



**US Army Corps
of Engineers®**

Engineer Research and
Development Center

Ongoing Research

System-wide Modeling, Assessment, and Restoration Technologies (SMART) Research Program

Problem

The Corps recognizes the need for a system-wide approach to ecosystem management, restoration, and decision-making to provide environmental sustainability in the stewardship of the Nation's water resources. Historically, tools and technologies available for water resources assessment have not been used extensively for large-scale and multiple project (system-wide) assessments. As the Corps increases its activities in sustainable watershed and water resources management, increased use of existing and new tools is anticipated. SMART is designed to build and deliver these tools for effective system-wide applications.

Description of Research

SMART is a strategic research and development program developed by the U.S. Army Corps of Engineers (USACE) for integrating ecosystem assessment, modeling, and restoration technologies into its planning, construction, operation, and maintenance activities. Research activities include process descriptions for nutrient transport and ecological responses to nutrient management; coupled hydrodynamic, transport, and ecological simulation models for large-scale applications; and connecting ecosystem quantification techniques with restoration outcomes for decision-making.

Expected Products

One major SMART product will be a Web-based decision support framework. The framework will allow access to information, databases, numerical models, index models, habitat models, and socio-economic models. Coupled or linked models are also being developed for system-wide assessments. A tiered approach allows use of various levels of models and tools based on scientific needs, user ability, and available resources. The framework is flexible to allow individual applications of tools, information, and decision-making software—or more complex applications involving coupled or linked models. Since applications will vary, the system is being developed for “customization” as needed for different applications. Prototype applications are being developed with District partners for field input to the product development.

Potential Users

Primary users of SMART technology are USACE Division and District planners and project managers, regulators, and operation and maintenance managers that are involved with system-wide studies such as watershed studies, ecosystem restoration, and water reallocation studies. These tools are also available to other agencies and Corps partners since these studies are often collaborative efforts. Coordination is maintained with many national and international agencies and academic organizations.

Projected Benefits

SMART provides the Corps with significant new capabilities in applying an integrated suite of environmental modeling and assessment tools to fully address environmental mission needs at watershed and basin scales. This suite of capabilities increases effectiveness in partnering with other agencies and private stakeholders, reduces costs associated with restoration of degraded resources, and encourages sustainable management of our national resources.

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Participating ERDC Laboratories

Cold Regions Research and Engineering Laboratory (CRREL), Coastal and Hydraulics Laboratory (CHL), Construction Engineering Research Laboratory (CERL), Environmental Laboratory (EL), Information Technology Laboratory (ITL).

