Submission on the Productivity Commission's Paper on National Water Reform

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Experience

I have worked in various roles in the water industry since 1992. Firstly, in water policy as Executive Officer of the now abolished Water Resources Council (1992-96) and then as Manager Environment followed by Manager Sustainability (1996-2015) with the Water Corporation of Western Australia.

I also have experience at the National level, serving on Board or project committees of the Water Services Association of Australia (WSAA), and I represented WSAA as Australia's member of the US-based Water Environment Research Foundation (WERF, now WE&RF).

Although I have national and international experience in the urban water industry, I am most familiar with the water-related issues in Western Australia. The emphasis of my submission is on developing future water reform priorities.

Property Rights in Water

I am concerned that some of the assumptions underpinning property rights in water are ill-defined. This might be because of my inadequate knowledge, but it appears to me that a key assumption underpinning the concept of property rights in water is that the quantum of water resources traded in a market will remain relatively stable, and available in the long-term.

This assumption is not supported by the reality of declining water availability in south-western Western Australia, where surface water flows and groundwater recharge has declined by around 70% since the mid-1970s. It is also questioned in some of the recent literature on 'best practice' adaptation to climate change, where the key message is that the past behaviour of systems, particularly hydrological ones, cannot be relied upon as an indication of future behaviour. See, for example, Stafford Smith et. al. (2011) and the industry-leading WSAA Climate Change Adaptation Guidelines (2016).

I understand that the maximum allowable consumptive extraction within a water market may be reduced when the availability of 'environmental' water is reduced, but the decline in available water in south-western Western Australia continues, and shows no signs of reversing. It is difficult to conceive of a water market in which the quantum of the resource falls below the levels needed to sustain the environment, and after that irrigated agriculture and other consumptive uses.

It is most unlikely that property rights in water will remain secure in the face of declining water availability in the environment, and mechanisms to define and manage this risk are urgently needed. It is also essential to understand that there are limits to climate change adaptation, and that the combination of changing water availability (this includes too little and too much water) and extreme events such as Cyclone Debbie in Queensland and New South Wales is likely to cause the failure of water markets and businesses.

I do not support public compensation of water market participants who are 'caught' by climate-driven reductions in available water, given the easily available knowledge on the likely trajectory of rainfall in various parts of Australia as global warming progresses. This must be a matter of due diligence, financial disclosure and risk management by the owners and boards of companies participating in Australian water markets.

The recent speech by Geoff Summerhayes, Executive Board Member of the Australian Prudential Regulation Authority strongly supports this point, as do statements by Mark Carney, Governor of the Bank of England and legal opinion by Noel Hutley SC on company directors' legal obligations to consider the impacts of climate change (see references).

In south-western Western Australia, extensive plantation forestry has been allowed to develop without any regard to the water used by the trees. One of the most difficult cases is the 20,000 ha of pine plantations on the Gnangara Mound, that were originally established to provide a local supply of softwood to WA. The pines are now a liability, largely preventing the recharge of groundwater beneath them, and reducing the water available for the environment, public and private water users. This problem has been greatly exacerbated by the drying climate.

The ownership of 'new' water sources such as stormwater and reclaimed wastewater infiltrated to groundwater seem ill-defined, and are the subject of case-by-case negotiations between the owner of the water-producing infrastructure and the water resource regulator. A uniform, transparent policy approach to this issue would encourage investment in unconventional water sources, and improve water resource security.

Water Planning

I am concerned that some of the NWI objectives for water planning are a fantasy, particularly in the context of continuing global warming. There seems to be little concrete evidence that water planners and the community are open to dealing with the risks posed by climate change to ongoing water resource security, and of course the risks to the water markets supported by that resource. Is conventional water planning in danger of becoming a triumph of process over reality?

Water planners (and water users) must adapt to the reality of declining water availability, particularly in southern Australia. In south-western WA, many of the reservoirs in the Integrated Water Supply Scheme (IWSS) are now effectively 'stranded assets', because the streamflows into them have declined so much that the Water Corporation has abandoned them as reliable water sources. Some of these reservoirs are now mainly used to 'bank' desalinated seawater or groundwater during periods of low demand, then releasing water to meet demand peaks.

Groundwater recharge rates have also declined in a non-linear fashion, and resource security and environmental values are both under threat on the Gnangara Mound, Perth's major groundwater source.

A huge, and probably largely unacknowledged problem with current water planning arises because of the rapidly changing relationships between rainfall and runoff (and rainfall and

groundwater recharge). The statistical distributions of rainfall, runoff and recharge are continually changing – a condition called statistical non-stationarity. The continuing non-stationarity of these critical variables means that the probability of future events, for example annual or seasonal rainfall, or extreme events such as floods and droughts, cannot be reliably estimated (Bates et. al. 2010; Water Services Association of Australia, 2016).

Non-stationarity means that will be almost impossible to estimate the 'sustainable yields' of either surface water or groundwater systems, and importantly the probability of extreme events. This problem makes investments in many types of infrastructure much riskier. Investor confidence will be threatened by our inability to reliably estimate future water availability and the likelihood of extreme events.

Experts in best practice adaptation to climate change recommend a that broadly-based scenario analysis approach is adopted. This should include a broad range of participants – climate scientists, hydrologists, water engineers, government representatives including treasury and water resource regulators, and of course interested community members and business owners. Engaging the widest range of participants helps mutual understanding and acceptance of the risks from changing climate, and minimises, but does not eliminate the risk of investing in stranded assets. For more information on best practice climate change adaptation, please see Stafford Smith et. al. (2011) and Water Services Association of Australia (2016).

Water Infrastructure

As discussed in the section on Water Planning above, global warming and consequential climate change is creating increasingly difficult dilemmas for investors in and owners of water-related infrastructure.

Australian urban water utilities have already had to adapt to harsh changes in their operating environment – from running out of water, to floods, power outages and other disruptions. These disruptions may or may not be linked to climate change, but they are an indication of things to come.

Adaptation to the climate change and extreme weather events experienced in Australia has already cost the urban water industry millions of dollars. In some cases, the responses of governments and water utilities to these events have been heavily criticised, particularly because the Millennium Drought broke at the time that large seawater desalination plants had been built, and people with short memories complained at the 'waste' of money involved.

Urban and rural water utilities and irrigation cooperatives can expect the challenges associated with climate change – protecting assets and providing consistency and quality of service – to increase in both frequency and magnitude as warming progresses. Infrastructure operators will have to cope with events not previously experienced. It is clear that the past is not a reliable indicator of the future, because the probability of extreme events is rapidly changing, making conventional approaches to the estimation risks unreliable. This causes a serious problem for water industry planners and decision-makers,

and underlines the need for innovation in both policy and practice if adaptation actions and investments are to succeed.

The recent floods in Queensland and northern NSW provide a graphic example of the looming problems confronting water and other infrastructure operators and the communities they serve. Assets have been damaged or destroyed and services disrupted, and the costs of restoration will be high. Poorly located towns such as Lismore may gain partial protection if flood levees are built, but experience elsewhere has shown that levees create a false sense of security, and encourage intensification of development behind them. All flood control structures can fail, and when levees are over-topped, the damage is often greater than before they were built.

Urban and Rural Water Services in WA

There is a widely-held belief that competition in the provision of urban water services is inherently good – but where is the evidence for this? Competition in the National Energy Market has clearly not delivered benefits to customers. Instead energy market 'reforms' have resulted in the doubling of electricity prices to eastern Australian consumers, over-investment in poles and wires, and under-investment in new generation capacity and increased network instability. Electricity market reform has also failed to deliver innovation in improved products and services (Wood and Blowers, 2017).

In general, water utilities tend to be natural monopolies, because unless one is situated close to a large river system, the costs to move water over long-distances is prohibitive. That said, there should be effective mechanisms to drive improved efficiency and effectiveness amongst water service providers, including ensuring that they maintain their licence to operate by producing excellent social and environmental as well as financial outcomes.

In my view the key role of publicly-owned water utilities is to provide essential services, sustainably, reliably and affordably. These essential services include the obvious ones of a sustainable water supply, wastewater collection and treatment, and for some, provision of bulk water for irrigators and urban and rural drainage services. That said, their less obvious services are also critical – protection of public health by providing safe potable water, and increasingly recycled water as well as separating the 'mouth from the anus' in the words of the late Professor Nancy Millis, by providing safe wastewater services. The first responsibility of a publicly-owned utility should not be to maximise profits, although it should be required to operate in a financially viable manner, and support the economy through the contribution of tax-equivalent dividends to government and by provision of essential water services.

The focus of privately-owned utility services in in stark contrast to this, and this has been amply demonstrated in the manifest failures of the national electricity and gas markets. The focus of privately-owned businesses is to maximise profits and returns to shareholders, not to provide the services mentioned above in the most beneficial manner to the community and the wider economy. In my view, it is essential that the Productivity Commission understands in detail the causes of the problems caused by privatisation of parts of the national electricity and gas markets, and does not recommend similar pathways to disaster for the different sectors of the Australian water industry.

In the early 2000s, the Integrated Water Supply Scheme (IWSS) that supplies Perth some population centres to the south, and the Goldfields and Agricultural regions to the east of Perth via the historic Goldfields Pipeline was close to failure because of more than 20 years of below-average runoff into its storages. The State Government and the Water Corporation were confronted with the spectre of recurrent economic damage to the economy, estimated to be around $1.4 billion annually if total bans on outside watering were introduced. Instead, the renowned *Security through Diversity* strategy was developed, and it successfully achieved water security for the IWSS. This achievement would have been much more difficult, and perhaps impossible, if significant parts of the water supply were privately owned. See Marsden Jacob Associates (2006).

Public or private investment in water production infrastructure is very risky – this has been amply demonstrated by the partial 'stranding' of eastern Australian seawater desalination plants as water sources when the Millennium Drought broke. The key risk arises because in complex water supply schemes with multiple water sources and varying costs of water production, scheme operators will want to use the cheapest water first. In Australia, most reservoirs supplying scheme water are publicly owned, and provide the cheapest source of water to most cities. Seawater desalination and indirect potable wastewater recycling schemes provide bulk water at costs of around $1.50 to $2/kilolitre compared with about one tenth of that for water from long-established reservoirs.

When water is abundant, reservoirs and other low-cost water resources will be the preferred source of supply, leaving expensive desalination plants idle or under-utilised.

The community must be fully engaged in the discussion about the level of water security desired, and understand the wider economic costs and benefits of getting this wrong, and the consequences of running out of water.

In huge states like WA, subsidisation of remote water users via the WA Government's Community Service Obligation (CSO) mechanism is a socially responsible policy, because most of the State's wealth is generated in rural and regional areas. It is inequitable to expect communities living in remote locations to pay the full costs of their water services if we expect them to live and work under such trying conditions.

The Water Corporation receives an operating subsidy from the State Government to cover the difference in the cost of providing the service and the revenue it receives from customers in country towns. In 2015/16, the Water Corporation received an operating subsidy of $390 million to provide water and wastewater services to country towns (Water Corporation, 2016).

'Water services price regulation in Western Australia is different to most other jurisdictions in Australia, and the regulation of the gas and electricity industries in Western Australia. In most states, the government does not determine water prices. Rather, the regulator (the Economic Regulation Authority) has the power to determine prices and is able to implement other measures, such as service standards or efficiency mechanisms, to improve the performance of water businesses over time. The ERA m akes re

State Government. The Government considers the ERA's recommendations and decides the tariffs to be implemented' (Economic Regulation Authority, 2016).

The WA Government is therefore free to set prices that may be higher than those recommended by the ERA, but doing so provides funding to support the Community Service Obligation scheme of subsidised water services in regional WA.

Urban and Rural Drainage in WA – and 'Disintegrated' Water Cycle Management

In Western Australia, there is confused and incomplete governance of stormwater and drainage systems, with no effective system in place to protect or enhance water quality. In metropolitan Perth, local authorities own and manage about 70% of the stormwater drainage system, and the Water Corporation owns and manages a network of 828 km of main drains. The Water Corporation also manages 2250 km of rural main drains (https://www.watercorporation.com.au/about-us/environment-and-sustainability/drainage-management).

The western and southern coastal plains of WA generally have sandy soils that contain shallow aquifers. Many of these soils are highly leached, and have low water-holding capacities and the tendency to leach dissolved substances such as nitrogen- and phosphorus-based fertilisers. In many locations, both urban and rural drains have been built to lower high watertables so that the development of urban areas and farmland could proceed.

This combination of leaching sands and high watertables has caused most coastal plain waterways to become nutrient-enriched, with the consequent algal blooms causing environmental harm and reduced amenity for people. Despite these problems, the shallow aquifers in the sandy soils provide cheap and convenient storage for infiltrated stormwater, and the value of this resource would be enhanced if basic measures were in place to protect water quality.

Most road drainage pits that form the entry points in most local government stormwater systems do not function as intended. These structures are designed to infiltrate stormwater into the shallow aquifer through the base of the pit, but in many instances this does not occur because the pit bases are clogged with decaying organic matter, sediment and other contaminants from the roadways. The residual water held in the pits also provides ideal breeding habitat for mosquitoes – potential vectors of disease.

Clogged infiltration pits also mean that valuable water is being wasted, because instead of it recharging the shallow aquifer, contaminated stormwater travels through the piped drainage network into infiltration sumps or sensitive receiving waterways, where its contaminants cause harm and much of the water is lost to evaporation.

There is an urgent need to reform stormwater and drainage governance in WA. The current system is far from best practice, causing harm to natural assets and ineffective use of stormwater, a major water resource. The WA Local Government Association (WALGA) put forward a plan for integrated management of the Swan-Canning Estuary in 2011, but it failed to gain the support of WA Government regulatory agencies or the Water Corporation.

A well-governed approach to both urban and rural water cycle management is still lacking, with ill-defined and overlapping responsibilities amongst agencies and inadequate technical and financial resources making problems worse. I think that a fundamental review of current arrangements is urgent, and that this needs to lead to reformed governance, including funding, of the management of both water quantity and quality on a catchment basis.

Regulation of Water Services and Water Users - Assessing Progress and Costs and Benefits of Policies

The Productivity Commission and state-based economic regulators have the clear objective that the benefits of regulation do not exceed costs. In my experience, this test is often not met in WA, where there is no formal mechanism of regulatory impact statements in place.

The ERA has announced that it will conduct a high-level regulatory impact assessment of a sample of environmental and health regulations to assess whether the costs are proportionate to the benefits. The ERA intends to prioritise the regulations that are estimated to impose the highest costs on the water corporations (Economic Regulation Authority, 2016).

In addition, there is the problem of 'unaccountable' behaviour by some people in regulatory agencies. Many regulatory instruments lack any credible scientific basis for the limits contained in them, and also fail to justify new the contaminant or microbial limits in standards with an objective risk assessment.

One example is the draft *Environmental Standard: Composting* released by the WA Department of Environment Regulation in 2016, in which some contaminant levels have been set so low that even clean compost made from urban green waste may not comply. Even if the permitted contaminant levels were significantly higher there would be no risk of causing soil contamination because compost is simply too expensive to over-apply!

The microbial limits in the compost standard are identical with those in the 2012 Western Australian guidelines for biosolids management (Department of Health, 2012). One example of over precaution is the indicator of pathogenic virus risk, coliphages, is set at <10 pfu per 10 grams of dry final biosolids for the highest grade of biosolids. This limit has been set without any evidence of either health or environmental problems arising from the land application of biosolids in WA, and is without precedence in any other advanced jurisdictions.

The European Union's review of the environmental, economic and social impacts of the use of sewage sludge on land reveals that coliphages are not used as indicators of microbial hazard, and that permitted metal limits, such as copper, are an order of magnitude higher than those in the WA instruments above (Milieu Ltd., no date). The over-conservative contaminant and microbial limits in WA unreasonably inhibit the beneficial use of organic wastes such as green waste and stabilised sewage sludge to improve soils and conserve water, and add to the costs borne by water utilities and composters.

Formal regulatory impact assessments should be routine in all Australian jurisdictions, and advice from the Productivity Commission on the best way to approach these is needed.

Climate Change

I have commented above on the fundamental importance of climate change as a driver of uncertainty, within and well beyond the water industry. There is little evidence so far that water service providers are proactively integrating best practice approaches to climate risk into their governance systems, but rather react when their assets and operations are disrupted by extreme events, as with the current severe floods in NSW and Queensland. Appendix 1 contains a summary of the key risks from climate change to water-dependent businesses.

There is an increased likelihood of social and political conflict, as well as rising costs, as the frequency and severity of extreme events increases with ongoing global warming. All sectors of the water industry must adopt and refine current best practice to their region. Best practice is currently defined in the Water Services Association of Australia's Climate Change Adaptation Guideline, as well as the recent papers on the duties of directors (Water Services Association of Australia, 2016; Summerhayes, 2017; Hutley, 2016).

Measures of resilience to climate change need to be added to the agreed outcomes and actions for the existing eight key elements of the National Water Initiative. In my view, the most rigorous test is to maintain continuity of service as the climate changes and extreme events occur.

Environmental Water Provisions

Environmental Water Provision theory needs to have the assumptions underpinning it clarified. There is increasing evidence that past climatic behaviour does not predict the future climate, and most EWPs have been based on the statistics of long river flow or rainfall records (Bates et. al., 2010; Stafford Smith et. al., 2011).

In south-western WA, severe declines in surface flows and groundwater levels are already changing aquatic ecosystems, and there is no remedy. For example, several south west reservoirs have never overflowed, and wetlands that depend on the superficial aquifer for their water are now dry in most years, and are being colonised by terrestrial plant species. There is simply not enough water available to release flows to maintain the form of river channels or to supplement drying wetlands in south-western WA.

Some amelioration is possible, but innovative ways to maintain aquatic habitats will be needed as the climate dries. Releasing stored desalinated seawater from reservoirs that costs $2/kL to produce is unlikely to happen.

Achieving Reform

Achieving efficient and sustainable water services is a complex, multi-faceted problem, and there are arguments for and against whether a national approach is needed for such policy endeavour.

National approaches have appeal, but they must be nuanced to accommodate the diverse range of natural, economic and social environments found across the nation. That said, not all water service providers are equal, and some have implemented world-leading approaches to some of the problems they face. A major strength of the Australian water industry is its culture of open collaboration, information sharing and support, at least among urban water utilities. Smaller water utilities often lack the technical and financial resources to develop improved approaches to their issues alone, and it is wasteful to 'reinvent the wheel' when solutions are already available.

The NWI has delivered significant benefits to Australia, but it should be improved to deal with major emerging issues, such as the risks posed to the water industry itself and to strongly water-dependent industries such as irrigated agriculture, and the natural environment.

I suggest that the Commission reviews and identifies examples of best practice on various issues in Australia and elsewhere. Once this is done, shorter, more succinct proposals for reform could be released for public comment and refinement before they were adopted and implemented.

If reforms are adopted nationally, the familiar tied grant approach could be used to encourage their uptake.

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Appendix 1 – Key Risks from Climate Change for Water-dependent Businesses

System at Risk	Key Risks from Climate Change
Source waters	➢ Higher use of non-climate dependent sources, resulting in higher costs. ➢ High peak flows, requiring more flood space in reservoir, and reducing volume in storage ➢ Contaminated runoff from bushfires and reduced yield during forest regrowth after fire. ➢ Lower groundwater reserves from reduced recharge. ➢ Reduction in aquifer reserves and water quality from seawater intrusion. Increase in algal blooms and reduced effectiveness of some water purification chemicals from increased temperatures.
Built assets	➢ Increased odours from sewerage networks and treatment plants. ➢ Increase in extreme weather events causing asset failure, disruption to power supplies and other problems. ➢ Change in hydraulics for sea-based infrastructure.
Environmental impacts	➢ Potential increase in breaches of obligations and regulations. ➢ Insufficient water to provide for environmental flows. ➢ Increased need for environmental flows to support waterway health. ➢ Changes in catchment vegetation affecting run-off and yields.
People and workplace	➢ Urban heat island effect – increasing risks of morbidity and mortality. ➢ Reduced mobility and risks to workforce during extreme events. ➢ Reduced access to assets (e.g. flooded roads). ➢ Changes to disease patterns, such as tropical diseases increasing their range or entering the country.
Interdependencies	➢ Increased insurance costs or refusal by insurers to cover risks. ➢ Declining income/revenue, such as when water use restrictions are imposed or water demand declines. ➢ Disruption of essential services, including blackouts. ➢ Movement of populations.
Customer service delivery	➢ Increased disruptions to service delivery from bushfires, floods, power outages. ➢ Increased human stress from acute water shortages, drought, floods and coastal inundation. ➢ Changing customer expectations; increasing

	complaints of service failure. ➢ Increased peak demands for water as temperatures rise. ➢ Increased demand for water for agriculture; reduced water security for irrigators. ➢ Decreased willingness to bear increasing costs of climate change adaptation. ➢ Greater uncertainty for investors in water infrastructure (both private and government).

Adapted from Water Services Association of Australia (2016). Climate Change Adaptation Guidelines, Appendix D.