PROBLEMS OF EARTHQUAKE HAZARD ASSESSMENT
AND VULNERABILITY ANALYSIS

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Introduction

According to recently adopted definitions, "seismic hazard" means the probability that a certain ground motion parameter will not be exceeded at a site within a specific period of time. "Vulnerability" is the degree of loss to a given element at risk, resulting from the occurence of a natural phenomenon, and is expressed on a scale from 0 to 1. The word "risk" is then used to denote the expected, probable loss in terms of number of lives lost, damage to property or disruption of economic activity. Thus, risk depends on hazard, vulnerability and elements at risk. The definitions were formulated by a group of experts convened in Geneva by UNDRO in July 1979 [UNDRO , 1980].

The knowledge of seismic risk is a determining factor in preventing or mitigating the disastrous effects of earthquakes. Equally determining is the awareness of risk, that is the perception by the public and the authorities of its social and economic implications. Such awareness will ease the problem of defining locally acceptable levels of risk, which are in themselves determining factors for the successful application of detailed land-use measures and site planning as well as the formulation and implementation of appropriate building codes. Hazard and vulnerability analyses comprise the key inputs to risk assessment. The purpose of the present paper is therefore to review the methodology of hazard and vulnerability assessments and the accuracy of the information provided.

Methods of Seismic Hazard Assessment

The present methods of seismic hazard assessment are based on the following operations:

1. Definition of potential earthquake source regions in terms of their boundaries and of the average earthquake activity which is defined by the magnitude (or intensity)-frequency relationship

$$N (M) = \alpha e^{-\beta M}$$

and by the upper threshold magnitude (or intensity) M_{max} truncating the $N (M)$ distribution.