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## Assessment of the influence of surface water on groundwater quality related to the Wadi El-Bey watershed (Tunisia) using field sampling and quantitative groundwater modelling

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The PRIMA Sustain-COAST European project aims at exploring innovative governance for sustainable coastal groundwater management and pollution reduction in the context of a changing climate by involving researchers, local citizens, water stakeholders, and policy makers in interactive dialogue. Four study sites have been selected, among them the Wadi El-Bey watershed in Tunisia, located about 40 km south of Tunis. The study area is the Grombalia aquifer whose size is approximately 391 km<sup>2</sup>. It is bordered to the north by the Gulf of Tunis and the Tekelsa Hills, to the east by the Abderrahman Mountain and the oriental coastal highlands, to the south by the Hammamet Hills, and to the west by the Bou Choucha and the Halloufa mountains. The Grombalia aquifer is bounded northward by the Mediterranean Sea and westward by the Gulf of Tunis. It constitutes a complex aquifer system formed by shallow unconfined, semi deep, and deep aquifers with different exploitation levels. The interest of the study relies on the upper aquifer. Surface flow occurs mainly in 5 wadis toward the north, reflecting regional topographic gradients.

During the last few decades, the Grombalia shallow unconfined aquifer had been under stress by groundwater pumping due to the increasing population and development of agricultural and industrial activities. Recently, it has been noticed in some wells a rise in the level of the water table due to the abandonment of the exploitation of surface wells and to the irrigation by the water transferred from the north of the country, and considerable deterioration of groundwater quality due to saltwater intrusion and increased nitrate contamination as well as the organic matter in terms of COD.

A groundwater numerical model for the Grombalia aquifer has been developed using Feflow 7.4 to simulate groundwater level changes under steady state and transient conditions. The steady state flow calibration was carried out using the water levels measured 1972 in 35 observation wells and then used as initial state of the Grombalia aquifer system. To show the influence of groundwater management, especially for agricultural activities, and interaction with surface water, measurements of water level, water temperature, pH, electric conductivity and water quality data

(e.g., nitrate concentration) have been conducted during the 2020 field campaign, at selected monitoring wells and in neighbouring transects of surface water.

The groundwater model constitutes a solid basis for further studies under transient flow and transport conditions to compare different water management, climate change and contamination scenarios, and is part of the calibrated multi-criteria decision supporting system developed in the PRIMA Sustain-COAST project context.

## References

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