

Scenarios for Activity Three: Volcanic Eruptions

Mount Rainier, Washington

Mount Rainier, at 4,393 meters (14,410 feet) is the highest peak in the Cascade Range. It is a volcano covered by more glaciers than any other mountain in the conterminous United States. This tremendous mass of rock and ice, in combination with great topographic relief, poses a variety of geologic hazards, both during inevitable future eruptions and during the intervening non-eruptive periods. Built upon the flanks of Mount Rainier are the metropolitan centers of Seattle, Tacoma and Olympia. These cities and the many smaller towns are at substantial risk from this volcano.

Mammoth Lakes, California

Long Valley Caldera a 15- by 30-km oval-shaped depression located 20 km south of Mono Lake along the east side of the Sierra Nevada in east-central California. This area of eastern California has produced numerous volcanic eruptions over the past 3 million years, including the massive caldera-forming eruption 760,000 years ago. The most recent eruption occurred just 250 years ago in Mono Lake at the north end of Mono-Inyo Craters volcanic chain. On May 25-27, 1980, the Long Valley caldera was rocked by four $M = 6$ earthquakes. This seismicity heralded the onset of a wave of activity within the caldera that has continued through the present time. Unrest has taken the form of seismic swarms, uplift of the resurgent dome, and areas of vegetation killed by increased CO₂ emissions, all interpreted as resulting from magma injected to different levels beneath the caldera. Continuing economic development in the Mammoth Lakes area has swelled the local population, increasing the risk to people and property if an eruption were to occur.

Three Sisters, Oregon

Three Sisters is one of three potentially active volcanic centers that lie close to rapidly growing communities and resort areas in Central Oregon. Two types of volcanoes exist in the Three Sisters region and each poses distinct hazards to people and property. South Sister, Middle Sister, and Broken Top, major composite volcanoes clustered near the center of the region, have erupted repeatedly over tens of thousands of years and may erupt explosively in the future. In contrast, other volcanoes, which range from small cinder cones to large shield volcanoes like North Sister and Belknap Crater, are typically short-lived (weeks to centuries) and erupt less explosively than do composite volcanoes. Hundreds of these less-eruptive volcanoes scattered through the Three Sisters region are part of a much longer zone along the High Cascades of Oregon in which birth of new volcanoes is possible.

Hawaii

Ever since lava first erupted above sea level over 500,000 years ago to begin building the Island of Hawaii, countless eruptions from its five volcanoes have built the "Big Island" to a towering height of more than 4,000 m (13,000 ft). Its two most active volcanoes -- Mauna Loa and Kilauea -- erupt lava frequently enough to pose a serious hazard to property on many parts of the island. About 40 percent of Mauna Loa has been covered by lava in the past 1,000 years and over 90 percent of Kilauea's surface is covered by lava less than 1,100 years old. As land development expands toward areas of relatively high hazard, the threat to life and property on Hawaii will increase accordingly.