

# GOVERNANCE OF MANAGED AQUIFER RECHARGE (MAR) IN THE CSG CONTEXT

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## BACKGROUND PROBLEM

### The CSG water extraction/production problem:

Competition for the groundwater, surface impacts and recharge/recovery of the groundwater formations is uncertain.



Fairfax Media, 3 September 2017

**MAR** = the purposeful recharge of water to aquifers for subsequent recovery or environmental benefit. MAR in the CSG context can address water security, and environmental impacts.

### Governance problems:

CSG governance is criticised as complex, inefficient, inequitable and MAR governance mechanisms are undeveloped.

## RESEARCH QUESTION

Are there regulatory mechanisms in respect of aquifer injection of CSG produced water which can drive sustainable development of groundwater?

## RESEARCH METHODOLOGY

**Two case study jurisdictions-** Surat Basin Qld Aust and Powder River Basin Wyoming USA.

**Document analysis** of legislation and guidelines, permits, licences, CSG water management plans, monitoring reports and data.

**Interviews** - 27 participants (13 interviews) to date.

## KEY LITERATURE AND THEORY

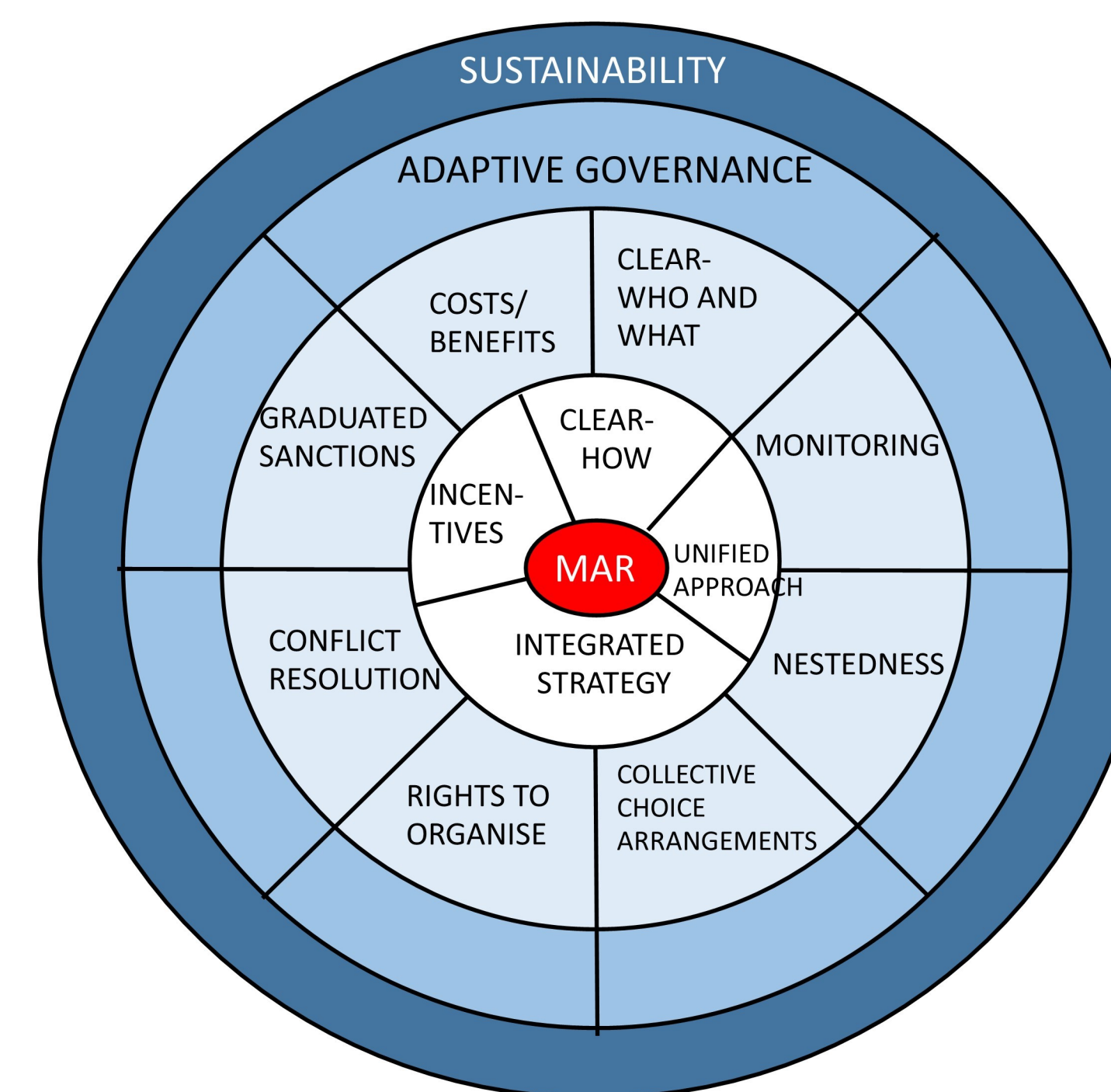
### Recommendations for MAR governance :

- Certainty in respect of entitlements,
- Integrated catchment management strategy,
- Unified approach to assessment with state based MAR guidelines,
- Economic incentives.

MAR involves groundwater, a Common Pool Resource (CPR).

### Ostrom's design principles for CPR's:

- Clearly defined boundaries– who and what,
- Congruence between benefits and costs,
- Collective choice arrangements,
- Monitoring and evaluation,
- Graduated sanctions,
- Efficient conflict resolution,
- Minimal rights to organise,
- Nested enterprises.



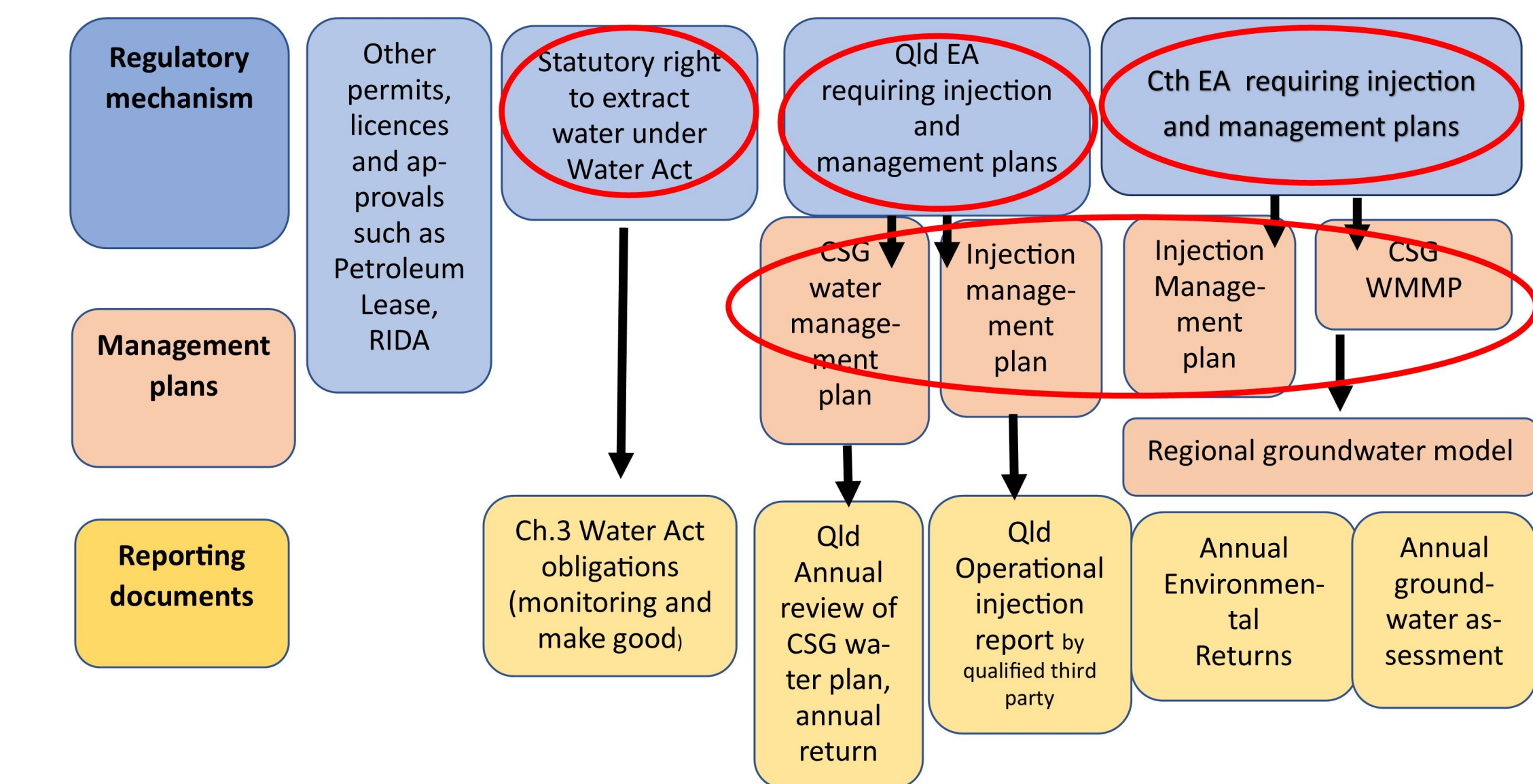
Use of **Adaptive Management** (AM) can reduce uncertainty.

## REFERENCES

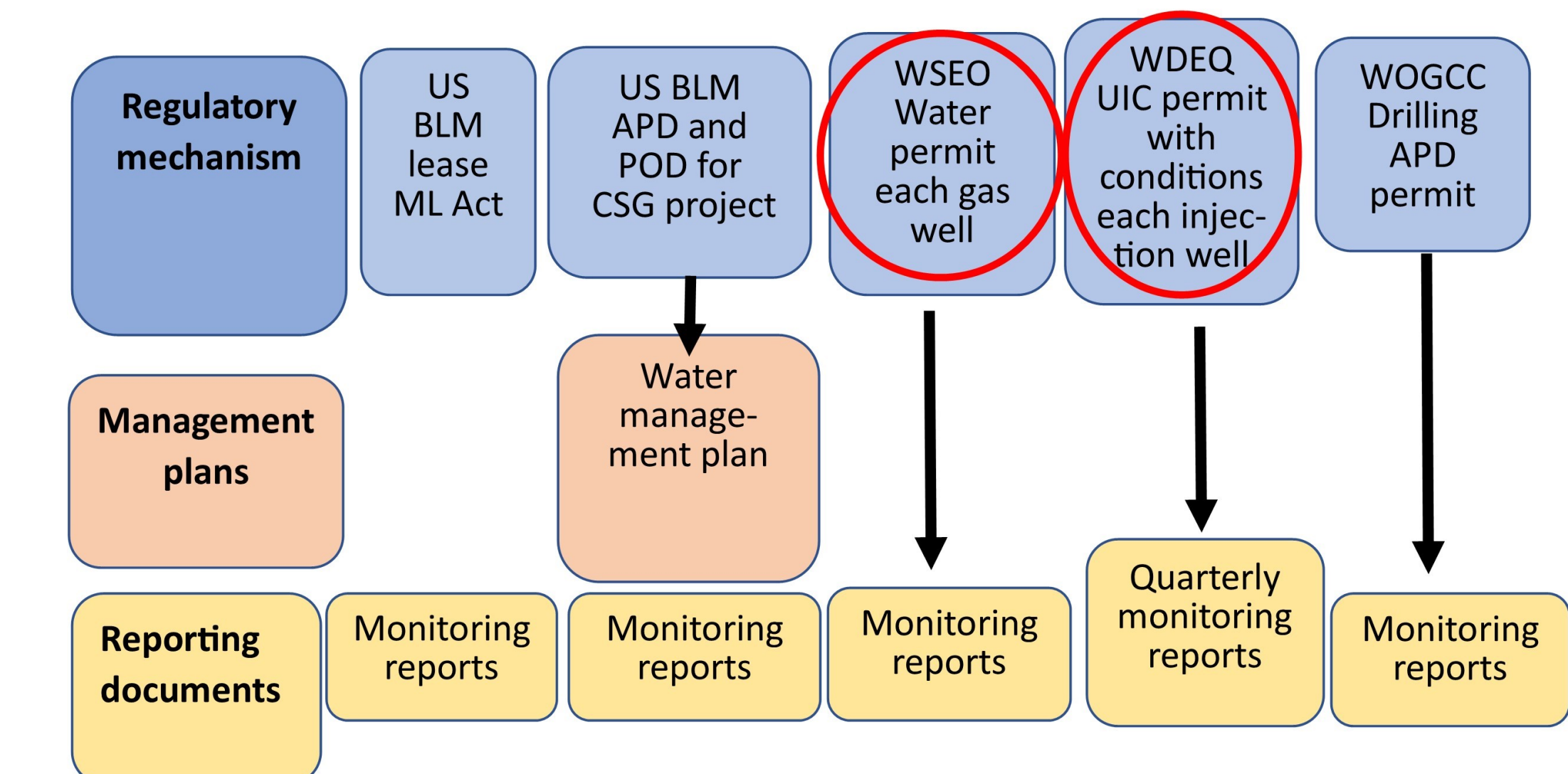
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- Katie Vincent and Alex Gardner, 'Managed aquifer recharge using alternative water sources in Western Australia: A new property rights approach' (2014) 23 *Australian Property Law Journal* 36
- Michael Bennett, Alex Gardner and Katie Vincent, 'Regulatory Renovation for Managed Aquifer Recharge Using Alternative Water Resources: A Western Australian Perspective' (2014) 24(1) *Journal of Water Law* 5
- Robert G. Maliva, 'Economics of Managed Aquifer Recharge' (2014) 6(5) (05/2014) *Water* 1257 at p1258
- Elinor Ostrom, *Governing the Commons: The Evolution of Institutions for Collective Action* (Canto Classics Edition 2015 ed, 1990)

## EMERGING FINDINGS

Qld  
Frame-  
work



Wyoming  
Frame-  
work



- Clear and flexible entitlements facilitate MAR,
- AM reduces uncertainty and facilitates MAR,
- Congruence between costs and benefits and economic incentives facilitate MAR,
- Lack of proactive planning and integrated catchment management strategies can impact MAR ,
- Integrity of monitoring impacts confidence,
- Lack of collective choice arrangements and rights to organise impacts confidence,
- Lack of efficient and equitable conflict resolution mechanisms impacts confidence.