

Organic compounds and isotopes investigations to improve pollution-sources tracking of groundwater in coastal regions of the Mediterranean

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With the very dynamic modification of coastal regions of the Mediterranean, impacts on groundwater quality are dramatically increasing. This is especially the case concerning sanitation strategies in urban and coastal environments. Associated with tracking of changes in land use, this study proposes an approach involving emerging organic contaminants (EOCs) and isotopes of the environment as indicators of the alteration of groundwater balance due the exposure of shallow aquifers to the risks of infiltration of untreated wastewater from sewage defects. This methodology was applied to the shallow aquifers beneath 3 coastal and urban regions in Tunisia, Italy and Corsica respectively in semi-arid hydrocontext. Combined with an updated follow-up of groundwater piezometric fluctuations in relation with inputs from surface contamination sources, the spatialization of contamination levels by EOCs provided a clear delineation of the most impacted aquifer zones. This approach revealed a significant link between the continuous rise in piezometric levels by contributions from untreated inputs and the accumulation of high levels of contamination in groundwater for the Tunisia case study. It also highlighted the main threat that contaminated groundwater by EOCs represent for the hydraulically connected coastal wetlands for the Corsica and Italy case studies. The understanding of EOC underground pathways allowed the determination of the fates and processes responsible for the diffusion of contamination throughout the studied aquifers. The ability of groundwater to reflect population life style and the use patterns of such organic molecules was also assessed. Besides revealing the legacy of persistent contamination, this approach involving EOCs as tracers with different levels of persistence provided a spatial observation of the aquifer exposure to continuous contamination processes.