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Is artificial recharge promoting microbial activity and biodegradation processes in groundwater systems?

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Managed Artificial Recharge (MAR) represents a strategic tool for managing water resources, especially during scarce periods. On one hand, it can increase water stored in aquifers and extract it when weather conditions do not permit exclusive exploitation of surface resources. On the other, it allows improve water quality due the processes occurring into the soil whereas water crosses vadose zone.
Barcelona (Catalonia, Spain) conurbation is suffering significant quantitative and qualitative groundwater disturbances. For this reason, Sant Vicenç MAR system, constituted by a sedimentation and an infiltration pond, was constructed in 2009 as the strategic water management infrastructure. Compared with other MAR facilities, this infiltration pond has a reactive bed formed by organic compost and local material. The objective is to promote different redox states allowing more and different degradation of chemical compounds than regular MAR systems. In previous studies in the site, physical and hydrochemical parameters demonstrated that there was indeed a degradation of different pollutants. However, to go a step further understanding the different biogeochemical processes and the related degradation processes occurring in the system, we studied the existing microbial communities. So, molecular techniques were applied in water and soil samples in two different scenarios; the first one, when the system was fully operating and the second when the system was not operating during some months. We have specifically compared microbial diversity and richness indexes and both cluster dendrograms obtained from DGGEs analysis made in each sampling campaign.