
Contaminants of emerging concern (CECs) as indicators of pollution and hydrological processes in an anthropized mediterranean water basin: Case of the Kasserine Basin (Central Tunisia)

Wafa Hayouni^{*1,2}, Séverin Pistre^{†1}, Najiba Chkir^{‡2}, and Kamel Zouari^{§2}

¹Hydrosiences Montpellier – Institut de Recherche pour le Développement, Institut National des Sciences de l'Univers, Centre National de la Recherche Scientifique, Université de Montpellier, Institut national des sciences de l'Univers – France

²National Engineering School of Sfax – Tunisie

Résumé

This study investigates the occurrence of 368 emerging contaminants of concern (CECs) in surface and groundwater in the semi-arid Mediterranean basin of Kasserine, central Tunisia (North Africa). It provides the most detailed and up-to-date dataset on organic pollution in the region. A total of 101 emerging contaminants were detected in both surface water and groundwater during a monitoring campaign conducted in May 2023, providing a comprehensive overview of organic pollution in this catchment. Most of the pollutants were detected more frequently in surface waters, where they were generally found in higher concentrations, suggesting that wastewater discharges into watercourses are the main source of these pollutants. Pharmaceutical products were identified as the most frequently detected groups of contaminants, highlighting their prevalence in the samples analysed. Hydrophobic CECs showed the highest detection frequencies and concentrations. In contrast, hydrophilic contaminants, despite their biodegradability, are more easily transported by water flows to the lower parts of the study catchment. The direct connection between the shallow Plio-Quaternary (PQ) aquifer and surface pollution sources facilitates the spread of a wide range of emerging compounds. The PQ aquifer is composed of sand and gravel layers and allows rapid migration of contaminants from the surface to the groundwater. The geology of this aquifer increases its susceptibility to contamination. This approach has allowed the development of a conceptual representation of the vulnerability of the aquifer to urban pressures and the prediction of the impact of further urbanisation on groundwater quality. These findings highlight the need for rigorous management strategies to monitor and mitigate the impact of CECs in this vulnerable region, in order to protect the quality of surface and groundwater resources.

Mots-Clés: Micropollutants, Water quality assessment, Shallow aquifer, Surface water, Wastewater, Contamination tracers

*Intervenant

†Auteur correspondant: severin.pistre@umontpellier.fr

‡Auteur correspondant: najiba.chkir@flshs.usf.tn

§Auteur correspondant: najiba.chkir@flshs.usf.tn