



**International Association of Hydrogeologists**  
**COMMISSION ON MANAGING AQUIFER RECHARGE**  
**ANNUAL REPORT 2016**

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Web sites: English: [www.iah.org/recharge](http://www.iah.org/recharge)  
Spanish: [www.dina-mar.es/](http://www.dina-mar.es/)  
Chinese: <http://china-mar.ujn.edu.cn/>

### 1. Aims of Commission

The Commission promotes the securing and expanding of water resources and improving water quality in ways that are appropriate, environmentally sustainable, technically viable, economic and socially desirable. It encourages research, development and adoption of improved practices for management of aquifer recharge and improving knowledge, skills and capabilities of practitioners, water resources managers and regulators. The Commission facilitates exchange of information between members internationally (e.g. via a web page and an email list), by disseminating results of research and practical experience (e.g. via conferences and workshops), raising awareness of MAR among IAH members, related professions and the community, and through its members undertaking projects and activities identified by plenary participants as important.

### 2. Highlights of 2016

- *ISMAR9 Mexico City, June 2016*
- *Workshops of MAR for sustainable development and global MAR inventory*
- *Update of IGRAC MAR Portal*
- *Call to Action on Groundwater Management, including MAR*
- *MAR Economics Working Group reforms at ISMAR9*
- *Mario Lluria awarded Herman Bouwer Award (by AHS & CGRA at ISMAR9)*
- *MAR Plenaries at ISMAR9 and IAH Congress, Montpellier, Sept 2016*
- *GRIPP announced with IAH participation*
- *3 active EU projects on or including MAR with open meetings on MAR, Feb & Oct 2016*
- *INOWAS holds first Summer School on MAR, Dresden, 4-9 September 2016*
- *IAH-MAR web site revamped, Dec 2016*

### 3. ISMAR9

ISMAR9 (9<sup>th</sup> International Symposium on Managed Aquifer Recharge) was held in Mexico City, 20-24 June 2016 and organised by UNAM, CONAGUA and ANEAS in conjunction with IAH, UNESCO and ASCE. It incorporated BSMAR15 (15<sup>th</sup> Biennial Symposium on MAR) of the Arizona Hydrological Society and Groundwater Resources Assoc of California. ISMAR9 was attended by more than 200 people from 23 countries in five continents. 140 abstracts were received resulting in 83 presentations in 22 technical sessions, 22 poster papers. On 20 June 3 half-day courses (infiltration systems, well recharge systems and water quality), and 3 workshops were run (MAR for development and Global Inventory by commission working groups); and a Mexican case study workshop (MAR opportunities in

Central Valley, Mexico). These were in addition to 2 keynote speakers Dr. Víctor Alcocer Yamanaka (CONAGUA) and William Alley (former USGS director) and excursions, technical (Atotonilco WWTP), and cultural (Pyramids of the Sun and the Moon), social activities and four daily newsletters. All sessions had simultaneous translation in Spanish and English. ISMAR9 also included a plenary session of the Commission and a special session for the presentation of the Herman Bouwer Award, for significantly advancing the understanding or utilization of MAR. Mario Lluria was the deserving awardee, and it was fitting that the presentation took place in Mexico, as Mario has worked extensively in Latin America as well as USA and Europe in this role.

The Commission very deeply appreciates the attendance and significant contribution of Antonio Chambel, then Vice President (now president) who represented IAH Executive for the first time in the ISMAR Symposia series. This certainly helped build relationships with many whose only experience of IAH until ISMAR9 has been at Commission level. We hope this will be an ongoing feature of ISMAR symposia.

A significant outcome of the week was the fulfilment of an initiative of the host organisations through broad participation in the development of "Sustainable Groundwater Management Policy Directives" in the form of an ISMAR9 call to action. This was cultivated and edited by Tim Parker and Fernando Gonzalez Villarreal and published on the ISMAR9 web site after the symposium.

<http://www.ismar9.org/>

Special thanks are due to Adriana Palma Nava (UNAM) and members of the Organising Committee and to Roberto Ramírez de la Parra (CONAGUA) and members of the Steering Committee for the huge commitment they made to ensure the success of the Symposium. It was a warm social atmosphere and everyone who attended came home with new friends as well as valuable scientific and technical exchanges. Thanks also to UNESCO and Conference organisers for provision of funds to reduce the attendance costs of a number of delegates from developing countries.

More information and photos, showing the spectacular venue, the Palace of Mines, in the heart of the historical and cultural centre of Mexico City are on the ISMAR9 web site.

In the IAH-MAR Plenary it was announced that ISMAR10 will be held in Madrid, Spain in May 2019. At the closing ceremony Enrique Fernandez Escalante issued an invitation for all to attend.

#### 4. ISMAR9 Publications

A booklet of all abstracts was published by Adriana Palma Nava on the ISMAR9 web site [www.ismar9.org](http://www.ismar9.org) along with some of the powerpoint presentations and photographs. As with previous ISMARs, Enrique Fernandez Escalante has published the ISMAR9 poster papers on the IAH-MAR Spanish web site at: <http://www.dina-mar.es/pdf/P-ISMAR%209-v6.pdf>

Following the new publication model from ISMAR8, Beijing, Oct 2013, rather than a proceedings, papers were selected for submission for review and publication in special issues of several journals, one of which was open access and the other open access for a period after publication.

"*Water quality considerations of MAR systems*" is the title of the special issue of the open access MDPI journal **Water**, edited by Pieter Stuyfzand and Niels Hartog.

[http://www.mdpi.com/journal/water/special\\_issues/ARS](http://www.mdpi.com/journal/water/special_issues/ARS) (12 ISMAR9 papers were selected and 13 papers have been published by 2 Mar 2017 and more will come in 2017 (including some papers from an open call).

The theme of a special issue of the Springer journal ***Sustainable Water Resources Management*** is "*Managed Aquifer Recharge in Integrated Water Management*". This is being edited by Peter Dillon, Paul Pavelic, Weiping Wang and Adriana Palma Nava, and when published will appear at <http://www.springer.com/earth+sciences+and+geography/hydrogeology/journal/40899> and will have open access for a period. On this page is a description of the special issue and a place to subscribe to alerts of content on the release of new issues of this journal. More than 60 papers were invited and 26 were submitted and are in process of review and revision in Feb 2017.

## 5. Working Groups

### 5.1 Monograph on Clogging and its Management – leader: **Russell Martin**, Aqueon Pty Ltd, Australia)

This group aims to produce a 2nd clogging monograph focussed on methods to manage clogging in MAR operations. Papers are invited to form chapters within this monograph. As a related objective, papers are needed to help move towards standardization of methods to predict clogging for different source water treatment processes for a particular soil or aquifer. More information and original monograph are at <https://recharge.iah.org/working-groups/clogging-and-its-management>

### 5.2. **Managed Aquifer Recharge for Development** – leader: Yan Zheng (Southern University of Science and Technology, PR China/ City U New York/ UNICEF)

Yan led a UNESCO-IAH workshop in Mexico City on 20 June 2016 on *Managed Aquifer Recharge for Development: Lessons Learned and the Way Forward*. [www.ismar9.org](http://www.ismar9.org) A survey was undertaken, the scope of the groups activities revised, and it was decided to produce a series of fact sheets on successful MAR projects (see <https://recharge.iah.org/mar-for-sustainable-development> ) for more information.

### 5.3. **MAR Global Inventory** - leaders: **Catalin Stefan** (TU Dresden- Germany) and **Nienke Ansems** Intl. Groundwater Resources Assessment Centre, Delft, The Netherlands)

Catalin and Nienke led the first UNESCO-IAH workshop of this working group, on 20 June 2016 in Mexico City, aimed at harmonising data and encouraging new contributions to enable expansion of the inventory which is accessible through the IGRAC MAR Portal. This working group which commenced at IAH Rome Congress in 2015 has expanded the inventory to 1200 sites in 57 countries based on readily available literature. Members have contributed a number of papers to SWARM special issue on ISMAR9. For more information see <https://recharge.iah.org/global-mar-inventory>

### 5.4. **MAR to MARKET** - leaders: **Enrique Fernandez Escalante** (Tragsa, Madrid, Spain and **Teresa E. Leitão**, LNEC, Lisbon, Portugal)

This working group is the global channel for an Action Group under the European Innovation Partnership (EIP) named: “*Strategies and actions to bring managed aquifer recharge technique to industry (MAR(solutions) to MARKET)*”. This group in association with MAR-SOL EU project has been hyperactive holding a series of meetings in The Netherlands (Feb 2016), Greece (Mar 2016), Tunisia (May 2016), Italy (June 2016), Bolivia (July 2016), Germany (Oct 2016), Spain (Nov 2016), Italy (Nov 2016), Portugal (Dec 2016), to increase awareness of MAR, particularly widening the clientele. More detail of 2016 activities is at: [https://recharge.iah.org/files/2016/08/martomarket-dinamar-marsol-2016\\_EFE.pdf](https://recharge.iah.org/files/2016/08/martomarket-dinamar-marsol-2016_EFE.pdf)

A full description of the activities in 2016 and future activities is given at: [http://www.dinamar.es/file.axd?file=2014%2F4%2Fsubmission\\_MAR+to+MARKet-IAH-MAR-WG-v3.pdf](http://www.dinamar.es/file.axd?file=2014%2F4%2Fsubmission_MAR+to+MARKet-IAH-MAR-WG-v3.pdf)

### 5.5. **Economics of MAR** – Leader: **Andrew Ross** (Australian National University, Canberra, Australia)

This Working Group was reformed at the Plenary at ISMAR9 and Andrew subsequently led a group to discuss objectives and plan activities. This has already been fruitful with economic data obtained for a number of sites, in concert with Inventory and Sustainable Development working group leaders, and a manuscript submitted for the SWARM special issue on ISMAR9. More information is at : <https://recharge.iah.org/economics-of-mar>

### 5.6. **60 years history of MAR** – Leaders: **Peter Dillon** (NCGRT & CSIRO) and **Pieter Stuyfzand** (KWR & TU Delft)

The aim of this working group is to produce a journal paper in 2017 that summarizes 60 years of experience in research and practice of MAR around the world. National contributions have been received from Australia, China, Germany, Israel, Italy, Jordan, Netherlands, South East Asia, Southern Africa, Spain and partial summaries from England, France, India and contributions promised from USA and will be web mounted at the IAH-MAR web site. Technology contributions have been

received for ASR, and are awaited for infiltration basins, river bed modifications and bank filtration. For more information see: <https://recharge.iah.org/60-years-history-mar>

**5.7. Working Group on Call to Action on Groundwater Management – Leaders: Tim Parker** (Parker and Assocs, California, USA) and **Fernando González Villarreal** (National Autonomous University of Mexico (UNAM))

Tim and Fernando led an activity during ISMAR9 to develop a clear statement on policy principles for groundwater management, including MAR within that context. They organised two sessions in ISMAR9 to take inputs, construct draft policy principles that were then discussed and further synthesised. They formed a working group to refine the outcomes of the workshop and produce a document that was then circulated more widely for comment, further revised and agreed and adopted as a communication called a “Call to Action on Groundwater Management”. This was in the form of a 2 page document, and as a summary paragraph, as well as giving accompanying information on its origin. These are mounted in English and Spanish at: <http://www.ismar9.org/>. It has been disseminated at Stockholm Water Week (by GRIPP), IAH 43rd Congress Montpellier, and in guidance of various groundwater policy frameworks in USA, Mexico and Australia. The document is freely available to all who wish to use it. Discussions have been held with a view for a larger role for IAH in the policy space, and the possible formation of a Commission. This pathway forward is not yet resolved. <https://recharge.iah.org/call-to-action-on-groundwater-management>

## 6. Plenary at ISMAR9

83 people representing 21 countries attended the IAH-MAR Plenary, Tues 21 June 2016, 3.40 – 5.00pm, in the Main Hall, Palace of Mines, Mexico City, ISMAR9, Mexico

Antonio Chambel welcomed all on behalf of IAH and UNESCO. Reports and plans of working groups were discussed and information given about publications from those activities and from ISMAR8 and ISMAR9. Information was disseminated about *GRIPP – GW Solutions Initiative for Policy & Practice – MAR-Network* activities in China, recent EU MAR project outputs, South Asia Groundwater Forum, and INOWAS Summer School on MAR, (TU Dresden 4-9 Sept 2016).

Enrique Fernandez Escalante led a successful proposal for ISMAR10 to be held in Madrid Spain in May 2019 and Enrique invited all present to ISMAR10 and showed an invitation video.

Antonio presented Certificates of Appreciation from IAH to : Mario Lluria, Paul Pavelic, Weiping Wang, Albert Tuinhof and Gabriel Pérez de los Cobos. – for their contributions to the science and practice of MAR. Citations are listed in notes of that Plenary. <https://recharge.iah.org/recent-iah-mar-plenaries>

Antonio acted as returning officer, for election of co-chairs of IAH-MAR. The three incumbents had expressed a desire to continue in office and as there were no other nominees and in the absence of dissent or abstinence Antonio declared Peter, Weiping and Enrique elected for a three year term, until ISMAR10. Adriana Palma Nava expressed her willingness to stand for the position of co-chair at the next election. Peter advised he would stand down at the next election.

Andrew Ross proposed the formation of a working group to evaluate the economics of MAR to complement activities of other working groups and a collection of interested people subsequently met to determine specific outputs for short term activities of the Economics of MAR working group.

## 7. Plenary at IAH Congress in Montpellier

26 people representing 13 countries attended a compressed IAH-MAR Plenary Tues 27 Sept 2016, 6.50 – 7.40pm, during IAH Congress 43, Rondelet 2, Corum, Montpellier, France (and a further 13 apologies were received).

After a brief summary of the role of IAH-MAR in the context of the UNESCO IHP VIII (2014-2021) <http://www.unesco.org/new/en/natural-sciences/environment/water/ihp-viii-water-security/> noting in particular Focus Area #2.2 Strategies for MAR, and the specific objectives to which the Commission working groups were making a contribution.

Reports and plans of working groups were discussed and information given about publications from those activities and from ISMAR9. Adriana Palma Nava, Chair of the Management Committee for ISMAR9 briefly summarised the events of ISMAR9 and positive responses by stakeholders and attendees. Enrique Fernandez Escalante invited all to ISMAR10, Madrid, May 2019. Karen Villholth presented information on GRIPP – GW Solutions Initiative for Policy & Practice and gave an invitation to the workshop next morning.

The question of whether IAH needed a Groundwater Management Commission was raised by Tim Parker, who had led the Call to Action statement from ISMAR9. This is a matter agreed to be discussed between Tim and the IAH Executive. John Chilton raised a question on mapping of MAR suitability. Between IGRAC and TU Dresden considerable activity is underway to develop techniques and disseminate completed maps. Enrique invited any interested to the MARSOL final meeting Leipzig, Germany, 17-19 October 2016. Jana Sallwey reported on the 1st INOWAS Summer School on MAR in Dresden, Germany, 4-9 September 2016. This had 26 participants from 18 countries. This is a network of junior researchers on MAR (on LinkedIn: <https://www.linkedin.com/groups/8209154>) and at Antonio's suggestion Jana connected with Early Career Hydrogeologists Network in relation to 2nd Summer School in planning for September 2017 and ECHN's plans for a training activity in 2017.

## **8. Invitation**

Members of IAH and others are invited to participate in this Commission to receive and contribute news and information via our email list, to attend symposia and workshops, notably ISMAR10 in May 2019, and to initiate formation of working groups to produce needed specific outcomes over a finite time frame. You can join our email list from the English language website [www.iah.org/recharge](http://www.iah.org/recharge) which has recently been refurbished.

*Peter Dillon, Weiping Wang, and Enrique Fernandez Escalante  
Co-chairs IAH Commission on Managing Aquifer Recharge  
March 2017*