

National Watershed Assessment: A Decision Support Framework for Regional Planning

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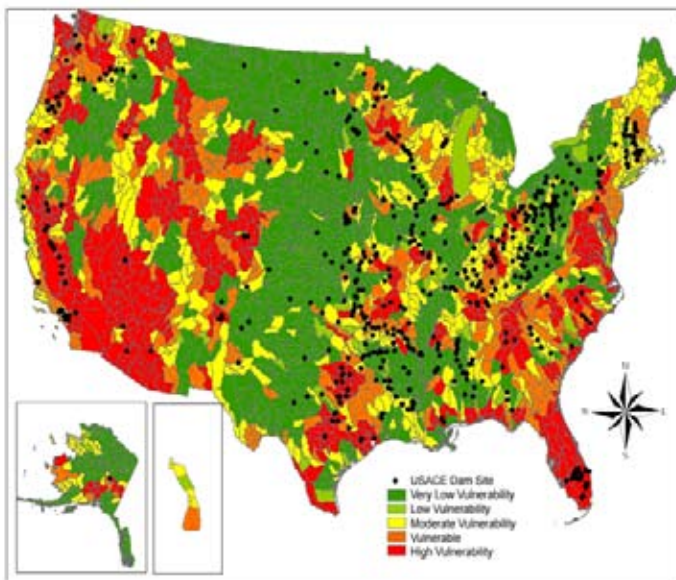
The U.S. Army Engineer Research and Development Center recently completed a national watershed assessment to inform operations of U.S. Army Corps of Engineers dams. The National Water Sustainability Analysis provided a screening of watersheds for which additional studies, planning, and actions may be recommended to ensure continued viability and sustainability of USACE dam operations.

Planning in a watershed context is also critical to sustainable operations of military installations. Planning decisions—what facilities to construct, where to construct them, and what technologies to use—have an impact on dam operations. Conversely, dam operations affect flood control, availability of potable water, recreational opportunities, and ecosystem functions.

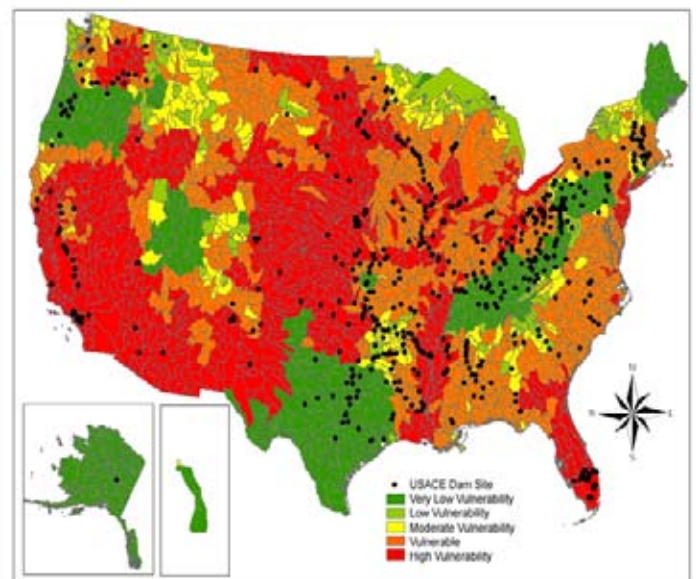
The project used methods developed in 2005 that apply a sub-set of sustainability indicators from the Sustainable Installations Regional Re-

source Assessment tool to the watershed scale of analysis. This methodology was updated with the latest data sets and several new indicators were added. The 27 SIRRA indicators relate to water supply and demand in a watershed context. Through the use of SIRRA, this project identified watersheds with potential sustainment problems, ranked watersheds by their relative vulnerability to such problems, and referred those watersheds containing critical USACE dams and flagged as “at risk” during screening to evaluation and referral for appropriate intervention.

ERDC’s Construction Engineering Research Laboratory applied this method to the 2,252 eight-digit hydrologic unit code (HUC8) watersheds in the continental United States. The results were displayed in national maps color-coded on a scale from very low vulnerability to high vulnerability, with point scores ranging from 1 to 5. The 607 USACE dams were overlaid on top.



This indicator is a measure of how fast a region has grown during the previous seven years—from 2000 to 2007. The degree of population growth is an indicator of the demand for water resources. Data is from the U.S. Census Bureau.



This indicator characterizes the extent to which rates of groundwater withdrawals are exceeding long-term average recharge rates. Data is from the U.S. Geological Service.

The scores for the 17 water supply indicators were summed to obtain an overall water supply vulnerability score for each watershed. Likewise it was done for the ten water demand indicators to obtain an overall water demand vulnerability score. The sum of all 27 indicators provided a rating of watershed health.

The selected indicators represent a broad spectrum of issues related to resource availability and development. The 27 indicators provide a wide variety of information about population, land development and usage, watershed quantity and health, natural disasters, infrastructure, air pollution, and regional energy. Indicators come from a variety of sources such as the U.S. Geological Service for water use information, the U.S. Environmental Protection Agency for air pollution data, the U.S. Fish and Wildlife Service for endangered species data, and the U.S. Census Bureau for population statistics. Since most of these are national data sets and were chosen due to the availability of national data, mapping provides a ready pictorial view of the sustainability issues.

A list of watersheds ranked by relative vulnerability score is the outcome of using the SIRRA methodology in a watershed context. Of the 2,252 HUC8 watersheds in the nation, the analysis indicates that 601 (27 percent) of the watersheds are vulnerable or highly vulnerable. Another 1,011 (45 percent) of the watersheds were rated as moderately vulnerable. The remaining 639 (28 percent) of the watersheds were rated as having low or very low vulnerability. Areas of high

growth and urbanization host the most endangered watersheds. Regions within California, Arizona, the southeast states, and New Jersey/ New York City show the greatest vulnerability. This is not an unexpected result as these areas have experienced rapid growth and continue to experience development pressures. Watersheds in areas rated the least vulnerable tended to be located in rural areas or settings with low population.

This application of the SIRRA model demonstrates a prototype for how a Web-based decision support framework can be applied to system-wide watershed management. The assessment represents the first tier of a multi-tiered approach that 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 the information to support decision-making. The SIRRA framework supports USACE's desire for adaptive management methods, learning frameworks, multi-purpose planning, and sustainable solutions.

Results of the National Watershed Assessment were captured in, "National Water Sustainability Analysis: A Characterization of U.S. Watershed Health," A publication of the USACE Actions for Change program. The report includes the meta-data documentation for each indicator and provides the logic for indicator selection along with data sources, method of calculation, and assessment criteria. Expected publication is September 2009.