

Waste Not

Public ignorance, pseudoscience and political timidity have continually fought against wastewater recycling in Australia. Rob Holmes investigates the 'yuck factor'.

Wastewater is needlessly and expensively discharged into the near shore marine environment when it could be recovered for potable water supply. But the only barrier to achieving a sensible and scientifically rational outcome is public scientific ignorance.

Unbelievably, Perth, where I live, has been facing diminishing rainfall since the 1970s, while a most obvious and immediate solution has been studiously avoided in any public discussion whatsoever. At the same time, proposals are canvassed by State parliamentarians for a canal to bring water 2500km from the Kimberley or tapping the deep South West Yarragadee aquifer.

One is consequently led to believe that that if we cannot live within our means, it is then OK to go and plunder, in a prohibitively expensive manner, the resources of others. The 580km Kalgoorlie Pipeline, built from Perth to the goldfields in the 19th century, is often cited as an example of the forward thinking and courageous engineering that should now ignite the courage needed to build the proposed Kimberley canal. What is missing from the discussion is that the WA Goldfields have never had any other option for water supply. The goldfields receive less than 270mm annual average rainfall and have groundwater with salinity akin to seawater.

Regardless of the fact that reverse osmosis seawater desalination is now coming to the rescue of the metro water supply, we face and will continue to face an increasing water supply shortfall¹. One of the clear benefits of using wastewater as

a resource for potable water is that, as water consumption increases with population size, so does the amount of wastewater generated. Rather than creating a problem of how to get rid of more and more of this stuff, we need to treat it as a precious resource.

The consequences of dumping untreated sewage into the ocean are well understood². To avoid the environmental impacts, wastewater is put through an expensive purification process to allow ocean discharge. Primary treatment removes the majority of solids and secondary treatment further reduces pathogens, solids and nutrients³. However, secondary-treated wastewater still represents an environmental risk because of its high nutrient content.

For Perth, at least, expensive environmental impact assessments have been undertaken and monitoring programs are in place⁴ to protect the near-shore environment where wastewater is discharged.

Perth has three major wastewater treatment plants that together discharge about 114 gegalitres per annum (GL/pa) of secondary treated wastewater via the Ocean Reef, Swanbourne and Sepia Depression outfalls⁴. The WA Water Corporation

(WaterCorp) states that we are currently looking at a deficit of 63GL for the 2011-12 summer season if we don't cut back on consumption. If no rain this winter, the dams will no longer be a source of water supply until we can get some decent rain; simple as that. 114GL of wastewater could provide about 81GL of high purity recycled water⁵. And nearly as bad, we take nutrients from the soil for food, then discharge these into the ocean as a pollutant. We need to recycle nutrients just as much as we do water.

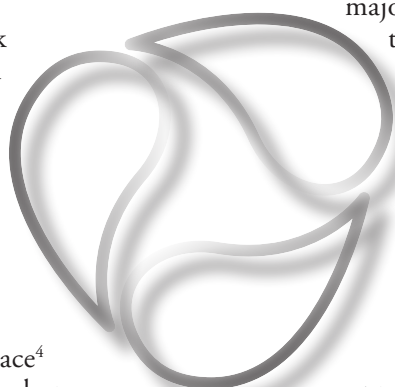
REVERSE OSMOSIS

Reverse osmosis (RO) is a process whereby water is forced under high pressure through extremely fine membranes to produce water of higher quality. RO technology extends from hand-operated RO pumps that can be bought over the counter to huge seawater desalination plants for major cities – it's all the same technology, just a matter of size and the amount of power available. RO is used to purify tap water for the beverage industry, is used aboard ships at sea to provide a constant supply of potable water and can be applied to either seawater or wastewater to provide very pure potable water in gegalitre quantities.

But the prospect of any state government or local authority contemplating the option of RO wastewater recycling ("RO recovered water" for the

purposes of this article) for potable consumption is nothing less than 'courageous'; ie political suicide.

It's all about the 'yuck factor'.



“With utter predictability, anti RO campaigns will be fear-based without any reference to scientific data”

Recall the row that erupted when Toowoomba City Council in SE Queensland⁶ proposed that RO recovered water was the best possible option to help secure the town's water supply. A community action group played heavily on the yuck factor, promoting the idea that they would be forced to drink sewage. Claims that "yet unknown chemicals" in RO-derived drinking water could have an unforeseen outcome such as for asbestos, thalidomide and Teflon (Teflon?). The campaign spread like a virus into the rest of the country where extended drought was having its impact, killing any rational discussion that was underway with leading politicians publicly backing off. Other anti-RO arguments used elsewhere are that RO water is too pure or ultra pure - all the healthy minerals (dissolved solids) are lacking in RO water that are necessary for good health. You can't win, it's either too pure or it's just yucky. An article published in *Wikipedia* voices some of the less fantastic concerns about potable use for RO recovery water - unfortunately these claims are unreferenced⁸. However, other websites promote the use of RO to remove these same contaminants that have made their way into US water supply via wastewater infiltration into rivers and groundwater.

With utter predictability, anti-RO campaigns will arise as a matter of certainty should any authority propose RO recycling to supplement public water supply, and with equal certainty these will be fear-based without any reference to scientific data - any factual evidence that is raised in support will be shouted down and ignored. Such is the sad state of affairs where in this country the debate on the anthropogenic role for global warming seems to be led by shock jocks and opportunistic politicians.

The fact of the matter is that the RO product (from seawater or wastewater) has to be constantly monitored for purity before it can be distributed either to industrial or potable use for which extremely high purity is demanded.

PERCEPTION PROBLEMS

Why is RO recovered water such a problem?

The yuck factor is one. As a social-commentator who writes occasional columns for *The West Australian* put it: "I would rather have pins stuck in my eye than drink recycled waste water!" That is, for no real reason other than I just don't like the idea, it's all too yucky to think about. She probably didn't go to school the day that they taught science.

Unfounded fear is another. Scientific ignorance will fuel alarmists claiming that there are unknown risks in using RO for potable water supply.

Newspapers and radio stations make money from creating or reporting controversy. *The West Australian* consistently refers to RO recovered water as "recycled sewage", which is to put the worst possible slant on the matter and which is clearly illogical. It is not sewage that is recycled, it is water. Who wants sewage delivered back to their home? No doubt, the rantings of every nutter, shock jock and scientific dill would be given full voice. No political career can withstand this sort of stuff. Unfortunately, scientific nous is either absent or thin on the ground amongst those who work for newspapers or commercial radio stations.

Even worse, the prospect of RO recovered water for potable use would give the political opposition - it doesn't matter which party



is in opposition - a free kick. Who cares about the security of our water supply, so long as I can score points against the government of the day?

WATER SUPPLIES TODAY

At the moment in Perth, there is absolutely no escaping the fact that the WA Water Corporation is deeply concerned about the ongoing security of supply for the WA Integrated Water Supply System⁹ (IWSS). Full page advertisements have appeared in the press together with a TV and radio advertising "Save 60" blitz¹⁰ - the need to save 60 litres per household per day to bridge the existing water

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supply gap of 63GL over the next year.

Traditionally, Perth's water supply has primarily relied on superficial aquifers on the coastal plain that lie north and south of the city – these are the Gnangara and Jandakot superficial groundwater aquifers¹¹. After groundwater, Perth has relied on surface-water storage in the coastal hills for the second-most important source of water. The management (or rather mismanagement I should say) of metro groundwater supply is a story in itself, best left for another article. Superficial groundwater that once dominated Perth's metro water supply has now dropped to 35 to 55 per cent of total supply with groundwater now approaching exhaustion and with other supply options coming on line¹². The accumulated Water Corporation data, collected for metro supply dams, tell the history of Perth's dwindling rainfall – it is a declining rainfall regime, among other effects, that has impacted the capacity of groundwater to maintain a major supply for the IWSS.

Figures available on the WaterCorp and Dept of Water Websites¹³⁻¹⁶ provide a graphical representation of what has happened to Perth rainfall and the consequences for both surface storage and groundwater supplies. Of course, we could be rescued by good rains or perhaps catastrophic floods, as experienced by our eastern states brethren, but then again we might not. It is not worth going into the detail of the referenced figures, they are from government websites and tell their own story. Of course, we do have others who would tell us that we have never had it so good and that our water supply problems are caused by the naughty WA Water Corporation¹⁷.

WHAT IS BEING DONE?

Nonetheless, governments of different colours have not been sitting on their hands. We are, after all, staring at a brick wall in water supply that is

looming closer every year as is patently obvious from the figures referenced above.

Options either approved or canvassed include the following.

Commissioned in 2004, the Kwinana Water Recovery Plant (KWRP) now returns about 6GL/pa of high quality RO recovery water from secondary-treated waste water. The official line is, of course, that this replaces the scheme water that industry would have used. I suspect that RO recovered water was the most sensible suggestion that WaterCorp could come up with, given the amount of wastewater that gets thrown away every year. Given the yuck factor, it then became a question of which sector in WA is science-educated and would use it without a fuss? Heavy industry, of course! The KWRP, now having been operational for seven years, has provided ample opportunity for WaterCorp to test for every known contaminant that could be a concern to the public should RO be proposed for direct potable use. It is important that such information should be made fully available.

There is WaterCorp's proposal to replenish groundwater with RO waste recovery. Good on you, guys. But WaterCorp's website is rather coy about how it will go about this. On closer examination, it becomes clear that high quality RO recovered water is proposed to be pumped into the superficial aquifer which of course will be available for groundwater abstraction. But with a disclaimer of how the little beasts that live in soil and in the aquifers will not be harmed, because we promise to remove all the icky stuff. Not

what you would expect from a science-based organisation.

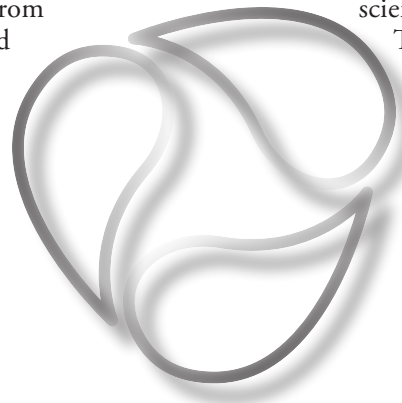
This pandering to the Yuck Factor is clearly expensive and wasteful. Why not just pump RO product directly back into the reticulated supply and take some pressure off the aquifer and allow it to recover on its own?

Toowoomba also had a plan to pander to the yuck factor by pumping RO recovered water into the town water reservoir - where a good proportion of it would evaporate. But that didn't help

one bit as history tells us. Singapore discharges its RO recovered water into its drinking water reservoirs. Singapore also exports RO recovered water to NSW as bottled water – NEWater – not a bad idea.

Commissioned in 2006, the Perth Seawater Desalination Plant pumps 45GL/pa into the IWSS. Planned for commissioning later this year, the Southern Seawater Desalination Project, Perth's second desal plant, is planned to eventually produce 100GL/pa. Without these plants, we would now most certainly be up the proverbial creek without a paddle – our groundwater is at its lowest level yet and our dams are in a similar situation. Regardless of RO seawater, we are still facing a 63GL/pa shortage that somehow has to be met this year if users don't stop splurging tap water on their lawns.

Colin's Canal was originally proposed by Ernie Bridge¹⁸, former Minister for Water in the WA State Parliament, as a 2500km canal from the water-rich Kimberley region. This idea was credited with the loss of the Liberal Party's election hopes when espoused by leader Colin Barnett as



“ Political timidness in the face of public ignorance will be used by alarmist & opportunistic politicians and shamelessly exploited by the media. ”

an election promise for the 2005 state election (maybe not, but I don't think it helped much). The current Minister for Water in the WA state parliament recently raised the issue again as a matter for discussion.

A previous State Labor government proposed that the South West Yarragadee be tapped to supplement the IWSS. The SW Yarragadee Aquifer,¹⁹ is a vast and deep aquifer storing an estimated 1000GL overall of fresh water. The plan to extract up to 45GL/pa from the SW of the aquifer was vehemently opposed by south-west communities, among others, for other reasons, stating that the proposal could reduce natural surface discharges that feed south-west river ecosystems²⁰. The matter has now recently been raised in the press again, as a cheaper option to the Southern Seawater Desalination Project, which is going to burn a lot of electricity over the years.

WHAT CAN BE DONE?

Clearly, the problem is political timidity in the face of public scientific ignorance which will be used by alarmist and opportunistic politicians and shamelessly exploited by the media - who should know a lot better.

The job is to debunk ignorance and to educate and assist those who are capable of making good policy decisions. I know from my contacts within the State water authorities that leading environmental scientists and political parties are all aware of the need to stop throwing away treated

wastewater. They are justly fearful of the yuck factor.

Our job, wherever we are in Australia, is therefore multifaceted.

We need to encourage politicians on both sides of politics to agree to a position that they will not use water recycling as a scoring point wherever they may find themselves on the benches.

We will need to encourage water ministers and their public servants to engage in open public debate on the merits of RO water recycling.

And we will need to encourage, through our own efforts, a debate on water recycling. ■

About the author:

Dr Rob Holmes' career includes 15 years in universities and 20 years in environmental science. He is currently an independent environmental consultant.



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