



Groundwater management and the seawater intrusion: methods to reduce the quality degradation risk (study cases in southern Italy)

M. Polemio

CNR-IRPI, CNR-IRPI. Bari Dept., Bari, Italy (m.polemio@ba.irpi.cnr.it, 0039-080-5929610)

A multi-methodological approach based on monitoring and spatio-temporal analysis of groundwater quality changes is proposed. The presented tools are simple, quick and cost-effective in order to give service to all sorts of users.

The chief and simplest purpose of the monitoring network is the detection of the piezometric or potenziometric level in the aquifer. The spatial and multi-temporal analysis of usual chemical and physical data provides both an assessment of the spatial vulnerability of the aquifer to seawater intrusion and of the water quality trend in terms of salinity. The evaluation of the salinity trend or of salinity-correlated parameters highlights the effects of groundwater mismanagement.

The spatial and temporal analysis of seawater intrusion effects on groundwater quality is made easier when simple criteria to define the effect existence can be established. The simplest criteria should be based on a threshold approach or on the determination of parameters and of values of these parameters discriminating between fresh or seawater-contaminated groundwater. The threshold must be determined considering the local hydrogeological conditions, the specific chemical-physical characteristics of rainfall and of dry deposition (deposition of particulate from the atmosphere onto the ground surface in the absence of rainfall), the geochemical nature of rocks, and any local natural factor that might determine the variability of fresh groundwater salinity.

The paper discusses the applicability of the chloride concentration, the Cl/Br molar ratio, and of ratios Na/TDS and Cl/TDS to define threshold parameters and values, contributing to identify the origin of groundwater salinity. The applicability of the method is tested considering valuable groundwater of large coastal porous and karstic aquifers located in southern Italy.