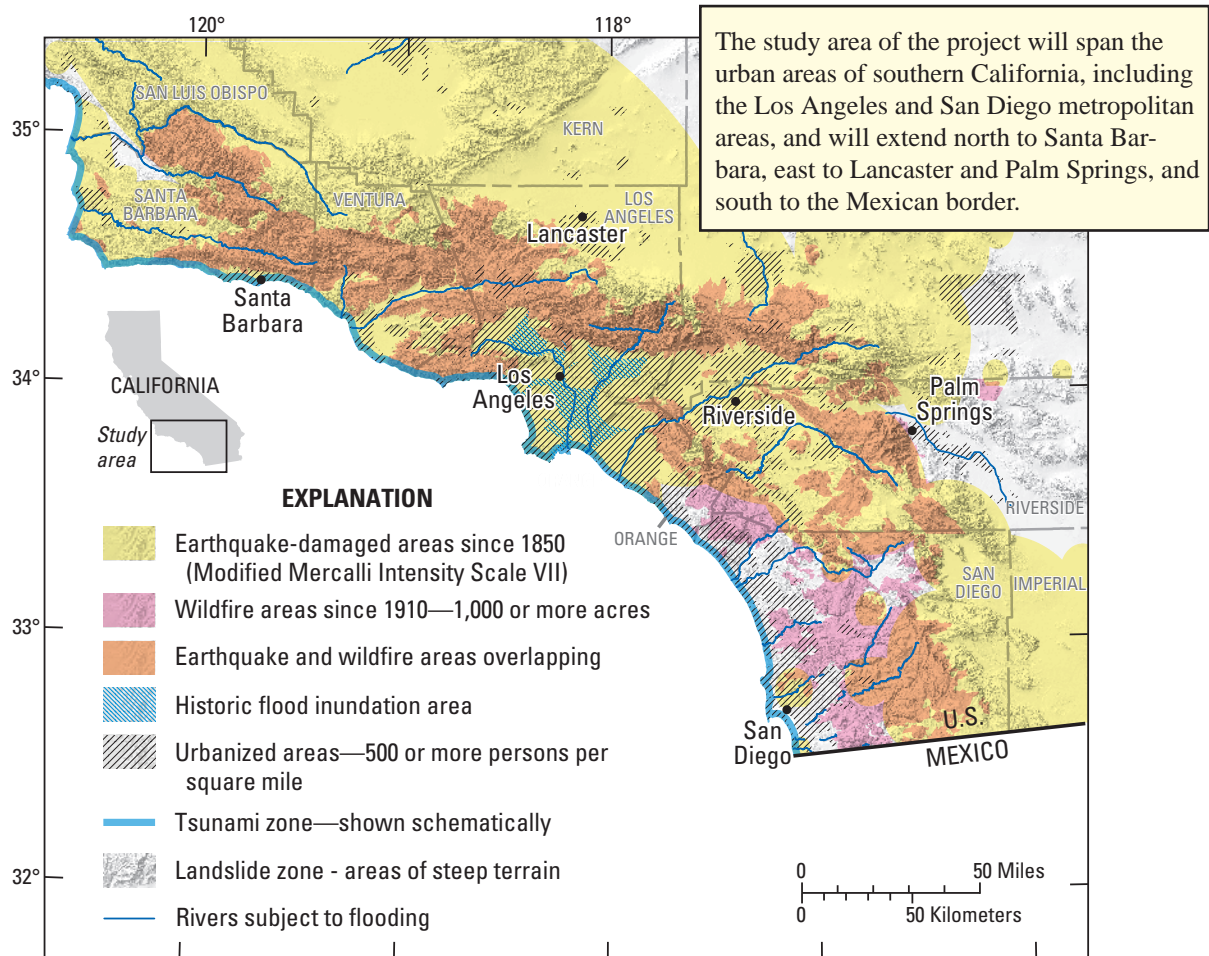


# Increasing the Resilience to Natural Hazards in Southern California

Southern California is at great risk for extreme catastrophic losses owing to numerous natural hazards, such as earthquakes, wildfires, floods, tsunamis, landslides and coastal changes, that occur in this area (fig. 1). Expected losses from these hazards are estimated to exceed \$3 billion per year in the eight counties of southern California.

## In southern California

- Natural hazards have devastating consequences, including loss of life and injury, replacement costs of buildings and infrastructure, loss of function of critical facilities, service and infrastructure outages, business interruption, loss of jobs, and a decrease in the quality of life.
- Multiple natural hazards are commonplace and often overlap to create secondary hazards. For example, earthquakes can produce landslides and severe fires and heavy storms can produce debris flows.
- Every year since 2000, when the population of the eight counties of southern California was nearly 19.7 million people, an estimated 276,000 more people become at risk from primary and secondary natural hazards.
- Decision makers require different types of information at a wide range of spatial and temporal scales. The decision-making environment is dynamic and therefore decision makers need to be able to access the most recent information derived from scientific investigations that account for human and natural forces of change.
- Effective risk-reduction options depend on resources that are subject to budget constraints and on personal or organizational preferences for acceptable levels of risk; therefore, models and simulation studies are useful for quantifying options.



**Figure 1.** Geographical extent and overlap of natural hazards in southern California.



Photograph by M.J. Rymer, U.S. Geological Survey

**Natural gas pipeline broken as a result of the 1994 Northridge earthquake in southern California.**

The Multi-Hazards Demonstration Project (MHDP), initiated by the U.S. Geological Survey in 2007, brings together multiple disciplines and partners to help communities in southern California reduce death and destruction from natural hazards. To help increase the resilience of communities to future natural hazards, the project combines the knowledge of geology, water resources, geography, and biology with sound economic, engineering, social science and geospatial information capabilities to

- Create a focal point to improve communication among scientists and disaster managers and community planners.
- Plan USGS science projects with community partners. Interaction with community partners will aid the USGS in understanding community needs, improve emergency-management decisions, and guide future USGS research.
- Initiate or expand real-time hazard monitoring and warning systems.
- Provide new and easy-to-access hazards data, information, assessments, and models for use by community decision makers and researchers.
- Develop and improve new research products, tools, risk maps, and assessments. Combine geologic, hydrologic, geographic, and biologic hazard products with economic, engineering and social science research to improve emergency-management decisions.
- Use the best of what is developed for the MHDP for southern California to build a robust Urban Hazards program for the Nation.



Photograph by Rudolph R Contreras, U.S. Geological Survey

**2003 Cedar Fire, San Diego County, southern California. About 280,000-acres burned.**

**To accomplish the objectives of the Multi-Hazard Demonstration Project, the USGS will**

- Ensure that research will be useful to the communities of southern California.
- Conduct the best possible multidisciplinary scientific research.
- Work in partnership with the region's communities to support them in using the research results.



Photograph by Robert E. Wallace

**The San Fernando earthquake of 1971 collapsed freeway overpasses in southern California.**



Photograph by Jim Bowers, U.S. Geological Survey

**Landslide at Laguna Beach, California, June 2005. The landslide occurred after record heavy rainfall in southern California in the preceding months. It occurred next to the 1978 Bluebird Canyon landslide.**

Natural-hazard information is useful to community decision makers in preparing risk-reduction strategies. To provide the best scientific information on natural hazards, the USGS will carry out research to increase the understanding of the framework of hazard possibilities, vulnerable environments, community response, and associated risk-reduction options. The vulnerable environment is in part created by humans, but natural elements such as the soils, geology, hydrology and ecology also make an environment vulnerable. The goal of the USGS activities is to provide an understanding of the relationships between human actions and environmental vulnerabilities to aid in making informed decisions about possible risk-reduction activities.

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