

Multidisciplinary Geo-scientific Hazard Analyses: Istanbul Microzonation Projects

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Istanbul (Turkey) is located on the west edge of North Anatolia Fault and hence is an earthquake prone city with a population that exceeds 15 million people. In addition, the city is still growing as center of commerce, tourism and culture that increases the exposure more and more. During the last decade, although Istanbul grew faster than ever in its history, precautions against a possible earthquake have also increased steadily.

The two big earthquakes (in Kocaeli and Duzce Provinces) occurred in 1999 alongside Istanbul and these events became the trigger events that accelerated the disaster risk reduction activities in Istanbul. Following a loss estimation study carried out by Japanese International Cooperation Agency (JICA) in 2001 and Istanbul Earthquake Master Plan prepared by four major universities' researchers in 2003; it was evaluated that understanding and analyzing the geological structure in Istanbul was the main concern.

Thereafter Istanbul Metropolitan Municipality's Directorate of Earthquake and Ground Research (DEGRE) carried out two major geo-scientific studies called "microzonation studies" covering 650 km² of Istanbul's urbanized areas between 2006 and 2009.

The studies were called "microzonation" because the analysis resolution was as dense as 250m grids and included various assessments on hazards such as ground shaking, liquefaction, karstification, landslide, flooding, and surface faulting. After the evaluation of geological, geotechnical and geophysical measurements; Earthquake and Tsunami Hazard Maps for all Istanbul, slope, engineering geology, ground water level, faulting, ground shaking, inundation, shear wave velocity and soil classification maps for the project areas were obtained. In the end "Land Suitability Maps" are derived from the combination of inputs using multi-hazard approach.

As a result, microzonation is tool for risk oriented urban planning; consisting of interdisciplinary multi-hazard risk analyses. The outputs of microzonation are used in land development/use plans, hazard identification in urban transformation, determination of the routes and characteristics of various types of engineering structures such as highways, tunnels, bridges, railroads, viaducts and ports. Hence, by the use of detailed geo-scientific analyses, basics of earthquake resilient urbanization is guaranteed.