The Parliament of the Commonwealth of Australia

The Value of Water:

Inquiry into Australia's management of urban water

Report of the Senate Environment, Communications,

Information Technology and the Arts References Committee

December 2002

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Terms of Reference

On 5 April 2001 the Senate referred the following mat6ters to the Environment, Communications, Information Technology and the Arts References Committee for inquiry and report by 1 April 2002 (which was later extended to 5 December 2002):

a) the management of water in Australian cities including:

   i. a review of existing reports on the management of water, predominantly in urban areas, and

   ii. an assessment of what constitutes ecologically sustainable water use and the environmental, health and economic implications and imperatives for achieving this, taking into account:

      (A) projected population growth and consumption rates,

      (B) water quality and adequacy,

      (C) urban planning, and

      (D) water management systems;

b) the progress and adequacy of Australia's policies to reduce urban water use and improve water quality;

c) evironmental performance in urban stormwater management, including:

   i. effects of accelerated run-off from sealed urban catchments on waterways,

   ii. the impact of urban run-off on receiving waters,

   iii. best environmental practice in urban stormwater management, and

   iv. clarification of roles, responsibilities and reporting requirements amongst public agencies at state and local government level; and

d) the potential for Australia to improve water quality and environmental outcomes, incuding:

   i. the opportunities, constraints and costs of:

      (A) waste water recycling, grey water use and urban stormwater utilisation, and

      (B) improved water use efficiency in household, garden, public open space and industrial contexts demand management,

   ii. the effectiveness of applying financial, market and other mechanisms to achieve water efficiency,

   iii. the effectiveness and relevance of environmental management systems, certification programs and best management practices, and

   iv. the introduction of bulk water entitlements and water markets, and their implications for urban and industrial water consumption.

Committee membership

Members:

Senator Lyn Allison (AD, VIC) (Chair)

Senator John Tierney (LP, NSW) (Deputy Chair)

Senator Kate Lundy (ALP, ACT)

Senator Sue Mackay (ALP, TAS)

Senator Tsebin Tchen (LP, VIC)

Senator Penny Wong (ALP, SA)

Substitute Members

Senator Crossin to replace Senator Mackay for the inquiry into environmental regulation of uranium mines

Senator Buckland to replace Senator Lundy for the inquiry into environmental regulation of uranium mines

Senator Scullion to replace Senator Tierney for the inquiry into environmental regulation of uranium mines

Participating: Members:

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Senator the Hon Ron Boswell (NPA, QLD)

Senator Bob Brown (AG, TAS)

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Senator George Campbell (ALP, NSW)

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Senator Grant Chapman (LP, SA)

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Senator the Hon Helen Coonan (LP, NSW)

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Senator Christopher Evans (ALP, WA)

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Executive Summary

Australian cities have generally been well served by the arrangements to date: they have had reliable water supplies, they have had good public health and they have had good drainage. But the time is now ripe for a new approach to be much more effective in terms of water use, and for much more useful environmental outcomes.[1]

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Traditionally, management of water has been to protect health and safety, to prevent damage and danger to person/s and property. Today, water should be recognised as a valuable resource and the planning and management of a site be undertaken with regard to water being an asset.[2]

Introduction

In conducting its inquiry into Australia's urban water management, the Committee has collected a wealth of evidence from submissions, reports, oral evidence, and the valuable impressions gained from site visits around the country.

It is clear that urban centres in Australia are using water in ways, and quantities, that are unsustainable.

There is however, a growing public and institutional awareness of the problem and the level of commitment to change is obvious from the strong interest in the inquiry from all sectors. Australia has the technology, the resources and the scientific know-how to fix the problems.

Although a great deal is being done, the real need is to force the pace of change. Reform is not keeping pace with the ecological damage caused by the expanding ecological footprint of our cities.

The report addresses each of the Committee's terms of reference and takes a solutions based approach to urban water management, rather than simply recounting a list of problems.

The Committee is mindful of the fact that urban water management is a shared responsibility of all three levels of government in Australia and this guarantees jurisdictional complexity. Accordingly, the report considers the roles of all three levels, but ultimately focuses its recommendations on matters that are the responsibility of the Commonwealth.

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1 Professor Mein, *Proof Committee Hansard*, Melbourne, 23 April 2002, p 267.

2 Hornsby Shire Council, *Submission 6*, p 2.
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Problems in Australia's urban water use

Demand and supply

Australians use about 350 litres per person per day, and despite significant reductions in per capita consumption over the past decade, overall demand is gradually increasing due largely to increasing population. On current trends many cities and towns in Australia will still need to find new sources of water unless there are significant improvements in water conservation.

Some cities and towns are harvesting water from aquifers at a greater rate than they are being recharged. For others, the quantity and quality of raw water in their water catchments are under pressure from agriculture and logging.

Urban water users are also now competing for water against irrigation and environmental flows for rivers and streams and this competition is likely to become more intense over time as irrigation-dependent agriculture keeps expanding and the forecast reductions in rainfall as a result of climate change, take effect.

Difficult and possibly expensive decisions will have to be made and major reforms in our management will have to be made to ensure ongoing, reliable and high quality urban water supply.

Stormwater and effluent

Existing stormwater systems were designed to prevent flooding and the prevailing view was that rainwater falling on cities should be transported as quickly as possible into the receiving waters of streams, rivers and the sea.

The water generally moves at speed through our stormwater systems and brings with it high levels of pollution from urban activities. Pollutants include litter and general detritus, sewer overflows, vehicle emissions, animal faeces, garden fertilisers, silt and vegetation.

While natural ecosystems can absorb some pollutants, metropolitan centres produce waste streams that are too concentrated and which move too quickly via concrete drains and pipes to be assimilated by receiving waters. The results are algal blooms, fish kills, closed beaches and shrinking fisheries, all of which have direct effects on the health, prosperity and amenity of urban areas. River systems and enclosed waters such as Moreton Bay and the Great Barrier Reef are particularly vulnerable to effluent and stormwater pollution.

There are also hidden pollutants in stormwater derived from pharmaceutical products such as endocrine disruptors, as well as the chemicals and antibiotics in agricultural runoff.

Institutions and policy

The institutional and policy complexities of three jurisdictions of government, the myriad of agencies responsible for planning, health, environment protection, natural resource management and price regulation and institutional inertia in general have been barriers to achieving greater progress towards more sustainable water management.

Water also flows across local and state boundaries and problems caused in one jurisdiction will often have to be dealt with in another.

Infrastructure legacy

Australia has billions of dollars worth of water supply, sewerage and stormwater pipework, and water and sewage treatment plants. The network of pipes transporting sewage and stormwater in inner city areas tends to be old, inefficient, in poor condition and designed around concepts that are now outdated. Rapid replacement of this infrastructure would be prohibitively expensive.

Water pricing

At an average of around $1 per kilolitre, the price of water in Australia, compared with other countries and with other products is very low and as such is not providing any incentive to households for water conservation. It has been possible to keep water prices low because neither the costs of taking the water from the environment nor of protecting the catchments from which it is collected are required to be included in the current 'full cost recovery' pricing regimes.

Increasing water prices would be politically contentious and many consumers would argue that because water is a basic human need, it should be free. However, it is ironic that Australians are prepared to pay a thousand times more per litre for bottled water than they do for tap water of much the same quality.

Similarly, the costs of stormwater runoff are not attributed. A block of land covered with impervious surfaces such as roofs and carparks is charged no more in drainage fees than a similar sized block with a large garden and minimal runoff.

Management Principles: ecological sustainability and the water cycle

Achieving an ecologically sustainable pattern of water management in Australia, and measuring our current practices against this goal, must ultimately be based on an understanding of the natural water cycle, which in Australia, is characterised by great diversity and variability. Accordingly, the management of water around Australia must be essentially local, tailoring decisions to local conditions in different parts of the continent. Management solutions must also be based on the three parameters of

environmental, social and economic sustainability. The report provides a number of indicators to judge such sustainability.

It is also important that improvements to the urban water management system are not made in isolation, but are closely integrated with national reforms to water management.

Solutions

From the evidence received during the inquiry, reinforced by visits to a number of innovative examples of best practice, the Committee is convinced that Australia already has most of the knowledge, technical expertise and systems to solve the problems in urban water management.

Demand management

There is considerable scope to reduce water use and achieve efficiencies. Water efficient appliances such as dual flush toilets, low flow shower heads, washing machines and dishwashers can dramatically reduce water use in homes. This can be coupled to water efficient gardens, using native plants, minimal lawns and efficient watering systems. However, the fundamental factor in a successful demand management program is changing behaviour away from habits such as hosing down driveways and gutters, watering lawns during the heat of the day and having long showers.

Variability in water usage patterns and geographic conditions means that no single demand management strategy will be appropriate for all places. Balancing costs and benefits is integral to deciding how to implement a demand management strategy and while the least cost basis is appropriate for initially choosing between demand management alternatives, achieving ecologically sustainable water use may require more aggressive adoption of demand management tools.

Water reuse and recycling

Australia reuses only a small fraction of its wastewater, whether it be stormwater or effluent, and there are major opportunities to improve on this performance.

Water can be reused on gardens and playing fields, for irrigation, in industrial processes, and in the sewage treatment systems themselves, which are heavy users of water. Developments such as Rouse Hill in NSW have implemented a dual pipe system that delivers both potable and recycled water to homes.

Techniques such as Aquifer Storage and Recovery and sewer mining also introduce greater flexibility into systems for using wastewater.

Nevertheless, recycling still faces major obstacles. Often recycled water is remote from the users, and the costs of storage and transport are prohibitive. Matching the availability of recycled water with the needs of the users can also be problematic. Most of all, negative public perceptions remain a significant barrier to expanded

applications for recycled water, together with certain legitimate health issues that need to be resolved.

New generation treatment systems

Australia has working examples of facilities that can treat wastewater to the highest standards, up to and including potable water. Technologies used include membrane filtration, bio-remediation, and dissolved air flotation processes.

These tertiary treatment technologies are gradually being adopted around Australia, and are instrumental in rectifying the damage caused to waterways and coastal areas from sewage discharges.

This technology is also driving a change towards smaller scale treatment plants, which in the future is likely to see individual suburbs, office buildings and housing developments have their own treatment systems. This will offer great opportunities for reuse of water, by creating multiple supply sources. The innovative system used at the Sydney Olympic site at Newington is a model of this direction.

Stormwater and Water Sensitive Urban Design

Techniques are now available that are vastly more efficient and which sustainably reintegrate stormwater flows into urban water cycles, making effective use of this water as a resource. Developments such as the Lynbrook Estate in Victoria demonstrate the techniques of water sensitive urban design and also show that the associated costs of construction and maintenance are comparable with conventional methods. At the same time, they offer surrounding communities increased levels of utility and aesthetics.

Unfortunately the application of water sensitive urban design principles remains the exception rather than the rule, even in new developments, where the implementation costs are much lower.

Some developers adopt features of WSUD that are ostensibly environmentally friendly and attractive to buyers, but which play no role in water efficient design. It is common for example, to see natural, functioning wetlands be drained in housing estates, and replaced with small ornamental lakes that have no filtering or purifying role in stormwater management.

However, much of Australia's stormwater infrastructure will reach the end of its useful life over the coming twenty years and this provides Australia with a rare opportunity to replace this infrastructure with more ecologically sustainable systems.

Education and information systems

The key to changing Australia's urban water use is to change the mindset of water users, which requires education programs that target all levels of society. Water efficiency must also be embedded in the design of our cities, and so must be understood by engineers, planning professionals, architects, plumbers and builders.

Many innovative and effective education programs are being run around Australia, including those of WaterWatch, AWA, the GreenPlumbers, and Healthy Waterways. These have worked to reinforce water efficiency education campaigns by State and Territory governments, which have achieved significant reductions in per capita water consumption and a notable increase in community awareness of water conservation over the past two decades.

Nevertheless, the Committee identified the need to extend these education programs further, and particularly to address the lack of broadly integrated skills training that professionals require to understand, design and implement water efficient designs. There is a need to further develop integrated and cross disciplinary training of professionals to create a more holistic view of sustainability.

Wastage of water, a cultural preference for European style gardens, and lack of knowledge of the water cycle still create substantial barriers to efficient water use, and the widescale adoption of recycling.

Another prerequisite for sustainable water management is strong research and easy access to the resulting information.

Australia has a number of excellent research institutions, that provided valuable assistance to the Committee. These include the Cooperative Research Centres, CSIRO, and specialist research centres at universities such as the Centre for Resource and Environmental Studies at the Australian National University. The National Land and Water Resources Audit is also developing a powerful national level information resource.

The strong links between the CRCs and other research institutions with industry bodies such as the Australian Water Association and urban water authorities means that much of this research is being disseminated effectively.

Goals for Australian urban water management

A central concern for the Committee is how to make all of these solutions actually happen. What is lacking is a sense of urgency.

In Australian cities, efficient water use is still perceived as an emergency measure to be adopted during drought conditions. In a country of such limited water resources, this behaviour must be the norm, not the exception.

Using a combination of techniques is the key to changing this.

The committee considers that the Commonwealth can do much to drive the pace of change and the starting point for this leadership role is to adopt aggressive goals.

Australia must commit to sustainable water management goals.

Recommendations for change

The Committee makes the general recommendations that:

A. The Commonwealth play a more prominent role in driving the changes needed to manage urban water more sustainably.

B. A national approach is taken to overcome the jurisdictional barriers to better practice.

C. A high priority be given to scientific research into water management coordinated at the national level.

D. Efforts be made to enhance awareness of the environmental issues associated with water use and management.

E. Water prices should better reflect the significant impacts of current extraction and discharge. Any extra revenue generated should be used to improve performance in this area.

F. Australians generally be encouraged and assisted to use less water, recycle more effluent and significantly reduce the impact that urban development and its stormwater collection and transport has on natural systems.

In addition, the Committee specifically recommends:

A National Water Policy

1. The development of a **National Water Policy** (NWP) through a **National Water Partnership Framework**.

The National Water Partnership Framework

2. The National Water Partnership Framework between all levels of government, research institutions, catchment management authorities and the general public should include:

    - reforms to simplify institutional arrangements for urban water management;
    - an examination of the effectiveness of COAG water reforms in achieving sustainable water management;
    - collaboration between levels of government and all stakeholders;
    - participation by local communities;
    - consideration of consumption targets in water service provider licences or revenue caps for retail water distributors; and
    - developing a system of water conservation targets in operating licences.

Setting targets

3. The NWP should include agreed State and local targets with timeframes for:
    - catchment protection and rehabilitation;
    - rehabilitating natural waterways and wetlands;

- effluent reuse;
- stormwater retention and pollution removal;
- subsidies to encourage domestic rainwater tanks;
- better maintenance and monitoring and reporting of leaks;
- per capita water consumption reductions;
- long term infrastructure investment;
- decentralised, small scale sewage treatment; and
- reducing effluent to ocean outfalls.

Setting standards

4. The NWP should set standards that include:
    - model planning codes that incorporate water sensitive urban design principles, supported by multidisciplinary training;
    - national water efficiency standards and rating schemes for appliances and building systems;
    - best practice guidelines in:
        - the design of stormwater infrastructure and management,
        - urban forms that minimise impervious areas,
        - greywater reuse,
        - on-site rainwater collection, and
        - small-scale sewage treatment systems;
    - best practice water management standards in the Building and Plumbing Codes of Australia developed in collaboration with the Australian Building Codes Board and the National Plumbing Regulators Forum.

Better monitoring, reporting and data

5. The National Water Partnership Framework include measures to achieve better monitoring, reporting and data access, including:
    - monitoring systems to gauge the effectiveness of urban water management strategies and, in particular, the impacts on receiving waters;
    - nationally consistent reporting mechanisms on water management; and
    - a regularly updated, spatially based information system on water consumption, sewage and drainage production.
6. The Commonwealth examine legislative and regulatory opportunities for reporting on water consumption.

Funding and financing better water management

7. The Commonwealth, in conjunction with the States and Territories and the private sector, consider funding mechanisms for a comprehensive research effort to include:

    - Integrated Urban Water Management;
    - reuse of stormwater and wastewater;
    - water quality issues;
    - a national water reuse research program, covering:
        - **socio-economics of reuse**, (for example, factors affecting public confidence in products grown with reclaimed water, and methods to appropriately account for externalities in investment decisions),
        - **innovative technologies for reuse** (in collaboration with private sector investors, to reduce costs of treatment of reclaimed waters),
        - **environmental fate of constituents** (viruses, endocrine disruptors, organic chemicals, nutrients, salt and their re-entry into the human food chain or human exposure, or ecosystems), and
        - **human health risk assessment** (toxicology and endocrinology studies and application of risk based methods);
    - groundwater management;
    - catchment management;
    - small scale treatment technologies;
    - low energy sludge dewatering;
    - leak detection;
    - low cost salinity removal;
    - small scale water treatment and recycling plants for use in domestic, commercial and industrial processes; and
    - water-independent housing.

8. Consideration of pricing and financing for better water use and management

    - an examination of the water utility dividends paid to government;
    - an examination of urban water pricing to develop full cost recovery water pricing mechanisms;
    - an examination of the effectiveness of current Commonwealth grants programs related to urban water management; and
    - consideration of funding options to implement the policy objectives, including environmental levies, resource ‘royalties’ or general revenue.

Leading by example

9. The Commonwealth develop a strategy for progressively upgrading all Commonwealth buildings for high standards of water efficiency.
10. The Joint House Department be funded to change all toilet cisterns in Parliament House to dual flush and to fit water efficient shower roses.

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Senator Lyn Allison
Chair