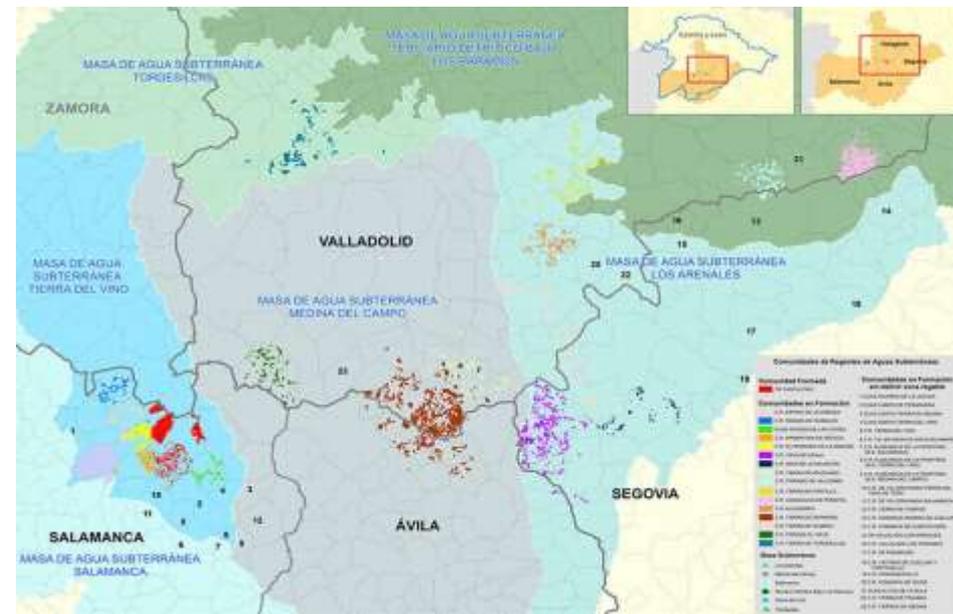


Theme 1



The “Co-MAR” concept and how the groundwater user associations are improving integrated water resources management schemes, governance and water security

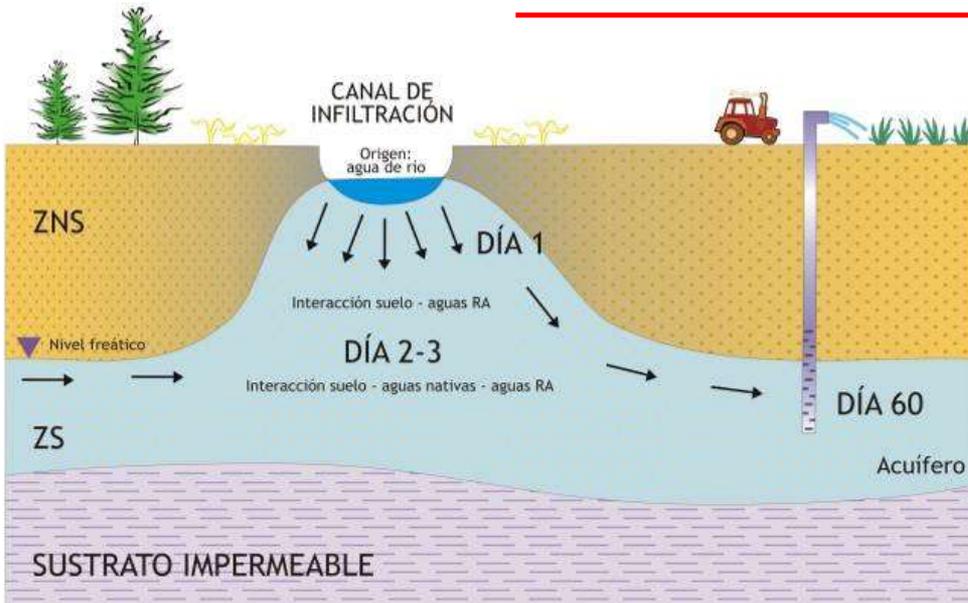
Demo-sites from Castilla y León (Spain)

Dr. Enrique Fernández Escalante (IAH MAR Commission, Tragsa R&D) efernan6@tragsa.es

Dr. Elena López Gunn (iCatalist Consulting, Spain) elopezgunn@icatalist.eu

Introduction

- ✓ **Managed Aquifer Recharge (MAR)** is a promising **set of techniques to improve IWRM** and cope a variety of water management-related issues
- ✓ International governance approach is changing from a top-down to a **bottom-up approach**
- ✓ **The obligation (by law) of being organized in “water users associations” (CUAS) to negotiate with water authorities** is creating “spaces of trust” and driving to an **innovative and more social decision making perception**
- ✓ The **participation of end-users in decision making may improve IWRM, governance schemes, rural development and water security**
- ✓ This presentation exposes some **IWRM advances thanks to GW user’s associations and Co-MAR in the central part of Spain.**



Key issues addressed

- ✓ People Public-Private Partnership (PPPP) enhances governance and water security
- ✓ The intervention of end-users in the Decision Support Systems (DSS) improves hard and soft management measures for IWRM
- ✓ CUAS in areas where Managed Aquifer Recharge (MAR) is applied have introduced the concept **Co-MAR**
- ✓ Spaces of trust are key in these achievements.

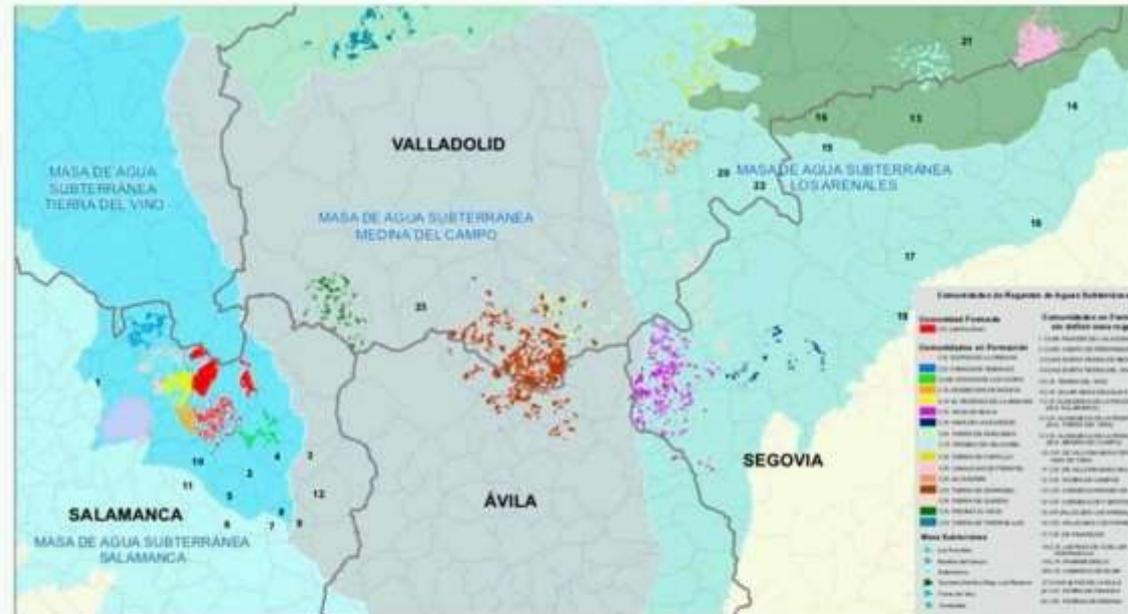
*The term PPP in Spain refers to a collaboration to manage, in this case water resources, between the government or public authorities and private landowners.

Occasionally private landowners intervene to build infrastructure under this arrangement

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



Confederación Hidrográfica del Duero



- Dieciséis de ellas han presentado ya los estatutos para su constitución y han definido la superficie regable, que alcanza las 20.000 hectáreas en rotación.
- El objetivo de la Confederación es disponer, al menos, de una comunidad de usuario por cada masa de agua.

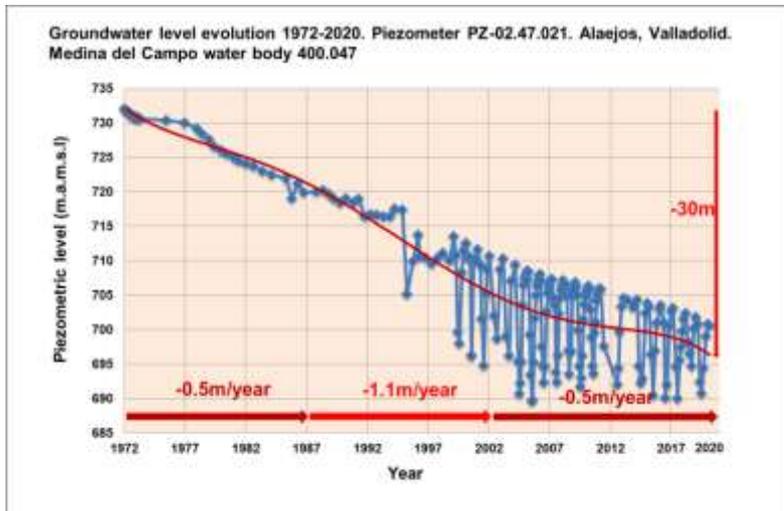
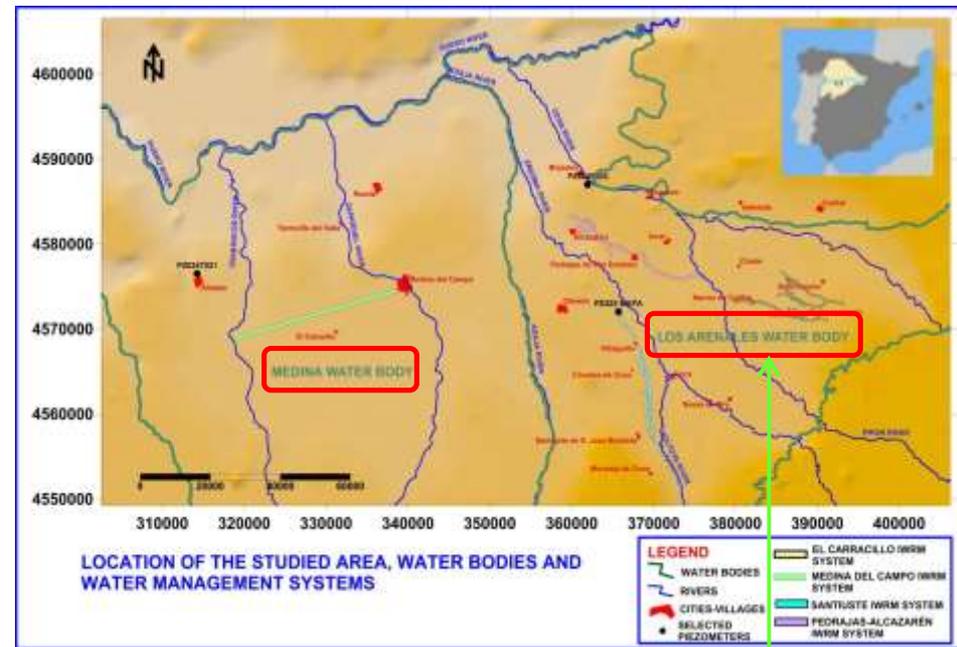
Background (1/2)

Intensive groundwater use cases in Castilla y León (Spain)

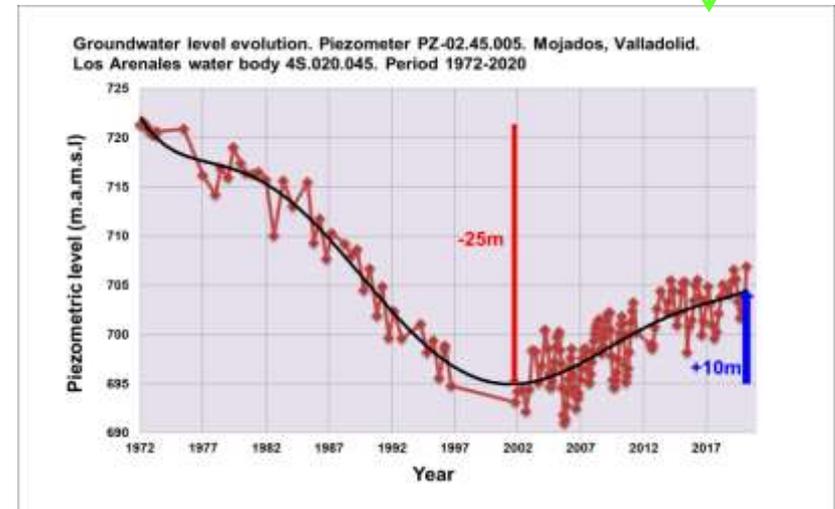
Water Exploitation Index (WEI)

According to the Spanish Water Act, Art. 40, **each water body with a WEI exceeding 0.80 requires intervention by the Water Authorities:**

- ✓ **Los Arenales: 1.30**
- ✓ **Medina del Campo: 1.65**

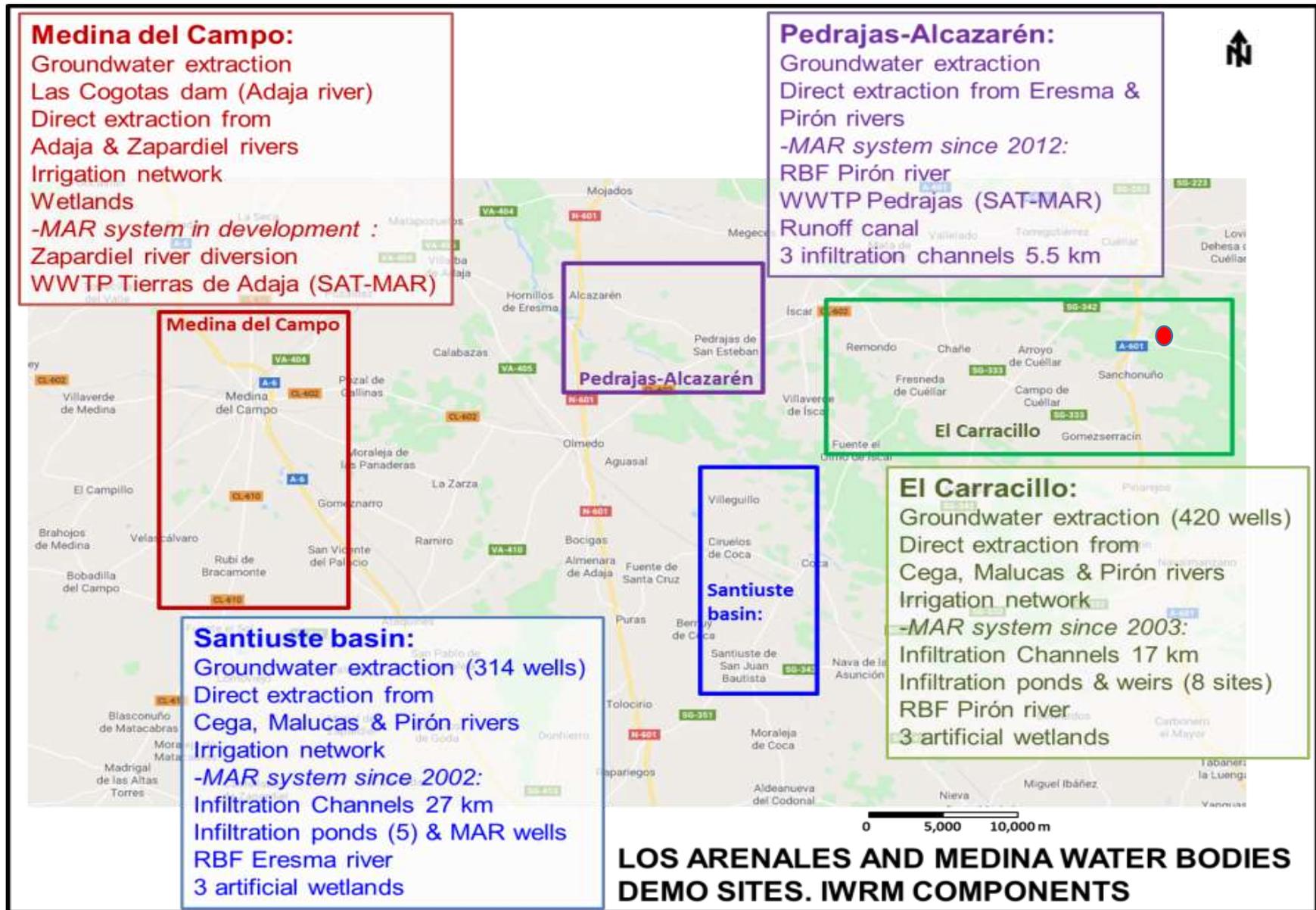


Medina del Campo Groundwater Body (1975-2020)
MAR activities have still not been fully implemented



Los Arenales. Between 1972 and 2002, a 25 m groundwater decline was registered in the whole aquifer. In the last 18 years there has been a small recovery thanks to MAR, reducing the decline to -15 m (+10).

Background (2/2)

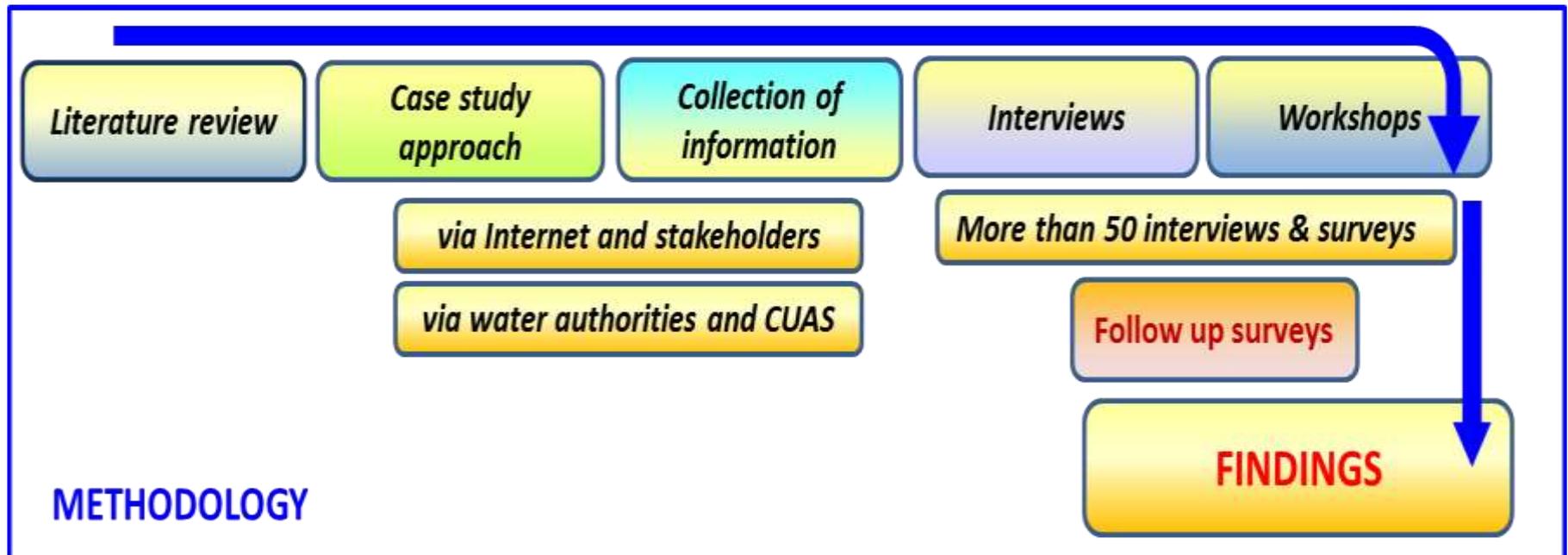


Case-study sites and their main IWRM components

Methodology

- ✓ **MAR and CUAs serve as entry points** to understand the full system, including other IWRM measures
- ✓ The authors used combined a 4-stages method consisting of literature reviews, case-study analyses and primary data treatment from more than 50 interviews, surveys and five workshops in rural areas.

Co-MAR methodological approach



Results (1/2)

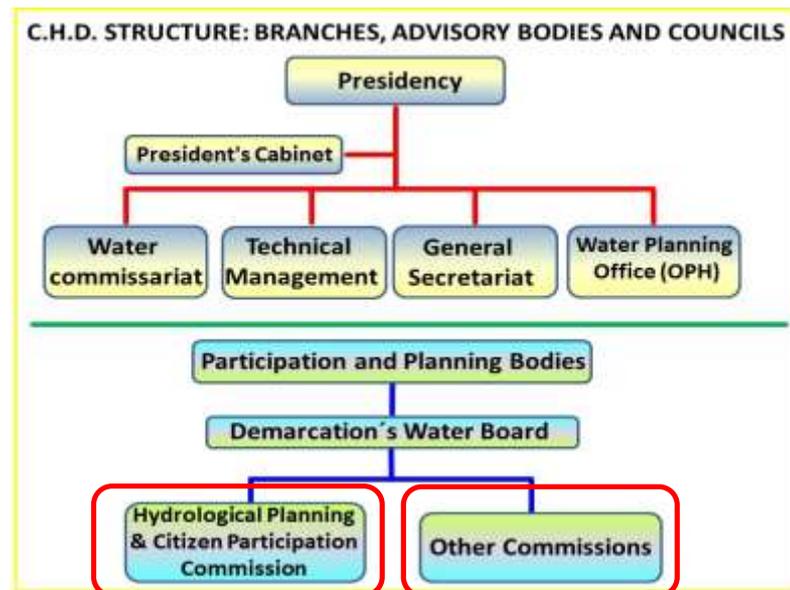
-Both groundwater bodies, Los Arenales & Medina del Campo, count on **4 groundwater users' communities** (El Carracillo, Medina del Campo, Cubeta de Santiuste de San Juan Bautista and Alcazarén*), **places in which MAR takes place since 2002 and provides about 24% of the total water used for irrigation** in the area.

* In process

-End users' participation in DM :

CHD structure, advisory bodies, and councils

[Duero River Basin Plan, or PHD (CHD, 2016)]



CUAS and Irrigation Communities' structure



-**Hard structural measures** to address intensive groundwater use:

Managed Aquifer Recharge schemes

-**Soft non-structural measures:**

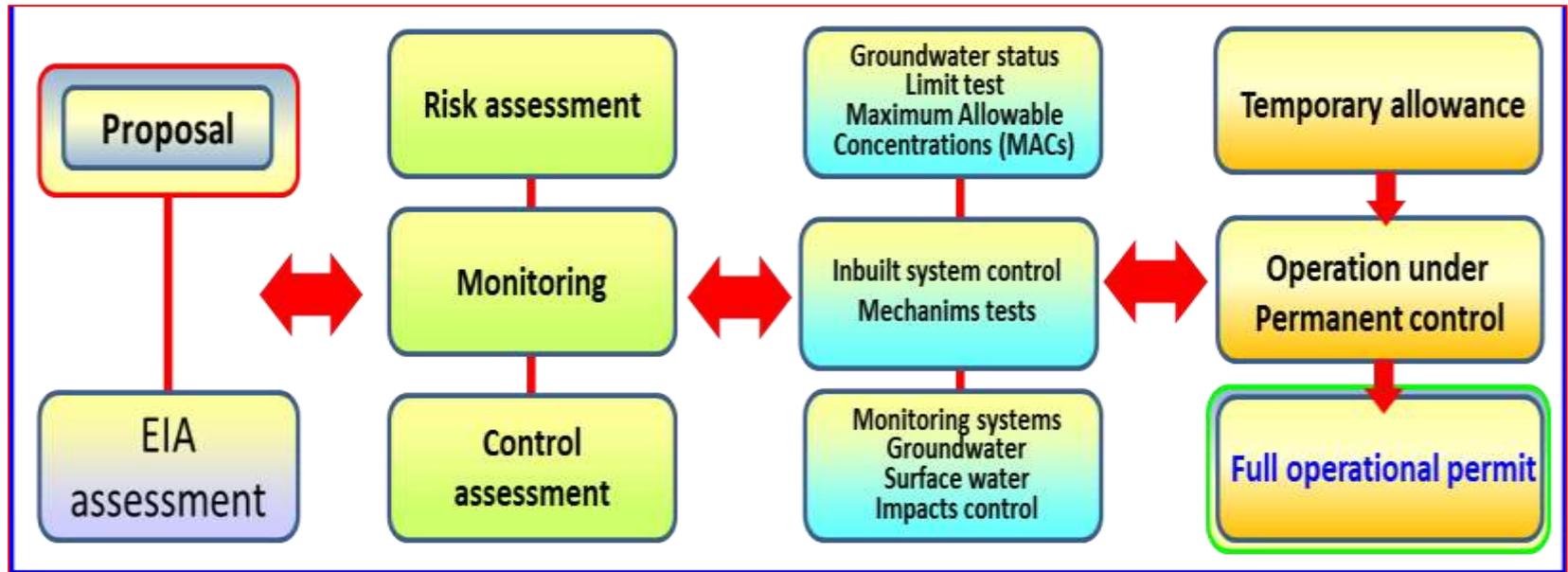
CUAS and wider stakeholder engagement

-**“Space for collaboration” in socio-technical systems**

-**Stakeholders** are a group of agents that represent the local population, researchers...

Results (2/2)

Stages to implement a Co-MAR system



Some indicators for Co-MAR outcomes (benchmarking)

	Region of Castilla y León	Municipalities in the case study areas
Density of working age population (unit: inhabitants between 20 and 64 years old per km ²)	7.4 inhabitants./km ²	17 inhabitants/km ²
agroindustry (unit: related jobs workers per km ²)	3.73 w/km ²	11.29 w/km ²
Number of companies in the area (Unit: nº of companies per km ²)	0.46	1.28
Population growth	-6% decrease in the region	+28% since MAR began

Vs

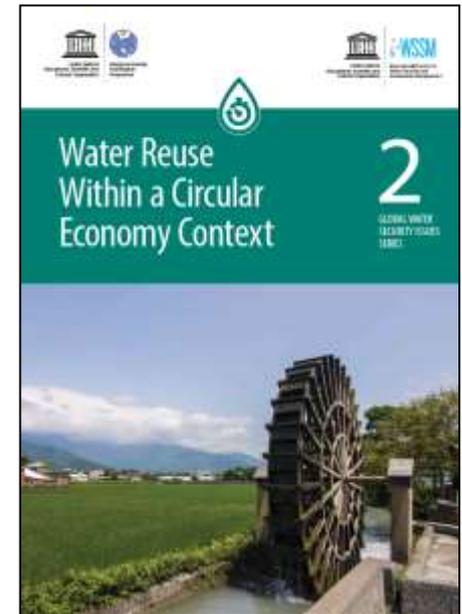
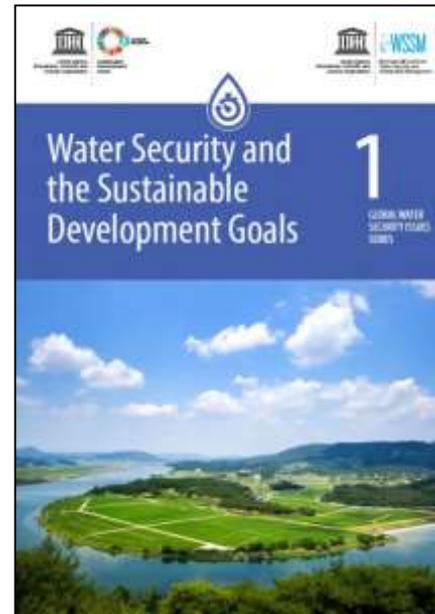
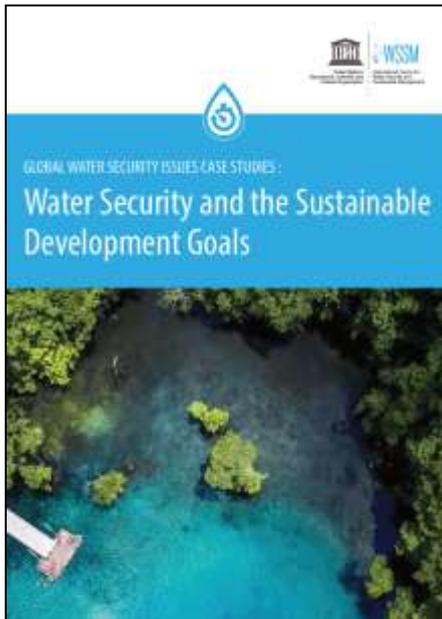
Conclusions & recommendations

- ✓ **Co-MAR at Los Arenales** is an example of *PPPP* as collaboration for the management of the water resource among **public authorities and private landowners**. It is **key to improve the IWRM mechanisms**
- ✓ **The bottom-up approach** involves end-users..., *stakeholders* and even the general population in **decision making processes**, resulting **more social and effective**
- ✓ **Co-MAR** has permitted **higher values for economic and environmental indicators** in the studied areas where MAR takes place
- ✓ **The *spaces of collaboration*** are becoming the basis for new governance schemes that aim more sensibility at **all users' collective interest**
- ✓ **New aquifer recharge experiences** could be conducted in **Los Arenales and Medina areas to bring WEI down**
- ✓ A "**shift in paradigm**" is necessary in the water sector, from traditional patterns of water consumption to a circular economy approach, **considering wastewater resources and MAR**.
- ✓ **Regulation changes** are needed, as well as **modernization** of the irrigation systems, measures to improve **water and energy efficiency** backed by the nature (NBSs) for **better economic results and water savings**.
- ✓ ***Deepening the Space for collaboration***
- ✓ ***MAR with added post treatment processes for better water quality***
- ✓ ***Decision support systems combining technical and social aspects.***

To broaden this info...

WSSM_GWSI 2020 (in press)

Fernández-Escalante, E. and López-Gunn, E. (2021, in press). *Co-managed aquifer recharge: Case studies from Castilla y León (Spain)*. UNESCO and UNESCO i-WSSM. 2021. The Role of Sound Groundwater Resources Management and Governance to Achieve Water Security (Series III). Global Water Security Issues (GWSI) Series – No.3, UNESCO Publishing, Paris.



https://reliefweb.int/sites/reliefweb.int/files/resources/i-WSSM_GWSI_Case_Studies_%28small_size%29_final.pdf

Managing Aquifer Recharge Commission (IAH-MAR)

IAH Commission on Managing Aquifer Recharge



WELCOME ABOUT THE COMMISSION SYMPOSIA AND WORKSHOPS WORKING GROUPS COMMUNITIES COLLABORATIONS RESOURCES

Welcome



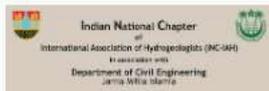
Attendees at ISMAR10, Madrid, May 2019 – the latest triennial symposium of IAH-MAR, UNESCO and ASCE

Welcome to the website of the International Association of Hydrogeologists Commission on Managing Aquifer Recharge (IAH-MAR). Here you can discover what our working groups are doing and contribute to their current projects, you can download resources on MAR, connect with people, get information on symposia coming up, and join our email list to stay informed of latest news. We also have sister sites in Spanish and Chinese.

Managed Aquifer Recharge

Managed aquifer recharge, also called groundwater replenishment, water banking and artificial recharge, is the purposeful recharge of water to aquifers for subsequent recovery or environmental benefit. It embraces methods such as riverbank filtration, stream bed weirs, infiltration ponds and injection wells, and uses natural water sources and appropriately treated urban stormwater, sewage and other waste waters to increase groundwater storage, protect and improve water quality, and secure drought and emergency supplies. Its growing scientific base supports its rapidly increasing use as a vital management tool in the sustainable use of the world's water resources.

Latest News



National Seminar on “Resilience of Groundwater Resources for Accommodating Changing Climate Scenarios” – 7 November 2020 in New Delhi,

<https://recharge.iah.org/>

CURRENT PROJECTS THAT YOU CAN JOIN

- New working group: MAR in Conferences. Coordinator: Daniela Benedicto van Dalen
- New working group: Urban MAR. Coordinator: Niels Hartog
- LatinMAR Community of Practice – a new initiative to advance MAR in Latin America. Coordinator: Adriana Palma
- MAR Suitability Mapping Working Group. Coordinator: Jose Bonilla
- Contributions to a second monograph on clogging-focussing on its management – Clogging Working Group. Coordinator: Russell Martin
- Groundwater Solutions Initiative for Policy and Practice (GRIPP) – a Collaborative International Project, Coordinator: Karen Vilholth

JOIN OUR MAILING LIST

Register with our large email group to share information, ideas and news concerning recharge enhancement.

Join IAH-MAR email community

WhatsApp group on Aquifer Recharge Management



About 150 members debate on MAR issues.
Pls, scan the QR code

Madrid, 2021 June 9th

Thank you

