

Thirty years of eruption at Kilauea Volcano Hawai'i: a review of impacts and mitigation strategies

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As Kilauea Volcano surpasses 30 years of nearly continuous activity, impacts from simultaneous summit and rift eruptions continue to challenge the Island of Hawaii's communities and environment. On one front, lava flows from the east rift eruption have inundated communities, destroying 214 primary structures between 1983 and 2012. On another front, elevated levels of acid gases and aerosols from the persistent east rift eruption have leached metals into domestic water supplies, affected human and livestock health, and damaged agricultural crops, native forests, and farming and ranching infrastructure. Health and environmental impacts were amplified by the onset of the summit eruption in 2008, which was accompanied by an order of magnitude increase in summit SO₂ emissions and a factor-of-three increase in ambient SO₂ in nearby communities. Hawai'i County was declared a federal disaster area due to agricultural losses from the effects of volcanic emissions for the period 2008-2011.

Federal and local land and emergency managers, environmental and public health agencies, scientists, and health researchers have addressed the ongoing challenges of living with Kilauea's long lived eruptions using a variety of approaches. To address hazards associated with volcanic air pollution, multi-agency web-based tools provide real-time and forecast data of SO₂ gas and particle concentrations to help people minimize their exposures. Downwind facilities including a health clinic, a hospital, and a new gymnasium are planning to install air handling systems to improve indoor air quality during periods of high exposure. Ongoing health studies are quantifying asthma and lung growth rates, and respiratory symptomology in exposed populations. Federal low interest loans and grants have helped farmers and ranchers compensate for crop and livestock losses, and replace metal fencing and infrastructure deteriorated by exposure to acid gases and aerosol. Early in the east rift eruption, it was recognized that lead-bearing roofing and plumbing materials were contributing to contamination of rainwater catchment systems due to leaching by acid rain. These construction materials have largely been removed or isolated and alternate sources of water have been made more available.

As Kilauea enters its fourth decade of nearly continuous activity, the ongoing eruptions present a good opportunity to review and enhance efforts to minimize the negative impacts of volcanic eruption in Hawai'i and similar settings worldwide. An evaluation of best management practices for long-term volcanic activity can help physical scientists and multi-agency partners in Hawai'i improve their response to community impacts caused by Kilauea's ongoing activity.