



FACING TOMORROW'S CHALLENGES: USGS SCIENCE IN THE DECADE 2007–2017

A National Program to Assess Hazards, Risk, and Resiliency

In 2007, the U.S. Geological Survey (USGS) developed a science strategy outlining the major natural science issues facing the Nation in the next decade. The science strategy consists of six science directions of critical importance, focusing on areas where natural science can make a substantial contribution to the well-being of the Nation and the world. This fact sheet focuses on a program to assess natural hazards and how USGS research can strengthen the Nation with information needed to meet the challenges of the 21st century

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Importance of Hazard and Risk Assessment to the Nation

Recent natural hazards—Hurricane Katrina, Mt. St. Helens, the Northridge earthquake, and western wildfires—are examples of catastrophic events that threaten the Nation's safety, security, economic well-being, and natural resources. Equally threatening are the effects of slower, more chronic hazards related to climate change, such as drought or ecosystem collapse. Increased monitoring

and communication is needed to improve real-time forecasting and is needed to work to prevent natural hazards from becoming natural disasters.

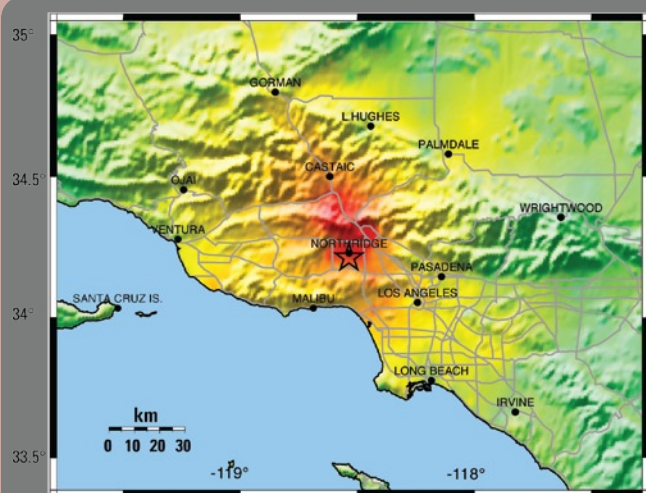
Why Action is Needed Now

Current trends point to increasing numbers of hurricanes making landfall, increasing drought, more destructive wildfires, and an increasing number of people moving into coastal and other high-risk areas. Until recently, the num-

ber of lives lost to natural hazards in the United States has declined each year; however, the economic cost of major disasters continues to rise. Each decade, the cost in constant dollars of property damage from natural hazards doubles or triples. The Nation's aging infrastructure and building stock make the potential effects from natural hazards even more serious and imminent.

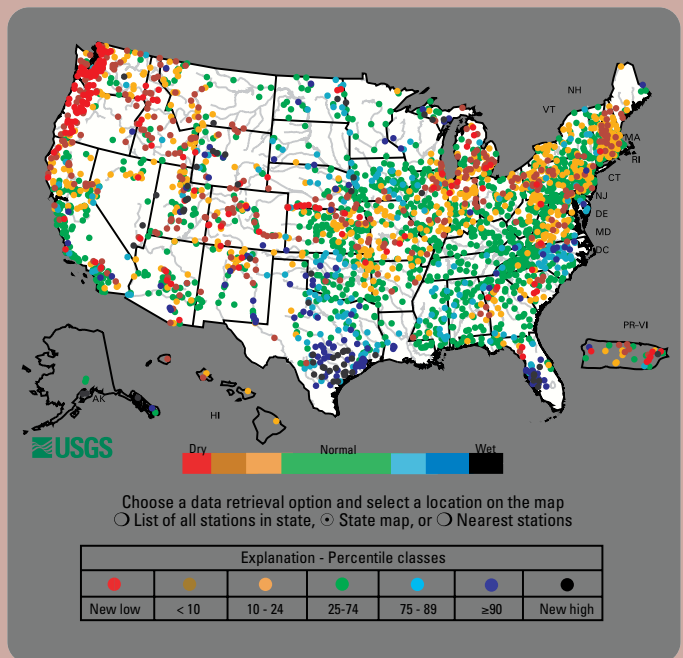
With risk and vulnerability to natural hazards and disaster-relief costs rising, the Nation needs a clear understanding of the potential threats, the vulnerability of society to these threats, and strategies for responding to and recovering from these threats. How government and community leaders deal with these issues will determine the Nation's standard of living and ability to compete in a global economy.

Real-Time Information for Safer Communities



PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	none	none	none	Very light	Light	Moderate	Moderate/Heavy	Heavy	Very Heavy
PEAK ACC.(%)	<.17	.17-14	1.4-39	3.9-92	9.2-18	18-34	34-65	65-124	>124
PEAK VEL.(cm/s)	<0.1	0.1-1.1	1.1-3.4	3.4-8.1	8.1-16	16-31	31-60	60-116	>116
INSTRUMENTAL INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+

A ShakeMap shows the intensity of shaking for a magnitude 6.7 earthquake near Northridge, California, 1994. Simplified versions are quickly available for the news media.



Water Watch is the official USGS website for real-time streamflow conditions nationwide in relation to historical conditions (<http://water.usgs.gov/waterwatch>)

How the USGS Can Help

The USGS is uniquely qualified to implement this science strategy because of its broad range of expertise, experience in interdisciplinary thinking and action, and proven skills in building customer relationships. The USGS has statutory and mission responsibilities for using the best science available to help decisionmakers and citizens respond to natural hazards and plan for a safer, more resilient society. The agency has the lead Federal responsibility to issue alerts for earthquakes, volcanoes, and landslides to enhance public safety and to reduce losses through effective forecasts and warnings. Other agencies, such as the National Weather Service and the Federal Aviation Administration, rely on USGS information to help them fulfill their responsibilities for such tasks as issuing flood or tsunami watches and warnings, developing building codes in earthquake-prone areas, monitoring seasonal wildfire danger conditions, or helping pilots avoid dangerous volcanic ash clouds. Interdisciplinary research about earth processes will lead to systems and models that allow communities at risk to make better decisions and safeguard people and property.



Hurricane Katrina made landfall as a Category 4 storm in Plaquemines Parish, La., on August 29, 2005, and altered the physical, ecological, social, and economic structure of New Orleans and the entire Gulf of Mexico coastal zone in ways that will have enormous long-term effects.

Major investments in robust monitoring networks—such as the Advanced National Seismic System, the National Volcano Early Warning System, and the National Streamflow Information Program—are needed for accurate predictions and assessments of hazards, as well

as information critical to response and recovery efforts. Forecasts that are based on understanding physical processes will yield a new generation of risk-focused products so that USGS and its partners can help communities better understand their vulnerability to the forces of nature.

USGS Science Can Meet the Challenge

The USGS is ready to take action by:

- Expanding and modernizing USGS monitoring and communications capabilities to take full advantage of technological advances and deliver reliable products. A network of monitoring stations across the country will provide timely and reliable information on stream levels, volcanic and earthquake activity, wildlife diseases that may affect human health, and other potential hazards.
- Increasing research into the causes and consequences of natural hazards and enhancing the understanding of the linkages among natural hazards, the environment, climate, and society.
- Developing models with robust predictive capability to support land and emergency managers in short- and long-term hazard mitigation.
- Developing a core group of USGS and partner researchers, including governmental, private-sector, and academic groups, to focus on understanding and communicating society's vulnerability to natural hazards.
- Developing communications strategies that focus on understanding the risk and resilience of society to natural hazards and looking for new ways of communicating hazard assessments to local audiences.

A Vision For the Future

The Nation is safer from natural disasters, thanks to a seamless, integrated disaster reduction/monitoring/warning system maintained and operated by the USGS and its partners. Improved communication ensures that communities have enough warning to respond to the natural hazards they face.

For Additional Information

U.S. Geological Survey, 2007, *Facing Tomorrow's Challenges—U.S. Geological Survey Science in the Decade 2007–2017*: Available online at <http://pubs.er.usgs.gov/usgspubs/cir/cir1309>

Also, visit the USGS home page at <http://www.usgs.gov/>