

Decision-making to support Managed Aquifer Recharge (MAR). A study for Southern Portugal

Summary

The PhD program aimed to establish the necessary procedures to characterise the ability of the territory to be subject to Managed Aquifer Recharge (MAR) strategies. These procedures involved combining a collection of constraints and variables, among which the meteorological variability (both past and future projected) and the set of geographical site characteristics, such as terrain morphology, river basin and aquifer conditions, and potential natural or alternative water sources available at the regional scale.

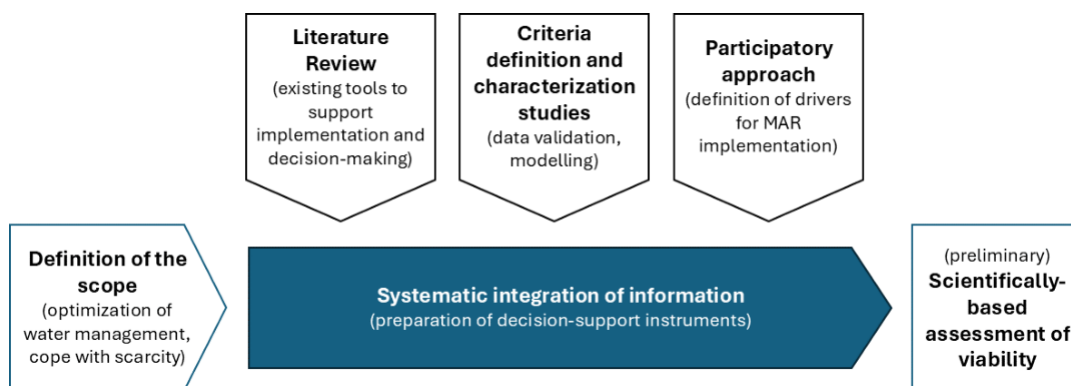
A Multi-Criteria Decision Analysis (MCDA) for the Southern Region of Portugal provided information about the most feasible MAR site, given not only the set of site characteristics, but also encompassing stakeholders' and beneficiaries' scrutiny. This analysis was developed in open-source software, ensuring that it is accessible to all and easy to replicate, promoting MAR strategies as a complementary solution to cope with water scarcity problems.

The accomplished milestones of this PhD program are the following:

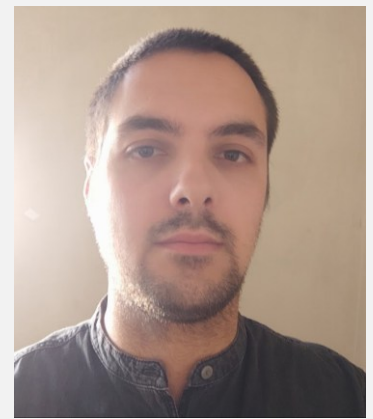
1. Data collection and understanding of existing MAR methodologies and technologies, as well as their application spectrum: methods revision and national and international legislation framework.
2. Inventory of possible water sources for MAR infiltration/injection, conducting an analysis of water availability at the regional level, taking into consideration future scenarios.
3. Definition and testing of a GIS-based MCDA method application protocol that correlates the implementation area characteristics and the source/type of recharge water with MAR infrastructure.
4. Assessment of implementation limitations to ensure suitable replicability in other study areas.
5. Discussion of the long-term usefulness of the MCDA-generated maps in the water resource decision-making process and recommendations for potential future updates.

Keywords

Managed Aquifer Recharge, integrated water resources management, decision-making; MAR feasibility; Multi-Criteria Decision Analysis.



General framework for the studies conducted in this thesis



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