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A review of policy, legal, land use and social change in the management of urban water resources in Sydney, Australia: A brief reflection of challenges and lessons from the last 200 years

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ABSTRACT

The management of water in Sydney, Australia, is marked by tragedy, foresight, protectionism and social upheaval. The settlement of the first fleet colony at Sydney was determined by its water assets with its sheltered and deep harbour and access to reliable freshwater for the soon to be burgeoning town. During the first 100 years of European settlement, the management of Sydney's water resources was characterised by minimal planning and arguably contempt for any regulatory regime, culminating in a pandemic of water borne diseases and pollution. From a perilous beginning beset by drought and disease, water management evolved over the next century to achieve what was at the time world's best practice in sanitary engineering and laying the foundation for the water systems that occur today. These achievements relied on a centralised approach, which solved water supply and sanitation issues but created a new set of environmental problems such as the discharge of diffuse water pollution into urban streams. As the city of Sydney moves into its third century, water management remains a critical issue for state and local government. This has occurred through the convergence of a range of social, political, climatic and environmental factors, each with their own separate but interrelated and overlapping agendas. Sydney still defines its essential character in terms of its harbour, beaches and waterways. If urban water management is to be a central foundation for a sustainable future for Sydney, reforms are needed and necessary.

Introduction

The history of water management in Sydney has followed a path common to many cities evolving from a small settlement to a major metropolis. The catalysts for change have been many and varied, perhaps best described as stochastic, turning on pivotal changes in community needs and expectations, engineering, scientific discovery and, occasionally, political foresight. This paper presents a perspective on how Sydney has grappled with, and responded to, the many challenges facing water managers from early European settlement to the present. It concludes with an analysis and assessment of the NSW Government's metropolitan water plans and other related strategies designed to set future and arguably a more sustainable direction for urban water management.

Early days of settlement 1770–1800

The intended location for the settlement of the First Fleet was Botany Bay, as identified by Captain Cook following his brief stopover in 1770. However, after some seven and a half months at sea with 11 ships, Captain Arthur Phillip was less than enthusiastic about the site identified by Cook. Not only did it offer little protection to shipping, the 'fine meadows' referred to by Cook could not be found and fresh water, while ample for the crew of the *Endeavour*, was insufficient to meet the needs of the First Fleet, let alone those of a permanent settlement. Fortunately, a short sail north revealed what Captain Phillip described to Lord Sydney in his first dispatch as 'the finest harbour in the world' (Barnard, 1980). This optimism was not universally shared, as Daniel Southwell, a sailor on the *Sirrus* wrote, 'there are no rivers of water, we are indebted to the frequent rains that supply the little runs that furnish us' (Cathcart, 2009).

The Tank Stream was a very small creek, originally providing a small flow of water from a hanging swamp (Haworth, 2003). It was the original water supply for the city (1788–1830) and soon became unreliable, particularly during the times of drought that

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plagued the early years of settlement. To overcome this, Captain Phillip ordered the construction of Australia's first water engineering project, consisting of three holes or tanks (thus its name) into the sandstone abutting the stream to act as reservoirs. Given the proximity of the city's residents to these reserves coupled with a lack of understanding of water borne disease they soon become polluted with human and animal waste and gradually transformed into an open sewer.

Disease and deterioration of the waterways 1800–1890

The 19th century in Sydney was a century of disease (Curson, 1985). The urban waterways linking the everyday activities of the early town contributed to the spread of waterborne infectious disease (Gilbert, 1998). By today's standards, Sydney in the 1800s had human health statistics that we would now associate with developing nations (WHO, 2008). For example, in 1855 infant mortality in Sydney claimed more than one-quarter of all live births (Curson, 1985). The growth of Sydney's population was hampered by wave after wave of infectious diseases, including whooping cough, scarlet fever, small pox, typhoid, and the plague (Curson, 1985). This was not dissimilar to other cities of the world at the time. London, for example, suffered many devastating cholera outbreaks in the 1850s (Smith, 2002). This reflected the reality that only a few of the larger European cities, for example Paris had seriously turned their minds to water and sanitary engineering.

This is not to suggest early settlers were completely unaware of the issues of urban water management. In 1803, the *Sydney Gazette* (18 December) published what was most likely Australia's first government environmental order in relation to water pollution:

> *If any person whatever is detected in throwing any filth into the stream of fresh water, cleaning fish, washing, erecting pigsties near it or taking water out of the Tanks, on conviction before a Magistrate their house will be taken down and forfeit five pound for each offence to the Orphan Fund.*

Sadly this order did not achieve its intent, despite the severity of the penalty. In 1810 and regularly thereafter it was necessary to introduce further orders that sought to reduce ongoing pollution of the local waterways by residents and industry (Henry, 1939; Aird, 1961).

The gradual demise of the Tank Stream led the colony to look for water elsewhere. Those that could sink bores did so, not knowing that the contaminants that had infected the Tank Stream also permeated the fractured sandstone into which their bores were sunk, polluting their supply. Wealthy residents were also able to buy water from the Lachlan Swamp wetlands (now Centennial Park) further a field. This ultimately led to the construction of Busby's bore by convict labour in 1830 (Hirst, 1983). This linked the Lachlan swamp that was fed by groundwater in the Quaternary sand deposits in the Botany Basin to the city (Haworth, 2003). Industry was gradually forced to relocate south of the growing town, across the sand sediments of the Botany Basin, towards Botany Bay drawing on the more regular groundwater supply, but more importantly to minimise the more obvious polluting impact on the city's water supply.

In 1842, the management of water passed from the Imperial Colony to the new Sydney Corporation – the forerunner of Sydney City Council. A Water Committee was established with responsibility for the supply of water to the city and suburbs. The Committee also had responsibility for setting water rates and exemptions, licensing of plumbers, making water supply by-laws and other curious tasks such as maintaining Council's fire engines and erecting public fountains (Aird, 1961).

Politically, this period saw a transition from the dominant views of the powerful landed and wealthy gentry to an emerging democracy reflecting the egalitarian spirit of residents and the press. In 1856 those in power were forced to acquiesce to a new form of government independent of England and able to make its own decisions based on local needs and conditions, including the provision of water assets and services (Clark, 1978a).

While Sydney was still a modestly sized town it had outgrown its rudimentary settlement origins. Little care was taken with disposal of waste and it was common for latrines to be dug in backyards beside drinking water wells (Clark, 1978b). Infectious diseases created hysteria amongst the community and infant mortality rose sharply during the middle and second half of the 19th century (Smith, 1990). Through the lack of proper water management, Sydney had polluted and channelised the Tank Stream, drained the Lachlan Swamp wetlands and, by 1858, was up to its third water supply scheme, the Botany Swamps. The Botany Swamps scheme was located downstream of Lachlan Swamps and drew on the highly porous Quaternary sands of the Botany Basin (Haworth, 2003).

Emergence of visionary water planning

A lack of public finances and possibly political will led the State Government of New South Wales to dissolve the City Council only 12 years after Sydney was incorporated as a city (Aird, 1961). Three Commissioners (nowadays referred to as administrators in the *Local Government Act 1993* (NSW)) were appointed to take charge from 1854 to 1857 (Act No. 17 1853). During this period plans were drawn up and work commenced on the construction of minor sewers in almost every street linked to five designed sewer outfalls at Wattle Street (Blackwattle Bay), Hay Street (Darling Harbour), Tank Stream (Sydney Cove), Fort Macquarie (Bennelong Point) and Woolloomooloo (Woolloomooloo Bay) (Aird, 1961). These works were completed in 1859 under the direction of the newly formed Sydney City Council and a specific committee charged with responsibility for sewage, among other things.

The newly formed Council, however, did not capitalise fully on this momentum. Many aspects of the water supply, sewerage and stormwater systems still did not meet the community's, political, social or health expectations. In 1867 a Royal Commission into Sydney's water supply was instigated 'to make a diligent and full inquiry into the present provision for a supply of pure water to the city of Sydney and suburbs . . .' and in 1873 the Sewage and Health Board was established by the government to prepare a scheme for Sydney and its suburbs (Aird, 1961; *Sydney Morning Herald*, 9 May 1885). In relation to water supply, the Commission recommended the construction of the Upper Nepean dam to replace the drought-affected Botany supply scheme (Aird, 1961). The Upper Nepean water supply was an ambitious engineering scheme that required the colony to start collecting and storing surface runoff from the uplifted Illawarra Plateau south west of Sydney (Haworth, 2003). The soils derived from the Hawkesbury and Narrabeen Sandstones of this largely undisturbed bushland were very poor (Haworth, 2003) but yielded water of excellent quality with very low nitrogen and phosphorus concentrations (Harris, 2001). The waterways created deeply dissected sandstone gorges in the Woronora and Illawarra plateau which proved ideal for building deep water storage reservoirs (Haworth, 2003). Once constructed, this scheme was able to supply sufficient water to assist in the flushing of the sewage system that had previously left many streams so polluted 'that eventually their dry weather flow consisted largely of fouled or slop water' (Aird, 1961, p 128).

However, it was not until 1890 that the Secretary for Public Works, the Hon Bruce Smith, provided reinvigorated focus to fund