



To foster the science and the art of soil, water, and related natural resource management to achieve sustainability.

International Headquarters

945 SW Ankeny Road
Ankeny, Iowa 50023-9723
Telephone (515) 289-2331
fax (515) 289-1227
email: swcs@swcs.org
<http://www.swcs.org>

SWCS ISSUE BRIEF

Sedimentation, Conservation Measures, and the Future of Reservoirs¹

The Issue

The U.S. government made significant investments in building reservoirs, primarily for flood control purposes, in the 1950's and 60's. Many of these reservoirs are now important water sources for public water supplies, recreation and economic development, agricultural and industrial uses, hydropower, and river navigation. While many of these reservoirs were built for a projected life of 150 to 200 years, it is now projected that for many, that life will be cut short by 50 to 100 years due to sedimentation. In many of these reservoirs, the volume of water storage for public water supplies and other uses has been sharply reduced by sedimentation. Furthermore, water quality has been negatively impacted by total suspended solids, nutrients, pesticides, trace metals, and/or endocrine disrupting compounds, diminishing the beneficial uses of the reservoirs. Protecting our reservoirs from sedimentation and accelerated eutrophication is a high priority issue for many states and for the federal government, and is crucial to the future quality of life for our citizens. Due to the many beneficial uses of reservoirs, their degradation impacts a variety of economic, public health, environmental, and social concerns.

Research, Educational, and Policy Needs

In order to protect and sustain our system of reservoirs and to fully realize their potential benefits, there are a number of research, educational, and policy needs, summarized below.

1) Reservoir Information System - There is a need to conduct a more complete assessment of reservoirs on a recurring basis, in order to quantify the degree of sedimentation and rates of sedimentation. A reservoir information system is needed that characterizes the status of reservoirs and documents change over time. Economic analyses are needed to assess the cost of sedimentation and eutrophication and the economic benefits of implementing BMPs. The public needs to be educated about the condition of reservoirs, their finite life, and the cost/benefits of reservoir protection.

2) Identifying Sources of Sediment and Base Loads in Streams - One of the biggest research needs is to identify and quantify the significant sediment sources and their rates of delivery to reservoirs for a range of ecosystem types and climatic zones. All potential sources need to be considered including uplands, riparian areas, streambanks, and stream channels. The contribution of ephemeral gullies to upland erosion needs to be quantified. Simulation models need to be developed that account for all the sources of sediment and nutrients and that predict the impacts of management practices. There also is a need to quantify the base sediment load for stable stream channels for a range of physiographic conditions

¹ Based on a conference sponsored by USDA-CSREES (Grant No. 2008-35102-19258), USDA-ARS, K-State Research and Extension, and the Soil and Water Conservation Society; September 14-16, 2009; Kansas City, MO; attended by 172 professionals from 23 states plus District of Columbia, Puerto Rico, and two Canadian Provinces, representing a range of university, government, and private organizations.

and under conditions of changing climate. Current and developing professionals need fundamental training in stream morphology and natural stream characteristics and how to accurately identify significant sediment sources and appropriate control measures.

3) Model Development and Improvement - There is a critical need to develop models that: 1) Simulate how small impoundments affect geomorphology and hydrology of the watershed; 2) Evaluate long term strategies to maintain usable storage over multiple environments; 3) Quantify impacts of sedimentation on all parts of the system, utilizing holistic ecosystem approaches; 4) Incorporate shifting climate patterns into projections of sediment rate and water supplies; and 5) Are coupled with social systems.

4) Watershed Scale Processes and Management - Protecting our reservoirs depends on an improved understanding of watershed scale processes and management including social aspects of BMP selection and implementation, how to improve flood plain services, and integrated approaches to controlling sediment load. Research data are needed on best management practices and their impact, including quantifying the lag time between implementing BMPs and in-reservoir changes. We need to communicate reasonable expectations for seeing changes/impacts from BMPs.

5) Policy Frameworks and Institutional Needs - Continued support of programs that support implementation of conservation measures is paramount, as well as development of policies for watershed protection, including easements, zoning, ordinances, and regulations. A decision-making process for targeting funds for reservoir management and maintenance is needed. There is a need to improve communications and collaboration among government agencies at different levels (local, state, federal), so that policies and regulations support rather than counter each other. An adaptive policies framework will be needed to address climate change scenarios for different eco-regions.

Recommendation

Attention to the issues surrounding the future of our reservoirs and the threats to their beneficial uses could not be more timely. Public water supplies are at risk and recreational uses are being diminished while climate change and aging infrastructure, especially for smaller flood control dams and conservation structures, threaten to exacerbate the problem. The recent dam failure on Lake Delhi near Manchester, Iowa highlights the threat of the combined effects of sedimentation, aging structures, and extreme weather events. This is a national problem that calls for a federal interagency collaborative effort. A national integrated collaborative strategy is needed that draws on the expertise and capabilities of research, educational, information and outreach, and action agencies and organizations. Our recommendation is that either an existing group, such as the Subcommittee on Sedimentation, Advisory Committee on Water Information, led by USGS, or the National Institutes for Water Resources (NIWR) also led by USGS, or a new group, to be formed, develop such a strategy. Some of the agencies that need to be involved in developing and implementing a strategy to deal with the complex issues surrounding sedimentation, and the protection of our system of reservoirs include: USDA (ARS, NIFA, NRCS, and U.S. Forest Service), Department of the Interior (USGS, NIWR, Bureau of Reclamation, Bureau of Land Management, U.S. Fish and Wildlife Service, and NOAA) the U.S. Army Corps of Engineers, and USEPA. These agencies need to work in collaboration with universities, state and local agencies, and non-government agencies.

The Soil and Water Conservation Society endorses the establishment of an interagency task force (either through existing entities or a new one formed for this explicit purpose) charged with developing and implementing a national strategy aimed at protecting our national system of reservoirs and addressing the key threats of sedimentation and eutrophication. This strategy is expected to include research, education, outreach, policy frameworks, and implementation of conservation measures.