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USING SEISMIC SCENARIOS FOR URBAN RISK MANAGEMENT IN DEVELOPING COUNTRIES

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While a number of microzoning studies have been carried out in countries like Japan and the United States, few have been performed in developing nations. However, most of the population at risk of an impending earthquake concentrates in the developing countries. This situation has two main implications: 1) practically all the existing microzoning methods have been created in developed nations, and 2) most of the cities under seismic threat in the developing countries do not have the basic information that is usually needed for microzoning studies and for planning seismic risk reduction programs.

While there is an urgent need to provide the leaders and scientists of the developing countries with the tools, methods, and information necessary for the establishment of disaster mitigation policies, the available microzoning techniques cannot be applied as they are to the local conditions. The existing procedures need to be adapted to meet the social, economic, and technical realities of the local people.

The purpose of the Quito, Ecuador, Earthquake Risk Management Project was to develop and test a procedure to improve the management of urban seismic risk in developing countries. It was conducted between the summer of 1992 and the spring of 1994 and involved more than one hundred individuals from ten countries and disciplines such as seismology, structural and soils engineering, urban planning, emergency preparedness, banking and insurance.

This project increased the understanding of Quito's earthquake risk by estimating more comprehensively than ever before the consequences of potential earthquakes on the city, and producing the most complete survey of Quito's urban infrastructure with emphasis on its vulnerability to earthquakes. The project also raised awareness of Quito's earthquake risk through workshops, technical and popular publications and television programs. The project made significant contributions to designing self-sustaining programs to manage Quito's earthquake risk by creating a framework of a comprehensive risk management program, triggering the city to write an emergency response plan, and stimulating the formation of a council of business and industry representatives to exchange information about disaster preparedness.

Another important conclusion of the Project was that many of the city's public schools are vulnerable to collapse during major earthquakes. In response, the Quito School Earthquake Safety Project was initiated in December 1994 with three objectives: evaluate the vulnerability of Quito's public schools to earthquakes; design affordable means of strengthening a sample of those schools that are vulnerable; and strengthen the sample of

vulnerable schools. The most significant finding of the project is that the relatively inexpensive process of identifying high-risk schools and designing their retrofits generated sufficient local funding to pay for retrofit construction. As of this writing, local funding has been committed to retrofit 11 of this project's school buildings, and to design new, earthquake-resistant school modules for use in new school construction.

It will take some time to understand completely how effective these two projects will be in reducing the seismic risk in the Ecuadorian capital. To contribute to risk reduction, these projects need to be followed by a process of implementation of the recommendations and plans that they have produced.

Projects similar to those implemented for Quito have been planned for other cities such as Guatemala City, Cumanß and Caracas in Venezuela, and Mexicali in Mexico. It has been difficult, however, to realize these projects due to, mainly, the difficulty of getting the necessary funding. More work is needed to demonstrate the cost-effectiveness of investments in mitigation.