Sinkhole Occurrence Risk Assessment and Management in Areas of Abandoned Underground Mines

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SUMMARY

The increasing interest of cities for building and infrastructure development causes much more frequent use of abandoned underground mines area and, on the other hand, increases loading on the terrain surface. The possibilities of sinkholes monitoring, and prediction of the sinkhole occurrence risk assessment were the objectives of this paper. A novel early warning system for sinkhole occurrence was presented in the case study of the Wieliczka salt mine. The study area is on the UNESCO world heritage list. Over one million tourists visit them every year. Therefore, safety in this area is a priority. The study was based on big data integration to support the analysis of rock masses stability. Fuzzy logic and Analytic Hierarchy Process methodology were used to infer the threat to the rock mass stability under conditions of high uncertainty. The result of the research is a spatial analysis of the risk of sinkhole occurrence on the surface and the estimation of the zones hazarded by high stresses in the rock masses under the ground. The management of potential risk for the urban areas on the surface will be a further goal of the research outcomes. Some possibilities of those tasks have been proposed in the paper.