

7. What are some examples of a hurricane's destructive force?
8. What are thunderstorms and how do they occur?
9. Where and when do tornadoes occur?
10. What is a blizzard?
11. What natural disaster causes more deaths than all others?

### Activities

- Share historical myths about earthquakes with your students, including the Japanese myth about the giant fish that caused earthquakes. See [www.ceri.memphis.edu/public/myths.shtml](http://www.ceri.memphis.edu/public/myths.shtml) as one source for these myths. After discussing these myths, encourage students to create their own myth about the cause of earthquakes.
- Visit the University of Edinburgh's earthquake locator web site at [www.geo.ed.ac.uk/quakexe/quakes](http://www.geo.ed.ac.uk/quakexe/quakes). Using a world map, help students to plot the locations of any earthquake activity for the past month. Encourage students to search for patterns. Where are the majority of earthquakes taking place?
- Create a model of an erupting volcano with your students. See the "Volcano World" web page: [volcano.und.nodak.edu/vwdocs/volc\\_models/models.html](http://volcano.und.nodak.edu/vwdocs/volc_models/models.html) for variations of volcano models. Challenge interested students to look for research on volcanoes in outer space and report back to the class.
- Have students list the various safety precautions one should take in case of either a hurricane or a tornado.

### Internet Resources

Periodically, Internet Resources are updated on our web site at [www.libraryvideo.com](http://www.libraryvideo.com)

- [www.miamisci.org/hurricane](http://www.miamisci.org/hurricane)  
This educational site, maintained by the Miami Museum of Science, presents information on the formation and identification of hurricanes, safety rules and weather planes, as well as storm-related weather activities for home or classroom and personal narratives of survivors of natural disasters.
- [volcano.und.edu](http://volcano.und.edu)  
"Volcano World" is a great source of information about volcanoes. One interesting feature of this site is the "Current Eruptions" page, which provides up-to-date details about active volcanoes. This site also presents many volcano images, facts and activities.

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- [www.nhc.noaa.gov](http://www.nhc.noaa.gov)  
The National Hurricane Center site contains information on current Atlantic and Pacific storm activity, summaries of past storms, storm names for upcoming years, a glossary of terms and storm statistics.
- [www.cotf.edu/ete/modules/weathernot/weathernot.html](http://www.cotf.edu/ete/modules/weathernot/weathernot.html)  
This site, part of NASA's Classroom of the Future program, contains activities related to the environment, including weather prediction. Descriptions of the activities, directions and links to information sources are provided. Teacher information on planning, facilitating and assessing the activities is also available.

### Suggested Print Resources

- Abbott, Patrick L. *Natural Disasters*. McGraw-Hill, New York, NY; 2001.
- Barnard, Bryn. *Dangerous Planet: Natural Disasters That Changed History*. Crown Books for Young Readers, New York, NY; 2003.
- Collins, Ace. *Tragedies of American History: 13 Stories of Human Error and Natural Disaster*. Plume Books, New York, NY; 2003.
- Hinshaw-Patent, Dorothy. *Fire: Friend or Foe*. Clarion Books, New York, NY; 2000.

### TEACHER'S GUIDE

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V6055



## Natural Disasters

### Grades 4–8

The *Eyewitness DVD Series* explores the natural world with fascinating film footage and nature photography fused with striking special effects and stunning graphics. The programs offer a unique "eyewitness" view of events that shape the Earth and the living things that inhabit it.

Interactive menus allow viewers to easily select and replay any section of a program. Other features include interactive assessment quizzes and "Hotspots" — video icons that appear throughout the program and allow students to further explore specific science content or areas of interest. Each title contains a segment that reveals all the behind-the-scenes wizardry that goes into the production of the *Eyewitness* series, along with recommended web sites for further research.

Included in this guide is a brief synopsis of the program, background on the science concepts presented in the show, discussion topics, activities, vocabulary and additional resources for students to explore.



## Background

Earth, wind, fire and water are environmental forces that make life on Earth possible. They are also responsible for many of the world's natural disasters. Natural disasters are extreme, sudden events caused by environmental factors and can injure people and damage property. In the last century alone, the death toll from combined natural disasters has reached ten million people, often thousands at a stroke. Shifting external forces cause hurricanes, floods, tornadoes and blizzards. In one day, there may be five hurricane-force storms brewing, at least 15 volcanoes actively erupting, as well as four major earthquakes, plus a handful of tornadoes at any given moment!

The deadliest and most destructive storms on Earth, hurricanes and tornadoes continue to fascinate us with their awesome force. The tropical cyclone, known also as a hurricane or typhoon, is a massive storm that develops over water. About 40 such storms wreak havoc on the planet each year. Heat sets up ocean currents and evaporates vast quantities of water at the equator. This creates hot moist air which is driven to the cooler poles in a process that works like atmospheric air conditioning. Given a spin by Earth's rotation, the storm steadily builds, drawing energy from the moist, tropical air. Winds increase, causing severe damage to the land and property. More accurate prediction is the best hope for avoiding loss of life.

Tornadoes are spawned in hurricanes or thunderstorms. In the United States, there can be at least a thousand a year. A stream of cool air spins into warmer, horizontal winds. Because the tornado's winds spiral inward and upward, they create a vacuum capable of sucking a house off its foundation.

The Earth's surface lies in huge pieces called tectonic plates. Internal forces give rise to earthquakes and volcanoes. When they grind together, earthquakes occur. In 1755, a huge earthquake in Portugal was believed by the Spanish Inquisition to be divine punishment for a sinful population. Even the survivors were roasted alive! In Haicheng, China, in 1975, an earthquake occurred. Even though there were 90,000 residents, only 300 were killed because people responded to the warning signs. But only 18 months later, a devastating quake struck China, and its death toll was half a million people.

Volcanoes and earthquakes are most likely along the edges of the tectonic plates, like the gigantic loop known as the "Ring of Fire." A tsunami is actually the Japanese term for a seismic sea wave, caused when Earth's tectonic plates collide beneath the sea. The Hawaiian Islands are at great risk, right in the center of the "Ring of Fire."

In 1991, Mount Pinatubo in the Philippines erupted, throwing out millions of tons of ash and dust. As the particles spread through the atmosphere they affected the climate of the whole world. Near the eruption, the skies were darkened for days and the ash caused havoc for human and animal life. In 1996, a volcano in Iceland melted a glacier, causing fire and flood. A volcano can also trigger lethal landslides.

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A drought is another kind of natural disaster. A prolonged period of no rain can occur in virtually any climate, and a drought takes its toll gradually. The greatest threat to human life is not the drought itself, but the famine that is likely to follow. An arid region is most vulnerable for floods and fire, but life has evolved to survive the presence of fire. Some plants have seeds that cannot germinate without a dose of extreme heat.

More people die in floods than in any other kind of natural disaster. Flooding is the most common and widespread of all natural disasters. It can happen anywhere and at anytime, with devastating results to life and property. Tropical storms, cyclones and tsunamis produce heavy rains and can flood coastal communities.

No region on Earth is immune to natural disasters. As we gain scientific understanding of the causes and nature of such phenomena, we can learn how to protect ourselves to some degree. The greatest natural disaster of all would be far more difficult to escape. It would come from outer space in the form of a meteor or asteroid impact and could cause the extinction of life forms. Some scientists believe an impact such as this was the disaster that caused dinosaurs to die out and that made room for the evolution of humankind.

## Vocabulary

**avalanche** — Any swift movement of snow, ice, mud or rock down a mountainside or slope.

**blizzard** — A winter storm characterized by high winds, low temperatures and driving snow.

**crust** — The outer layer of the Earth, consisting of rock plates floating on the mantle.

**cyclone** — A low-pressure weather system characterized by circular wind motion. Hurricanes are a type of tropical cyclone.

**droughts** — Unusually long periods of insufficient rainfall. Famines are extreme shortages of food often caused by droughts that cause people to die of starvation.

**earthquakes** — Trembling movements of the Earth's crust. These tremors are generally caused by shifts of the plates that make up the Earth's surface.

**flood** — A weather event that occurs when a body of water rises and overflows onto normally dry land. Usually, floods occur after periods of heavy rainfall.

**hail** — Precipitation in the form of balls or lumps of clear ice and compact snow.

**hurricane** — A tropical cyclone with maximum sustained winds of at least 74 miles per hour. "Hurricane" comes from the Carib Indian word "urican," meaning violent storm of wind.

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**monsoon** — A wind system that occurs on a seasonal basis, bringing heavy rains. Monsoon means "season" in Arabic.

**plates** — Moving, irregularly-shaped rock pieces that make up the thin, solid crust of the Earth's surface.

**precipitation** — Water vapor that condenses and falls to the Earth as rain, sleet, snow or hail.

**Saint Bernard dogs** — Large dogs bred by monks for rescue work in the Swiss Alps, which were named for the monks of the monastery of St. Bernard.

**squall** — A brief, violent storm.

**storm surge** — A rise in the sea level that accompanies a tropical storm or hurricane.

**tornado** — A violent, whirling windstorm occurring over land, characterized by long, funnel-shaped clouds.

**tsunamis** — The Japanese term for tidal waves — unusually high sea waves that can follow an earthquake on the ocean floor or a volcanic eruption.

**typhoon** — A tropical cyclone occurring in the western Pacific Ocean or off the coast of China. The word "typhoon" may come from "Typhon," the father of the winds in Greek mythology.

**volcano** — An opening in the Earth's crust through which lava, gases and other materials from the mantle reach the surface.

## Discussion Topics

- Discuss the Japanese proverb that says, "A natural calamity will strike at about the same time the terror of the last one is forgotten." How can you prepare for natural disasters?
- Explain that some of the biggest disasters in history are not natural at all, but are caused by human error or terrorism or involve vehicles. Discuss how accidents involving modern-day conveniences like air travel and nuclear power can take lives and impact the planet. Even situations like sports events can take surprising turns for the worst.
- Did a meteorite wipe out the dinosaurs and allow for human evolution?

## Focus Questions

1. What are some ways that wind can alter the surface of the Earth?
2. How can soil cause a natural disaster?
3. Why is the Huanghe River called "China's Sorrow"?
4. How can forest fires have a positive effect?
5. Why do some people live near volcanoes or in flood plains?
6. What disaster happened in the American South in the 1930s? Was it completely 'natural'?

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