

Groundwater management of large aquifers in southwestern France by regional hydrodynamic models

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In southwestern France, groundwater resources are withdrawn for various uses (drinkable water, irrigation, industry, geothermal energy, forestry, conservation of wetlands, shellfish breeding among others) which can sometimes cause conflicts between users. To help the management of these resources, regional hydrodynamic models have been developed. These models have been a support to the public policies for over 20 years.

In the northern region, groundwater is in close relation with rivers, especially during periods of low-water levels. Indeed, groundwater used for irrigation impact not only the stream flows, but also the water supply for the second large wetland of France: the Marais Poitevin. The developed models have permitted to test the impact of several scenarios of water withdrawals. These tests help to determinate the amount of water that can be pumped to respect defined objectives as water levels in piezometer and river flows. These models were also used to test the impact of the eventual implementation of water tanks (400,000 to 800,000 m³).

Further south, the major problem is the important reduction of the level of the Eocene aquifer in the department of Gironde. In this area, the regional hydrodynamic model has been developed since 1990. Its development allows the management of deep groundwater resources and contributes to validate strategies of exploitation based on different simulations. This model also allows to answer problems of overexploitation and to analyse areas where water savings could be done to avoid this overexploitation, and to estimate the impact of new resources.

The extreme southern region has a significant particularity: on two different sites, groundwater is used for the storage of gas. The cyclic injection and withdrawal of gas impacts significantly the aquifer level. The proposed model is adapted for the groundwater resources knowledge and management of this case.

Finally, these models were used to evaluate impacts of climate change on groundwater resources in order to allow authorities to evaluate strategies to adapt to this change (Project Explore 2070 for example).