



# NATURAL DISASTERS

THE SCIENCE & GEOGRAPHY

BEHIND THE  
EVENTS



A HOT TOPICS NEWSPAPER SUPPLEMENT FROM



# Welcome to the future. The years ahead will bring many changes.

Computers will become smarter and faster. Some - maybe all - cancers eventually will be cured, as will other diseases, such as AIDS.  
A woman may be elected president.

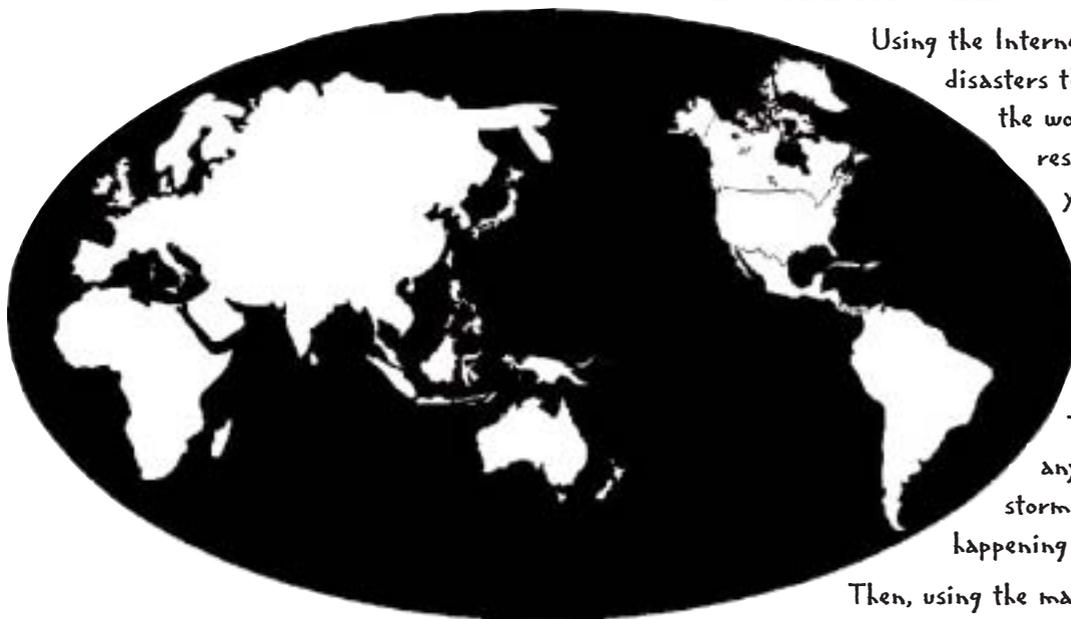
But lots of things will not change, things like the Earth. Although we may get better at predicting weather, it's unlikely that we'll ever really control it.

There still will be hurricanes, tornadoes, tidal waves, blinding blizzards and drenching downpours. Many of these disasters occur because of the geographic location of the places where they happen. Throughout this section, we'll look at the science and geography that explain these natural phenomena. And because weather occurs on a geologically active planet, any one - or even all! - of these disasters may be happening somewhere on Earth this very minute.

In fact, a mild earthquake rolled across Alabama and parts of southern Tennessee on only the second day of the new millennium, and shortly after that, the Mayon Volcano in the Philippines erupted, sending a plume of steam and ash four miles into the air. Although no one died in either of these incidents, natural disasters kill thousands of people each year. Some of them can kill millions. And although no one can really predict the future, here's a safe prediction: In the future - maybe tomorrow - there will be a natural disaster somewhere on Earth.

But remember this, too: It's a very big planet. Although an earthquake may rock a portion of the planet tomorrow, chances are it will be nowhere near you. So take a deep breath and enjoy this special tour of the power of nature. We'll crisscross the entire planet many times and give you lots of good information and ideas about everything from hurricanes to tidal waves. Hope it blows you away!

## GEOGRAPHY HELPS US UNDERSTAND



Using the Internet, you can now discover all the natural disasters that have recently occurred everywhere in the world. Using your school's computer resources and following the instructions of your teacher, log onto the World Wide Web's Cable News Network at [www.cnn.com](http://www.cnn.com). You'll be on the home page of CNN, television's 24-hour news station. Once there, look for the links marked "Weather," and "Nature." There you will find current news about any of the volcanoes, earthquakes, storms, floods, and more that are currently happening on Earth.

Then, using the map on this page, note where some of these things are happening and mark them on the map.

## Location, Location, Location

Some of the natural disasters happen because of the geography of the places where they happen. The study of geography is divided into five themes that help us understand it.

One of those is "location," which can mean either an exact location or a relative location. Every point on Earth has a specific location that is determined by an imaginary grid of lines on the map showing what are called latitude and longitude. Latitude measures distances north and south of the line in the middle, which is called the Equator. Meridians of longitude measure distances east and west of the line called the Prime Meridian. Geographers use latitude and longitude to pinpoint a place's absolute, or exact, location.

It is also important to know how one place interacts with others. This is called "relative location." With your classmates, brainstorm a list of ways in which your hometown is connected to a nearby place. As you read about the places where natural disasters happen, find them on a world map and note their exact locations, including their latitude and longitude. You can also think about how these places interact with others in times of disasters.



Check the international section of your newspaper and select two cities currently in the news to locate on a map. Find ways in which the two cities are connected.  
Skill: Locating diverse places

Another of the five themes of geography is "place." All places have their own characteristics that make them different from other places. Geographers describe places by their physical and human characteristics. Physical characteristics include such things as animal life, while human characteristics may be noted in architecture, work, land use, and communication or transportation networks. Languages and religious and political ideas also shape the character of a place. Studied together, the physical and human characteristics of places provide clues to help us understand

# Understanding



PLACE

the nature of different places on Earth.

As you read about natural disasters around the world, make a mental note of the characteristics of the different places where they happen. Tidal waves, for example, happen only in places near the ocean. Volcanoes can happen only in mountainous regions.

You may want to begin your discussion about place by walking with your classmates around the outside of your school. What physical and/or human characteristics can you find?

## PROJECT AMBASSADOR



Divide your class into groups of 4 or 5 students each. Have each group choose a country. (Try picking one that you find in the newspaper.) Each group will play the role of United States ambassador to that country. Discuss what kind of place your country is. What unique qualities should the ambassador have in order to do a good job representing the United States in that place? Each "ambassador group" is going to confront a natural disaster that could affect people in the place they are posted. (For example, an earthquake, tornado, flood or any disaster you read about in this section.) What physical characteristics of the country might influence the crisis? What human characteristics of the place might affect the group's ability to respond to the crisis? Your group will present an action plan for dealing with this crisis. Feel free to use any research tools you can to find out more about your country in order to develop your plan.



1. Page through the newspaper, examining the headlines to see whether any natural disasters happened somewhere in the world yesterday.

Skill: Describing the interrelationship of human/environmental interactions

2. Who are some of the people that would be needed in case of a natural disaster?

Look through the Help Wanted ads to find the types of personnel who could be helpful in an emergency. Write next to each position the specific task that could be performed to help in an emergency.

Skills: Skimming, scanning, identifying locations



# Volcano

In January 2000, a volcano in the Central American country of Guatemala erupted. Hot lava, fire and ash pouring out of Pacaya, the nation's largest volcano, burning at least 50 nearby residents, required nearby villages to be evacuated of more than 2,000 people. In many parts of the world, volcanoes are a way of life.

Miles below you, deep underground, the Earth's temperature is so hot that rock melts into a molten fluid called magma. At times, breaks in the Earth's crust, called fissures, cause this molten rock to pour out onto the land. We call it lava when it's coming out of a volcano. The fissures that spew lava are volcanoes, some of the most destructive forces known. This molten rock is extremely dangerous, capable of killing and injuring people and wildlife, and destroying villages and natural habitats.

Many of the world's mountains are actually extinct volcanoes - volcanoes that no longer erupt. The problem, though, is that scientists still cannot predict when a volcano will become active again. For example, in 1980, Mount St. Helens in Washington state famously blew its top, fully 123 years after its last eruption! It was one of the most violent eruptions in modern history, with an explosion heard 200 miles away and knocking down trees as far as 15 miles from the mountain. A cloud of poison gas 15 miles high and 20 miles wide poured out of the volcano, killing 57 people and destroying all life near the mountain. When it was over, the mountain's height had dropped from 9,677 feet to 8,364 feet, and massive piles of ash and soot covered forests, streams and homes.

That's the trouble with volcanoes - not only do they spew dangerously hot molten rock, but they release killing gases, too. When the volcano Mont Pelée in Martinique erupted in 1902, the cloud of gas that poured down its slope killed 38,000 people, making it one of the worst volcano disasters ever.

## How volcanoes form

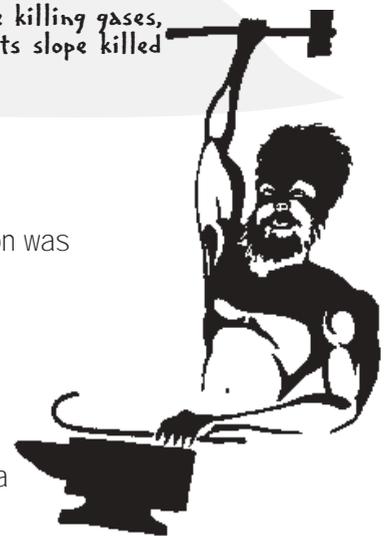
In the ancient Roman religion of many gods, Vulcan was the gods' blacksmith, and his forge for making iron was underground - under a volcano in Sicily. When the volcano erupted, it was Vulcan at work.



Although that is not how volcanoes form, Vulcan did lend his name to these amazing mountains - and scientists still do not understand everything about how they are created. At hot spots in the Earth's crust, heat causes underground rock to melt. As the rock melts, gases are given off and mix within the magma. The magma rises through rock, melting a channel to accumulate in a magma chamber deep underground.

Over time, pressure from both the magma and gases builds up in the chamber, forcing the magma to rise, causing the volcano to form as a mountain, then violently exploding out the top - and even the sides - of the volcano. Sometimes, fiery rocks rain down out of the sky after an eruption. But sometimes, lava quietly oozes out of one or several vents with no explosion at all.

If the volcano erupts many times over many years, the mountain grows larger and larger as it covers itself with cooling lava and the exploded debris. Ultimately, a volcano quiets down, although for how long no one knows. Scientists generally classify volcanoes as extinct, dormant or active. Dormant volcanoes - those that are temporarily quiet - may awaken any time. But even extinct volcanoes have come back to life after hundreds of years.



# Famous Volcanoes

Can you use classroom, library and even computer and online research tools to write in the name of the country of each famous volcano? Then use modeling clay to make a small model of a volcano. Place the model on your classroom globe, making sure to mark your volcano's name.

Mount Etna: \_\_\_\_\_

Fuji Mountain: \_\_\_\_\_

Mount Pinatubo: \_\_\_\_\_

Kilimanjaro: \_\_\_\_\_

Mauna Loa: \_\_\_\_\_

Paricutin: \_\_\_\_\_



DISASTER  
DETECTIVES

On the night of August 26, 1883, a volcano on a remote Pacific island exploded, creating one of the loudest sounds in history, heard more than 3,000 miles away. Before the eruption, the island measured some 18 square miles; two-thirds of the island exploded into the sky when this volcano erupted! The volcano's eruption also created a powerful tidal wave that swept the nearby islands of Java and Sumatra, killing thousands of people. The dust that poured out created spectacular sunsets across the world for months to come and made temperatures drop worldwide.

Can you figure out the name of this incredible volcano? To become a Disaster Detective and find the name, simply use the classroom's or library's globe or atlas to answer the questions as you find them.

Write the answer to each question in the space provided just below, one letter per space. Use the numbered letter to fill in one of the corresponding numbered spaces in the mystery volcano's name below. For example, check out the first clue below. When you write its name, the letter above the number "3" goes into the corresponding space in our mystery volcano's name.

Happy hunting!

**Clue 1:** It's the largest country on the continent of Asia. With its capital city of Beijing, this country is home to more people than any other nation in the world.

1. \_\_\_\_\_  
3

5. \_\_\_\_\_  
5

2. \_\_\_\_\_  
7

6. \_\_\_\_\_  
6

3. \_\_\_\_\_  
8

7. \_\_\_\_\_  
4

4. \_\_\_\_\_  
2

8. \_\_\_\_\_  
1

FINAL ANSWER: \_\_\_\_\_  
1 2 3 4 5 6 7 8



# Earthquake!

**Listen:** Can you hear it? Can you feel it? Somewhere in the world right now, the Earth is shaking from an earthquake, one of the most destructive forces of nature.

In January 2000, an earthquake rumbled the Greek island of Evia, near the country's capital, Athens. There were no injuries and little damage. The next day, eastern Japan was shaken by an earthquake that shut down a nuclear reactor in Tokaimura. Thankfully, the reactor was not damaged in the quake and resumed operation less than two hours later. These were both gentle earthquakes.

We live on a planet that is geologically active and prone to earthquakes. According to the United States Geological Survey, about 20 major earthquakes occur around the world each year and kill perhaps 10,000 people per year. Some years see more damage than others. For example, by these measurements, 1999 was a bad year. In August 1999, a major earthquake rocked the central Asian country of Turkey, causing the virtual collapse of several cities. About 17,000 people died in that earthquake alone, and thousands more were injured. Earthquakes continued shaking that region; in November, another big quake killed 700 more people and injured another 5,000. And in Taiwan, an island off the coast of China, another great quake caused the deaths of more than 2,300 people and injured 10,000 more.

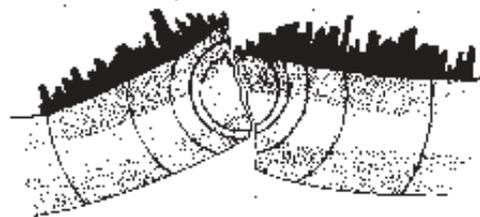


## How earthquakes are formed

Use these words to fill in the blanks and complete the paragraph. Use each word only once.

Asia    San Andreas    earthquake    grand    landslides    Richter    plates  
heat    Himalayas    San Francisco    faults    buildings    mantle

The Earth's surface is made up of many large blocks of crust called \_\_\_\_\_. The plates almost float on the semifluid rock of the layer below the surface called the \_\_\_\_\_. An \_\_\_\_\_ occurs when two plates move away from, or into each other. Geologists believe that the plates are driven by large currents created by \_\_\_\_\_ generated deep within Earth. As heat rises inside the Earth, plates of crust push whole continents around. Most earthquakes occur at the boundaries of plates, where uneven cracks in the earth called \_\_\_\_\_ mark the boundaries of plates. Faults may run for many miles. One of the world's most famous plate boundaries is the \_\_\_\_\_ fault, which runs through the California city of \_\_\_\_\_. Here, two pieces of crust are moving away from each other. In Africa's Rift Valley, the plates are moving away from each other, and the land in between has dropped over time.

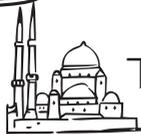


Where India meets the continent of \_\_\_\_\_, the plates of crust are pushing against each other, forming mountains called the \_\_\_\_\_, which are still growing today. Over time, stress and pressure

build up as the plates move into or away from each other, and an earthquake strikes. When an earthquake rocks the land, it can topple \_\_\_\_\_ and bridges and can cause mudslides and \_\_\_\_\_. Geologists use the \_\_\_\_\_ scale to measure how strong an earthquake is. An earthquake measuring 7.0 on the scale is a major quake, but one hitting 8.0 - which is rare - is called a \_\_\_\_\_ earthquake. Each one point on the scale actually represents a tenfold increase in strength!

# QUAKE KIN' COUNTRIES

Here are some of the earthquake-prone countries mentioned in this supplement. Working in teams or alone, use library and Internet resources and references to fill in the information on each country



## TURKEY:

Capital city: \_\_\_\_\_

Population: \_\_\_\_\_

Language: \_\_\_\_\_

Religion: \_\_\_\_\_

Currency: \_\_\_\_\_



## CHINA:

Capital city: \_\_\_\_\_

Population: \_\_\_\_\_

Language: \_\_\_\_\_

Religion: \_\_\_\_\_

Currency: \_\_\_\_\_



## JAPAN:

Capital city: \_\_\_\_\_

Population: \_\_\_\_\_

Language: \_\_\_\_\_

Religion: \_\_\_\_\_

Currency: \_\_\_\_\_



## GREECE:

Capital city: \_\_\_\_\_

Population: \_\_\_\_\_

Language: \_\_\_\_\_

Religion: \_\_\_\_\_

Currency: \_\_\_\_\_



## Disaster Detective Clues (Write the answers to these clues in their numbered space on page 5.)

### Clue 2

It's the largest river in South America, flowing through the world's largest rain forest and the nation of Brazil.

### Clue 3

It's the largest desert in the world, covering North African countries from Morocco to Egypt with its dry sands.

# HURRICANE!

Use a dictionary to write the definitions of these three words. What does each mean?

Hurricane: \_\_\_\_\_

Typhoon: \_\_\_\_\_

Cyclone: \_\_\_\_\_

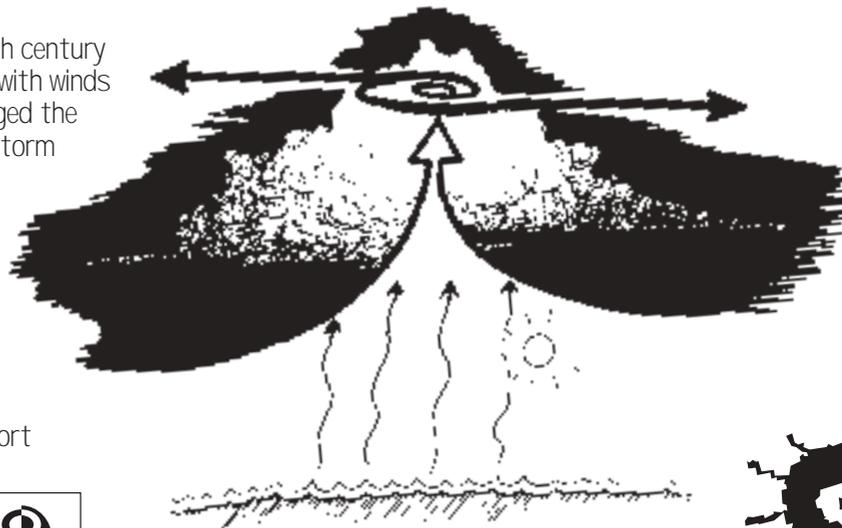
In 1900, meteorology, the study of weather, was a new science, and predicting the weather was difficult. On September 8 of that year, a fierce hurricane swept into the southern United States in the Texas island city of Galveston. A full century later, it still reigns as one of the worst natural disasters in American history - and one of the biggest mistakes in meteorology. The local weather bureau knew that a storm was in the Gulf of Mexico, but the forecasters were certain it would head to Florida. It did not.

It gathered strength, the wind whipping up to 145 miles per hour. The storm pushed a surge of water ahead of it, a wall of waves that smashed into Galveston, leveling homes and sweeping people into the violent water. When it ended, 8,000 people - one-fifth of the island's population - had died, and \$20 million in damage resulted. Today a similar disaster might cause billions of dollars in damage, but \$20 million was a great deal of money back then.

The word "hurricane" is the name applied to fierce tropical storms that start over oceans in certain regions near the equator. In the Atlantic Ocean, these storms are called hurricanes; in the Pacific Ocean, they are referred to as typhoons.

Hurricanes form only above warm ocean water. Because of this, the hurricane season begins in June and lasts through November. Warm, water-saturated air is forced upward by cooler, denser air, and the storm begins to swirl around a center, the eye of the storm. Once the wind speed hits 74 miles per hour, the storm is classified as a hurricane, which can sometimes spread more than 400 miles wide. Within the eye of the storm, which averages 15 miles in width, winds stop and clouds lift, but the seas remain very violent. Hurricanes travel at varying rates, anywhere from five to fifty miles per hour.

The two strongest hurricanes to hit the western hemisphere in the 20th century were the 1988 storm named Gilbert, devastating Jamaica and Mexico with winds that gusted up to 218 m.p.h. and the 1935 Labor Day storm that ravaged the Florida Keys with 200-m.p.h. winds. The death toll of 400 in the 1935 storm probably would have been much higher, but the storm missed Miami. Destructive hurricanes in recent memory include: Hugo (1989), with more than \$4 billion in damage and more than 50 deaths; Andrew (1992), with an estimated \$12 billion in damage, more than 50 dead, and thousands left homeless; Mitch (1998), a storm that killed more than 10,000 people in Central America; Ivan (2004) which caused over \$13 billion in damages; and Katrina (2005) with thousands dead and billions in damages, resulting in the evacuation of the city of New Orleans and requiring the largest relief effort ever in the U.S.



# The Aftermath of a Disaster

## Disaster strikes! Then what?

After a natural disaster like a hurricane, areas are often left in chaos. There may be no clean drinking water and no electricity or other power. People may have lost their homes and other worldly possessions. There are a number of problems that have to be dealt with right away.

The first challenge is to search the area and rescue any people that may be stranded. While disasters may cause millions and even billions of dollars in damage, the most important thing is to save lives and the search and rescue effort does just that.

Then, after the people are safe and sound, the next challenge is to provide them with food, water and shelter. Oftentimes, after a disaster, an area may be left without potable (drinkable) water. There may be plenty of water, in fact, too much water as a result of flooding but that water is not safe to drink. Why?

The water that comes out of a faucet has been treated so that it is free from dangerous chemicals. The water that surrounds an area in a flood may carry poisons in the form of chemicals and bacteria that could make people sick. And, sometimes the water treatment plants are damaged during a disaster so that even the water coming from faucets is no longer safe until they can fix the treatment system.

Next is the issue of power. Disasters may also knock out power lines or power plants. These have to be fixed and that takes time. Sometimes, affected areas may be without power for days or even weeks.

Disasters bring out the best in some people and the worst in others. After a disaster there are lots of stories about ordinary people who act as heroes. They may be individuals reaching out to help strangers or they may be part of a relief effort with the Red Cross or other humanitarian group. Groups like those go into stricken areas to help people with food and shelter. Sadly, there are some people who use the aftermath of a disaster in the worst way. They use that chaotic time to loot and to go into abandoned stores or homes to steal what they can.

People who live through a disaster often learn lessons that change their lives. They can learn that what really matters in life is your life and your health, not the things you own. Disasters can devastate lives but as long as people survive, they can have hope. Where there's life, there's hope and the day after a disaster is a time when many people have to start anew.



1. Hurricanes, of course, are a form of weather.

Check out your newspaper's index to find the weather information. Find the forecast, read it, then check outside. Is the forecast correct? Can you find a forecast for tomorrow? Write a forecast for tomorrow in your own words. Check this forecast to see if you were right.  
Skill: Investigating weather

2. A flood can happen when rivers overflow their banks due to heavy rains. Look through the newspaper to find rivers pictured or mentioned in an article or noted on a map. What other bodies of water are cited? Locate the bodies of water on a map of the world.  
Skill: Locating diverse places



### Disaster Detective Clues (Write the answers to these clues in their numbered space on page 5.)

#### Clue 4

It's the body of water that separates Alaska from the Siberian section of Russia.

#### Clue 5

It's the frozen continent that covers the South Pole.

# Tornado Tornado Tornado

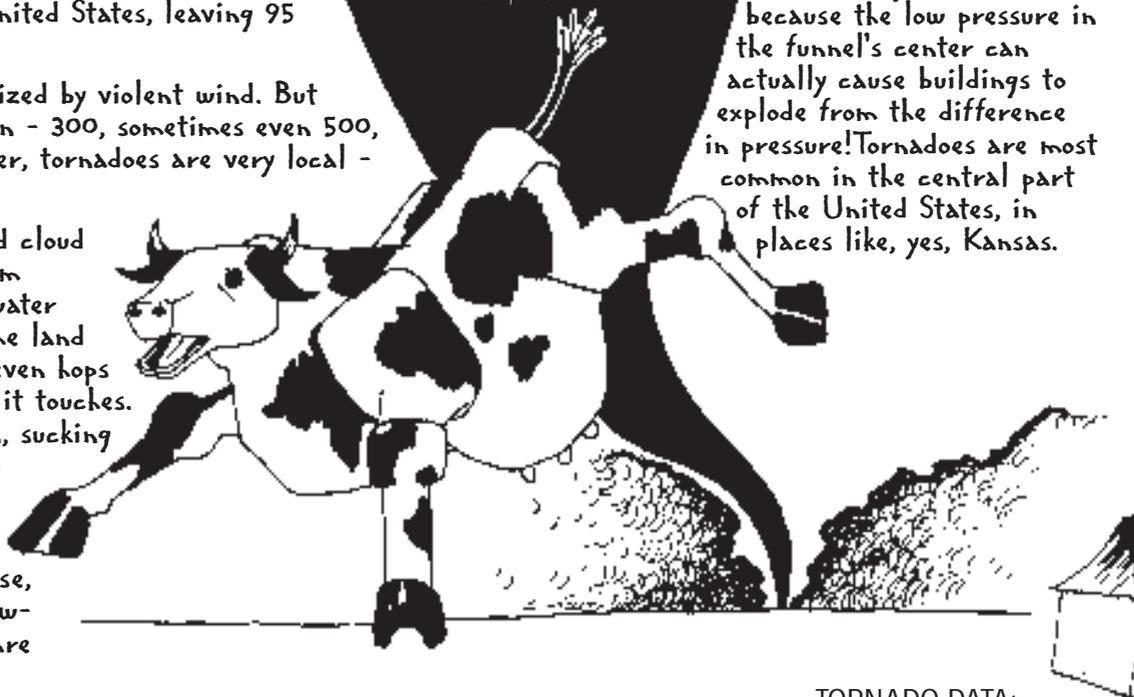
The most famous tornado of all, of course, wasn't real. It was the one from a movie, "The Wizard of Oz," that carried Dorothy and Toto to the magical land of Oz. But tornadoes are very real threats. In 1999, 30 "killer" tornadoes whipped through the United States, leaving 95 people dead.

Like hurricanes, tornadoes are characterized by violent wind. But tornadoes whip faster than hurricanes can - 300, sometimes even 500, miles per hour! Unlike hurricanes, however, tornadoes are very local - usually only yards wide.

The tornado's unmistakable funnel-shaped cloud drops down from the sky out of dark storm clouds, and is made visible by dust and water droplets mixing inside. It moves across the land at speeds of 25-40 mph, and sometimes even hops from place to place, destroying whatever it touches. Tornadoes sometimes form over the ocean, sucking salt water into a column called a waterspout. In the desert, "dust devils" are small whirling clouds of sand.

Tornadoes are formed from violent, intense, high-energy storms and develop within low-pressure areas of high winds. Tornadoes are

dangerous not only because of their fast-moving winds but because the low pressure in the funnel's center can actually cause buildings to explode from the difference in pressure! Tornadoes are most common in the central part of the United States, in places like, yes, Kansas.



## Graphing Tornadoes

In 1999, 1,205 tornadoes were recorded in the United States by the government's Storm Prediction Center. Here's the number of tornadoes recorded per month. Use this data to create a bar graph on this page, then answer the following questions:

### TORNADO DATA:

Jan: 169	May: 325	
Feb: 18	Jun: 275	Sep: 42
Mar: 28	Jul: 82	Oct: 5
Apr: 152	Aug: 86	Nov: 10
		Dec: 13

Which month had the most tornadoes? \_\_\_\_\_

What is the average number of tornadoes for a month in the year 1999? \_\_\_\_\_

Which one the least? \_\_\_\_\_

325  
300  
275  
250  
225  
200  
175  
150  
125  
100  
75  
50  
25  
0



Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.



Hurricanes, tornadoes, floods, and snowstorms have killed thousands of people and caused billions of dollars of damage each year. Find a weather-related story and write an outline of the article.

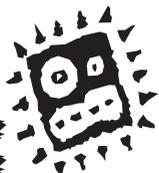
Skill: Explaining causes of different kinds of weather

## Disaster Detective Clue

(Write the answers to these clues in their numbered space on page 5.)

### Clue 6

It's the world's largest island and the only continent that is entirely an island. Home of marsupial mammals, like the platypus, its capital city is Canberra.



# DROUGHT!



Throughout the summer of 1999, much of the northeastern United States was locked tightly in the grip of a drought, a period of abnormally dry weather when little or no rain falls. For much of Pennsylvania, for example, the governor declared a drought emergency and made it illegal to fill a swimming pool or water a lawn. The level of water in reservoirs (a source of drinking water) was dropping, wells were drying up, and the summer's corn crop was ruined. Just as Pennsylvania and other states were considering even more drastic water conservation measures, Hurricane Floyd arrived in late September. This massive storm dropped record levels of rainfall in some places, more than 10 inches of rain falling in one day in some places. It was as if the Earth had found a way to balance its problem with a solution.

Because the Earth is so huge and climate varies so much, there is almost always some place dealing with drought. If a drought is brief, it is called a dry spell. To earn the

name "drought," it should last for a long time and cover a large area.

Horribly, droughts can sometimes last for years. The 20th century's worst drought occurred in a region of western Africa called the Sahel. Changes in wind directions from the ocean robbed the region of rain from 1968 through the early 1980s.

In the United States, according to the Microsoft Encarta '98 Encyclopedia, a major drought occurs roughly every 22 years. One of the worst American droughts ever occurred in the famous Dust Bowl of the 1930s, when thousands of poor farmers fled dying Great Plains farms for a better life in California.

Droughts rarely can be predicted, but people living in places with a high chance of drought can take numerous precautions, especially by using water wisely at home, in work and especially on farms.



## DROUGHT EMERGENCY!

Imagine that your home state is suffering from a drought, and you and your class work for the governor of your state. Your mission: Design a plan that people can use to conserve water in their homes. Below are some uses of water in a home. Can you name five more? Write them in the list. Then, in the next column, label each use a "Need" or a "Want." "Needs" are uses of water that people require for survival; "Wants" are uses that are nice but not required for survival.

Uses	Need or Want?
1. _____	_____
2. _____	_____
3. _____	_____
4. _____	_____
5. _____	_____
6. Flushing the toilet _____	_____
7. Watering houseplants _____	_____
8. Watering flower garden _____	_____
9. Watering vegetable garden _____	_____
10. Filling swimming pool _____	_____
11. Filling water pistols _____	_____

Break into groups of 4 or 5 students each. Each team shares its list of uses, needs and wants. Do you all agree? The governor says that to conserve water during the drought, your group must ban three uses of water for as long as the dry spell lasts. Which three things should people stop doing during the drought? When your group agrees, write the uses here: \_\_\_\_\_

When done, all groups should share answers. Do the groups all agree? Take a class vote as to the three uses that your class recommends the governor ban during the drought.



Droughts often come in the summer, when the temperature is the hottest. Hot weather combined with no rainfall is a double whammy for farmers trying to grow crops. Turn to your newspaper's weather page. Can you find a weather map of the United States? What will be the hottest city in the United States today?

What will be the coldest?

If your almanac page has a listing of cities around the world, where in the world will temperatures be the hottest today? Coldest?

Find these two cities on a globe or a world map. Why is one hot and the other less so?

Skill: Interpreting maps and charts

## Disaster Detective Clues (Write the answers to these clues in their numbered space on page 5.)

**Clue 7** It's a country with one of Africa's largest cities, Nairobi, as its capital.

**Clue 8** It's the United States' largest chain of mountains, dividing the country through states including Colorado and Wyoming.



# FLOOD!

On the previous page, we learned that drought - the lack of water - can be a problem. But too much of a good thing can be a problem, too. And too much water results in a flood.

In December 1999, while the rest of the world was preparing for the New Year and millennium celebrations, the South American nation of Venezuela was recovering from one of the worst floods in its history. Torrential rains along the country's north coast caused rivers to swell, and mudslides came pouring down the mountains. When it was over, more than 10,000 people died and almost 200,000 were left homeless. Shortly after that a similar horror happened in Mozambique.

Every year, floods occur all over the world. When it rains or snows, the water travels to a variety of places. Some stays in the soil, some is absorbed in the roots of plants, and some evaporates back into the air. But most of the water percolates underground to emerge in springs and streams, or it runs into streets, where storm drains shunt it into creeks and streams. But when it rains so much that natural systems are overwhelmed with water, flooding results.

Floods can be very damaging and very costly. They kill people, demolish homes (sometimes whole towns), and destroy crops and wildlife habitat. At the same time, flooding is a natural process, for many rivers flood in the springtime when warming weather melts snow that may have accumulated on mountain tops. People have lived with floods throughout time and have even lived alongside - and tried to control - floods. In fact, many cities and civilizations, like ancient Egypt, grew up alongside rivers where flooding provided water and nutrients for growing crops. It is the unexpected flood, or the severely high flood, that causes problems for people and rivers.

## River Match:

Floods are caused when rivers overflow their banks. Below you will find three columns. The first has names of rivers, the second has countries, and the third has continents. Use the library or computer encyclopedias to draw a line from the river to one of the countries it flows through. Then draw a line from that country to the continent in which you can find that country. The first is done for you.

Murray	China	South America
Colorado	Sudan	North America
Po	Italy	Australia
Nile	United States	Africa
Amazon	Australia	Europe
Yellow	Brazil	Asia



1. Floods result, in part, from too much rain. Does your newspaper contain an almanac page that lists rainfall for the year? Can you find the rainfall chart? How many inches of rain have fallen so far this year in your town or city? How many inches normally fall by this time this year? Is your area ahead or behind in rainfall?

Skill: Understanding how weather conditions are measured

2. The emotions of people could range from excitement to relief to sorrow during a natural disaster. Survey the newspaper for photographs of people expressing their emotions. Make a collage of the people and label how they are feeling.

Skill: Describe and discuss shared issues in the human experience

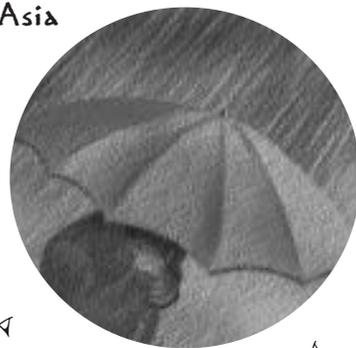


R

Each student can choose one river about which to create a one-page report and a map.

The report should cover the countries through which the river flows, the size and extent of the river, important cities that have been founded along the river, the role that river has played in history - and anything interesting about that river. Display your reports in the school hallway. You can choose from the six rivers in the first column above, or any of the following:

Congo, Danube, Delaware, Ganges, Hudson, Jordan, Mekong, Mississippi, Niger, Ohio, Orinoco, Rhine, Rio Grande, Seine, St. Lawrence, Thames, the Tigris and Euphrates (work on these two as one river), Volga, Yangtze, Yukon, Zambezi.



# Snow and Ice!

## SNOWSTORM! BLIZZARD!

Hurricanes usually occur during the summer and fall. In the winter, any storm that deposits snow on the ground is called a snowstorm. While snowstorms are usually not as disastrous as a volcano or a hurricane, they can damage property and kill people. Motorists stuck in cars have frozen to death, as have homeless people on park benches. Snow and ice on roads cause car accidents, and snowstorms can knock out electrical service to homes. Snow can be a bigger disaster than you might think.



But sometimes a hurricane-style storm blows in during the winter, bringing in fierce winds and driving snow. This storm is often called a blizzard. Blizzards are most common to the western United States, but sometimes occur in other parts of the country. The famous blizzard of March 11-14, 1888, covered much of the eastern United States and is widely regarded as the country's worst blizzard ever. People generally call any large snowstorm a blizzard, but weather scientists have an exact definition.

Worse even than snowstorms is an avalanche. In mountainous regions, a large mass of snow can suddenly plummet down a slope or cliff, moving as fast as 100 miles per hour! In recent years, a series of avalanches caused problems in Alaska.

# ICE STORM!

In cold sections of the country, precipitation often falls in the form of snow. Sometimes, however, frozen pellets of hail can rain down from the sky. But the worst winter weather of all is an ice storm, freezing rain that coats everything and turns immediately into ice.

Very special circumstances must be in place for an ice storm to develop - and those conditions are met in places like the southeastern United States. Here, warm, moist, water-rich air might move over the top of cold, below-freezing air. When rain falls from the warm air above, its droplets pass through the colder air. If that air is so cold that it's below the freezing point of water, frozen rain falls from the sky and begins glazing over roads, houses, power lines, trees, and everything with water that turns to ice immediately.

That's an ice storm, one of the most dangerous storms of all.

On January 7 and 8, 1973, Atlanta and much of northern Georgia were devastated by frozen rains that turned into, in some places, four inches of ice. The ice snapped electric lines and poles, causing 300,000 people to lose power for a full week. Schools were closed for a full week, too, and many people died in traffic accidents. The storm even killed millions of trees, their branches snapping off helplessly from the weight of the ice.



## Research!

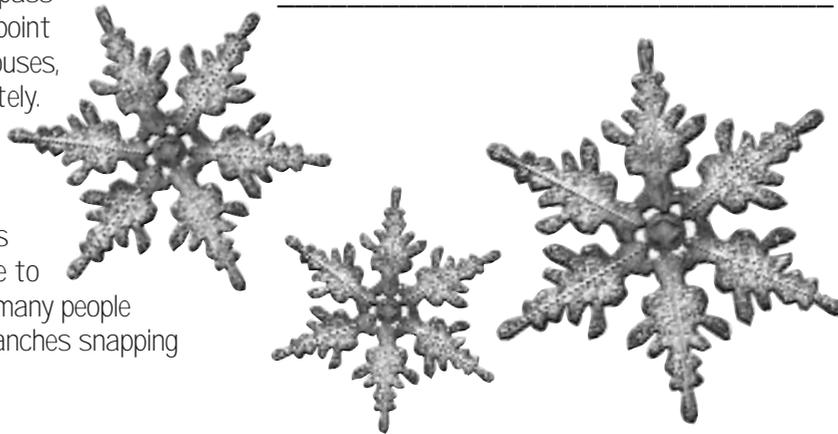
Use a school encyclopedia or search the Weather Channel's web site ([www.weather.com](http://www.weather.com)) to find the exact definition of a blizzard: Write it here:

Blizzard:

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## PRINCIPALLY SPEAKING



If your school is in a cold climate, your school's principal or superintendent probably spends the entire winter worrying about having to cancel school for a snow day. While you might love snow days, knowing how and when to cancel school is one of the hardest decisions an administrator makes.

Invite your school's principal into the classroom and interview him or her about snow days or other days when school might have to be closed for bad weather. Ask these questions - and others you might think of yourself - to understand the story behind these days:

1. How does the school decide whether or not to cancel school?
2. How many people do you have to talk to before you can make your decision?
3. What time does the decision have to be made by?
4. Does the school or school system hire its own weather forecaster?
5. Can you think of a time when the weather report was right and you made the correct decision? What was the biggest wrong decision ever made?
6. How do parents feel about weather cancellation days?
7. What should students know about these days that we don't already?

# Wildfire!

During a dry spell or a drought, lightning can strike or a campfire can be left alone - and a fire can rage through a forest, killing millions of plants and animals that are unable to escape the flames. Every year, more than one million acres of forests burn in the United States, an area almost as big as the state of Delaware.

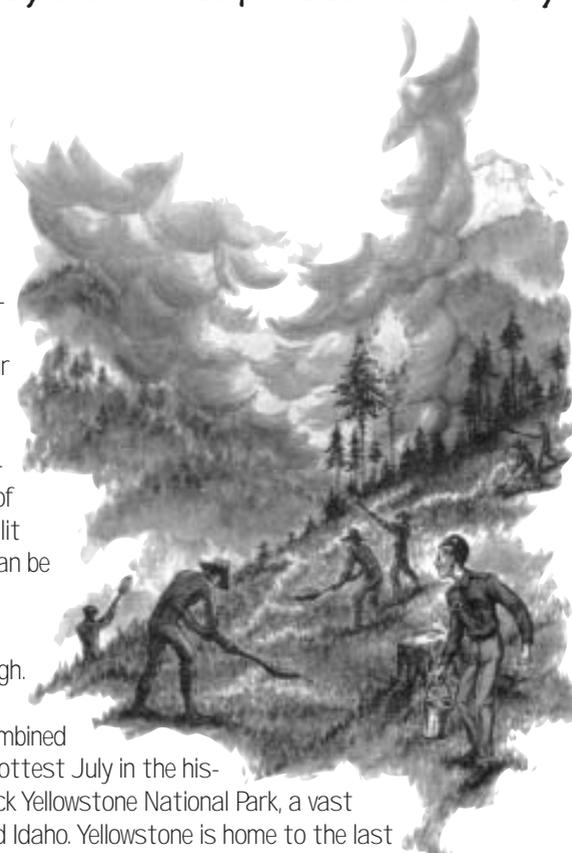
The worst part about forest fires is that, according to the U.S. Forest Service, more than 80% of them - that's four out of five - are caused by careless people. Smoldering cigarettes and carelessly tended campfires are the two largest causes of forest fires.

## Humans Can Help or Hurt

Again, geography comes into play. Another of the five themes is "human/environment interaction." In studying this, geographers look at all the effects - positive and negative - that occur when people interact with their surroundings. Sometimes a human act on the environment can be helpful, such as damming a river to prevent flooding. But, sometimes, as in the case of leaving a fire untended or carelessly tossing a lit cigarette into the forest, human interaction can be very harmful to the environment and result in disasters like wildfires.

People are not the sole cause of wildfires, though. In the summer of 1988, for example, much of the United States was locked in a drought combined with very hot weather. That year marked the hottest July in the history of weather record-keeping. Lightning struck Yellowstone National Park, a vast natural area located in Wyoming, Montana and Idaho. Yellowstone is home to the last free-roaming herd of bison in the country and is best known as the place to visit Old Faithful, the remarkable geyser that spouts regularly and often. That summer, Americans watched helplessly as millions of acres of Yellowstone burned. It may have been the most famous forest fire ever. In 1999, wildfires burned through parts of California and Montana, too.

Sometimes, though, fires are helpful to the forests they burn. As old trees burn and fall, more sunlight gets to the forest floor and allows for new growth.



1. In addition to world and national news, newspapers report on local and regional news, too. Check the newspaper's table of contents for the section of local news. Read through that section of the newspaper. Can you find any stories about fire in this section? If so, what happened? What was the story? Was it good or bad? How would you feel if this had happened to you?  
Skill: Using the index

2. Choose several items pictured in today's newspaper and discuss the raw materials needed to make them, the most likely place of production or manufacture, and the most likely form of transportation from the place of manufacture to the United States.  
Skill: Using picture clues

## MOVEMENT MOVEMENT MOVEMENT

Certainly during times of disasters, people interact with other people.

But really, people interact with other people, places and things almost every day of their lives.

They travel from one place to another; they communicate with each other; and they rely upon products, information and ideas that come from beyond where they live. So "movement," this movement of people, things and ideas is another of the five themes that help us understand geography. The theme of movement helps us understand how we are connected with, and dependent upon, other regions, cultures and people in the world.

To better understand this movement, find five items in your classroom that were made in the United States and five that were made in another country. Which are easier to find? Why?



# Tidal wave! Tsunami!

Millions of years ago, dinosaurs roamed the Earth for a very long time. One of the greatest mysteries in all of science is why the dinosaurs, after 160 million years, vanished almost overnight. Some scientists strongly believe that a very large asteroid crashed into the planet from outer space somewhere near the Yucatan peninsula of Mexico.

Imagine what a mess that would have made! The asteroid hit with such force that it rocked the Earth, setting off earthquakes everywhere. The force of the blast also would have created fierce winds that would have swept for miles, knocking over trees everywhere. Volcanoes would have begun erupting in many places, lava flowing down their sides. Molten lava would have caused unspeakable wildfires, the fires pouring soot and smoke into the sky. This soot, in turn, would have blocked the sun's rays, causing temperatures to drop. Poison rains would have fallen, the water mixed with toxic chemicals from the soot and ash.

In short, just about every catastrophe we've discussed in these pages would have happened at one time. With one more: tidal waves. That asteroid hitting in, or even just near, the ocean would have sent monstrous waves moving across the oceans. "Tidal wave" is the popular name for a tall, destructive wall of water - a very large wave - that can strike coastal areas, especially nations along the Pacific Ocean. Because the wave is not caused by tides, scientists have stopped calling them tidal waves. Instead, the proper name is tsunami (soo-NA-mee), a Japanese word that means "harbor wave."

It's appropriate that the world uses a Japanese word for this disaster, because many tsunamis have struck Japan through history. Tsunamis are caused by earthquakes under the ocean, or sometimes undersea volcanic eruptions and/or landslides. Violent shaking of earth and rock under water causes large waves to form in the ocean, waves that build taller and taller as they approach land. Amazingly, tsunamis can move thousands of miles across the ocean at speeds of up to 500 miles per hour! When they reach the shore, they can form a wall of water 50 feet high, as tall as a five-story building!

The force behind a tsunami is huge. In the course of history, they have been known to destroy entire villages. On December 26, 2004, a powerful tsunami in the Indian Ocean hit 12 countries and caused tremendous damage. With a death toll of more than 200,000, it was certainly one of the most devastating natural disasters of all time.



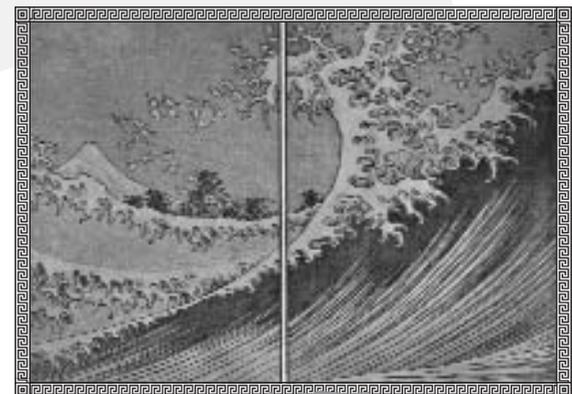
Back to our dinosaurs. It wasn't just one tsunami that was created by the asteroid, but waves of many tsunamis. Wow! With volcanoes, earthquakes, tidal waves, wind storms, poison rains, wildfires, and more raging simultaneously, the question isn't why the dinosaurs died; rather, it's how did anything else survive!?

## Region



Another theme of geographic study is "region," an area on the earth's surface that is defined by certain unifying characteristics. They may be physical, human or cultural. Geographers also study how a region changes over time. After reading about the tsunamis, for example, you should understand that one characteristic of the regions where these happen is their location near the ocean. Without the ocean, big waves would be impossible.

Skim through some of the other information in this section about other natural disasters. Note some of the characteristics of the regions where each of these disasters happens.



## In The News

Though tsunamis have nothing to do with tides, if you live in a coastal town or city, your newspaper might tell you when the tides are. Can you find a tide table in your newspaper? When is low tide? When is high tide? Does anyone in your class know what causes tides?

Skill: Gathering information from charts

## Thinking About Disasters:

On these pages you've been reading and studying about a lot of seriously scary and yet amazingly awesome things. Volcanoes are beautiful yet deadly. Few things are prettier than a snowstorm, yet storms can kill. What did studying this make you think about people, about nature, and about the power of natural forces? Write your thoughts and discuss them with your class

# Defining Disasters

Let's learn the names and definitions of some of the natural disasters discussed in this section. Find the names of our disasters in the margins around this crossword puzzle. Read the clues, each one a definition of one of the disasters. Guess which disaster matches its definition, and complete the crossword puzzle.

- Across**
1. A funnel-shaped column of air that whirls at speeds of up to 500 miles per hour.
  5. A possible rise in the Earth's temperature caused by human pollution.
  7. A violent storm with fierce winds and torrential downpours.
  8. A heavy snowstorm with high, blinding winds.
  9. A large wall of water usually caused by an earthquake under the ocean.
  11. An overflowing of water onto land that is normally dry.

- Down**
2. A mountain that emits soot, ash, steam and molten rock.
  3. A long period of abnormally low rainfall.
  4. A shaking of the earth that's often accompanied by rumbling noises.
  6. A winter storm that covers everything in a sheet of ice.
  10. A rapidly spreading fire that cannot be controlled by firefighters.

## Resources to learn more.

- Disasters on the Web!**  
 There are lot great sites on the Web for discovering more about the topics discussed in these pages. Here are a few recommended sites:
- [www.weather.com](http://www.weather.com): Television's Weather Channel official site. Check out its listing of "Storms of the Century," the worst storms of the 1900s. You'll also find weather maps and news stories about floods, hurricanes, etc.
  - [www.neic.cr.usgs.gov](http://www.neic.cr.usgs.gov): The home page of the National Earthquake Information Center. Click on "Near Real Time Earthquake List," and scroll down the page to find a map of yesterday's earthquakes all over the world! Watch this Web address carefully; for some reason, there is no dot after the www. The way it reads above is correct. Try it yourself to be sure.
  - [www.volcanoes.org](http://www.volcanoes.org): The home page of the North Pacific Learning Center, with lots of great news and information about volcanoes.
  - [www.tornadoproject.com](http://www.tornadoproject.com): The Tornado Project's site, filled with great information about tornadoes.
  - [www.nhc.noaa.gov](http://www.nhc.noaa.gov): The government's National Hurricane Center home page is overflowing with things to see and do concerning these incredible weather systems.
  - [www.fema.gov](http://www.fema.gov): The Federal Emergency Management Agency is the government group responsible for helping you get out of the way of approaching disasters. Scroll down the site's home page to the button, "Disaster Photos," and check out the scary photos of tornado-ravaged homes and towns.

Here are some great web sites, created by students, where you can learn more about natural disasters, read some survivor accounts, and find out how to handle them:

- <http://www.thinkquest.org/library/16132.shtml>
- <http://www.thinkquest.org/library/10136.shtml>
- <http://www.thinkquest.org/library/27292.shtml>

**Answer keys**

**Crossword puzzle,**  
 Across: 1. TORNADO; 5. GLOBAL WARMING; 7. HURRICANE; 9. TIDAL WAVE  
 Down: 2. VOLCANO; 3. DROUGHT; 4. EARTHQUAKE; 6. ICESTORM; 8. BLIZZARD; 11. FLOOD

**Famous volcanoes, page 5**  
 Mount Etna: Italy  
 Mount Pinatubo: Philippines  
 Mauna Loa: U.S. (Hawaii)  
 Fuji Mountain: Japan  
 Kilimanjaro: Tanzania  
 Paricutin: Mexico

**How earthquakes form, page 6**  
 Order of words: plates, mantle, earthquake, heat, faults, San Andreas, San Francisco, Asia, Himalayas, buildings, landslides

**Disaster Detective Clues:**  
 Did you discover the volcano's name? Here are the correct answers.  
 Clue 1: China; Clue 2: Amazon; Clue 3: Sahara; Clue 4: Bering Strait; Clue 5: Antarctica; Clue 6: Australia; Clue 7: Kenya; Clue 8: Rocky Mountains.  
 FINAL ANSWER: KRAKATOAI (it's spelled a variety of ways, sometimes Krakatau.)  
 Krakatoa is a small volcanic island in southwestern Indonesia between Java and Sumatra. Its eruption produced massive tsunami that killed thousands of people. Today, no one lives on Krakatoa, a testament to the power of nature.

**River Matching, page 12**  
 Murray-Australia-Australia  
 Colorado-United States-North America  
 Po-Italy-Europe; Nile-Sudan-Africa  
 Amazon-Brazil-South America  
 Yellow-China-Asia

**Credits:**  
 This Hot Topics supplement was:  
 Written by: Mike Weilbacher  
 Edited by: Ken Bookman  
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 Graphic design by: Gilbert & Associates  
 Some illustrations by: Zach Horn

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