



Integrated analysis of hydrogeochemical and diffractometric data: a tool for the evaluation of the pollution risk assessment from solid waste landfills

Dimitra Rapti-Caputo and Annalisa Martucci

Department of Earth Science, University of Ferrara, via Saragat, 1, 44100- Ferrara ITALY
(cpr@unife.it; mrs@unife.it)

The qualitative deterioration of the groundwater resources is a complex phenomenon that depends on the natural (i.e. hydrogeological conditions) and/or human factors. The present research allowed us to emphasise the behaviour of the alluvial aquifer systems characterised by important lithological heterogeneities caused by the palaeogeographic evolution of the last millennia and the strong human activities. In particular, in order to define the conceptual local hydrogeological and hydrogeochemical model, we analysed stratigraphical, hydrogeological and geochemical data, relative to one 'pilot' unconfined alluvial aquifer system, located in the Ferrara plain. As a second step, we analysed the geochemical composition of the groundwater resources, integrated on the diffractometric analysis of the total dissolved solids contained in the collected water samples for distinguishing the principal hydrogeochemical and crystalline phases occurring in the water resources. The distinct geochemical facies and the abundance of each crystalline phase mainly depends on the a) lithological composition of the aquifer system and especially the ionic exchange processes occurring at the microscale between the solid matrix of the aquifer and the fluid; b) mixing phenomena between the water of different alimentation zones; c) occurrence of superficial polluting sources associated with human activities. In the final step, the integrated analysis of all data allowed to estimate the pollution risk of the aquifer system due to the intense human activities.