PREDICTION AND RISK ASSESSMENT

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Prediction of natural phenomena which have the potential for causing disasters is an extremely difficult proposition both from a scientific and socio-political perspective. Experience has shown repeatedly our inability to predict events leading to disasters. Geophysical predictions, in order to have maximum utility, must specify the date, time, place and magnitude of physical events. In order to meet the minimum criteria for effectiveness and credibility, predictions must be stated within limits which are useful to the public and can be practically applied. Perhaps the best way to deal with the inevitable conflicts and uncertainties associated with the problem of disaster prediction is to either not make such pronouncements or issue forecasts based on the likelihood or probability of event occurrence. In the latter case it is best to provide simplified thresholds for various threat levels and suggest appropriate actions necessary to avert the impacts of an event.

We do not want to overwarn, thereby contributing to a panic. We find it useful for both the scientist and disaster manager to collaborate closely in setting threat parameters and developing contingency plans based on practicality and local experience.

It is in this context that we, in Office of Foreign Disaster Assistance (OFDA), have initiated the use of probabilistic forecasting techniques, and hazards and risk assessment methodologies in lieu of prediction. This is now possible because a considerable amount of time and money has been spent over the last seven years in capturing, compiling and analyzing hard quantitative historical and real-time physical data as inputs to operational national, regional and global early warning systems which are capable of providing significantly increased leadtimes on the likelihood of disaster. We have developed, in concert with many other agencies of Government, such as the USGS, NASA, NOAA, USDA and DOD a technical resources network supported by an impressive variety of ground and satellite-based remote sensing and monitoring systems. The goal has been to access environmental information in order to reduce the uncertainty of disaster occurrence, monitor potentially destructive phenomena, and assist host country disaster managers in identifying and tracking imminent threats to determine when to activate emergency plans, including evacuation, in order to protect populations at risk.

It is obvious that disasters can be avoided if the threats are properly identified and communicated to vulnerable population centers in a timely manner such that appropriate actions can be taken. The goal of disaster preparedness should be to establish the organization and procedures to implement strategic plans based on reliable forecasts and early warning of probable events. In order to accomplish this, we need to produce quantitative risk maps as well as real-time information, and teach disaster managers how to apply the data for decision-making and contingency planning. Assessment of risk—i.e., determining the probability that social or economic and life-threatening consequences of natural physical events will equal or exceed specified thresholds for a particular site or region during a specified exposure time—is the best way to deal with the uncertainty of future disasters. Even more important is the need to define the acceptable risk one is willing to assume and to project the political, economic and social costs associated with over-warning or under-warning. We also have found that risk and hazards analyses provide a sound basis for establishing disaster preparedness priorities at the host country and regional level.

In the past several years OFDA has supported the implementation of disaster forecasting and early warning systems in virtually every region of the developing world. Our applied research effort to date has concentrated on five major disaster types: earthquakes, volcanoes, tsunamis, severe storms and drought/famine.

Earthquakes

The ultimate goal of our earthquake hazard reduction activities is to assist host governments in reducing the death and injury toll caused by geophysical disasters. The starting point for this program several years ago was the need to quantify seismicity both

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