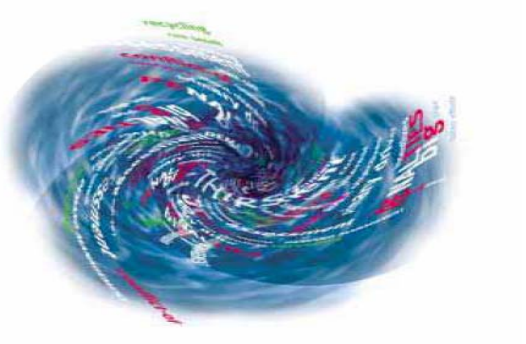
TOTAL ENVIRONMENT CENTRE



THE SUSTAINABLE ALTERNATIVE TO DESALINATION

In 2004 the Peak Environment Non-Government Organisations (PENGOs) released *Sydney's Water – Going to Waste?*, the report of the fourth Sydney Water Project (PENGOs, 2004).[1] The project reviewed Sydney Water's *Water Plan 21* and provided a range of recommendations for reform. These recommendations were designed to prevent the need for an environmentally destructive new dam on the Shoalhaven River at Welcome Reef; recognise the imperatives of climate change; and place urban water cycle management in Sydney on a sustainable footing. These recommendations would create an 'invisible dam' consisting of demand management, rainwater tanks, effluent re-use and other water conservation measures.

Key recommendations included:

- setting the sustainable yield of the catchments at 500 gigalitres (GL) per year to allow 100 GL for environmental flow purposes,
- a major shift to large scale effluent reuse for both new urban release areas and the existing metropolitan area,
- permanent low level water restrictions on specified outdoor uses,
- revising security of supply criteria relating to acceptable frequency of additional water restrictions from 97% to 95% to provide water for environmental flows (with consideration given to further revision to 90%),
- reforming pricing arrangements to reflect environmental costs and introduce step pricing for residential customers to encourage water conservation,
- introducing a wholesale step price to penalise Sydney Water for any bulk water purchases in excess of demand management targets and remove perverse incentives to under invest in demand management,
- improving the water efficiency of new and existing homes by mandating minimum standards of water efficiency,
- ensuring widespread adoption of rainwater tanks through increased incentives.

Since the release of this report a number of changes have been made to the management of urban water in Sydney. Some of these have been positive steps toward sustainability while others are regressive and environmentally damaging. This current review assesses progress to date and responds to new government proposals.

[1] See http://www.tec.org.au/member/tec/projects/UrbanESD/swgw1.html

Pricing

The NSW Independent Pricing and Regulatory Tribunal (IPART) has recently released a pricing determination recommending phased increases in the price of water from 1 October 2005 to 30 June 2009 (IPART, 2005), including step (or inclining block) pricing for residential customers. Customers using in excess of 400 kilolitres per year will pay a higher price for each additional kilolitre. This will be coupled with a reduction in fixed charges to provide increased incentives to conserve water. The Tribunal did not, however, recommend a wholesale step price.

Recycling and Water Conservation

The NSW Government has introduced the BASIX scheme to mandate water and energy standards for new homes. This will be extended to all existing properties sold after 1 July 2007. The rainwater tank rebate scheme has also been extended.

In its October 2004 Metropolitan Water Plan *Meeting the Challenges – Securing Sydney's water future* (DIPNR, 2004) the NSW Government also announced requirements for local Councils and the top 200 water using businesses in the Sydney metropolitan area to prepare water efficiency plans by March 2006 and implement efficiency measures by September 2007. A $30 million per annum Water Savings Fund was also established to businesses and local government to implement water conservation projects.

As part of this plan the NSW Government announced that non-potable reuse schemes would be developed in new urban release areas to reduce demand on drinking water supplies. It should be noted, however, that the claimed 70GL saving will take a long time to eventuate, meaning that Sydney's water management will be unsustainable for decades. (However this does not mean that the greenfield sites should not adopt reuse, stormwater harvesting and other efficiency measures as reviewed by the PENGOs.) [2]

These are to varying degrees, important steps toward curbing demand and moving towards greater sustainable water management. The gains are diminished, however, by other aspects of the government's metropolitan water plan.

Extra Dam Capacity

Of particular concern are increased water transfers from the Shoalhaven Dam and the raising of Tallowa Dam. These measures simply transfer the impact of Sydney's unsustainable water use practices to another river system. A key weakness of this strategy is its dependence on rainfall in a warming climate where rainfall is likely to be increasingly unreliable, particularly in the Blue Mountains catchments. Development of capacity to extract water from the bottom of dams that is currently unobtainable provides only a short term fix (although it does increase water availability) and also fails to address the problem of less reliable rainfall. Further it does not reuse urban water (and the investment with it), rather it releases more waterborne wastes into the coastal environment.

[2] The CRC for Water and Waste Technology undertook Life Cycle Assessments of various reuse scenarios and reported major environmental savings, including by recycling off site. The results are found in *Sydney's Water – going to waste?* (PENGOs, 2004)

Desalination

Perhaps the most environmentally regressive measure of this set of responses being undertaken by the state government is the current push for a desalination plant at Kurnell in Sydney's south east. Desalination reinforces 'one use' of water – the most devastating impact on water cycle management.

Such a plant would require massive quantities of electricity to drive the desalination process, thus increasing greenhouse emissions and exacerbating the effects of climate change. Indeed former NSW Premier Bob Carr is on record as referring to desalinated water as "bottled electricity".

Other serious environmental concerns are the mortality of young fish and other marine life entrained with or impinged against screens when the seawater is taken up through the desalination plant intakes. It is considered impractical for plants of over about 80 ML/d to use the safer approach of seabed filtration of seawater. Careful design of the desalination plant effluent outfall is also required so that the highly saline, deoxygenated reject water does not accumulate and cause anoxia of marine life. Chemicals used during the desalination process may also result in harm to marine ecosystems, such as disinfection by-products (California Coastal Commission, 2003). Further, blooms of jellyfish may well be impinged against intake structures and not only be killed but potentially shut down the plant due to blockages (Ashbolt. N, pers comm)

To date the government has not been able to adequately address these concerns, stating only that desalination is "beyond public debate".

AN ALTERNATIVE RESPONSE

The recommendations of the fourth Sydney Water Project provide a viable and sustainable alternative in the medium term to desalination and inter-basin transfers. The new leadership of the NSW Government must adopt a more visionary approach and embrace the need for major reform to achieve sustainable water cycle management. In particular the government must adopt large scale effluent recycling as a more sustainable and cost effective solution.

For example, recent government research shows 48% support for 'shandying' recycled water with current supplies by returning highly treated water to Warragamba Dam. This is a very significant result given that the government has made no attempt to promote this concept and has, in fact, been publicly antagonistic to indirect potable reuse. It is clear that a more formal and independent public consultation on this option is warranted.

One of the driving forces behind the push for desalination is the Government's fear that the present drought will persist and that an alternative supply must be produced as a matter of urgency. Analysis of data from Sydney Water's 2004 Annual Report (SWC, 2004) reveals that the 'shandying' option or indirect potable reuse of effluent from western Sydney STPs could provide a viable and environmentally sustainable alternative to desalination.

The NSW Government has recently asked three consortiums to submit proposals for three sizes of desalination plant: 125 megalitres (ML) per day or 45.5 GL per year, 200 ML per day or 72.8 GL per year and 500 ML per day or 182 GL per year (Hansard NSW Legislative Assembly,

2005). The largest of these should be seen as an unrealistic and highly expensive ambit claim. If built its 182GL per annum output would equate to 29% of current (pre-restrictions) demand of 630GL per annum. Capacity in excess of demand would represent a major stranded investment that would require a major increase in water bills to fund. There is also a serious danger that in order to pay for such a plant water users would be encouraged to use more water and that demand management and future recycling options would be abandoned. This would sacrifice progress achieved in recent years toward demand management and sustainable water cycle management.

Indirect potable reuse

At present almost 49 GL per year of treated effluent is discharged into waterways in Western Sydney each year (Table 1). Apart from one small STP at Richmond which uses secondary treatment with disinfection and one small STP at Blackheath which uses secondary treatment and microfiltration all of this effluent is tertiary treated and disinfected. If approximately 72% of this effluent was further treated to drinkable standard and utilised for indirect potable reuse it would immediately render a desalination plant unnecessary by producing 35GL of drinkable water per year.[3] This represents 5% of current sustainable yield. This means that slightly less than 6% of annual consumption would come from reuse water.

A number of options exist for such an approach. Treated effluent could be redirected into Warragamba Dam or into Prospect Reservoir. Alternatively effluent from some STPs could be directed to Warragamba and some to Prospect. Final choice of approach would depend on assessment of costs and benefits.

If directed into Prospect Reservoir 35GL per annum would represent approximately 0.67GL per week into a reservoir with a capacity of 13GL (i.e. approximately 5.2% of its capacity). Further dilution would occur as it is fed into the delivery system throughout Sydney. This is more equitable than having only a proportion of customers receiving reuse water and is less than the planned 14% indirect potable reuse for the expanding Singapore water supply system. It is important to note that such recycled water would be of higher quality than the raw (Hawkesbury River) water currently treated at the North Richmond water filtration plant for North West Sydney's sole drinking water supply.

It should be noted that the government is already proposing a recycled water pipeline linking the Western Sydney STPs and could gravity feed to Prospect Reservoir, saving more energy. This water would then go to the Prospect Water Filtration Plant (which treats water from Warragamba) where it would be (again) treated from a high quality level, now to drinkable standard. The Prospect WFP already takes water out of Prospect Reservoir a few times a year (to improve its quality) and during peak water demand by Sydney, hence no further modification to the WFP would be required.

A second stage could increase water availability by 23GL pa, (72% of current output) if the Liverpool and Glenfield STPs are brought into the system. The plants would have to be upgraded to tertiary treatment plus disinfection, as already appears the case with the proposed dual

[3] This allows no reliance on secondary treatment plants at Richmond and Blackheath; or the small Mt Victoria STP; and the possibility of varied outputs from year to year.

reticulation to the south west sector.[4] This would increase indirect potable reuse in Prospect to 8.6% or 9.7% of present annual sustainable yield.

Permanent Water Restrictions

Other options which could be immediately employed to avert the construction of an unsustainable and expensive desalination plant include permanent water restrictions and increased uptake of rainwater tanks and/or domestic greywater recycling systems.

Since the introduction of mandatory restrictions on 1 October 2003, consumption has been reduced by 10% of the 10 year average saving to around 63GL (DIPNR, 2004). This points to the contribution that permanent restrictions (such as have been adopted in Melbourne and Adelaide) could make. Permanent restrictions would include restrictions on outdoor water use, no hosing of hard surfaces and requirements that cars and boats must be washed with a bucket, trigger nozzle, or low volume, high pressure cleaner. Such an approach should be further supported with public information and incentives, like whitegoods star branding for low water-using plants and irrigation systems.

While permanent restrictions would be less stringent than those currently in place, even restrictions that were less that two thirds as effective would save 40 GL per annum. The actual type of permanent restrictions adopted should be set at such a level so as to save at least this volume of water, reflecting the essential move to more sustainable water use practices and cultural change amongst users in response to the challenges of recent years. Reducing security of supply criteria to allow more frequent higher level restrictions would further reduce consumption. Significantly a household survey conducted for IPART in late 2004 as part of the metropolitan water price review found that 70% of respondents supported some form of permanent water restrictions (IPART, 2005).

Taken together, 35GL per annum from Western Sydney STP's and 40GL per annum from permanent restrictions equates to 75 GL per annum, thus providing a viable and sustainable alternative to 45.5GL and 72.8GL desalination plants. When the second STP phase is added in, this results in 98GL or 16.3% of present sustainable yield.

Conclusion

Addressing Sydney's water supply problems requires both an immediate drought response and a longer term rebalancing of the supply and demand equation. The recommendations of the 4th Sydney Water Project provide sustainable long-term solutions including increased environmental flows and recycling.

The immediate drought response should include development of indirect potable reuse from Western Sydney STPs; consideration of incentive programs for domestic greywater recycling and permanent outdoor water restrictions.

Concerns about using treated wastewater should be alleviated by the fact it is treated twice by high standard plants and diluted twice.

[4] These STPs would have been used for recycling if the Georges River recycle pipeline scheme proposed in 2004, had been constructed.

Table 1: Annual Discharge Volumes From Western Sydney Sewage Treatment Plants (STPs)

Treatment Plant	Annual discharge (GL)
Hawkesbury-Nepean catchment	
North Richmond	0.3276
West Camden	3.1304
Richmond	0.0728
Penrith	8.0808
Warragamba	0.1238
Total for catchment	**11.7354**
Blue Mountains catchment	
Blackheath	0.3349
Glenbrook	1.2012
Mt Victoria	0.0473
Winmalee	5.4964
Total for catchment	**7.0798**
South Creek catchment	
Quakers Hill	11.7936
St Marys	12.5944
Riverstone	0.6916
Total for catchment	**25.0796**
Cattai Creek catchment	
Castle Hill	2.5116
Rouse Hill	2.5844
Total for catchment	**5.0960**
Total for Western Sydney STPs	**48.9908**

Source: Sydney Water Annual Report 2004 Environmental Indicators Report Volume 1 (SWC, 2004)

References

California Coastal Commission (2004). Seawater Desalination and the Californian Coastal Act

Department of Infrastructure, Planning and Natural Resources (2004) "Meeting the challenges. Securing Sydney's water future", DIPNR.

Independent Pricing and Regulatory Tribunal (2005) "Sydney Water Corporation, Hunter Water Corporation, Sydney Catchment Authority. Prices of Water Supply, Wastewater and Stormwater Services. Final Determination and Report", IPART.

Hansard NSW Legislative Assembly (2005) Comments by Premier Hon Morris Iemma MP 20/9/05, NSW Parliament.

Peak Environment Non-Government Organisations (2004) "Sydney's Water – Going to Waste? Project Report 4th Sydney Water Project" , Australian Conservation Foundation, National Parks Association, Nature Conservation Council, Sydney Coastal Councils Group, Colong Foundation, Total Environment Centre.

Sydney Water Corporation (2004) "Sydney Water Annual Report 2004", SWC.

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