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The Urban Water Agenda in 2007

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Introduction

The National Water Initiative signed in 2004 is very light on urban issues, other than some generalities about demand management, including restrictions, pricing, alternative sources and water sensitive urban design. This was because Governments believed the urban sector had responded well to the 1994 CoAG reforms and urban water was not an issue.

As it has turned out, the now highly disaggregated urban industry was not in good shape to cope with unexpected water scarcity, and the dreams of whole water cycle management of the 80's was by now almost impossible. With policy separate from practice, regulation separate from operation serious planning seems to have been forgotten in metropolitan areas.

This was all right for a while as all the industry had to do was to connect services to new subdivisions, as our urban sprawl continued unabated. From time to time most jurisdictions had a third pipe system development as a demonstration project or to meet pollution control requirements, but these were commonly rather expensive and working out an appropriate price for the recycled water an ongoing challenge.

Governments found the urban industry to be a wonderful cash cow, and took dividends from the industry without adequate reinvestment. The no new dams rhetoric meant that Governments felt virtuous as they focused on demand management, where it is clear there were many gains to be had.

The Climate Crunch

The urban industry of the nineties didn't ever look all that sustainable with major cities all proudly planning for an extra million people, but with no new water sources envisaged. It's as though they thought the new residents would bring their own water with them. Urban communities would have been more concerned had they realized that the planning model being used meant they would all share existing water with the new arrivals.

No one took the climate change warnings from science seriously. Others should act first, and anyway the problem was a long way off. Even the climate shift obvious in Perth

from the eighties was seen as an unfortunate aberration, giving Perth a problem but of no relevance to the rest of us.

We can now see that Australia seems to have been drying over the last decade. Rainfall in much of South Eastern Australia is very low, and large areas are now at the lowest on record. The Murray R is at unprecedented low flows. The average long term inflow has been about 11,000 GL, but this was last seen in 2000-1 and now we have had 6 years well below this. The Wimmera R in Victoria has over the last 10 years been running at 18% of 50 year average flow, and many other Victorian rivers are at 40% of their long term flow. In parts of Victoria this streamflow is now a 1 in 400 year event – a response to low rainfall, uncontrolled farm dams and uncontrolled bores and over-generous irrigation entitlements.

The period 1960 -1990's was much wetter in SE Australia than the preceding 1900-1950, and we now seem to have returned to a drier regime. Unfortunately our understanding of our water resources has developed in what seems to be an unusually wet period and we now face painful readjustment.

Urban Australians seem to be living beyond their means and face ongoing water scarcity. Rural Australians are more used to water shortages, but many communities are experiencing unprecedented water stress. Bores are failing and some towns are resorting to carting water. Irrigation has been vastly curtailed and there is no water being used on rice or cotton and still we are caught short. For the first time in my professional experience we face a situation where it is quite plausible that any of five of our capital cities could actually run out of water.

Ecology shows us that highly specialized organisms can be very effective in a stable environment but are less successful in times of turbulence. The same observation can be made about organizations.

While purists will point to the efficiency of the disaggregated water management model we have with many specialized units doing their bit, whether this system has the resilience to cope with a changing environment is less obvious. And given our global failure to confront carbon pollution, we must expect ongoing change to our climate.

The water industry model worked last century because we took a subsidy from the environment. We damaged rivers by over extraction, we damaged waterways by discharging inadequately treated wastes and we were profligate with our pollution of the atmosphere with carbon. Late in the 20th century our profligacy started to catch up with us and people realized the damage we had caused to waterways, the climate started to shift and we started to run out of water. We hit a threshold that we hadn't realized was approaching, and now find that some of the changes are probably irreversible.

The National Water Initiative as a Framework for Managing Uncertainty

While designed to confront the chronic problems of rural water and over allocation, the framework of the NWI does provide us with the way forward for urban water, and explicitly makes the links between urban and rural water. The principles are simple:

- Measure and control all of the available resource
- Allocate the consumptive pool efficiently to competing uses

Understanding the available resource

- Think whole water cycle – rainfall, catchment water, urban runoff, wastewater streams, groundwater and the sea. What might be available from other catchments?
- Understand the sustainable levels of extraction of each – realizing that this does not mean an average or a set percentage but is driven by extreme events.
- Operating beyond this sustainable level of extraction is just mining the resource which may collapse without warning once a threshold is reached.
- How might these sustainable levels change with predicted climate shifts
- Measure and report so all can make more informed decisions

Allocating the Consumptive Pool

- Understand current and likely future demands on the consumptive pool
- Consider how to drive efficiency in all the uses of water through planning and regulation, and through markets.
- Ensure water is used for the highest priority purposes when it's scarce.

While these principles are simple, and probably self obvious, they have been beyond the capacity of the urban water industry in the 20th century when water was plentiful and unlimited growth seemed to be a magic pudding creating wealth for all.

Five Challenges for the Urban Water Industry of the 21st Century

- Understand that growth needs water, and that we need to reverse the practice of the last century when we allowed development and then asked the engineers to provide the water. Now we need to show where the water will come from before development can start.
- Where we have over allocated available water we need to return these surface and groundwater systems to sustainable levels of extraction and understand that with climate shift the sustainable levels may be reducing and this may impact on urban supplies.
- Build the externalities into our pricing and project costing. Fully treat wastes before allowing discharge to the environment will make recycling more

economically attractive. Ensure the urban water industry is energy efficient and carbon neutral by using green energy and proving carbon offsets to repair catchment vegetation

- Manage the whole water cycle rather than just bits of it. Surface water and groundwater must be managed together as a single resource, and both of them impact on estuarine and coastal waters. Consider the stormwater and wastewater flows as resources to be harnessed not problems to dispose of.
- Get serious about driving water use efficiency in all parts of the urban water cycle and amongst all users. Use a mix of pricing, markets, regulation and education to change behavior and drive innovation. Let's stop avoiding the issue by allowing vested interests to have voluntary codes to hide their inaction.

Water Availability Controls Growth

Water planning must be done on a regional basis rather than just for individual catchments. When a region is facing water scarcity, as most are, water must be central to the development approval process. At the moment this is rarely the case. Either planners don't look at the issue of water availability, or if they do they refer it to the water utility that never seems to say there is insufficient water. Planners commonly operate at the local government level, whereas effective water planning needs to be done across a larger region.

In metropolitan and near-metropolitan catchments it is essential that surface and groundwater is clearly controlled and that interception activities like farm dams, and groundwater extraction is controlled and measured. This is commonly not the case.

Developer charges seem to have become a tax on land development, rather than a reflection of the actual costs of infrastructure to supply the new development with water, or the cost of acquiring a water entitlement.

Under the NWI in an over allocated catchment, which must include all of our major cities which already import water from adjacent catchments, a new water user must purchase a water license from an existing entitlement holder or show how they are expanding the consumptive pool to meet the new need.

A requirement like this could drive real innovation in the land development industry, and the water industry. It starts to provide a market pressure for alternative sources of water and perhaps some market discipline so that we get more cost effective solutions. It is challenging and perhaps could be a role for water utilities in acquiring entitlements and then selling them to developers.

Water planners must identify and consider all sources of water – not just catchment water, but purchasing from other entitlement holders, using alternative water from recycling and stormwater, groundwater and sea water. We can no longer afford to

exclude options on doctrinaire grounds so new dams, inter-basin transfers, desalination and recycling must be assessed on their merits. If water can't be found, the proposed development should not proceed.

WSAA has been a strong supporter of the water market where urbans can buy and sell with irrigation, and the Government can purchase water licenses in over allocated systems. This is a core element of the NWI, but has so far been sabotaged by rural interests concerned about the possibilities of wealth leaving their area. I have little doubt that we will overcome these barriers to trade.

Planning and consultation will commonly identify a number of ways to secure water supplies. It is important not to select a preferred option early, but subject a number of promising options to rigorous scrutiny. Evaluate each alternative thoroughly - will it work, what will it cost, what are its environmental impacts and what is its social acceptability?

We need to require water sensitive urban design and drive more innovation in the land development industry. Make land developers acquire the water they need for their development prior to subdivision approval. This could be purchased from a water authority if they had spare water, from irrigators. They could explore alternative sources of water, but the cost should be a cost of land development, not spread across all other users. This is already happening where connection of new development to existing infrastructure is expensive due to distance. New irrigation developments re subjected to this discipline and so should new urban developments.

Sustainable Levels of Extraction – A Cap for Urban Users

The commitment to return over allocated systems to sustainable levels of extraction is as relevant to urban communities as for rural. Most of our cities are taking a lot of water from surface and groundwater system, and many of these systems are showing signs of degradation in their rivers, estuaries and groundwater system.

Determining the sustainable levels of extraction is a technical and social challenge, but effectively this will provide a cap on extraction that urban communities will have to live within. Like in rural Australia, anyone wanting additional water will have to purchase an entitlement from an existing holder.

Given the variability of streamflow in Australia, the NWI say such shares in the consumptive pool, determined each year, should be expressed as a proportion of the available water rather than a set volume. This will be challenging for urban authorities who will need to respond with a diversity of sources.

Water planning will identify the environmental flow requirements to protect the health of rivers, and there will be ongoing tensions about people not being allowed to water lawns while water is flowing past to maintain the environment. A common proposal will be to use recycled water, which if we argue it is good enough for drinking it is hard to argue it

is no good for the environment. Water quality and timing issues must be managed, as does public perception.

We must regulate and manage all major sources of water. As we have demonstrated in the MDB, putting a cap on surface water extraction just displaces extraction to groundwater, often only metres from the streambank, with little appreciation of extractors of regulators that it is the same water.

Building in the Externalities into Costing and Pricing

This commitment appears in each round of water reform in the 1994 and 2004 statement, and in each case gets politely ignored because it's either difficult or painful. To me there are three simple elements to start the process.

Fully treat wastes before they are discharged to a standard where they cause no damage. This includes wastewater and stormwater, and if such treatment were provided both would be sought after as alternative water sources. Recycling would have to cover the costs of storage and transport, but not the costs of treatment which presently dogs recycling efforts.

Pay for the catchment services we expect. Our catchments provide valuable ecosystem services, including the provision of water. There are costs of land management in closed catchments, including weed and pest control and fire management and suppression. These should be costs on the water user. In open catchments where we expect farmers to provide water, we should pay them if they meet a land management standard which provides good quality water.

Most of our alternative sources of water for our cities create more carbon, driving the climate change that is pushing us to water scarcity. The carbon emissions of the industry are reported in WSAA facts, which I commend. Now we need to make the water industry carbon neutral by requiring green power, or carbon offsets of some sort. This could pay for revegetation in degraded catchments. The water industry does not have to wait for everyone else to move on carbon. A move to carbon neutrality would mean clearer costings for all alternative sources of water and put a spotlight on some of the sillier recycling or water transport proposals

Manage the Whole Water Cycle

This is a challenge for a highly disaggregated water industry whose main focus is to protect revenue streams rather than provide water security. I will mention just a few topical issues.

Rainwater Tanks – A number of jurisdictions now require rainwater tank be installed in new houses and that they be plumbed into in-house water uses such as hot water and toilets. Economists don't like rainwater tanks and consider them a costly way to augment

water, water authorities don't like losing the revenue stream and some are concerned about possible health risks. On the other hand:

- Roofs provide runoff from small showers when dry catchments do not
- Tanks can be installed on short notice compared to other augmentations
- Tanks build water literacy in householders and empower them to consider water use
- Slowing the first rush of runoff in a storm helps protect the health of urban rivers
- Any costs should be compared with future augmentations not the presently under priced catchment water in most cities
- If rainwater tanks were a key element of water supply then mains could be used more as top up device requiring cheaper water supply and drainage infrastructure
- Despite their limitations, a high proportion of the rural community and a proportion of the urban population in some cities, notably Adelaide, have depended successfully on rainwater for drinking for many years

The Engineers Australia "Australian Runoff Quality: A Guide to Water Sensitive Urban Design" does encourage rainwater tanks as a useful part of water supply while a subcommittee of the National Public Health Partnership has sponsored the publication *Guidance on the use of rainwater tanks, 2nd ed.* (Australian Government, 2004). This observes that mains water is used for purposes ranging from drinking to toilet flushing and garden watering, but that the use of rainwater tanks as an alternative source of water for any of these purposes has the potential to reduce pressure on limited surface and groundwater resources.

Recycled Water – The economics of recycling will never stack up while we don't insist that normal sewage treatment should be to a standard such that the water can be recycled or discharged to the environment without harm. With recycled water commonly costing \$3/Kl to produce, which includes a component of sewage treatment, it is hard to compete with catchment water at \$1.20/KL.

It may be desirable to toughen up trade waste rules to assist with recycling, or even consider separate sewer systems for industrial areas with difficult waste streams.

But a real additional cost of recycling is the requirement for separate pipe systems to distribute it, which where there are community concerns requiring it to be kept separate from drinking water that is not a community concern for desalinated water. Third pipe systems are expensive, and may be only a transition solution while communities get used to the idea of recycled water going back to supply and being mixed with catchment water.

I expect over the next decade communities will come to accept this mixing of recycled water into supply. I expect some country towns that are out of water, and hence find development constrained, will choose this option, as is Queensland for its Sth Eastern growth area. We seemed to have moved beyond silly referenda on single options to recycle and allowing it to take its place in augmentation options to be assessed

As long as it is done well, and there are no health problems, then other communities will follow suit and I expect the general community to get more comfortable with the idea of recycled water as they get more familiar with it.

Groundwater – as cities confront running out of water, several are turning to groundwater as a solution. While Perth and Darwin have long used groundwater for supplying drinking water, it is a new feature in other areas. There appears to be much misunderstanding about groundwater, and some seem to believe it is a magic pudding of infinite good quality water. Relying on totally unproven groundwater systems is now part of the water supply strategy for several cities.

States must take full control of groundwater. There should be a moratorium on any further bores until sustainable levels of extraction are known. All bores must be licensed, metered and charged for. Groundwater generally is replenished from rainfall, and may be only a temporary part of supply during a drought. We also need to assume groundwater and rivers are connected and are the same water unless proven otherwise.

Aquifer storage and recovery has been well demonstrated in Adelaide and is now being pursued in other cities. However, with regulators unfamiliar with concept, there are many regulatory hurdles that may be unnecessary, and States need to resolve these. Where it is feasible this approach has the advantage of much reduced evaporative losses than the open water in a dam.

Stormwater – by which I mean urban runoff with the obvious problem of storage. Aquifer storage and recovery as practiced by the Salisbury City Council in Adelaide may provide one storage option. Another is the use of urban lakes which need to be designed in at the start of the land development process, and although they take up land, it is commonly flood prone land and does mean much cheaper drainage infrastructure than the concrete channels adorning our older cities.

New Dams – the ill informed frequently call for new dams to resolve water shortages. They rarely identify sites where a dam could be built or assess the chances of it getting water. The last dam the Federal Government built, Googong outside Canberra is located in a rain shadow and is unlikely to fill except in the wettest of year. New dams should not be excluded on doctrinaire grounds, and should be assessed like other augmentation options – but they require a site with appropriate geology and a catchment with reasonable likelihood of rainfall.

Raising the Efficiency of Water Use in Urban Communities

I believe a lot of water is wasted in urban Australia through inefficient appliances and plumbing indoors and lousy irrigation practice outdoors. We can build water sensitive urban developments, and most jurisdictions have a few boutique examples but these learnings have not flowed through to the general land development industry.

Achieving these improvements in water efficiency will require a mix of public education, regulation and market solutions. Demanding water availability be considered at the subdivision approval stage is obviously a key first step and NSW has developed the BASIX system to encourage water and energy efficiency in housing.

Promote water efficient Houses, Commercial Buildings and Suburbs

Have a water efficiency rating system for houses, commercial buildings and for suburbs, maybe reflected in their drainage rates to give a price signal, and to give developers a marketing advantage.

Mandating Water Efficient Appliances and Plumbing

While industry bodies love voluntary regulation and codes of practice, these are often not sufficient to get appropriate water efficiency

Mandating the use of water efficient appliances and plumbing fittings in homes and commercial buildings has the potential to increase the certainty of water efficiency outcomes and stimulate innovation in the design of water using appliances. It is unacceptable to have automatically flushing urinals in buildings in times of water scarcity, and retro fitting of more appropriate fittings should be required. The hotel sector has long argued that voluntary codes of practice are all that is needed, but the reality is these have had little impact and one commonly finds hotels without even dual flush toilets. The voluntary approach has failed and regulation is needed.

Charging the Real Costs of Water

We need to ensure the price of water does reflect the real costs of supplying it. Building in the costs of externalities discussed earlier will lead to a more realistic pricing, and this may have some impact on efficiency of water use.

Even this step will be met with loud opposition. Those with large gardens and swimming pools will develop a sudden and laudable concern for the wellbeing of the disadvantaged who might not be able to afford to bathe their five children if prices reflect the real costs.

We need to look after the disadvantaged if we are to be a humane society, but I don't think making this social welfare part of the water industry is appropriate. The social welfare arrangements need to be met by Governments, not by expecting selected suppliers of goods to carry the costs by spreading them across other users.

Scarcity Pricing of Water

Current water restrictions have raised the ire of many, and some well off consumers argue for a market approach where those who can pay should have as much water as they want, and presumably those without money go without. *“A market solution for water. Malcolm Turnbull thinks we should have as much of the stuff as we want, as long as we*

pay for it.” AFR 25/11/06. The Business Council of Australia has a similar viewpoint. This raises interesting equity issues as is partly behind the tiered pricing regimes we now have.

These issues become starker when we consider scarcity pricing issues during droughts. When any other commodity is in short supply, the price goes up and people make decisions as to how much of they want. We saw that with bananas after the cyclone destroyed the banana crop, and we see it less with petrol, which everyone now sees as essential and thinks the Government should keep the price cheap

If during times of water scarcity water prices rose, this could be expected to reduce usage perhaps more effectively than rhetoric and water restrictions. Grafton and Kompas (2006) explored the idea of raising Sydney water prices as the dam levels dropped by say 5% increments aiming to balance supply and demand such that dam levels did not drop below a critical level. This might require more than a 50% increase in short term water prices and raises some equity issues that need to be addressed.

Another market based approach is to issue water users with an entitlement and allow them to trade, in a similar fashion that is emerging in the rural water industry. This would be simple to trial with the larger industry water users who if they could make water savings would be able to sell some of their entitlement. It could provide a stronger economic rationale for water efficiency. How this would help during water shortages is less clear as prices escalate, presumably some would choose to stop using water and take the financial windfall, as happens in agriculture. This would have flow on effects to employment.

Professor Mike Young in a recent “Droplet” explores the idea of giving all urban residents an individual entitlement and allowing them to trade. Electronic platforms make such trading possible and could provide an economic incentive to improve water use efficiency and to reduce water use. How new entrants acquire an entitlement in fully allocated systems needs to be explored, as does the transaction costs of operating such a market when water is relatively underpriced.

Managing Risks in Urban Water Systems

Climate Shift

The Australian climate has always been amongst the most variable in the world and that is why Australia has always had to store much more water than other countries to give the same security of supply. Climate shift seems to be making it more variable and perhaps more extreme. Our capitals may get increases in the large rainfall events brought on by Northern cyclonic activity, or they may not get the big events that in the past have been used to fill storages. This is what seems to have happened in Perth, and if it is now happening in the East one wonders if Warragamba or Thomson Dam will again fill.

Bushfire Risk

The risks of wildfire in our main urban catchments seem to be increasing with climate shift as we get hotter and drier summers. The impacts of extensive wildfire on catchment yield are well known and for instance for Melbourne could halve the yield over a decade.

Interception Activities

As rural lands transition to urban they go through a peri-urban phase where there is a marked increase in small dams that have the effect of reducing river flow. In some catchments around Melbourne it is thought that up to 60% of runoff in the catchment is captured in these dams and used for ducks to swim on and to improve the view. It is not used for any productive purpose but has an impact on stream flow. Governments have been reluctant to control this proliferation, although they are required to control interception activities under the NWI.

Responding to Risks

Some of these risks can be managed by resource managers to some extent and others cannot. Clearly one way to reduce risks is to have a portfolio of supply sources, so that if one or more fail others can meet demand. This is where sources independent of rainfall like recycling and desalination become more attractive.

Water planners should now be developing suits of alternative supply options and assessing each. For viable options, the time to bring them on stream should be known and the trigger point of water in storage known so construction can start on time. Preliminary work on planning, design and approvals can be done prior to the decision, as has been done with the Sydney desalination plant. This option approach is common where further information is likely to become available to improve the decision. In the case of rapid technology development such as desalination, the longer investment can be deferred the better the chance of a more cost effective solution.

Perhaps the biggest risk to water security for urban Australians is the replacement of serious planning with poorly analyzed political decisions. Each recent election has seen proposals for significant water infrastructure projects that have not been seriously designed, planned or assessed. Political focus groups are not a substitute for detailed technical assessment. Had the channel from the Kimberley got up at the last WA election, it would have doubled the water bill for each Perth household and provided water at about 6 times the cost of desalination. Each election now sees a new dam, new desalination plant or an expensive channel being proposed with little analysis or understanding.

In their review of the urban sector Marsden Jacob and Associates refer to poor quality of planning, inadequate consideration of climate shift, planning that only looks at a partial set of solutions and excludes others from assessment on doctrinaire grounds and poor consultation to carry communities along. They see a potential for greater revenue, but

that subsidies will pervert investment decisions and that centralized control of capital has constrained the necessary investment.

The Federal Governments Role and the Urban Water Industry

The Prime Minister and Premiers signed the National Water Initiative between 2004 and 2006 and this provides an appropriate framework for confronting water scarcity. Unfortunately, nearly all of the timelines have slipped, and Governments have found it rather challenging to implement these requirements.

The National Water Commission was established to advise Governments on progress against their commitments, and to advise the Prime Minister on investments for the \$2 billion Australian Government Water Fund established to assist the implementation.

While many funding proposals have been made for AGWF, it has been hard to find worthwhile investments that help deliver the NWI. Many seem to reflect a wish to shift the cost of water supply augmentation or waste treatment services from local ratepayers to the taxpayer. Many have been poorly planned, designed and costed and represent a subsidy to communities that don't want to implement the pricing commitments of the NWI.

Proposals that have arisen out of good regional water planning and have been properly developed would generally have been built anyhow; poorly developed proposals seem more like chancing the arm in case a windfall arises. With water utilities returning around \$1 billion dollars a year to State Governments it has not been apparent as to why particular cities should get a Federal subsidy for their water augmentation schemes, their waste treatment facilities or for urban drainage investments.

The Prime Ministers National Plan for Water Security has refocused Federal attention on issues that span State boundaries and indicates that urban water supply is a State issue and should be within the financial capacity of the urban sector to be achieved without Federal subsidy

The NWC has already committed resources to various studies of relevance to urban systems

- Review and assessment of water restrictions
- Water efficiency labeling scheme (WELS) - appliances
- Smart Approved Water Mark (outdoor water use issues)
- Review of Institutional and regulatory Guidelines
- Water recycling Criteria for ASR
- Guidelines for Evaluating WSUD
- Water Resource planning and lessons learned
- New water entitlements (stormwater and recycled water)

There will be further investments to help deliver these sorts of products to assist the urban industry.

Summary and Conclusions

Urban Australia is facing serious water scarcity and the urban industry does not appear to have foreseen the challenges we now face. The climate shift has been more sudden than most predicted, but uncontrolled growth of urban areas was always going to challenge the industry to meet growing demands.

A financial model where the water industry was seen as a revenue provider prevented much of the necessary infrastructure investments and to atrophy of planning capacity within the industry.

The National Water Initiative provides the best framework for going forward and addressing the issue of water security for urban Australia. We need to measure and manage the whole water cycle rather than selected bits of it, and we need to engage our communities to take them along on this journey as we confront ongoing water scarcity for rural Australia.

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