

Improvement to Brazos County Research Enterprise. The SDRWS will positively influence lives of the majority of Texas’s citizens since 45% of them reside in cities/towns smaller than 100,000 population. The principal investigators’ funding, experience, and professional contacts will be leveraged to attract private industries, governmental, and non-governmental agencies to participate in SDRWS activities. Establishing the center will place TAMU squarely in a leadership role as the State and the nation develop long-term plans to meet ever growing water demands and enhance TAMU’s competitiveness for large extramural water-related grants.