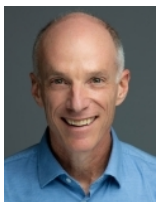
RESEARCH BRIEF
Start Date: Mar 9, 2022 | Duration: 24 months

NAWI
National Alliance
for Water Innovation

Next-Generation Desalination for Treatment of Agricultural Drainage Wastewater



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Challenge

Farmers in arid regions have long been aware of the need to manage salts in drainage from irrigated fields. In California's San Joaquin Valley, salt management has been complicated by the presence of selenium and other naturally occurring toxins, such as arsenic and uranium, in drainage water. The management of salinity is further exacerbated by groundwater overdraft because deeper strata tend to contain more saline groundwater. In addition to salinity management, modern agricultural practices, including pesticide application and intensive dairy farming, have contaminated aquifers with pesticide residues and nitrate. These contaminants are of great importance in the Southern San Joaquin Valley where around 50,000 people who obtain their water from private wells are exposed to one or more contaminants at concentrations above the safe levels established by the USEPA. Over the past two decades, local stakeholders have considered the possibility of using desalination as part of new strategies for managing salts and toxins in the San Joaquin Valley but the approaches have tended to be too expensive or not enough information was available on technology performance. The potential impact of deploying next generation desalination technologies to address problems related to water quality and sustainable land use makes this project an ideal opportunity for NAWI.

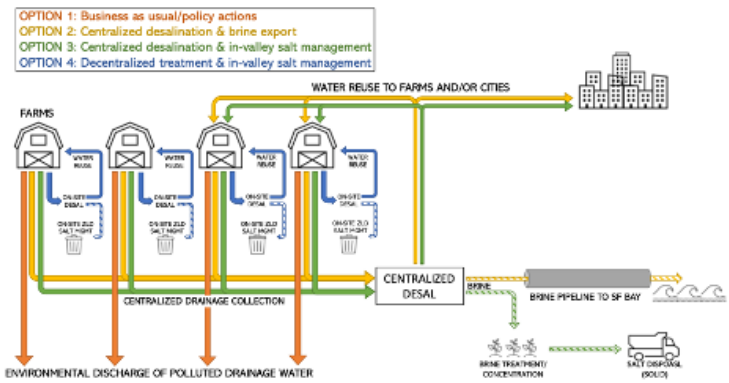

Figure 1. Existing and emerging approaches for managing agricultural drainage in the San Joaquin Valley. Research will focus on ways in which next-generation desalination can help Options 3 and 4 achieve pipe parity.

Research Approach

The overall goal of this project is to identify approaches that are likely to lead to adoption of desalination and advanced water technologies for treatment and reuse of agricultural drainage water. To achieve this goal, NAWI researchers will employ a multidisciplinary perspective that considers tradeoffs among alternatives and spatial differences in land use across the region. The researchers will:

- Analyze irrigation drainage water management strategies, including policy measures and available and emerging desalination technology applications.
- Develop a dynamic economic regional framework capable of assessing the costs of various approaches and projecting the likelihood of adoption of desalination and advanced treatment systems.
- Identify performance enhancements and policy strategies that will allow desalination and advanced water technology to achieve pipe parity and adoption in the San Joaquin Valley and other important agricultural regions of the United States.

Impact

Successful completion of this project will raise awareness among water managers about the potential for desalination to solve problems related to agricultural runoff management, and could make the San Joaquin Valley the first location in the country where next-generation desalination is applied to agriculture at scale. It is anticipated that the outputs of this project will provide a basis for identifying the advances in water treatment technologies that are needed to achieve pipe parity to enable reuse of agricultural drainage and protection of community water supplies from agricultural contaminants.

RESEARCH PARTNERS

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