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Numerical simulation of sea water intrusion on the northern coast of Albania

FATOS HOXHAJ
Institute Of Hydrometeorology

Seawater intrusion into the confined aquifer took place between Erzen and Mat river in the northern part of the Albanian Adriatic Coast. A severe salt water intrusion is taking place in the groundwater system due to low phreatic water levels in the area. Seepage quantities inthe five selected points continue to decrease due to a decrease in upward flow gradients in the hydrogeologic system, caused by an increase in salinity. Chloride concentrations at several wells were observed to be increased steadily into Mat river where were at their peak.

A three-dimensional finite element model (SUTRA) has been developed to simulate the spatial and temporal evolution of hydraulic heads and chloride concentrations of the groundwater. SUTRA (Saturated-Unsaturated Transport) is a computer program that simulates fluid movement and the transport of either energy or dissolved substances in a subsurface environment. The simulation model was based on the transition zone approach, which requires simultaneous solution of the governing water flow and solute transport equations. Various aquifer parameters were verified with the numerical model in order to obtain satisfactory matches between computed values and observed data.

Following a description of water resources of the Albanian coastal area, their peculiarities and unique management problems under expected change of socio-natural systems, the research aims to adopt *an improved multi-criteria approach* to water resources using powerful techniques for a spatial analysis like GIS and SDSS.

The paper discusses the advantage of implementing, in a spatial decision support system, the most efficient strategies for data capture, integration, analysis and modelling, for the assessment of impacts concerning to expected changes on the water resources of the Albanian coastal area deriving from development scenarios. The importance of integrating socio-economic and natural parameters in the context of *an improved multi-criteria approach* and the need to define indicators on which decision-making processes is based, is outlined. This embraces the view that tomorrow's breakthroughs are likely to occur at the interfaces of traditional managements and therefore the barriers between them must be dissolved.