



Co-Managed Aquifer Recharge (Co-MAR). A bottom-up approach for Integrated Water Resources Management enhancement.

Novel term employed at Los Arenales aquifer (Spain) and results

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Co-Managed Aquifer Recharge (Co-MAR), multi-level governance, groundwater users association (CUA), space of collaboration, stakeholders, stakehomers, green solutions, Public-Private People Partnership (PPPP) and Decision Support Systems (DSS)

ABSTRACT

Co-Managed Aquifer Recharge (Co-MAR) is a novel concept in which the integrated water resources management techniques, including MAR, are organized with the contribution of water authorities, stakeholders/end-users, and related institutions with no direct interest in the subject (Stakehomers). This approach entails a greater contribution of groundwater users in the governance, relating MAR and multilevel governance in a participatory approach in which the whole society gets involved in water management issues by means of the creation of "spaces of collaboration". These spaces are created based on confidence for the fair use of (ground)water resources and in organizational measures with a direct influence on groundwater quality and therefore, on environmental issues and green practices. These spaces are becoming the basis for new governance schemes that are aimed to increase sensibility at the groundwater exploitation for the whole user's collective interest, including ecosystem services and green solutions.

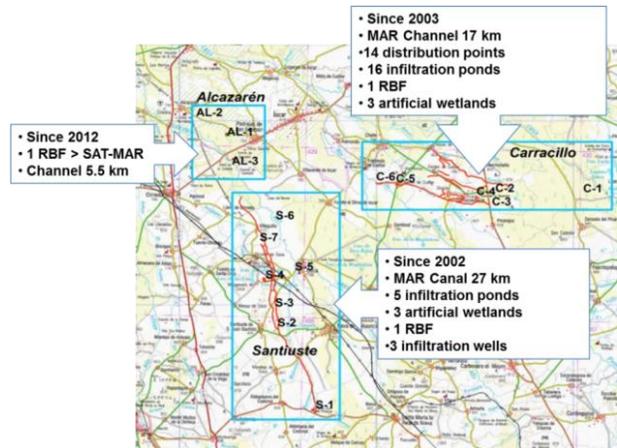
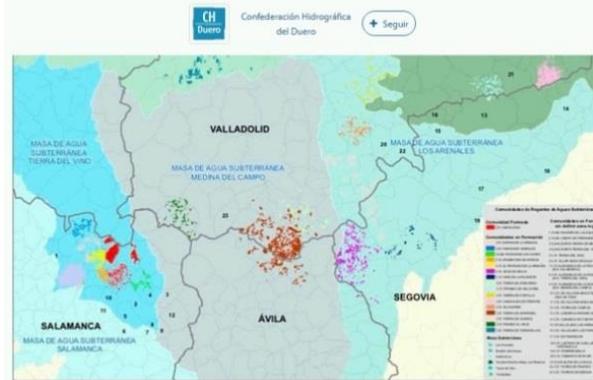
Spanish regulation requires that, for every over-exploited aquifer, responsible water authorities (CHD) must engage communities or groundwater users (CUAS), to be a unique counterpart to negotiate and reach agreements in the future management of the resources. This scheme has modified the traditional "top-down" scheme for integrated water resource management (IWRM) into a more collaborative space, in which members of the general public, in general, represented by CUAS' Boards and external experts as stakehomers, have the possibility to propose inputs for water management regulations, assignment criteria seeking the collective benefit, controlling land-use practices, improving future water supply prospects and water quality standards for rural development, within an "environment of trust". In the case of Los Arenales aquifer, Co-MAR expects policy implications and includes a **certain control on the demand**, which is another novel issue in which end-users organize the groundwater exploitation taking into consideration not only the present but also the foreseen future resources.

The article demonstrates through real case studies at Los Arenales aquifer, with four regional-scale MAR systems and 39 CUAS how Public-Private Partnership (PPP) enhances governance and water security; and how the intervention of farmers (and the population in general) in the Decision Support Systems (DSS) are improving the application of hard and soft management measures for IWRM, taking into consideration a certain control on the demand and reserving a certain amount of the resources for green functions.

The four MAR systems closely studied are Carracillo, Cubeta de Santiuste de San Juan Bautista, Alcazarén and Medina del Campo. These locations count on Managed Aquifer Recharge (MAR) facilities, some since 2002, which provide between 22 and 25% of the total amount of water used for irrigation with quota systems for groundwater extractions. At the same time, the 39 CUAS explore MAR possibilities to be implemented in their respective areas and proposing recommendations to improve the water security, the fair distribution of the resource, and the current governance schemes.

The experience is having positive results, overall, for example with job creation and economic growth due to improved yields and productions. In addition, end-users have been able to save up to 36% in energy consumption thanks to the increase in piezometric levels. MAR is also reducing agricultural depopulation. From the experience gained, MAR has become a key element for agricultural development and water security. However, some pending issues remain and it is necessary a "shift in paradigm" in the water sector, from traditional patterns of water consumption to evolve to a circular economy approach in which wastewater resources are not considered unwanted, but rather an important asset in a context of water scarcity where MAR is an IWRM key technique.

La CHD tramita la creación de 39 comunidades de usuarios de aguas subterráneas



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