

Title: Role of Technology in Managing Vulnerability to Natural Disasters with Case Studies of Volcanic Hazards on Non-Industrialized Islands.

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Abstract

Technology is one tool used and misused for managing society's vulnerability to natural disasters. A natural disaster arises from the combination of a natural hazard (a characteristic of the environment) and vulnerability (a characteristic of society). Many of the difficulties encountered when using technology for managing vulnerability to natural disasters result from neither technical problems nor the specific natural disaster event, but manifest because society errs in applying technology. This study examines, critiques, and suggests improvements for this area.

One of the most problematic steps for an engineer is defining the design criteria which should be used to anticipate a system's response to a load from a natural hazard or from vulnerability. Because both natural hazards and vulnerability are often difficult to understand and to predict, the design load input is difficult to predict and to select properly. Anticipating every potential design scenario is also challenging. The definitions for current design criteria are often based on past experiences, which is a form of reactive engineering rather than preventive engineering.

Although preventive engineering tends to be the best approach to engineering problems, natural disaster prevention cannot usually be completely effective and in many cases can have unexpected and deleterious consequences. Therefore, the prevention of vulnerability is a more appropriate focus. An examination of non-technological influences on vulnerability and of spatial, temporal, cultural/philosophical, and technological boundaries and scales illustrates important ideas which assist in preventing vulnerability to natural disasters.

The concepts and models developed in this study are applied to case studies of volcanic hazards on non-industrialized islands. The eruptions of Mount Pinatubo in the Philippines (initial eruption in 1991) and Soufrière Hills in Montserrat (initial eruption in 1995) and are examined.