



## **Vulnerability assessment at a national level in Georgia**

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The risk always exists when cities are built on. Population growth in cities and urbanization in natural hazard-prone zones leads to infrastructure expansion. The goal of the society is to construct natural hazards resistant infrastructure and minimize the expected losses. This is a complicated task as there is always knowledge deficiency on real seismic hazard and vulnerability. Assessment of vulnerability is vital in risk analysis, as vulnerability is defined in many different ways. Work presented here mostly deals with assessment of infrastructure's and population vulnerability at national level in Georgia. This work was initiated by NATO SFP project "seismic Hazard and Risk Assessment for Southern Caucasus – Eastern Turkey Energy Corridors" and the two work packages WP4 (seismic risk) and WP5 (city scenarios) of risk module of EMME (Earthquake Model of the Middle East Region) project.

First step was creation databases (inventory) of elements at risk in GIS. Element at risk were the buildings, population, pipelines. The inventories was studied and Created in GIS for the following categories: Building material, number of stories, number of entrances, condition of building, building period. For pipelines pipe type (continuous or segmented), material, pipe diameter.

Very important is to estimate the initial cost of building for assessment of economic losses. From this purpose the attempt was done and the algorithm of this estimation were prepared taking into account obtained the inventory. Build quality, reliability and durability are of special importance to corresponding state agencies and include different aesthetic, engineering, practical, social, technological and economical aspects. The necessity that all of these aspects satisfy existing normative requirements becomes evident as the building and structures come into exploitation. The long term usage of building is very complex. It relates to the reliability and durability of buildings. The long term usage and durability of a building is determined by the concept of depreciation. Depreciation of an entire building is calculated by summing the products of individual construction unit' depreciation rates and the corresponding value of these units within the building. This method of calculation is based on an assumption that depreciation is proportional to the building's (constructions) useful life. We used this methodology to create a matrix, which provides a way to evaluate the depreciation rates of buildings with different type and construction period and to determine their corresponding value.

Finally some attempt was done to investigate how these structures were damaged by various hazards. In other words vulnerability curves were constrained on the basis on the relation between various hazard intensities and damage data.