

HAZARDS AND THREATS

LANDSLIDES, MUD AND DEBRIS FLOWS

WHAT IS A LANDSLIDE

The term landslide includes a wide range of ground movement, such as rock falls, deep failure of slopes, and shallow debris flows. Although gravity acting on an over-steepened slope is the primary reason for a landslide, there are other contributing factors including the following:

- Erosion by rivers, glaciers, or ocean waves create over-steepened slopes
- Rock and soil slopes are weakened through saturation by snowmelt or heavy rains
- Earthquakes create stresses that make weak slopes fail
- Earthquakes of magnitude 4.0 and greater have been known to trigger landslides
- Volcanic eruptions produce loose ash deposits, heavy rain, and debris flows
- Excess weight from accumulation of rain or snow, stockpiling of rock or ore, from waste piles, or from man-made structures may stress weak slopes to failure and other structures

Slope material that becomes saturated with water may develop a debris flow or mud flow. The resulting slurry of rock and mud may pick up trees, houses, and cars, thus blocking bridges and tributaries causing flooding along its path.

Landslides constitute a geologic hazard because they are widespread, occur in all 50 states and U.S. territories, and cause \$1-2 billion in damages and more than 25 fatalities on average each year. Expansion of urban and recreational developments into hillside areas leads to more people that are threatened by landslides each year. Landslides commonly occur in connection with other major natural disasters such as earthquakes, volcanoes, wildfires, and floods.

The U.S. Geological Survey (USGS) developed the National Landslide Hazards Mitigation Strategy – A Framework for Loss Reduction Report. This circular outlines key elements of comprehensive and effective national strategy for reducing losses from landslides nationwide and provides assessment of the status, needs, and associated costs of this strategy. The circular is submitted in compliance with a directive of Public Law 106-113. A broad spectrum of expert opinion was sought in developing this strategy report, as requested by the U.S. Congress in House Report 106-222.

The strategy was developed in response to the rising costs resulting from landslide hazards in the United States. The strategy gives the Federal Government a prominent

role in efforts to reduce losses due to landslide hazards, in partnership with State and local governments. The USGS has taken the lead in developing the strategy on behalf of the large multi sector, multi agency stakeholder group involved in landslide hazards mitigation. The USGS derives its leadership role in landslide hazard-related work from the Disaster Relief Act of 1974 (Stafford Act). For example, the Director of the USGS has been delegated the responsibility to issue disaster warnings for an earthquake, volcanic eruption, landslide, or geologic catastrophe (1974 Disaster Relief Act 42 U.S.C. 5201 et seq).

The National Landslide Hazards Mitigation Strategy includes developing new partnerships among government at all levels, academia, and the private sector and expanding landslide research, mapping, assessment, real-time monitoring, forecasting, information management and dissemination, mitigation tools, and emergency preparedness and response. Such a strategy uses new technologies advances, enlists the expertise associated with other related hazards such as floods, earthquakes and volcanic activity, and utilizes incentives for the adoption of loss reduction measures nationwide.

To access the National Landslide Hazards Mitigation Strategy, please [click here](#).