

Numerical Simulation of the Seawater Intrusion between the Rivers Drini and Mat along the Albanian Coastal Area

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Abstract. Groundwater aquifers are an important resource in coastal regions between rivers Drin and Mat in the northern part of the Albanian Adriatic Sea. However, these coastal aquifers are very vulnerable to the seawater intrusion through a possible overdraft of groundwater exploitation or insufficient recharge from upstream. In order to better understand the characteristics and trend of seawater in this zone a monitoring network of 12 wells for water level and chloride concentration was established.

A version of SUTRA model was developed in this paper to simulate and predict the spatial and temporal changes in water level and chloride concentration of the groundwater in the area. Two general approaches, i.e. the sharp interface approach and the transition zone approach, have been used by numerous authors worldwide to analyze seawater intrusion in coastal aquifers. In this study, a 3-D transient model based on the transition zone approach was used and solved using a finite element method. Such models may require simultaneous solution of the governing water flow and solute transport equations. Based on numerical simulations, equiconcentration lines were drawn to characterize seawater intrusion. The developed solution should be applicable to a variety of saltwater intrusion problems.

This zone is filled mainly by the alluvial deposits of Mat River and less by the deposits of the river Drini in the north. Deep well records show that the thickness of quaternary deposits at most of the region generally is more than 150 m, while the maximal thickness is about 280 m. Gravelly sediments outcrop along the Mat River course and in the remaining part of the plain, only silt to clay deposits outcrop. However, it appears that gravelly sediments form some layers separated by clayey sediments and are widely distributed at depth overall Mat River plain. On hydrogeological point of view the zone represents a multilayered artesian aquifer system. The maximal cumulative thickness of the gravel aquifer layers in the central part of the zone is about 150-180 m. Along the Mat River the aquifer seems to be continuous, whereas at distances 1.5 -2 km from the river two to four or more aquifer layers appear.