A National Priority: Building Resilience to Natural Hazards

The time has come for a new national approach to natural hazards.

Historically, we have regarded hurricanes, floods, tornadoes, earthquakes, drought, wildfires, and other extremes as unforeseeable and their associated devastation as unavoidable. But science and engineering have advanced the characterization and prediction of natural hazards, provided new tools for protecting people and property, and shed new light on how long-established public policies and ways of doing business have made society even more vulnerable. Today, we possess unprecedented means to anticipate hazards, protect citizens and property, and reduce accompanying disruption. There is a flip side, however: in the aftermath of disasters, today's public officials are rarely held blameless.

U.S. disaster costs are increasing—in part an inevitable consequence of population growth and rising wealth. Losses are aggravated further because greater numbers of citizens live in harm's way, often tragically unaware of their vulnerability. Each decade, property damage has doubled or tripled in terms of constant dollars. Individual events can inflict staggering human suffering and dollar losses totaling tens of billions – e.g., 1992's Hurricane Andrew (61 deaths, hundreds of thousands homeless, $23B), the 1993 Midwest floods (more than 50,000 displaced, $21B), 1994's Northridge earthquake (65 deaths, 12,000 hospitalized, $45B). In 1999, Hurricane Floyd triggered the evacuation of nearly 4 million people and drove more than 10,000 into shelters. In comparison, waging

the Persian Gulf War cost the United States and its allies $60B. Property destruction and business disruption due to disasters now rival warfare in terms of loss.

Natural extremes take many forms. The next President must be ready to contend with

- myriad disasters carrying price tags of $10B and perhaps one or more in the $100B range. (Based on recent experience, 85% will be weather or climate related, accounting for two-thirds of the damages; the other 15% will be geophysical.)
- one or more regional water shortages, with economic impacts comparable to or exceeding the gasoline price increases of 2000.
- a U.S. military intervention partially or totally compromised by the impact of severe weather or other hazards on high-tech weapons systems and supporting logistics. (Examples in recent years include the dust storm that tragically ended President Carter's attempt to rescue the Iranian hostages, the Pinatubo volcanic eruption that closed Clark Air Force Base in the Philippines, and the impact of adverse weather on NATO air operations over Bosnia.)
  • legal battles over urban air quality violations triggered by atmospheric inversions, pitting industrial and transportation interests, cities, the EPA, and environmental interest groups against one another, with billions of dollars in the balance.

- multiple power shortages (outages, brownouts, etc.) triggered by local and regional weather extremes, including space weather, and causing spot price increases.

Events like these will lead to increasingly severe economic, social, and political consequences—at the local, state, and federal levels.

Accordingly, disaster reduction can and should be a national priority. The incoming administration can build U.S. resilience to extreme events by taking the following steps:

- **Conduct, with the Congress and the nation, a national assessment of community vulnerability**, for local and state use in assigning priority to mitigation efforts and for federal use in identifying potential vulnerabilities and anticipating problems. Mount an accompanying education and awareness effort that will allow families and individuals to assess personal vulnerability at home, school, and the workplace.

- **Develop incentives that will encourage communities and states to implement pre-event mitigation measures** (along the lines recently fostered by Project Impact and related programs) to save lives and protect local and regional economies. These include more responsible land use, disaster-resistant construction, retrofit of existing structures, and protection of critical infrastructure – communications, electricity, gas, water, sewage, and transportation. (The federal government can take the lead through additional steps to protect its own buildings and operations.) The nation must also invest in the R&D needed to make these precautionary measures more affordable and

more cost-effective. Recognizing the importance of extreme events to the environment and natural resources, including agriculture and ecosystems, we must adopt policies that capture the benefits of extremes (such as the contributions of tropical cyclones to rainfall or the benefits of wildfires to forest health), while minimizing their adverse effects. For example, a flood by itself is bad enough; the natural disaster is compounded when it becomes a slurry of animal carcasses, toxic wastes, and sewage, as happened in the aftermath of Hurricane Floyd.

- **Improve the timeliness and reliability of hazard detection and warnings**. Start with people. Build expertise, not just in predicting hydrometeorological and geophysical hazards *per se* but also in determining their social consequences and the scientific, technological, and policy means to reduce their threat. Accelerate R&D. Finally, strengthen the warning infrastructure. Build the required observing networks, the communications, and the computing needed to: anticipate earlier, and more accurately, the genesis and arrival of oncoming storms; monitor stream flows and soil moisture; and more promptly detect emerging seasonal and interannual shifts in storm track and frequency. Map geological hazards and floodplains, provide real-time warnings of strong earthquakes, and archive data for later use by structural engineers. A number of federal agencies have plans for upgrading observing networks and modernizing infrastructure at modest cost compared with current federal disaster payouts; these plans simply need to be implemented. Investments across a range of technologies are important, but the nation should take special advantage of information technology to improve dissemination of warnings to those in harm's way

and transform the emergency response environment: from information-starved to information-rich.

- **Build resilience to hazards into every relevant federal government decision** across a broad national agenda. Because international development banks failed to do this in Central America, Hurricanes Georges and Mitch wiped out a decade of investment—billions of dollars—and took 10,000 lives, in just a few days. The United States faces similar threats. In Seattle, Silicon Valley, the San Francisco Bay area, St. Louis, New Orleans, New York, and other major commercial hubs, federal and private sector investments over the years have generated great wealth but also created unprecedented exposure to hazards.

- **Create and exercise partnerships**. Government at all levels—federal, state, and local—cannot address the problem adequately by itself. It takes the combined efforts of government, private enterprise, NGOs, and the academic community, as well as the awareness and support of the general public, to make inroads. Insurers, the financial community, utilities, commercial weather service providers, and other economic sectors each have a special role to play. Take the lead in establishing frameworks to enable and foster the needed collaborations.

- **Measure progress**. Nationally, we have only just begun to identify and assess risk and estimate vulnerability adequately. We lack loss estimates that are consistent

across all hazards, from event to event and year to year. Establish the needed statistical capability within the appropriate federal agency.

- **Develop a national culture of learning from mistakes**. All too often, in the aftermath of disasters, we encourage the philosophy of "rebuild as before." This condemns us to recurrent losses that could be greatly reduced or avoided altogether. We need to adopt the same approach that we take as a nation to aviation accidents, where each incident prompts analysis, recommendations for change, and follow-through. These procedures have made air travel increasingly safe over the years. The Administration should establish an investigative body, analogous to the National Transportation Safety Board, that evaluates the causes of federally declared disasters and provides states and communities with the information they need to rebuild more safely.

- **Work cooperatively with other nations to reduce vulnerability to hazards**, for both humanitarian and U.S. national interests. Hazards are a common enemy of humankind. Over the past two years, earthquakes in Turkey and Taiwan, the devastation of Hurricane Mitch with its associated floods in Central and South America, and floods and fires in China and Indonesia have repeatedly brought this point home. Such events across the globe affect U.S. strategic and commercial interests, as in the case of the shortage of integrated circuit chips resulting from the Taiwan earthquakes.

- **Provide leadership**. Foster the full range of actions above by taking hazard experience into account when making critical appointments at agencies, including, but not limited to, NOAA, EPA, FEMA, USGS, NASA, NSF, OMB, and OSTP.

We, the undersigned institutions, urge the incoming administration to give priority to these actions.:

David M. Farmer, Senior Vice President, Federal Affairs
Alliance of American Insurers

Michael P. Gaus, President
American Association for Wind Engineering

Russell G. Slayback, President
American Geological Institute

Marcia K. McNutt, President
American Geophysical Union

Ronald D. McPherson, Executive Director
American Meteorological Society

John A. Clizbe, Vice President, Disaster Services
American Red Cross

Ian M. Friedland, Associate Director for Development
Applied Technology Council

Ronald F. Abler, Executive Director
Association of American Geographers

Jonathan G. Price, President
Association of American State Geologists

Brenda Jones, National Chairperson and CEO
Association of Contingency Planners

Lisa Holland, Chair
Association of State Floodplain Managers

Don Markle, Executive Director
Blue Sky Foundation

Nahum Schneiderman, President
Circum Pacific Council for Energy and Mineral Resources

Bruce A. Bolt, President
Consortium of Organizations for Strong Motion Observation Systems

Mary L. Carrido, Co-founder
Disaster Recovery Business Alliance

Susan K. Tubbesing, Executive Director,
Earthquake Engineering Research Institute

Avagene Moore, President
Emergency Information Infrastructure Project

Harvey G. Ryland, President and CEO
Institute for Business and Home Safety

Elizabeth B. Armstrong, Executive Director
International Association of Emergency Managers

Richard P. Kuchnicki, Executive Vice President
International Code Council, Inc.

Anne Meltzer, Executive Committee Chair
IRIS Consortium

Don Saracco, Vice President
MLC & Associates

Gerald Jones, Chair
Multihazard Mitigation Council of the
National Institute of Building Sciences

James Greene, President
National Emergency Management Association

George D. Miller, President and CEO
National Fire Protection Association

Frank Nutter, President
Reinsurance Association of America

Susan Newman, Executive Director
Seismological Society of America

Herman Brandau, Associate General Counsel
State Farm Insurance Companies

James Hammill, Advisor – Special Projects
Telcordia Technologies

Richard A. Anthes, President
University Corporation for Atmospheric Research

Richard H. Davies, President
Western Disaster Center

Patricia L. Sutch, Executive Director
Western States Seismic Policy Council

Bill Baird, President
W.F. Baird & Associates