International Association of Hydrogeologists

COMMISSION ON MANAGING AQUIFER RECHARGE

ANNUAL REPORT 2012

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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.

Summary:

In 2012 Commission organised and/or promoted a number of activities to advance the science and application of MAR. We continue to make progress on the activities that were agreed to at ISMAR6 in Phoenix in 2007 and at ISMAR7 in Abu Dhabi in 2010, and were reinforced at a Commission Plenary Sessions at the Niagara Falls IAH Congress in September 2012 and at the International Groundwater Conference in Aurangabad in December 2012. A publication was produced by members for the GEF-FAO Groundwater Governance Program, Cornelius Sandhu (University of Applied Sciences, Dresden) edited a special issue of Journal of Indian Water Works Association on River Bank Filtration and Russell Martin (AGT, Adelaide) and a band of co-authors are bringing together a monograph on management of clogging. Preparations for ISMAR8 Beijing, 15-19 Oct 2013 are well underway thanks to a strong local organising committee, including Chair, Prof Zhao, Prof Weiping Wang and Jordy Yin (secretariat). More than 70 oral papers have been accepted, some of which will be published in special editions of several journals, at least 4 workshops and an interesting field trip are offered.

Activities in 2012: Conferences and Workshops

American Ground Water Trust 2012 MAR Programs

The American Ground Water Trust (AGWT) a non-profit education organization, continued to promote the science, technology and policy of Managed Aquifer Recharge with the following conferences.

30-31 January 2012 Aquifer Recharge Conference, Ontario, California
Organised by AGWT in partnership with: Association of Ground Water Agencies, Groundwater Resources Association of California, California Groundwater Coalition, IAH Commission – Groundwater for Decision-Makers, and Southern California Water Utilities Association

This conference had 28 presenters talking about the status of aquifer recharge projects in USA and California in particular, describing case studies, technologies, needs and policy issues: Aquifer Recharge Program, Ontario, CA This was followed on 1 Feb by a field trip to Long Beach Saltwater Barrier Recharge Site.

10-11 September 2012 AGWT also ran the **12th Annual Florida Aquifer Recharge Program**, in Orlando, Florida. 22 presenters covered status of projects issues and solutions. One session was devoted to coastal aquifer management and sea level rise. : Aquifer Recharge Conference, Orlando FL

For any questions about past or future MAR related programs in the USA, contact IAH member Andrew Stone, AGWT Executive Director (astone@agwt.org). CDs of the PowerPoint presentations made at all of these events are available for purchase – www.agwt.org

13-14 February 2012, Adelaide, Australia: National Workshop *Pathogen Fate in Aquifers*

Invited speakers:
Jack Schijven, (RIVM, Netherlands), Liping Pang (CRI, New Zealand), Simon Toze, Jatinder Sidhu and Saeed Torkzaban (CSIRO, Australia). Twenty regulators and researchers attended.

The science of pathogen fate in aquifers and unsaturated zone was discussed, particularly the relative importance of net attachment and inactivation, measurement methods available, and reliability of models to predict fate. It was agreed that there is a need for further scientific information to allow pragmatic regulation for managed aquifer recharge and groundwater quality protection. Research gaps were identified and a summary of research recommendations was produced. This is available from peter.dillon@csiro.au

Virus transport and inactivation - spatial and temporal attenuation processes occur in combination.

15-19 February 2012, Workshop on Managed Aquifer Recharge through Village-level Intervention, Udaipur, Rajasthan, India
This was the start-off workshop for a four year research project of the Australian Centre for International Agricultural Research in selected villages in Rajasthan and Gujarat. The project is led by Prof Basant Maheshwari of University of Western Sydney and contains several Indian and Australian partners. The objective is to evaluate the economic, social and environmental effects of MAR within village scale interventions to improve livelihoods of village communities. Further details are at: http://www.uws.edu.au/marvi

Groundwater Resources Association of California Webcasts on MAR
GRA ran a series of webcast on Managed Aquifer Recharge. Each of these occurred between 12 noon to 1:30PM California time on the WEBEX platform. These are being continued in 2013. Further information and web link is at www.grac.org. This information is provided by Tim Parker of GRAC.

GRAC Webcast Series on Managed Aquifer Recharge:
Apr 18, 2012 – MAR No. 1 – Groundwater Recharge Mapping – New California Policy Requirements
Sep 25, 2012 – MAR No. 2 – What's a Good Recharge Project
Nov 14, 2012 – MAR No. 3 – Spreading Case Studies
Dec 12, 2012 – MAR No. 4 – Injection Case Studies
Jan 16, 2013 – MAR No. 5 – Recycled Water Recharge
Feb 6, 2013 – MAR No. 6 – Tracers and Recharge
Mar 6, 2013 – MAR No. 7 – Recharge Outside California

16-21 Sept 2012, Niagara Falls IAH Congress – a theme on Groundwater Recharge was coordinated by Vic Heilweil (USGS) and Peter Dillon (CSIRO). This included 24 papers on MAR and 6 papers on natural recharge presented in 5 sessions. There were also 2 poster papers on MAR. In addition a **Plenary of the Commission on Managing Aquifer Recharge** was held and attracted 25 attendees. http://www.iah.org/recharge/downloads/IAH-MAR-Commission-Plenary-Niagara%20Falls-agenda-19sep2012.pdf
Further actions: for areas of (1) MAR policies and institutions, and (2) Economics of MAR, we would aim to generate a synthesis from papers submitted to ISMAR8 or collate papers for a thematic edition of a journal. Concerning inventory of MAR, the UNESCO International Groundwater Resources Assessment Centre (IGRAC) is processing data for 400 sites previously collected to make these web

accessible. MAR-NET progress has stalled but it is hoped in ISMAR8 to rekindle progress on this network of centres of training and demonstration in MAR.

3-5 December 2012, Shijiazhuang, China: GEF-FAO Groundwater Governance Consultation IAH had developed four Thematic Papers on Groundwater Governance was represented at each of five regional consultations, of which this was the fourth. MAR is central to thematic paper 4 on 'Management of aquifer recharge and discharge processes and aquifer storage equilibrium' and this is referenced and available by web link below under 'Publications and resources'**.**

11-12 December 2012, Anna University, Chennai, India: SAPH PANI Training Course on MAR This training course organised and edited into a set of notes by Prof Elango Lakshmanan elango@annauniv.edu involved 16 presenters from the Saph Pani (Safe Water) project. The training covered a wide range of selection, design, operation and safety aspects of MAR projects for more than 50 attendees. The Saph Pani project's full name is *Enhancement of natural water systems and treatment methods for safe and sustainable water supply in India*. It is an European Union funded collaborative research project which started in October 2011 with a duration of three years involving a consortium of 20 partners from India, Europe, Sri Lanka and Australia. Web address is: http://www.saphpani.eu/service/home.html
This project will is developing and proving low cost options essential for the future of water supply urban areas in India and involves studies at a number of sites in India. The project includes Work packages : WP1 – Riverbank filtration; WP2 – Managed aquifer recharge; WP3 – Wetland treatment systems; WP4 – Post-treatment; WP5 – Modelling; WP6 – Integrated assessment; WP7 – Training and dissemination. The project coordinator, Thomas Wintgens, is assisted by project manager Anders Nättorp: anders.naettorp@fhnw.ch

11-12 December 2012, Amman, UNESCO Workshop on Managed Aquifer Recharge UNESCO Representative: Lucilla Minelli.

19 December 2012, Aurangabad, Maharashtra, India – Peter Dillon convened a plenary for participants of the International Groundwater Conference. This attracted ~ 20 attendees. The agenda was as for the Niagara Plenary. There were expressions of ongoing interest among attendees for further technical information and networking on MAR.

Publications and Resources

Special Issue of Journal of Indian Water Works Association on River Bank Filtration
Cornelius Sandhu of University of Applied Sciences, Dresden edited the December 2012 special issue of this journal which is dedicated to River Bank Filtration in India. Nine papers describe the application of river bank filtration, that is pumping from alluvium to induce infiltration of river water, and improve and modulate its quality for use, primarily as drinking water supplies. After an overview paper on the status and opportunity for river bank filtration in India, three papers focus on case studies on tributaries of the Ganges River in the State of Uttarakhand and in New Delhi. Several papers give specific attention to water quality improvements through river bank filtration, recording declines in organic carbon and thermotolerant coliforms and one proposes river bank filtration as an alternative to pre-chlorination of water supplies. Environmental tracers were used to characterise travel times of bank filtrate. Several papers focussed on radial collector well technology and performance and one paper describes a horizontal media filter as an emulation of river bank filtration. Finally one paper discusses the public acceptance of river bank filtration and found that for communities where bank filtration had been installed, significant public health improvements had occurred and there was high public acceptance. For more information please contact Indian Water Works Association; iwwa@rediffmail.com or Cornelius Sandhu; sandhu@htw-dresden.de

IAH agreed with UNESCO to develop 4 thematic papers for the Groundwater Governance Program of the Global Environmental Facility of World Bank and UN Food and Agriculture Organisation. These were completed during the course of 2012 one of which was assigned to this Commission. This has now been web-published and members may find this document of interest in showing how MAR in combination with demand management can help to restore depleted aquifers. The reference is:
Dillon, P., Fernandez, E.E. and Tuinhof, A. (2012). **Management of aquifer recharge and discharge processes and aquifer storage equilibrium**. GEF-FAO Groundwater Governance Thematic Paper No. 4, 49p. www.groundwatergovernance.org/resources/thematic-papers/en/

The European Commission research project RECLAIM WATER resulted in a publication that shows how managed aquifer recharge in combination with engineered water treatments is being used around the world to produce safe drinking water and irrigation water supplies. It can be found at:
Kazner, C., Wintgens, T. and Dillon, P. (eds) (2012). **Water Reclamation Technologies for Safe Managed Aquifer Recharge.** 429p. IWA Publishing, London, UK.
http://www.iwapublishing.com/template.cfm?name=isbn9781843393443

The 3R consortium http://www.bebuffered.com/index.htm produced a new booklet describing methods andapplications of recharge to create a water buffer to resist drought in rural and urban settings at various scale. This extends from these authors previous work to cover principles, a discussion of the effect of scale, and economic evaluation of benefits and costs before presenting an expanded set of case studies from around the world, mostly in developing countries.
Tuinhof, A., van Steenbergen, F., Vos, P. and Tolk, L. (2012). ***Profit from Storage - The cost and benefits of water buffering.*** http://www.bebuffered.com/downloads/3R_Profit_from_Storage_2012.pdf 115p.
This was launched at Stockholm WWW on 30 August 2012 at the 3R Consortium and FAO seminar (9:00-12.30pm) on ***Upscaling water storage solutions: the economic potential.***
http://www.bebuffered.com/seminar.htm

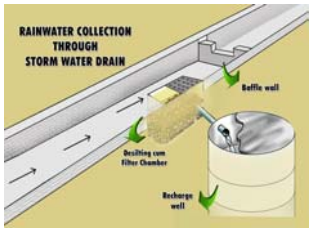
In May 2012 Tragsa, the Spanish organisation that undertook a major Project called DINA-MAR released a booklet '**Rechargeable Sustainability. The key is the Storage**' to update, condense and translate into English the 2010 DINA-MAR report "Management of Aquifer Recharge within the framework of sustainable development". The new booklet summarises MAR operations and opportunities in the whole of Spain. The text has four sections: 1) a summary of the Workshop held on June 30, 2008; 2) a summary and conclusions of the final DINA_MAR publication; 3) a summary of the closing workshop held 25 May 2011, and 4)
general project conclusions. The booklet is in English and Spanish and is found at:
Fernandez, E.E. and Sauto, J.S.S. (2012). **Rechargeable Sustainability. The key is the Storage**. 58p. Tragsa.
http://www.dina-mar.es/post/2012/08/31/NUEVO-DINA-MAR-Publicacion-e2809cSostenibilidad-recargable-La-llave-en-el-almacene2809d-disponible-en-Internet.aspx

A survey of the status of **Progress with Managed Aquifer Recharge in Australia** was also published by the National Water Commission in 2012. It can be found at:
Parsons, S., Dillon, P., Irvine, E., Holland, G. and Kaufman, C. (2012). Progress in Managed Aquifer Recharge in Australia. National Water Commission Waterlines Report Series No 73, March 2012, SKM & CSIRO, 107p. http://archive.nwc.gov.au/library/waterlines/73

Progress with Groundwater Clogging Monograph
Based on requests at IAH Congress in Krakow and ISMAR7 in Abu Dhabi, Russell Martin and Peter Dillon developed an outline for a monograph on clogging and its management in MAR (infiltration systems and wells). This is a fundamental issue for viability of MAR and assembling information systematically should help resolve some of the uncertainty surrounding this topic. Contributions were sought by emailing the IAH MAR email list. A meeting was held at IAH Congress in Niagara Falls in Sept 2012 to advance the monograpgh. More than 12 contributions were offered and have been received by Russell Martin rmartin@agwt.com.au who is editing the publication, aiming for its release at ISMAR8 (Oct 2013).

Click here for a **video of a stormwater recharge well in Chennai** in action – a posting from India Water Portal - submitted by ashis on November 20, 2012 - 11:04.

http://www.youtube.com/watch?v=0UwWfv_rH0Q



http://www.youtube.com/watch?v=91K-28X7qcM&feature=related

Activities coming up: ISMAR8

15-19 October 2013, Beijing, ISMAR8 – www.ismar8.org. The website contains information on 6 workshops, ~80 oral papers and a number of poster papers and a registration facility. This is the premiere international MAR conference and is held on average once every three years. The chair of the organising committee is Prof Xuan Zhao (Tsinghua University), Vice Chair is Prof Weiping Wang (Co Chair of this Commission and Jinan University) and secretary to the conference is Jordy Yin; ismar8@126.com An excellent cross-section of Chinese participating organisations will be involved. Everyone interested in MAR will find this a valuable conference and there will be much to learn from international developments.

Ongoing Activities

1. IAH- MAR Websites

In 2012 the Spanish website IAH-MAR website has continued to be run actively by Enrique Fernandez-Escalante, TRAGSA, Madrid. The Chinese website is also doing well thanks to Weiping Wang, University of Jinan, China. The English language website is now maintained by Jan Mahoney of CSIRO Land and Water. The three sister websites are found at:
www.iah.org/recharge http://www.dina-mar.es/ http://china-mar.ujn.edu.cn

2. Email List

IAH Australian Chapter and Flinders University of South Australia have maintained this list, which has a stable number of 300 members in 33 countries. A number of emails were sent during 2012 advising of new conferences, workshops, reports and opportunities. We hope non-members of IAH find this helpful and encourage you to join IAH and enjoy the full benefits of membership. The list can be joined from the web site (www.iah.org/recharge).
