U.S. Geological Survey Highlights

Introduction

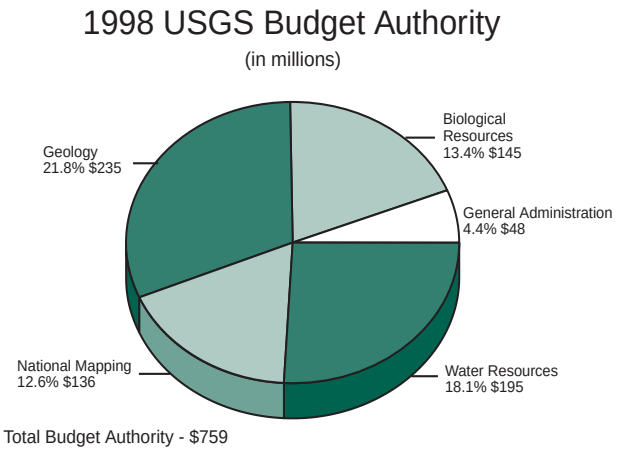
USGS Mission

"The U.S. Geological Survey provides the Nation with reliable, impartial information to describe and understand the Earth."

The U.S. Geological Survey (USGS) is a natural science organization that is recognized worldwide as scientifically credible, objective, and demonstrably relevant to society's needs. The USGS provides the Nation with reliable information to describe and understand the Earth. This information is used to minimize loss of life and property from natural disasters; manage water, biological, energy, and mineral resources; enhance and protect the quality of life; and contribute to wise economic and physical development. USGS conducts research in four major science disciplines—biology, geology, hydrology, and cartography—through which it develops and applies innovative means to solving problems in resource management.

The USGS has an important and essential role in building and rebuilding the Nation in the 21st century as we did in the 19th and 20th centuries, but the role will be different and it will change with time. We have become the Nation's chief natural science agency for a reason and a purpose—to provide the kind of science that will serve the citizen and help the Nation adapt to a rapidly changing world; to be the agency that can help this Nation find, protect, develop, and enjoy the natural resources that are essential for building and living in the next century; and to be an agency that can help significantly reduce the risks from natural hazards. The new USGS motto, "science for a changing world," appropriately reflects the importance of looking forward and being sensitive to the changing needs of society.

USGS budget authority supports activities that cover a broad range of physical, chemical, and biological systems. This diversity of disciplines gives the USGS great strength in dealing with the problems facing society that the agency is being called upon to address. Increasingly, the USGS is being recognized for science that is interdisciplinary in scope and highly relevant to the issues important to the Nation. The USGS is striving to increase this interdisciplinary approach to address issues with an integrated manner, particularly in making scientific data sets integratable with one another.



U.S. Geological Survey Programs

The National Mapping Program - The mission of the National Mapping Program is to meet the Nation's need for basic geospatial data, ensuring access to and advancing the application of these data and other related earth science information for users worldwide.

Water Resources Investigations - Water Resources Investigations has the principal responsibility within the Federal government for providing the hydrologic information and understanding needed by others to achieve the best use and management of the Nation's water resources.

Biological Research - Biological Research's mission is to work with others to provide the scientific understanding and technologies needed to support the sound management and conservation of our Nation's biological resources. A fundamental part of this mission is embodied in the deep commitment to make data and information on the Nation's biological resources more accessible to more people.

Summer campers learn how to use USGS topographical maps (photo by USGS).

Geologic Hazards, Resources, and Processes - The Geologic Hazards, Resources, and Processes programs have science goals designed to address pressing issues facing the Nation in the next decade. In general, these goals focus on understanding human interaction with the natural environment and build upon long-term USGS investments in basic research into the fundamental geologic processes controlling how the Earth works.

Principal USGS Themes

The USGS has identified four principal theme areas—Hazards, Natural Resources, Environment, and Information Management—to more effectively communicate how USGS earth science information contributes to public policy issues.

Hazards

Hazards are unpreventable natural events that, by their nature, may expose our Nation's population to the risk of death or injury and may damage or destroy private property, societal infrastructure, and agricultural or other developed land. USGS activities in the hazards theme area deal with describing, documenting, and understanding natural hazards and their risks. A key accomplishment in 1998 was:

- *Alerting the Nation of Potential Landslide Hazards Associated with El Nino Weather Effects* - The distribution of El Nino-induced precipitation and temperature anomalies for 1997-1998 was predicted by USGS using its computerized national landslide susceptibility map in conjunction with national climate outlook maps produced by the National Oceanic and Atmospheric Administration (NOAA). This combination of USGS and NOAA information indicated where and when rainfall- and snowmelt-induced landsliding might have occurred during the 1997-1998 winter and spring. This information, which was frequently updated and refined and made available on the Internet at *http://geohazards.cr.usgs.gov*, indicated broad regions of the Nation that increased potential for landslides during the El Nino climatic episode.

Natural Resources

The natural resources of our Nation are its land, water, minerals, and energy. These renewable and nonrenewable resources are needed to sustain life and to maintain and enhance our economic strength. USGS activities in the natural resources theme area inventory the occurrence and assess the quantity and quality of natural resources. A key accomplishment in 1998 was:

- *Helping to Mitigate Acid Mine Runoff* - USGS scientists are applying their knowledge and expertise to develop environmentally acceptable and cost-effective treatment processes for acidic, metal-laden drainage from abandoned coal mines. Field tests of the technology are currently being conducted in cooperation with the National Park Service, the Freshwater Institute, and the Pennsylvania State Department of Environmental Protection. Field tests include establishing the effects of the treatment process on acid-sensitive aquatic invertebrates and fish. Treating only a portion of the stream with super-treated effluent reduces the need for large, expensive equipment and decreases the costs of all aspects of the treatment process

Over 400,000 abandoned mines are found on Federal lands. In addition, many more are adjacent to Federal lands or are affecting water quality and biological resources under Federal stewardship. Defunct mines have contaminated public and private lands with more than 50 billion tons of untreated mine waste. In the Appalachian coal region, acid mine drainage has degraded more than 8,000 miles of streams and has left some aquatic habitats virtually lifeless. The cleanup and remediation of abandoned mine sites will require a huge investment of taxpayers' dollars. In West Virginia alone, the coal industry is spending approximately $1 million each day to treat acid mine drainage.

Environment

Our Nation's environment—air, water, soil, and plant and animal life—is constantly changing as natural processes and human actions affect it. USGS activities in the environment theme area include studies of natural physical, chemical, and biological processes as well as addressing the results of human actions; the goal is to provide the understanding and scientific information needed to recognize and mitigate adverse impacts and to sustain the environment. A key accomplishment in 1998 was:

- *Studying Air Pollution in and around Mt. Rainier* - Recent studies by USGS scientists and students have shown that Mt. Rainier National Park is the most polluted area of Washington State in terms of tropospheric (the inner layer of the atmosphere) ozone. Ongoing cooperative work between USGS scientists and the National Park Service will provide an early warning to future changes in air quality and the health of sensitive plant species in Mt. Rainier National Park. Ozone, a colorless gas, is formed from nitrogen oxides and organic compounds, common components of fossil fuel emissions, in the presence of sunlight. It is highly toxic to both humans and vegetation at very low concentrations. Pollutants produced in the Seattle-Tacoma metropolitan area are transported eastward toward the Cascade Range, where Mt. Rainier is directly in the path of the pollutant plume. Weekly average concentrations of ozone are actually higher in the Mt. Rainier regions than they are in the Seattle area, with the highest exposures at high elevations up to 8,000 feet. Ozone synthesis is enhanced by warm, sunny weather, so rural residents, recreational visitors, and alpine vegetation are exposed to potentially harmful levels of ozone during the summer when park visitation is highest and plants are metabolically active. As the human population of the Seattle-Tacoma region continues to increase and more motorized vehicles crowd local highways, air pollution levels can be expected to increase as well.

Information Management

USGS scientists working on air quality monitoring in Mt. Rainier National Park (photo by USGS).

Information management is both a strategy, driven by customer needs, and an infrastructure, shaped by technology, for handling and distributing information. Information management crosses disciplinary and administrative boundaries. USGS information management activities organize, catalog, archive, maintain, and disseminate earth and biological science data and information so that all potential users are aware of and can acquire the information. A key accomplishment in 1998 was:

- *The National Atlas of the United States of America* - The new National Atlas of the United States is an ambitious, government-wide partnership led by the USGS that aims to make geographic information more readily accessible to individual Americans. The National Atlas is designed to promote greater geographic awareness through the development and delivery of products that provide easy to use, map-like views of our natural and societal landscapes. It will include products designed to stimulate children and adults to visualize, comprehend, and even marvel at the complex relationships between environments, places, and people. The National Atlas is intended to serve the interests and needs of a diverse populace in many ways—an essential reference, a framework for information discovery, an instrument of education, an aid in research, and an accurate and reliable source for scientific information.

  The USGS and its partners delivered their first new National Atlas products in 30 years during 1998. These included:

  - an online, interactive mapping system that allows citizens to make and explore their own maps within their favorite Internet browser;

  - information pages on the Internet that describe this project and its opportunities for business partnerships;

  - an interactive mapping engine for the interagency *recreation.gov* web site;

  - innovative and redesigned National Atlas paper maps; and

  - complete, consistent, and authoritative digital map layers that can be downloaded and used to explore information gathered at a national level.