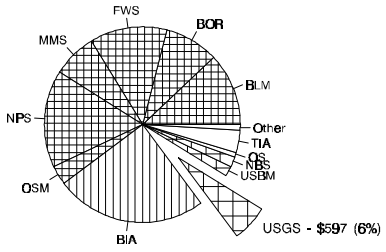
U.S. Geological Survey

America faces and will continue to face critical questions about our natural resources: How much land, water, energy and minerals are available to us as a nation? How can we plan for, prepare for or prevent natural hazards like floods and fires, earthquakes and volcanos, tornados and hurricanes? The Geological Survey was formed to provide impartial, scientific information to help our nation answer these questions.

In 1879, an act of Congress established the United States Geological Survey (USGS). Its initial charge was the "classification of public lands, and the examination of the geological structure, mineral resources, and products of the National domain."

In the ensuing 116 years, USGS has expanded, adapted, and consolidated its programs to respond to the Nation's need for credible, unbiased scientific information that is readily available to the public and private sectors to enable them to carry out their land and resource management responsibilities.

FY 1994 USGS Budget Authority
($ in millions)



Total DOI Budget Authority - $9,663

The Geological Survey is now the federal government's largest civilian mapmaking agency, the primary source of data on the nation's water resources, and the research coordinator for the nation's top earth science professionals.

"The value of [the USGS] to the bay area and earthquake-prone California is virtually immeasurable. Its highly professional research...is not the kind of long range science that can expect to attract private investment. Yet it's exactly the kind of science that saves lives.... The fundamental issues of public safety are clearly the proper province of the Federal government. The crucial scientific role that has been carried out with quiet competence for so long by the USGS must be fully protected, in the interest of all of us."

Los Angeles Times, January 1995

Emergency Response: The Geological Survey works with local, State, and national emergency management agencies during earthquakes, volcanic eruptions, landslides, floods, and hurricanes. For many impending natural disasters, such as floods and volcanic eruptions, USGS provides advance information to emergency management agencies so that warnings can be made.

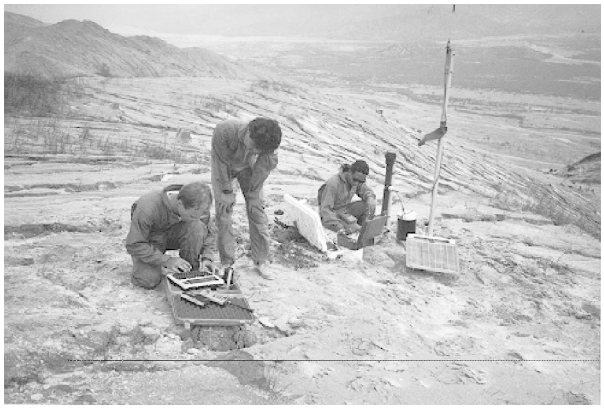
Within hours of the declaration of emergency after hurricane Andrew, the Geological Survey had maps in the hands of planners and emergency coordinators, letting them focus on the hardest hit areas first. With approximately 9,700 employees located throughout the United States, USGS provides timely and unified topographic, geologic and hydrologic information in response to natural disasters.

Since November of 1993, USGS has directed the interagency Scientific Assessment and Strategy Team (SAST), which was established by the White House to provide scientific advice to policy makers in response to the 1993 floods in the upper Mississippi River basin. Intense efforts by the team resulted in the development of a large digital geographic data base available for multiple planning uses, a preliminary analysis on the interrelations of hydrology, geomorphology, and ecology with flooding, and information and map data to be used in policy analysis and decision making. The preliminary
results of the team's efforts have been made available to the public in the document *Science for Floodplain Management into the 21st Century*. A

clearinghouse has been developed for the data base, which is accessible over the Internet via the SAST home page. The team's continuing activities include publishing background information and final research results in a series of documents and maps. The project is considered to be a model for interagency cooperation and coordination.

Minimizing Earthquake Damage: The U.S. experiences 8 to 10 significant, potentially damaging earthquakes each year. Urban planners and engineers use USGS seismic safety data to develop stronger building codes and structural design. In addition, the U.S. has 1,800 seismic stations in 38 seismic networks, 40 percent of which comes from USGS.

Volcanic Disasters Averted: In June 1991 at Mount Pinatubo (Philippines), this century's second largest volcanic eruption would have killed tens of thousands of people were it not for quick work by the USGS. More than 65,000 people were evacuated before the eruption, including 14,500



USGS and Filipino scientists verify operation of a mudflow-detection at Mount Pinatubo.

Americans. Hundreds of millions of dollars worth of U.S. military aircraft were evacuated just before eruption.

There are 65 potentially active volcanoes in the western U.S. and Alaska, causing high altitude volcanic ash clouds that are a direct hazard to aircraft. Several eruptions of Redoubt Volcano during 1989-90, caused $100 million in damage and lost revenue. To reduce the future hazard of ash to the aircraft industry, USGS scientists now geophysically monitor the Alaskan volcanoes closest to Anchorage. As a result, three Spurr Volcano

Strong shaking from the Northridge earthquake collapsed this parking structure on the campus of the California State University at Northridge. Because the earthquake occurred at 4:30 a.m., no people were in the structure.

eruptions in 1992 caused no damage to aircraft at all.

Mapping and Geospatial Data: The USGS is perhaps most widely known for its mapping capabilities. In fact, almost every United States citizen, over the course of his or her lifetime, will come into direct contact with some form of a USGS quadrangle map. USGS works with other Federal, state, academic and private cartographic agencies to ensure that new data are readily available and that the data are collected according to national standards. This ensures that the data are usable and adaptable for multiple purposes, thereby avoiding duplication of effort and saving taxpayers and the economy millions of dollars each year. The focus of USGS Mapping programs is rapidly changing from producing maps to ensuring the availability of spatial data and coordinating spatial data standards among Federal, state and local agencies.

Geology: The Congress chartered USGS as an agency staffed with geologists to survey the new Nation's vast expanses. Today, the geological component of the Geological Survey remains at the forefront of geological research both on land and at sea. In concert with State geology agencies, USGS provides geologic data to support public policy decisions of State and local officials such as highway location, building reinforcement codes in earthquake-prone areas, and selection of landfill sites.

Water Resources: One of the fastest-growing

activities within USGS is its program of water-resource evaluations. Local studies of water quality and quantity feed into a larger aggregation of data which characterizes the Nation's water supply. Over 7,200 streamgaging stations throughout the country provide a constantly updated data base to local managers to assist them in flood forecasting and water management. Other studies provide information on non-point source water pollution, contamination of ground water, and the availability of surface and ground water for various uses.

The USGS Federal-State Cooperative Water Resources program is unique in that State and local agencies provide funds to match USGS Federal appropriations, and USGS does the work. Typically the program is oversubscribed, resulting in the States offering up to 40 percent more funds than USGS can match. In 1995, more than 1,100 cooperative agencies will be participating in the program.

Cooperative Program investigations are designed to meet State and local needs that also address national issues. Through the pooling of resources, USGS is able to conduct studies that lead to an improved understanding of the Nation's water resources to the mutual benefit of all levels of government -- at substantial savings.

U.S. Geological Survey: The Face of the U.S. Seafloor

The charter of the U.S. Geological Survey (USGS) places with it the primary responsibility for mapping territories of the United States. In 1983, President Reagan signed the Proclamation declaring the Exclusive Economic Zone (EEZ) of the United States extending the sovereign territory of the nation from the coastline to 200 nautical miles offshore. With this one action, the territory of the United States was enlarged by more than 13 million square kilometers, all of which are under water. The USGS program to systematically map the entire 13 million square kilometers began in 1984 and is expected to be completed by the end of the century.

The challenges encountered in mapping the seafloor thousands of meters beneath the sea surface are similar to the challenges of mapping the Moon or Mars. The marine environment is hostile, the tools rely on remote sensing, and mapping requires geological intuition, imagination, and experience. Reconnaissance views of the seafloor, however, will allow the next generation of scientists to concentrate on those critical areas that will provide the keys to understanding the geology and geological processes of the ocean floor.

GLORIA (Geologic Long Range Inclined ASDIC) is an electronic mapping system built by the Institute of Oceanographic Sciences in the United Kingdom and selected by the Geological Survey specifically to conduct surveys of the EEZ, producing digital image maps of the seafloor from reflected sound waves..

As GLORIA surveys provide a road map of the ocean floor, Geological Survey scientists correlate mosaics of sonar images with existing geological information. Geological Survey scientists have learned from GLORIA mapping in the Gulf of Mexico that models for sediment dispersal on the Mississippi fan, models that are used by industry to explore for oil and gas, must be revised.

GLORIA mapping, with its technology enhancements, has significant application to earthquake prediction, fisheries, communications, pipelines, drilling, military, shipping, commerce, and technology advancement.