

Chapter 9**CRITICAL THINKING****● Earthquakes****Can Earthquakes Be Predicted?**

Since the earliest times, philosophers, astrologers, and fortune-tellers have tried to predict earthquakes. All used some signs that seemed to indicate an earthquake was coming. The Roman general Pliny the Elder theorized that earthquakes could be predicted using these four warning signs: (1) buildings that tremble slightly, (2) a low cloud spread over a wide area, (3) well water that becomes cloudy and begins to stink, and (4) animals that behave strangely.

Pliny's theory was never proved. People, however, have observed strange behavior of animals before many earthquakes. For example, in early Greece, a historian noted the mass exit of many animals, including rats and worms, from the city of Helice. Five days after the animals began leaving, the city was destroyed by an earthquake. Another incident occurred near Lisbon in 1755. The shoreline swarmed with earthworms that had left their holes. Eight days later, Lisbon was destroyed by an earthquake. Can animals be used to predict earthquakes? Many people think that animals may detect the tremors that precede an earthquake. Animals may behave strangely because of escaping gases caused by tectonic activity. Or animals may behave differently because they sense a change in the weather. Earthworms may leave their holes when they fill with water because of changes in the water level in underground aquifers.

Today scientists use a variety of measures to try to predict earthquakes. Scientists study the history of areas to determine if a cycle of earthquakes exists. They measure the speed of seismic waves and changes in the electrical resistance of rocks in fault areas. They examine the

levels of the radon gas in well water. They note changes in Earth's crust. They identify gaps, or areas in earthquake-prone regions that have not had recent releases of strain.

In 1975, seismologists successfully predicted that an earthquake would strike the Liaoning Province in China. They did it by using scientific instruments and observations from people who lived in the province. The people of the area had been trained to watch for signs that an earthquake might be coming. Some even built their own instruments to help them. They observed strange occurrences in the area. They reported frequent tremors and tilting of the ground. And they reported strange behavior in animals. One example of the strange behavior was that hibernating snakes awoke and fled their holes. The snakes froze to death in the winter cold. Finally, about 12 hours before the earthquake hit, the signs occurred so frequently it seemed clear that an earthquake was likely. Thousands of people were evacuated from the area. Because of the evacuation, only a few people were killed when the earthquake struck.

Not all earthquakes, however, are preceded by such clear signs. That is one reason that the work being done at earthquake research centers throughout the world is very important. Scientists hope to develop techniques for making short-term predictions. With accurate short-term predictions, areas could be evacuated before an earthquake occurs, and facilities such as power plants could be shut down. These procedures would save lives and lessen the amount of destruction an earthquake could cause.

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?