

International Association of Hydrogeologists Commission on Managing Aquifer Recharge



**International Association
of Hydrogeologists**

the World-wide Groundwater Organisation

**IAH Commission on
Managing Aquifer Recharge**

IAH-MAR REPORT OF ACTIVITIES 2024

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Sister Websites:

Spanish: <https://dinamar.tragsa.es>

Chinese: <http://china-mar.ujn.edu.cn/>





Report of activities by IAH-MAR co-chairs and commission members in 2024

(at least one IAH-MAR member has participated in the reported activities)

Major events

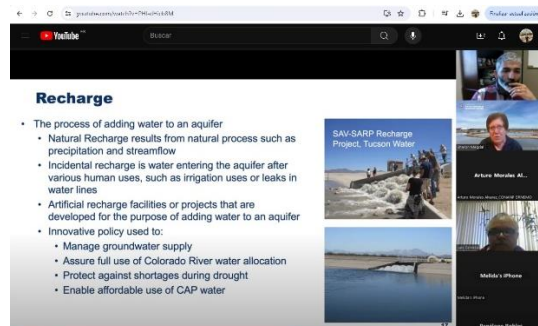
- **BSMAR 18 Symposium took place in Arizona from April 3-6, 2024.**
 - Co-organised by IAH-MAR members. More info:
<https://ahssymposium.org/bsmar/>
- **IAH 2024 conference.**
 - The IAH 2024 conference took place in Davos, 2024, September 8-13th. Specific session on MAR. 25 abstracts received:
<https://www.iah2024davos.org>
- **IAH-MAR Commission plenary (online). 2024 October 1st, 15:30 h CET.**
 - In 2024 the meeting took place online via Zoom as to allow also participation from MAR community members who couldn't attend the IAH congress in Davos.
The aim of the meeting was to provide an update on the activities of the commission and to facilitate the communication and exchange of ideas among the MAR community members ahead of the next ISMAR12 Symposium in South Africa. More info:
<https://recharge.iah.org/files/2024/10/2024-10-01-IAH-MAR-Commission-plenary.pdf>

Courses, lectures and webinars

- **EU Climate Dialogues project (EUCDs): Multi-Country Activity on Adaptation (MC08). Online Adaptation Dialogue Morocco.**
 - January 25, 2024. The overarching aim of the EU Climate Dialogue is to foster the exchange between EU and EU Member States with stakeholders from Morocco on the issue of adaptation in the water sector in terms of assessing vulnerabilities and risks as well as managing water resources (too much, too little water). Through sharing of knowledge and exchange on good practices on adaptation in the water sector in the light of climate change and its linkage to the National Adaptation Strategy as well as Plan. The online event supported efforts in adaptation the field of water management and foster cooperation. Three IAH-MAR members gave a presentation.



- **Regional Hybrid Training Workshop on “Groundwater governance: lessons learned, challenges and solutions”. April 23-24, 2024, Tehran, Iran.**
 - IAH-MAR Commission members cooperated in the organization of this workshop and imparted six slots. More info, concept note, and program: <https://rcuwm.ir/news/groundwater-governance-lessons-learned-challenges-and-solutions/>
- **Geological Society of America conference in Anaheim, CA, 2024, September.**
 - A “marer” of the IAH-MAR group reported a session about "Advances in Managed Aquifer Recharge." More info: <https://s23.a2zinc.net/clients/corcexpo/gsa2024/public/enter.aspx>
- **Chihuahua University organized a webinar on Water Solutions through partnership.**
 - Dr. Sharon Megdal has presented a summary from the WRRC 2024 Annual conference: Implementing Water Solutions Through Partnership, and reflections to the 10th World Water Forum (Bali, Indonesia). Presentation in YouTube: <https://www.youtube.com/watch?v=PHI-dHicb8M>



- **IAH-NL mini-symposium: "Ensuring sustainable water availability for agriculture: Potential and challenges for managed aquifer recharge".**
 - Thu 26 Sep 2024 (16:00 CET) — IAH-NL mini-symposium: "Ensuring sustainable water availability for agriculture: Potential and challenges for managed aquifer recharge"
 - With contributions from early career hydrogeologists: Felix Joger (winner IAH-NL MSc thesis award-Pieter Stuijtzand Scriptie Prijs) Sophie Luijendijk Lennart Brokx. Utrecht University (The Netherlands). More info: <https://netherlands.iah.org/iah-nl-mini-symposium-2024>
- **MEWAC – FEMAR Symposium. Amman, Jordan, 19 Nov 2024.**
 - The Project MEWAC-FEMAR members have organized their first conference.



Resource persons from HTWD, TUD and SME UBV (Germany), Yarmouk University (Jordan), and the Tunisian Ecole Nationale D’Ingenieurs in Sfax shared their expertise on topics ranging from hydraulics, water quality and numerical groundwater modelling to well drilling and construction and site investigation, monitoring and assessment techniques including the application of remote sensing methods.

- **Nature-based solutions in the WEF NEXUS world. Pisa, Italy, 2024 Oct 23th.**
 - Webinar hosted by Santa Anna Scuola in relation with the NEXUS-NESS project (PRIMA call). While **climate change** is posing at risk traditional **water resources management**, there is the urgent need to devise **low-energy** and **low-impact solutions** to adapt the environment, societies and economies to this threat.



More info: <https://www.santannapisa.it/it/evento/nature-based-solutions-wef-nexus-world-application-case-studies-and-market-perspectives>
 Project website: <https://prima-nexus-ness.org/>
 Results summary: https://www.linkedin.com/posts/rudy-rossetto-45a0922_prima-nexusness-italynel-activity-7247942605735350272-CA7c/?utm_source=share&utm_medium=member_desktop

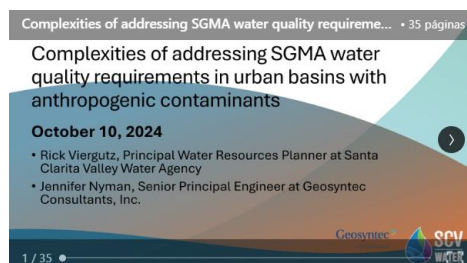


- **GEOSS webinar about “The Effectiveness of the MAR Scheme at a Mine along the West Coast of South Africa”.**
 - This talk examined the effectiveness of the managed aquifer recharge (MAR) scheme and its impact on the aquifer. Given the deposit’s sandy nature, with a low percentage of thin, hard rock lenses, mining is conducted using conventional open-pit methods.



The Elandsfontein Mine MAR Scheme is included in one of the field trips for ISMAR 12.

- **AGU Fall Meeting (9-13 December 2024, Washington D.C. USA).**
 - AGU 2024 Fall Meeting session H017 on: Advances in Managed Aquifer Recharge for Groundwater Sustainability. Helen Dalkhe, IAH-MAR member, worked on it.
More info: <https://agu.confex.com/agu/agu24/gateway.cgi#>
- **Santa Clarita Valley Water District, CA, USA. Complexity of addressing SGMA water Quality requirements.**
 - Navigating the groundwater quality provisions of the Sustainable Groundwater Management Act (SGMA) presents significant challenges. Achieving compliance will require time and consistent application of SGMA regulations in the Groundwater Sustainability Plans (GSPs)...



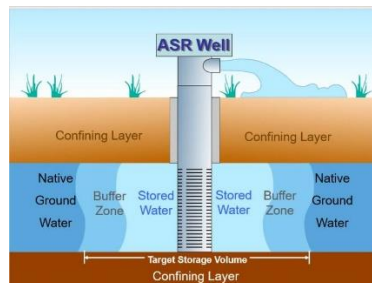
Presentation accessible at:

<https://www.linkedin.com/feed/update/urn:li:ugcPost:7265831315332034561/>

Publications



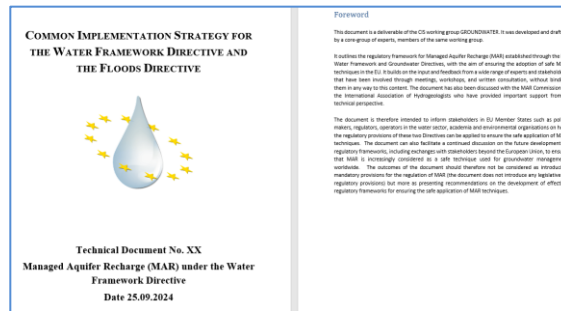
- **ISMAR 11 special issue. Managed Aquifer Recharge. A key to sustainability.**
 - Selected papers on MAR, specially presented at ISMAR 11, are published in this Special Issue of the open-access Journal WATER, co-edited by IAH-MAR Chairs. Ten papers have been published, including an editorial paper in late Dec. 2023. More info:
https://www.mdpi.com/journal/water/special_issues/Aquifer_Recharge.
- **Managed Groundwater Recharge and Rainwater Harvesting.**
 - New springer book on MAR with special focus on developing countries. It highlights how groundwater recharge enhancement and rainwater harvesting help in making water resources sustainable. It also provides case studies of these applications in developing countries to resolve the water crises. Editors: Dipankar Saha, Karen G. Villholth & Mohamed Shamrukh. More info:
<https://link.springer.com/book/10.1007/978-981-99-8757-3>
- **NGWA's best suggested practice on aquifer storage and recovery updated.**
 - The NGWA document Best Suggested Practices for Aquifer Storage and Recovery (ASR) was recently updated by a consensus of groundwater professionals from around the country.



More info:

<https://www.ngwa.org/detail/news/2024/09/06/ngwa%27s-best-suggested-practice-on-aquifer-storage-and-recovery-updated>

- **European Guidelines document on MAR from the Common implementation Strategy (CIS), working group on groundwater.**
 - In Sep 25th the CIS group have published the European Guidelines document INCLUDING ALMOST ALL OUR IAH-MAR COMMISSION INPUTS (the document moved around from 2023 July submitting participants inputs by November). Our contributions have been listened and heeded, and also, from MARSOL/UT projects.



The expected Directive on MAR for agricultural uses at European level would have been the best solution to move forward, as two countries vetoed it last year when trying to approve the text. That is why the European guidelines for MAR have been published instead.

Please, check this link: <https://circabc.europa.eu/ui/group/9ab5926d-bed4-4322-9aa7-9964bbe8312d/library/009c6b9f-3773-4592-ad79-3503dbf6d07f/details>

- **MAR books repository updated 2024 October 2nd (DINAMAR).**
 - We keep gathering those books of hydrogeology, specially dedicated to MAR technique which are available on the Internet for free. It's a repository for technicians and practitioners where they could meet a library to attend their inquiries.



Access the updated collection and access more than 120 free books on MAR: <https://dinamar.tragsa.es/post/actualizacion-update-libros-sobre-la-tecnica-mar-repositorio-mas-de-120-libros>

- **IWMI water policy brief. Issue 44. Managed aquifer recharge applications for climate adaptation in developing countries: Mounting evidence, abundant potential.**
 - Managed aquifer recharge (MAR) is a well-established technique that enhances groundwater storage during wet periods, thereby making water available during dry periods. Four case studies from Africa and Asia reviewed in this brief demonstrate the concrete and sustained benefits derived from MAR...



Access the Bulletin: <https://hdl.handle.net/10568/158162>

Download the full publication:

<https://cgspace.cgiar.org/server/api/core/bitstreams/2dd445f3-fbe2-43f1-b186-854dd26911e9/content>

Other relevant publications

- **Spring 2024 - California's Groundwater...**
 - Semi-annual Conditions Updates are more frequent supplements to the comprehensive 5-year California's Groundwater (Bulletin 118) Updates <https://water.ca.gov/calgw>, and also provide additional perspective on the near-real-time data availability through California's Groundwater Live. <https://sgma.water.ca.gov/CalGWLive/>
URL: https://data.cnra.ca.gov/dataset/ae160cf2-51d8-450d-82cc-2708e63ccd95/resource/ba12c11f-b8b8-4d37-a9e4-13c2d7831285/download/may_2024_semi_annual_groundwater_conditions_report_v3.pdf
- **Presentación del libro "Agua subterránea. Visibilizando lo invisible".**



<https://www.youtube.com/watch?v=u6OpiM3JU-w>

- **Hydraulic regeneration of the Huacachina oasis in Ica, Peru.**
 - MAR-related interesting article in the Peruvian press about the hydraulic regeneration of the Huacachina oasis in Ica, Peru, thanks to anthropic techniques. Our friend Roberto Navarro played an important work in this activity, and he might broaden some Info.
<https://andina.pe/agencia/noticia-huacachina-peligro-ingemmet-advierte-descenso-nivel-agua-y-plantea-solucion-980814.aspx>



Our colleague Fluker Peña (et al) published a related interesting technical report years ago...

Fluker et al: <https://repositorio.ingemmet.gob.pe/handle/20.500.12544/370>
Roberto and Francisco presented the problem and solutions in ISMAR 10 conference: <https://dinamar.tragsa.es/post/tras-la-clausura-de-la-web-ismar10-net-los-principales-resultados-se-han-trasladado-a-dinamar-tragsa-es>

- **Emilio Custodio: a pioneer in groundwater management and key reference for hydrogeologists worldwide.**



- HJ has published an article about our dear professor and MAR defender and former IAH-MAR member, who sadly passed away some months ago. Access the full article: <https://link.springer.com/article/10.1007/s10040-024-02826-7>

More activity

- **Use of MAR as a water management strategy in Western Australia's mining industry.**
 - The event was a one-day seminar showcasing the use of MAR as a water management strategy in Western Australia's mining industry. Doug Brown helped drive and promote the event in collaboration with the WA IAH and gave the key note presentation about establishing the FMG MAR scheme in the Pilbara region, where a total of ~360 ML dewatering water is re-injected to the aquifer each day to mitigate against environmental impact on a RAMSAR listed wetland, and which has now been operating for over 10 years.

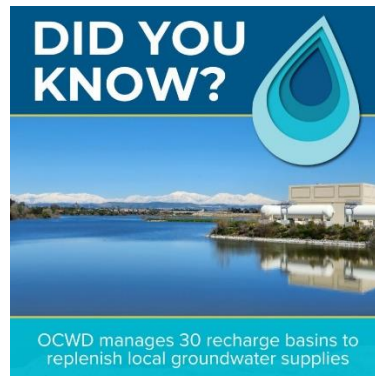


- **2024 SGMA Implementation Summit. 2024 June 5-6th.**
 - The popular Annual GSA Summit is being revamped in collaboration with the ACWA Groundwater Committee and SGMA Implementation Subcommittee. This is a once-a-year GSA and communities of interest get-together to foster progress on SGMA implementation, collaborating with ACWA members and implementers and GRA technical experts. The 2024 SGMA Implementation Summit is in full swing! Our panels have sparked insightful discussions on managing water quality and addressing groundwater depletion. The expert roundtables provided deep dives into critical topics, fostering great collaboration and knowledge sharing. More info: <https://www.grac.org/events/EventDetails.aspx?id=1855354>



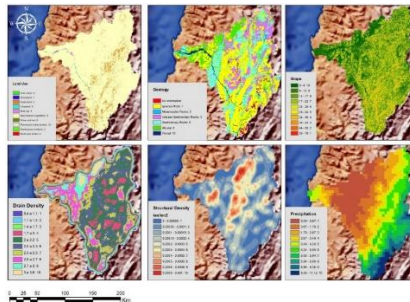
Others

- **IAH-MAR Commission, mandate 2021 – 2026.**
 - Submission of report of activities for 2023 (2024 January).
- **MARSOLut project (intense participation of IAH-MAR members).**
 - Five new PhD theses on MAR were defended successfully. More info: www.marsolut-itn.eu
- **Consulting IGRAC's GGMN information at the Los Arenales aquifer.**
 - Part of the data used for a 'global-scale' study of groundwater levels, published in #Nature, is now available in our Global Groundwater Information System. The analysis is rooted in the analysis of millions of groundwater-level measurements in 170,000 wells from 1,693 aquifer systems in over 40 countries. Study in Nature Portfolio by: Scott Jasechko... (UC Santa Barbara) <https://lnkd.in/dkaDAyed>. IGRAC have incorporated this system in their GGMN server. IGRAC's link shared by Arnaud Sterckx (arnaud.sterckx@un-igrac.org): <https://ggis.un-igrac.org/view/ggmn/>
We have consulted the IGRAC site for Los Arenales aquifer, to check happily that the trends of the piezometers closest to the recharge areas are coming up for the groundwater level; but other piezometers nearby are still coming down. Results: <https://dinamar.tragsa.es/post/consulting-igrac-s-ggmn-at-the-los-arenales-aquifer-in-english>
In summary, MAR is working well in the Los Arenales aquifer regarding groundwater level rise, but obviously, more in the intervention areas than in the whole aquifer.
- **30 percolation basins at Orange County Groundwater Basin.**
 - DYK OCWD manages 30 percolation basins that slowly recharge water back into the Orange County Groundwater Basin while naturally filtering and purifying it? This high-quality water eventually becomes part of north and central Orange County's drinking water supply...



Read more: <https://www.ocwd.com/what-we-do/groundwater-management/>

- **La recarga artificial de acuíferos, una solución para la seguridad hídrica del desierto de Chile (in Spanish).**
 - Investigadores de la Universidad de Atacama y del Centro Avanzado para Tecnologías del Agua (CAPTA) de la Universidad de Chile, desarrollan innovadoras técnicas de hidroinformática para la identificación de las zonas más eficientes y adecuadas para la recarga artificial de acuíferos en el desierto de Atacama...



More info (in Spanish):

<https://www.elmostrador.cl/cultura/ciencia-cultura/2024/07/11/desarrollan-tecnologia-para-la-recarga-artificial-de-acuiferos-en-el-desierto-de-atacama/>

<https://www.iagua.es/noticias/centro-avanzado-tecnologias-agua-capta/recarga-artificial-acuiferos-solucion-seguridad>

- **Podcast. Groundwater talks. MAR in southern Africa.**
 - Groundwater Talks interview with Sumaya Israel and Eberhard Braune, authors of the Book Managed Aquifer Recharge: Southern Africa: <https://open.spotify.com/show/3670QwaYJqjCYRixRAPocV>



Download: <https://lnkd.in/du4QSYm7>

- **GEUS, DEPA and the Danish Embassy in India have shared their expertise on managed aquifer recharge (MAR) with an Indian delegation.**
 - Representatives from the CGWB delegation also gave a presentation on some of the ambitious initiatives on groundwater management in India, which they are in charge.



Read more: https://www.linkedin.com/posts/bj%C3%B8rn-kaare-jensen-2802828_monday-we-had-the-pleasure-to-host-a-delegation-activity-724722485788353312-sDgS/?utm_source=share&utm_medium=member_desktop

- **Under the China-Europe Water Platform, a side event SE-11 Managed Aquifer Recharge Seminar was held during the third Asia International Water Week on September 26, 2024 in Beijing China. The Seminar was organized by EU-China Cooperation on Water.**
 - In this session, options, risks and uncertainties for MAR using both fresh and treated wastewater were examined. Contact: Yinghao Li (Yinghao.li@gopa.de) and Lars Skov Andersen (lars.skov.andersen@gmail.com)



PROGRAM

Chairs:

Dr. LIU Suxia, Institute of Geographic Sciences and Natural Resources Research
Chief Consultant em. Bjørn Kaare Jensen, GEUS, Denmark

SESSION 1 TECHNOLOGIES FOR MANAGED AQUIFER RECHARGE		
10:30 – 10:35	Welcome Speech Richard Hardiman	
10:35 – 10:45	Review of MAR technologies	Lars Skov Andersen ECCoW Consultant
10:45 -11:00	Progress of MAR in China	Professor em. Wang Weiping University of Jinan
11:00 –11:20	Piloting MAR on North China Plain (Recorded)	Dr. Guo Wensi Singapore University
SESSION 2 CHEMICAL ASPECTS OF RECLAIMED WATER FOR MAR		
11:20 – 11:40	Water Quality Aspects of MAR using reclaimed water	Professor HAN Dongmei ECCoW Consultant CAS Institute of Geographic Sciences and Natural Resources Research
TBC 11:40-11:50	Water Quality Indexes governing Managed Aquifer Recharge in the karst aquifers of Apulia (Recorded)	Dr. Alfieri Pollice IRSA-CNR Water Research Institute
11:50 – 12:00	Natural decay of pollutants in riverbank sediments	Dr Ma Yunjie SUSTECH
12:00 – 12:20	Standards for reclaimed water used for Groundwater Recharge and Reuse in Israel	Dr Shai Ezra Israel National Water Authority MEKOROT
SESSION 3 APPLICABILITY OF USING RECLAIMED WATER FOR MAR IN CHINA		
12:20-12:50	Q & A Debate <ul style="list-style-type: none"> • Professor Wang Weiping • Dr Shai Ezra • Professor Han Dongmei 	
12:50-13:00	Closing remarks	Chairs

For more information about the 3rd Asia International Water Week, please visit: <https://3-aiww.scimeeting.cn>.

Other dissemination activities

- Publication of 8 newsletters (almost on monthly basis) with MAR-related activities: <https://recharge.iah.org/newsletters>
- IAH-MAR Commission on Twitter: <https://twitter.com/IAHMARCom>
- WhatsApp group on MAR: about 193 participants.
- Various posts on personal LinkedIn pages of Commission's co-chairs

Note: The list above is a selection of the activities conducted by members and associates of this Commission, and it does not include the exhaustive activities resulted from different projects on managed aquifer recharge, such as R&D project workshops, training courses, field trips etc.

For detailed information, please, consult the newsletters collection of the IAH-MAR Commission: <https://recharge.iah.org/newsletters>.