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# Localized Recharge Modeling of a Coastal Aquifer from a Dam Reservoir (Korba, Tunisia)

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**Abstract :** Located in Cap Bon peninsula (Tunisia), the Lebna dam was built in 1987 to balance local water salt intrusion taking place in the coastal aquifer of Korba. The first intention was to reduce coastal groundwater over-pumping by supplying surface water to a large irrigation system. The unpredicted beneficial effect was recorded with the occurrence of a direct localized recharge to the coastal aquifer by leakage through the geological material of the southern bank of the lake. The hydrological balance of the reservoir dam gave an estimation of the annual leakage volume, but dynamic processes and sound quantification of recharge inputs are still required to understand the localized effect of the recharge in terms of piezometry and quality. Present work focused on simulating the recharge process to confirm the hypothesis, and established a sound quantification of the water supply to the coastal aquifer and extend it to multi-annual effects. A spatial frame of 30km² was used for modeling. Intensive outcrops and geophysical surveys based on 68 electrical resistivity soundings were used to characterize the aquifer 3D geometry and the limit of the Plio-quaternary geological material concerned by the underground flow paths. Permeabilities were determined using 17 pumping tests on wells and piezometers. Six seasonal piezometric surveys on 71 wells around southern reservoir dam banks were performed during the 2019-2021 period. Eight monitoring boreholes of high frequency (15min) piezometric data were used to examine dynamical aspects. Model boundary conditions were specified using the geophysics interpretations coupled with the piezometric maps. The dam-groundwater flow model was performed using Visual MODFLOW software. Firstly, permanent state calibration based on the first piezometric map of February 2019 was established to estimate the permanent flow related to the different reservoir levels. Secondly, piezometric data for the 2019-2021 period were used for transient state calibration and to confirm the robustness of the model. Preliminary results confirmed the temporal link between the reservoir level and the localized recharge flow with a strong threshold effect for levels below 16 m.a.s.l. The good agreement of computed flow through recharge cells on the southern banks and hydrological budget of the reservoir open the path to future simulation scenarios of the dilution plume imposed by the localized recharge. The dam reservoir-groundwater flow-model simulation results approve a potential for storage of up to 17mm/year in existing wells, under gravity-feed conditions during level increases on the reservoir into the three years of operation. The Lebna dam groundwater flow model characterized a spatiotemporal relation between groundwater and surface water.

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