

Economic Value of Groundwater

Hydrological Society SA

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Project Overview

- Report for the NWC
- Prepared by Marsden Jacob with assistance of RPS
- The report outlines a preliminary evaluation framework for:
 - the economic value of G/w for consumptive & non-consumptive uses
 - principles for the appropriate level and type of G/w management resources
 - guidelines for prioritising G/w management resources.

Overall Framework

Value of
consumptive
use

Value of non-
consumptive
use

Risk and
management
objectives

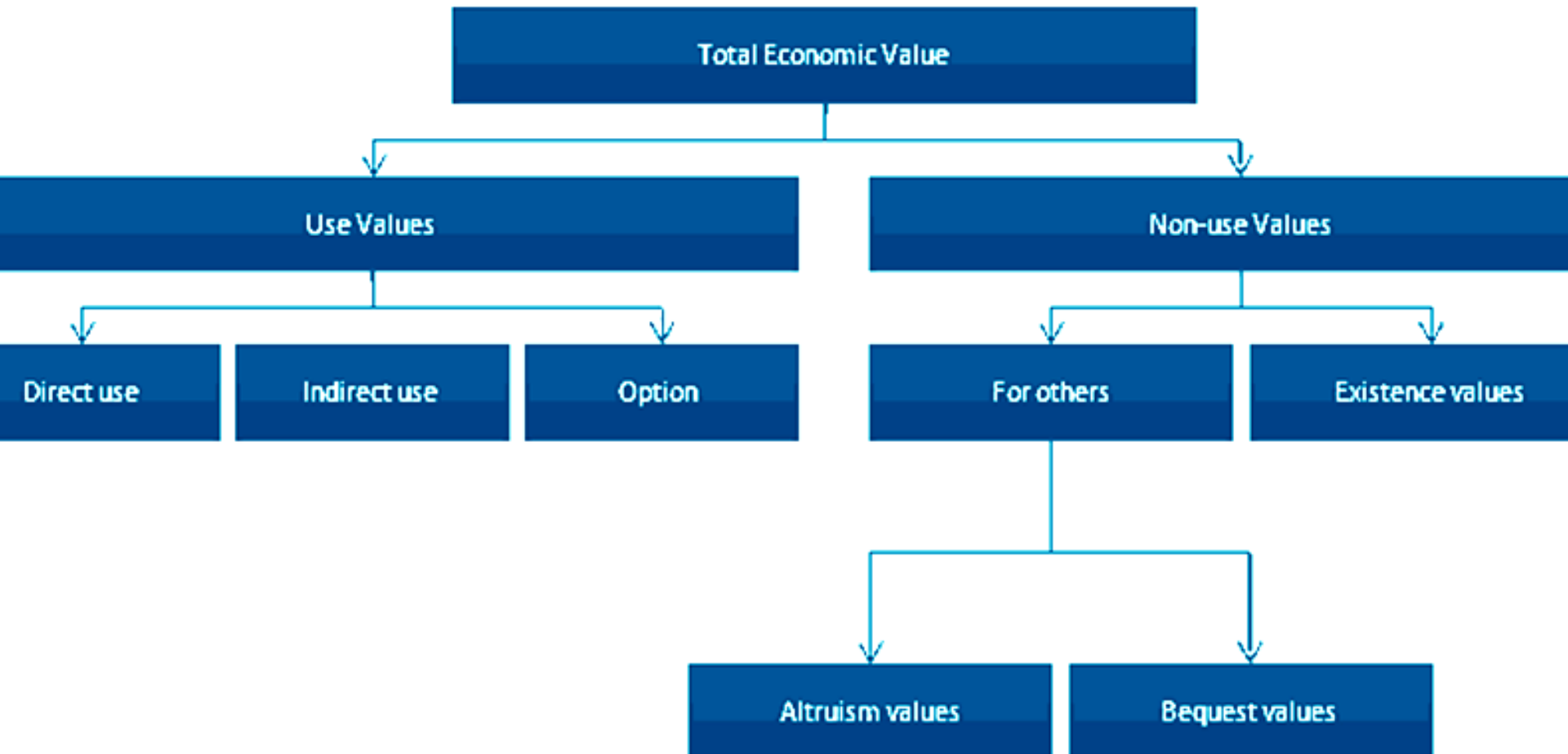
Management
costs

Other
(unquantified)
considerations

Appropriate level and type
of management resources
(unconstrained budget)

Prioritising management
resources
(constrained budget)

Total Economic Value Framework



Case studies

Framework Report + 5 Case studies:

- **Gnangara (Western Australia)**
- Shepparton (Victoria)
- **Daly River (Northern Territory)**
- Lockyer Valley (Queensland)
- **Northern Tasmania**

Gn

Gnangara – lies to the North of Perth

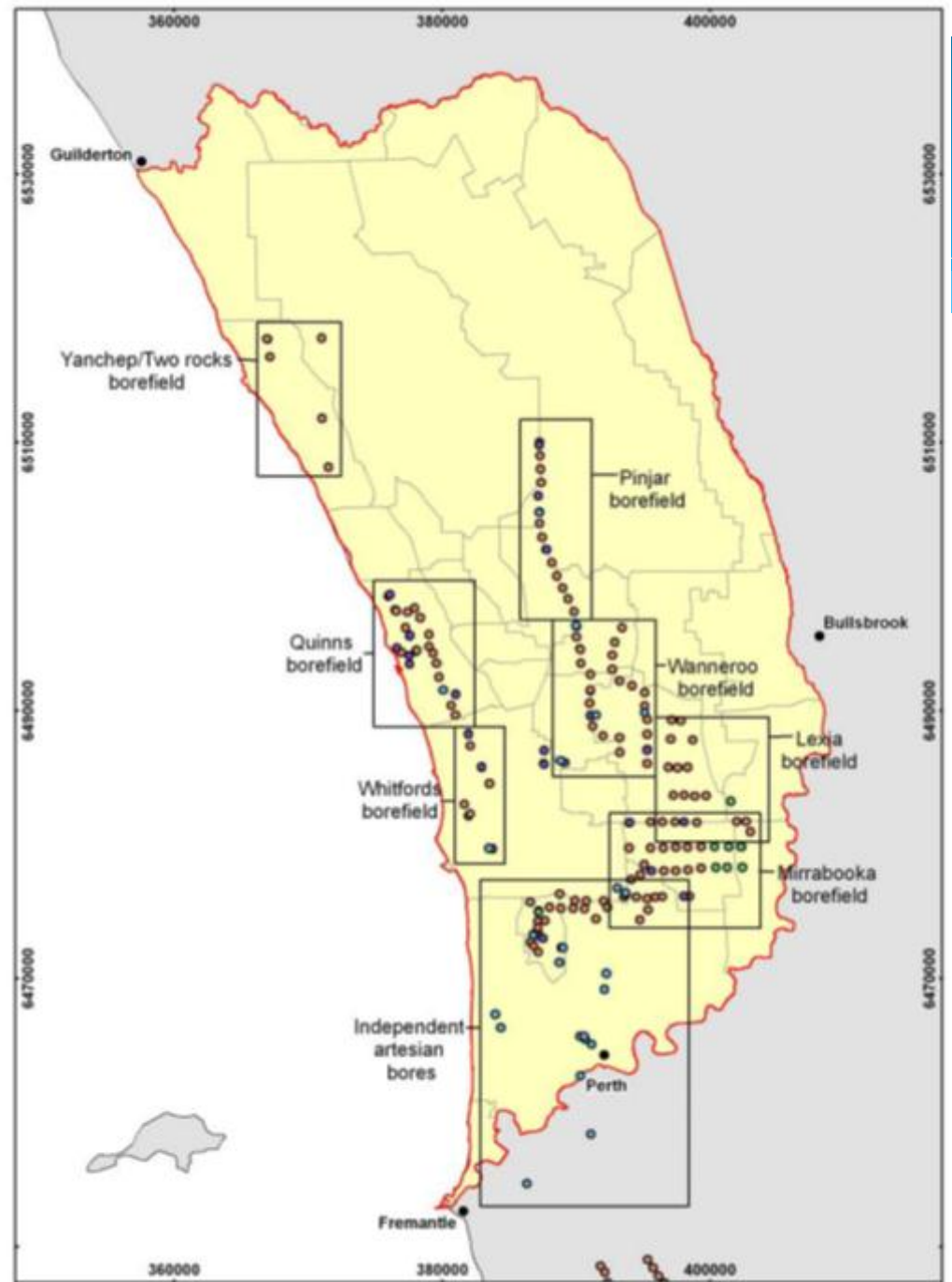
Contains four aquifers:

- Superficial
- Mirrabooka
- Leederville
- Yarragadee.

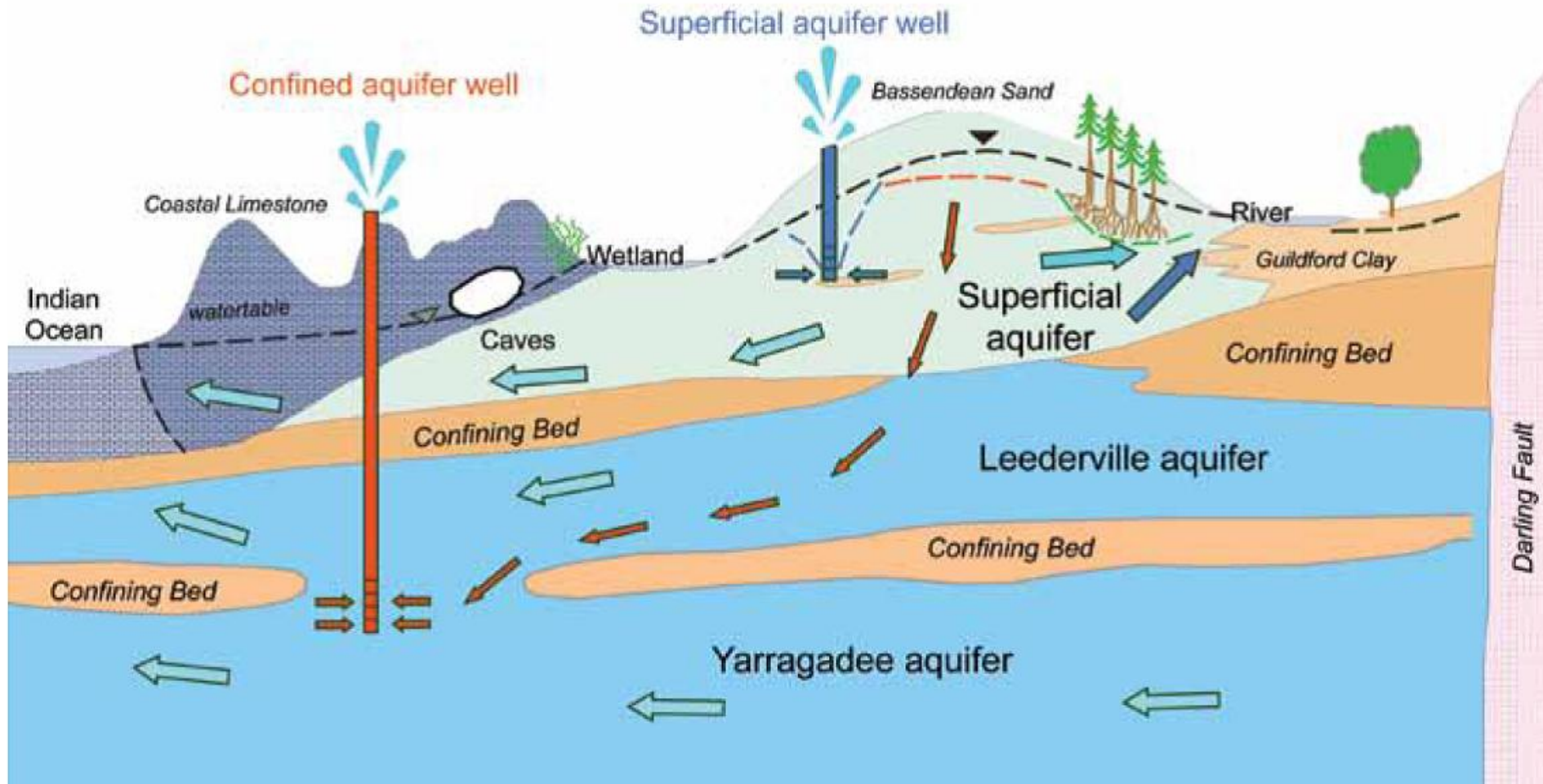
Important for Drinking water supply as well as horticulture and industry

Vital for Perth's water supply:

- High value uses
- Extensively researched
- Well understood



Gnangara – Well understood and modelled



Value as a drinking water source

Gnangara provides several advantages as a water supply for Perth, including:

- close proximity to Perth
- minimal treatment is required
- extracting water is relatively inexpensive and requires low energy levels
- as a groundwater source it is less directly impacted by climate variability
- some ability to “bank” water
- the Water Corporation has substantial existing infrastructure in place.

Gnangara - Consumptive Values

Water use category	Total volume GL/yr	Unit value (\$/kL)
Public water supply	136	1.80
Horticulture and agriculture	72	0.09–1.87
Domestic bores	32	0.10–1.80
Parks and gardens	30	0.10–1.80
Industry and commercial	15	1.80–10.00
Other	10	0.10–1.80
Total	295	

Total Consumptive Resource Value = \$6.7 Billion

Gnangara - Non-consumptive Values

Non-consumptive values identified for Gnangara groundwater:

- support for 69,000 ha of native vegetation, valued at a total of \$100 million (**willingness to pay**)
- support for urban wetlands, which based on increased property values could be worth as much as \$4 billion (**hedonic pricing**)
- support for stygofauna in the Yanchep Caves, valued by park and cave goers at around \$4 million (**visit costs**)
- Aboriginal cultural values (**unquantified**).

Management Actions

The Dept of Water and Water Corporation undertake a Wide range of management actions:

- Water management planning, including determination of annual allocations
- Influencing land planning to protect water quality (Priority 1 – Priority 3)
- Licensing and compliance activities (policing)
- Engineered environmental improvement initiatives (supplementing wetlands)

Management Actions

Management activity

Resource assessment (incl. groundwater replenishment)
Environmental improvement initiatives
Management of existing users

Behavioural impact

Potential to increase usage through improved modelling
Reduce extraction from environmentally sensitive areas
Actively pump water into environmentally sensitive areas
Enforcement of licensed consumption limits
Land use restrictions

Groundwater impact

Maintain watertable levels in environmentally sensitive areas
Protection from potential contaminants

Environment and end-user impacts

Maintain wetland, surface vegetation and other GDE health
Maintain low Water Corporation treatment costs
Maintain low risk of illness for scheme (IWSS) water users
Defer scheme (IWSS) expenditure if additional water extraction is permitted

Economic value

Maintain wetland, surface vegetation and other GDE value
Reduced Water Corporation treatment and source development costs
Reduced exposure to the costs associated with illness

Management Activities

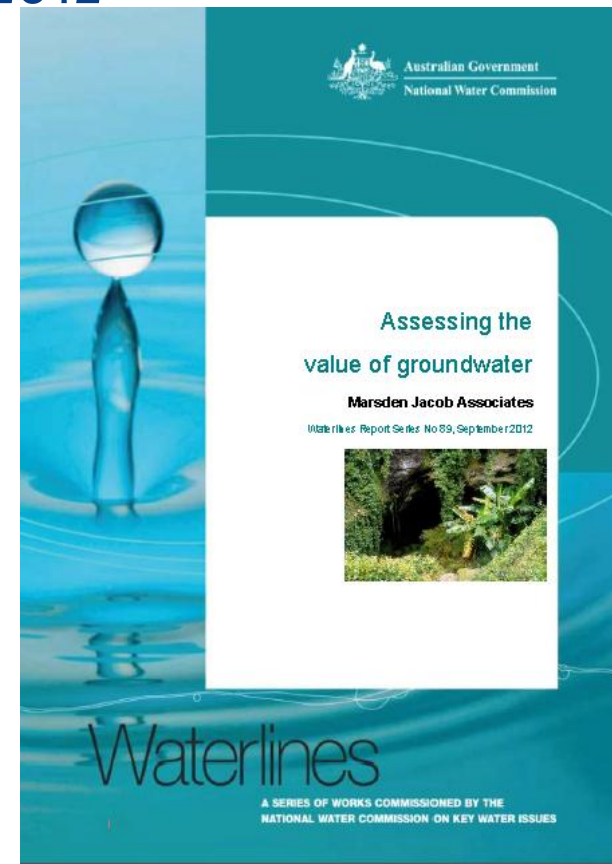
Management activity	Cost	Benefit	Benefit cost ratio
Resource assessment	\$30 m	\$341 m	11
Environmental initiative – Lake Jandabup pumping	\$31 m	\$64–113 m	2.1–3.6
Compliance – Gngangara Pilot Metering	\$25 m	\$45 m	1.8
Environmental initiative – Yanchep Caves pumping	\$2.1 m	\$2.7 m	1.3
Environmental initiative – Lake Nowergup pumping	\$43 m	\$18–\$21 m	0.4–0.5
Water source protection – specified area	\$950 m	\$334 m	0.3
Water resource protection – other areas		NA	

Conclusions













- Framework brings together the GW values and the impact of management actions in protecting & maximising these values
- Gnamangara useful casestudy for the framework
 - Well understood resource
 - High value – with a mix of consumptive and non-consumptive values
 - Remains patchy knowledge and information on the non-consumptive values

Further Information

- Report is available online (NWC Webpage) – Waterlines Report Series No 89, Sept 2012
- alex.marsden@marsdenjacob.com.au
- Marsden Jacob Office's
 - Perth,
 - Melbourne,
 - Sydney &
 - Brisbane



Hypothetical development area

-  Nominal development area
-  Bush Forever areas
-  existing public water supply well (unconfined)
-  proposed public water supply well (unconfined)
-  existing public water supply well (confined)
-  proposed public water supply well (confined)
-  geomorphic wetlands - conservation
-  geomorphic wetlands - resource enhancement
-  geomorphic wetlands - multiple use
-  underground water pollution control area
-  landscape/rural small lot subdivision boundary (notional line subject to future investigation)
-  groundwater sub-areas

