EARTHQUAKE MONITORING BASED ON SEISMIC INTENSITIES

Lenka S S TIMIOVSKA[1]

SUMMARY

Earthquake monitoring programs require substantial information on the hazard through improved a national seismological networks. The important indicator to show expected earthquake hazard is the distribution and the rate of earthquakes occurrence in the past. Especially for our country we use historical records for obtained the following maps in the seismic monitoring: map of source zones (seismogenic zone maps); map of maximum seismic intensities I_{max} which indicates the source generating these earthquakes; map of depending of intensities from ground conditions. As is known such prediction based on seismic gaps is needed to formulate appropriate earthquake disaster mitigation measures. This paper is prepared for examine the influence of ground conditions and contributing to the formulation of appropriate hazard risk for earthquake mitigation in Macedonia. There is a need of extensive educational for seismic risk and finding ways for its mitigation. Such an approach would be ideal not only for making the citizens aware of the effects and consequences of large-scale catastrophes, but, what is even more important, for familiarizing themselves with measures for mitigation of earthquake consequences particularly while they are at home. The realization of a program for public education should start at once. The population should have access to information about institutional measures and expected advantages and limitations. This is necessary from the aspect of giving them an opportunity to criticize many wrong ideas related to institutional procedures for hazard reduction.

INTRODUCTION

Projects elaborated by several researchers in Macedonia point to improper planning of practical measures for decrease of damages induced by earthquakes. This shortage of planning is evident at all social levels, both in the public and the private segment, and it is most likely that not much can be done toward better preparedness of citizens in case of future earthquakes. This attitude “it will easily be corrected” characteristic for all levels of Macedonian society forms a blockade against any serious planning for mitigation of damages from many kinds of future catastrophes. Accordingly, it seems that the citizens of Macedonian shall find themselves unprepared for the next earthquake, although maybe not in a state of non-expecting such a catastrophe. But, what is to be worried about in such a situation is that the citizens do not accept that is exactly them that shall most probably be affected by the consequences of such a future earthquakes or floods or fires and e.t.c. Natural disasters always come suddenly and unwanted for mankind. In every disastrous, loss of lives, ownership and morality would comes after. In the past years, earthquake was considered the most deathly natural disasters.

[1] *Institute of Earthquake Engineering and Engineering Seismology*

THE IMPACTS OF EARTHQUAKE DISASTER

Earthquake disaster mitigation programs require substantial information on the hazard through improved a national seismological networks. The important indicator to show expected earthquake hazard is the distribution and the rate of earthquakes occurrence in the past e.g. (Kockelman, 1990, and Littleton, 1992). Especially for our country we use historical records for obtained the following maps in the seismic zoning:

- map of source zones (seismogenic zone maps),
- map of maximum seismic intensities I_{max} which indicates the source generating these earthquakes,
- map of depending of intensities from ground conditions

One of the elements of earthquake mitigation is seismic zoning as a multydisciplinary approach to providing a practical information leading to reduce losses of human life and material losses. It was defined zoning maps which incorporate site effects on the whole territory of Macedonia. From the resulting assemblage of data concerning intensity data sites were classified into one of three categories, (Trifunac, 1979), soft, intermediate and rock, i.e., s=0,1,2. was obtained the map of depending intensities from ground conditions. Also, was found the correlation between source of occurred earthquakes, neotectonic zoning and the distribution of maximum intensity i.e. the map of maximum seismic intensities I_{max} which indicates the source generating these earthquakes. A seismic zonation was done by use of intensity distributions surveyed densely and precisely. The following scaling relation is obtained and used for seismic zonation, (Timiovska, 1996):

$$I(I_0,R,s) = I_0 + 0.162 - 0.023R - 0.577\log R - 0520s \quad (1)$$

On the bases of seismic zoning map, it is found four zones of expected damages assuming that soil conditions of whole territory are unified, i.e. soft soil condition. This enables that additional map of expected damages for other soil conditions prevailing at each individual site. What is to be done? It is clear that the citizens of Macedonia are generally not well informed about both the risk of occurrence of an earthquake and the corresponding measures to be taken in case of an earthquake. The following considerations are a kind of recommendation for solution of these problems:

- the emergency measures to be taken in case of an earthquakes should be reconsidered within the context of urgent procedures in case of any type of a catastrophe. The need of a complete readiness at both state and local level is of a high importance for each country susceptible to natural risks.
- there is a need of extensive educational for seismic risk and finding ways for its mitigation. Such an approach would be ideal not only for making the citizens aware of the effects and consequences of large-scale catastrophes, but, what is even more important, for familiarizing themselves with measures for mitigation of earthquake consequences particularly while they are at home. The realization of a program for public education should start at once.
- the population should have access to information about institutional measures and expected advantages and limitations. This is necessary from the aspect of giving them an opportunity to criticize many wrong from the aspect of giving them an opportunity to criticize many wrong ideas related to institutional procedures for hazard reduction, for

example, ideas was supported by the Building Code, the Earthquake Damage Commission and Ministry of Defense.

- investigation of the existing fund of structures and their resistance depending on magnitude as well as evaluation of the danger to which the human potential is exposed an danger imposed by future usage of buildings of high risk,

- performance of investigations of the probability of occurrence of earthquakes and adequate zoning in respect to several parameters defining the risk. These activities should be covered by greater participation of Government, i.e. different funds that shall enable more intensive and ample investigations,

- the effect of probabilistic losses should be investigated, particularly the consequences of failures as well as the effect of damaged buildings that directly influence population,

- the measures for preparedness for future catastrophes and mitigation of risk should be amended by information on social and economic aspects that follow each earthquake.

CONCLUSION

The conclusion is that the domestic assets scale is a valid instrument for measuring living conditions on a cross-cultural basis since to have worked in the same way in all countries involves into transition period, especially observing closely the level of development or culture. The proposed measures for mitigation of earthquakes consequences was not tested in this study except for filed work usability in Bitola earthquake. Nevertheless, the Gevgelija Earthquake study demonstrated its usefulness and we are sure that, with being refined, it will work in future disasters. In other words in underdeveloped countries like Macedonia, in any case of a disaster the national economy suffers great damage. Because of this, the government of my country is responsible for the general prosperity of its citizens through minimizing aftereffects of disasters and insuring rapidity recoveries, or apply a method for earthquake-hazards, or any natural-hazards mitigation.. The mentioned topics should be subject of discussions not only at official level but also public gatherings including specialists, financiers, businessmen and public. The involvement of public is of primer importance for acceptance and non-acceptance of expense (necessary financial resources) for development corresponding programs for mitigation of earthquake effects. Avoiding of damage due to future catastrophic earthquakes in Macedonia prescribes rapid preparation of programs for risk mitigation and their practical application.

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