

Mitigate water scarcity through nature-based solutions using Managed Aquifer Recharge. Hydrological and hydrogeological studies and decision support protocol development

Summary

The PhD program aims to develop the necessary procedures to define the ability of the territory to be subject to Managed Aquifer Recharge (MAR) strategies. These procedures will result from characterizing and 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, vadose zone conditions, natural or alternative water available resources, soil infiltration capacity, and implementation feasibility at regional scale.

A Multi-Criteria Decision Analysis (MCDA) that includes the previous issues will provide information about the most reliable MAR site, given the set of site characteristics. The basis of this analysis is to be developed in open-source software, assuring that it is accessible to all and easy to implement, and promoting MAR application as a complementary solution to cope with water scarcity problems.

Specific objectives are to be accomplished in relation to the following milestones:

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 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, ensuring that the method is reproduced through the use of open-source software and that it is replicable to other study areas.

Keywords

Managed Aquifer Recharge, decision support protocol, MCDA, water availability.



PhD student

Tiago André Nunes Martins

PhD program

Civil Engineering (IST, University of Lisbon)

Supervisor

Manuela Portela (CERIS, IST, University of Lisbon)

Co-supervisors

Teresa Eira Leitão (LNEC) and Manuel Mendes Oliveira (LNEC)

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