Quake warnings, seismic culture

Since 1990, nearly one million people have died from the impacts of earthquakes. Reducing those impacts requires building a local seismic culture in which residents are aware of earthquake risks and value efforts to mitigate harm. Such efforts include earthquake early warning (EEW) systems that provide seconds to minutes notice of pending shaking. Recent events in Mexico have issued alerts for more than 150 quakes over three decades, what has been missing—hence the focus of our mission—is an assessment of public perception of the system. These first major damaging earthquakes since SASMEX was built provided a rare opportunity to learn how people perceived and responded to EEW.

Our findings point to a collectively positive attitude toward SASMEX, with the public generally accepting of the technical limitations. They show a greater tolerance for alerts associated with little or no perceptible shaking than for late or missed alerts. Residents said that all alerts provide an opportunity to practice protective actions and that hearing, seeing, or talking about EEW helps build awareness of earthquake risk and appropriate protective actions. These findings are consistent with surveys regarding EEW in Japan done after the 2011 Tohoku-Oki M9.0 earthquake.

We draw several recommendations from our reconnaissance. EEW systems are seen as being valuable despite technical limitations. This should give us added confidence to accelerate deployment of EEW systems elsewhere. Also, EEW systems should provide an initial alert that is as simple as possible to prompt people to take immediate action. Follow-up information from authoritative institutions is needed in the seconds and minutes after an alert is issued and shaking has subsided. A wide range of media channels should be used. In addition, the warning information and messaging provided by all EEW systems must be consistent and distributed widely. In Mexico, information from the public SASMEX system did not always align with information from the private SkyAlert system. Importantly, an EEW system is only as good as the likelihood that effective action is taken to reduce harm. This means closely pairing EEW development with disaster preparedness research, education, planning, and policy.

Richard M. Allen and the EERI Reconnaissance Team*

*Earthquake Engineering Research Institute Reconnaissance Team: Elizabeth S. Cochran, U.S. Geological Survey; Tom Huggins, Massey University; Scott Miles, University of Washington; Diego Otegui, University of Delaware.

Published by AAAS
Quake warnings, seismic culture
Richard M. Allen and EERI Reconnaissance Team

Science 358 (6367), 1111.
DOI: 10.1126/science.aar4640

Use of this article is subject to the Terms of Service