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# Developing new earthquake scenarios for Israel using the Hazus MH 2.1 Multi-hazard Loss Estimation software

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Israel is situated along the tectonically active Dead Sea Transform (DST) experiencing magnitude 6-7 earthquakes with recurrence time of hundreds to thousands years. Worldwide, mitigation of future earthquake damage, improving of population survival and evaluation of expected earthquake effects is done using modern earthquake loss estimation computer techniques. Consequently these techniques have become common and are widely used to quantify potential, social and economic losses from earthquakes. However, so far in Israel only preliminary damage and loss estimation scenarios were developed. The present study uses the Hazus MH 2.1 Multi-hazard Loss Estimation software to simulate, for the first time, modern damage and loss estimation scenarios for various earthquakes affecting Israel.

The studied area is divided into census tracts, each hosting populations of ∼2,500, and including data records of medical care stations, emergency facilities, central bus stations, railway bridges, ports, airport facilities, drinking-water and sewage facilities and fuel farms. In addition, information regarding geology, topography, location of the active faults, historical earthquake epicenters, demographic and economic exposure were implemented into the Hazus databases. For the first time 2,200 different building construction schemes were built for each scenario, based on age, height, type of construction and occupancy.

A landslide susceptibility map was developed and incorporated into the Hazus data-base as well.

Two synthetic earthquakes were simulated (Ein Gev and Ayelet HaShahar scenarios), both are Mw=7.0 and focal depth of 10 km.

In both cases severe earthquake damage to major buildings and infrastructure took place up to a distance of 60 km from the epicenter. It is shown that even for low seismic building codes, strong earthquakes will apparently not severely affect the entire country. The preliminary results clearly show that the building type and seismic design of the examined facilities have a major influence on the amount and type of damage, whether caused to a single facility or to a group of buildings. For example, in the Ayelet Hashahar scenario a total of 20 police stations and 5 fire and rescue services stations may be damaged severely and a few may collapse. One day after the earthquake, 89 of the 278 police stations and 21 of the 60 fire and rescue services stations are expected to have a functionality level less than 60%.

Landslides are expected to develop mainly in steep slopes at a radius of about 50 km including damage in major population centers.

The results of the simulations show excellent ability of Hazus to resolve the expected different damage levels and loss for various types of buildings and infrastructures for each specific census tract in Israel, as well as locate sites of expected landslides. The loss information provides decision-makers and emergency authorities a tool for planning and exercising emergency actions following an earthquake.