

LANDSLIDES

Two thirds of the U.S. population resides in counties or parishes that have areas susceptible to landslides. Landslides destroy homes, disrupt traffic, damage property and cause injuries and deaths.

Nationally, landslides cause **25-50 deaths each year** and **up to \$2 billion in losses annually**, according to the American Red Cross. They are a common phenomenon in all **50 states**.

A **landslide** is the downslope movement of rock and soil that occurs when the force of gravity exceeds the resistance of the underlying earth.

Factors that cause landslides include water saturation, erosion, earthquakes, volcanic eruptions, alternating freezing and thawing of ground and development activities.

Landslides often occur during periods of heavy rainfall or rapid snow melt. They are also a typical secondary effect of wildfires because burning can lead to rapid erosion during rain storms and thus unstable ground.

The **Congressional Hazards Caucus** encourages all citizens and communities to be aware of risks posed by landslides and take appropriate steps to reduce their vulnerability to landslides.

The La Conchita landslide damaged 36 homes and killed 10 people in 2005.

Photograph by R. L. Schuster, USGS

FOR A LANDSLIDE

BEFORE

- Know your area. Consult with local officials, state geological surveys, departments of natural resources, and university departments of geology and get a professional referral for a detailed site analysis.
- Prepare a family disaster plan with procedures for evacuation and a disaster supplies kit.
- Stay alert and informed during rain storms.
- If you feel you are at immediate risk, contact local police, fire, and public works department, inform neighbors, and leave the area immediately.

DURING

- Move out of the path of the landslide. If you cannot exit your house, move to the second floor.
- If you cannot move out of the path of a landslide, curl up into a ball and protect your head.

AFTER

- Stay away from the affected area because more landslides may occur.
- Allow experts to survey area for trapped or injured victims, broken utility lines and damaged property.
- Fix drainage problems as soon as possible after the landslide so additional movement does not occur.
- Check with professionals on the status of property.

TYPES OF LANDSLIDES

FALLS

- **Rock Fall:** Abrupt movement of rock, boulders, or soil that becomes detached from cliffs or slopes on lines of weakness.
- **Topple:** Forward rotation of a block of soil or rock about a pivot point that is below or low in the block.

SLIDES:

- **Slump:** Mass movement of rock or soil which collapses and moves over a concave surface; also known as a rotational slide.
- **Slide:** Mass movement of an intact mass of rock or soil over a weak plane, such as a fault or bedding plane; also known as a translational slide.

FLOWS:

- **Creep:** Slow downward movement of rock or soil, which can serve as an important early warning sign for potentially larger landslides.
- **Debris avalanche:** A very fast, downhill mass movement of soil and rock.
- **Debris flow:** Mass movement of material coarser than sand which begins slowly on the tops of slopes saturated by water, gradually accelerating and picking up debris.
- **Mudflow:** Mass movement of material finer than sand, mixed with large amounts of water.
- **Lahar:** Flowing mixture of water-saturated rock debris that forms on the slope of a volcano. Often occurs when a snow-capped volcano erupts melting a large amount of snow or ice.

RESOURCES and ASSISTANCE

USGS National Landslides Hazards Program: Supports research to improve understanding of landslides: landslides.usgs.gov

USGS National Landslides Information Center: Distributes information on landslides: landslides.usgs.gov/nlic

American Red Cross: Provides information on landslides and steps to preparedness: www.redcross.org/services/disaster/keepsafe/landslide.html

U.S. Search and Rescue Task Force: Northeastern organization dedicated to search and rescue and disaster relief: www.ussartf.org/landslides.htm

National Flood Insurance Plan: FEMA site on NFIP: www.fema.gov/business/nfip

Knowledge Network—SLIDE! Documentary *Slide!* provides general info on landslides: www.knowledgenetwork.ca/slide

AREAS PRONE TO RISK

- Areas burned by wildfires
- Bases of steep slopes
- Bases of drainage channels
- Old landslides
- Developed hillsides where leach-field septic systems are used
- Areas with lawn irrigation
- Areas with weathered shale
- Hydrothermally altered volcanic rocks

EARLY WARNING SIGNS

- Increase in discharge of storm water drainage areas.
- Small landslides, tilting trees, bulges, cracks, disrupted utilities or water ponding on the surface
- Noises, such as cracking or creaking, indicate imminent danger

SECONDARY EFFECTS

- Chaotic landscape—buried valleys, dozens of small hills
- Formation of lakes as streams are blocked
- Flooding
- Landslide-generated waves or Tsunamis
- Horseshoe-shaped craters
- Explosive volcanic eruptions
- One or more additional landslides

AREAS SAFE TO BUILD ON

- Gently sloping ground that has not been affected by landslides in the past
- Flat-lying areas away from steep slopes
- Along or on top of ridges that are set back from the tops of slopes



A highway crew removes material along the Columbia Parkway in Cincinnati, Ohio. Leaning trees are an important indicator for unstable ground. *Photography by Bob Fleming, USGS.*

The **Congressional Hazards Caucus** is co-chaired by Senators Ted Stevens (AK), Mary Landrieu (LA), and Ben Nelson (NE) and Representatives Wayne Gilchrest (MD), Dennis Moore (KS), Jo Bonner (AL) and Zoe Lofgren (CA). The goal of the Caucus is to provide ways to help individuals, businesses, and communities better prepare for and mitigate the costs of disasters. The Caucus seeks to foster an important dialogue on steps that government and citizens can take to lessen the severity of these disasters. For more information visit www.hazardiscaucus.org.