Applying vulnerability theory for volcano disaster risk reduction

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Damage from the late 2006 lahars of Mt Mayon.

Disaster: From Hazard or Vulnerability?

In tackling volcano-related disasters, the focus is frequently on the volcanic event or phenomenon, often termed the "hazard". Volcanic activity, however, is normal, often serving important ecological and societal functions such as fertilizing land and providing geothermal energy. Disasters occur when a community's ability to cope with an event, which might or might not be extreme, is surpassed. In such instances, policies and decisions have created conditions over the long-term which often neglect communities' perception of their own context—and in some cases which have exacerbated the extreme event. This process by which these conditions are created is termed "vulnerability".

Community participation in vulnerability reduction.

Vulnerability Analysis

Most vulnerability analysis methods assume that vulnerability is:

- Quantitative: vulnerabilities can be calculated and summed.
- Objective: vulnerability analysis is factual and indisputable.
- Absolute: only the exact numbers are used to understand vulnerability.
- Non-contextual: calculation methods are transferable to other locations.
- Applicable to the current state: this snapshot in time gives the full story.

Improved theory suggests that vulnerability is additionally:

- Qualitative: emotions and the value of intangibles (e.g. photos) are important.
- Subjective: characteristics termed "vulnerable" depend on point of view.
- Proportional: percentages of people or infrastructure affected matter.
- Contextual: vulnerability depends on each specific situation.
- A process with a past and future, which is not dictated by a single event.

Vulnerability Reduction

Factoring in the vulnerability traits suggested here entails:

- Appraising possessions of emotional and cultural, as well as financial, value.
- Understanding how culturally defined "normal" order has been disrupted.
- Implementing programs which reduce absolute and proportional vulnerability.
- Asking people who might be affected their views of their vulnerability.
- Understanding the long-term impacts of interventions implemented.

The risk and cost of disasters can be reduced because:

- The stress and discomfort of the disaster and recovery can be alleviated.
- Culturally relevant solutions increase the likelihood of successful recovery.
- With a lower proportion affected, more resources could be mobilized after.
- Participation can galvanize people to solve their own problems.
- An evolving, ongoing, and learning process is supported.

Policy Implications

- Different vulnerabilities within a population mean that different approaches should be used to ensure that people can initiate and direct the changes which need to be made.
- Individual (e.g. gender) and community (e.g. cultural) characteristics must be factored into vulnerability reduction.
- Understanding and addressing vulnerability depends on local contexts and interests meaning that vulnerability analysis and reduction is a political and cultural process.

Teide on Tenerife, an island population with many differing vulnerabilities.

Key Sources

Chester, 1993, *Volcanoes and Society*, Edward Arnold, UK.
Hewitt (ed.), 1983, *Interpretations of Calamity from the Viewpoint of Human Ecology*, Allen & Unwin, UK.
Lewis, 1999, *Development in Disaster-prone Places: Studies of Vulnerability*, Intermediate Technology Publications, UK.
Oliver-Smith, 1986, *The Martyred City*, UNM Press, USA.
Wisner et al., 2004, *At Risk: Natural Hazards, People's Vulnerability and Disasters*, 2nd ed., Routledge, UK.

This poster is based on a weather-related disasters poster presented at the American Meteorological Society's Annual Meeting in January 2008.