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Numerical groundwater modelling SMART-CONTROL web-based tool applied on MAR system of Bas-Gapeau Alluvial Aquifer (Hyères les Palmiers, France).

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Managed aquifer recharge (MAR) is a widely accepted technique to increase groundwater supply for drinking and mitigate salt water intrusion in coastal aquifers heavily pumped for several usages. This is the case of the Gapeau aquifer located close to Hyères city, South of France, where the full-scale Aquarenova scheme launched in the 2010s by SUEZ mitigates the salt water intrusion by an infiltration of Roubaud River water in the alluvial aquifer through basins and by a pumping strategy controlled by data measurements provided by a monitoring system. An efficient control of recharge and recovery processes through simulation-based optimization and control incorporating real-time data would allow water operators to optimize the performance of MAR systems.

The SMART-Control approach encompasses research, piloting, demonstration, training and technology transfer in one framework. The core of this approach consists of the web-based INOWAS platform, where various analytical and numerical tools for MAR assessment are compiled. The approach will be tested at the full-scale Aquarenova scheme which ensures that the framework can be applied to improve integrated water resources management techniques. The application of the Smart-Control web-based tool T03 – Numerical Groundwater Modelling and Optimization is provided for modelling Bas Gapeau alluvial aquifer and its groundwater management (the MAR solution and the pumping strategy). A MODFLOW numerical model of the Gapeau aquifer is implemented on the platform for simulating groundwater flow in transient conditions and especially for assessing the impact of the infiltration through basins. Apart the reference scenario, three scenarios have been simulated on a 2.5-year duration, based on several assumptions on MAR scheme numbers and location. The numerical model developed on the web-platform constitutes at this stage a feasibility demonstration.

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