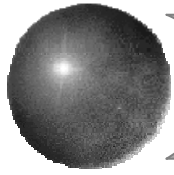
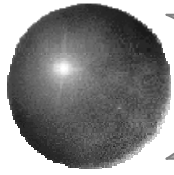


# Landslides: An Important Earthquake Hazard

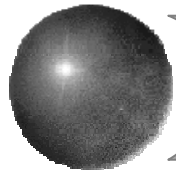
Paula Gori  
U. S. Geological Survey  
Associate Coordinator,  
Landslide Hazards Program  
MS 908, Reston, Virginia





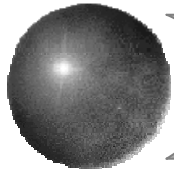
## *Main Themes of the Presentation*

- Landslides are a significant cause of damage and fatalities during earthquakes
- Emergency managers need to be prepared to respond to landslides
- Landslides are best mitigated by sound land-use planning



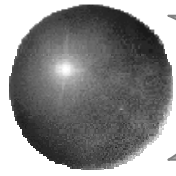
# *Earthquakes Trigger Landslides*





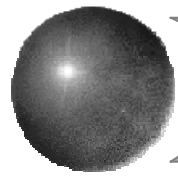
*The size of the area affected by earthquake-induced landslides depends on:*

- The magnitude of the earthquake
- The focal depth of the epicenter
- The topography and geologic conditions near the fault
- The frequency and duration of the ground shaking
- The saturation of the soils



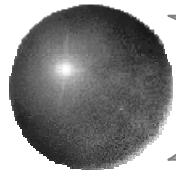
# *Landslides cause extensive damage*





# *Nisqually, WA Earthquake 2001*

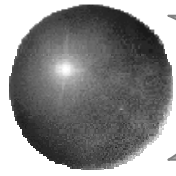




# *Damage to Salmon Beach from 1949 Puget Sound and 2001 Nisqually Earthquakes*

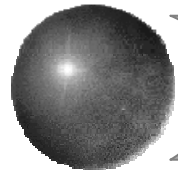






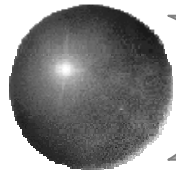
# *Landslides Cause Extensive Loss of Life*





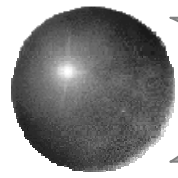
# *Hebgen Lake, Montana, Earthquake August 1959.*





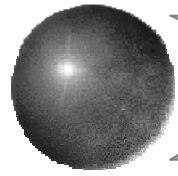
# *Cabins at Hilgard Lodge lifted by seiche and dropped*





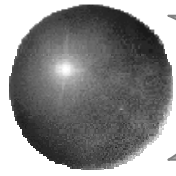
# *New Madrid Earthquake 1811-12*





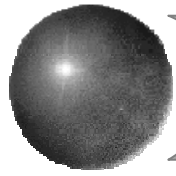
# *Landslides complicate response and recovery efforts*





## *Issues related to recovery*

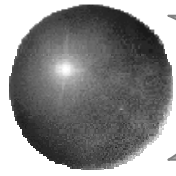
- A destructive landslide can result in financial ruin for property owners because landslide insurance is usually not available.
- The largest direct public costs resulting from landslides are for repairing bridges, highways, roads, sidewalks, and storm drains.
- HAZUS offers landslide layer, but the community must fill in soil information.



## *Landslides are a National, State, and Local Problem*

- Landslides cause up to \$3 billion in damages and 25 to 50 deaths annually.
- Costs of landslides are increasing as land susceptible to failure is developed.
- Reducing landslide losses depends on all levels of government and the private sector.

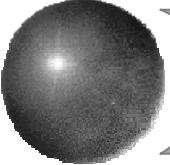




# *National Landslide Hazards Mitigation Strategy*

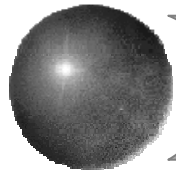
- USGS developed a strategy addressing landslide hazards at the request of Congress
- The strategy gives the Federal Government a prominent role in leading efforts to reduce losses due to landslide hazards in partnership with State and local governments and the private sector
- The USGS outlined the National Landslide Hazards Mitigation Strategy in Circular 1244.
- The Academy of Sciences praised the strategy





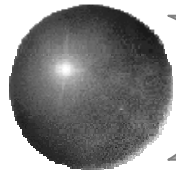
# *Land-Use & Emergency Planning Reduces Landslide Hazards*





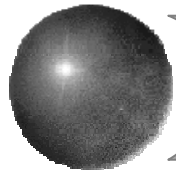
## *Landslide Hazards and Planning Project*

- The main goal of the USGS/APA project is to educate the planning community on landslide hazards and how to reduce their impacts on communities and individuals.



## *USGS/APA Project Outcomes*

- The USGS and the APA will publish a practical guidebook for planners entitled “Landslide Hazards and Planning” in 2005 due to be released soon.
- The two organizations are also collaborating on training and workshops for local planners and curriculum for planning schools. Also incorporate into FEMA mitigation training.
- USGS web site <http://landslides.usgs.gov>
- APA web site <http://planning.org/landslides>.



## *For Additional Information*

- USGS National Landslide Information Center
- <http://landslides.usgs.gov>
- 1-800- 654-4966