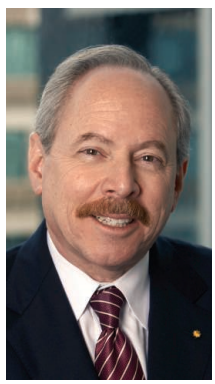
Marcia McNutt is Editor-in-Chief of *Science*.



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Preparing for Disasters

DISASTERS ARE INEVITABLE AND CAN STRIKE ANYWHERE AT ANY TIME. WHETHER IT'S A NATURAL event (such as a hurricane, flood, or earthquake), a disease pandemic, or a purposeful or accidental human action (such as an act of terrorism or fire), the consequences can be wide-ranging and devastating. Scientifically trained personnel often play vital roles in emergency response and recovery efforts. Under the right circumstances, they can mobilize research to better understand the nature of the event and how best to respond to similar events in the future. But the scientific community also needs to plan carefully for disaster preparedness and mitigation for its own infrastructure and resources.*

Disasters can produce long-term setbacks for science when they affect research facilities, as was the case when Hurricane Sandy struck the U.S. East Coast in 2012; when the 2011 earthquake, tsunami, and nuclear plant explosions happened in Japan; when the 2010 earthquake hit Haiti; or when Hurricane Katrina flooded New Orleans in 2005. In addition to damaging expensive research buildings and equipment, such disasters can wipe out experimental records, samples, voucher specimens, and unique laboratory animals that may have taken years or even decades to develop. Researchers and lab support staff may be confronted with the difficult choice of risking their own lives to save valuable experiments and equipment on which their careers depend. No amount of insurance coverage can compensate for the time lost to duplicate the interrupted work or the loss of valuable and shareable scientific resources. Furthermore, the population in the surrounding area can be placed in harm's way if toxic or dangerous chemicals or biological agents are inadvertently released or left unprotected.

One example of a scheme for disaster planning and response is the U.S. Department of the Interior's (DOI's) Strategic Sciences Group (SSG).† First deployed during the 2010 Deepwater Horizon oil spill and more recently for Hurricane Sandy, the team's methodology has been codified into DOI operations to prepare for and respond to disasters of all sorts and could be extended to include a research institution's own disaster preparedness planning. At the core of the SSG's activities is scenario development: What are the cascades of consequences that might occur as the disaster unfolds, with approximate probabilities of those chains of events? What interventions could be mobilized to prevent the most damaging effects? With this type of strategy, a lab could plan for the most likely disasters and for rare events with large impacts. This approach also facilitates deciding how to invest in disaster mitigation. Interventions that both prevent losses when frequent events happen and short-circuit the after-effects of rare but severe occurrences would clearly be prioritized over interventions that would only mitigate damages from a rare event.

A consideration in any incident response plan should be whether and how best to mobilize research efforts that can help increase understanding of both the nature of the event and its outcomes, and to determine how well crisis response efforts have worked. These analyses are essential for improving future emergency preparedness, response, and recovery. There are many reports of cases where vital data have been lost when governmental and local institutions have been poorly prepared to enable timely, well-designed, and effectively executed studies in the midst of, and after, an emergency.‡

The number of multibillion-dollar disasters is on the rise, and no part of the globe is out of the reach of one sort of disaster or another. The recent disasters and their consequences should be a signal that every research institution and its constituent laboratories should begin discussions, if they haven't already, on how to prepare for the worst, as the worst clearly can happen.

– Marcia McNutt and Alan Leshner

10.1126/science.1244097

*See the special series "Global Quake Risk" at www.sciencemag.org/extra/quakerisk. †G. E. Machlis, M. K. McNutt, *Science* **329**, 1018 (2010). ‡N. Lurie, T. Manolio, A. P. Patterson, F. Collins, T. Frieden, *N. Engl. J. Med.* **368**, 1251 (2013).

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