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Groundwater role on the ecological preservation of the Biguglia lagoon (Corsica, France)

Garel, E.¹, Huneau, F.¹, Jaunat, J.², Celle-Jeanton, H.³, Santoni, S.¹, Garrido, M.^{1,4} and Pasqualini, V.¹

¹ University of Corsica, CNRS UMR 6134 SPE, Campus Grimaldi, BP 52, F-20250 Corte, France (garel@univ-corse.fr)

² University of Reims Champagne-Ardenne, EA 3795–GEGENAA, 2 esplanade Roland Garros, F-51100 Reims, France

³ University of Bourgogne-Franche-Comte, CNRS UMR 6249 Chrono-Environnement, 16 Route de Gray, F-25030 Besançon, France

⁴ Office de l'Environnement de la Corse, Département Strategies et Sciences de la Mer, Avenue Paul Giacobbi, F-20600 Bastia, France

The Biguglia lagoon is the largest wetland of Corsica Island and is located south to the densely urbanized city of Bastia which is largest urban and commercial area of Corsica. To preserve the ecosystem, the Biguglia lagoon is recognised as a RAMSAR site (wetlands of international importance, especially as waterfowl habitat) since 1991. A part of the ecological preservation of the lagoon is based on the quantity and the quality of the freshwater supply coming from temporary surface water flows and permanent groundwater flows unfortunately still underestimated and misunderstood.

The Quaternary alluvial deposits of the Bastia plain correspond to the main aquifer of the region and the lagoon is laterally hydraulically connected to it. An important part of the drinking water supply of the Bastia urban area is pumped from this aquifer.

To evaluate the role of the groundwater connexion to the lagoon hydrological behaviour, hydrogeological investigations were carried out with a multi-tracer geochemical approach (major ions, trace elements, $\delta^{18}\text{O}$, δD and ^3H). In April 2015 (high-water period) and in September 2015 (low-water period), field campaigns were organized to sample 42 groundwater points, 6 river waters, 1 canal point and 4 brackish water lagoon points.

Results show a clear impact of the surrounding anthropogenic activities on the groundwater quality of the alluvial plain of the Biguglia lagoon. The presence of old groundwater dated with ^3H indicates a current pollution of the groundwater due to former agricultural practice. The impact of the commercial gardening, which is a recent land activity, is not yet visible. However, decennial residence times of groundwater indicate in the near future, a potential threat to the drinking water supply quality as well as to the lagoon water quality by the current agricultural activities.

The noticeable NO_3^- concentrations, above the drinking standards limits, and the trace elements content of the groundwater, compared to the low concentration in the surface water, reveals to be a major source of future potential disturbance for the lagoon and its dependent ecosystem.

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