**Prediction**

Of the many attempts to find clues for predicting the location, time, and strength of future earthquakes, the best results seem to be associated with seismicity studies using earthquake observatories. Other methods are based on detecting gaps in the seismic record of a region. Segments along a fault where displacement has not taken place for a long time are more likely to release built-up stresses.

Seismologists have found that major earthquakes are often preceded by certain measurable physical changes in the environment around their epicenters. These changes include the degree of crustal deformation in fault zones; the occurrence of dilatancy, that is, an increase in volume, of rocks; and a rise in radon concentrations in wells. Continual monitoring and close scrutiny of these changes are expected to improve prediction capability. Risk maps can be prepared for some earthquake-prone regions, as in California, where surface faults can be monitored. Although useful in transcurision zones, such as along the San Andreas Fault, the method is not applicable to subduction zones, where seismic activity, generated deep in the Benioff zone, is only vaguely correlated with surface structures.

**Reducing Earthquake Hazards**

Although earthquakes can cause death and destruction through such secondary effects as landslides, tsunamis, fires, and fault rupture, the greatest losses in terms of both lives and property usually results from the collapse of man-made surface and subsurface structures during the violent shaking of the ground. Seismologists routinely gather considerable quantities of data to explain the characteristics of the recorded ground motions that take place during earthquakes. Such knowledge is needed to predict ground motions in future earthquakes so that earthquake-resistant structures can be designed.

The most effective way to reduce the destructiveness of earthquakes is to design and construct buildings and other structures capable of withstanding strong shaking. When a site is proposed for the construction of an office building, for example, factors such as the geometry and frictional properties of a nearby fault line, the passage of seismic waves through surrounding subsurface rocks, and the condition of the soil and rocks that will be surrounding the building must be considered.

In many cases an accelerogram, a diagram showing the acceleration of, the velocity of, and the displacement caused by a simulated earthquake, is used to determine the viability of a site for safe building construction. In many countries economic realities usually require that buildings are constructed not for the complete prevention of all damage, but to minimize damage from moderate earthquakes and to ensure no major collapse during the strongest earthquakes.