The Australian Water Reform Journey

An overview of three decades of policy, management and institutional transformation

August 2016

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THE AUSTRALIAN WATER PARTNERSHIP

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Foreword

The Australian Water Partnership is pleased to provide this high-level overview of the Australian water journey. Over the past three decades, this journey transformed water policy, management and institutional arrangements in Australia.

Driven by the recognition that water is an economic enabler, our experience has shown that water can be managed sustainably, in a way that increases its economic value while meeting environmental objectives.

This paper outlines the drivers for water reform, identifies the key areas transformed and provides some insights on the pathway to implementation.

The Australian Water Partnership has prepared this report for our international partner organisations and other interested water industry professionals around the world.

While Australia's water reform journey is far from finished, our experience may provide valuable ideas for other countries as they tackle their own water management challenges. Hopefully, this report will provoke new thinking and discussion.

The Australian Water Partnership also intends to publish related papers and information providing more detail on key reform areas such as drought and water scarcity management, integrated river basin planning, irrigation modernisation, urban utility improvements, and enabling data, tools and knowledge. The references at the end of this paper also provide further reading, as well as sources to support the findings in this report.

I thank the author Professor Jane Doolan from the University of Canberra, former Deputy Secretary for Water Resources Management in the State of Victoria and National Water Commissioner, for her outstanding efforts compiling this overview. It has benefited greatly from advice provided by several leading Australian water policymakers and managers: Jim Keary, Leith Boully, Professor John Langford, Greg Claydon and Tony Slatyer.

Their experiences, judgments and review comments have contributed to making this a broadly conceived perspective on Australia's water reform journey. The author and the Australian Water Partnership would like to thank them for their contributions, while noting that responsibility for the final content rests with us.

Prof Gary Jones
Chief Executive
Australian Water Partnership

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Executive summary

Australia has been implementing a program of reform to change the way water is used and managed across the country for over thirty years. Australian water reform has been an evolving journey, striving to create a water sector that is economically and environmentally sustainable, that provides a secure basis for future investment, and that yields high returns to the community.

The drivers for reform

Australia took its first water reform steps in response to challenges that had emerged from the supply-focused management approach prevalent from the 1900s to late 1970s. By the 1980s, this approach had resulted in a legacy of debt, poor pricing policies, service delivery challenges and widespread environmental degradation. In addition, recurrent drought and increasing concern over water scarcity catalysed reforms to improve security of supply.

Developing a national water reform agenda

In 1994, Australia's national and state governments jointly developed a strategic framework for efficient and sustainable reform of the Australian water industry. This was implemented in all states across Australia with much of the effort focused in the Murray–Darling Basin (MDB): Australia's most highly committed and complex basin. Following review, this national reform framework was refreshed and extended in 2004 and re-endorsed in 2014.

Australian national water reform agenda aimed to increase the productivity and efficiency of Australia's water use and ensure the health of river and groundwater systems, while servicing the needs of rural and urban communities. Governments' objectives in implementing the long-term agenda were to provide greater certainty for both investment and the environment, and to ensure that Australia's water management could deal with change responsively and fairly. These aims and objectives fed into the overall reform vision—to achieve a market, regulatory and planning based system of managing water resources for rural and urban use that optimised economic, social and environmental outcomes; and that was delivered by an efficient and sustainable water industry.

Reform priorities and enablers

Over three decades of water reform in Australia, four key areas, underpinned by two essential enablers, were consistently pursued through preliminary state reform programs and the national water reform agenda.

Transforming water allocation

Water reform required a shift from an old, administrative method of water allocation that assumed no environmental limits to the resource to a new system that is market-based, works within sustainable resource limits, and provides economic value to individual water entitlement holders and the nation overall. A critical first step included setting diversion limits for surface and groundwater systems to protect the environment and the rights of existing users. This effectively capped highly-committed systems, which then created the driver to enable widespread water trading. This transformation required the conversion of existing, ill-defined water rights into secure, long-term, tradeable entitlements; and the gradual development of water trading rules and water markets.

Improving environmental management

Imperative to a market-based system of water allocation is a sustainable water resource base, overseen by robust environmental management. This was addressed in reform by providing a legally-recognised share of water to the environment and tackling the over-commitment of water resources in some areas to improve environmental condition.

Reforming pricing of water services

Reform of water pricing was based on the principles of consumption-based pricing, full-cost recovery, and removal of cross-subsidies. This promoted efficient and sustainable use of water resources and assets, and improved the financial viability of water businesses by providing adequate revenue streams for service delivery.

Modernising institutional arrangements

Reform necessitated the transformation of old institutions and small, local water authorities into organisations that were financially viable and could provide clear services to their communities efficiently within environmental constraints. Critical actions that underpinned this transition included separating the roles of water resource management; standard setting, service delivery and regulatory enforcement; and independent economic regulation of water pricing.

Enabler: Ensuring community and stakeholder engagement

Implementing water reform involves a series of trade-off decisions, all with real-life implications for individuals, water users, industries, communities, their local environments and their regional economies. To ensure fair, properly negotiated and politically achievable outcomes, mechanisms for community and stakeholder engagement were built into the key water reform areas.

Enabler: Improving water information and knowledge

Water information underpins every element of water planning and management. Investments in Australia's information and knowledge base over the last three decades have enhanced data collection, decision-support tools and information management platforms; as well as improving understanding of environmental and social drivers.

Insights on implementing reform

Australia's pathway to implementing water reform has shown that reform takes time. It is an iterative and evolving endeavour. Along the way, governments have had to deploy a range of tools to drive changes: innovative policy, financial incentives, improved information, reformed institutions and new legislation. Over the past thirty years, drought has played a role in both catalysing and testing reform. Many contentious reforms were incubated or trialled in Australia's Murray–Darling Basin: the nation's largest, most complex and heavily utilised river basin.

The water reformers

Maintaining the momentum for water reform requires the commitment of people to the concept of water reform and the benefits it will bring. Water reformers in Australia have included bureaucrats in the national and state governments, irrigation industry leaders, stakeholders, community leaders, environmental stakeholders, water authority staff and scientists and academics.

Reflections on Australia's water reform journey

Driven by the recognition that water is an economic enabler, the Australian water reform journey has shown that water can be managed sustainably, in a way that increases its economic value whilst meeting environmental objectives. As Australia's water reform journey has progressed, it has also become evident that reform in this sector is ultimately a long-term social transformation, involving trade-offs on numerous issues, impacting a vast array of people across a range of scales. Accordingly, water reform must be taken in a series of steps, developing and negotiating at each stage of the journey to find workable solutions. Therefore, water reform is a long-term endeavour needing decades to work on priority issues and implement changes at a time and at a pace that can be sustained by communities and governments

1 Developing the Australian water reform agenda

The Australian context

Australia is renowned for its highly variable climate, evident in its history of recurrent droughts punctuated by floods. Highly variable and often irregular rainfall, coupled with high rates of evaporation, result in limited reliable surface flows and the lowest run-off of inhabited continents. Consequently, Australia depends on water storage more than any other developed country; storing more water per head of population than anywhere else in the world. Groundwater is also a critical component of Australia's water systems.

Australia's population is ~23.4 million, ~90% of whom live in urban areas with ~60% living in cities of more than 1 million people. Water usage across Australia in 2013-14 was estimated at 23,500GL[1]. Of this, 17% was used in urban areas and over 60% in irrigation.

Australia is a federation of six states and two territories. Under the Australian Constitution, ownership of water is vested in these governments, which therefore have responsibility for land and water management. The Australian Government (being the national government) takes an oversight, facilitation and funding role to ensure that the national interest is served, particularly in transboundary river and groundwater basins such as the Murray–Darling Basin (MDB). From a governance perspective, this meant that a national water reform agenda required the agreement of the Australian Government together with the governments of each of the states and territories.

1.1 Pre-1990—the drivers for reform

Australia's water history has been shaped by the nation's social and economic needs. From the 1900s to the late 1970s, governments focused on developing water resources to supply cities and towns, and to open up irrigation areas and mining industries to promote regional growth. This entailed the construction of storage and delivery systems in all states, often undertaken in the aftermath of drought and funded, predominantly, by governments. Effectively, this period was a major 'build and supply' phase. Associated institutional structures were established to undertake this role in providing water services to communities.

By the 1980s, towards the end of this development phase, a range of issues was becoming apparent. Investment in infrastructure had left governments with a significant legacy of debt, as well as a water infrastructure portfolio that would make ongoing calls on future government budgets for maintenance and refurbishment. Despite the level of investment to date, there was increasing competition for these scarce and variable water supplies, coupled with limited potential to increase supply in regions of high water demand, due to a shortage of cost-effective, large-scale dam sites or undeveloped groundwater resources.

With increasing competition for water, the deficiencies of the existing water rights systems also became evident. In many areas, these rights were not based on a clear understanding of resource availability. Consequently, a number of water systems were over committed causing detrimental impacts on both downstream users and the environment. This was particularly evident in periods of drought. Additionally, because water rights were tied to land, the only way to effectively transfer water between users was through land purchase.

1 Australia has adopted the metric system for water measurement and water volumes are frequently measured in megalitres (1 ML = 1 million litres) and gigalitres (1GL =1000ML). 1GL converts to 1 000 000 cubic meters or 810.7 acre feet

At this time, the water industry in Australia comprised large monolithic institutions whose job was either to provide water and sewerage services to capital cities or manage irrigation areas, together with a plethora of small authorities or local governments providing varying levels of services to regional and rural communities. Water authorities set their own prices and, sometimes, their own environmental standards. In building new dams and wastewater systems, they were often both the project proponent and the resource manager responsible for its impact. In urban areas, water prices were primarily based on property value, reflecting neither the costs of supply nor water use. Metering was rarely in place. For many smaller towns across the country, water supplies did not meet drinking water quality standards, and there was frequent cross-subsidisation to other local government services. Urban wastewater discharges were major pollution sources in both rivers and marine environments.

In irrigation areas, water authorities were heavily dependent on state government subsidies with only part of their revenue being funded by irrigators through water sales and drainage rates. In 1988, the Rural Water Commission in Victoria estimated that losses to the Victorian Government on its operations were more than A$130 million, including forgone return on equity. Water was being used to produce low-value crops; for example in 1991, over half of Australia's irrigated land was used for feed production. Additionally, water use was highly inefficient, the profitability of irrigated agriculture was low, and many farms were considered to be marginal businesses. Moreover, irrigators were highly susceptible to the effects of drought, which usually prompted them to call for the construction of new water storage facilities to bolster security of supply.

It was also becoming increasingly apparent that current water management systems across the country were causing significant environmental damage. From the late 1960s, river salinity—caused by the clearing of native vegetation, irrigation development and poor drainage—became a persistent problem in the River Murray, creating significant stress for downstream communities. Between January 1965 and June 1968, the salt concentration measured at a point upstream of key irrigation areas and Adelaide's water supply exceeded 800EC (electrical conductivity being the measure used to determine salinity) for 31 months and peaked at 1400EC. These levels cause marked reductions in crop yield and quality and exceed World Health Organisation guidelines for human consumption. Excessive salinity events occurred again in the early 1980s. This had obvious economic impacts on the communities along the river and heightened public awareness of the impacts of poor water management. Inter-connected with this, inefficient irrigation was leading to the rise of saline water tables, resulting in widespread waterlogging and soil salinisation. By the mid-1980s, 96,000 hectares of irrigated land in the MDB were showing visible signs of salinisation and 559,000 hectares of land were affected by high water tables. This with the situation was projected to worsen rapidly over the next 20 years.

In 1981, the mouth of the River Murray closed for the first time since European settlement. This was a defining event, exposing the extent of upstream water extraction. Later in 1991, years of nutrient pollution coupled with hotter climatic conditions created a toxic algal bloom that stretched for over a thousand kilometres in the Darling River. This prompted the New South Wales Government to declare a state of emergency, as they advised local communities to avoid the toxic water completely. These problems were not limited to the Murray Darling Basin (MDB). Over the same period, toxic algal blooms occurred in Swan-Canning estuary, in the heart of Perth in Western Australia, as well as the Peel-Harvey estuary in Western Australia and the Gippsland Lakes in Victoria. These events signalled that the environment was under massive stress and that in some places the sustainable limits of water resources in Australia had been reached, or over-reached.

The impacts of overcommitted water systems were not just environmental. They also had economic consequences, affecting water availability, land productivity, regional tourism and agricultural exports. In many cases, these impacts became the 'call to action' for communities and politicians.

The combined issues of infrastructure debt, poor pricing for water services, service delivery challenges and environmental degradation shifted the focus of water management in Australia from simply providing more water supply to understanding water use and demand and its relationship to environmental condition and social well-being.

These challenges were primarily the responsibility of state governments, which are accountable for land and water management under the Australian constitution. From the 1980s, various state governments started to tackle water issues in their own jurisdictions and in the jointly-managed MDB. Victoria undertook a wide-ranging bi-partisan parliamentary review of water management across the state over three years. This produced a landmark report that became the blueprint for long-term water reform in the state, particularly in relation to institutional arrangements and water resource management. Despite a change of government almost immediately after its completion, the report came to drive all aspects of water reform for over 30 years in Victoria and set a significant example of what could be achieved.

Governments in Australia also acted together on issues, where they faced common imperatives. In 1988, in the MDB — the proving ground for many of Australia's most successful water reforms — the accountable state governments of Victoria, New South Wales and South Australia came together with the Australian Government to develop a Salinity and Drainage Strategy to manage salinity in the River Murray. This introduced a cap on river salinity and included an innovative system of credits and debits to account for the salinity impacts of actions taken by states. It was one of the first applications of an economic market-based approach applied to natural resource management and enabled irrigation development to continue to occur while also improving salinity levels in the River Murray.

Governments responsible for the MDB also embarked on a water audit, which revealed that water extraction had reduced the median annual flow from the entire basin to the sea to 27% of the flows that would have occurred without development. Several years later, in 1995, this project culminated in an agreement between all basin governments (including Queensland and the Australian Capital Territory) that this level of water extraction was unsustainable. They therefore agreed to implement a 'cap' on all surface water diversions across the basin, generally limiting water diversions to 1993 levels of development. This was a fundamental decision, which set up the drivers for water trading, water markets and accurate water accounting to show compliance with the cap.

Another national approach involving all governments addressed water quality. This eventually led to a National Water Quality Management Strategy in 1994, which established the principles for Integrated Catchment Management and guidelines for setting standards for freshwater and marine water systems for different human uses and impacting processes. Related to this, governments worked together on producing the Australian Drinking Water Guidelines, which strongly influenced water management in urban systems. The challenge of providing water for the environment was also tackled, finally resulting in the National Principles for the Provision of Water for Ecosystems introduced in 1996.

However, by the early 1990s, governments had collectively recognised that, overall, water management across Australia was providing a poor return to the national economy and was also causing significant environmental damage. The old system—where water had been viewed as an unlimited public resource to be developed and managed by governments, often for relatively localised social benefit—had left a legacy of debt, inefficient use and massive environmental degradation, all of which would be both difficult and costly to resolve. It was agreed that a quantum shift at the national scale was required: one that fundamentally recognised that water was becoming an increasingly scarce resource. The water management efforts of state governments in their own jurisdictions, their collective actions in the MDB and the experience of working together on specific issues like water quality, had demonstrated that change was both possible and beneficial. However, to achieve the shift at the national scale would require more than the piecemeal approach that had been taken up to that point. It would require a coordinated,

nationally-agreed reform agenda that would transition the way water was managed, used and funded across all of Australia from the 'environmentally laissez–faire', government-funded, 'build and supply' philosophy to a system that was both economically and environmentally sustainable, providing a secure basis for future investment and capable of yielding high returns to the community.

Drivers for reform

By the 1980s, the construction of water storage and delivery systems to provide town water supplies and irrigation systems had left a legacy that included:

- *government debt and financially unsustainable water authorities*
- *issues associated with inadequate drinking water quality and service levels in many regional towns and cities*
- *inefficient irrigation areas producing low-value returns*
- *widespread environmental degradation due to exceeding water resource limits, coupled with poor management.*

These problems became the drivers for national water reform in Australia.

1.2 1993 onwards—developing a national water reform agenda

In 1993, the Council of Australian Governments (COAG)—Australia's peak intergovernmental forum which comprises the head of the Australian Government and the heads of state and territory governments—commissioned a review of water resource management in Australia and the development of a strategic framework for the efficient and sustainable reform of the Australian water industry.

In developing this national water reform framework, the approach undertaken was to identify 'best practice' in all elements of water management across the states and the MDB and to combine them into a cohesive agenda that would change every aspect of water management. The review provided an opportunity for the key advocates for water reform in state and national governments and industry to come together and develop a forward-looking, transformational agenda. This was not an agenda of 'lowest common denominator'. It was an agenda that would deeply challenge governments, policy-makers and communities. However, if it could be implemented, the framework would fundamentally alter the way water was managed, used and valued in Australia, with significant environmental and economic benefits for the nation. It would transition Australia into a new phase of 'sustainable water management'.

COAG signed off on this national water reform framework in 1994 and, in recognition of its economic importance to the country, included it as a key element in its broader National Competition Policy reforms a year later. These reforms aimed to restructure the entire Australian economy in order to boost its competitiveness. Incorporating water management into this broader economic reform program signalled agreement from governments that water management was a critical component of the Australian economy and that water reform was a national priority. State governments agreed to report progress on reforms on an annual basis and, if progress was considered to be inadequate, were subject to financial penalties imposed by the Australian Government. This public reporting, coupled with the potential for financial penalties, provided a significant incentive to maintain reform momentum through even the most challenging times.

Ten years later, the national water reform agenda was reviewed. At this time, it was concluded that, although considerable progress had been made in a number of the key areas, reform was proving harder

than anticipated, particularly relating to environmental sustainability. Water demand had continued to rise and environmental problems caused by salinity and over-commitment were becoming more evident. The lead-up to the review also coincided with the early years of what would become the Millennium Drought (1997–2010). As it became drier, there was increasing concern about water availability, the sustainability of water use and the environmental impacts of current diversion levels.

At this time, various stakeholders were pressuring governments to recommit to the water reform agenda. Environmental stakeholders wanted further progress on over-commitment. Irrigation groups sought action on water allocation, pointing out that differences between states and lack of transparency was undermining confidence in the integrity of water entitlements and inhibiting investment. Worried about the implications of addressing over-commitment, irrigation farmers argued for compensation for water users and their communities if entitlements were reduced.

In 2004, COAG responded by refreshing and extending the national water reform agenda as the National Water Initiative (NWI). This national agreement built on the original agenda, adding new elements, and more clearly defining expected key outcomes and actions to drive the efforts of governments. At the time, the NWI was the most comprehensive water reform agenda in the world, providing policy direction on all the major elements of water management required to move towards a truly sustainable system of water resource management. Arrangements were set up for independent oversight and auditing of progress, and governments were required to report regularly on their progress in implementing reform. Given its national significance, COAG received regular reports on progress and new issues. Direct linkages to the National Competition Policy reforms, reporting and payments were not extended to the NWI agreements, but other 'reform incentives', including national government funding provisions, were developed.

In 2006, the Millennium Drought now in its ninth year, hit particularly hard. Much of Australia experienced the lowest inflows on record, causing extreme water scarcity that impacted towns, irrigation areas and the environment. In response, governments had to reprioritise some previously agreed actions in the context of severe drought and the future prospects of climate change. All of Australia's major capital cities augmented their water supplies with climate-independent desalination plants. In 2008, COAG responded with an agreement to further develop and enhance the national urban water framework to improve security of supply. The drought clearly showed that the MDB continued to be over-committed and, as a result, the national government embarked on a massive and somewhat controversial A$13 billion program to reset the balance between environment and consumptive use, setting a new sustainable diversion limit for the basin and assisting irrigation communities to adjust to this with investment in water purchase and infrastructure modernisation. The intent of this intervention was consistent with the reform agenda and resulted in considerable acceleration of key parts of it. However, in doing so, it substantially changed the governance arrangements for the MDB. This is discussed further in Section 3.5.

The NWI was re-endorsed as the blueprint for water reform by all governments in 2014.

Australia's national reform agenda

The underlying objectives of the Australian national water reform agenda were to:

- *increase the productivity and efficiency of Australia's water use*
- *ensure the health of river and groundwater systems while servicing the needs of rural and urban communities.*

COAG's objectives in implementing the long-term agenda were to:

- *provide greater certainty for investment and the environment*
- *ensure that Australia's water management could deal with change responsively and fairly.*

The aim was to achieve:

- *a nationally-compatible, market, regulatory and planning based system for allocating and managing water resources for rural and urban use that optimised economic, social and environmental outcomes*
- *an efficient and sustainable water industry.*

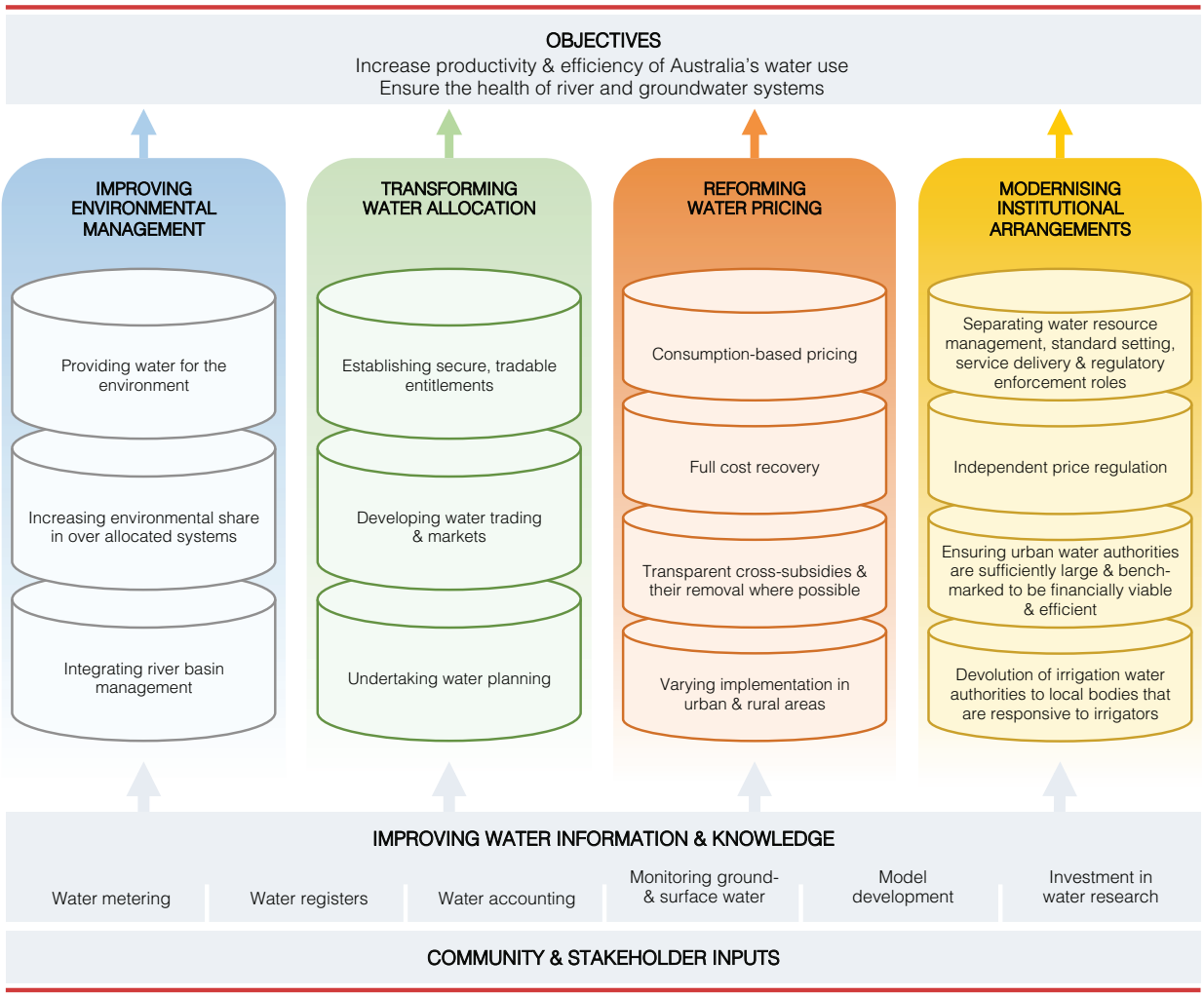
2 Broad directions of the Australian water reform agenda

The national water reform agenda worked within the Australian constitutional setting for water management and state-based legislation. Under this, ownership of water is vested in state governments. This arrangement where ownership of water is vested in governments was established through legislation in each state over one hundred years ago and provides a key foundation element which has enabled governments to manage water resources in the public interest both through the 'build and supply' phase and through the transition to the new paradigm of sustainable water resource management.

Looking back on the 30 plus years of water reform in Australia, there are four key overarching areas that were consistently pursued through the preliminary state government reform programs, the collective MDB program, and both the COAG and NWI national agendas. These are (Figure 1):

- transforming water allocation
- improving environmental management
- reforming pricing of water services
- modernising institutional arrangements.

Figure 1. Consistent objectives and elements of water reform in Australia over the past thirty years.



Implementing reforms in each of these four key areas over three decades has involved a series of trade-off decisions, all of which had direct implications for individuals, industries, communities, their local environments and their regional economies. Because of this, reforms could only made by achieving negotiated outcomes with stakeholders and communities that were politically workable at the time and that were then able to be translated into real, on-ground changes in the management of water systems.

This had implications for how reform could be both achieved and implemented.

Firstly, it had to be conducted in ways that allowed a negotiated settlement between key players to be achieved. Secondly, implementation often required improvements in knowledge and understanding of how water systems worked and were being managed.

Recognising this, the four key reform areas were complemented by two additional enablers were essential to achieve reform:

- ensuring community and stakeholder engagement
- improving water information and knowledge.

Taken together, these four overarching objectives and two enablers formed the basic structure for national water reform. Over thirty years, work in these six areas would move the management and use of water on to an environmentally and financially sustainable footing, promoting efficiency of use and generating greater economic returns for individuals and the country as a whole.

The following sections briefly describe each reform objective, its rationale and the major actions required to be undertaken to enable it to occur.

Although most of the national water reform occurred under the banners of the COAG (1994) and NWI (2004) policy agreements, these didn't cover everything. There were major advances over the thirty years in the areas relating to drinking water quality standards and pollution management that were also delivered by the Australian water industry. These were areas that were experiencing significant, nationwide challenges and where advances were occurring internationally. Improvements were being driven in these within the health and environmental protection agencies. In addition, corresponding work was occurring in the area of integrated catchment and natural resource management was also occurring. These advances complemented the COAG and NWI national water reform agenda.

2.1 Transforming water allocation

In Australia, state and territory governments can allocate water entitlements to their water authorities and other parties, enabling them to extract and use water for a range of purposes including irrigation, industrial use, the servicing of rural and urban communities, mining and the environment.

In allocating water entitlements, governments must ensure that water is allocated and used to achieve social and economic outcomes in an environmentally sustainable way. For the holders of water entitlements, the right to extract and use water comes with responsibilities to use it in accordance with conditions set by government. It should be noted that the actual legal ownership of the water always remains ultimately with the state government - it is only the right to extract and use water that is conferred on to the holders of water entitlements.

As Australia pursued its water reform agenda, there was a need to move from the old, administrative method of water allocation, which assumed there were no environmental limits to water resources, towards a new system that is efficient, flexible and market-based, working within sustainable resource limits and providing economic value to individual water right holders and the nation overall.

In the past, under the old system, governments had handed out ill-defined water rights based on land area and type of water use, virtually on demand, often for a social or regional development purpose, and with no or limited understanding of environmental limits of the water system. Whenever a drought occurred, there was pressure from irrigators for governments to build another dam or allow extra groundwater extractions to bolster their water security and provide additional water for new development. Over time, this approach led to problems of environmental degradation and created significant financial sustainability problems for governments.

Against this backdrop, individual irrigation farmers became increasingly concerned about their tenure and the reliability of supply of their water entitlement. There was a growing recognition that there were limits to the resource: if new rights continued to be handed out, firstly they would start to affect the reliability of the rights of existing irrigators in the system. Secondly, as the environment deteriorated, poor water quality could further affect the availability and reliability of their water supply.

As a result, limits on total water use were established in highly committed and over-committed catchments and groundwater basins. In the first instance, diversion limits were introduced into small, specific irrigation areas to protect the rights of existing users in those systems. South Australia capped its local irrigation systems in 1968. However, the introduction of the cap on surface water diversions across the MDB in 1995 became the major catalyst in the water reform process. This profound step meant that the only way new or existing users could gain access to more water was by acquiring it from someone else who already held an entitlement, normally another irrigation farmer. Capping the system also meant that irrigators would have to learn to manage within Australia's variable climate, coping with droughts when they occurred. This created the dynamic for some irrigation farmers and water managers to consider the potential benefits of wide-spread water trading.

Initially, communities and irrigation industries harboured significant reservations about moving to a system of tradeable water entitlements, where water was increasingly treated as a valuable product. People were concerned about water 'moving out' of their region for numerous reasons. They were worried that stranded irrigation assets could cause problems for local industries and towns, and could potentially increase service delivery prices for the remaining irrigators. They were apprehensive about the possibility that large investors ('water barons') might manipulate the market to the detriment of smaller players. And there were significant concerns about the potential environmental consequences of water moving between irrigation systems.

However, the effect of putting limits on the system made water trading virtually inevitable – it was simply not possible to obtain water any other way. The challenge then was to do it in a way that would minimise any adverse social and environmental consequences, enable rural communities to adjust and maximise the economic value from the use of water.

Notwithstanding initial concerns and challenges, the ability to trade water provided benefits at two scales. Individual irrigation farmers now had a legally-defined water entitlement that was a financial asset. This offered far more choice and flexibility in managing their businesses in response to drought and seasonal conditions. For broader regional economies, water began to have a real economic value, driving efficiency of use and moving water to higher value crops. This, in turn, would provide broader benefits to communities with value-add industries being established.

However, the transitioning to a market-based system of water allocation couldn't happen easily or quickly. It required substantial action on a range of different fronts, including:

- *Establishing legally-defined, secure and tradeable water entitlements for surface and groundwater*. The aim was to establish entitlements to water that had similar properties to land titles, that is they were explicit, exclusive, tradeable and enforceable. The new water entitlements were developed to

reflect the physical nature of the water systems and clearly defined not only the maximum volume allowed to be taken, but also its relationship to water availability. Effectively, entitlements provided a share of catchment inflows (hence in dry years, when inflows were low, the volumes able to be extracted were also low). The new water entitlements were required to be now separated from land. As the old entitlements were converted to the new system, it was very important to ensure that the new entitlements were additive and within the available caps set for total water extraction. This tight specification ensured that entitlements could be traded with no unacceptable third party impacts. Providing secure long-term entitlements and the ability to trade these entitlements has increased the value of water over time and boosted investment in water-related enterprises.

- *Developing the rules for water trading and establishing water markets.* A measured, evolutionary approach was taken, moving from initial trading between irrigators within irrigation districts in the late 1980s to trading between irrigation districts in the early 1990s, and then to a pilot interstate trading exercise across the southern sections of the MDB. This carefully negotiated approach ensured that with each step, the consequences were understood, irrigation farmers had time to learn how to work within a market system, and there were no serious adverse social and economic consequences. By 2012, a mature interstate market operating across the MDB was being utilised by irrigators, urban water authorities, and governments on behalf of the environment. Smaller markets now operate in other areas around Australia.
- *Developing related water planning processes*. These provided consistent mechanisms for water managers, key stakeholders representing competing water uses and their communities to work together at the river valley scale to negotiate outcomes for each system that, initially:
  - converted the old water rights/licences into the new more secure entitlements
  - established the environmental limits of the resource, thereby setting 'sustainable diversion limits'
  - identified the share of water for the environment required to ensure sustainability and underpin the entitlement system.

Over time, through iterations of these planning processes in their water system, the key players continued to negotiate ways to achieve more efficient system management, improved management of surface and groundwater, and where needed, solutions to address over-commitment.

2.2 Improving environmental management

The new market-based system of water allocation, aimed at increasing the economic value of water for both individual irrigation farmers and regional economies, is based on a core principle of sustainable water resource management. Environmental condition underpins water resource quality and availability. Significant degradation (for instance high salinity concentrations or toxic algal blooms) can undermine reliability of water supply and therefore the integrity of the entitlement system. Recognising this, as governments moved towards a market-based system of water allocation, they also moved to improve environmental management. Attempting to arrest and, where possible, reverse the decline in environmental condition was essential to secure a sustainable resource base. This required a suite of actions:

- *Providing a legally-recognised share of water to the environment* which could not be eroded away in the future. This required treating the environment as a legitimate user of water with transparent and enforceable rights. The first wave of water planning processes specified an initial share of water for the environment. This was achieved by establishing rules governing when and how water could be taken and supplemented, and in some regulated systems by providing water entitlements for the environment.

- *In over-committed systems, increasing the environment's share of water to improve environmental health.* This required water planning processes in these systems to consider whether more water should be provided to improve the health of rivers, wetlands and groundwater-dependent ecosystems, and if so how that could be achieved. Solutions have included government investment in water efficient irrigation with the savings going to the environment, purchase of water entitlements for the environment on the water market by governments and private trusts, as well as agreements to gradually reduce entitlements so that affected regional communities and economies can adapt over time or other innovative solutions. Overall, this has proved to be one of the most difficult reform challenges, both because of the significant trade-offs involved and the impacts on regional communities and economies by effectively reducing the pool of water for irrigation or other consumptive uses. While the greatest gains to date have been achieved in the MDB as a direct result of the Australian Government's A$213 billion investment program, measures to return water to the environment have provoked great community controversy and disagreement. Australia's experience has shown that progress can be facilitated by accompanying government investment in water-efficient infrastructure, as this creates 'win-win' situations where all stakeholders (irrigators, regional communities and the environment) gain benefits. This, however, is a costly solution.
- *Managing water within an integrated river basin management context*. Recognising the connectivity between land and water management, an integrated approach would minimise the impacts of waste discharges and catchment land use and ensure they do not have a significant adverse impact on the quality and quantity of surface and groundwater. This is fundamental to maintain environmental condition and protect the integrity of the entitlement system. Managing in this context also ensures that downstream implications of decisions made upstream are understood and taken into account.

2.3 Reforming pricing of water services

Water pricing reform was a crucial element in moving away from the problems inherent in the old 'build and supply' phase to the new sustainable water management paradigm. For both urban and rural systems, the goal was to introduce pricing regimes based on the consumption-based pricing and full-cost recovery principles. Ideally, this would involve the removal of cross-subsidies, or at least enforce greater transparency. Water pricing reform was needed to promote efficient and sustainable use of water resources and water assets, ensure that efficient water businesses remain financially viable, provide adequate revenue streams for service delivery, and facilitate the functioning of water markets. In urban systems, it would also position water authorities to fund future investments.

Although the overarching goal was the same for metropolitan water utilities, regional urban water authorities and irrigation authorities, the starting point and challenges for each sector were very different. Given this, governments set different milestones and timelines for each of these three types of water authorities. These recognised that reforms could only be undertaken at a pace to which customers and communities could adjust.

For urban areas, the aim was to adopt consumption-based pricing and to earn a real rate of return on assets by 1998. In fact, consumption-based charging was introduced in most metropolitan and regional urban centres in the 1990s, with full-cost recovery achieved in metropolitan systems by 2011. This required metering for properties and in some areas, involved the introduction of rising block tariffs. However, cost-recovery charging has been more difficult to achieve in rural and remote regions due to distance, lack of diversity in supply, low populations and a lower economic base.

2 AUD$ was 0.74 US$ as at July 2016

Pricing reform proved particularly challenging in irrigation areas, given it had to balance the financial sustainability of the irrigation authorities against financial sustainability of their customers (irrigation farmers). As a result, the pace of reform has been slower. The approach taken has been to separate charges for storage and delivery, moving towards pricing for each that reflects the cost of operating, maintaining and replacing relevant equipment and infrastructure, rather than providing a real rate of return on assets. There was considerable opposition from irrigators on these issues, particularly when they were being run by a central government agency. However, over time, pricing reform was also accompanied by institutional reform which, in the irrigation sector, devolved responsibility for managing irrigation systems to local irrigation authorities. As this occurred and these local irrigation authorities had to take financial responsibility for their operations, their irrigation customers had a direct input into decisions on service level standards for irrigation, drainage, flood control and the associated costs and pricing. Pricing negotiations were undertaken at the local level and price increases were gradually implemented, although it was never easy.

The Millennium Drought, which affected Australia from the late-1990s, presented numerous challenges to pricing reforms. In response to alarm over dwindling supplies, major desalination plants were commissioned to augment supply in the five capital cities of Melbourne, Perth, Sydney, Adelaide and Brisbane. For the most part these were funded through water pricing. However, in several instances, governments did subsidise these projects, meaning that water customers did not face the full costs of water services. As water prices rose rapidly to fund these large projects (e.g. Melbourne's water prices doubled over five years), affordability issues were raised and some governments intervened in the pricing processes and specified maximum price increases. In the irrigation sector, governments subsidised fees for irrigators during the drought and also invested heavily in irrigation modernisation. Generally, these interventions have generated water savings, which could then be directed to additional consumptive supply or for environmental use – however, they have also directly subsidised irrigation in these systems.

These actions taken by governments have been aimed at providing short term relief to communities as they dealt with issues thrown up by the extreme drought. They show, that even in market-based systems of water allocation and management, governments retain control and can intervene to meet additional policy objectives, if necessary. However, such interventions need to be approached with caution so as to not undermine achieving long-term direction and goals. The directions for pricing reform remain clear but it has not been a smooth or painless path.

The exception to this has been the development of new irrigation systems. Australia's national water reform agenda included a strong policy directive that future investment in new irrigation schemes, or extensions to existing schemes, should only be undertaken where economically viable and ecologically sustainable. These principles have been applied in the development of new irrigation areas in Tasmania, and will be adhered to as proposals to develop water resources in northern Australia are developed and considered.

2.4 Modernising institutional arrangements

Moving to the new paradigm of sustainable water resource management required institutional reform, transforming both the large entities that had undertaken the 'build and supply' phase, as well as the plethora of small local water authorities. The aim was to develop entities that were financially viable and capable of providing services to their communities efficiently within environmental constraints. Once again, this reform required action on several different fronts, with varying approaches for urban and rural systems.

- *Separating the roles of water resource management, setting service standards and introducing regulatory enforcement.* Institutional reform provided a means for governments and communities to understand and make transparent the trade-offs between competing elements. This was a basic prerequisite to achieving cost-reflective pricing. It also ensured that the water sector was clearly subject to independent regulation on environment and drinking water quality issues: areas which had previously lacked transparency.
- *Moving towards independent economic regulation of water prices for both urban and rural sectors.* This has been a highly important reform. As cost-reflective pricing was introduced and water prices started to rise, both governments and communities needed a mechanism to provide independent assurance that:
  - their water services are being undertaken efficiently
  - they provide services for which communities are willing to pay
  - their water authorities will remain economically viable over the long term.

All states have set up either independent price regulators or advisers. However, the model was placed under significant pressure during the drought, when major augmentations to urban water supplies were undertaken. Costs and prices rose rapidly as a consequence. As previously explained, some governments then intervened in the pricing processes and specified maximum price increases to relieve pressure on communities.

- *Ensuring that water services are delivered as efficiently as possible.* Water utilities, particularly those in metropolitan areas, were required to have a commercial focus, aiming to provide a return to their government owners on previous investment in infrastructure. Together with the introduction of independent price regulation, governments attempted to drive more efficient services in two ways. They scrutinised the financial viability of small local water authorities and local governments providing urban water services to rural and regional towns. The challenge was to create local water authorities that are responsive to local needs at a scale that provides efficiency, financial sustainability, and compliance with health and environmental standards, while ensuring that future growth can be managed. In Victoria, this process has involved a series of mergers over thirty years, reducing the numbers of urban water authorities from 385 to 15 in several stages. Likewise, Queensland has merged a number of its local governments (which provide urban water services), moving from 157 to 71. These mergers are always locally controversial and politically difficult to implement as local communities are concerned about take-overs, winners and losers, cross-subsidisation of other areas, and consequent price rises.
- Governments also tackled delivery efficiencies by benchmarking the performance of water authorities on key aspects of their service delivery and financial performance; releasing the results in annual reports. Benchmarking was actually started by the urban water industry through its peak body (the Water Services Association of Australia) but was replicated by governments in 2004 and now covers almost all urban water authorities and many rural water authorities in reports. This allows governments, communities and the authorities themselves to understand how efficient their

operations are compared to their industry peers around the country. The Australia's water industry performance benchmarking approach has become a major driver for improved performance and innovation across the sector.

- *Devolving operational responsibility to local bodies in irrigation areas.* This was undertaken to ensure irrigation farmers would have input into and ownership of those decisions that determine the balance between service levels and resultant pricing. This has occurred across all states, to the extent that some schemes have been privatised in New South Wales, Western Australia and South Australia, with irrigator-owned corporations and cooperatives. In Victoria, devolution has also occurred, but the rural water authorities remain government-owned. Devolution has been critical in moving towards sustainable pricing regimes, by promoting efficiency in service delivery and informed local ownership. However, this is not universal and there is variation in performance across irrigation areas.

2.5 Ensuring community and stakeholder engagement

Implementing reforms in each of these four reform areas over 30 years in Australia has involved a series of trade-off decisions, all of which have had direct implications for individuals, industries, communities, their local environments and regional economies. Resolving these challenges can only occur through achieving negotiated outcomes between key stakeholders, communities and governments—outcomes that were politically achievable at the time. Getting to a negotiated outcome does not mean that all players agree, but they do understand and accept it—it represents a settlement. This is the only way of enabling and embedding change over the longer term.

This means that reform processes must be designed to achieve this as an outcome. A key element is ensuring a high degree of community and stakeholder participation in the process. Mechanisms for community and stakeholder engagement were built into key water reform areas at every stage. They were intrinsic to enable the development of water trading rules; they are embedded in water planning when considering how much water to provide to the environment; and they are an important input to water pricing decisions, especially when considering the levels of service that water users want and the services communities are willing to pay for.

Because water management issues are inherently complex, with significant implications for local communities, some reform processes take years to reach a negotiated outcome. However, Australian water managers have learnt (sometimes, the hard way) that meaningful community engagement is critical to achieve enduring reform. Undertaken properly, it enables:

- differing community views to be heard and understood
- facts and evidence to be disseminated to all participants
- local innovative solutions and preferred options to be canvassed and explored
- a shared understanding about advantages and disadvantages of various management options
- buy-in of all parties to the final recommended solution
- longevity for the agreed outcome, to which all parties have contributed.

2.6 Improving water information and knowledge

Water information is fundamental to all aspects of sustainable water resource management. It underpins water planning, water trading and the operation of water markets, environmental management, water service delivery and compliance. It provides the evidence base for the community processes that enable reform to occur. Its importance is encapsulated in the old saying "you can't manage what you don't measure".

As water reforms have been implemented, the move towards more efficient and sustainable water management has demanded considerable improvements in the information base, modelling tools and the basic knowledge used by water managers. Over 30 years, this has involved

- *Introducing and improving water metering* to understand water use, enable consumption-based pricing, encourage efficiency and underpin entitlement compliance.
- *Better monitoring of surface and groundwater resources* to understand their connectivity and behaviour under different climatic conditions, particularly drought. This information underpins water planning, seasonal water allocation processes, systems operation, environmental management, flood warning and incident response (e.g. to algal blooms or salinity events). It indicates the broad status of water resources for long-term planning and supplies information for day-to-day management.
- *Developing water registers* detailing entitlement holders, their water use and trading activity to support the water market.
- *Improving modelling capability* to underpin planning and systems operation.
- *Development of state and national water accounts* to demonstrate where water is being used, for what purpose and what remains in rivers, wetlands and aquifers for environmental needs.
- *Investment in research* to improve knowledge of water environments and their environmental flow requirements under different climatic scenarios, groundwater behaviour, hydrology and climate, efficient irrigation practices, social requirements, community responses to drought, and to develop tools to support decision making.
- *Investment in skills and capability building* to ensure that water managers have the knowledge, skills and capability to deliver water services at the standards expected by their communities and governments.
- *A commitment to make water information publicly accessible* via national and state government websites to maximise community understanding and investor confidence (e.g. through the Bureau of Meteorology www.bom.gov.au).

A key driver for many of these improvements was the introduction of resource limits and the market-based approach provided a known economic value for water. This drove greater efficiency of water use which required a better understanding of where water was being used, where losses were occurring and potential areas for system efficiencies.

3 Implementing National Water Reform

The previous sections have outlined the key drivers for national water reform in Australia, as well as the key reform areas in which work has been undertaken over 30 plus years to move Australia into a new phase of environmentally and economically sustainable water management delivering economic value to the nation. The next section provides some insights as to how that reform actually occurred.

3.1 The reality of water reform

As stated previously under the section on community and stakeholder engagement, each area of water reform required a series of significant trade-off decisions and negotiated outcomes, all of which had real-life implications for individuals, industries, communities, their local environments and their regional economies. Inevitably, this meant that water reform was an iterative process, which had major implications for the pace of reform over thirty years in Australia.

Each reform step takes time, resources, community acceptance and sometimes, political capital to set up and time to consolidate. Each time settlement on an issue is reached; it is another step in the reform process. Time is then needed for the reform to consolidate and for communities and industries to adjust to the new settings. As this occurs, a series of new implementation issues arise and, as the benefits of reform become clear to communities and industries, this sets up new drivers for next wave of reform.

Quite often, reform in one area will drive improvements in another. Water allocation provides a good example. Here, the establishment of water trading and a water market provided an economic value to water and water rights. As the economic value of water traded on the market increased, it required the development of water accounting and registers to provide high quality information to underpin investment in the market. Policy and management institutions had to be strengthened to provide investor confidence that water rights acquired on the market would continue to yield over the long term. More often than not, potential improvements were identified by irrigators, industry and other stakeholders as they used the system and risked their own investment and livelihoods.

Water reform over time

Water reform is an evolving journey taken in a series of steps. Each step:

- *requires stakeholder and community agreement*
- *builds on the work that has gone before*
- *has to be politically workable at the time*
- *identifies new implementation issues to be solved*
- *sets up the drivers for next wave of reform.*

The Australian experience also demonstrates that communities can only absorb a certain amount of change at any one time without reform fatigue setting in. This means that governments can't necessarily move on all issues at once. They need to be opportunistic, working on areas of concern to communities or industries at times when they care most. Some things have to be put 'on the backburner' until there is a new interest or issue, and a greater chance of success.

This means that water reform is not a linear process. It is more like a jigsaw puzzle comprising a series of pieces that can be put together in different ways, but with a final picture that is guided by the broad policy directions. Although, implementation can look messy and chaotic from the outside, it is actually a journey of continuous improvement taken in incremental and often iterative steps. This means water reform is a long-term endeavour. Enduring changes take decades to implement, with progress achieved at a pace that can be sustained by communities and governments.

This is a critical lesson from the Australian experience in implementing our water reform journey. People need to be brought along with you. However, it is possible that learning from our experience in some areas, other countries may be able to leap-frog or fast-track on some issues, particularly in areas where technological advances have occurred.

3.2 The tools of water reform

In undertaking reform in Australia, governments needed to utilise the various tools at their disposal. To support reform, they have developed innovative policy, provided investment, built infrastructure, improved information and reformed institutions.

Governments introduced new and innovative market-based policy approaches in a range of areas. They provided financial incentives and, in some cases, penalties. They established new regulation and new regulatory bodies and reformed institutional arrangements. All governments, particularly the Australian Government, invested heavily in a range of programs aimed at catalysing or accelerating reform. Examples include the Australian Government's' funding of A$13 billion to reset the MDB, A$250 million for the Raising National Water Standards program (invested in projects to improve integrated water management and water knowledge), and the A$450 million water information program, aimed at improving the standard of water information and reporting across the country.

However, a key tool in water reform has been development of new legislation. All of the key areas of reform have required changes in the legislative basis for water management. Under the national water reform program, it has been a critical requirement that states pass new legislation that would update their previous water laws to enable and give long-lasting effect to desired water reform outcomes.

3.3 The role of drought in water reform

In Australia, drought has been a significant driver in water management. In the 'build and supply' phase, much of the construction of storages and delivery systems was undertaken in response to recurrent drought and water scarcity.

The sequence of drought followed by water supply construction has often led to the assumption that progress in Australian water management occurred as a short-term, *'ad-hoc'* crisis response to droughts and occasionally floods. This isn't entirely accurate. Droughts have tested the water policy, management and regulatory arrangements in place at the time. Water scarcity effectively puts the 'blowtorch' on the water policies and arrangements of the day, exposing deficiencies at times when communities are intensely concerned and governments are acutely interested. Droughts have often provided the stimulus for governments to take action on the next step in water reform with the imprimatur of governments and the community. They also offer the chance to review and refine water reform elements and policy with a high level of community, stakeholder and government interest. The adage that 'water managers never waste a good crisis' is true. They take advantage of the opportunities presented by droughts to make the next leap forward in implementing the long-term water reform agenda.

The Millennium Drought in Australia illustrates how this can occur. This was the longest and most severe drought on record. Effectively, it severely tested the water reforms put in place through COAG and NWI and, for the most part, they were found to be highly robust. The water market provided the means for many irrigation enterprises to survive the drought and production became more efficient. In the critical period between 2005 and 2009, although water availability for irrigation dropped by 53 per cent, the gross value of irrigated agricultural production fell by only 29 per cent. Most urban water systems were augmented, with costs predominantly factored into water prices. For the most part, these new supplies were climate-independent or used alternative water sources, and all occurred within the capped diversion limits. The need for efficiency in water use in all sectors—urban, rural, industrial and environment—became obvious and was embedded in community attitudes. While governments provided funding during the drought to alleviate hardship and provide solutions to regional communities, these investments, for the most part, consolidated the reform directions. Drought also provided opportunities for refinement and acceleration of some of the reform actions.

3.4 Implementing national reform in a federation – a diversity of approaches

Australia's federal system has had both advantages and disadvantages for national water reform. A national program requires the agreement of the states and territories (who are responsible under the Constitution for land and water management), as well the national Australian Government. This can be a difficult process to initiate because effectively there has to be 'something in it for everyone'. However, once agreement has been reached entailing commitment from all sides, this gives real power to the agreed reforms and provides the basis for longevity. If one or two parties start to flag, pressure can be applied from the others. Moreover, it allows stakeholders, industry and communities to hold governments to account over the long term.

Participating in the COAG and NWI agreements put significant obligations on each of the state and territory governments. However, it also provided them with benefits, most notably a national context in which they could set their own reform agendas. This provided authorisation for the areas of water reform they were already tackling, and a rationale for taking on new and difficult areas yet to be discussed and progressed. Significantly, the Australian Government provided financial incentives to encourage participation and ongoing implementation. This helped get communities over the line on number of difficult issues, and sustained momentum over the long term.

The role of the Australia's national government in this process was to identify the national economic, social and/or environmental interest, act as an intelligent facilitator, broker and monitor of the reform process, and provide funding incentives to initiate and maintain reform.

In agreeing to a national water reform agenda, all governments effectively adopted an umbrella policy and roadmap for how they would undertake water reform across the country. The agreements articulated the specific and detailed outcomes desired by governments, but they did not prescribe the process, providing some space for alternative pathways and approaches by different states. Each state continued to implement the reform agenda within their own legislative frameworks and political contexts, setting out their priorities in dealing with the issues. This led to a diversity of approaches towards implementing reform. Effectively, over the long term, it encouraged innovation, sharing of experience, and solutions tailored to specific regions and communities. Thirty years on, while there has been progress in all states, they are all still at different stages in the water reform journey.

3.5 The role of the Murray–Darling Basin

Over thirty plus years of Australian water reform, there has been an ongoing feedback loop between reform undertaken in the MDB, state water reform processes, and the development and implementation of the national water reform agenda.

While some level of diversity was important to generate local solutions, a degree of consistency was also required to ensure investor confidence, particularly in the MDB: the basin with the highest level of competition over water, the greatest level of over-commitment, and the largest regional economic productivity. Given that this is also a transboundary basin involving the national government, four state governments and one territory, the lessons learnt in the MDB were highly significant in the Australian water reform journey.

For all the relevant governments, managing the MDB has been a dominant factor in their approach to water management for over 100 years. It has forced states to work together and, in doing so, they have both developed and tested their reform solutions. Because of its national significance and multi-state operations, the Australian Government has had a facilitative and oversight role. Key decisions have required the collective agreement of the partner national and state and territory governments.

The MDB has been the incubator and proving ground for many of the most successful water reforms. Working together in this basin, partner governments:

- developed an innovative salinity management approach, based on a salinity cap and a credit/debit framework, which has lasted for 30 years and was recently re-endorsed
- took the fundamental step to 'cap' diversions, which drove entitlement reform, water trading and water markets, transforming the MDB into a 'world's best' example of a mature water market
- invested >A$1 billion to recover 500GL of consumptive water as a 'first step' to improving environmental flows in the River Murray, combined with a series of works to manage them.

However, the Millennium Drought challenged the consensus MDB governance model. In 2006, the year with the lowest inflows on record, irrigation allocations were at their lowest ever and the large Ramsar-listed lakes at the lower end of the River Murray were at risk of widespread irreversible acidification. The then Prime Minister called an emergency MDB drought summit in November 2006 to assess the situation. There was particular concern that water scarcity could worsen in the short term, and become even more frequent in the longer term with the potential impacts of climate change. The Australian Government responded by commissioning a scientific study to examine the potential impact of climate change on the surface and groundwater resources of the MDB under a range of scenarios. This predicted that, in the southern MDB, there would be a median 13% reduction in surface water availability by 2030 under a median climate change scenario. However, under this scenario, the reduction in extremely dry years could be as severe as 70-80%.

The impacts of the drought together with these climate predictions clearly showed that the MDB was still over-committed, even with the 'first step' 500GL recovered by the partner governments. In 2007, on the basis of its national significance, the Australian Government intervened in the management of the basin. It announced a major and comprehensive A$13 billion program to reset the balance between environment and consumptive use, setting a new sustainable diversion limit for the basin and assisting irrigation communities to adjust to this with investment in water purchase and infrastructure modernisation. The water recovered for the environment is now managed by a new national entity, the Commonwealth Environmental Water Holder, whose role is to use the entitlements to provide environmental flows to achieve new, more stringent environmental objectives.

In doing this, the governance on water allocation in the MDB was fundamentally shifted from the partnership/consensus model to one where the national government set the sustainable diversion limits and the states were required to comply. A partnership model has been retained for other issues such as salinity and river management. As a result, the governance of the MDB is now a mix where the national government is a regulator on issues of water allocation, an entitlement owner and a partner government on other natural resource management issues. This new arrangement is still being worked through.

Due to substantial national government investment, the MDB has achieved greatest progress in addressing over-commitment, with all catchments due to achieve their sustainable diversion limits by 2024. The intent of this intervention was consistent with the water reform agenda and enabled a considerable acceleration of key parts of it. However, it has caused considerable community concern and outrage as large volumes of water are being taken out of irrigation and provided to the environment. Community and structural adjustments following these reforms are still occurring.

3.6 The water reformers

Maintaining the momentum for water reform over the long term requires the commitment of people to the concept of water reform and the benefits it will bring. In Australia, there was (and still is) a significant number of people committed to and involved in water reform. These include bureaucrats in state and national governments who approach their jobs with a high degree of leadership, enthusiasm and perseverance, irrigation industry leaders who can see the potential benefits for their industry and who negotiate with government on behalf of their stakeholders, community leaders who do the same for their local and regional communities, environmental stakeholders who argue for the rights of the environment in all of the negotiations, water authority staff who take pride in their work and understand their contribution to their communities, and scientists and academics who bring the evidence base to the table and knowledge that allows better decisions to be made. Over 30 years, leaders have continually emerged in all of these areas.

Whilst there was often a wide divergence of views about issues and solutions, all of these people understand the importance of water and water reform and have been willing to participate in the ongoing discussions, planning processes, debates and negotiations that are the way water reform occurs. It requires commitment and resilience on the part of all these people and a general willingness just to ‘hang on in there and keep trying’. When governments’ interest wanes, stakeholders keep the pressure on. When stakeholders need to be convinced, governments provide incentives. In Australia, the story of water reform has been created by a wide range of people from the government, industry, environment and academic sectors working together at national, state and local scales. For all of them, it’s been much more than just a job, it has become a life’s work. They are the water reformers.

4 Thirty years on – what has reform achieved?

The benefits of the Australian water reform journey are clear. A recent assessment of progress against the national water reform found the following outcomes:

Water allocation

- Legally-defined, secure, tradeable water entitlements are in place in all states but one. For entitlement holders, these rights are now recognised as financial assets, and are accepted as security for bank loans (similar to land titles).
- Water markets have been successfully established, particularly within the MDB. Water trading is now a critical business tool for many irrigation farmers and industries responding to variable water availability. It provides them with new business choices because they can now modify their production and water use to maximise their financial positions and manage their risk. Water authorities in the area are also turning to the market to diversify their water supply portfolio. The overall turnover in Australia's water markets was A$1.4 billion in 2012–13 showing the real and increasing value of water to the Australian economy of water reforms. Importantly, it provided the means for many irrigation farmers and industries to survive the Millennium Drought.
- Water planning processes have been undertaken and arrangements are in place for the main areas of intensive water use across Australia. This means that, in these areas, based on best available evidence and with community consultation and engagement, caps for consumptive use have been set and there are rules for consumptive and environmental use. Most states have more than 80% of water use managed under water plans.
- Water information and data systems, integrated basin planning models, water registers and water accounting are in place to provide high quality information to support the water markets and the water planning and entitlement frameworks.
- In 2015, the estimated value of all water entitlements in the southern MDB was A$6.9 billion.

Environmental management

- There are clear legally-based provisions for water for the environment in all water plans. There are remaining questions, in some systems, about whether these are adequate. Nevertheless, these provisions ensure that consumptive use in these systems is capped and act as the starting point in the next wave of water planning. In the MDB and a number of other regulated systems, these include some environmental water entitlements and there are sophisticated management arrangements in place for their use.
- Progress on returning over-committed systems back to an environmentally sustainable level of diversion has been slow except in the MDB where all catchments will be returned to sustainable levels of diversion by 2024, based on best available scientific analysis.
- Formal statutory institutions to manage environmental entitlements have established in Victoria and at the national level. Other states perform these roles within government departments.
- As at February 2016, the Commonwealth Environmental Water Holder held a total volume of 2410GL of water entitlements of varying reliability in the MDB and the Victorian Environmental Water Holder holds a total of 824GL of water entitlements of varying reliability in systems across Victoria.

Pricing of water services

- Significant progress on water pricing has been made, particularly in urban systems. There is full cost recovery in metropolitan systems.
- Water prices in some states include components to cover planning and management costs and/or environmental externalities.

Institutional arrangements

- Institutional separation of the roles of policy, service delivery and regulation has occurred.
- There is some form of independent regulation of water pricing in all states.
- Performance benchmarking of all urban, rural and regional water delivery agencies occurs annually.
- Irrigation systems are managed at the local level.

Provision of water services

- Drinking water provided by urban water utilities is monitored and is consistently safe and of a high quality, assessed against national guidelines and standards.
- Residential water consumption in cities and towns has dropped significantly and is now on average, 179kL per property per year.
- Some cities have more diverse suite of water sources including desalination.
- The use of recycled water is steadily increasing.

Reforming water allocation, establishing resource limits for consumptive use and long-term secure entitlements has provided certainty to investors and provided the context for long-term investment in water-related enterprises in regions, boosting regional economies. The establishment of water markets provided the means for both water entitlements and seasonal water allocations to change hands. This provided both a value to these entitlements for individuals and a way of adapting their businesses to climate variability on an annual basis. At the market level, the growth in water trading that has occurred is actually 'the optimisation of water resources in real time'. These key reform areas have been the ones that have unlocked the potential value of water in the Australian economy.

The institutional and pricing reforms have been significant in fundamentally shifting from a the model for water management where governments were in control and responsible for investment to a devolved model where governments have established the management, market and pricing frameworks in which local water authorities, communities and industries make their own decisions on infrastructure and the balance between levels of service and water pricing. The water pricing reforms have ensured that future infrastructure maintenance, refurbishment and augmentation are, for the most part, covered by prices reducing the potential for government unfunded future liabilities.

A key measure of the success of the Australian water reforms, to date, is the performance through the Millennium Drought. This severely tested the reform agenda and showed it to be robust whilst highlighting the potential for refinements and improvements. In general, the economic and social consequences of the drought were less severe as a result of water reforms that had been put in place.

4.1 What water reform has meant for water users

Thirty plus years of water reform in Australia has changed the way water is now managed across the country. It has also meant some substantial changes for urban and rural water users and for the environment.

For urban users, generally, there is a high level of confidence that drinking water provided is safe and of a high quality. Since the drought, water supply has been secured with a diverse suite of water sources in all major cities and per capita water consumption has reduced. There has been investment in desalination, recycling, stormwater management and aquifer recharge to secure water supplies that will continue to yield even in a drier climate change future. Water prices have risen as cost-reflective pricing has been implemented but this has also provided a clear incentive, together with education programs during the drought and appliance labelling, to reduce water consumption in both households and industry. The key issue for urban water managers now is how to manage water in ways that will enhance the liveability of cities and towns particularly with the prospect of climate change.

For irrigation farmers, the water allocation reforms have delivered major benefits to individuals and industries, and indirectly to their communities. They have created water entitlements that are recognised as a financial asset, which can be used as collateral for investment loans. They have encouraged irrigator investment in water efficient production by realising and increasing the value of water. The introduction of water trading and water markets has provided irrigation farmers with flexibility and choice in how they manage their enterprises and adapt to changing water availability, both in the short and long term. Studies have shown that water trading provided important economic benefits to local and regional communities, and that sales of water injected cash into many local economies. Water trading helped New South Wales rice-growing communities and some Victorian dairying communities to respond to drought and commodity price declines. It also enabled the development of new horticultural enterprises and facilitated significant expansion in economic activity in Victoria's Sunraysia region. These reforms have helped make irrigation communities more resilient in dealing with changes in water availability and economic circumstances.

For the environment, the reforms have been substantial. Legal provisions of water for the environment have been made in every area for which a water plan has been undertaken. Over-committed catchments in the MDB will achieve new sustainable diversion limits by 2024. Other over-committed catchments have slower pathways to sustainability. Wastewater discharges into rivers have improved as environmental standards have tightened and recycling has increased. Overall, some of the key water-related drivers of environmental degradation have been addressed. However, corresponding discernible improvement in environmental condition will take some time to become apparent.

5 Reflecting on Australia's water reform journey

In looking back over thirty years, there has been a transformation in the way water is managed and used in Australia and in the water industry responsible for its management. As that change occurred, there has been visible progress in meeting the goals that COAG set for water reform. The value of water to the Australian economy is being increasingly realised. There have been significant improvements in the services provided to urban and rural communities. In terms of environmental degradation, many of the degrading processes have been controlled and improvements in environmental condition are evident in a number of areas.

However, it has not always been a smooth or an easy journey. The shift from the 'build and supply' mode to the modern sustainable management phase has involved a major social transformation. This has required significant trade-offs on numerous issues, all of which affect people at different scales—individual farmers, communities, local environments and regional economies. Resolving competing interests can only occur through negotiated and politically achievable outcomes between these various groups. This is one of the fundamental lessons from the Australian experience.

This insight has implications for how water reform occurs. It means that water reform is a journey of continuous improvement taken in steps, achieving and building on successes and revisiting them over time. It also means water reform is a long-term endeavour needing time to make the changes, working on issues and at a pace that can be sustained by communities and governments.

Reflecting on the level of reforms achieved over the last thirty plus years, the Australian water reform process has been sustained over that period by four key things:

- A clear, consistent policy agenda that made sense, that was refined over time and that could be delivered in workable steps, enabling some of the benefits to be seen as the reform progressed.
- Leadership and commitment to the agenda across all the key sectors involved in its implementation, including national and state governments, industry and regional communities and academics. This is critical to its ongoing success – all of these groups have an interest in the outcomes and all are needed to develop and negotiate workable solutions. At various times, the actual driver of reform has changed – sometimes it's a government driving change in communities. On other issues at different times, it will be industry or regional communities pressuring governments to continue the effort for change.
- Sustained support for the agenda from across the political spectrum. This is possible when the reform outcomes are clearly in the national interest and the language, milestones and priorities can be adapted to a changing political agenda.
- Implementation reporting and audit discipline that required regular, public reporting by governments on progress, where successes could be demonstrated and where laggard behaviour could be identified.

6 The next phase

Although much has been achieved, the Australian water reform journey continues. In each of the key reform areas outlined in Section 2, next steps still need to be taken. The challenge of climate change means that water entitlements, the planning and markets regime, and the new environmental water management frameworks all need to be effective under a broader range of climate scenarios and, in particular, in a likely future of decreasing rainfall for those parts of the country already dealing with water scarcity. The focus on water use efficiency will need to be strengthened and, in urban environments, the role of water services in providing liveable cities needs to be thoroughly explored. In irrigation, the drive will continue for increased efficiency in water use and distribution, higher productivity from water use and achieving financial and environmental sustainability. As the generation of people who contributed to the thirty years of water reform retire and move on, a new generation needs to understand the importance of the long history of complex work that has gone before and maintain the effort into the future.

Reflections on the Journey – Our Pearls of Wisdom

Our experience has shown that water should be viewed as an economic enabler, providing it is managed within sustainable resource limits. Once this is accepted, it becomes the driver for initiating reform that will have economic, social and environmental benefits.

Water reform is ultimately a long-term social transformation. It involves major trade-offs on numerous issues, all of which affect people at different scales – individuals, communities, their local environments, their regional economies. Moving forward can only occur through achieving broadly agreed outcomes that are politically achievable.

Because of this:

- *Water reform is complex, hard, politically challenging, resource intensive and potentially financially costly.*
- *Water reformers can't do everything at once – reform requires resources, political capital and community acceptance. Governments can only move on a couple of key issues at a time without exhausting all three.*
- *Water reformers need to be opportunistic, recognising when changes in water availability, in the political context or community attitudes provide a window to move forward in key reform areas.*
- *Water reformers need to be flexible, recognizing there are many ways reform objectives can be achieved and negotiating workable solutions is a critical part of the job.*

Therefore, water reform is a long-term endeavour:

- *It's an evolution occurring in steps over decades with each successful step setting up new issues and new drivers for change.*
- *It is a journey of continuous improvement. At any one stage, there is always a better outcome possible but rarely is optimization actually achieved.*
- *It is never finished.*

Imperatives to achieve enduring reform:

- *Leadership and commitment at the political levels is essential—at senior levels of bureaucracies and within communities, industry and the academic sectors*
- *There must be a clear road-map for reform directions, refreshed at intervals to inspire new generations of politicians, senior bureaucrats, community, academic and industry leaders.*
- *Sustained support is needed from across the political spectrum. This can be maintained when the outcome is clearly in the long-term national interest, there is the potential to reposition key reform elements in the context of an incoming government's requirements and where there is flexibility in setting priorities to be responsive to a new government's needs*
- *Regular reporting of progress is important to show the benefits of past hard decisions and to learn lessons from failures.*

BUT the benefits are great.

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