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# The 'Drought Antidote' : An archaeology of artesian water management in NSW

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**Key words**: Great Artesian Basin; Pastoralism; Drought Proofing; Water Security; Archaeology

**Abstract**

The Great Artesian Basin covers a vast area of inland Australia, enabling dependable water supply across the rangelands. In New South Wales artesian bores were introduced to benefit the pastoral industry, established by the Department of Public Works under the *Artesian Wells Act, 1897* and the *Water and Drainage Act, 1902*, hereafter referred to as the Artesian Scheme. However, the focus of research has been on current environmental concerns and the rehabilitation of artesian bores, with limited attention to historical water management strategies associated with the scheme. Remains of environmental modification from the Artesian Scheme are extensive throughout pastoral landscapes, although this archaeological record is delicate and disappearing with inadequate research conducted. This paper explores the origins of the scheme and considers localised variation, implementation, and operation through investigation of a case study: Sherwood Bore, near Rowena in north-west NSW. Drawing upon historical documentation, oral history and archaeological interpretation of remnant infrastructure, this research revealed the Artesian Scheme represented socio-economic development by supporting pastoral settlement opportunities and pastoral growth.

## Introduction

A large portion of New South Wales (NSW) is arid to semi-arid rangelands which experience low, irregular rainfall. Limited permanent water sources restricted pastoral development until the initial drilling of artesian water in 1878 (Powell *et al.*, 2015) and subsequent confirmation of the large extent of the Great Artesian Basin (GAB) in 1892 (DPW, 1893). This vast groundwater basin provided a dependable water supply and enabled large-scale expansion of pastoralism (Murray, 2018). The GAB underlies 22% of Australia, spanning 25% of NSW (DPIE, 2023), and large areas of Queensland, South Australia, and the Northern Territory (Figure 1).

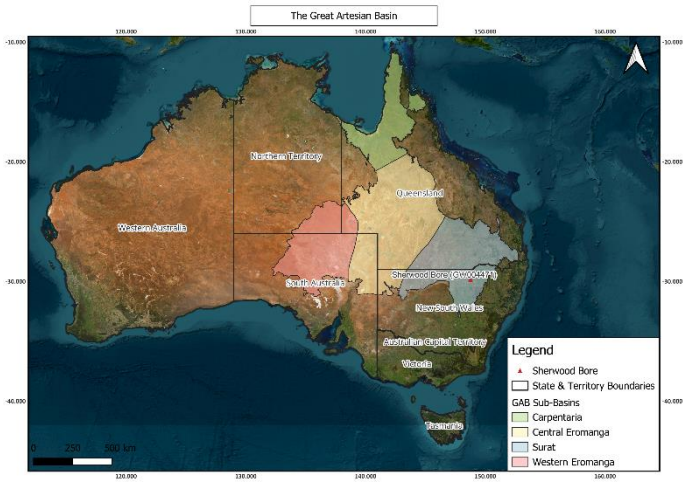


Figure 1: GAB Boundary (adapted from SEED layer "Water Sharing Plan – Groundwater Sources").

In the late nineteenth century economic, social, political, and environmental factors combined to encourage the initiation of one of the most ambitious modern schemes of deliberate environmental modification – the GAB Bore Scheme. From 1878, 8,000 bores were drilled across NSW as a means of providing permanent reliable water to landholders (DPIE, 2023), encouraging an expansion of European settlement into previously sparsely occupied areas, and significant growth of pastoral industries away from watercourses. In NSW, bores were sunk under the *Artesian Wells Act, 1897* and *Water and Drainage Act, 1902* for stock (sheep and cattle) and domestic applications, watering over 1,100,000ha (DPW, 1910, p. 9); hereafter referred to as the Artesian Scheme. These bores were governed by Bore Water Trusts, through elected Trustees, to oversee the maintenance through employing maintenance men, and operation of artesian water management (DPW, 1906). Associated water management infrastructure includes: *distribution tanks, divisors* (used to adjust the direction of flow), *bore-drains* (Figure 2a), and *water storage dams*. The Artesian Scheme represents unique rural engineering, governance, and employment in the context of a state development policy through expansion of the pastoral industry (DWE, 2009).


a)


b)

Figure 2: Sherwood Bore-drain (a) and Sherwood Bore (b), courtesy of D. Phelps, 2006.

The Artesian Scheme was successful in many of its aims, encouraging expanded pastoral settlement but also seeding its own demise. The early configuration of unregulated free-flowing bores led to significant problems with GAB water supply and the failure of much of the system. Since 1990 the *Cap and Pipe the Bores Program* (*CPBP*) has capped many bores and introduced reticulated systems of pipes, tanks, and troughs to reduce water loss through evaporation (DPIE, 2023). Consequently, in many areas the Artesian Scheme effectively finished more than 30 years ago, with prolonged deterioration, and operation is now almost out of living memory. Despite the significant impact on the development of European settlement in inland Australia and the pastoral industry (Godwin & L'Oste-Brown, 2012), the history at either a macro or micro scale is largely undocumented, with archaeological remains of the infrastructure vanishing or deteriorating.

This paper explores the history and archaeology of the Artesian Scheme in NSW. It aims to understand the archaeology of the scheme as an example of settler-induced anthropogenic change/environmental modification as a development strategy, as well as the industrial archaeology of the scheme and its operation. It will also examine regional implementation of the scheme, as well as micro-scale of a single bore's establishment, operation, and impacts upon adjacent properties, including the processes of maintenance of the bore and distribution system and its decline and modification over time. These aims are achieved through a case study focusing on Sherwood Bore (ID No. GW004471) (Figure 2b) which operated from 1907-2007, located near Rowena, NSW, on the property Glen Eden. This property has been owned and operated by the author's family since c.1902. Research explores historical documentation and generational oral history, combined with the archaeological record.

**Methods**

Investigation of the GAB was undertaken across multiple scales (state, regional, and local), which required an innovative combination of existing methodological approaches. Recognised methods were derived from previous studies and general literature to suitably combine interdisciplinary approaches to address the unique research topic. A multi-scalar approach was required to comprehensively understand such a large-scale management scheme, as there is interplay between levels where one informs the other, and which has not previously been undertaken for the historical period. Selected methods included the interpretation of historical sources, regional investigation, oral history, archaeological features, and artefact assemblages. The progression of the Artesian Scheme through macro and micro scales was achieved through the development of phases from the available evidence.

**Results**

Deliberation regarding the operation and implementation of such a large-scale water management scheme commenced in 1892 after a town bore was successfully sunk in Coonamble, which was previously considered outside the strata containing artesian water (DPW, 1893, p. 9). This success significantly increased the area of land with potential access to the GAB, prompting political discussion for future possibilities to supply permanent, reliable, water to regions periodically without water for the benefit of the pastoral industry. A subsequent design phase was characterised by experimentation and implementation of improved infrastructure and distribution approaches. By 1906 rapid implementation was underway to improve water security across an enormous pastoral landscape, "…which was formerly periodically denuded of stock by frequently-reoccurring droughts" (DPW, 1906, p. 5). In 1910, 48 Trust Bores were operational, supplying 1,102,695ha, with an additional 546,779ha proposed through future works (DPW, 1910, p. 9). Investigation of historical population change indicated no significant changes, suggesting the Artesian Scheme was intended to support economic growth, specifically for small pastoral enterprises to increase wool productivity. This also explains a concentration of Trusts within the semi-arid North-West, which had better potential to reach economic goals through reliable water supply, in comparison to the arid Western Division. The rapid geographic expansion of the large-scale Artesian Scheme was not reflected locally, and requires multi-scalar insight.

Localised progression represents the site-specific implementation of the Artesian Scheme through processes of construction and continuous maintenance to ensure dependable water supply. Archaeological survey introduced variation in management strategies and infrastructure, producing difficulties in comprehensively understanding the nature of this cultural landscape across numerous sites. Oral history revealed difficulties in the sinking of Sherwood Bore, and the effect individual agency from the maintenance men had on the archaeological record.

**Discussion and Conclusion**

Environmental archaeological studies of irrigation internationally have primarily focused on ancient management strategies (Shaw & Sutcliffe, 2001 & Konstantinov *et al.*, 2023), and advise a shift towards more sustainable modern practices. Guttman-Bond (2010) recommended sustainable ancient methods could be reintroduced, stating seven countries were successful, with further research underway. Reintroduction of knowledge was also proposed to combat aridification caused by climate change, noting methods may only be

suitable across regions with similar climate conditions (Kaptijn, 2017). *Archaeology for Sustainable Agriculture* (2020, p. 420) suggested archaeology's strongest contributions were "…its ability to demonstrate that agricultural sustainability is historically contingent, and… its attention to outcomes, or completed cycles of agricultural development." This stressed the complexity and urgency for agriculture to improve sustainability, which would require on-going collaboration amongst diverse stakeholder groups (Fisher, 2020). This research highlights the ability for archaeology to enhance decision making, especially within water management and agricultural settings.

Large scale agriculture was also practiced in the Indus Valley in c.2600 BCE where an extensive network of canals was used for irrigation (Angelakis *et al.*, 2020). The use of bore-drain networks bares similarities in environmental modification to the Indus Valley, to supply water to extensive pastoralism, suggesting that the decision for distribution methods may have been influenced by previous approaches. However, unlike, ancient examples the Artesian Scheme was relatively short lived, spanning over 120 years, with initial implementation lasting only 19 years after discovery of water at Coonamble. The Artesian Scheme was also industrial, requiring less labour than the Indus Valley example, but rapidly causing dramatic change across a large landscape. Research into ancient water management indicates the longevity of environmental modification to improve water security for a variety of purposes. Research into management of the GAB could benefit understanding of ancient practices and can inform future approaches.

The use of artesian water was considered pivotal to pastoralism across arid and semi-arid regions in Queensland, NSW, and South Australia (Brake, 2020). Murray (2018) called for an archaeology of extensive pastoralism within the GAB, but did not outline a methodical approach, which this research has attempted to provide. Future directions could pursue variability through purposes of bores, landholder response, environmental variation, strategic differences in the Western Division, or a more detailed regional study through numerous case studies, especially of Florida Bore.

The Artesian Scheme was successful initially, substantially improving water security, especially during periodical droughts, but effectiveness varied, followed by early gradual decline. While historical water management was progressively phased out the Artesian Scheme endures, increasing the significance of understanding historical strategies to inform future decisions. Historical documents demonstrated the introduction of artesian water supply was intended to support pastoralism, enabling smaller enterprises to become viable – implemented following extensive pastoral sub-division. Interpretation of changing pastoral production in NSW revealed comparable stock populations, but improved resilience and industry response from periodical droughts, and supported increased productivity – this was reflected locally at Sherwood Bore through marginally improved stocking capabilities. This further suggests water security underpins production, while fodder insecurity and market dictate stocking responses. Review of regional population growth indicated no significant increase current to the introduction of artesian water, suggesting the Artesian Scheme was not intended to maximise population growth. Instead, the Artesian Scheme intended to maximise property number, settlement opportunities and economic growth through significantly improved water access and security enhancing wool productivity.

**Acknowledgements**
This paper is adapted from my Honours thesis, which I would like to acknowledge my supervisor, Prof. Martin Gibbs, for allowing me to pursue my chosen topic, and for his endless support, advice and analogies. I would like to thank my family for all of their support, especially my grandparents, Carl and Thalia, for their insight. For Harold's posthumous knowledge, for photographs from Wendy Burrell, and for UNE Ethics Approval (HE23-118). My further thanks to my parents, David and Wendy, and partner, Skye, for their combined efforts proofreading numerous drafts.

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