



Assessment of complex aquifers using GIS tools: an evolution overview of the Campo de Dalias (SE Spain)

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The Campo de Dalias constitutes a complicated aquifer system that not only serves as a drinking water source but a catalyst for the regional economy, which is based on irrigated agricultural production. In fact, there are about 22.000 ha covered with greenhouses in the area. These aquifers have been studied since the 70's by different agencies, but there is no single database that contains all the gathered information. The hydrology group from Almeria University has carried out several studies and PhD research works that have produced a big amount of hydro-data. With the aim of organizing and managing all these data organized in different formats, a unique data model to store all information has been built. As GIS tools and geodatabase models are designed to be applied to different scenarios by a wide range of users, it is important that each design is easy to understand and implement. With this in mind, the data model created was intended to be simple, dividing the information in static and dynamic and being wells and boreholes the core of the georeferenced database.

A geodatabase was developed to build a hydrogeological information system, which can be used to support hydrogeological analysis and modelling of Campo de Dalias aquifers. This dataset consists of a relational database containing all the available information. It will assist in developing analysis concerning the water of this basin and providing accurate and reliable information for the resolution of water resources issues. The study was carried out at the watershed-scale and the information had been processed and reprojected in order to use the same characteristics for the whole basin, creating several feature classes contained into a geodatabase.

The results allowed delineating the processes occurring in the study area and the affected areas. In this way, we detected a situation of hydric stress related to the overexploitation and to the decline of the water level under examination.

Using GIS we have been able to sketch the evolution of these aquifers with dynamic tools that adapt to different requirements and are easy to understand for different users. The Campo de Dalias geodatabase is a powerful tool of hydrogeological analysis and groundwater territorial management. It allows identifying areas affected by most important hydrogeochemical processes that are acting on these aquifers; seawater intrusion, leaching of deposits and evaporites, brine mobilisation, hydrochemical changes due to the interconnection between different aquifer layers and hydrothermal processes. In a graphical and direct way we were able to see and show how the boreholes had moved from the coast to the mountains, as seawater intrusion progressed and how agricultural practices have contributed to deteriorating water quality. This geodatabase represents the first major attempt to establish a more complete understanding of the basin as a whole, using old data and new ones produced in the last decade. It also represents a direct and easy way to share information with different stakeholders.