

Strategic Analysis Paper

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Australia's Water Security Part 2: Water Use

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Key Points

- Water use in Australia has led to the full allocation of much of its available surface water.
- The agriculture sector is the largest water consumer, accounting for just over half of all water consumed in Australia.
- Population growth and industry expansion will contribute to increased water demand in the future.
- Groundwater, in particular, requires greater management and regulation to ensure more equitable and environmentally sustainable water use.
- Current water availability will not meet future demand. Ongoing investment and management in both the public and private sectors is critical to meeting this demand.

Summary

Australia is one of the highest per capita water consumers in the world. Understanding the way that a country uses its available resources and where demand is likely to increase is important when assessing the long-term likelihood of a supply-demand gap. In Australia, growing urban populations, economic growth led by industry expansion and a goal of increasing agricultural production, will all contribute to rising water demand to 2050. Most basins in the country, however, have reached their allocation limits. This has led to a prioritisation from both the private and public sectors for greater water use efficiency and the identification and utilisation of alternative water resources. This paper will look particularly at water usage in Australia. Governance, management and investment in the sector will be discussed in subsequent papers.

Analysis

The Millennium Drought Effect

Australians use approximately 26,000 gigalitres (GL) of water every year¹. This equates to 1.3 million litres for every man, woman and child. With access to less than one per cent of the world's freshwater resources, water consumption in Australia is still among the highest in the world. During the 2000s the average consumption of water per person per year in OECD countries was 870 kilolitres; Australia's average consumption was 930kL per person.

Water use in Australia has been shaped by a number of factors, including geographic precipitation patterns, industry development, population growth and long-term climatic variations. Reduced precipitation and water availability, following the commencement of the Millennium Drought in 2002, had a significant influence on policymaking and water management in Australia.

The drought highlighted the vulnerability of industries and consumers to fluctuations in rainfall patterns. Reduced precipitation and the ongoing drought led to a drop in water availability. According to the Australian Bureau of Statistics (ABS), water consumption across Australia fell by 28 per cent between 2004-05 and 2009-10. Household water consumption fell to 1,868GL over the same period, reflecting an 11 per cent reduction. Climate change forecasts suggest that these vulnerabilities will increase in the longer term as rainfall variability and prolonged periods of drought rise in frequency.

As Australia's population continues to grow, the demand for urban water will create challenges for water managers. The majority of natural water resources in Australia have already reached allocation limits. In some instances, resources are over-allocated between user groups and economic mechanisms have been adopted to manage usage. Meeting competing water demand into the future will require innovation, the economic valuation of water and co-operation across sectors.

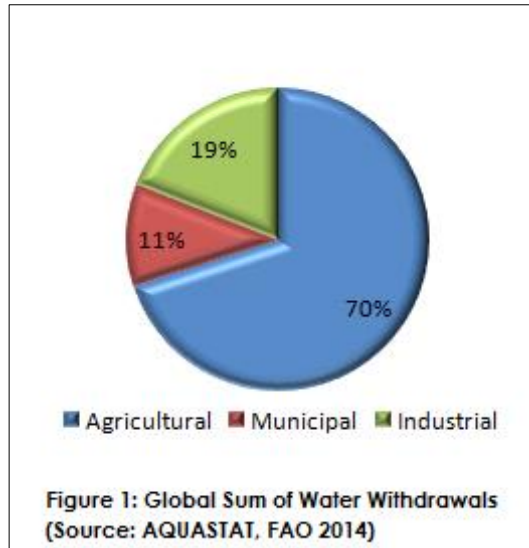
Australia's Key Water Users

Agriculture

Agriculture is the largest consumer of water in Australia. The industry accounts for just over half of all water consumed in the country. In 2012-13, the industry consumed 11,900GL of water. According to the ABS, this is an increase in consumption of 2,900GL from the previous year. Of the water used within agriculture, the ABS estimates that 93 per cent was used for crop and pasture irrigation.

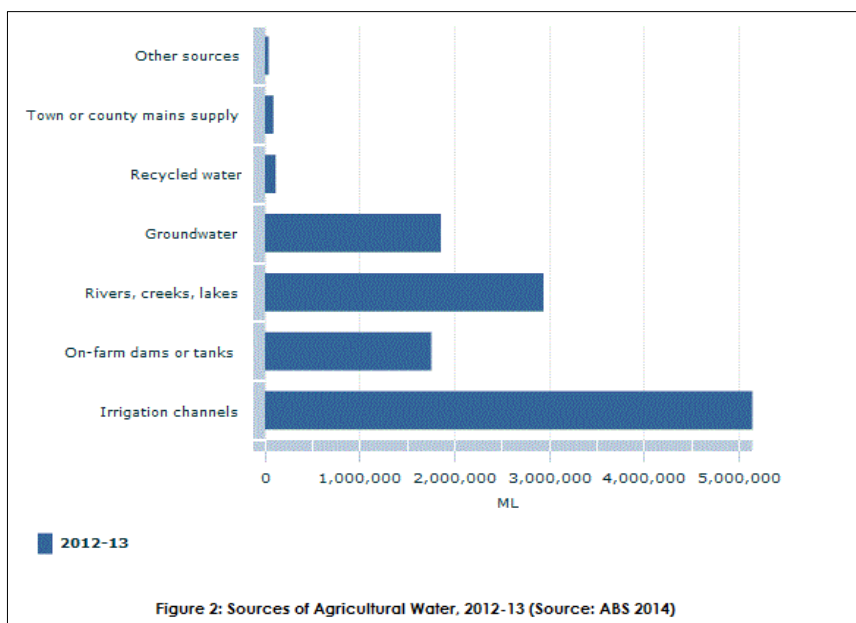
Agriculture accounts for the majority of the world's water withdrawals (Figure 1). While irrigation is the key use for water in Australian agriculture, irrigated land accounts for less than one per cent of Australia's agricultural land.

¹ White, Robert (2007) "Australia's Water Crisis" *Australasian Science*, Mar 2007, vol 28(2)

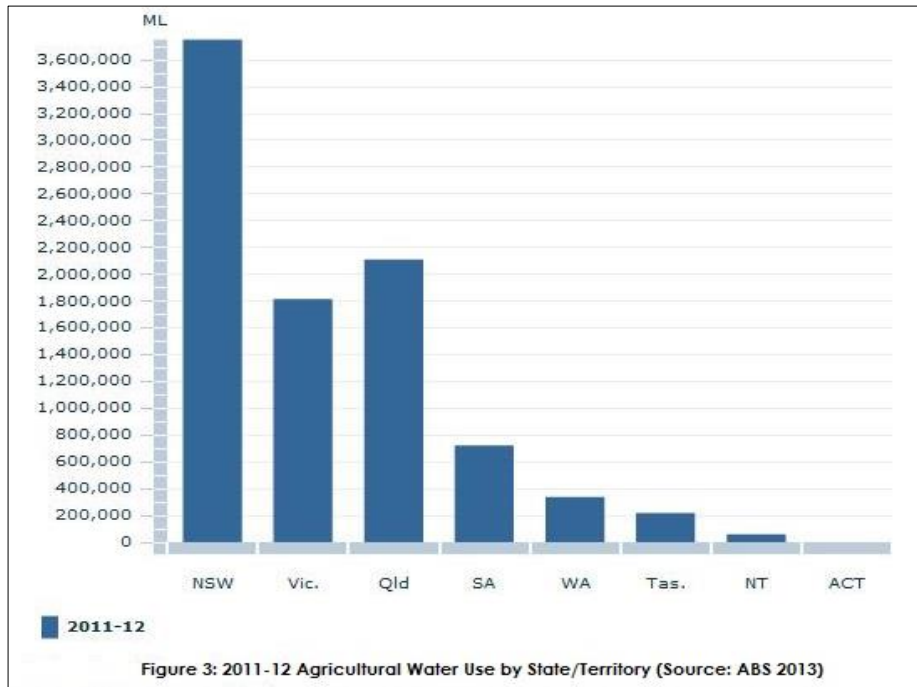


Water use efficiency in agriculture is already relatively high in Australia. Despite a five per cent increase in the area of irrigated land in 2009-10, water for irrigation use only rose by 1.5 per cent in the same year. The average application rate decreased from 3.7 ML/ha to 3.6 ML/ha as a result. If the expansion of agricultural production is to continue, however, the utilisation of previously uncaptured resources, coupled with efficiency measures, will be required.

In 2012-13, 43 per cent of Australia’s agricultural water was sourced from irrigation channels, 25 per cent from rivers, creeks and lakes, 16 per cent from groundwater and 15 per cent from on-farm dams and tanks (Figure 2). Surface water resources across Australia have, in most cases, reached or surpassed allocation limits. Agricultural expansion, therefore, will require greater investment in alternative water sources. The greatest gains can be made through on-farm water recycling and the expansion of capture and storage facilities.



Agricultural water use by State and Territories varies widely. In 2011-12, New South Wales and Queensland had the highest agricultural water use (Figure 3). Major agricultural production areas are found in both these states, accounting for this usage. Within New South Wales, the Murray Darling Basin (MDB) is responsible for the majority of agricultural water use. The basin accounts for 65 per cent of Australia’s irrigated land and produces one-third of the [national food supply](#).



Future demand, influenced by greater urban/industry water needs, along with agricultural growth, will require more water than is currently available. To ensure there is enough water to meet demand and support agricultural expansion, increasing efficiencies where possible, but more importantly, developing alternative water sources will prove critical.

Industry

Industrial water use encompasses a broad number of user groups: particularly mining, manufacturing, food processing, electricity and gas supply. CSIRO estimates that, in the 2008/09 financial year, the industrial sector consumed 2,840GL of water, approximately 20 per cent of Australia’s total water consumption for that year. Given the increased availability of surface water since 2009, particularly in south-east Australia, industry water consumption in 2014 is now likely much lower than 20 per cent of Australia’s total water consumption. Overall consumption in the sector, however, continues to rise in line with industry expansion.

The mining sector, according to the ABS, accounted for four per cent of industrial water consumption in 2009-10. But water use in mining and industry is actually much higher than this figure. Groundwater is a major source of water for mining and oil and gas activities; however, under state legislation, these uses are often not regulated within regular licensing

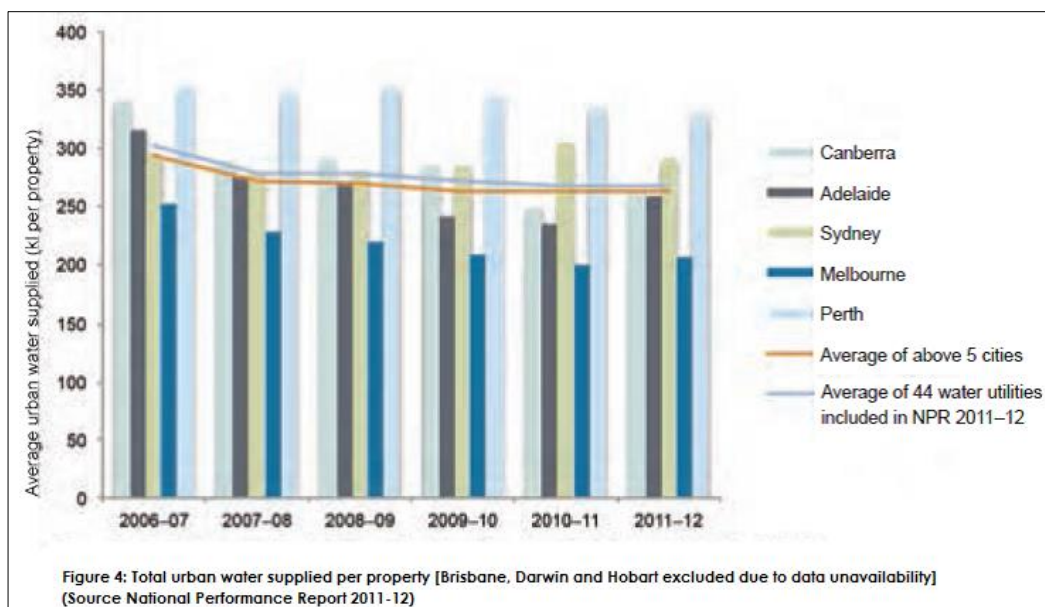
requirements and entitlement allocations. A great deal of water use in this sector is thus unaccounted for, jeopardising both groundwater and users within a system.

For industry to expand in Australia, within a water market dominated by agriculture and domestic surface water users, the sector must prioritise innovative, alternative methods of accessing and utilising water. Continued water price rises should further incentivise the sector to adopt these technologies and develop integrated, sustainable water management systems. The sector has the potential to lead water management developments in Australia. Unaccounted groundwater use must also be addressed to more equitably manage available water resources between users and reduce the risk to the environment.

Household

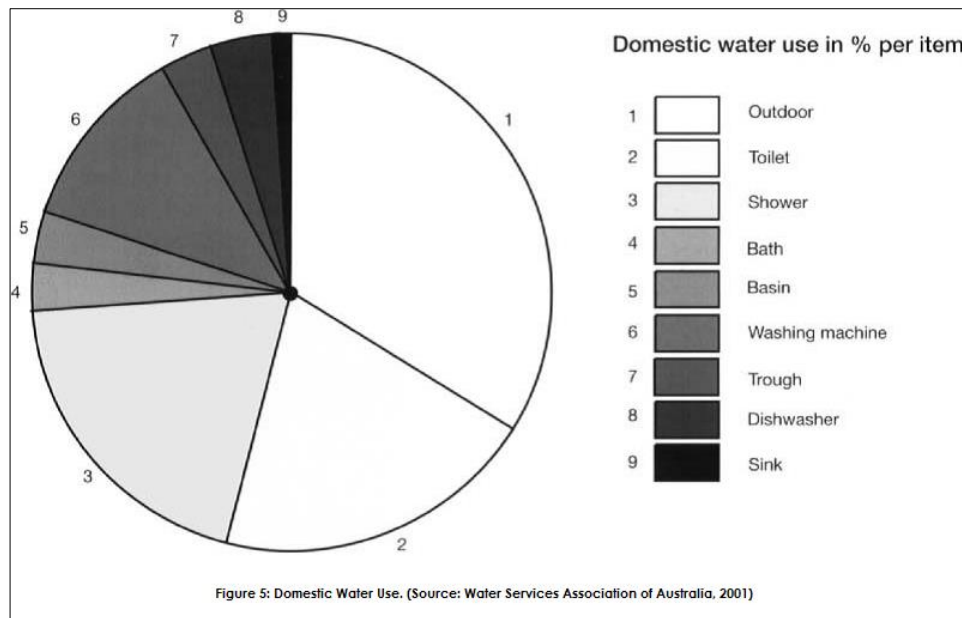
Of the total volume of water supplied to urban areas, the National Water Commission in 2013 estimated that residential water use accounted nationally for 63 per cent; commercial, municipal and industrial used 25 per cent. The ABS estimates that, in 2009-10, the household sector consumed 14 per cent of Australia’s total water consumption.

On a per property basis, Perth was the highest [urban water user](#) nationally in 2011-12. This is despite severely limited natural water resources. There has, however, been a continual downward trend in household water use in the city, reflecting ongoing government strategies to reduce water consumption across the state. Nationally, from 2006 to 2009, there was an overall average decline in household water use (Figure 4). This correlated with ongoing drought, particularly in the south-east. From 2010 the trend has reversed with household water use in Canberra, Adelaide and Melbourne rising as drought conditions eased.



According to the Water Services Association of Australia, Australian households on average use 20 per cent of domestic water on showering; 20 per cent in toilet use; 12 per cent in the washing machine; 34 per cent in the garden and the remaining water on other household

water devices (Figure 5). Water utilities across the country continue to invest in demand-side management and behaviour change programs to encourage water use reductions in the household. Reducing the amount of water used for outdoor purposes, in particular, will equate to considerable water savings.



Population growth will lead to a considerable rise in water demand to 2050. Australia’s current population is approximately 23.4 million people (ABS 2014). This is expected to grow to between 36.8 to 48.3 million people by 2061 (ABS 2013). The rise in water demand for municipal purposes, which accompanies population growth, will place significant pressure on current water supplies. Many of Australia’s cities are in regions experiencing a long-term decline in rainfall. Climate change will contribute to further natural supply reductions. A long-term management outlook is required to prioritise sourcing alternative water and “climate proofing” water supply systems.

Environmental Water Use

Historically, environmental water requirements were overlooked when allocating available water to user groups. Since 2004, the [National Water Initiative](#) has led governments, at both the state and federal level, to manage environmental and public benefit outcomes relating to water. This is done through the assessment of the flow characteristics, important for river health and their ecosystems, and subsequently calculating the flow requirements of that system.

Conflict arises when users see water allocated to the environment as a wasted asset “flowing out to sea”. In reality environmental water needs are not at odds with consumptive use. [Redefining management](#) to address specific outcomes and strategies, rather than broadly referencing ‘environmental flows’ can reduce the ambiguity surrounding the terminology and change public perceptions relating to environmental water needs. Overlooking environmental water requirements altogether, however, runs the risk of disrupting ecological processes crucial to functioning ecosystems and landscapes. Further,

long-term disruptions, leading to environmental degradation, can translate to the loss of economic value. The assessment of environmental water requirements and balancing user demands continues to evolve and will require long-term management.

Water Demand Trends and Policy Recommendations

Population growth and industry expansion in Australia will place pressure on the current allocation arrangements. Urban centres will require greater access to water for household consumption and basic services, as well as more advanced wastewater treatment facilities. This will equally demand greater infrastructure development, particularly for the storage and transport of water.

There is an urgent need to further develop groundwater regulations relating to extractions in industry. The lack of consistent regulations for user groups undermines entitlement schemes and risks the integrity of groundwater resources. There is an element of uncertainty with groundwater systems and their interaction with surface water, but that should not deter policy development and management.

Demand-side management requires renewed engagement with user groups to increase efficiencies and reuse water where viable. In most capital cities, permanent watering restrictions have assisted with lowering household consumption. Agricultural water efficiency is relatively high, however, encouraging the use of water saving technology and switching to less water-intensive products can lead to further savings. Equally, industries require incentives to lower their water usage and reuse water where feasible.

Prioritising environmental water needs is critical to maintain natural systems and ensure long-term sustainability. Climate change forecasts suggest that natural water systems will become increasingly unreliable. Much of [southern Australia](#), where key agricultural areas are located, has been identified as particularly vulnerable to climate change. Ensuring that environmental water needs continue to be recognised will become more important to ensure that ecosystems can adapt and survive under a changing climate. It will also mean that water users need to adapt. Securing reliable and safe water supplies should be prioritised to reduce the impact of climate change on industries, agricultural production and domestic supply.

Australia will require greater volumes of water and more advance infrastructure to meet user demand into the future. It also needs to become a more efficient water user. Water management and investment priorities in Australia continue to ensure demand is being met. Part Three of this series will further investigate the governance of water in Australia and the complexities arising from water policies and management at both the state and federal levels. An assessment will be made on the effectiveness of water governance in the country and areas where improvements can be made.

Any opinions or views expressed in this paper are those of the individual author, unless stated to be those of Future Directions International.

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