

Section 3

Weather-Related and Other Natural Disasters

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Introduction

The devastating effects of natural disasters such as earthquakes, floods, fires, tornados, and hurricanes are well known. Worldwide, millions of lives have been lost and countless millions of individuals have been injured or had their lives disrupted by these and other naturally occurring events. Damage caused by earthquakes, tornadoes, floods, wildfires, and volcanic eruptions can leave entire communities completely incapacitated. Depending on the event, a large number of victims may be seriously injured and massive structural damage may occur. After any natural disaster, there may be wave of victims seeking shelter, food, and other assistance.

Natural and man-made disasters often overlap, as in the case of industrial catastrophes, structural collapse of buildings, transportation-related emergencies, release of hazardous materials by fires or explosions, and infectious disease outbreaks. Dealing with these commonly occurring events requires an all-hazards approach to better coordinate emergency preparedness and response efforts.

All-hazards planning must include the potential for subsequent or secondary emergencies following a primary natural disaster. Special attention must be given to structural collapse, downed power lines, ruptured gas lines, and loss of other basic services. While a building may sustain no immediately apparent effects following an earthquake for example, it may still be structurally damaged or otherwise unstable enough to pose a serious risk for its inhabitants, with a need for evacuation. The consequences of prolonged power outages, contaminated drinking water supplies, and infectious disease outbreaks also must be considered.

Natural disasters and weather-related events pose a substantial risk of communications disruptions, infrastructure destruction, and large numbers of displaced persons who require food, shelter, and medical care. Moreover, they may create a need for resources not commonly considered in disaster response. For example, building collapse after an earthquake requires rapid mobilization of construction personnel and heavy equipment, urban search and rescue teams, and mortuary services.

Without question, a natural disaster will occur somewhere in the United States every year. Intensive monitoring by governmental agencies such as the U.S. Geological Survey, National Weather Service, and National Oceanic and Atmospheric Administration can provide early warning for some of these events. This facilitates disaster mitigation by allowing implementation of emergency plans and evacuations. Although some natural disasters are predictable according to season, geographical location, and by using sophisticated tracking systems, many others (eg, wildfires, flash floods) can occur with little or no warning. The section provides many useful links for obtaining up-to-date information to facilitate effective planning and response to various natural disasters.

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General Weather Information

Authoritative weather-related information is available from the National Weather Service at the National Oceanic and Atmospheric Administration:

- [National Weather Warnings](#)
- [Today's U.S. Weather Forecast](#)

Drought and Water Conservation

Drought is a normal, recurrent feature of climate. It occurs almost everywhere, although its features vary from region to region. In the most general sense, drought originates from a deficiency of precipitation over an extended period of time, resulting in a water shortage for some activity, group, or environmental sector. Information about the effects of excessive drought and actions to take to protect yourself and your property, is available on the following Web sites:

[American Red Cross](#)

[DisasterHelp.gov](#) (multi-agency federal resource)

[National Drought Mitigation Center \(University of Nebraska-Lincoln\)](#)

[National Oceanic and Atmospheric Administration \(NOAA\) Drought Information Center](#)

[National Coalition of Organizations for Disaster Education](#)

[North Dakota State University Extension Service](#)

Earthquakes

An earthquake is a sudden, rapid shaking of the Earth caused by the breaking and shifting of rock beneath the Earth's surface. This shaking can cause buildings and bridges to collapse; disrupt gas, electric, and phone service; and sometimes trigger landslides, avalanches, flash floods, fires, and huge, destructive ocean waves (tsunamis). Earthquakes strike suddenly, without warning; they can occur at any time of the year and at any time of the day or night. Each year, 70 to 75 damaging earthquakes occur throughout the world. The key to surviving an earthquake and reducing your risk of injury lies in planning, preparing, and practicing what you and your family will do if it happens. For more information, refer to the following Web sites:

[American Red Cross](#)

[Centers for Disease Control and Prevention \(CDC\)](#)

[DisasterHelp.gov](#) (multi-agency federal resource)

[EQNet](#) (a collaborative effort of many of the institutions providing information related to earthquake hazards mitigation)

[Federal Emergency Management Agency \(FEMA\)](#)

[National Coalition of Organizations for Disaster Education](#)

[The University of Nevada Reno, Seismological Laboratory](#)

U.S. Geological Survey

- [Earthquake Hazards Program](#)

[World Health Organization](#)

Floods

Ninety percent of all natural disasters in the United States involve flooding. Each year, an average of 100 people lose their lives in floods, with damage averaging more than \$2 billion. Flash floods are the number one weather-related killer in the United States. They can occur within a few minutes or hours of excessive rainfall, a dam or levee failure, or a sudden release of water held by an ice jam. For more information, refer to the following Web sites:

[American Red Cross](#)

[Centers for Disease Control and Prevention \(CDC\)](#)

[DisasterHelp.gov](#) (multi-agency federal resource)

[Federal Emergency Management Agency \(FEMA\)](#)

[National Coalition of Organizations for Disaster Education](#)

[National Oceanic and Atmospheric Administration \(NOAA\)](#)

- [National Weather Service](#)

[North Dakota State University Extension Service](#)

[U.S. Geological Survey Real-Time Water Level Information](#)

[World Health Organization](#)

Heat Waves

Heat is one of the most underrated and least understood of the deadly weather phenomena. In contrast to the visible, destructive, and violent characteristics associated with other natural disasters, such as floods and tornadoes, a heat wave can be a “silent killer.” The worst heat disasters, in terms of loss of life, occur in large cities when a combination of high daytime temperatures, high humidity, warm night time temperatures, and an abundance of sunshine occurs for several days. Large urban areas become “heat islands.” Brick buildings, asphalt streets, and tar roofs store heat and radiate it like a slow burning furnace. Heat builds up in a city during the day and cities are slower than rural areas to cool down at night. More information about the effects of excessive heat and actions to take to protect yourself and your property is available from the:

[American Red Cross](#)

[Centers for Disease Control and Prevention \(CDC\)](#)

[Federal Emergency Management Agency \(FEMA\)](#)

[National Coalition of Organizations for Disaster Education](#)

Hurricanes/Tropical Storms

A hurricane is a severe tropical storm that forms in the southern Atlantic Ocean, Caribbean Sea, Gulf of Mexico, or in the eastern and central Pacific Ocean. Hurricanes need warm tropical oceans, moisture, and light winds above them. Under the right conditions, a hurricane can produce violent winds, enormous waves, torrential rains, and floods. For more information on these tropical storms, refer to the following Web sites:

[American Red Cross](#)

[Centers for Disease Control and Prevention \(CDC\)](#)

[DisasterHelp.gov](#) (multi-agency federal resource)

[Federal Emergency Management Agency \(FEMA\)](#)

[Huracan.com](#) (weather reports and National Hurricane Center forecasts, graphics and photographs, and basic information about hurricanes)

[National Coalition of Organizations for Disaster Education](#)

[National Oceanic and Atmospheric Administration \(NOAA\)](#)

- [National Hurricane Center](#)

[Tropical Storms, Worldwide Tracking Data \(University of Hawaii\)](#)

Landslides

Landslides are typically associated with periods of heavy rainfall or rapid snow melt and tend to worsen the effects of flooding that often accompanies these events. In areas burned by forest and brush fires, a lower threshold of precipitation may initiate landslides. Debris flows, sometimes referred to as mudslides, mudflows, lahars, or debris avalanches, are common types of fast-moving landslides. It is estimated that nationally they cause up to \$2 billion in damages and from 25 to 50 deaths annually. For more information, refer to the:

[American Red Cross](#)

[Centers for Disease Control and Prevention \(CDC\)](#)

[Federal Emergency Management Agency \(FEMA\)](#)

[National Coalition of Organizations for Disaster Education](#)

[U.S. Geological Survey National Landslide Information Center](#)

Thunderstorms

A thunderstorm is formed from a combination of moisture to form clouds and rain; rapidly rising warm air; and lift from cold or warm fronts, sea breezes, or mountains. Thunderstorms may occur singly, in clusters or in lines. Thus, it is possible for several thunderstorms to affect one location in the course of a few hours. Some of the most severe weather occurs when a single thunderstorm affects one location for an extended time bringing heavy rains (which can cause flash flooding), strong winds, hail, lightning, and tornadoes. Lightning is a major threat during a thunderstorm. In the United States, between 75 to

100 people are killed each year by lightning. While thunderstorms and lightning are found throughout this country, they are most likely to occur in the central and southern states. For more information, refer to the:

[American Red Cross](#)

[Federal Emergency Management Agency \(FEMA\)](#)

[National Coalition of Organizations for Disaster Education](#)

[National Weather Service](#)

Tornadoes

Tornadoes are among the most violent storms. In an average year, about 1,000 tornadoes are reported across the United States, resulting in 80 deaths and more than 1,500 injuries. A tornado is a violently rotating column of air extending from a thunderstorm to the ground. The most violent tornadoes are capable of tremendous destruction, with wind speeds of 250 mph or more. Damage paths can be in excess of one mile wide and 50 miles long. Tornadoes can occur anywhere in the United States at any time of the year. In the southern states, peak tornado season is March through May, while peak months in the northern states are during the summer. For more information, refer to the:

[American Red Cross](#)

[Centers for Disease Control and Prevention \(CDC\)](#)

[DisasterHelp.gov \(multi-agency federal resource\)](#)

[Federal Emergency Management Agency \(FEMA\)](#)

[National Coalition of Organizations for Disaster Education](#)

[National Oceanic and Atmospheric Administration \(NOAA\)](#)

- [National Weather Service](#)

Tsunamis

Tsunamis are a series of very long waves generated by any rapid, large-scale disturbance of the sea. Most are generated by sea floor displacements from large undersea earthquakes. Tsunamis can cause considerable destruction and loss of life within minutes on shores near their source; some tsunamis can cause destruction within hours across an entire ocean basin. Most tsunamis occur in the Pacific region but they are known to occur in every ocean and sea. Although infrequent, tsunamis are a significant natural hazard with great destructive potential. For more information, refer to the following Web sites:

[American Red Cross](#)

[Centers for Disease Control and Prevention](#)

[Federal Emergency Management Agency \(FEMA\)](#)

[National Coalition of Organizations for Disaster Education](#)

[National Oceanic and Atmospheric Administration \(NOAA\)](#)

[World Health Organization](#)

Volcanoes

Explosive volcanoes spew hot solid and molten rock fragments and gases into the air. As a result, ash flows can occur on all sides of a volcano and ash can fall hundreds of miles downwind. Dangerous mudflows and floods also can occur in valleys leading away from volcanoes. If you live near a known volcano, active or dormant, be prepared to follow instructions from your local emergency officials. Additional Information can be found at the following Web sites:

[American Red Cross](#)

[Federal Emergency Management Agency \(FEMA\)](#)

[National Coalition of Organizations for Disaster Education](#)

[National Oceanic and Atmospheric Administration \(NOAA\)](#)

University of North Dakota

- [Volcano World](#)

Supported by NASA, this site features a clickable world map and list of currently erupting volcanoes, arranged by date of event.

U.S. Geological Survey

- [Glossary of Volcanic Terminology](#)
- [Volcano Hazards Program](#)

Weekly report of worldwide volcanic activity, current updates for U.S. and Russian volcanoes, volcano fact sheets, volcano monitoring and warning systems, a photo glossary of volcano terms, and lists of books and videos on volcanoes.

Wildfires

In many areas, wildlands have become overgrown with trees and other plant life. When coupled with drought conditions and an ignition source, this build up of plants can provide the fuel for a potentially disastrous fire. Wildfires often begin unnoticed and can spread quickly, igniting brush, trees, and homes. Information about protecting yourself and your property from fire-related damage is available from the:

[American Red Cross](#)

[Centers for Disease Control and Prevention \(CDC\)](#)

[DisasterHelp.gov](#) (multi-agency federal resource)

[Federal Emergency Management Agency \(FEMA\)](#)

[Firewise](#) (Web site created for people who live, vacation, or own structures in wildfire-prone areas. It offers online wildfire protection information and checklists, as well as listings of other publications, videos, and conferences. The interactive home page allows users to ask questions of fire protection experts and to register and receive further information as it becomes available.)

[International Fire Information Network](#) (provides support to an international net of wildfire information; also, contains information on education, training on fires and special services)

[National Coalition of Organizations for Disaster Education](#)

[National Oceanic and Atmospheric Administration \(NOAA\)](#)

[US Fire Administration](#) (Federal Emergency Management Agency)

Winter Storms

Severe winter storms can cause widespread damage and disruption. Heavy snow often results in paralyzed transportation systems, highway crashes, and stranded motorists. When accompanied by intense winds, ice, and extreme cold, winter storms can isolate individuals and entire communities. More information about the effects of winter storms and extreme cold and actions to take to protect yourself is available from the:

[American Red Cross](#)

[Centers for Disease Control and Prevention](#)

[Federal Emergency Management Agency](#)

[National Coalition of Organizations for Disaster Education](#)

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