

Notes from
IAH Commission on Management of Aquifer Recharge
5th Plenary Session of IAH-MAR
Friday 13 Oct 2006: 8:30 – 12:00 am
at 34th IAH Congress, Beijing, China
International Convention Centre, Meeting Room 1, Ground Floor

20 people from 10 countries signed the attendance sheet; these were Jaco Nel, Yongxin Xu, Segun Adelana* (Sth Africa), Arana F., Alin C. (Thailand), Oscar Escolero (Mexico), Xu Min, Chen Junfeng, Qian Hui, Tian Jinghong, Haipeng Guo, Zhi Yuanma, Bingfa Zhi (China), Uwe Troeger (Germany), Andreas de Jong (The Netherlands), Jiri Krasny# (Czech Republic), Ken Howard (Canada), Peter Jolly, Peter Dillon (Australia), George Yu (USA). Visits were made by others including Stephen Foster, Chair of IAH.

* IAH Vice President, Africa, # IAH Coordinator of Commissions and Chair of IAH Commission on Hard Rocks, ^Chair IAH Commission on Urban Groundwater

Apologies: Ian Gale (UK, Vice-Chair), Albert Tuinhof (The Netherlands- leader of Inventory Working Group), John Moore & Ivan Johnson (USA), Andrew Skinner (Exec Manager IAH), Willie Stuckmeier (Sec General), Dr Chadha & Dr Rai (India), Alice Aureli & R. Jayakumar (UNESCO), Makoto Nishigaki, John Apambilla Akudago, and Fajar Lubis (Japan)

1. Welcome (08:30)

1.1 Commission Objectives & Agenda (Peter Dillon, IAH-MAR chair) i.e. sustainable, responsible management of aquifer recharge, to offset water shortages and in particular address UN MDG for drinking water supplies.

1.2 Communications –web site managed by Ian Gale, BGS: www.iah.org/recharge, searchable publications data base, email list, links, project reports. **Action: All wanting to join email list** please do so via the web site. If you have problems please contact Peter.Dillon@csiro.au Everyone is welcome to insert abstracts of conference papers and reports (grey literature) on the searchable data base or advise of further web links and research projects relevant to MAR.

1.3 Introductions of all present –

Jiri – linkages across commissions sought. Hydrogeology of fractured rocks book out next year.

Alin and Arana – Thai Dept Water Resources starting two mega projects on MAR. One on ASR in Bangkok, one on rural area addressing flooding in wet season. Looking to acquire and develop knowledge of MAR operations.

Wandong Won (sp?) – China Geol Survey – how to manage aquifer recharge

Adreas –freelance consultant- groundwater policy for Afghanistan, promote pilot projects for MAR

Oscar- National Univ of Mexico – overexploitation of aquifers in northern Mexico, cities water demands and flooding incidence increasing due to population growth and climate change, maybe storing below ground could help with both these problems, wastewater being used for irrigation around edges of cities, perhaps treat better and reuse in towns. MAR technology is expensive, how to simplify?

Uwe Troeger – Tech Uni of Berlin, Chair of Hydrogeology, First artificial recharge was in 1875 near Berlin followed in 1890 by Theim constructing a lake with a sand bed to infiltrate surface water – Uwe can access old German reports. If anyone is interested in writing up history please contact Uwe. Sewage infiltration beneath irrigation areas. Aiming to recharge a geothermal aquifer in Brazil where heads have dropped 60m. Care with water and thermal balance needed. NE Brazil high salinity in deep salinity stratified fractured rock aquifer that Uwe is proposing to recharge with fresh water in intermittent wet periods to freshen the aquifer. Limited resources to study problem. Bank filtration also considered.

Qian Hui, Tian Jinghong – need aquifer management not recharge management. Near Xian pumping has drawn down a deep aquifer so that there is now land subsidence and earth fissures. They tried to recharge via boreholes but these became clogged. There is no other way to access these deep aquifers. In Northern Xiangshi Province galleries beneath the river bed were used to collect water. This worked well

for the first two years but then the flow severely declined. Geothermal waters from >100 wells of up to 2000m deep have been used in Xian, and are important for tourism, but levels have dropped very quickly because there is little recharge. They are considering injecting to see if they could maintain water and heat balances. Tian is studying geochemical and isotopic characteristics of geothermal waters.

Peter Jolly – NT govt has undertaken ASR at Goulburn Island for dry season drinking water supplies for local community and at Alice Springs reuse of effluent via Soil Aquifer Treatment. Varied conditions from arid to humid tropics, but isolated, few resources for an enormous area, like a developing country. Have used whatever expertise available.

Yongshin Xu – UNESCO Chair, Univ of Western Cape - there is a need to keep up with knowledge. Local project at Atlantis and plans have been made for recharge of reclaimed water on Cape Flats aquifer.

Segan Adelana – most sub-Saharan African cities have a supply shortage, particularly Cape Town and in Ethiopia. Don't think Africa can cope with some of the ASR done in Australia, requires too many resources and expertise.

Stephen Foster – drew attention to AGRAR project report of Ian Gale and team. This is mounted on the IAH-MAR web site, and Stephen advised hard copy is available from Ian at ing@bgs.ac.uk

2. Current Working Groups - Recent activities

2.1 Strategies for Managed Aquifer Recharge in Semi-arid areas (Ian Gale)

Report commenced Dec 2000 and completed in June 2005. UNESCO covered publishing cost but all writing and editing was voluntary. Excellent publication suitable at community leader –non-technical level. Copies available at www.iah.org/recharge or (a few) copies available from Ian Gale. We need to have a different model for producing publications, whereby they can be done during normal working hours. Proposals to be discussed later, and also concerning translation of this document.

2.2 Training Progress report. (David Pyne)

UNESCO, workshops run in Egypt, Iran, Pakistan, Vietnam, WMO-Mexico National Water Commission Workshop in San Luis Potosi July 06 organised by Oscar Escolero. Peter has offered to write a page on MAR for John Moore's Groundwater Primer –(for him to include in future groundwater courses) **Action : Peter D**

2.3 MAR Governance Progress report. (Andre La Forest/ Peter Dillon)

Andre LaForest (Canada) had offered to lead this working group in Berlin at ISMAR5 Plenary but Peter has only just followed up with him. A proposal has been submitted to Aust Govt for support of two documents on water quality guidelines and water entitlements for MAR. Peter will keep all posted, and support is sought on providing information on national regulations governing MAR re quantity and quality. Such a request with a template for what is sought, filled in for one country, will be sent out in first 3 months of 2007 if project proceeds. **Action: Peter D**

2.4 Inventory Progress report. (Albert Tuinhof)

Albert commenced a MAR inventory in 2002 but little progress was made until recently when the Dutch Govt provided him financial support. Peter showed the spreadsheet that Albert had sent and asked all present to assist with completing this for their country. It was likely to be web mounted and those present agreed that their email addresses be provided to Albert so he could make contact. The template and instructions were likely to be mounted on the IAH-MAR web site, and an email would be sent to the email list when this occurred. **Action: Peter D**

3. IAH MAR Forthcoming Conferences (10 mins)

3.1 ISMAR6. IAH/ASCE/NWA/AHS. 28 Oct – 2 Nov 2007, Phoenix, Arizona, USA. (Doug Bartlett (jointly with Arizona Hydrological Society 13th Biennial Artificial Recharge symposium)

www.ismar2007.org

Peter advised that abstracts are due 15 October and encouraged all to submit. Some funding will be available to enable attendance of members of developing countries. There will be oral and poster papers. Field visits will be exceptional as there are so many different types of MAR projects, and some on very large scale.

3.2 Proposal procedure for ISMAR7 (Peter Dillon) – any expressions of interest?

Tentative expressions of interest were received from Africa, possibly Cape Town, and from Xian, China. There will be further discussion between Peter and Yongxin Xu and Jaco Nel, possibly in relation to establishment of a demonstration project, and with Qian Hui, Tian Jinghong, possibly similarly, with a view to developing at least one firm proposal for ISMAR7 in 2010 with possibly another proposal for 2013. **Action: Peter to follow up by email.**

4. IAH Participation in UNESCO & other Workshops and Training Programs

4.1 UNESCO/IAH workshop on Implementation of MAR in Developing Countries: Benefits, Problems, and Solutions. Berlin, 11 Jun 05. – report on this is on IAH-MAR web page.

4.2 GEF/STAP/UNESCO Workshop in New Delhi, 19 – 22 September 2005. Managing the subsurface environment: Managed Aquifer Recharge. Workshop report at <http://stapgef.unep.org>

4.3 Small Island Developing States – members informed that there would be a workshop in Caribbean Nov 06 to discuss establishment of a project on managing groundwater in small islands with a view to determining role for MAR in augmenting and protecting resources

4.4 Other workshops proposed or under consideration:

* International Groundwater Conference, Coimbatore, India, Feb 2007 – (Dr Rai (NGRI) and Dillon, drafting an outline – intend to include AGRAR project summary, happy to involve others who intend going or would like to inform Indian colleagues)

<http://www.cig.ensmp.fr/~iahs/conferences/2007Coimbatore.pdf>

* American Ground Water Trust 6th ASR workshop next week, Orlando, Florida (Andrew Stone)

* Centre for Groundwater Studies 4th ASR workshop in May2007 Gold Coast, Queensland (Trevor Pillar).

* other suggestions for workshops/training/education are always welcome

5. International Research Programs on MAR and Publications:

Peter referred to the IAH-MAR web site www.iah.org/recharge where a ‘research’ page has been set up by Ian Gale. This includes :

EC Projects (Overview – Avelino Gonzalez-Gonzalez), RECLAIM WATER (Thomas Wintgens), GABARDINE (Martin Sauter)

AWWARF, WateReuse Foundation, Global Research Alliance, Global Water Research Coalition

Other recent publications on MAR–Ian Gale (Strategies and AGRAR reports referenced earlier), David Pyne (2nd Edition of his ASR book has now been published), Albert Tuinhof (MAR Calendar 2006 – on IAH web site), Ricky Murray (Sth Africa summary publication on MAR – useful teaching resource), Ed Bouwer (edited Procs on 2nd Bank Filtration Conference Cincinnati, ~ 2004, ISMAR5 Procs – UNESCO will make available electronically and will also appear as a book in due course (apologies over delays).

6. Proposal for a publication – Oscar Escolero

Oscar Escolero announced that he is securing support of National Water Commission of Mexico and possibly World Meteorological Organisation for him to edit a book in Spanish on MAR relevant to Latin America. Oscar explained that addressing water needs in arid cities would require reuse of wastewater and harvesting of stormwater. Existing groundwater overuse has created storage space in aquifers to store recharged water. Irrigation with wastewater also has some unexpected consequences. The book would cover theory and methods as well as some interesting case studies. Oscar invited members of the IAH-MAR Commission to contribute to this book in Spanish or in English, that will be translated. Oscar will develop with Peter and the Mexican Water Commission an outline of the book, that could be used in training courses. The outline and an invitation for contributions would then be circulated to IAH-MAR members. Those present expressed willingness to contribute to the book.

Maybe IAH-MAR could then also seek support for English or other language versions of the book (possibly from UNESCO).

A meeting of contributors could be held at ISMAR6 in Phoenix, to accelerate the finalising of the text, aiming for conclusion of first draft of whole text by end 2007. **Action: Oscar**

7. How could IAH MAR better serve non-English speaking hydrogeologists

Tian Jinghong said that in China, many academics and tertiary trained hydrogeologists could read English documents, regardless of whether they could speak or write in English. However many colleagues in government and industry could not read English documents, and for ease of communicating with these people Chinese translations would be very valuable. Oscar Escolero, on the other hand said that the majority of well-educated Spanish-speaking hydrogeologists did not speak English. Similarly, for French-speakers in West Africa.

Andreas deJong referred to a US web-site where diagrams are posted and captions, annotations, axes can be translated into other languages by others who visit the site and saved to the site. In this way it is possible to have sets of good diagrams downloadable in 30 or more languages. Andrea offered to provide the web address so we could aim to replicate this for MAR materials on our own website. **Action: Andrea**

Uwe referred to a toolbox at the world bank website which has good information for water that is useful for giving talks. He will send its address to the IAH-MAR email list. **Action: Uwe**

Following discussion we reached the following conclusions:

* For short publications of a non-technical nature, such as overviews or relating to policy, we would aim to produce in English, Spanish, Chinese and French. While academics and many hydrogeologists may have English, this is not generally true of their colleagues in government at all levels, or for community leaders or politicians. IAH-MAR members therefore have a resource they can download and give to their colleagues. The Strategies for MAR document, either as it stands or in a very condensed form eg at brochure level is an example of a document warranting translation. **Action: Peter** to follow up with UNESCO and Ian Gale.

* Similarly for good figures, diagrams, designs, even of a technical nature that would be useful to converse with non-english speaking scientific, engineering or technical colleagues, it is desirable to put these into as many languages as possible. This may require translation of relatively few words such as captions, text boxes, axis titles, legends, etc for good diagrams to be much more useful internationally. **Action: Peter** to follow up with Ian Gale to see what is possible, and whether we can establish a multi-lingual resources section on the IAH-MAR web site and to seed it with diagrams, eg taken from Strategies document, following the model described by Andreas. If so we would advise all through the IAH-MAR email list where to find figures for translation on the IAH-MAR web site, and where to post MAR literature in other languages.

* For material of a scientific or technical nature, we would aim to be more inclusive of Spanish-speaking hydrogeologists. This would require translation of English documents and posting of MAR-specific resources that have already been published in Spanish (or other languages). This could include Oscar's book when completed. **Action: Oscar, Peter and Ian Gale** to identify resources to be translated and/or uploaded and discuss with UNESCO.

8. Creating new initiatives

Possible new activities include publications on:

8.1 **MAR for arid city water security** – title to be defined as per item 6 above, in Spanish, with possible translations to English – Leader: Oscar Escolero; Supported by: Mexico National Water Commission and possibly WMO; Inputs needed from members: see item 6 above.

8.2 **Governance of MAR** (entitlements and water quality protection) – Leader: Peter Dillon; Proposals for support submitted to Australian Government; Inputs sought from all countries represented in IAH-MAR Commission on relevant regulations, guidelines concerning water quality, and concerning entitlements. Peter will provide more details in due course (see section 2.3). Uwe noted that the basic context for water ownership of surface water and groundwater, especially if one is owned by the state and the other is privately owned (as in Brazil and India) needs to be declared at the outset. In most cases

IAH-members are unlikely to be the ones responsible for regulations, but may be able to access this information and draft a brief outline in English of the relevant regulations in their country.

8.3 Clogging (permeability decline) in MAR – Leader: Peter Dillon; To develop an outline for such a document that could be used by members to generate support at national and international level for their contributions to it. Aim to produce in several languages. Would include new scientific knowledge on clogging processes and how this has led to improved management of clogging in basins and wells. Case studies would also be welcome where these contribute to the knowledge base. Suggestions included Barcelona, Xian, Port Sudan.

8.4 Quantifying benefits and costs of MAR – proposed by Ken Howard. The aim is to develop a network of MAR demonstration sites internationally, covering a variety of technologies, aquifer types, water sources, and end uses and where there is sufficient monitoring to evaluate the performance of these and to quantify the benefits and costs, and compare with alternatives. Peter to continue to promote and will seek involvement of EC and AWWARF projects, UNESCO. This presents a good case for support by national governments to promote replication of successful MAR projects and to use these as a basis for national or regional education and training programs. **Action: All** – Please advise Peter of one or two specific sites in your country where either (a) such information already exists, or (b) projects that are emerging that have potential to produce such information, (c) if you are willing to lead the writing up of one or two demonstration project(s) in your country, and (d) whether you have the resources to complete such an assignment or whether you need to seek local or other resources. **Action: Peter** to follow up with UNESCO and GEF to explore potential funding arrangements that could facilitate participation by those countries where there is greatest potential to contribute to UN MDG for safe drinking water supplies.

9. Recharging the Commission (with activity leaders from developing countries)

Following a proposal for regional representation (from Lahore workshop) in the IAH-MAR Commission we need to ensure that this takes place. There was no representative of Pakistan or India at the plenary, and greater participation and benefits for countries in transition is a continuing desire of the commission. Peter is willing to ask conference organizing committees (of IAH Congresses and ISMAR conferences) that are able to award travel support to give attention to such representatives of the IAH-MAR Commission. **Action: Anyone from a developing country wishing to take a leadership role in any of the initiatives above, please let Peter know.**

10. Date for Next Meeting and Close (12.00 noon)

At the request of IAH, the Commission will conduct a brief plenary at IAH 35th Congress in Lisbon, Sept 07. The next major plenary meeting of the Commission will be at ISMAR6, October 2007, Phoenix.