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Hydrochemical evaluation of a groundwater system connected to a wetland: A case study in the Seyfe Lake wetland, Kirsehir, Turkey

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Abstract

Wetlands play an important role in the hydrologic cycle and are also regarded as major water reservoirs. Hydrochemistry application is an important tool which enables the evaluation of water type, water-rock interactions, discharge and recharge mechanism of wetlands. The aim of this study is to clarify the hydrogeochemical processes involving recharge and discharge mechanism of the wetland system and determine the hydrochemical characteristics of the wetland water, based on groundwater and surface water chemistry data. Within this scope; a detailed geological, hydrological, hydrogeological, hydrochemical and isotopic studies were performed in the Seyfe Lake catchment. Seyfe Lake and its surroundings, which is located in Mucur district, approximately 16 km northeast of Kirsehir, Turkey, is a first degree natural reserve and Ramsar Site. First field campaign was carried out in September 2019 and twenty three sampling points were selected in the study area. Sampling points were chosen from the wetland area and wells and springs that are located in the recharge area. Physicochemical parameters such as pH, specific electrical conductivity, temperature and discharge rates of the water samples were measured in-situ. Temperature, specific electrical conductivity and pH of the water samples ranges from 14.5°C to 21.2°C, from 370 $\mu\text{S}/\text{cm}$ to 30500 $\mu\text{S}/\text{cm}$ and from 7.15 to 8.65, respectively. Discharge rate of the springs are between 0.02 and 1 l/s. These waters have neutral to slightly alkaline character. Stable isotopes and hydrochemistry are used to identify possible recharge areas, origin of waters, groundwater-surface water relation and water-rock interactions. The $\delta^2\text{H}$ and $\delta^{18}\text{O}$ values of the water samples ranges between -27.61‰ to -80.88‰, and -11.97‰ to 0.86‰, respectively in the Seyfe wetland area. The results of this study will contribute to a better understanding of groundwater dynamics and hydrochemical processes in the wetland area.

Key words: Hydrochemistry, Stable isotopes, Wetland, Ramsar site, Seyfe Lake, Kirsehir