

**A STRATEGY FOR FEDERAL
SCIENCE AND TECHNOLOGY
TO SUPPORT
WATER AVAILABILITY AND QUALITY
IN THE
UNITED STATES**



September 2007



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Report of the

NATIONAL SCIENCE AND TECHNOLOGY COUNCIL
COMMITTEE ON ENVIRONMENT AND NATURAL RESOURCES

Subcommittee on Water Availability and Quality

September 2007

EXECUTIVE OFFICE OF THE PRESIDENT
NATIONAL SCIENCE AND TECHNOLOGY COUNCIL
WASHINGTON, D.C. 20502

September 4, 2007

Dear Colleague:

The United States has reaped the benefits of abundant and reliable supplies of fresh water since its founding. However, the impacts of population growth, development, and climate change are placing increasing stress on our Nation's water supplies. For example, a recent Government Accountability Office study determined that 39 U.S. states anticipate some level of water shortage within the next decade.

The Subcommittee on Water Availability and Quality of the National Science and Technology Council's Committee on Environment and Natural Resources was established to consider this issue. The Subcommittee was charged with: (1) identifying science and technology needs to address the growing issues related to fresh water supplies, (2) developing a coordinated, multi-year plan to improve research to understand the processes that control water availability and quality, and (3) enhancing the collection and availability of the data needed to ensure an adequate water supply for the Nation's future.

This report is a result of that interagency collaboration. It provides an overview of the set of challenges that face us in our pursuit of adequate fresh water supplies, lays out the research priorities associated with those challenges, and provides recommendations for a federal science strategy to address this important issue.

Sincerely,



John H. Marburger III
Director, Office of Science and Technology Policy
Science Advisor to the President

CONTENTS

Members of the Subcommittee on Water Availability and Quality	iv
Preface.....	v
Introduction.....	1
Science informs water policy and management decisions.....	3
Principles for applying science and technology to water availability and quality	5
The challenges of meeting future U.S. demands for water.....	7
A Federal science strategy to meet U.S. water challenges.....	15
Next steps.....	27
Conclusion	27
Selected bibliography.....	28
Appendix I	28
Appendix II.....	35

TEXTBOXES

What is our current water use?.....	2
Setting a responsive and effective national water-resources research agenda	6
New techniques for measuring sediment	8
Hydrologic applications of microgravity measurements:	
measuring changes in ground-water storage.....	16
Microbial source tracking to identify the source of fecal contamination	18
Water extracted with the production of oil and gas.....	20
Collaborating to maintain flood control and improve riverine ecosystems	22

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PREFACE

The National Science and Technology Council (NSTC) establishes national guidelines for Federal science and technology investments. Under the NSTC's Committee on Environment and Natural Resources is the Subcommittee on Water Availability and Quality (SWAQ), which is made up of 25 Federal agencies that collectively are responsible for all aspects of Federal water research and/or water resource management.

The Directors of the Office of Science and Technology Policy and the Office of Management and Budget, in their August 12, 2004, joint memorandum, requested Federal agencies, through the NSTC, to "develop a coordinated, multi-year plan to improve research to understand the processes that control water availability and quality, and to collect and make available the data needed to ensure an adequate water supply for the Nation's future." With this report, the SWAQ lays out the research priorities and identifies opportunities to further these goals.

Earlier, the SWAQ prepared a report, "Science and Technology to Support Fresh Water Availability in the

United States," which has been widely disseminated and well received by the water management community. In that 2004 report, SWAQ outlined the need for coordinated science and technology efforts to better understand water supply and demand in the United States. Although it serves as a valuable introduction to the issues of water availability, that report did not deal explicitly with water quality. In the present report, SWAQ takes a more comprehensive approach by considering water quality and quantity together, as has been recommended by numerous Federal advisory bodies.

This report describes topical areas for future emphasis in Federal water science and technology programs. The report does not contain an inventory of current programs; rather, the report focuses on topics that would benefit from increased interagency and public/private collaboration and/or increased resources. SWAQ has already begun work on implementation plans for some of the priority topics identified.



Salmon River, Idaho



NRCS

Introduction

U.S. Water Resources— Are We Facing a Shortage?

Water is essential to maintain human health, agriculture, industry, ecosystem integrity, and the economic vitality of communities and the Nation. Throughout history, a key measure of a civilization's success has been the degree to which human ingenuity has harnessed fresh water resources for the public good. Indeed, civilizations have failed because of their inability to provide a safe and reliable water supply in the face of changing water resources and needs.

In its early history, U.S. water management focused largely on alleviating or controlling the impacts of floods and droughts. Investments in dams, water infrastructure, navigation infrastructure, canals, and water treatment plants provided safe, abundant, and inexpensive sources of water, aided flood management, and dramatically improved hygiene, health, and economic prosperity. The U.S. water resources, infrastructure, and technologies became the envy of the world.

Water-related science and technology have served our Nation well. The Nation has built infrastructure that provides safe drinking water, agricultural irrigation, hydropower, flood control, and navigable waterways. Through improved waste treatment technology, great strides have been made in improving water quality, and in protecting and enhancing habitat for aquatic organisms and recreational opportunities for the public.

The dawning of the 21st century brings a new set of water resource challenges. Climate variability and change, mining of finite ground water¹ resources, and degraded water quality dramatically impact the amount of fresh water available at any given time. The increasing competition among water users means that critical decisions will be made about allocating water for agricultural use and consumption by cities, for maintaining water reservoirs and ensuring in-stream flows for aquatic ecosystems, and for industrial and energy production and recreational uses. Even small changes in water quality, quantity, or the time when water resources are available can render water supplies useless for their intended applications or hazardous to life and property. Today, water quantity and water quality are equally critical to the long-term sustainability of the Nation's communities and ecosystems.

Authority to manage water resources is largely delegated to States, Tribes, and local municipalities. SWAQ is committed to productive collaboration with these water resource managers. SWAQ has identified a Federal role that emphasizes the variety of ways that water science and technology can be used to inform policies and decisions for managing water resources for the public good. As we, the citizens of the United States and governmental agencies at all levels, face today's national water resource challenges, the Nation will again rely on opportunities and tools offered by science and technology. Federal water research and development will increase the range of options and will inform the public, water managers, policymakers, and the private sector about the benefits, costs, and risks of the variety of decisions they face.



Lynn Betts, NRCS

¹For the purposes of this report, ground water refers to water under the surface of the earth, such as soil moisture or water found in aquifers; surface water refers to water on the surface of the earth, such as rivers, lakes, wetlands, and estuaries.