

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

FY 2012 STATEMENT OF NEED

Resource Conservation and Climate Change (RC) Program Area

**CLIMATE CHANGE IMPACTS TO DEPARTMENT OF DEFENSE
INSTALLATIONS**

1. Objective of Proposed Work

The objective of this Statement of Need (SON) is to improve our ability to assess the potential impacts to Department of Defense (DoD) permanent installations due to climate change and to facilitate appropriate adaptive responses. Research proposals are sought to: (1) identify the type and value of climate-related information, including information on associated physical effects that result from climate forcing (e.g., changes in flood and fire regimes), and are needed by DoD natural and built infrastructure planners and managers to assess future climate change risks and vulnerabilities, (2) identify, enhance, or develop tools and methodologies that enable the generation of such information at the required spatial and temporal scales and its associated uncertainties that are of value to the preceding end-users, and (3) develop pilots to assess approaches to climate change risk assessment and decision-support strategies that are resilient in the light of the uncertainties. Proposals should focus on the types of climate-related information needed by natural and built infrastructure planners and managers that are of relevance to DoD to conduct its mission on permanent installations in the US and its territories.

Research needs include but are not limited to improvements in our understanding of the following:

1. Types of weather-related decisions that DoD natural and built infrastructure planners and managers already make, how weather affects those decisions, and the temporal and spatial nature of those decisions.
2. Relationship of the currently available output information, and the information projected to be available within the next five years, from general circulation models (GCM) and earth system models, regional climate models, and derivative products¹ to the extant type of information used by planners and managers to make decisions.
3. Opportunities to improve the match between the type of information planners and managers need versus what is potentially available from the global and regional models and derivative information products. Opportunity assessment at regional spatial scales should include appropriate consideration of sources of certainty and uncertainty that

¹Derivative information can be directly related to climate information (e.g., change in the number of heating degree days, changes in drought or other extreme event patterns, etc.) or can be information on changes in physical drivers that result from climate forcing (e.g., sea level rise, storm surge, changes in flood patterns, and so on).

address the decisions to be made when applying statistical refinement or other techniques (e.g., downscaling) to global model outputs.

4. Use of appropriate statistical techniques to assess when decisions are more affected by extreme events of low frequency and probability versus changes in means and medians.
5. Development and use of decision-support strategies and analytic methods that support adaptive strategies whose performance is relatively insensitive to poorly characterized uncertainties.

Proposals submitted in response to this SON may address one or more of the research needs listed above; however, of particular interest are those proposals that take a holistic approach to the above research needs. In addition, proposals submitted in response to this SON may address one or more regions of relevance to DoD.

2. Expected Benefits of Proposed Work

The desired outcome is knowledge that: (1) improves our understanding of the types of decisions, both near- and long-term, that DoD natural and built infrastructure planners and managers make and how climate change-induced changes in weather and physical drivers that result affect those decisions; (2) improves our capacity to use models, tools, and analytic methods to supply the information necessary for decision-making, especially under poorly characterized uncertainties, and (3) elucidates the role of extreme events in guiding decisions, especially within a risk management context appropriate to DoD decision-making.

3. Background

Substantial advances have been made in climate modeling and the scientific understanding of human-induced climate change and the risks it poses. Nevertheless, climate predictions derived from climate modeling efforts, even when the information is considered accurate, are often inadequate by themselves to provide the information needed by end-users for planning and management decisions. Decisions are made within a complex social structure, including those decisions made by DoD, that affect how or whether information is used. The risks to mission posed by climate change to DoD may have both similarities and differences to the decision context that other federal agencies may face. Accurate predictions of future climate and its variability is an important factor, but not the sole factor, that might guide DoD decision-making in the face of climate change.

Department of Defense policy calls for a strategic approach to the challenges posed by global climate change, including addressing the potential impacts to DoD natural and built infrastructure at permanent installations that support DoD's national security mission. The most recent Quadrennial Defense Review (QDR) identified climate change as playing a significant role in the future security environment. With respect to DoD installations, the QDR stated that "the Department must complete a comprehensive assessment of all installations to assess the potential impacts of climate change on its missions and adapt as required." The research being sought by this request is designed to support this objective.

In addition to DoD policy, Executive Order 13514, Federal Leadership in Environmental, Energy, and Economic Performance, directs Federal agencies to assess their vulnerabilities to climate change and the need for possible adaptation strategies. The Interagency Climate Change Adaptation Task Force issued its first progress report on this effort this October. That same Executive Order also mandated that each agency develop, implement, and annually update a Strategic Sustainability Performance Plan (SSPP), which in part compels each agency to: “evaluate agency climate-change risks and vulnerabilities to manage the effects of climate change on the agency’s operations and mission in both the short and long term.” The initial DoD SSPP was submitted to and approved by the Council on Environmental Quality this summer.

The DoD’s commitments in the QDR and SSPP have resulted in a proposed approach for addressing climate change risk and vulnerability at permanent military installations, ranges, and facilities. The goal of this approach is to ensure that over time DoD installations are resilient to the potential impacts of climate change. In particular, the initial focus is on development of a decision framework that outlines the types of risks that may occur to DoD mission and installations under climate change, the types of decisions DoD may need to make regarding these risks, and the spatial and temporal nature of these risks and decisions. Ultimately, DoD planners and managers require actionable information in a form they can readily access and use if they are going to respond appropriately and in a timely manner to climate change.

To support DoD’s proposed approach for meeting the QDR and SSPP commitments, this SON looks to improve the knowledge base that is a prerequisite for a comprehensive, spatially and temporally appropriate assessment of the potential impacts of climate change to DoD permanent installations. Ultimately, accurate impact assessment and subsequently adaptation planning and implementation rely on answering the question: What are we adapting to? That question is complicated by the current state of climate models and their ability to provide reasonable estimates of climate-related and physical driver information at the appropriate spatio-temporal scales needed to make decisions. An additional concern is the nature of the information output from climate models and whether it is in a form useful to planners and managers: that is, does it reflect the type of weather information to which they currently respond and use to make decisions. Finally, the past may not be a good analog for the future under climate change. Climate variability may be as important, if not more so, to consider for decision purposes as climate change. New statistical and decision-support tools and analytic methods are needed to help planners and managers respond to extreme events and to the deep uncertainties associated with the future climate and its impacts.

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. Two options are available:

Standard Proposals: These proposals describe a complete research effort. The proposer should incorporate the appropriate time, schedule, and cost requirements to accomplish the scope of work proposed. SERDP projects normally run from two to five years in length and vary considerably in cost consistent with the scope of the effort. It is expected that most proposals will fall into this category.

Limited Scope Proposals: Proposers with innovative approaches to the SON that entail high technical risk or have minimal supporting data may submit a Limited Scope Proposal for funding up to \$150,000 and approximately one year in duration. Such proposals may be eligible for follow-on funding if they result in a successful initial project. The objective of these proposals should be to acquire the data necessary to demonstrate proof-of-concept or reduction of risk that will lead to development of a future Standard Proposal. Proposers should submit Limited Scope Proposals in accordance with the SERDP Core Solicitation instructions and deadlines.

5. Point of Contact

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For Core proposal submission due dates, instructions, and additional solicitation information, visit the SERDP web site at www.serdp-estcp.org/Funding-Opportunities/SERDP-Solicitations.