

The Volcano Monitoring and Disaster Prevention Program in Nicaragua

Wilfried Strauch, *Instituto Nicaragüense de Estudios Territoriales (INETER)*,
Managua, Nicaragua, email wil.gf@ineter.gob.ni, <http://www.ineter.gob.ni>

The Nicaraguan Volcanic Chain is one of the most active volcanic regions in the world. In the last years, several volcanic eruptions or other volcano related dangerous or disastrous phenomena have occurred in Nicaragua. In October 1998, a landslide on Casita volcano killed more than 2000 people. The National Disaster Prevention Program in Nicaragua has greatly developed in Nicaragua in the last years. Its legal base, the organizational structure and scientific and technical potential were strengthened. The volcano disaster prevention program in Nicaragua consists of the following elements:

- 1) Mapping of volcano hazards;
- 1) Monitoring and early warning;
- 2) Information, Training and education of civil defense forces, local authorities and local population
- 3) Evacuation and Rescue.

Mapping: Since 1997 projects are going on to achieve till 2001 a complete geological mapping of the volcanic chain, including mapping and preparation of GIS on geological hazards.

Monitoring: An efficient seismic network was developed in the last years, installing telemetric seismic stations in all of the active or potentially dangerous Nicaraguan volcanoes. The seismic monitoring permitted since 1994 several successful eruption alerts. Alert messages were emitted to government, Civil Defense and public, hours, days or weeks before the beginning of the eruption. High precision GPS based geodetic monitoring began in 1999. An intense monitoring program on volcanic gases and geophysical parameters is going at Masaya volcano, in cooperation with several foreign scientific groups. Volcanic gases are affecting thousands of persons living near volcanoes in Nicaragua. Therefore, INETER is preparing a program for the integration of gas sampling and analyses techniques in the routine volcano monitoring at all active volcanoes. INETER is beginning to use satellite based surveillance techniques for the volcano monitoring. Visual observations, regular visits to the volcanoes are an important element of the volcano monitoring program. Based on the monitoring of the November 1999 eruption of San Cristóbal volcano local authorities and population were alerted in April 2000 on the increased hazard of lahars in this volcano. In May 2000 lahars affected the predicted area, they were visually observed by INETER volcanologists and recorded by seismic stations but caused no important damages nor affected the lives of people. INETER is beginning to use automatic cameras (Webcams) for the continuous monitoring of the active volcanoes.

Information, training and education; Evacuation and rescue: INETER has a strict and efficient scheme which permits the rapid information of government, Civil Defense, local authorities, mass media and population about dangerous situations in volcanoes, eruptions, unusual seismic activity. The Civil Defense Organization carries out training of local authorities, of rescue teams, and carries out rescue operations. The National Emergency Commission coordinates the activities of the different institutions and organizations for the prevention and mitigation of natural disasters