The case for water reform:
being prepared for extreme extremes

1. Acknowledgements

This evening, I'd like to start by acknowledging the place on which we gather tonight, on the **traditional land of the Ngunnawal people**, and I pay my respects to their Elders past and present.

Gatherings are an important part of life for First Nations, and I recognise the intricate and enduring connection to water of our Indigenous Australians.

Thank you to the University of Canberra and Griffith University for hosting the event this evening.

I would like to acknowledge:

- the **Reverend Vicky Cullen**, Patron of the Peter Cullen Trust,
- **Professor Ross Thompson** from the University of Canberra,
- **Professor David Hamilton** from Griffith University, and
- **Darryl Day,** Chief Executive Officer of the Peter Cullen Trust.

I would also like to acknowledge my wonderful colleagues, Professor Mary O'Kane and my partner Stephen Barry, who helped me prepare for this speech.

Finally, I would like to acknowledge those who have been so terribly impacted by the extreme weather events over the last months, weeks and days.

I was honoured to be invited to deliver the 2022 Peter Cullen Lecture and play my small, but important part, in continuing the legacy of the great, late Peter Cullen.

Fittingly in the preparation for this speech, I have had the opportunity to reflect on Peter's extraordinary legacy with others, including Professor Hamilton, Darryl Day and Professor O'Kane, and some of my colleagues who have had the benefit of taking part in the Science to Policy Leadership Program.

Peter was the founder of the Freshwater Ecology Co-operative Research Centre – "one of the best CRCs ever" in Professor O'Kane's words.

As one of the most eminent water scientists in Australia, Peter improved our knowledge across many fields - from catchment management to environmental flows, freshwater and lake ecology to nutrient dynamics.

Peter showed us the power of good science communication and evidenced based policy. As a policy-maker, working in the area of natural resource management for two decades, I know from experience – good and bad – that this combination, together with a solid implementation plan, is how you make change in the public interest.

Peter's accomplishments in defining and testing many of the early science communication principles we use widely today are, in my opinion, one of the most important gifts he gave us.

As I turn to my theme for tonight's lecture, Peter's work in going beyond the boundaries to communicate complex science is never more important than during extreme times.

2. Introduction

What do I want to talk to you about tonight?

I want to:

- set out the Australian Government's national water reform commitments
- reflect on what we have achieved to date
- reflect on the impacts of the extreme drys and extreme wets we have lived through recently, and
- map out what I think are the priorities for national water reform in the face of climate change and these extreme extremes.

The National Water Initiative is the shared commitment by all Australian Governments to drive sustainable water resource management across the country.

How to renovate the National Water Initiative – so it again drives water reform – is the key issue water leaders of Australian governments grapple with when they come together at the moment.

One of the key questions we need to grapple with is: what does 2050 look like from a water perspective?

The key challenge is: how should the next National Water Initiative be designed to set us up to deal effectively with the future given what we are living through?

Until this year we would have had a level of confidence in the following statement:

> *In the future, there will be increasing demand on water supplies from population growth and food production with decreasing availability due to climate change.*

The trend of less has been the focus.

But as the third consecutive La Nina peaks, we need to reassess (again) the risks we have to plan for.

What is sustainable water resource management in a period of such dramatic change?

The wet extremes that we wake to daily at the moment, and the dry extremes from which we are recovering.

Through national water reform we can make change to build our resilience to extremes.

I think the key priorities for national water reform in the face of a rapidly changing climate should be:

1. Coordinated, strategic, clear and trusted **science**
2. A strategic approach to better **groundwater management**
3. Facilitating **First Nations peoples' rights and interests** in water
4. Ensuring access to **safe and secure drinking water**.

These are the priorities I see from where I sit.

Others may not agree. That is ok. We need to have the discussion.

Why am I focused on these as priorities?

Coordinated, strategic, clear and trusted **science**, including climate risk scenario modelling, is the foundation stone for water reform in the face of extreme extremes.

Groundwater is often the last port of call during drought. I saw the importance firsthand of groundwater, leading the regional water portfolio in NSW, during the last drought. Many towns on the Barwon-Darling switched to Great Artesian Basin water as their town weir pools dried up. Groundwater resources were pushed to their limit. We had to pull together what we now call "tiger teams" to process exponentially increasing bore applications. We had to support our groundwater scientists who needed to assess the impacts of these applications on a resource they needed more information about.

The current National Water Initiative does little for **First Nations peoples**. First Nations peoples continue to experience disadvantage across the Australian economy. This is also true of the water economy, where they have limited ownership of water rights.

Ensuring access to **safe and secure drinking water** – a fundamental right - is a major challenge not only during the dry dries but also the wet wets.

2.1 The Policymaker

I am somewhat of an imposter in the water space having only had a direct role for the last 4 ½ years.

I am a lawyer by training. After escaping from a big law firm, I worked for Aboriginal organisations for a decade, including for the Minister for Indigenous Australians, the Hon. Linda Burney MP, when she was the Director-General of the NSW Department of Aboriginal Affairs. Natural resource management was my focus during this time, including developing standalone heritage protection legislation and working on the review of the *Aboriginal Land Rights Act 1983*.

I also worked as a lawyer for land councils and First Nations people on land and native title claims, including rights to water.

Policy and legislative reform have been the focus of my career in the NSW and Australian Governments. I have led policy and legislative reform in primary industries including agriculture, fisheries, forestry and biosecurity, as well as Crown lands, biodiversity management, mining and energy. I have also worked as a regulator. I set up and ran the Office of Coal Seam Gas in NSW.

I took over the regional water portfolio in NSW following the 4-Corners program "Pumped". I was responsible for science, modelling, policy, planning and a broad range of programs, including local water utility regulation and the Aboriginal water and sewerage program.

It was this role that got me hooked on water resource management and showed me the importance of science and modelling and talking to people about the data we are collecting, what model scenarios were showing and developing appropriate policy and planning responses.

It wasn't just the intellectual challenge but the amazing and committed people who work in water resource management: those in local councils, water utilities, the engineers, the scientists, the planners, the engagement officers, the modellers, and the regulators.

I moved to the Commonwealth in 2020 to lead the water division.

From my experience as a policymaker, one thing I know is that water reform requires real collaboration – it requires testing, discussion, debate and understanding from different perspectives – and there are many interests to navigate.

2.2 National water reform commitments

On Saturday 21st of May, the Australian people went to the polls and voted in a new Australian Government for the time in almost a decade.

A new government puts new cogs into motion.

For public servants, it starts with the incoming government brief which provides an overview of the portfolio. A series of deep dive meetings then follow with the Minister and staff.

And we begin work on pathways and options to deliver on the new government's agenda.

2.3 The National Water Reform Agenda

The new Government has committed to an ambitious national water reform agenda:

- renewing the National Water Initiative
- looking at the case for a National Water Commission to drive ongoing water reform and future-proof Australia's water resources
- expanding the National Water Grid Investment Framework to allow funding for a broader range of projects, including essential town water supplies in regional and remote communities
- increasing First Nations' ownership of water entitlements and participation in decision making, and
- delivering the Murray-Darling Basin Plan in full.

For me as a policy-maker to say this is an exciting time, is an understatement.

3. Where have we come from?

Before talking about the challenges that confront us in a changing climate, and how we navigate the next chapter of the water reform journey, I want to reflect on what we have achieved so far.

3.1 Murray-Darling Basin

Given how contested implementation of the Murray-Darling Basin Plan has been, we often forget that the rest of the world regards Australia as an international leader based on this ambitious natural resource management reform.

The plan to re-balance water needs between consumptive users and the environment, arose out of the millennium drought. It is a plan agreed and being implemented by six governments, which is making a significant difference.

The concept of a Commonwealth Environmental Water Holder is one of the most significant reforms to be driven by the Australian Government.

The fact that the water holder, Dr Simon Banks, now manages more than 2000 GL of water is an amazing thing. Water across the Basin from Queensland to the Murray mouth is delivering environmental outcomes guided by science, First Nations peoples and local communities – these environmental outcomes are the

foundation for healthy communities, for a thriving tourism industry and for the sustainability of the food and fibre that is grown in the Basin.

As the Environment and Water Minister, the Hon. Tanya Plibersek MP has observed:

> *"… there's a lot of history and emotion behind the Basin Plan… and the Commonwealth is not going to downplay or minimise that."*

The interactions the Minister has had since she took on the job have been overwhelmingly constructive. Different kinds of people, from different walks of life, living in different parts of the Basin, have gone out of their way to share their perspectives and ideas.

They've come forward with practical proposals. They want the Basin Plan to work.

Importantly, Basin Ministers recommitted at their recent council meeting to deliver the Basin Plan; and to work through the challenges of doing so together.

3.2 The National Water Initiative

The National Water Initiative Intergovernmental Agreement was agreed by the Council of Australian Governments – COAG – in 2004. The National Water Initiative provided a national blueprint for water reform. It was, and remains, a shared commitment by Australian governments to environmentally sustainable levels of extraction.

The Initiative is now 18 years old.

Most jurisdictions have made significant progress toward their 2004 commitments.

The progress at the Commonwealth level needs to be acknowledged and celebrated too: a Water Act in 2007, a Basin Plan in 2012 and a Commonwealth Environmental Water Holder.

The National Water Initiative has driven water trading and environmental water management reforms. It has delivered wide ranging benefits for consumptive users, including more efficient water use. It has also started to set us up to adapt to climate change.

The principles in the National Water Initiative continue to guide water planning and management decisions across Australia. By many measures the National Water Initiative has been a success.

4. Extreme extremes – what have we seen since the Initiative was signed?

The National Water Initiative was signed in 2004 during the Millennium Drought. Since then, water resource management has been defined by extremes.

The toll that the last 6 years has taken on allocation teams, river operators, on water utility staff, and on drought and flood coordinators and engagement teams has been severe – they interface daily with the communities and water users dealing with the business and personal impacts of extreme conditions and weather – while having to make and revise management decisions on a daily basis.

In 2019, the Murray-Darling Basin was in crisis clocking up the driest three-year spell on record.

Three years later, we are living through some of the nation's worst recorded flood disasters.

- In the 3 days to 28 February, greater Brisbane received 676.8 millimetres of rainfall, the largest total ever recorded in Brisbane

- In July, Warragamba Dam - Sydney's primary reservoir, was spilling almost a Sydney Harbour full of water a day – that's 500 gigalitres a day, following 2 years with zero inflows.

People have died, homes and businesses have been destroyed along with crops, livestock and infrastructure.

The rain that has fallen in the last week has fallen on catchments that are already so wet they quickly become saturated resulting in faster flash flooding events with less volumes of rain.

The Macquarie River at Bathurst and the Lachlan River at Forbes have been forecast to exceed record heights too.

In the middle of this extreme volatility, we have the challenging job of designing the strategic framework to guide management of Australia's water resources over the next two decades.

In my view, the National Water Initiative needs at least a 20-year horizon and to have an eye to what the next 50 years hold.

I want to draw out some of these recent extremes to underline the water reform challenges we face.

4.1 Perth

Looking across the Nullarbor: two years ago parts of Western Australia were in the grip of one of the worst droughts – for some pastoralists, the worst they had seen in more than 40 years. Regions like the Gascoyne, Great Southern and Eucla, saw their driest or second driest April on record.

In 2015, Perth's dams received the lowest inflows on record – only enough water to supply Perth for 14 hot summer days.

Over the period from 1975 to 2018, Perth's dams saw an almost 80% reduction in annual inflows.

Perth, a city of almost 2 million people, is living with the impacts of a changing climate and increasingly reliant on alternative water sources. It's not surprising that, in the past decade, West Australia has set the pace for desalination, with the first plant providing water to Perth in 2006. The plant built in 2006 now produces 18% of Perth's water supply.

4.2 Brisbane and Lismore floods

On the other side of the country, 2010 and 2011 saw one of Australia's largest flooding events in the urban metropolis of greater Brisbane. 200,000 people were impacted, 90 towns were affected and tragically, 33 people lost their lives. There was almost $2.5 billion in direct damage – and the reduction in Australia's GDP was estimated at $30 billion.

We have heard over the last couple of days about the terrible impact of flooding in Eugowra in the Central West of NSW.

As Mick Fuller and Professor O'Kane reported following their NSW Flood Inquiry in July this year:

The impacts of the major storms and flooding experienced during February-April 2022, and again in July 2022, are still being assessed. Disaster was declared across 98 Local Government Areas, from the Northern Rivers … to the Illawarra and west to Broken Hill.[1]

Almost 15,000 homes have been damaged with over 5,000 uninhabitable,[2] *and close to 8,000 people are currently living in emergency accommodation.*[3]

Estimates .. by the Insurance Council of Australia … identified the February-March flood events in NSW and south-east Queensland as the costliest flood in Australian history….[4]

[and] *Tragically, 9 people lost their lives.*[6] [1]

There has been significant research, modelling and other work done on understanding the risks from dry dries and exploration of the appropriate management and planning responses. We need to make sure we are doing this for the wet wets too.

And we also need to acknowledge that floods are critical, natural processes.

4.3 Northern Basin

Implementation of the Murray-Darling Basin Plan has been bookended by extremes - the worst drought on record in the Southern Basin and a drought that was so extreme in the Northern Basin it was almost inconceivable. Mass fish kills at Menindee Lakes in January 2019 were the shocking culmination of the worst in-flows on record, into and down the six major tributaries that feed the Barwon-Darling - the Baaka River.

As the head of the Regional Water portfolio in New South Wales, I travelled to Wentworth, Pooncarie, Menindee, Wilcannia and Broken Hill on three trips between May and November 2018, with Jock Laurie, the NSW Drought coordinator, to hear from communities, the Barkandji and other First Nations Peoples, water users, residents and local councils about a Basin Plan project which required the reconfiguration of the lakes to reduce evaporative losses. The lakes were almost empty. The rain had stopped and the river had stopped flowing. The quality of what remained was terrible. Block banks – temporary dams - were being installed across sections of the Lower Darling to hold water back for stock and domestic use. People were distressed and traumatised. The landscape had turned into a desert. It was horrific.

I will translate that horror into numbers:

- In the **Macquarie** – the 36 month flows into Burrendong Dam were **72% less** than the previous lowest recorded inflows in 1937-40
- In the **Namoi** – the 24 month flows into Keepit and Split Rock Dams **were 87% less** than the previous lowest recorded in flows in 1918-20.

Having to make the water allocation decisions across NSW for the 18/19 and 19/20 water years is one of the hardest things I have had to do in my career.

The prolonged nature of the drought – 3 consecutive dry years – exceeded the existing water security planning horizon and reserves for critical human water needs.

In Queensland, water was carted to Stanthorpe for 15 months at a cost of more than $10m. Inglewood was within weeks of carting water for town supply. In NSW we costed water trains to Dubbo.

[1] 2022 Flood Inquiry, Volume One: Summary report (29 July 2022), p.2.

In April 2019, following much welcome rain, I had the challenging job of having to impose water restrictions on irrigators in the Macquarie and the Namoi – I had to prevent them from pumping water as it flowed passed them for the first time in a long time. Many had had little income for the previous two years. I had to do this between water ministers - as the new ministry was being sworn in following the 2019 NSW election. I also had to publish my reasons for imposing those restrictions.[2]

In September and October 2019, the Border Drought Flow was coordinated between Queensland and NSW to make a release from Glen Lyon Dam of around 14GL to replenish Boggabilla and Goondiwindi Town Weirs. This release was targeted at town supplies but also replenished waterholes supporting stock and domestic supplies. Environmental water came to the rescue of towns and people along the river.

Significant effort went into contingency planning for alternative supplies, mostly around the use of groundwater.

Water quality issues led to bottled water being supplied to some small towns. Major towns were subject to severe restrictions.

In the Barwon-Darling, by June 2019 there had been a period of 364 days of no flow at Walgett.

Fish relocations were undertaken to protect breeding stocks.

Every part of the water management system was under challenge – we were often in uncharted territory. Our risk scenarios hadn't contemplated that systems could get so dry.

Having the opportunity to look closely at infrastructure, policy and planning options to deal with these extremes through the NSW regional water strategies process and to do this with local councils and communities was a very necessary response. It was through this strategic framework that we could start to develop pathways to prioritise better management arrangements for critical human water needs, for First Nations peoples, the environment and irrigators.

4.4 Science and extremes

These case studies highlight the significant challenges we face in working out how best to prepare for the future – swinging from one extreme to the other.

For me clear, trusted science, modelling and monitoring will be critical to guiding and implementing water reform. There is some great science being done in Australia and we need it to continue to push the boundaries.

- **ARC Centre of Excellence for Climate Extremes**

Last week (10 November 2022) researchers at the ARC Centre of Excellence for Climate Extremes had research published in the journal *Science* which pioneers a new technique using weather radar data to identify rapid rain bursts.[3] Rain bursts are destructive short bursts of rain that overwhelm roads, gutters and drainage systems in as little as 10 minutes.

Until now, it has been difficult for climate scientists to identify changes in rapid rain bursts due to limitations in rain gauges, satellite data and climate models. The researchers identified thousands of rapid rain bursts over Sydney using weather radar data over two decades. They found that the most severe rapid rain bursts had intensified by 40% over Sydney during this period - a phenomenon not explained by regular climate processes.

[2] Temporary water restriction for Namoi and Macquarie water sources - Water in New South Wales (nsw.gov.au)
[3] https://climateextremes.org.au/rapid-rain-bursts-in-sydney-have-intensified-by-40-in-2-decades/

- **Commonwealth Environmental Water Office**

The Commonwealth Environmental Water Office's (CEWO) management of water for the environment is guided by its on-ground monitoring, evaluation and research program known as Flow-MER.[4]

This program brings together Australian scientists, water managers, First Nations people and local communities across the Murray-Darling Basin to undertake on-ground monitoring, evaluation, and research on how best to manage water allocated specifically for the environment.

This world leading research is critical to ensure that the use of environmental water achieves the best outcomes for our rivers, wetlands and floodplains, as well as the animals, plants and people that depend upon them.

5. What should the priorities for the next National Water Initiative be?

5.1 Coordinated, strategic, clear and trusted science

Coordinated, strategic, clear and trusted water science should be a key priority area for the next National Water Initiative.

As a policymaker, good access to hydrological modelling, research, condition monitoring and socio-economic analysis is critical. This is the data you need to test and guide policy options analysis and decision-making; to inform water resource planning, infrastructure and allocation decisions.

We need an effective science-to-policy pipeline with science investment across jurisdictions well-matched to policy and program needs.

Given scientists, modellers and policymakers aren't always natural bed fellows, a collaboratively designed strategic framework to guide the science and modelling effort is key to making sure our investments get the best value for money.

Coordinated and strategic science is essential for ensuring water managers across the country are well-equipped to manage for climate extremes.

The Australian Government is investing significant funds, through the Murray-Darling Basin Authority, to upgrade river models, assess the impacts of climate change on Ramsar wetlands, to better understand how much water will be available in the future, and to track and report on the health of Basin Rivers through a sustainable rivers audit.

These are all much-needed investments in updating the foundational science essential for managing Basin water resources in a changing climate. These investments need to build on the work being done by states, water corporations and universities.

Strategic science coordination can provide a pathway to leverage and extend these Basin investments to water managers across Australia.

[4] https://flow-mer.org.au

- **O'Kane Review**

Given the importance of science and research, we have commissioned Professor Mary O'Kane to do a strategic review of water science and research.

The primary objective of Professor O'Kane's review is to provide advice that enables the Commonwealth to:

- ensure water science and research investments are strategically aligned, and add value to water policy and planning into the future
- position Australia as an international leader in water science and research, including national leadership and coordination.

Professor O'Kane is engaging with a diverse range of stakeholders who have an interest in water science, including governments, science providers, and First Nations people. She will publish a draft report in the first quarter of 2023 to continue this important public conversation.

5.2 A strategic approach to better groundwater management

Groundwater plays a significant role in times of surface water scarcity, particularly in times of drought when it can become the only water source for communities and farms that would usually rely on surface water.

As I have said, we push it to its limit during dry times.

A strategic approach to better groundwater management should also be a key priority area for the next National Water Initiative.

Groundwater makes up about 17% of Australia's accessible water resource. It is used for drinking water, agriculture, industry, and provides water for the environment. In many regions of Australia, groundwater is the only reliable source of water.

The Great Artesian Basin is one of the largest aquifers in the world, covering 22% of Australia, and contains water that is millions of years old. It is the only reliable source of fresh water for a significant area of inland Australia.

About 40% of Perth's water comes from the Gnangara Mound groundwater system and increasingly over coming decades Perth will rely on replenishment of that groundwater from treated wastewater.

In the Northern Territory, almost all communities rely on some groundwater. There are around 35,000 water bores; 90% of the water supply comes from groundwater.

Despite its importance, groundwater and its connectivity to surface water is still not well understood. Work needs to be done to improve the knowledge base – our understanding, building models - and our management practices.

There is power in bringing this effort together to back in a more ambitious plan to improve groundwater management across the country. Importantly, we need to map out how this plan will be implemented as part of a new National Water Initiative.

5.3 Facilitating First Nations peoples' rights and interests in water

I have had the privilege of working for and with First Nations peoples throughout my career. In addition to grappling with the impacts of climate change, the case for reform to recognise connection and rights and interests in water is becoming urgent.

The case for national leadership is clear. The current National Water Initiative does little for First Nations peoples.

First Nations peoples continue to experience disadvantage across the Australian economy. This is also true of the water economy, where they have limited ownership of water rights. Most First Nations peoples were historically denied property rights. When water rights were separated from land, it follows that they missed out on this economic opportunity too.

Current estimates suggest that First Nations corporations hold only 0.19% of total water entitlements nationally.

The Australian Government has committed to:

- increasing First Nations' ownership and involvement in decision-making; and
- ensuring that the authority, knowledge and experience of First Nations people better informs the work of environment agencies and water resource management decision making.

First Nations peoples have been leading research and driving conversations for over two decades on reform to support First Nations' water ownership, including through:

- The Echuca Declaration of 2007,
- The Mary River Declaration of 2009 which noted that "new ways to deal with governments need to be created, such as new authoritative, statutory governance arrangements… this could include the establishment of… an Indigenous Water Commission", and
- The Cultural Flows Research Project of 2018 which noted that "[t]o date there is no First Nations' water holder in any state or territory within Australia…[a] Cultural Water Holder could acquire and hold water rights via purchase, gift and savings from water infrastructure improvements."

The next National Water Initiative needs to ensure access to safe and secure drinking water for First Nations communities too.

In this regard, I want to draw your attention to the critical work done by the Water Services Association of Australia (WASA) - Closing the Water for People and Communities Gap – Improving Water Services to First Nations Remote Communities Report and to acknowledge one of its authors, Eric Vanweydeveld, a Cullen Trust fellow.

The report provides a comprehensive review of remote water services and elevates the voices of First Nations people.

Involving First Nations peoples in decision making on policies and programs that affect their daily lives will lead to better outcomes.

5.4 Safe and secure drinking water

I won't say much more about the importance of ensuring safe and secure drinking water.

It speaks for itself.

In public service terms, having to rock up to a weekly meeting with the NSW Secretary of the Department of Premier and Cabinet to report on what we were doing during the last drought to make sure people didn't run out of drinking water made it clear to me.

We've learnt the lessons through the extremes of the last 6 years, let's design the principles for a robust nation-wide framework.

I would like to acknowledge the Urban Water Reform Committee members from across the country who have worked, together sharing their experience and knowledge to make change in advance of a new National Water Initiative. The water security diagnostic tool they have led and tested is the kind of work we need to continue to support across Australia.[5]

6. <u>National water reform – what is the role for the Australian government?</u>

The new government has committed to renewing the National Water Initiative to better prepare Australia for future threats to water security, especially those posed by climate change.

Most of the fundamentals for good water resource management in the current Initiative are sound.

I've set out tonight what I think are key areas for reform in the face of extreme extremes.

I want to finish with some open questions:

- what does successful national water leadership look like to you? and
- what is the role for the Australian Government in the face of the extremes of a changing climate?

At a minimum I think we need a framework for the next 20 years, with an eye to the next 50 years. And we need to:

- Work with states and territories to set out principles for best-practice water resource management
- Ensure water resource managers have access to the right evidence base to make informed decisions, and
- Provide a strategic national-level framework for the key areas of First Nations rights and interests in water, science, groundwater and access to safe and secure drinking water.

Peter would expect there to be a robust conversation across governments, water resource managers, water users, community groups, engineers, scientists and First Nations people about the next era of national water reform.

I invite you to be part of the conversation.

Rachel Connell
Head of Division, Water Reform Taskforce
Department of Climate Change, Energy, the Environment and Water **16 November 2022**

[5] Urban water policy and reform - DCCEEW