

US earthquake resilience needs strengthening, says new report

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A new National Research Council report presents a 20-year road map for increasing U.S. resilience to earthquakes, including a major earthquake that could strike a highly populated area. The report was mostly written prior to the March 11 earthquake in Japan, but the committee of experts who authored it noted that the Japanese experience is a reminder of the devastation that can occur even in a country acknowledged as a leader in implementing earthquake-resilience measures.

In recent decades, destructive earthquakes in the U.S. have only been moderate to strong in size or have occurred in sparsely populated areas; the country has not suffered a truly devastating [earthquake](#) in more than a hundred years. Because of this, the committee expressed concern that many people have been lulled into a false sense of security that the nation already is earthquake resilient. The committee highlighted the results of a recent earthquake-scenario exercise in Los Angeles, which indicated that a magnitude-7.8 earthquake would result in staggering losses, and noted the lack of disaster resilience demonstrated by [Hurricane Katrina](#).

The report identifies an 18-task road map for implementing the strategic plan adopted by the National Earthquake Hazards Reduction Program (NEHRP), which would make the nation earthquake resilient. Established by Congress in 1977, the multiagency program is led by the [National Institute of Standards and Technology](#) and includes the [Federal Emergency Management Agency](#), National Science Foundation, and

U.S. Geological Survey.

The report endorses NEHRP's 2008 strategic plan and stresses that the road map tasks are required to develop the nation's capacity to maintain important community functions and recover quickly following damaging earthquakes. The committee also emphasized that a dedicated and strategic effort is needed to diffuse knowledge gained by the NEHRP into communities.

Funding for NEHRP totaled \$129.7 million in 2009. The committee estimated that the cost for its earthquake-resilience road map would be \$306 million annually over the first five years.

The 18 tasks are:

1. Undertake additional research to improve understanding of earthquake phenomena and to increase earthquake-prediction capabilities.
2. Deploy the remaining 75 percent of the Advanced National Seismic System, which provides magnitude and location alerts within a few minutes after an earthquake as well as the basic data for many of the road map tasks.
3. Evaluate, test, and deploy earthquake early-warning systems.
4. Complete coverage of national and urban seismic hazard maps to identify at-risk areas.
5. Develop and implement earthquake forecasting to provide communities with information on how seismic hazards change with time.

6. Develop scenarios that integrate earth science, engineering, and social science information so that communities can visualize earthquake and tsunami impacts and mitigate potential effects.
7. Integrate science, engineering, and social science information in an advanced GIS-based platform to improve earthquake risk assessment and loss estimation.
8. Model expected and improvised emergency response and recovery activities and outcomes to improve pre-disaster mitigation and preparedness.
9. Capture, disseminate, and create a repository of the critical information that describes the geological, structural, institutional, and socio-economic impacts and disaster response after earthquakes occur.
10. Support social sciences research to evaluate mitigation and recovery.
11. Establish an observatory network to measure, monitor, and model the disaster vulnerability and resilience of communities.
12. Integrate the knowledge gained from many of the tasks to enable accurate simulations of fault rupture, seismic wave propagation through bedrock, and soil-structure interaction to understand the response of buildings and other structures to shaking and compute reliable estimates of financial loss, business interruption, and casualties.
13. Develop new techniques for evaluating and retrofitting existing buildings to better withstand earthquakes.

14. Enhance performance-based engineering to achieve better building design and enable improved codes and standards for buildings and other structures.
15. Review and update standards so that critical "lifeline" infrastructure -- such as electricity, highways, and water supply -- can function following an earthquake.
16. Develop and deploy the next generation of "green" high-performance construction materials and components for use in buildings' seismic framing systems.
17. Encourage and coordinate technology transfer between the NEHRP and the private sector.
18. Initiate earthquake resiliency pilot projects in local communities to improve awareness, reduce risk, and enhance emergency preparedness and recovery capacity.

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