

## **Flash floods modeling and the problem of the underground maze of the Poznań Stronghold (Bogdanka catchment study case)**

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For many years, the city-fortress of Poznań was a strategic point on the map of Poland. Hundreds of underground corridors and labyrinths guaranteed a good protection of the city. They changed their function over time and were partly transformed into a sewage system. Over the years, all plans and documents on this subject were lost (mainly during the World War II) thus creating an unknown and uncovered sewer structure.

Currently, Poznań is a highly urbanized, intensively developing city, which manifests itself in increasing the amount of impermeable surface, which together with the progressing climate change is the reason for the frequent occurrence of phenomena called flash flood. Additionally, many years of neglect during the communist regime and the post-communist era in the context of drainage preserve and lack of comprehensive rain and sewage strategies are making the local society organize its own water monitoring systems (VGI - Volunteered geographic information). In cooperation with the Adam Mickiewicz University, it has been managed to develop a model that allows forecasting flash flood phenomena and warning residents.

The main purpose of the work is to present the problem of the Bogdanka catchment, which is located in the city center. This area has the highest precipitation within the whole city and its sewage system is outdated and neglected. It is estimated that the inefficient network is only known in 60%, which makes the designing of rainwater management system extremely difficult. For the purposes of the project there was created a hydraulic model, which includes the work of the network and has been compared with VGI observations, media reports of flash flood, as well as evidence from the State Fire Service interventions and water levels in the river. This model makes it possible to forecast the phenomena in relation to the current wetness of the catchment and the forecasted precipitation, which allows to some extent to adapt to the current situation. Bogdanka River is still a threat to the residents of the city center, but they have independently adapted to face it.