

## Seismic risk in Chisinau, Moldova

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Chisinau is the capital city and the largest infrastructural entity of the Republic of Moldova. The population of Chisinau is around 800.000 residents. The city is placed in the centre of the country and close to one of the most active seismic areas of Europe - Vrancea, thus it is of an utmost importance to evaluate the seismic risk the citizens are exposed to.

The area of Chisinau is around 120 sq. km, and it had mostly enlarged in the last century, following a strong urbanization process. An important turnpoint in the evolution of the building environment in Chisinau was the middle of 1950's, when the first high-rises were built (more than 4 floors). Nowadays, the architecture of Chisinau is mostly represented by high residential buildings and numerous private residencies. The old part of the city still hosts buildings raised at the beginning of the XXth century and many of them are close to become unusable. 30% of the buildings in Chisinau were built after 1980, while another 30% - before 1940, this meaning that most of the buildings are already being used for more than 50 years and probably are insufficiently seismic resistant. Considering the height of the buildings, statistics show that most of them are 1-2 floor buildings, and only few percents represent buildings higher than 8 floors. However, the low number of high buildings host around 80% of the citizens, meaning that the seismic vulnerability of these buildings is of great importance.

The current research represents the evaluation of the seismic risk of Chisinau, and the main objective is to provide solid foundation for future reforms which are to decrease the potential losses of an earthquake. The research was performed on more than 24560 buildings and considered as input the characteristics of the 1940 November 10 (M=7.4) earthquake, one of the most representative seismic events of the XXth century in region. The main step in evaluating the seismic risk is determining the seismic vulnerability of buildings. Two different methods were used during the research. One was based on evaluation of the average damage degree, while the second evaluates the direct economic loss a potential earthquake would cause.

The results of the research show that if an earthquake similar to the one from 1940 will hit Chisinau again, then most of the old buildings located in the historic part of the city will be completely destroyed, while the modern high-rises will suffer only minor damages. However, considering the economic losses, these show that a M=7.4 earthquake will have severe economical consequences. Approximately 1bn euros can be lost, which represent 12.5% of the total cost of the real estate.

The evaluation of the seismic risk in Chisinau shows that a devastating seismic event similar to the 1940 earthquake might cause severe social, infrastructural and economic losses which urges the need to implement the necessary measures which would enable the sustainable development of the city and ensure social safety.