

EGU24-17825, updated on 02 Nov 2024

<https://doi.org/10.5194/egusphere-egu24-17825>

EGU General Assembly 2024

© Author(s) 2024. This work is distributed under the Creative Commons Attribution 4.0 License.



Passive Removal of Stormwater Polar Organic Contaminants in Geomedia-Amended Biofilters

María Alejandra Cruz Bolaños¹, Jan Willem Foppen², Enric Vázquez-Suñé¹, and Marc Teixidó¹

¹Department of Geosciences, Institute of Environmental Assessment and Water Research (IDAEA), Severo Ochoa

Excellence, Barcelona, Spain

²Department of Water Management, Faculty of Civil Engineering and Geosciences, Delft University of Technology, Delft, the Netherlands

Next-generation stormwater drainage systems (e.g., green infrastructure) are increasingly implemented to enable runoff infiltration into the subsoil for aquifer recharge. Unfortunately, urban runoff can act as a major transport vector of pollution, and conventional infrastructure fails to remove polar organic contaminants. We studied the transport and removal of novel polar (mobile) stormwater vehicle-related organic contaminants of emerging concern, utilizing batch experiments and laboratory sand biofilters amended with granulated activated carbon (GAC) and biochar. Rapid small-scale column breakthrough curves and a 1D transport model demonstrated geomedia amendments can enhance target organic contaminant removal via sorption. However, contaminant transport was subject to kinetic effects, making it sensitive to infiltration flow rates and hydraulic retention times. To overcome these challenges, we developed pilot-scale 1-m length biofilters operating at relevant environmental conditions. These columns included a water retention zone equipped with various sensors to keep track of hydraulic and contaminant removal performance. Overall, our research contributes to understanding pollutant fate and transport during passive infiltration and enhancing conventional removal technologies for polar organic contaminants.