



A RESEARCH PROSPECTUS FOR THE GREAT ARTESIAN BASIN

(as revised June 2009)

Purpose of the *Research Prospectus* [see www.gabcc.org.au for full text]

The Great Artesian Basin (GAB) is the world's largest fresh water artesian aquifer system and one of Australia's most important water resources. Landholders and governments have invested many millions of dollars in the GAB to rehabilitate bores, renew water delivery infrastructure and improve knowledge about the Basin and the benefits that it provides. With this investment comes the opportunity to improve GAB management and support the values attached to the GAB. However, our knowledge of the Basin is incomplete. Additional research is required on the structure, functions and values of the GAB, the infrastructure used to access GAB resources, higher value uses for GAB resources and GAB management and investment. The Great Artesian Basin Coordinating Committee, a national advisory group to government on management of the GAB, with representatives from all stakeholder groups, is well placed to work with research and funding organisations to encourage and facilitate priority research.

The aim of the *Research Prospectus* is to identify priority GAB research. It is hoped that the *Prospectus* will guide the preparation of new research proposals that provide an opportunity for researchers, industry and resource managers to collaborate in meeting the needs of the management of the Basin into the future.

In principle:

- research should focus on identified areas of strategic priority, and inform/influence practice and policy.
- research findings should be accessible to a wide audience, and
- cooperation should be maximised and duplication minimised.

In this context, research is defined as any form of inquiry seeking evidence to increase knowledge and includes activities that expand, clarify, reorganise and/or create knowledge. It includes not only traditional scientific research but also approaches like surveys, literature reviews, case studies, statistical analysis and focus groups.

Addressing the research questions

The GABCC has identified important knowledge gaps in a range of research areas. The GABCC invites potential researchers/contractors to provide proposals to address the priority research questions outlined below. These questions have been grouped under five themes: 1. Understanding the resource; 2. GAB access infrastructure; 3. Monitoring and measurement; 4. Higher values uses; and 5. Valuing investment and allocation.

This document outlines the questions in **theme 4: Higher values uses**.

4. Higher value uses

Investment to introduce best practice water use into the pastoral industry has been considerable as this industry uses the most GAB water. New water distribution technologies have opened up new opportunities for pastoralists and land managers. Importantly, this has led to benefits to all users across the Basin. Similar investment in initiation of best practice water use for other industries within the Basin would yield further benefits to the resource and requires investigation.

4.1 Pastoral industry

The development and installation of new materials and technologies to access, control and distribute water have made major changes in the pastoral industry and the way landholders manage their country. Appropriate uses of new technologies can have important environmental benefits and improve values supported by the GAB. Additional research is required to continue the development of new technologies and find more effective applications for existing ones that improve production, reduce costs and improve management practices in the pastoral industry.

Priority research questions

- a. How can productivity be improved through watering point management and distribution?
 - i. How can watering points be managed to reduce total grazing pressure and improve the condition of country?
 - ii. How can watering point design and distribution be used to manage stock and control feral animals?
- b. How can technologies, such as telemetry, photo-imaging and electronic tagging, be used at watering points to improve stock management and control feral animals?
 - i. How can water distribution systems be used to improve animal health and nutrition?
 - ii. What are the costs/benefits of these new technologies?
- c. Are there other opportunities to use artesian pressure and water temperature to increase efficiencies, diversify production or improve operations?

4.2 Petroleum industry

The extraction of petroleum from aquifers normally results in formation water coming to the surface along with targeted petroleum products. Additional research is required to identify cost-effective ways to separate the petroleum from water, either in the aquifer or at the surface without having to dispose of the water. Research into cost effective treatment and productive use of formation water is also needed.

Priority research questions

- a. Can down-hole separation of petroleum products be undertaken while maintaining potentiometric head?
- b. What opportunities are there for closed loop separation of petroleum products and reinjection of formation water?
- c. How can formation water be treated following separation of petroleum products for productive use or reinjection?
- d. What aquifers are affected by extraction of co-produced water?
- e. How can we better measure, monitor and determine the effects of extraction of co-produced water?

4.3 Mining industry

The mining industry is a significant user of GAB water. Open cut mining can cut through GAB aquifers and result in dewatering from GAB aquifers. Mineral exploration often requires drilling into GAB aquifers. These exploration wells need to be abandoned properly and can, under proper procedures, be converted into useful water wells. Additional research is required into cost effective use of GAB water by the mining industry and the impacts of mining on the integrity of the GAB.

Priority research questions

- a. How can we better measure, monitor and determine the effects of dewatering of GAB aquifers around mining developments?
- b. What options are there for treatment and reinjection of GAB water from mining developments?
- c. Can water saving practices in mining and processing be improved?
- d. What is the state of rehabilitation and abandonment of mining exploration wells that drill into GAB aquifers?
- e. Can mining exploration bores that drill into the GAB be converted to use as water bores while protecting the resource?
- f. What are the affects of final voids in open cut and underground mines?

4.4 Tourism industry

The GAB is important to regional tourism across the Basin. The natural discharge of water from GAB springs supports natural and cultural values that are important attractions for people visiting the GAB. The water from the GAB supports tourist developments and regional communities that are essential to the tourist industry. Special attractions such as the mineral baths around Moree are of regional importance. Additional research is required into various aspects of the tourism industry in the GAB, to support encouragement and management of tourism.

Priority research questions

- a. How should tourism be managed around springs and other natural discharge sites?
- b. How can information be best provided to tourists on the GAB and values it supports?
- c. How can tourists be best informed about the cultural history of the GAB and the management of cultural sites?
- d. How can the involvement of indigenous interests in the development and operation of GAB tourism be facilitated?
- e. How can returns on water allocated for tourist enterprises be maximised?
- f. How can the judicious use of GAB water for special tourist industries supported be encouraged?
- g. What is the significance of the GAB in regional tourism?
- h. How can a national and international tourism profile for the GAB be created?

4.5 Community and industrial water supplies

The GAB is the only reliable water supply for many communities and industries across the Basin. Businesses, residents, town amenities and future developments depend on continued access to GAB water. Research is required into the role and significance of GAB water to communities and industries. Ways in which communities and businesses use GAB water, how it is treated and water saving strategies need to be investigated. In addition to the water, temperature and pressure are valuable commodities in their own right and some communities have taken advantage of this. The current use and potential benefit of these resources needs to be investigated. Likely development scenarios and the capacity of the GAB to meet projected demands also need to be considered.

Priority research questions

- a. What are the characteristics of water use pattern in GAB towns including quantity, quality, treatment, types of use and relative consumption?
- b. What are the likely developments involving expanded water use for domestic and industry purposes?
- c. What is the capacity of the GAB to meet future demands?
- d. What are the water saving and efficiency strategies for households, businesses and amenities, and what more could be done?
- e. What are the potentially productive uses of head pressure and temperature?
- f. What use could be made of new water infrastructure and treatment technologies by community and industrial water users?

4.6 Emerging industries

The reduction of waste and the recovery of groundwater pressures as a result of infrastructure renewal mean that there will be additional water available for allocation from the GAB. The pressure and temperature of the GAB has never been adequately utilised. A number of industries are currently developing across the GAB including irrigation of high value crops, coal gasification, geothermal power generation, coal seam gas development and carbon geosequestration. Additional research is required into new industries or practices that can be supported by GAB resources to improve and diversify current businesses and to develop new industries to contribute to regional development.

Priority research questions

- a. Where are the emerging industries in the GAB?
- b. What are the risks to the resource, environmental assets and existing users from further development of these industries?
- c. What technical aspects require further investigation?
- d. What are the opportunities for new industries?
- e. Are existing policy frameworks sufficiently mature / robust to effectively regulate emerging and developing industries?

Further information

Partnerships

The Committee is not well placed to directly undertake research. However, the Committee is well placed to

- provide leadership and focus strategic research
- broker relationships within the research community and between industry, policy and research groups
- build a knowledge base, and
- communicate research to a wide audience.

Scholarships

The GABCC has established two PhD top-up scholarships, each valued at \$5,000 per annum over three years. These top-up scholarships are intended to supplement the funding of primary scholarship holders who intend to conduct innovative research that will address priority research questions and themes identified in the *Research Prospectus*.

How to get involved

For further information on the *Research Prospectus*, potential for partnering or the PhD top-up scholarships, or to indicate your interest, please contact the GABCC Secretariat or complete a registration of interest form – see www.gabcc.org.au for further information.