



International Association of Hydrogeologists
COMMISSION ON MANAGING AQUIFER RECHARGE
ANNUAL REPORT 2015

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Web sites: English: www.iah.org/recharge
Spanish: 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 2015

- *Workshop in Beijing – determines to assist Govt formulate MAR Guidance*
- *Rome plenary establishes a Working Group on MAR Global Inventory*
- *Record 140 abstracts received for ISMAR9, Mexico City, 20-24 June 2016.*
- *MARtoMarket working group harnesses European research projects related to MAR*
- *New book on Policy and Economics of Managed Aquifer Recharge and Water Banking*
- *MAR networks now operating in China, Italy and Australia*

3. Working Groups

3.1 Monograph on Clogging and its Management - (Russell Martin, Aqueon Pty Ltd, Australia)
Russell Martin edited 15 contributions and published these on the IAH-MAR web site in 2013, as: Martin R (ed.) (2013) Clogging issues associated with managed aquifer recharge methods. www.iah.org/recharge/clogging.htm He awaits further contributions, particularly related to management of clogging to allow an expansion of this monograph with a view to a 2nd edition. ISMAR9 may help recruit new input.

Anyone interested please contact Russell at <russell.martin@aqueon.com.au>.

3.2. Governance of MAR – (Sharon Megdal, University of Arizona, USA)
A new book on *Policy and Economics of Managed Aquifer Recharge and Water Banking*, edited by Sharon Megdal and Peter Dillon was printed from the 14 downloadable papers in the special issue of MDPI Water Journal web. Orders may be placed via the website: http://www.mdpi.com/journal/water/special_issues/MAR

3.3. Economics of MAR – (Peter Dillon, Australia) Contributions made to MDPI Special Issue and now book. Our aim to develop a standard framework and measures to account for the costs (and benefits), of MAR has in part been undertaken by incorporating MAR in an excel spreadsheet benefit-cost analysis tool prepared by Marsden Jacob for the Australian Centre of Excellence in Water Recycling and documented in report for that Centre by Joanne Vanderzalm et al (2015) *Economics and experiences of managed aquifer recharge (MAR) with recycled water in Australia*.

<http://www.australianwaterrecycling.com.au/research-publications.html>

This needs expansion to capture additional externalities where there are multi-sectoral benefits. It is hoped that a set of case studies can be compiled after ISMAR9 that include financial and economic analysis of MAR to compare with other forms of water supply or water security, particularly in support of the MAR for Development Working Group.

3.4. Managed Aquifer Recharge for Development – Yan Zheng (City U New York/ UNICEF/Peking University, PR China). Yan led a workshop in Beijing on 7 Sept 2015 coordinated with Weiping Wang (Commission Co-Chair, Weiping Wang) and the MAR-network in China, on formation of MAR Guidelines for China and upscaling of demonstration projects. This workshop resolved that this was essential and collaboratively determined a pathway to progress this work.

A primary target of this working group is to run a UNESCO workshop on *Managed Aquifer Recharge for Development: Lessons Learned and the Way Forward* in Mexico City June 2016 at start of ISMAR9. Some financial support has been offered by UNESCO. www.ismar9.org

3.5. Water storage for managing climate extremes and change – Bridget Scanlon (U. Texas at Austin, USA). This working group has wound up having completed the task of editing a Special Issue of Environmental Research Letters, an open access journal. This was done jointly with IAH Commission on Groundwater and Climate Change. 8 papers were published, and only one focussed on MAR: Lopez *et al* (2014). Water management during climate change using aquifer storage and recovery of stormwater in a dunefield in western Saudi Arabia.

<http://iopscience.iop.org/article/10.1088/1748-9326/9/7/075008>

The issue is found at: <http://iopscience.iop.org/1748-9326/focus/Water%20Storage%20for%20Managing%20Climate%20Extremes%20and%20Change>

3.6. MAR to MARKét – Enrique Fernández Escalante (Tragsa, Spain)

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 has been hyperactive holding a series of meetings in Europe, Brazil, Chile and Peru under the auspices of the MARSOL to increase awareness of MAR, particularly widening the clientele.

A full description of the activities is given at: http://www.dina-mar.es/file.axd?file=2014%2F4%2Fsubmission_MAR+to+MARKet-IAH-MAR-WG-v3.pdf

3.7. MAR Global Inventory - Catalin Stefan (TU Dresden- Germany; IGRAC-Netherlands)

At the IAH-MAR Plenary Session in Rome, Catalin Stefan extended the MAR inventory produced by Christoph Sprenger in DEMAU project from 220 MAR projects in Europe to 1200 sites in 57 countries based on readily available literature. He synthesised data into various categories including growth in number of sites with time, by region, by MAR methodology, by type of source water, by type of aquifer and by end use. A plan was jointly developed with IGRAC for a working group and clarified the objectives of the exercise so that we could simplify and maximise the value of data acquisition. A workshop is planned for 20 June 2016 in Mexico City at ISMAR9 to advance this work and widen engagement.

4. Plenary at IAH Congress in Rome

14 people representing 11 countries attended the IAH-MAR Plenary Mon 14 Sept 2015, 5.40 – 6.40pm, during IAH Congress 42, Green Room, Mineralogy, Sapienza University, IAH Congress 42, Rome, Italy (and a further 13 apologies were received).

Aurelien Dumont (UNESCO) gave a talk on MAR and 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 Commissions working groups were making a contribution. Consequently the Co-chair had a follow up skype session with Alice and Aurelien to:

- (a) enquire on a proposal originally drafted by UNESCO and IAH and intended for GEF as an outcome of the Global Groundwater Governance Program. It involved case studies of over-exploited aquifers brought back to equilibrium through a range of measures including MAR, and workshops to build capacity in similar areas that are struggling.
- (b) follow up on resourcing to assist developing country delegates for ISMAR9 and the MAR in Development Workshop to be held before ISMAR9.
- (c) form a draft plan for potential UNESCO publications of working groups for consideration. This may include potential publications to arise from ISMAR9 workshops.

Finalisation of outcomes of these discussions will be reported in the next report.

Working groups activities were presented and summarised above, and information on ISMAR9 presented by Adriana Palma Nava and invitations were handed out. See below. The foundations for a new working group on Global MAR Inventory were established, and subsequently further jointly developed with IGRAC.

Other news items were presented and the more conspicuous ones are summarised and updated below.

5. ISMAR9 - Mexico City 20-24 June 2016 – Adriana Palma Nava

Adriana and ISMAR9 committees have been working hard to make a highly successful symposium. 140 abstracts were received, and successful authors have received acceptances for oral and poster papers. Six half day workshops/courses are offered on Monday 20 June; 2 workshops (MAR for development and Global Inventory); 3 courses (infiltration systems, well recharge systems and water quality) and case study (MAR opportunities in Central Valley, Mexico). Full papers are due 31 March. ISMAR9 also includes the US Biennial symposium on MAR in conjunction with Arizona Hydrological Society, Groundwater Resources Assoc of California, and includes announcement of the Herman Bouwer Award. The symposium will have simultaneous Spanish - English translation service proudly supported by CONAGUA. Papers that are suitable will be selected for publication in MDPI Journal Water and Springer's new Sustainable Water Resources Management (SWARM). There will be a technical field trip and a trip to Aztec pyramids. This is shaping to be the best ISMAR symposium yet. For more information see: www.ismar9.org

6. Other News and Events

Italian MAR Network: Rudy Rossetto founded and will coordinate the Italian Network on MAR - INMAR. This was gratefully acknowledged by all in attendance at the IAH –MAR Plenary in Rome. We look forward to hearing of the progress of MAR in Italy as a result of proposed activities and networking. Italy joins China and Australia as the first countries with active MAR networks.

Chinese MAR Network: Yan Zheng and Weiping Wang A Workshop 7 Sept 2015 at Peking University, Beijing, on forming MAR Guidelines for China unanimously agreed to proceed to offer to the most appropriate Ministry, to form a technical group of members of China MAR Network to

develop the guidelines. This work is being led by Yan Zheng and Weiping Wang. It is also proposed for comprehensive monitoring of selected demonstration / research sites.

Australian MAR Networks: MAR-Hub is an alliance of Australian companies, regulators and research providers that has formed in South Australia to help facilitate effective uptake of MAR (cluster facilitator: David Evans). In parallel with this, MAR operators networks have formed in South Australia (Greg Ingleton) and Victoria (Simon Robertson) to learn from each other's experiences in operating MAR projects. On 17 December 2015, a workshop in Melbourne with a phone hookup to Adelaide brought the groups together to initiate contact.

Update of MAR books repository. Enrique Fernández Escalante, Co-chair, has updated the repository in Feb 2016 including at least five new reports/books e.g., "Using Isotopes for Design and Monitoring of Artificial Recharge Systems". IAEA Tecdoc Series. TECDOC No. 1723. International Atomic Energy Agency, Vienna, released in Nov. 2013. This and other resources are found at: <http://goo.gl/YDTpVU>

The workshop "Boosting Managed Aquifer Recharge in Europe" held in Leeuwarden, The Netherlands, 9 Feb 2016, initiated by Members of the MAR to MARKET working group (and included contributions from Portugal, Spain, The Netherlands, Belgium, Italy, Switzerland, Austria and Germany). Presentations, summary and a "Declaration" of the workshop can be found at: <http://goo.gl/2DqcNn>

2015 Stockholm Water Prize: Years of highly effective work on increasing recharge from ephemeral streams with impressive community engagement in a flood and drought prone area in NW India has been recognised with the announcement of **Mr Rajendra Singh** as the 2015 Stockholm Water Prize Laureate. More information is at: <http://www.siwi.org/prizes/stockholmwaterprize/laureates/2015-2/>

The NCGRT Distinguished Lecturer in 2015 was Peter Dillon and the topic of his talk given in Australian capital cities and Christchurch was *Progress in Managing Aquifer Recharge in Australia and the Water Banking Frontier*. A survey conducted at the lectures revealed current views on MAR and also found that MAR now exceeds 200Mm³/yr in Australia with half of this being in mine and coal seam gas water management.

7. 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 ISMAR9, 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.

Peter Dillon, Weiping Wang, and Enrique Fernandez Escalante

Co-chairs IAH Commission on Managing Aquifer Recharge

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