Revitalizing Mitigation for the Nation: Implementing the Grand Challenges

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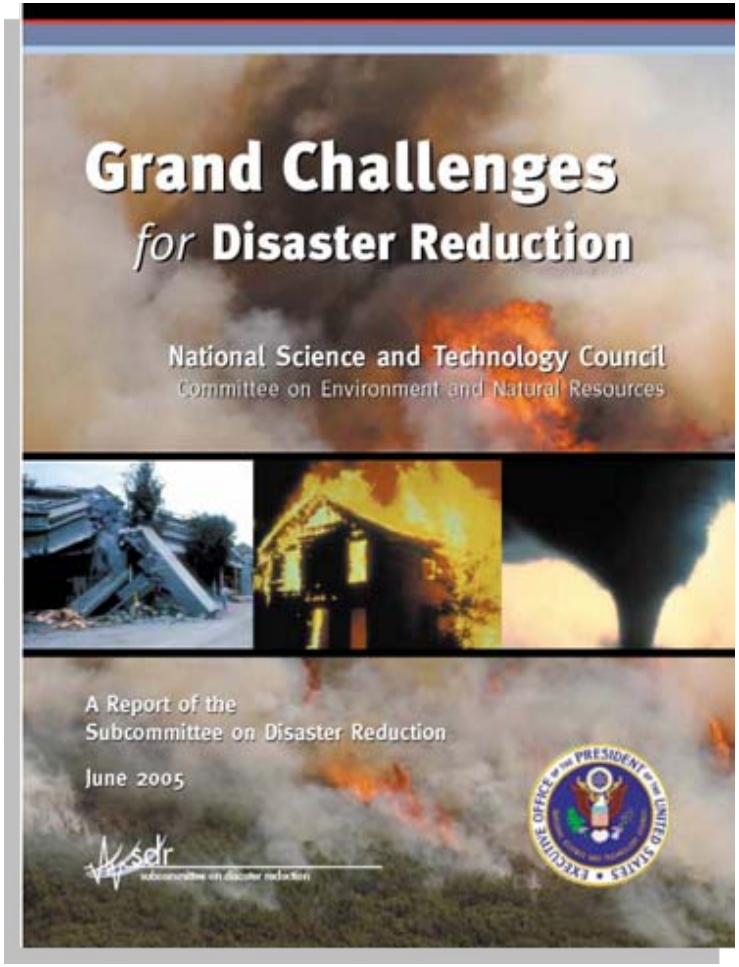
NSTC Subcommittee on Disaster Reduction

- The U.S. Subcommittee on Disaster Reduction (SDR) is an element of the President's National Science & Technology Council charged with establishing clear national goals for Federal science and technology investments in disaster reduction.
- Promotes interagency cooperation for natural and technological hazards and disaster planning.
- Facilitates interagency approaches to identification and assessment of risk, and to disaster reduction.
- Advises the Administration about relevant resources and the work of SDR member agencies.

SDR Member Agencies

- Department of Agriculture
  - U.S. Forest Service
- Department of Commerce
  - National Institute of Standards and Technology
  - National Oceanic & Atmospheric Administration
- Department of Defense
  - National Geospatial-Intelligence Agency
  - National Guard Bureau
  - U.S. Army Corps of Engineers
- Department of Energy
- Department of Health & Human Services
  - Centers for Disease Control & Prevention
  - U.S. Public Health Corps
- Department of Homeland Security
  - FEMA
  - Science & Technology Directorate
  - U.S. Coast Guard
- Department of Housing & Urban Development
- Department of the Interior
  - Bureau of Land Management
  - U.S. Geological Survey
- Department of State
  - U.S. Agency for International Development
- Department of Transportation
  - Federal Highway Administration
- NASA
- National Science Foundation
- U.S. Environmental Protection Agency

The Grand Challenges for Disaster Reduction



1. Provide hazard and disaster information where and when it is needed.
2. Understand the natural processes that produce hazards.
3. Develop hazard mitigation strategies and technologies.
4. Recognize and reduce vulnerability of interdependent critical infrastructure.
5. Assess disaster resilience using standard methods.
6. Promote risk-wise behavior.

In a more disaster-resilient America

- Relevant hazards are recognized and understood.
- Communities at risk know when a hazard event is imminent.
- Property losses and lives at risk in future natural hazard events are minimized.
- Disaster-resilient communities experience minimum disruption to life and economy after a hazard event has passed.

Implementing the Grand Challenges

The implementation strategy for the Grand Challenges is outlined in a series of documents describing the science and technology agenda for all major types of hazards as well as critical cross-cutting topics, including:

- Coastal Inundation
- Drought
- Earthquake
- Human and Ecosystem Health Hazards
- Fire
- Flood
- Hurricane
- Infrastructure
- Landslide
- Natural Resource Impacts
- Space Weather *(coming soon)*
- Technological Hazards
- Tornado
- Tsunami
- Volcano
- Winter Storms

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The *Grand Challenges for Disaster Reduction* is a ten-year strategy developed by the SDR. It sets forth six Grand Challenges for disaster reduction that, when addressed, will enhance community resilience to disasters and thus create a more disaster resilient Nation. These Grand Challenges require sustained Federal investment as well as collaborations with state and local governments, professional societies and trade associations, the private sector, academia and the international community to successfully transfer disaster reduction science and technology into common use.

To meet these Challenges, the SDR has identified implementation actions by hazard. Addressing these implementation actions will improve America's capacity to prevent and recover from disasters, thus fulfilling our Nation's commitment to reducing the impacts of all hazards and enhancing the safety and economic well-being of every individual and community.

What's at Stake

Definition and Background. A heat wave is a prolonged period of warm season temperatures well above normal for the area, often accompanied by high humidity. Heat waves can persist from a couple of days to several weeks and are often accompanied by periods of little or no rain and, in cities, by poor air quality. Heat waves are among the most deadly of all weather events.

Impacts. Although extreme events such as hurricanes, tornadoes, and floods make headlines for widespread physical destruction and heavy loss of life that can occur, more than 8000 deaths were directly attributed to excessive heat from 1970 to 2002 in the United States[2] and thousands more died as a result of heat-related causes.[3] In the summer of 1980, approximately 1700 deaths were directly attributed to persistent and oppressive heat that affected the East and Midwest. The Midwest heat wave of 1995 killed at least 465 people in Chicago alone.[4]

Heat wave impacts are widespread. While a large number of deaths may not occur in a single city every year, the cumulative impacts across broad regions over several days to weeks can result in heavy loss of life.

In an average year, 175 Americans die from the direct effects of extreme heat[4] due to a combination of factors such as failure to take adequate precautions, high humidity, lack of adequate ventilation or air conditioning, poor health and old age. Many more hundreds of deaths are associated with excessive heat attributed to heart attack, stroke, and also respiratory stress. Most deaths occur in urban areas where concrete, asphalt and physical structures raise temperatures in urban heat islands, and nighttime temperatures remain above average.

Heat waves also impact farming and ranching through loss of cattle other livestock. The 1999 drought in the U.S., associated with unusually warm temperatures, led to farm net income losses of approximately $1.35 billion.[5] About 25 percent of United States' harvested cropland and 32 percent of the pastureland were affected. Transportation is impacted by highway and railway buckling, and mechanical failures to trucks and railroad locomotives. Heat waves also can lead to water and electricity shortages.

HEAT WAVE

A report of the Subcommittee on Disaster Reduction (www.sdr.gov)

An element of the National Science and Technology Council (NSTC)

Wells NV magnitude-6 earthquake

Images courtesy Nevada Bureau of Mines & Geology

Grand Challenge #3: Develop hazard mitigation strategies and technologies.

- Incorporate revised national seismic hazard maps into next-generation model building codes;
- Improve the usability and acceptance of national model building codes by developing more accurate simplified methods for analyzing building and lifeline responses to earthquake-induced ground motions;

Grand Challenge #4: Reduce the vulnerability of infrastructure.

- Focus research on new mitigation technologies for purpose of avoidance, resistance, rapid repair and restoration of critical infrastructure and other essential facilities;
- Improve lifeline survivability through applying improved decision-making tools, redundancy, automated network assessment and shutoff systems, system hardening and network optimization technologies;

Grand Challenge #5: Assess disaster resilience.

- Extend existing risk and loss assessment software to serve as a primary tool for recovery planning and mitigation strategy development at the state and local levels. Collect cost-benefit information on value of monitoring and notification capabilities;

Grand Challenge #6: Promote risk-wise behavior.

- Develop scenarios for impact of likely earthquakes in high-risk urban areas, incorporating latest hazard data, HAZUS loss estimates, and local engineering, geoscience, planning, and emergency management expertise to deliver comprehensive picture of potential losses and encourage mitigation measures;

Super Tuesday tornadoes

Grand Challenge #3: Develop hazard mitigation strategies and technologies.

- Evaluate the response of the built environment to tornadoes by investigating load path, ultimate capability conditions, and the building envelope;
- Provide a technical basis for revised standards and codes that integrate local climatological and meteorological knowledge to improve standards for the built environment, improve safety, and reduce structural loss during tornadoes.

Grand Challenge #4: Reduce the vulnerability of infrastructure.

- Develop mitigation strategies with local authorities, such as burying power and communication cables.

Images via National Weather Service

Southern California wildfires

Grand Challenge #3: Develop hazard mitigation strategies and technologies.

- Develop and implement integrated landscape and larger-scale modeling and analysis systems for wildland fire planning and wildland-urban-interface community design that incorporate risk mitigation, fuels, fire behavior, smoke transport, resource and social values;
- Develop risk-based methods for deciding on the best strategies for mitigating the negative effects of wildland fire on ecosystems and communities; and,
- Understand the factors that motivate individuals to undertake risk mitigation activities.

And debris-flows on burn-denuded slopes

Grand Challenge #3: Develop hazard mitigation strategies and technologies.

- Develop improved structural mitigation techniques for landslide hazards,
- Evaluate effectiveness of alternative treatments for post-fire rehabilitation and restoration of severely burned slopes on reducing landslides and debris flows hazards.

Grand Challenge #5: Assess disaster resilience.

- Incorporate the use of risk analysis techniques to guide loss reduction efforts at the state and local levels;
- Provide information necessary to develop effective land-use plans and policies for at-risk communities;

More Information

http://www.sdr.gov