# Geographic Research in the USGS Western Region

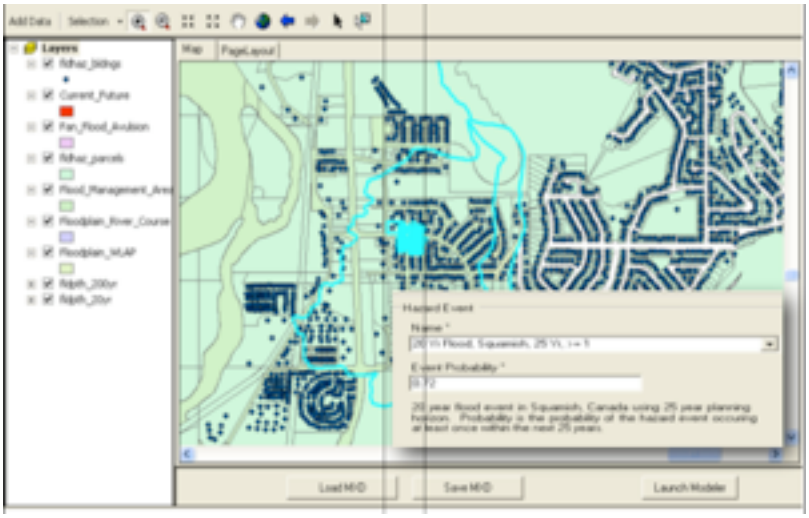
Reports from the National Academy of Sciences and others invariably ask USGS to ensure the quality of its science while finding ways to make it more relevant to important societal issues. Much of the research conducted in Western Region Geography does exactly that. In Menlo Park, California, Geography has a research team focused on developing tools and techniques to help people assess risk to natural hazards and environmental impacts. In Flagstaff and Tucson, Arizona, scientists explore new ways to use remote sensing to help communities deal with environmental issues.

The Western Geographic Science Center is comprised of about 50 scientists and support staff mostly located in Menlo Park, Flagstaff, and Tucson. USGS Geography programs also support several scientists in the Alaska Science Center who are developing the National Land Cover Database and assessing environmental changes.

WGSC is conducting cutting edge research on assessing risk for communities to natural hazards given the uncertainty of scientific knowledge. Science that colleagues in Geology, Biology, or Water Resources develop is used as input into

USGS Geography's two programs, Land Remote Sensing and Geographic Analysis and Monitoring have very strong relevance to the USGS mission and science strategy. The particular niche Geography has in the West is in connecting USGS science to people and communities.

*Sedimentation affecting coral reefs following a rainstorm on Molokai, Hawaii.*



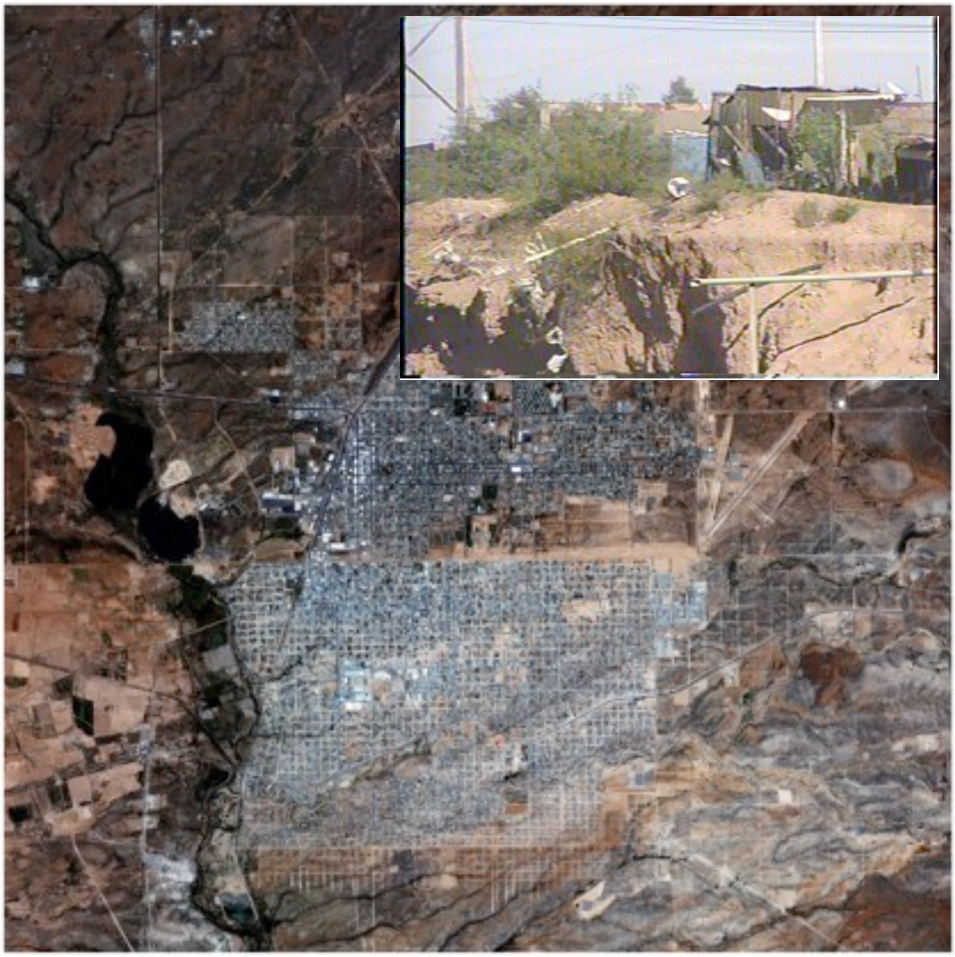
*Using the Land Use Portfolio Model to assess the risk of flooding in Squamish, British Columbia. Black dots show buildings at risk of flooding in a simulated 20-year flood.*

models that combine that knowledge with measurements of vulnerability of people and property. WGSC models develop a risk framework that communities can use to assess and make mitigation tradeoffs. This is accomplished using the Land Use Portfolio Model, developed by WGSC scientists in Menlo Park. The model takes portfolio theory developed for investors and applies it to assess alternative investments in hazard preparation and mitigation. WGSC scientists are now refining and applying this model in the USGS Multi-Hazards Initiative in southern California. Spinoffs from the portfolio model are also being developed to help the National Park Service evaluate park management and restoration deci-

sions in South Florida in the face of rapid urbanization. Expertise within WGSC in economics is enabling a benefit/cost analysis for the Future Land Imaging program. WGSC scientists are strong contributors to Geography's Land Cover Trends project. In the West, 30 years of Landsat data are being used to measure land cover trends, then determining some of the causative factors and impacts of this important national project.

WGSC scientists in Arizona specialize in remote sensing research and applications. Working on issues affecting the Salton Sea, coral reefs in Hawaii, along the US-Mexican border, in the Mojave Desert, and other locations. One project with the San Carlos Apache Nation involves developing remote sensing applications and then training tribal members how to use remote sensing to help manage their natural resources. Another important activity is work exploring how remote sensing systems can measure phenological change, or the changes that occur seasonally, as an indicator of various types of environmental change.

At the Cascades Volcano Observatory WGSC is filling a national niche for USGS in assessing vulnerability of people and communities to natural hazards of all kinds. This includes knowing where the populations are located at night and day and their special needs in the event of a hazard. Software that more accurately portrays population density is playing an important role. WGSC scientists work closely with communities in Oregon, Hawaii, and Washington to prepare vulnerability maps that will help them develop better tsunami response plans.



*Douglas, Arizona and Agua Prieta, Sonora astride the US-Mexican border. Inset shows sewer lines from houses extending into a nearby arroyo (photo by Silvia Villalobos de Zuñiga*

*Vulnerability assessment workshop, The Dalles, Oregon*

Current information on these and other projects is available on the WGSC web site at:

http://geography.wr.usgs.gov

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