

**Strategic Environmental Research and Development Program
(SERDP)**

FY 2022 STATEMENT OF NEED

Resource Conservation and Resiliency (RC) Program Area

**SALTWATER INTRUSION IMPACTS
ON DOD INSTALLATION INFRASTRUCTURE**

1. Objective of Proposed Work

The objectives of this Statement of Need (SON) are to improve the fundamental and applied understanding of how: (1) future sea-level change interacts with other factors that govern the level of the subsurface water table spatially and temporally; (2) future sea-level change interactions impact saltwater intrusion spatially and temporally; and (3) scenarios can be developed that describe the combined interactions in a non-stationary climate and their impacts on subsurface infrastructure and assets at Department of Defense (DoD) installations worldwide.

Specific research needs include the following:

1. Reduced-order subsurface water level models that incorporate sea-level change scenarios, total water levels, local groundwater associated with the unconfined aquifers, precipitation and runoff, and, where applicable, river discharge.
2. Reduced-order saltwater intrusion models that incorporate the information in Research Need 1 and salinity data to determine current conditions and future changes in local salinity profiles.
3. Development and application of broadly applicable and transferable subsurface exposure scenarios based on the modeling results from Research Needs 1 and 2 (supra) that correspond with sea-level change scenarios derived from the Defense Regional Sea Level (DRSL) database.

Proposals should seek to address all three objectives and all three research needs to be competitive. The focus on reduced-order models reflects the need to avoid overly complex, data intensive, and computationally expensive models that lack transferability, while favoring models that maintain robust relationships to relevant physical processes and can incorporate local data when available. Proposers are encouraged to include a conceptual model that identifies proposed and potential additional model components. Reduced-order model components must have a demonstrated basis for inclusion in the final model (versus elimination). Uncertain components that require further investigation before they can be eliminated or included must be planned to be resolved within the first two years of funded work. Model development and analysis must be proposed. In addition, evaluation and validation using simulation approaches can be incorporated into the proposal but are not required. For climate change-dependent information (e.g., applicable future changes in precipitation patterns), proposals must demonstrate an understanding of the appropriate use and limitations of available climate change information and their underlying modeling or analytical techniques.

2. Expected Benefits of Proposed Work

The DoD has a large number of high value coastal installations with subsurface physical infrastructure vulnerable to saltwater intrusion. The scenarios resulting from this work will be used to inform screening-level exposure assessments and possibly more detailed assessments of exposure, sensitivity, and adaptive capacity.

3. Background

The DoD relies on a large number of installations with extensive supporting infrastructure to prepare for and execute missions to defend U.S. national security interests. Many installations possess supporting infrastructure located below the ground surface and in the proximity of the saturated zone. As a result, a broad range of infrastructure (e.g., potentially drinking water supplies, underground storage tanks and pipes, electrical and communication systems, etc.) are potentially impacted by changes in subsurface water levels and salinity effects. Groundwater modeling and joint probability analyses of concurrent events (e.g., storm surge, runoff, and river discharge) are complex and data intensive. As a result, a reduced-order modeling approach is needed to enable the development of a robust but broadly applicable and transferable scenarios for use in a variety of assessments in the coastal environment. Proposers are encouraged to become familiar with the document, *Regional Sea Level Scenarios for Coastal Risk Management: Managing the Uncertainty of Future Sea Level Change and Extreme Water Levels for Department of Defense Coastal Sites Worldwide*¹, since projects resulting from this SON may be communicated in a manner similar to DoD Regional Sea Level Database (DRSL) or incorporated therein.

4. Cost and Duration of Proposed Work

The cost and time to meet the requirements of this SON are at the discretion of the proposer. The proposals must describe a complete research effort. It is anticipated that the scope of this SON is such that a multi-disciplinary team will be required to execute a successful effort. Single investigator efforts are not likely to be of sufficient scope to compete successfully. The proposer should incorporate the appropriate time, schedule, and cost requirements to accomplish the scope of work proposed. SERDP projects normally run up to four years in length and are currently limited to less than \$900,000 per year. Limited scope proposals encouraged in previous SONs will not be accepted under this SON.

5. Point of Contact

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For Core proposal submission due dates, instructions, and additional solicitation information, visit the [SERDP website](#).

¹ Hall, J.A., S. Gill, J. Obeysekera, W. Sweet, K. Knuuti, and J. Marburger. 2016. Regional Sea Level Scenarios for Coastal Risk Management: Managing the Uncertainty of Future Sea Level Change and Extreme Water Levels for Department of Defense Coastal Sites Worldwide. U.S. Department of Defense, Strategic Environmental Research and Development Program. 224 pp.