

NUMERICAL MODELLING AS A PREDICTIVE TOOL TO GROUNDWATER MANAGEMENT EVEN WITH LIMITED DATA (GIRONA, SPAIN)

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Summary. Quantifying groundwater resources is a difficult task when limited data are available, such as the Plioquaternary multilayer aquifer of the Girona and Salt Plain (Catalonia, NE Spain). However, the competent organism (Catalan Agency of Water) decided to gather all data and to develop a groundwater flow model with the aim of improving the quantitative understanding of this aquifer.

Initial simulations showed that the only relevant pumping wells identified within the area (10^6 m³/yr for industrial use) caused a regional groundwater head drawdown of about 10-15 m and extended 3-4 km. This could threaten the planned exploitation of 3 new human supply wells that were drilled to mitigate droughts affecting surface resources.

Given these results, it was decided to conduct a one-week pumping test in which the 3 wells would achieve up to 240 L/s with the objective of verifying the regional effects foreseen by the numerical model. The test was carried out during the spring season and definitely corroborated what the model had shown: a metric head drawdown at the whole aquifer domain.

This sequence (integrating data – formulating a preliminary numerical model – conducting a field test to verify numerical results) has proven very effective to obtain realistic results. Now, a more accurate pumping regime has been determined for the reserve human supply wells that limits their abstraction rates as a function of the availability of surface resources, i.e. to define an objective contingency plan for such reserve wells.

Key words: Girona Plain Plioquaternary aquifer, prior groundwater flow modeling, pumping test for validation, drought reserve wells, contingency plans.