The world’s only volcano crisis response team, organized and operated by the USGS, can be quickly mobilized to assess and monitor hazards at volcanoes threatening to erupt. Since 1986, the team has responded to more than a dozen volcano crises as part of the Volcano Disaster Assistance Program (VDAP), a cooperative effort with the Office of Foreign Disaster Assistance of the U.S. Agency for International Development. The work of USGS scientists with VDAP has helped save countless lives, and the valuable lessons learned are being used to reduce risks from volcano hazards in the United States.

On April 2, 1991, after being dormant for 500 years, Mount Pinatubo volcano in the Philippines awoke with a series of steam explosions and earthquakes. Ten weeks later, on the morning of June 15th, Pinatubo exploded in a climactic volcanic eruption. Fiery avalanches of hot ash (pyroclastic flows) roared down the flanks of the volcano, and giant mudflows of ash (lahars) swept more than 30 miles down valleys. Cities and towns near Pinatubo were devastated by falling ash. Ash fall also inundated the two largest U.S. military bases in the Philippines. On Clark Air Force Base, which was home to more than 15,000 American servicemen and dependents, many buildings collapsed under the weight of rain-saturated ash. Facilities at the U.S. Naval Station at Subic Bay, 25 miles from Pinatubo, were also severely damaged.

Despite the enormity of the devastation wrought by this explosive eruption, quick work by earth scientists helped keep the death toll low. Shortly after Mount Pinatubo’s reawakening, U.S. Geological Survey (USGS) scientists with the Volcano Disaster Assistance Program’s crisis response team arrived at Clark Air Force Base. Once on the scene, they joined scientists from the Philippine Institute of Volcanology and Seismology, who had begun monitoring the volcano. Their timely warnings permitted the safe evacuation of more than 75,000 people, including about 18,000 American servicemen and dependents from the two largest U.S. military bases in the Philippines, before Pinatubo’s climactic eruption.
Large explosive eruptions can endanger people and property hundreds of miles away, affect global climate, and cause widespread economic losses. For example, the drifting ash cloud from the June 15, 1991, eruption of Mount Pinatubo damaged more than 20 passenger jetliners (including those of American air carriers), most of which were flying more than 600 miles from the volcano.

Since 1980, volcanic activity worldwide has killed more than 29,000 people, forced more than 1,000,000 to flee from their homes, and caused billions of dollars in economic losses. On average, about 10 eruptions a year cause significant damage and casualties, and eruptions powerful enough to cause major disasters happen several times a decade.

There are more than 1,500 potentially active volcanoes in the world, about 550 of which have erupted in historical times. Moreover, most of the truly devastating and strongest explosive eruptions since 1800 have occurred at volcanoes with no historical record of previous eruptions.

Despite the threat posed by volcanoes, only about 20 of the 550 historically active volcanoes in the world are monitored adequately, and fewer than one-third are monitored at all. As growing human populations encroach further into areas of greater volcano hazard, the potential for deadly disasters increases.

In the early 1980’s, scientists at the USGS Cascades Volcano Observatory (CVO) in Vancouver, Washington, recognized that it was not economically feasible to fully monitor all potentially active volcanoes in the Pacific Northwest. To meet this problem, the USGS developed a suite of portable monitoring instruments that could be quickly deployed to reawakening volcano. These instruments are used to detect and analyze earthquakes, ground deformation, mudflows, and volcanic gas emissions. The data from these instruments are supplemented by additional information from global positioning (GPS) satellites, weather radar, and other equipment.

In 1985, the eruption of Nevado del Ruiz volcano, Colombia, triggered giant, fast-moving lahars that killed more than 23,000 people. Following this tragedy, the U.S. Agency for International Development’s Office of Foreign Disaster Assistance (OFDA) asked the USGS to help create a program to reduce fatalities and economic losses in countries experiencing a volcano crisis. Toward this goal the two agencies jointly established the Volcano Disaster Assistance Program (VDAP).

VDAP consists of a small core group of scientists at CVO, a larger group of other contributing USGS scientists, and portable volcano-monitoring equipment ready for rapid deployment. The VDAP crisis-response team is mobilized and sent overseas only when the U.S. State Department receives an official request from a country with a restless volcano. Once on site, the VDAP team works with local scientists and technicians to help them provide timely information and analysis to emergency managers and public officials.

Since 1991 the eruption of Mount Pinatubo, VDAP has responded to volcano crises in Central and South America, the Caribbean, Africa, Asia, and the South Pacific. Most recently, VDAP teams have been providing assistance to Mexico and to the Caribbean island of Montserrat.

Although highly visible, the activities of VDAP are only one aspect of the USGS Volcano Hazards Program. The new techniques developed and the experience gained by scientists with VDAP in volcano crises overseas prepare the USGS to better protect people’s lives and property from future eruptions of volcanoes in the United States.