MAR governance in Australia and SA

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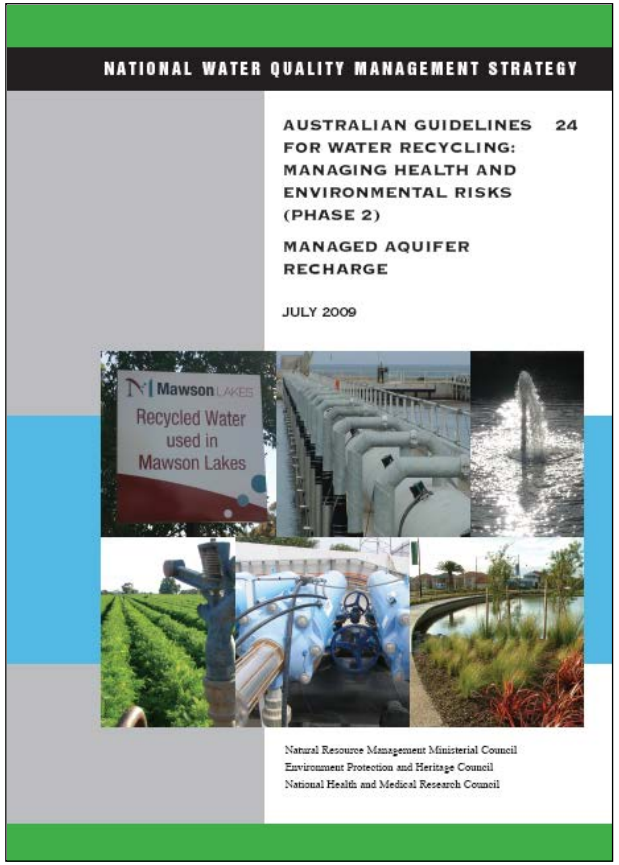
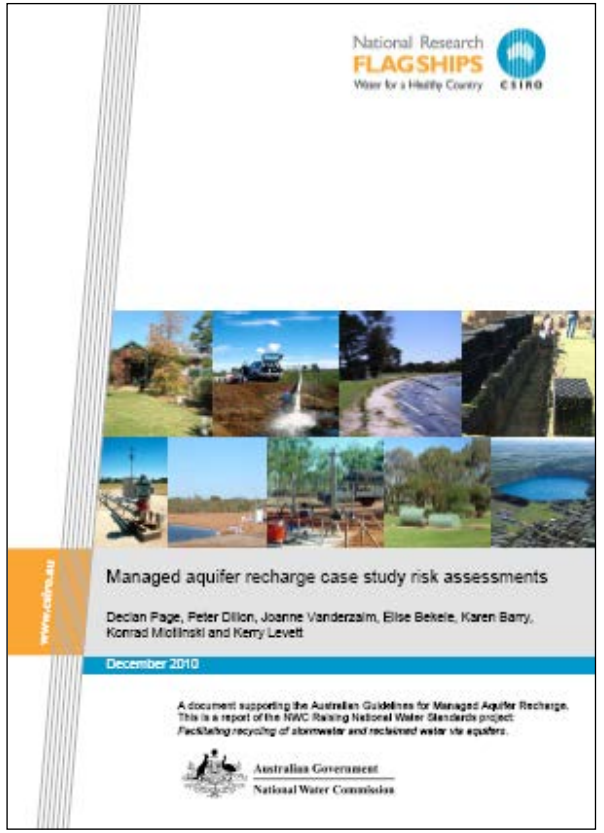
MAR policy matrix

Management Issue: / Resource:	**Quantity** Water and Storage Entitlements and Allocation *(Waterlines #38, 2011)*	**Quality** Human Health and Environment Protection *(MAR guidelines, NWQMS #24, 2009)*
Surface water	• Environmental flow requirements • Water allocation plans and surface water entitlements • Inter-jurisdictional agreements	• Catchment pollution control plan • Water quality requirements for intended uses • Risk management plan for water quality
Groundwater	• Groundwater plan & entitlements allocated • Groundwater-dependent ecosystems • Demand management • Capacity and entitlement for additional storage in the aquifer • Transfer of entitlements from MAR operations • Inter-jurisdictional agreements	• Groundwater quality protection plan for recharged aquifer • Water quality requirements for intended uses of groundwater • Risk management plan for water quality assurance beyond attenuation zone

MAR Guidelines – health and environment protection



NRMMC, EPHC, NHMRC (2009). Australian Guidelines for Water Recycling, Managing Health and Environmental Risks-Managed Aquifer Recharge. NWQMS Document 24, 237p. http://www.environment.gov.au/resource/national-water-quality-management-strategy-australian-guidelines-water-recycling-managing-1



Page, D., Dillon, P., Vanderzalm, J., Bekele, E., Barry, K., Miotlinski, K. and Levett, K. (2010). Managed aquifer recharge case study risk assessments. CSIRO Water for a Healthy Country Flagship Report, Dec 2010, 144p. http://www.clw.csiro.au/publications/waterforahealthycountry/2010/wfhc-MAR-case-study-risk-assessments.pdf

MAR Water Resources Policy Framework

MAR element:	Water capture	Recharge	Recovery	End Use
Entitlement	Unit share in stormwater or effluent consumptive pool, (*ie*. excess to environmental flows)	Unit share of aquifer's finite additional storage capacity	(Tradeable) extraction share which is a function of managed recharge.	
Periodic allocation	Periodic allocation rules. Potential for additional stormwater or effluent offsets	Annual right to raise the water table subject to ambient rainfall and total abstraction	Extraction volume contingent on ambient conditions, natural recharge and spatial constraints	
Obligations and condition	3rd party rights of access to infrastructure for stormwater and sewage	Requirement not to interfere with entitlements of other water users and water bankers	Existing licence may need to be converted to compatible entitlement to extract (unit share)	Water use licence subject to regional obligations and conditions, for use and disposal

Governance instrument

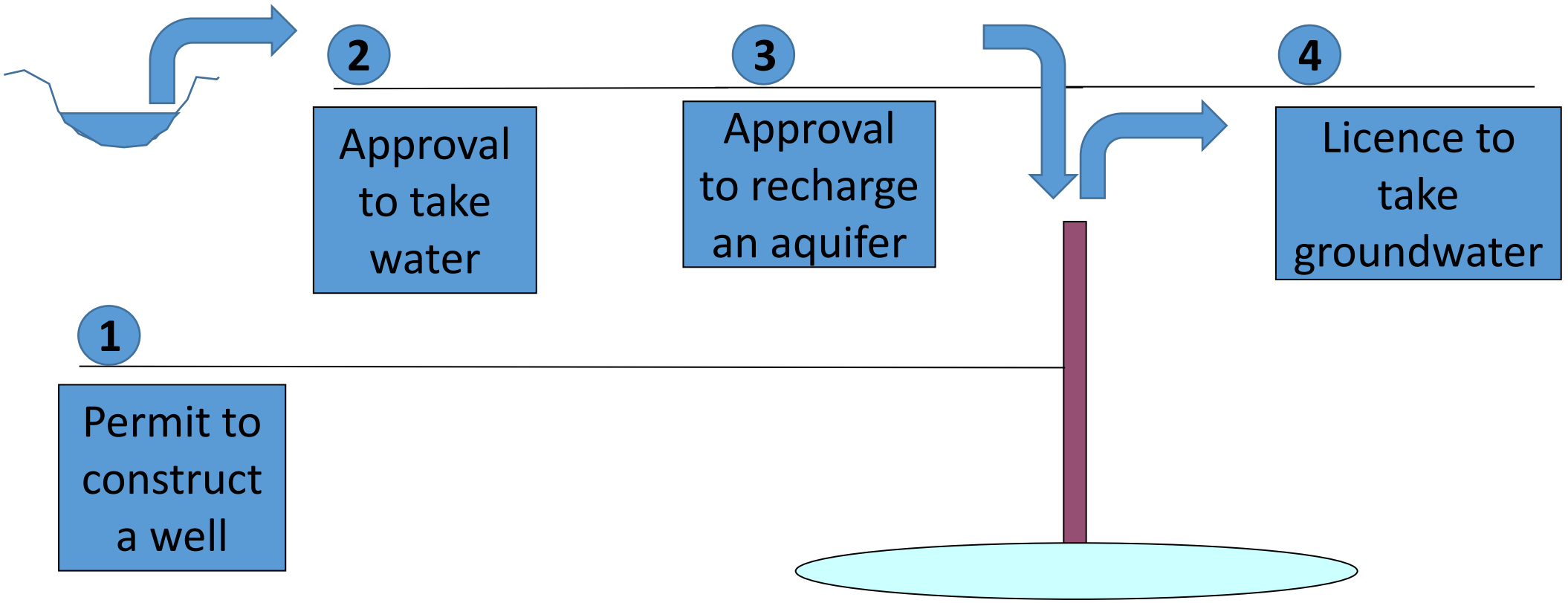
Ward and Dillon (2011). Robust policy design for managed aquifer recharge. NWC Waterlines #38, http://archive.nwc.gov.au/library/waterlines/38

Summary of MAR entitlements and allocations in Australian jurisdictions to manage MAR operations

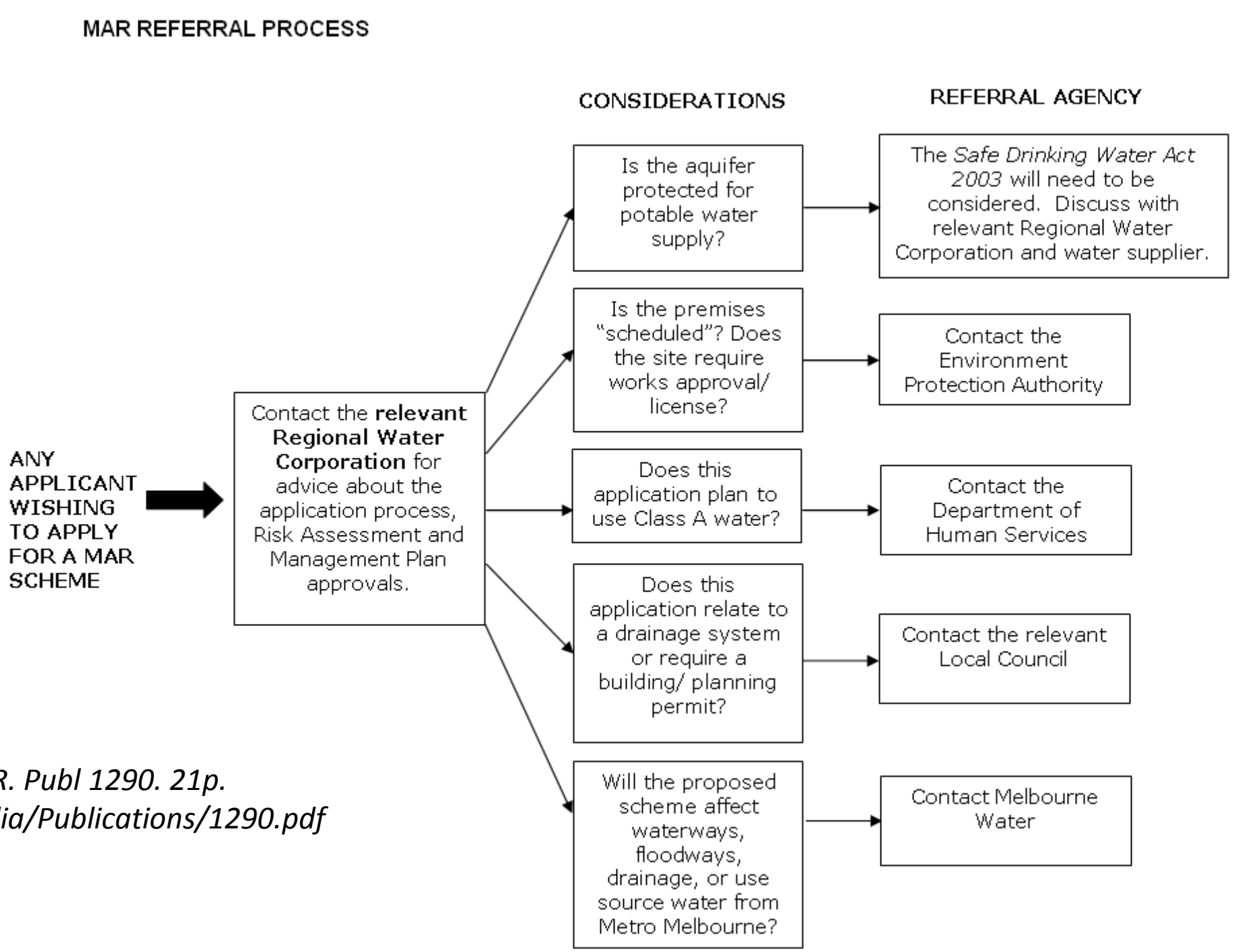
Jurisdiction	Entitlement and allocation policy for stormwater or sewage	Entitlement and allocation policy for recharge	Entitlement and allocation policy for recovery (including transfer)	End-use obligations
ACT	**yes**	no	no	**yes**
NSW	no	no	no	**yes**
NT	no	no	no	**yes**
Qld	no	emergent (CSG)	emergent (CSG)	**yes**
SA	no	no	**Yes—site specific**	**yes**
Tas	no	no	no	**yes**
Vic	**stormwater**	**yes**	**yes**	**yes**
WA	no	**yes**	**yes**	**yes**

from Parsons et al (2012) NWC Waterlines Report 73. Progress of MAR in Australia.
http://archive.nwc.gov.au/library/waterlines/73

Approvals for Entitlements that enable MAR



Vic- MAR Approvals via one-stop shop



Vic EPA (2009). Guidelines for MAR. Publ 1290. 21p.
http://www.epa.vic.gov.au/~/media/Publications/1290.pdf

WA Department of Water (2010) Operational policy 1.01 – Managed aquifer recharge in Western Australia. http://www.water.wa.gov.au/PublicationStore/96686.pdf

Contents

(25p + appendices = 44 p)

Australian benchmark MAR operational policy document

Setting Environmental Value Categories for Groundwater Protection

NWQMS Groundwater protection Guidelines (2013) section 4.2.3

http://www.environment.gov.au/water/quality/publications/guidelines-groundwater-quality-protection-australia-2013

In SA all environmental values are the default values to be protected in all SA groundwater.

Box 4.1 – Example of using salinity to determine appropriate Environmental Value categories for groundwater

The Victorian State Environment Protection Policy (SEPP) (Groundwaters of Victoria) (EPA Victoria 1997) uses groundwater salinity to define the beneficial uses to be protected. The SEPP includes the table below which shows the beneficial uses to be protected for various salinities.

	Segments (mg/L TDS)				
Beneficial Use	**A1 (0-500)**	**A2 (501-1,000)**	**B (1,001-3,500)**	**C (3,501-13,000)**	**D (> 13,000)**
Maintenance of ecosystems	✓	✓	✓	✓	✓
Potable water supply:					
Desirable	✓				
Acceptable		✓			
Potable mineral water supply	✓	✓	✓		
Agriculture, parks and gardens	✓	✓	✓		
Stock watering	✓	✓	✓	✓	
Industrial water use	✓	✓	✓	✓	✓
Primary contact recreation	✓	✓	✓	✓	
Buildings and structures	✓	✓	✓	✓	✓

This approach recognises that salinity often determines the possible uses of groundwater. The policy also includes provision for precluding certain beneficial uses if another background quality indicator will be detrimental to the beneficial use (determined based on salinity); if aquifer yields cannot sustain a particular beneficial use; or if an existing polluted groundwater zone has been identified by the EPA.

This approach focuses on an Environmental Value determination for which numerical guidelines can be used, and additional consideration of whether other categories such as cultural and spiritual Environmental Value would need to occur through community consultation.

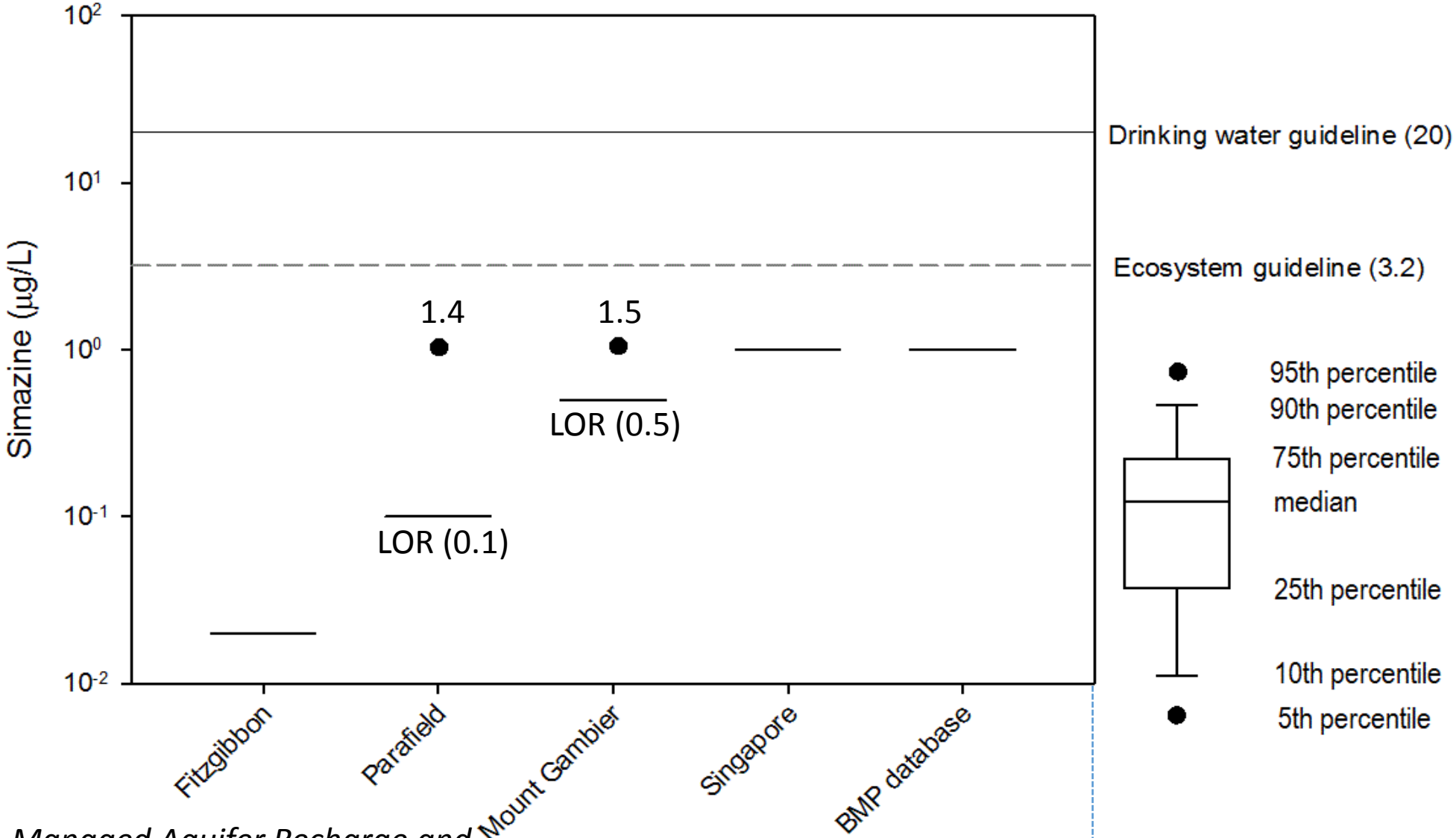
Setting Water Quality Objectives

NWQMS Groundwater protection Guidelines (2013) section 4.2.4

- Once the Environmental Value category has been identified and agreed through stakeholder consultation, water quality objectives can be defined. These set out the specific targets required to protect or enhance groundwater quality, and may be either numerical guideline concentration limits or a narrative statement that specifies water quality objectives. Guideline values that can be used as water quality objectives for specific Environmental Value categories are listed in other NWQMS documents, including:
- ***Australian and New Zealand Fresh and Marine Water Quality Guidelines*** **(ANZECC and ARMCANZ 2000)***;
- *Guidelines for managing risks in recreational water* (NHMRC 2008);
- ***Australian drinking water guidelines*** **(NHMRC and NRMMC 2011);**
- *Australian guidelines for water recycling: Managing health and environmental risks* (Phase 1) (EPHC, NRMMC and AHMC 2006);
- *Australian guidelines for water recycling: Managing health and environmental risks (Phase 2) – Augmentation of drinking water supplies* (NRMMC EPHC and NHMRC 2008);
- *Australian guidelines for water recycling: Managing health and environmental risks – Stormwater harvesting and reuse* (NRMMC, EPHC and NHMRC 2009a); and
- *Australian guidelines for water recycling: Managing health and environmental risks – Managed aquifer recharge* (NRMMC, EPHC and NHMRC 2009b).

* Currently in process of being updated, involving SA EPA

Simazine in stormwater



from:
Vanderzalm, J. et al (2014). Managed Aquifer Recharge and Stormwater Use Options: Satellite Sites Stormwater Quality Monitoring and Treatment Requirements Report, Goyder Institute for Water Research Technical Report 14/10.
http://goyderinstitute.org/index.php?id=20

EP(WQ)P 2003 herbicides not defined, pesticides 0 mg/L

Some possible next steps for SA:

1. A MAR operational policy that interprets Natural Resources Management Act 2004 to account for MAR
   - To draw from Waterlines #38 and WA operational policy
   - To provide a one stop shop for proponents of MAR projects
2. Revision of Environmental Protection (Water Quality) Policy 2003
   - To refer to NWQMS docs for health and environmental protection
3. Data collected at MAR sites to be available electronically for evaluation by researchers
4. A consultative process be established for finalizing reform on a short time line. (discussions on ASR Coord Committee started in 1996 and the task is incomplete, and has lacked industry input)

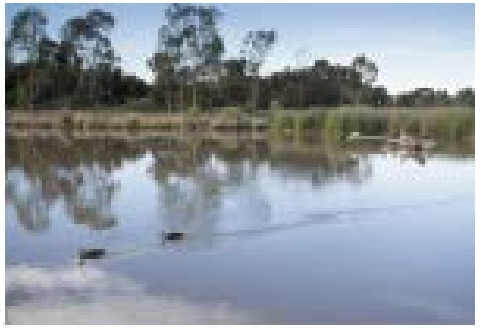
MARHub

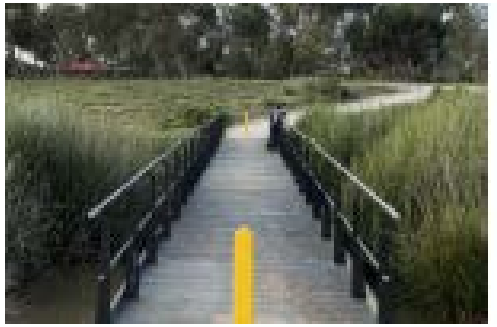
Leading Managed Aquifer Recharge Globally

www.marhub.net.au

30% of Global Academic Papers

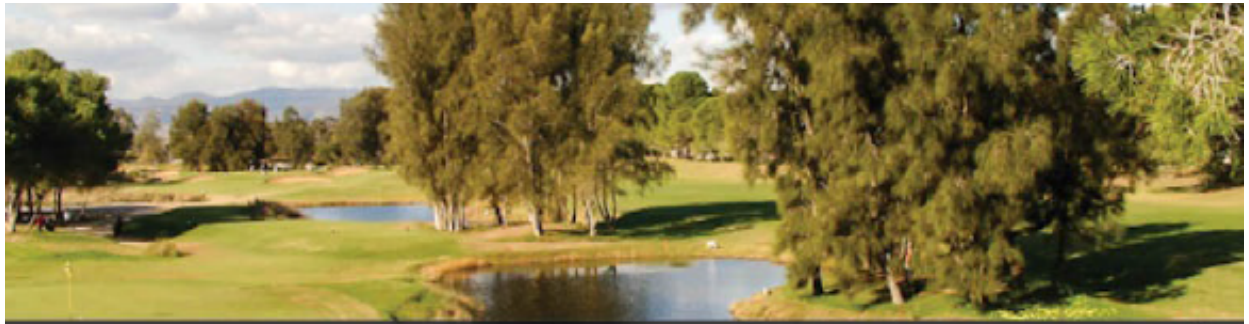
Over 34 Sites of MAR in South Australia





Government, Research & Industry Working Together

Courses to gain competencies in MAR
eg. NCGRT



Managed Aquifer Recharge

NATIONAL CENTRE FOR GROUNDWATER RESEARCH AND TRAINING

WHY IS THIS COURSE IMPORTANT?
The course objective is to impart knowledge that will assist regulators and practitioners to facilitate a smooth and efficient uptake of MAR for producing urban and peri-urban water supplies. At the end of the course participants will be aware of the traps, as well as the benefits and costs in planning, design, approval and operation of MAR Projects for sustainable water supplies.

WHO SHOULD ATTEND?
This course will suit potential proponents of MAR projects in local government, water utilities, industry and irrigators. The course will be valuable for urban planners, hydrogeologists, stormwater managers, environment protection health regulators and industry dealing with approval processes and inform policy makers.

WHO IS PRESENTING?
The course will be led by Russell Martin (Aqueon) who has more than 20 years of practical operational experience in this highly specialised field. Presenters include the highly experienced Peter Dillon, Jo Vanderzalm & Declan Page (CSIRO), Nathan Silby (W&G), Judy Blackbeard (MW), Matt Hudson (CWW), Simon Robertson(EGW), Edmond Lascaris (CW), Terry Flynn (SRW)

WHAT WILL THE COURSE COVER?
- Introduction and Overview of Managed Aquifer Recharge
- MAR applications within Urban Water Management: Utility and Local Government Perspective
- Economics of MAR/Business Case
- How to establish a MAR scheme – water quality considerations
- How to establish a MAR scheme – approvals and who to talk to?
- NRM Policy and MAR
- Establishing a MAR scheme – Technical considerations/tools & applications
- Risk assessment and management in MAR (interactive case study based on Parafield, SA)
- Establishing a MAR scheme – Engineering Considerations
- Operational Issues and their Management
- MAR - Workshop Exercise

NATIONAL CENTRE FOR GROUNDWATER RESEARCH AND TRAINING

COURSE DETAILS

12-13 OCTOBER 2015
MELBOURNE

CONTACT US
enquiries@groundwater.com.au
(08) 8201 5632

REGISTER AT
www.groundwater.com.au

International Association of Hydrogeologists
Commission on Managing Aquifer Recharge
IAH –MAR www.iah.org/recharge

Aim: Safe, sustainable recharge enhancement

Methods: web site, publications database, email list, conferences, projects, working groups, workshops

Outputs:

- UNESCO publications – '*Strategies to enhance recharge in arid and semi-arid areas' , '..managing aquifer recharge, discharge and storage equilibrium'*
- *Working groups -Monograph on clogging (Russell Martin (ed)), governance & economics (J Water special issue 2015), MAR for development (workshop at ISMAR9, 2016), International inventory of MAR (with IGRAC and EU),*
- ISMAR9, training programs

CoChairs: Peter Dillon, Weiping Wang, Enrique Fernandez Escalante

ISMAR9, Mexico City 20-24 June 2016

International Association of Hydrogeologists

NATIONAL CENTRE FOR GROUNDWATER RESEARCH AND TRAINING

There will also be a session on MAR at Australian Groundwater Conference Canberra 3-5 Nov 2015 see: http://www.groundwater.com.au/pages/australian-groundwater-conference-2015

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