


**Critical
Thinking**

Detecting Earthquake Patterns

Activity
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People have tried to predict earthquakes since the earliest times. The Roman general Pliny the Elder theorized that earthquakes could be predicted using these four warnings signs: (1) buildings that tremble slightly, (2) a low cloud spread over a wide area, (3) well water that becomes cloudy and stinks, and (4) animals that behave strangely.

Animal Sense

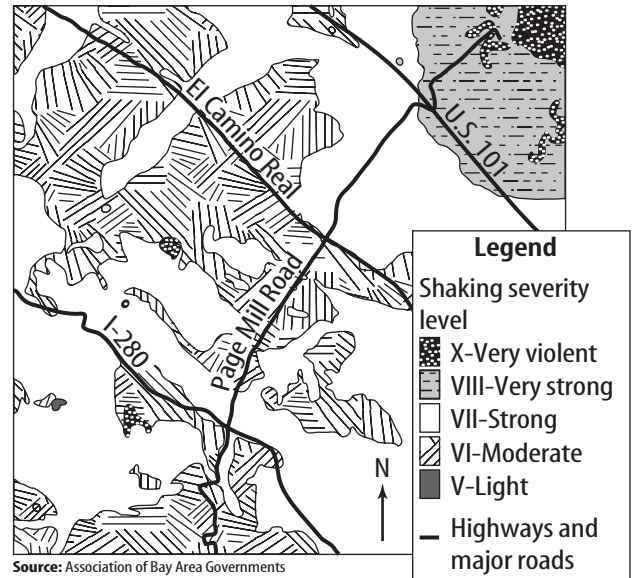
Although Pliny's theory was never proven, people have observed the strange behavior of animals before many earthquakes. In early Greece, one historian noted the mass exit of many animals from the city of Helice. Five days after the animals began leaving, the city was destroyed by an earthquake.

Animals might detect the tremors that precede an earthquake, or they might behave strangely because of escaping gases caused by tectonic activity. Perhaps animals behave differently because they sense a change in the weather.

Seismic Signs

Of course, scientists don't rely solely on animal behavior to predict earthquakes. They study the history of areas to determine whether a cycle of earthquakes exists. They measure the speed of seismic waves and changes in the electrical resistance of rocks in major fault areas. They examine the levels of radon and carbon dioxide in water. They identify areas in earthquake-prone regions that have not recently released seismic strain.

In 1975, seismologists successfully predicted that an earthquake would strike Haicheng,



This map shows the expected shaking intensity for Palo Alto, California, if an earthquake of 6.9 on the Richter Scale were to hit.

China. They did it by using scientific instruments and the observations of people who lived there. People reported frequent tremors and tilting of the ground. Furthermore, they reported that hibernating snakes awoke and fled their holes. Finally, about 12 h before the earthquake hit, the signs occurred so frequently that it seemed clear that an earthquake was likely. Thousands of people were evacuated from the area, and only a few people were killed when the earthquake struck.

Not all earthquakes, however, are preceded by such clear signs. An earthquake struck the city of Kobe, Japan, in 1995 without warning. In a quake that lasted only 20 s, nearly 6,400 people lost their lives, 35,000 were injured, and 400,000 were left homeless.

Applying Critical Thinking Skills

1. Is it wise to rely on strange animal behavior as a sign for an upcoming earthquake? Explain.
2. At present, scientists can make fairly accurate, long-term predictions of earthquakes. Do you think it's possible for them to develop accurate, short-term predictions? Explain.
3. Millions of dollars are spent on prediction research. Should this money be used for other purposes? Why or why not?