

Landslides in tectonically active regions

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Tectonically active plate-boundary regions, such as the western coast of South America, are particularly conducive to landslide generation, with resulting casualties and damage. Direct triggers for landslides there prominently include earthquakes. However, the ongoing tectonic activity typically sets up underlying conditions that lead to landslides produced by other triggers, such as intense precipitation, as well. These underlying conditions include: (1) widespread steep and high slopes, (2) active downcutting of fluvial systems, (3) widespread distribution of slopes composed of weak earth materials owing to the tectonic uplift of geologically young, highly fractured, or structurally deformed rocks and regolith, (4) widespread distribution of ash and other volcanic materials highly susceptible to slope failure, and (5) orographic enhancement of precipitation. Earthquakes produce a suite of landslide types that differs from the patterns produced by other triggering mechanisms. This paper will describe the types of earthquake-triggered landslides, the damage they cause, relations between landslide distribution and seismic parameters such as earthquake magnitude, and characteristics of slopes that make them susceptible to failure. The paper will also discuss the synergistic effects of earthquakes and rainfall in producing ongoing landslide hazards and the contribution of seismically generated landslides to long-term landscape evolution.