ECONOMIC IMPACTS OF EARTHQUAKE PREDICTION

Lee M. THOMAS
Federal Emergency Management Agency
Washington D.C 20472,
USA

In the United States, earthquake prediction is the responsibility of the U.S. Geological Survey. It supports fundamental researchs - data-gathering activities in areas of high-seismic risk throughout the western United States, Alaska, northeastern United States, and Mississipi Valley - and cooperative research efforts with host countries outside of the United States. The principal goal of the program is to develop reliable methods for forecasting the time, place, and magnitude of damaging earthquakes. Two distinct strategies for obtaining the goals of the program are being pursued concurrently. The first is the development of a sound theoretical basis for earthquake prediction. This approach emphasizes developing a deeper understanding of the details of the earthquake cycle and earthquake recurrence and the physics of the immediate pre-earthquake failure process. Research activities include theoretical, experimental, and field framework studies. The second strategy follows an empirical approach, which seeks to develop a set of criteria for issuing predictions in probabilistic terms based on empirical observations of earthquake precursors. The criteria may employ poorly understood phenomena and observations that previous experience worldwide has shown to precede damaging earthquakes. Successful intermediate and short-term forecasts of damaging earthquakes in China, Japan, and Mexico have relied principally upon the empirical approach.

Impeding the rapid solution of the problem by either strategy is the lack of an adequate base of observations. This lack is particularly acute in the United States because of the short historical record for large earthquakes and the relative infrequency of such events compared to other parts of the world. More and better observations are vital prerequisites for progress and, therefore, constitute an essential activity of the earthquake prediction program. When the prediction research program was designed in February 1978, it was estimated that detailed observations of at least ten earthquakes of magnitude 5 or greater would be needed to establish the empirical and theoretical approchaes. Since then, only three earthquakes of that size have been recorded within or adjacent to detailed networks of sensors.