

Urban groundwater model of Bucharest city, Romania

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Authors :

Name	Email	Country
Gogu Constantin Radu	radu.gogu@utcb.ro	Romania
Boukhemacha Mohamed Amine	boukhemacha-amine@hotmail.com	Romania
Gaitanaru Dragos	dragos.gaitanaru@gmail.com	Romania
Serpescu Irina	irina_serpescu85@yahoo.com	Romania

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ABSTRACT [295 Words]

Bucharest city (1.9 million people/228 km² surface) faces two main hydrogeological problems. Both are produced by the interaction between the aquifer system and the underground infrastructure. The first consists of a barrier effect produced by an extensively channelized river, increasing consequently the groundwater hydraulic heads in the surrounding areas. The second, a twofold concern, it is due to the strong hydraulic interaction between sewerage and the groundwater. As result, the seepage into the sewer network increases the influent at the waste water treatment plant. Restoration of its conduits triggers consequently the groundwater hydraulic heads increase.

Bucharest city conceptual hydrogeological model has been developed within a research project since 2010. Institutions, companies, and experts participated with data and knowledge to perform this work. A 3D geological model has been developed by stratigraphical litho-correlation (1800 boreholes). It focuses the Quaternary sedimentary deposits of the first 50 m below ground level and it was used to identify, delineate, and describe the existing hydrogeological units. Pumping tests and grain size distribution analysis have been performed to hydraulically characterize them. By intersecting the model with the existing urban infrastructure elements (subway, parking lots, etc.) it has been possible to provide the geometrical parameters needed to quantify their groundwater flow barrier effect and to identify the location of the sewer conduits and their potential hydraulic connection with the aquifer strata.

The hydrogeological model englobes the following datasets: hydraulic heads, surface water, groundwater recharge from precipitation and from the water supply system losses, drainage systems and seepage in tunnels. The resulted hydrological water balance identified that about 0.92 m³/s wastewater surplus originates from seepage. It has been determined that more than 20% (96.7 km) of the sewer network is completely or partially immersed into the groundwater.