

Managed Aquifer Recharge – an integrated water management solution for the Algarve

Summary

The Algarve region, Portugal is experiencing severe water scarcity with major concerns that water supplies are insufficient with limited resilience to drought. Managed Aquifer Recharge (MAR) can provide intermediate storage and bridge the gap between water availability and demand. However, success is dependent on water available and the aquifer capacity.

A regional study found that MAR can achieve a water resource benefit of 24 Mm³/yr, or 10% of the total water demand of the region, using good-quality water from ephemeral rivers that meets the requirements of the Groundwater Directive. MAR can replace 15 Mm³/yr of surface water used in the public irrigation perimeters, and 9 Mm³/yr can be used to develop and maintain a strategic groundwater resource in the aquifers of the central Algarve. Although climate change is predicted to result in an 8-13 % decrease in MAR recharge during the period 2041-2070 under the RCP4.5 scenario, this can be addressed by incrementally increasing the MAR design capacity. MAR could bring water resource benefits of a similar scale to planned major infrastructure projects (desalination, River Guadiana abstraction), whilst costs for MAR are lower than almost all the feasible alternatives, with many wider advantages. MAR is thus an important measure to increase water supply security and drought resilience in the region.

Limitations of MAR were identified with a case study of the Vale de Lobo sector of the Campina de Faro aquifer where a numerical model was designed to support decision-making under uncertainty to determine the effectiveness of MAR to prevent sea water intrusion. Due to limited water availability and continued groundwater abstraction at unsustainable rates, only limited improvements in hydraulic heads can be achieved with MAR in this aquifer, indicating a considerable reduction in groundwater abstraction in addition to MAR will be required.

Keywords

Managed Aquifer Recharge, coastal aquifers, groundwater modelling, data assimilation, drought, water supply resilience.



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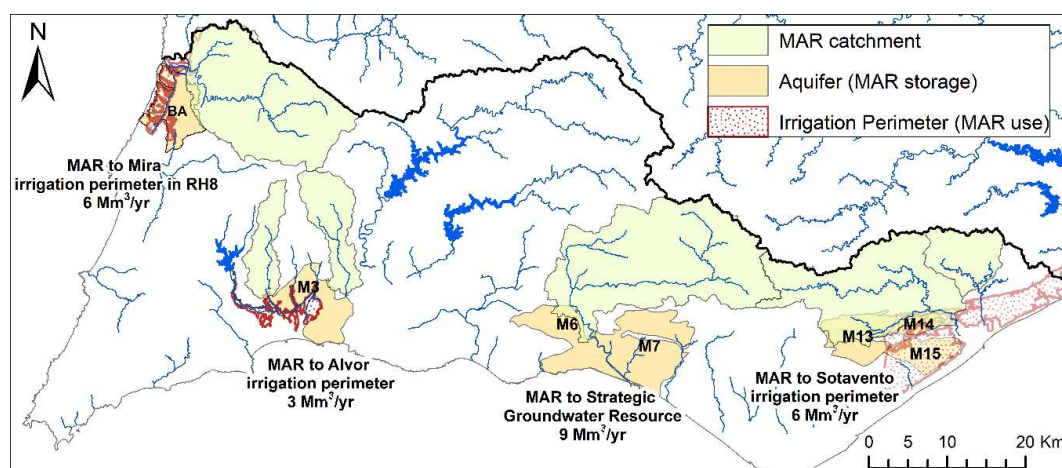
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Summary of the major potential MAR opportunities for the Algarve Region, Portugal.