



DEVELOPMENT OF A GIS-ORIENTED DATABASE FOR THE PRE- AND POST-EARTHQUAKE ASSESSMENT OF BUILDINGS

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ABSTRACT

The paper presents a comprehensive strategy for rapid visual inspection of buildings and optimal prioritization of strengthening or remedial actions that are necessary prior to, or after, an earthquake event, respectively. Based on the FEMA procedures and the experience gained in the framework of building assessment in Greece, a building inventory and ranking algorithm is created for the case of the city of Düzce, in Turkey, a city strongly damaged during the devastating 1999 earthquake. Moreover, a multi-functional computer tool is developed for the management, evaluation, processing and archiving of the data stock gathered during the pre / post earthquake assessment process. The database core is reflected in real time onto a multi-layered GIS platform offering quick visualization of the spatial distribution of the pre-earthquake building condition, as well as of damage after an earthquake. As a pilot study, the data acquired on site are wirelessly synchronized with the use of a Personal Digital Assistant (PDA) contributing to the reduction of the time required for information gathering. By applying the proposed strategy and using the GIS-oriented database for the case of a city already hit by a strong earthquake, the local authorities are equipped with a decision-making and risk management tool that is currently installed, tested and operating in real conditions.

Introduction

The August 17, 1999 Kocaeli earthquake, of magnitude 7.4, is one of the most destructive events ever to strike Turkey. This earthquake, also known as Izmit earthquake, occurred at 03:02 local time with epicenter at 40.702° N., 29.987° E., that is, about 11 kilometers (7 miles), southeast of the city of Izmit. On November 12, another major earthquake of 7.2 magnitude occurred 70 km east of Adapazari at 18:57 local time, resulting to heavy losses in the city of Düzce and affecting a population of more than 150,000, as well as causing heavy damage to more than 800 buildings (Ansal et al., 1999, Durakal, 2000, Youd et al, 2000). Since 2002 and within the framework of the European Union Research Project entitled “Marmara Earthquake Rehabilitation Project” (Europeaid/112976/D/G/TR) an effort was made to develop a computer-based risk management scheme for the city of Düzce built on a GIS-oriented database. The aim

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