Improving Natural Hazards Policies through Geoscience

Position Statement. Natural hazards are the results of Earth processes, which in some circumstances are exacerbated by human activity. Reducing the vulnerability of human populations, the built environment, and ecosystems to disastrous consequences from natural hazards is a social responsibility and an achievable policy imperative. Policy makers should address vulnerability to hazard impacts through promotion and adoption of effective strategies for risk reduction and resilience. Public policies that rely on geoscience are needed to investigate the causes of natural hazards, avoid those that are preventable, and limit the negative effects of hazards on public health, safety, and the environment. The Geological Society of America (GSA) urges scientists, policy makers, risk managers, and the public to work together to reduce our vulnerability to natural hazards. GSA strongly endorses greater integration of geoscience into prevention and mitigation programs, policies, and practices through:

- Government investment in research, monitoring, and outreach programs to better characterize the nature and distribution of natural hazards and their impacts on modern society;
- Increased focus on geohazards literacy in natural hazards awareness campaigns;
- Enlisting the resources of the private sector in hazards and disaster risk-reduction strategies;
- Effective communication and implementation of geoscience research and monitoring results to support functional public policy and private sector decision-making for mutual benefit; and
- Incorporation of geoscience into scientifically-sound educational programs at all levels.

Purpose. This position statement (1) encourages increased public and private investments to reduce natural hazards vulnerability through better understanding of geologic processes; (2) emphasizes the crucial role of geoscience education and outreach in broadening the public's understanding of their risk from natural hazards and the available options to reduce risk; and (3) promotes active participation of geoscientists in implementing public policy that will improve society's resilience to natural hazards.

RATIONALE

We inhabit a dynamic planet. Growing populations in hazard-prone locations, combined with the interconnection of modern economies, are increasing the vulnerabilities and risks associated with natural hazards:

- More people than ever before live on lands subject to earthquakes, floods, hurricanes, landslides, tsunamis, volcanic activities, wildfires, and other hazards.
- We now transport and stockpile large quantities of hazardous materials and wastes at temporary sites and in structures whose integrity can be compromised by extreme events.
- Today's large-scale, interdependent networks of critical infrastructure are both fragile and costly to repair. Cascading impacts could be felt for weeks, months, or even years, with exponentially greater effects in terms of life safety, public and economic health, and overall community viability.
- In the aftermath of many disasters, businesses close and either never reopen or fail. Emergency responders and critical care facilities are overwhelmed by sudden, immense, and sometimes long-term demand for their services. The costs of repairing buildings and infrastructure are often exceeded by the indirect socioeconomic costs associated with loss of jobs and business interruption. The impact of disaster experiences on mental health can also adversely affect the long-term functional recovery of communities in post-disaster environments.

3300 Penrose Place, P.O. Box 9140, Boulder, Colorado 80301-9140 USA ▪ Tel 303.357.1000, Fax 303.357.1070 ▪ www.geosociety.org

- Globalization of the world economy makes all of us vulnerable to disasters wherever they occur. Modern business practices such as just-in-time inventory management have created new vulnerabilities. Supply-chain interruption in one area may result in worldwide economic impact.

RECOMMENDATIONS

There is considerable value to society when science results in practical mitigation strategies that improve overall resilience to disasters. Therefore, GSA makes the following recommendations:

- Increased public investment is critical to improving our understanding of natural hazards and to characterize them and their impact over space and time. GSA supports funding to modernize and enhance monitoring networks so as to improve mitigation and emergency response by better characterizing the location, magnitude, and frequency of natural hazards. GSA also supports funding for programs related to the mechanisms and timing of natural hazard events, including the National Science Foundation's EarthScope initiative, the U.S. Geological Survey hazards mission area and National Cooperative Geologic Mapping Program, the multi-agency National Earthquake Hazards Reduction Program, NOAA's National Tsunami Hazards Mitigation Program, FEMA's Flood Map Modernization Program, and NASA's earth science mission. GSA also supports proactive outreach programs to both the public and private sectors, the latter of which owns or operates approximately 80% of the nation's critical infrastructure and can apply considerable resources toward greater resilience.
- Government agencies at local, state, national, and international levels have a special responsibility to integrate geoscience information and recommendations on natural hazards into land-use planning and sustainable development policies, as well as location, development, and long-term resilience of critical infrastructure. There must be a strong effort to coordinate hazard identification and risk-reduction activities across agencies and levels of government. The private sector and the general public should have access to reliable geoscience information to reduce vulnerability in areas of known natural or human-induced hazards, and to maintain critical operations in the event of a disaster. Increased public investment in geoscience education and outreach is needed in order to promote informed land-use decisions.
- Geoscientists have a professional responsibility to inform the public about natural hazards and opportunities to build a more resilient society. Clearly explaining geoscience knowledge, particularly with respect to uncertainty, and promoting individual and collective behaviors that may minimize disaster impact, can increase adaptive capacity and functional capability during and after a disaster. To enhance society's resilience and reduce the devastating effects of natural hazards, geoscientists must coordinate their efforts with engineers, architects, building code and standards developers, business leaders, public utilities, emergency managers, policy makers, design professionals, investors, insurers, news media, educators, relief organizations, and the public, as well as with other scientists.

Adopted October 2005; Revised November 2008; April 2012; October 2017

ABOUT THE GEOLOGICAL SOCIETY OF AMERICA

The Geological Society of America (GSA), founded in 1888, is a scientific society with over 25,000 members from academia, government, and industry in more than 100 countries. Through its meetings, publications, and programs, GSA advances the geosciences, enhances the professional growth of its members, and promotes the geosciences in the service of humankind. GSA encourages cooperative research among earth, life, planetary, and social scientists, fosters public dialogue on geologic issues, and supports all levels of earth-science education. Inquiries about GSA or this position statement should be directed to GSA's Director for Geoscience Policy, Kasey S. White, at +1-202-669-0466 or kwhite@geosociety.org.

Opportunities for GSA and its Members to Help Implement Recommendations

To facilitate implementation of the goals of this Position Statement and to increase the involvement of geoscientists in developing hazard policy, GSA recommends the following actions:

- Directly engage with land-use planners, emergency managers, response and relief agencies, and providers of critical infrastructure on every level, in order to best inform ongoing activities, such as hazard identification and modeling; hazard vulnerability development and maintenance; pre-disaster mitigation; situational awareness for responders during disaster response; and post-disaster decision-making during recovery and redevelopment. Direct engagement also allows us to provide the scientific basis for accurate and effective risk communication, understanding natural systems' effects on the built environment and the potential cascading impacts of natural hazards, and to clearly delineate the limits of our ability to model and forecast natural events.
- Seek opportunities to effectively communicate the value of integrating geoscience with natural hazards policy with (1) international, national, state, and local legislative bodies; government agencies; and non-governmental organizations; (2) private-sector leadership, especially in the finance, insurance, energy, utilities, equity, communications, manufacturing, and investment industries; and (3) private developers, economic development corporations, professional land-use planners, chambers of commerce, and other local decision makers.
- Seek opportunities to communicate the vital nature of geoscientific information for sound hazard policy to the general public. GSA members are encouraged to establish local contacts in print, electronic, and broadcast media to (1) provide updates on hazard-related information; (2) explain how geoscientific information can lessen the effects of a major natural disaster; and (3) promote the value of science-based approaches for addressing natural hazards. GSA encourages members to understand and engage in social media forums, write letters to the editor, and submit op-ed pieces on hazard policy to newspapers. Ideally, all of these could be done in concert with end-users of geoscience information (e.g., local planners or emergency managers), amplifying the value of public engagement.
- Geoscientists are also encouraged to identify the broadest range of diverse audiences and engage them by: (1) conducting field trips; (2) delivering public lectures; (3) presenting short courses or customized presentations; and (4) developing regional forums on hazards policy in partnership with industry groups via their professional organizations.
- Participate in professional forums and community interactions to encourage open discussion on the role that geoscience plays in effective hazard mitigation and policy development. Our interaction should emphasize the value of geoscientific information for planning and policy development and enable GSA members to be better-informed advocates for requesting funding for geoscientific information in support of hazard mitigation. GSA members are encouraged to use this Position Statement as a resource in their participation in public discussions related to the study and mitigation of natural hazards.