

IAH-MAR Commission. 2025 WEBINARS.

FINAL AUTHORS STATEMENTS

(in reverse chronological order)



Seminar #9. MAR in Latinoamérica

Edmundo Claro (Chile)

Mega-drought, climate change, and human activities have reduced recharge and increased pressure on aquifers in central Chile, affecting communities, ecosystems, and productive sectors. MAR offers an effective and flexible alternative for recovering aquifers and increasing storage, but its implementation remains low. For MAR to scale up, better data, adequate incentives, institutions capable of managing water dynamically, and participatory processes that generate trust and legitimacy are required.

Marino Puricelli (Argentina)

In the Pampas region, it is necessary to improve soil conditions in order to reduce surface runoff, facilitating the infiltration of rainwater into the same land where it falls. Agro-hydrological intervention on agricultural plots allows for an increase in the natural recharge of the water table. Field monitoring and modeling allow for a reduction in uncertainty estimation.

Roberto Navarro Venegas (Perú)

Integrated water resource management in the Ica aquifer is a challenge on an international scale, as it requires complex integration and a very important social component. MAR technology, although important, is insufficient on its own to balance supply and demand. It is therefore a proven and effective component, but it needs to be complemented.

Wener Ochoa (Guatemala)

Latin America suffers from a lack of hydrogeological governance. Aquifer recharge management (ARM) must become a strategic pillar of climate change adaptation,



integrating technology, nature, and community within a new regenerative framework for water governance.

Adriana Palma Nava

Managed Aquifer Recharge (MAR) is a growing strategy in Latin America to address water scarcity, aquifer overexploitation, and climate variability; but America's MAR implementation remains fragmented. Success depends on stronger policies, continuous research, community participation, and integrated water governance. MAR is also a crucial tool for water resilience, requiring greater integration into national and local water planning. Notable cases in Chile, Argentina, Guatemala and Peru demonstrate these assessments.

Seminar #8. MAR's social aspects

Elena López-Gunn (Elcano Royal Institute and Icatelist, Spain)

Co management of aquifers offers an opportunity to integrate different types of knowledge (local, practitioners, scientific) into an integrated approach that facilitates more effective and adaptable aquifer management and recharge.

Tapio Katko (Tampere University, Finland)

Some MAR myths may be:

1. Adequate and legal resources and control are required
2. Water Services education and research worldwide needs to be expanded from water and wastewater treatment also to policy, institutional and governance issues
3. Awareness raising and proactive communications need to become a key strategic tool by water utilities – to create public trust!

IAH-MAR Co-chairs

The creation of environments of trust and the wider multilevel governance are improving IWRM and MAR schemes, thanks to stakeholders' participation and an increased social approach.

Seminar #7. Construction criteria

Russell Martin (Principal hydrogeologist Wallbridge Gilbert Aztec, Australia)

MAR global uptake require an integrated set of actions grouped in economics, proven success cases, demonstration of the environmental and water quality benefits, and adaptability to different situation.

Seminar #6. Advanced MAR modeling

Chistophe Darnauls. SCEES, Clemson University. USA

Mahsa Ghorbani. SCEES, Clemson University. USA

Surface and subsurface interactions for soil and water resources require advance modeling and measurements of physicochemical properties, site hydrology, geology data and agricultural practices, including irrigation rates. Once the site is duly characterized, nitrates transport and interaction processes can be determined.



Seminar #5. MAR economics

Andrew Ross (Australian National University, Australia)

Transparent cost–benefit evidence is essential to unlock investment and build stakeholder confidence in MAR. Analysis of MAR costs and benefits shows that MAR can be cost-competitive with conventional supply under favorable hydrogeological and governance conditions. Further work is being undertaken to break down costs and refine estimates of benefits to support broader adoption".

Dennis Gonzalez (CSIRO, Australia)

This presentation showcased a framework for estimating the costs of managed aquifer recharge under uncertainty. Using a coupled water balance and economic model with stochastic inputs, the study explored how costs shift across different scales, scheme types, and operating conditions. By adapting this framework, a case study on the Upper King River in the Northern Territory showed that both pilot and full-scale recharge schemes appear economically viable, given the high value of irrigated agriculture they would support.

Seminar #4. Managed aquifer recharge in India

A.K. Sinha (IAH Vice-President for Asia; President, IAH Indian National Chapter)

States must know the significant areas with declining groundwater levels, to increase water security and sustainability. Government initiatives must improve national water policies supporting MAR, and these should include funding mechanisms and incentives provided by state governments and regional authorities.

Cornelius Sandhu (University of Applied Sciences Dresden, Germany)

Riverbank filtration (RBF) shows strong potential as part of managed aquifer recharge and integrated surface water–groundwater management to enhance drinking water production in the Indus–Ganga–Brahmaputra and Damodar river basins. Case studies from Punjab, Agra, West Bengal, and northeast India since 2021 demonstrate that RBF improves raw water quality by attenuating organic micropollutants and removing pathogens. However, implementing RBF is challenging in the IGB basin due to complex and heterogeneous fluvial deposits, which make it difficult to establish the necessary hydraulic connection between rivers and aquifers. Confirming this connection is essential to assess the proportion of bank filtrate, contaminant removal efficiency, and the potential of RBF to mitigate groundwater overexploitation. Overall, RBF has high potential for inclusion in river basin management plans in the IGB basin.

Seminar #3. The rule of the game

Manuel Sapiano (The Energy and Water Agency, Malta)



The European Union's Regulatory framework based on the Water Framework Directive is sufficiently robust to promote safe MAR which enhances groundwater quantity whilst ensuring a high level of protection to groundwater quality and therefore also to the sustainability of the groundwater dependent environment.

Rudy Rosetto (Scuola Superiore Sant'Anna, Italy)

Climate adaptation in water resources management must prioritize nature-based solutions (NbS) mimicking hydrological and ecological processes rather than relying only on hard engineering. Managed Aquifer Recharge (MAR) can be a key adaptation tool, but whether it qualifies as a nature-based solution it's still under debate, as MAR not always clearly delivers biodiversity benefits. Research is needed to highlight MAR techniques that may easily qualify as NbS, and to devise new MAR schemes that explicitly enhance environmental and ecosystem services.

Seminar #2. MAR in humanitarian context

Vijay Matta (UNICEF)

Successful implementation of Managed Aquifer Recharge (MAR) depends heavily on site-specific factors—hydrogeology, climate, topography, and project objectives. In humanitarian settings, these conditions are often poorly understood, so a structured process starting with a pre-feasibility study is essential. UNICEF's Office of Innovation has prioritized MAR as a key innovation area to improve resilient water supplies in arid and semi-arid regions through groundwater mapping and monitoring. As part of this effort, a MAR pilot in the complex humanitarian environment of Dollow, Somalia, has been selected based on initial desktop assessments and will be among the first to apply MAR using expert evidence in such contexts.

Seminar #1. Zero ground

Catalin Stefan (Technische Universität Dresden, Germany)

The global inventory of managed aquifer recharge (MAR) schemes was presented, including the web-based MAR portal realised in collaboration by TUD and IGRAC. The MAR portal was developed to facilitate access to MAR sites worldwide, promoting awareness and sharing of information on MAR as a sustainable groundwater management solution.

Enrique Fernández Escalante (TRAGSA Group, UPM, Spain)

The MAR facilities inventory is an open line of action to be renewed with both, ancestral and upcoming systems. The use of new technologies, e.g., digital twins, is improving MAR design and operational criteria, posing more effective constructions.

Yan Zheng (Southern University of Science and Technology, China)

Sustained environmental and human health protection is threatened by ~350,000 chemicals available in global markets, plus new biological entities including coronaviruses. These water-quality hazards challenge the proponents of managed aquifer recharge (MAR) who seek to ensure the integrity of groundwater. A risk-based regulatory framework accounting for groundwater quality changes, adoption in subsurface attenuation zones, and use of advanced monitoring methods is required to support confidence in the sustainability of MAR.



ONCE AGAIN, WE THANK PARTICIPANTS FOR THEIR KIND CONTRIBUTIONS.

FINAL SUMMARIZING VIDEO:

<https://youtu.be/A7Np134mKS0>

More info:

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

Gathered and assembled by Enrique Fernández Escalante. IAH-MAR Commission

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**International Association
of Hydrogeologists**

the World-wide Groundwater Organisation

**IAH Commission on
Managing Aquifer Recharge**