

Australian Government

National Water Commission

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Chair

The Hon. Tony Abbott MP Prime Minister of Australia Parliament House CANBERRA ACT 2600

Dear Prime Minister

It is with pleasure that I present to you, as Chair of the Council of Australian Governments (COAG), the National Water Commission's fourth assessment of the 2004 National Water Initiative (NWI).

The report meets the requirements of the National Water Commission Act 2004:

(i) to assess the progress of parties to the NWI towards achieving the objectives and outcomes of, and within the timelines required by, the NWI;

(ii) to advise COAG of those assessments; and

(iii) to advise and make recommendations to COAG on actions that the parties might take to better achieve those objectives and outcomes.

This year marks the tenth anniversary of the NWI, a policy blueprint that has maintained remarkable relevance over the past decade. The NWI has had strong support from successive federal, state and territory governments, backed by a sound COAG assessment framework delivered by the National Water Commission. All parties recognise that good water management fundamentally underpins economic, social and environmental outcomes across Australia. The Commission's 2014 report and our previous assessments have revealed the value delivered by the NWI as governments have progressively implemented their water reform commitments.

The NWI is undoubtedly a notable achievement, but it is not finished business. Achieving economically efficient and sustainable water management demands ongoing effort. Economic restructuring, fiscal restraint, climate change, competing priorities and uptake of technological innovation pose challenges and new opportunities for the way we manage our water resources.

Some elements of the NWI are incomplete or were underdone in the original agreement; others have been brought more starkly into focus due to our evolving operating environment. Many of the greatest opportunities ahead lie at the intersection of water policy with other public agendas such as regional development, Indigenous wellbeing and energy policy.

Pressing needs in water policy over the coming years are likely to be related to infrastructure, industry and markets. Ensuring that the lessons learnt from the water reform experience are successfully transcribed into new developments, including in Northern Australia, will be crucial to avoid the costly mistakes of the past.

This assessment found that the reshaping of the urban water sector to become more contemporary and customer focused is an important emerging opportunity. Coherent national reform principles are required for this complex and diverse sector.

In the rural environment, primary issues centre on the consolidation and completion of the Murray–Darling Basin Plan, the incorporation of extractive industry water impacts into broader regional planning frameworks, and innovative approaches to greenfield developments.

A consistent message arising from the Commission's work is that while the outcomes and objectives that comprise the NWI are enduring, many reform gains are now taken for granted and the multi-party support that has been a hallmark of this historic agreement is at risk of breaking down.

Strong leadership is essential to realise the full benefits of water reform and to embed proven NWI principles into the decision making of all Australian governments. With the abolition of the COAG Standing Council on Environment and Water, this leadership will need to be provided within the broader agenda of infrastructure and regulatory reform. The water industry will also need to take a more proactive role in holding governments to account.

The Australian Government has announced its decision to close the National Water Commission at the end of 2014. This is therefore expected to be the last assessment of the NWI undertaken by the Commission. Commissioners urge governments to safeguard independent and public oversight of key water reform elements and to pursue this report's ten recommendations through other institutional frameworks. The community, as much as industry and governments, has invested substantial intellect and energy into water reform across Australia. Transparent, rigorous and regular assessments of progress, coupled with independent auditing, remain crucial to build confidence that these efforts have indeed been worthwhile and are delivering well-targeted outcomes.

I thank my fellow Commissioners past and present, and Commission staff, for the dedication and professionalism that has characterised the Commission's work over its ten-year existence. I also extend my thanks to the successive state, territory and federal governments that have advanced this important area of public policy.

The Commission urges you, and all first ministers in Australia, to embrace the recommendations in this report.

Yours sincerely

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The Hon Karlene Maywald 22 September 2014

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Part Two

Part Two comprising all of the appendices to this document is available electronically and can be accessed at www.nwc.gov.au



Australian Government
National Water Commission

Chapter 1 **Reflections on progress:** overview and recommendations

1 Reflections on progress: overview and recommendations

1.1 Introduction

Water reform in Australia has been driven by the value of water as an enabler of economic activity and by the environmental, social and economic costs of exceeding resource limits.

By 1994 a number of Australia's surface water systems, particularly in the Murray–Darling Basin, were fully developed or overdeveloped. Augmentation of supply in highly regulated systems was becoming more difficult, with few undeveloped cost-effective dam sites remaining in the areas of greatest water demand.

As it became clear that water resources in particular catchments were fully allocated, the deficiencies of existing systems of water rights became exposed. There were administrative impediments to moving water allocations to higher-value uses, and potential for unmanaged allocation and third-party impacts. Much water extraction was unmeasured and water resource information was often lacking. Cities were also using water inefficiently. Prices did not encourage efficient water use or reflect the cost of supply. The consequences of these arrangements included a poor return to the economy from the use of water, as well as emerging problems of deteriorating water quality and river condition.

National agreement was reached on the principles underpinning the transition to a more efficient and resilient water sector in the 1994 Council of Australian Government's (COAG) Water Reform Framework and later expanded in the 2004 Intergovernmental Agreement on a National Water Initiative (NWI) (see Appendix F). These national agreements represented a shared appreciation of the need to implement a strategic framework to achieve an efficient and sustainable water industry. Progress in achieving the NWI's actions and objectives, and in implementing subsequent reforms agreed by governments, is the subject of this report which covers the period to July 2014 and builds on the 2011 assessment report, *The National Water Initiative – securing Australia's water future*.

While the principles of the 1994 framework underpinned the NWI, the 2004 agreement captured the lessons from a decade of reform. It provided more detailed commitments about the nature of water access entitlements and water planning, greater recognition of whole-of-water-cycle management issues by including groundwater and water-intercepting land use change, and emphasised the value of nationally compatible arrangements in underpinning investment confidence, especially in shared water systems. At its essence, the NWI established a blueprint for water governance that included:

- transparent and statutory-based water planning identifying the water available for consumption in a management area and dealing with issues such as the natural variability of water systems, major water interception activities, the interaction between surface water and groundwater systems, and the provision of water to achieve environmental outcomes
- clear, nationally compatible and secure water access entitlements ideally defined as a perpetual share of the available resource, with sound registry arrangements giving confidence to those investing in the water industry
- water pricing for recovering the cost of water services reflecting consumption and making pricing decisions and subsidies transparent
- institutional arrangements which promote the economically efficient and sustainable use of water resources, infrastructure assets and government resources devoted to the management of water; and which separate the roles of water resource management, regulation and service

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- effective water accounting providing information on how much water there is, where it is, who has
 control of it and who is using it, to inform decision-making and support public and investor confidence
- resolution of overallocation and overuse returning overallocated systems to environmentally sustainable levels of extraction
- open water markets removing artificial barriers to trading in water entitlements and allocations, bringing about more productive water use and enabling more cost-effective and flexible recovery of water to achieve economic, social and environmental objectives
- community engagement and consultation including Indigenous engagement in water planning, and clarity around who bears the risks of reductions in water availability
- assessment of proposals for investment in new or refurbished water infrastructure ensuring proposals are economically viable and ecologically sustainable before investment occurs.

As we approach the end of the second decade of national water reform, it is timely to consider the ongoing relevance of the initial drivers for reform as we evaluate what has been achieved, what remains to be done, and how the established and tested principles can apply to emerging issues.

1.2 Embedding the reform principles

The blueprint for water reform outlined in the 2004 NWI and the 1994 COAG Water Reform Framework has enabled major advances in Australia's water management and provides proven principles to guide future decisions.

The economic, social and environmental focus of the NWI retains significant support among governments and stakeholders. The Commission's 2014 assessment and the previous assessments have revealed the value which has been realised through implementation of the reform commitments and reinforced the importance of the principles underpinning Australia's water reform effort. Internationally and within Australia the NWI is widely regarded as good policy.

Most importantly, the NWI reform agenda is broader than the balance between environment and consumption in the Murray–Darling Basin which has dominated recent reform efforts and resourcing. While addressing environmental degradation is a key plank of reform, the NWI is also about making more efficient use of water for consumption, gaining greater value from water use and applying sound economic principles to water management. The greatest reform gains have come from establishing the entitlement, planning and market regimes, and institutional reform.

A consistent message arising from the 2014 assessment is that while the outcomes and objectives that comprise the framework remain relevant and enduring, many of the gains of reform are now taken for granted and the multi-party support that has been a hallmark of the NWI is at risk of breaking down.

This creates a risk of backsliding. At present water is not a priority for most governments across Australia, partly because of the substantial gains made through the reform process and partly because the major urban centres and irrigation districts are no longer in drought. Submissions to the 2014 assessment noted the potential for water to drop off government agendas, with the National Farmers' Federation stating 'the cessation of the Millennium Drought has meant that water reform is no longer "front of mind". This combined with the apparent budgetary constraints of most jurisdictions will challenge any future reform effort'.

Water reform principles have not been fully embedded in government processes. Realising all the benefits of the efforts made so far is therefore at risk. Comprehensive reform is essential to ensure that Australia is positioned to respond effectively to future opportunities and challenges posed by economic restructuring, global markets, climate change, technological evolution, and other fundamental shifts affecting the way we manage our water resources.

Specific areas of unfinished business that require further effort include:

- legislative reform in Western Australia and the Northern Territory
- further unbundling of water rights
- greater specificity around the ecological objectives and outcomes of water reform, underpinned by an appropriate monitoring effort
- scheduled water plan reviews based on a transparent process involving evaluation and public reporting
- specific pathways to achieve Indigenous objectives through water planning
- incorporation of all water uses within the one water planning framework.

Recommendation 1

Governments should not backtrack on water reform.

All Australian governments should fully embed National Water Initiative principles in water management decision making and maintain progress on reform.

The Commission considers that the most pressing needs in water policy today are likely to be infrastructure, industry and market-related. As a generalisation, Australian governments pay attention to water when supply is threatened, and remove resources from water management in times of good supply. This waxing and waning neither reflects the productivity gains from more efficient water management, both rural and urban, nor encourages innovation.

COAG has driven national water policy since 1994. With the recent abolition of the COAG Standing Council on Environment and Water and the forthcoming closure of the National Water Commission, water will no longer have a prominent place within the COAG forum. Water has less presence on the national political agenda and the Commonwealth is withdrawing from its former lead role. National leadership of water reform no longer exists to any material extent outside of the Murray–Darling Basin. Many opportunities remain for better and more efficient outcomes through national leadership and collaboration. In the absence of national collaboration, industry bodies will need to take on a greater role in thought leadership and holding governments to account. Where states see a common benefit in sharing knowledge and analysis, they will need to drive their own processes to realise the value of national collaboration. If this facilitation role is forsaken in the focus on day-to-day business, the opportunity to drive more cost-effective and innovative solutions will be lost.

Water management is a matter of community concern and the reforms of the past decade have greatly improved the transparency of government water allocation and investment decisions. The Commission strongly supports the continuation of independent oversight and the public accountability of governments and government-owned enterprises beyond the life of the Commission. A strength of the Commission has been that it reports to all Australian governments, its Commissioners were nominated by all states and territories as well as the Commonwealth for their specific expertise, and it has provided a skills-based national perspective not driven by shorter-term interests.

One of the challenges of water governance at the national level is where it falls within the bureaucratic structure. It is traditionally assigned to either the environment or agriculture portfolios and it currently lies with environment at the Commonwealth level. This reduces the opportunity for water to be viewed as a key economic driver. It also leads to a perception that government interest in water is largely progressed

through an environmental lens – even if the environment agency itself seeks to take a much broader perspective. In this context we support the attention being given to water matters by Infrastructure Australia, and the leadership role taken by the Department of Prime Minister and Cabinet in policy initiatives for the development of northern Australia.

An undoubted deficiency of the NWI implementation structure is that it has not engaged Treasuries and Premier's departments to the extent achieved with the competition policy payment arrangements applying to the 1994 COAG Water Reform Framework. Water reform's greatest advances have been achieved when they have been driven by a whole-of-government perspective.

Recommendation 2

Governments should not 'mark their own scorecards' on water reform.

Independent oversight and public reporting of the progress of water reform in achieving economic, social and environmental outcomes should continue.

Major reforms in water governance in recent years have been given effect in the Murray–Darling Basin. Chief among these is the Murray–Darling Basin Plan, which seeks to substantially reset the balance between water for the environment and water for production in the Basin, and changes the role of the Australian Government in setting this balance. The Basin plan was highly contested during its development, and its implementation will undoubtedly continue to be challenging. The Commission undertook several public consultation processes in developing this assessment report, and while general support for plan implementation was found, concern was expressed that the complexity and layering of water management arrangements in the Murray–Darling Basin have increased, imposing further transaction costs on water users.

To maintain community support and business confidence, it will be important that the processes used for Sustainable Diversion Limit (SDL) adjustment and constraints management are transparent, robust and technically sound and that the process to develop and accredit water resource plans is undertaken in a timely manner with community input. Effective implementation will require commitment and sustained resourcing across many agencies and multiple levels of government, as well as durable partnerships with communities and non-government organisations.

A substantial volume of work remains to be done not only to ensure the effective operation of the SDL adjustment mechanism, but also to deliver a viable constraints management strategy and to develop and accredit all 36 water resource plans. Past experience suggests that achieving implementation of water reform on this scale within the stated timeframe will be challenging, particularly given the slow start by some jurisdictions in developing feasible supply measure projects and the history of slow progress in developing the Basin plan.

The Commission urges the Commonwealth and Basin state governments to focus their efforts on completing water resource plans as scheduled, to fully implement SDLs by 2019, and on securing appropriate resourcing for ongoing monitoring and independent evaluation. A key role of the Commission was to undertake independent auditing of the effectiveness of Basin plan implementation, and the Commission considers that this auditing should be undertaken and published by a similarly independent group and adequately resourced in the future. Given the extent of work required to effectively and fully implement the Basin plan, the Commission is of the view that the first full audit of implementation activities should occur in 2015 or as soon thereafter as feasible, as recommended in the Commission's initial implementation report.

Recommendation 3

The Murray–Darling Basin Plan should be implemented in full and independently audited.

All Murray–Darling Basin governments should fully implement the Basin Plan and rigorous, regular and independent audits should be undertaken to build trust in its ability to secure enduring outcomes for the Basin and its communities.

1.3 Contemporary challenges: building productivity

Actions taken under the NWI have helped to increase the productivity and efficiency of Australia's water use but further opportunities remain to be realised.

One of the NWI's central aims is to increase the productivity and efficiency of Australia's water use. It recognises that past policies and practices often discouraged the efficient and sustainable use of water, leading to poor management of the resource, and uneconomic investment in water supply infrastructure.

As the Commission's 2011 assessment revealed, NWI-facilitated water markets now enable water in many rural areas to move to more productive and efficient uses. The removal of many unnecessary barriers to trade, the facilitation of interstate trade and the implementation of better service standards have streamlined water trading, which has become a vital tool for giving irrigators the flexibility to respond to variable water availability and market factors. Surface water trading in the Murray–Darling Basin is an increasingly mature market; however, additional benefits could be realised from further improvements to market systems and access to information. Further tradeable products are expected to emerge, either as new entitlement and allocation products or for related commodities such as capacity share and storage rights.

Outside the Murray–Darling Basin, and for groundwater systems, changes to the regulatory framework could allow trading to develop where water resources are scarce and hydrologically connected. Innovation in market products and in the technology underpinning market operations, such as common registry systems, should continue to be pursued, including through the private sector. Applying market-based approaches to the release of unallocated water also facilitates more economically robust decision-making. Governments need to ensure that entitlement and market reforms are completed and expanded to facilitate the economically efficient use of water.

Recommendation 4

Reforms to water rights and markets should be completed and expanded.

Entitlement and market reforms should be expanded to enhance market performance and extend productivity gains.

The 2004 NWI proposed little in the way of urban water reform, unlike the 1994 COAG Water Reform Framework and concurrent competition policy reforms which prompted substantial institutional change. The appetite for urban water industry reform is now at very different stages in different parts of the country, but it is recognised as an emerging issue in many jurisdictions.

Some governments may wish to unlock equity that has been built up in water businesses over time and recycle that capital into other parts of the economy. While this is not on the agenda for most state and territory governments at this time, it is notable that many services provided by the industry are already

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delivered by private companies. Any discussion of potential capital recycling raises the issue of whether the current regulatory settings are sound enough to manage such a development if it were to occur over the medium to long term.

In the Commission's view, who owns urban water businesses and assets is a less pressing question than the soundness of the regulatory regime and market structures. Political intervention in independent economic regulatory determinations, whether motivated by shareholder-return considerations or short-term political dynamics, is deferring cost-reflective pricing and efficient price signalling. This behaviour is a clear barrier to the achievement of efficiency and innovative outcomes sought through corporatisation, as well as a deterrent to the investment of private capital which is seeking stable, long-term investment opportunities.

Capital investment for asset refurbishment and renewal is a particular concern, given the deferral of renewal pushes risks and costs into the future. Pricing and institutional reforms are under pressure from short-term concerns about affordability and some governments are making decisions that are not consistent with the intent of the 1994 institutional reforms.

In some cities, the primary challenge is the difficulty of meeting increasing demands for water and stormwater management using traditional centralised infrastructure. Urban planning and regulatory arrangements are often not structured to enable a balanced assessment of the costs and benefits of decentralised approaches against more traditional centralised infrastructure solutions. Innovation can also be impeded by regulatory and pricing structures.

Urban planning processes more generally—which are characterised by a multiplicity of stakeholders and decision makers—do not have well-developed mechanisms to ensure decision makers can see, or have regard to, the full costs and benefits of options before them. Institutional arrangements can lead to infrastructure solutions being preferred over catchment-based solutions for water quality outcomes, regardless of comparative costs. Genuine and effective customer engagement processes have the potential to open significant opportunities for innovation and economic efficiency.

In 2011 the Australian Productivity Commission held a public inquiry into the case for microeconomic reform in the urban water sector. It would be timely for the Productivity Commission to revisit the value proposition for urban water reform to assist governments in developing a refreshed reform agenda.

Recommendation 5

Urban water reform should be accelerated to drive greater efficiency and innovation.

A contemporary urban water reform agenda should be developed by governments to improve economic efficiency and encourage innovation through independence of price setting, clearer performance objectives, contestability, and customer engagement.

It is also timely to move beyond the focus on water quantity, which has dominated the recent reform effort and risked disconnection between the water quantity and quality agendas. Potential water quality impacts often occur at the intersection of water management with other sectors – such as concern over unconventional gas and aquifer integrity, the potential impacts of northern Australian developments on fisheries, or the impacts of nutrient leaching and run-off on the Great Barrier Reef.

One of the themes in submissions to the 2014 assessment was concern that water quality has been inadequately dealt with in the past, with a push for better integration of land and water management in planning processes being required to address the issue, in both rural and urban contexts.

The NWI does not specify quality as a fundamental characteristic of water that should be recognised in water planning and property right arrangements. Nevertheless, water quality is as important in water management as volume, location and timing of delivery. Contemporary water management requires recognition of the interactions between water quality and quantity and the range of uses of water to achieve economic, social and environmental outcomes, and ensure cost-effective solutions.

The National Water Quality Management Strategy (NWQMS), which was incorporated into the 1994 Water Reform Framework, aims to achieve sustainable use of water resources by protecting and enhancing the quality of these resources. The NWQMS has non-mandatory guidelines for managing a range of water resources, and proposes the development of water quality plans for inclusion in present-generation water allocation plans.

The Commission's *National Water Planning Report Card 2013* highlighted the gap in understanding the water quality needs of environmental assets, as well as a lack of attention to water quality management and monitoring. This work identified that environmental water needs are largely focused on surface water flows and timing and that even where plans include water quality objectives, much less attention is given to achieving groundwater and surface water quality objectives beyond specific salinity components.

Recommendation 6

Water quality objectives should be integrated into decision making.

Water quality should be incorporated into water planning to achieve more resilient environmental and economic outcomes.

An important element of maximising productivity is for governments to improve the efficiency of their own processes. Several state jurisdictions have raised concerns about the reporting burden associated with Australian Government initiatives, in particular the information requirements of the Bureau of Meteorology (BoM) and Murray–Darling Basin Authority (MDBA). As part of its terms of reference the current review of the *Water Act (2007)* is considering opportunities to reduce or simplify the regulatory and reporting burden. The Commission strongly supports the water data and information initiatives undertaken by both of these Commonwealth agencies and the Australian Bureau of Statistics. Adequate water information is fundamental to sound planning and management. However, there are opportunities to better align water information produced. The performance of rural water delivery agencies and urban water utilities has for several years been reported through annual National Performance Reports. This reporting has facilitated transparency, benchmarking and peer competition. At the time of writing the future of these reports is uncertain.

Other potential opportunities to streamline regulation and processes also exist, and several NWI partner governments have initiated their own detailed investigations into these opportunities within their jurisdictions. The Commission strongly endorses the streamlining of regulation where the costs of that regulation exceed the benefits, noting that a decade of NWI implementation provides a wealth of knowledge on the criticality of the specific elements of reform and better pathways for implementation. However, we also sound a note of caution that red tape reduction needs to be well targeted. If it is not, it is likely to undermine—rather than enhance—hard-won gains and future productivity.

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Recommendation 7

Water information collection and sharing should be streamlined.

The Australian Government should review reporting associated with the National Water Account, the *Water Act 2007*, the Murray–Darling Basin Plan and the Water Account Australia to ensure efforts are well targeted to stakeholder needs and information is shared and reused among jurisdictions and agencies.

1.4 Future development: getting it right

Water management that is consistent with NWI principles enables economically efficient development, and helps avoid future remediation costs.

Governments, communities and industry have learned much from the past two decades of reform which have underpinned successful water-dependent development. The substantial government investment required to address the environmental condition of the Murray–Darling Basin starkly revealed the cost of getting water management decisions wrong. Overallocation of water resources or overcapitalising of assets can risk long-term economic viability and are likely to lead to substantial cost impositions on future governments.

While investment in irrigation infrastructure has been a historic feature of regional development initiatives, overly optimistic estimates of viability, inadequate cost-benefit analysis and inefficient pricing impose long-term costs on the community through ongoing subsidies or unanticipated environmental degradation.

Pricing which fully recovers the cost of water supply from industry and generates a rate of return on public investment should be applied in new developments—wherever feasible—to facilitate economically viable decision-making. Where social and environmental objectives form part of the government investment business case, a transparent and robust methodology should be applied to their consideration.

Future costs may also be incurred through government programs that do not adequately recognise the interaction of water management with other sectors; for example, from shifting to more water efficient but energy intensive forms of supply and use, or ignoring cost-effective catchment-based solutions in favour of water treatment infrastructure.

In the urban sector, government subsidies and policy bans on particular sources of supply in the past have distorted supply augmentation decisions, which can lead to costly choices and a lack of innovation. Failing to adequately account for whole-of-water cycle costs and non-monetary environmental or social amenity benefits also leads to sub-optimal decisions.

Recommendation 8

Governments should invest in water infrastructure only after rigorous cost-benefit analysis.

All government water infrastructure investment should generate a return for the community and be subject to robust water planning and transparent cost-benefit analysis.

In new development areas, particularly in northern Australia, governments face a lack of detailed water resource knowledge, and other potentially limiting issues such as transport infrastructure and distance to market. Water planning in these circumstances needs to be fit-for-purpose and adaptive. Robust information and a risk-based management approach will be required. Communities, including Indigenous communities, may not be well placed to take advantage of emerging opportunities and require capacity building. Water research, including for the highly episodic systems in the tropical north, remains an issue of national importance—and potential export opportunity—and is properly the business of governments as the stewards of the resource.

No doubt water is available to support further development in the north and it is entirely reasonable that governments will have multiple objectives in supporting water-dependent development. However, wider social objectives need to be made explicit and government investment in new developments should only proceed if a sufficient revenue base exists to sustain ongoing operation and future replacement, otherwise significant environmental and downstream costs may be incurred without commensurate benefits.

Recommendation 9

The National Water Initiative principles should underpin resource development decisions.

NWI principles, including best practice water pricing, should underpin all new water developments including those in northern Australia.

The rapid expansion of coal seam gas extraction during the past few years has revealed how water management arrangements can struggle to accommodate rapidly moving industries if knowledge of the resources is inadequate and planning regimes are not sufficiently adaptive. Mining and unconventional gas extraction can pose challenges to an integrated and comprehensive water management framework.

For the minerals and petroleum industries, the NWI allowed some latitude for special management arrangements in recognition that those industries may be using water of lesser quality, for a short duration, or be operating in regions where there is little competition for water resources. However, the value of integrating the arrangements for those industries into the water sharing framework has become apparent – both for resource management and for community confidence and social licence.

'Shadow' management arrangements for water-impacting industries that are implemented separate to the water planning process lack transparency and limit the capacity of water planning to sustainably and transparently manage water extraction. The security of existing users' entitlement to water can be compromised by water rights outside of the entitlement regime, as can water quality outcomes. Uncertainties over cumulative water impacts and water quality can pose a risk to the social licence for extractive industries. Governments and the industry have done much to allay this concern through enhanced regulatory processes and better communication, but the Commission remains concerned that these industries' water use is not always well integrated with broader regional water management processes.

Recommendation 10

The National Water Initiative should guide the way water is allocated and managed for all users, including extractive industries.

Water for extractive industries needs to be planned and managed by jurisdictions within NWI-consistent regional water frameworks to mitigate potential impacts on other water users and the environment.

1.5 In summary

Water reform in Australia is now at a cross roads. Solid progress on managing the nation's water resources during the past two decades has delivered tangible benefits to governments, communities and industries. The Millennium Drought tested the reform principles enshrined in the NWI but the principles have proven to be of enduring value, even when confounded by crisis, shorter-term priorities and declining resourcing.

In implementing the NWI, the Commission and its partner governments have adopted an adaptive and cooperative approach, recognising the need to learn and adjust when implementing change in complex and dynamic environments. This will become even more important as future reform proceeds during a time when other issues occupy centre-stage on the national agenda. The absence of COAG leadership will require progress to be led by state and territory governments and industry.

Given the substantial government investments and hard-won progress so far, and the valuable but challenging gains yet to be realised, it is critical that there is no backsliding from reform principles. The Commission urges all governments to sustain their commitment to enduring water reform, so that Australia continues to optimise water's elemental contribution to our economy, environment and communities. The Commission's recommendations to sustain this commitment are shown in Table 1 below.

Table 1: Recommendations

Recommendation 1

Governments should not backtrack on water reform.

All Australian governments should fully embed National Water Initiative principles in water management decision making and maintain progress on reform.

Recommendation 2

Governments should not 'mark their own scorecards' on water reform.

Independent oversight and public reporting of the progress of water reform in achieving economic, social and environmental outcomes should continue.

Recommendation 3

The Murray–Darling Basin Plan should be implemented in full and independently audited.

All Murray–Darling Basin governments should fully implement the Basin Plan and rigorous, regular and independent audits should be undertaken to build trust in its ability to secure enduring outcomes for the Basin and its communities.

Recommendation 4

Reforms to water rights and markets should be completed and expanded.

Entitlement and market reforms should be expanded to enhance market performance and extend productivity gains.

Recommendation 5

Urban water reform should be accelerated to drive greater efficiency and innovation.

A contemporary urban water reform agenda should be developed by governments to improve economic efficiency and encourage innovation through independence of price setting, clearer performance objectives, contestability, and customer engagement.

Recommendation 6

Water quality objectives should be integrated into decision making.

Water quality should be incorporated into water planning to achieve more resilient environmental and economic outcomes.

Recommendation 7

Water information collection and sharing should be streamlined.

The Australian Government should review reporting associated with the National Water Account, the *Water Act 2007*, the Murray–Darling Basin Plan and the Water Account Australia to ensure efforts are well targeted to stakeholder needs and information is shared and reused among jurisdictions and agencies.

Recommendation 8

Governments should invest in water infrastructure only after rigorous cost-benefit analysis.

All government water infrastructure investment should generate a return for the community and be subject to robust water planning and transparent cost-benefit analysis.

Recommendation 9

The National Water Initiative principles should underpin resource development decisions.

NWI principles, including best practice water pricing, should underpin all new water developments including those in northern Australia.

Recommendation 10

The National Water Initiative should guide the way water is allocated and managed for all users, including extractive industries.

Water for extractive industries needs to be planned and managed by jurisdictions within NWI-consistent regional water frameworks to mitigate potential impacts on other water users and the environment.



Australian Government National Water Commission

Chapter 2 Background

2 Background

This report is the fourth assessment of the implementation of the 2004 Intergovernmental Agreement on a National Water Initiative (NWI) and associated reforms undertaken by the National Water Commission. Previous assessments were undertaken in 2007, 2009 and 2011. The *National Water Commission Act 2004* (the NWC Act) requires the Commission:

- i. to assess the progress of parties to the NWI towards achieving the objectives and outcomes of, and within the timelines required by, the NWI; and
- ii. to advise COAG of those assessments; and
- iii. to advise and make recommendations to COAG on actions that the parties might take to better achieve those objectives and outcomes.

(National Water Commission ACT 2004, Part 2, Section 7)

2.1 About the National Water Commission

The Commission is an independent statutory authority established in 2004 under the NWC Act to drive national water reform and provide advice to the Council of Australian Governments (COAG) and the Australian Government on national water issues. The Commission works with all Australian governments, the water industry, research partners and other stakeholders to improve the way Australia manages its water resources.

The creation and functions of the Commission were agreed in the NWI intergovernmental agreement. It comprises five (previously seven) Commissioners nominated by the Commonwealth or state and territory governments for their expertise in water resource management; freshwater ecology or hydrology; resource economics; public sector governance; or the audit, evaluation or implementation of programs relating to natural resource management.

In May 2014 the Australian Government announced its intention to repeal the NWC Act effective 31 December 2014. As a result, this is the final Commission assessment of water reform progress and covers the period from 2004 to 2014.

2.2 COAG water reform framework

Water reform in Australia is a journey of decades, reflecting the fundamental importance of water to our economy and the significant challenges involved in managing a shared natural resource often impacted by times of scarcity. A national approach to water reform started in 1994 through the landmark COAG water reform framework and has been continued through subsequent initiatives such as the NWI (2004), the *Water Act 2007* (Cwth) and the Murray–Darling Basin Plan, which came into effect in November 2012. The 1994 COAG agreement took place in an environment where:

- approaches to charging often resulted in users of water services, particularly commercial and industrial users, paying more than the costs of service provision
- adequate financial provision was generally not made for major asset refurbishment needs in rural areas
- impediments existed to transferring irrigation water from low-value broadacre agriculture to higher-value uses in horticulture, crop production and dairy farming

- there were service delivery inefficiencies
- the roles and responsibilities of several institutions involved in the industry were not clearly defined.

In response to these issues, the 1994 framework set out commitments on institutional reform, pricing, entitlements, water trading and the environment – and these have been the underlying tenets of all subsequent reforms.

The decade following this agreement saw fundamental shifts in water management practices in Australia. By 2004, however, the incentive mechanism for implementation of the reforms (national competition payments) was drawing to a close, with many of the challenges that had underpinned the 1994 agreement not fully resolved. Concerns about the degree of sovereign risk attached to water access entitlements and the lack of compatible interstate arrangements (particularly for shared resources) arose. Overall, water reform was proving to be worthwhile but taking longer and presenting more challenges than had been anticipated. As a result COAG decided to refresh the reform agenda in 2004, recognising 'the continuing national imperative of increasing the productivity and efficiency of Australia's water use and the need to ensure the health of river and groundwater systems.'¹ This led to the NWI's development.

In 2013 COAG recommitted to the NWI by endorsing the *Next Steps in National Water Reform: Preparation for the future* (a report by the Standing Council on Environment and Water), outlining the National Water Reform Work Plan 2013–2017 as the next stage in the Australian water reform agenda. The report, included at Attachment E, identifies the water issues in which the greatest benefit from national progression is expected to be derived over the next 10 years, and lists specific actions for addressing these issues over the next five years. It also identifies the significant unfinished business from the NWI.

2.3 The National Water Initiative

The 2004 Intergovernmental Agreement on a National Water Initiative (NWI) is COAG's principal water policy agreement.

The NWI is a shared commitment by governments to increase the efficiency and sustainability of Australia's water use.

The initiative set out to achieve a nationally compatible market, regulatory and planning based system – one that manages surface and groundwater resources for rural and urban use, and optimises economic, social and environmental outcomes.

The NWI is an intergovernmental agreement between the Australian Government and all Australian state and territory governments in recognition of the vital contribution water makes to Australia's national interest. The agreement was initially signed by the Australian Government, four states and the two territories in June 2004. Tasmania and Western Australia signed soon after, in 2005 and 2006 respectively. At its heart, the NWI sets out the principles by which surface water and groundwater resources are to be shared to support resilient and viable communities, healthy ecosystems and economic development. It provides a detailed blueprint through agreed actions for water reform across the country – aiming to establish greater certainty for investment and the environment through clearly specified water access entitlements, addressing overallocated systems and improving the economic efficiency and environmental sustainability of water management.

1 NWI, paragraph 5.

Figure 1: NWI objective, elements and outcomes



Primary responsibility for implementing the agreement's reform agenda lies with the state and territory governments, with support from the Australian Government. The full agreement can be found at www.nwc.gov.au/__data/assets/pdf_file/0008/24749/Intergovernmental-Agreement-on-a-national-water-initiative.pdf

2.4 The Water Act 2007

Under the Australian constitution, water is vested in state and territory governments who make it available for use. The NWI was cast within this context, however the *Water Act 2007* (Cwth) and the 2008 Agreement on Murray–Darling Basin Reform by Basin states and the Australian Government fundamentally changed the Australian Government's role in water management.

The *Water Act 2007* (Cwth) provided for new governance and management arrangements primarily in the Murray–Darling Basin, including the making of the Murray–Darling Basin Plan in November 2012. Many provisions of the NWI have been codified in Commonwealth legislation through the *Water Act 2007* (Cwth), particularly with regard to water accounting, trade and environmental management. These governance reforms have been accompanied by Australian Government investment of \$13 billion.

The Commonwealth Water Act is currently under review, with the Review Panel's report due by November 2014. The terms of reference for the review include the effectiveness of the Water Act in achieving its objects and opportunities to reduce or simplify the regulatory and/or reporting burden while maintaining effective standards.

The Murray–Darling Basin arrangements are considered more closely in Chapter 3.

2.5 Previous reform assessments

The Commission last assessed NWI implementation in 2011, resulting in 36 findings and 12 headline recommendations focused around three areas: *Leadership, A Maturing Agenda* and *Making It Happen*. Key issues highlighted in the 2011 assessment included:

- water reform has delivered substantial benefits, but there are further benefits to be realised if NWI parties fulfilled their commitments
- the development of benchmarks, guidelines and support tools by NWI parties have provided a common vocabulary for reporting, improving and managing water reform across Australia
- water markets have increased productivity, improved flexibility and delivered economic gains but remain immature in some areas, with capacity to improve in disclosure, transparency and transaction costs
- while there has been an improvement in knowledge and understanding of Australia's water resources, there are still significant knowledge gaps that must be addressed
- there has been a substantial increase in environmental water available via buybacks and infrastructure improvements
- jurisdictions have been reluctant to identify overallocated systems, and accountability for agreed environmental outcomes remains insufficient
- rural and irrigation communities have benefited from water access entitlements and trade reforms, with entitlements and environmental water recovery delivering direct financial gains
- diversification of water supply in urban and peri-urban areas has delivered greater supply security, while at the same time presenting regulatory challenges
- governments need to better engage with their constituents, to make water reform better understood and facilitate constructive involvement in water planning and management
- governments need to recommit to the work of water reform, including delivering unfinished actions and participating in the development of a refreshed reform agenda that is fully integrated with water quality issues
- governments should review mining and petroleum regulatory arrangements to ensure that any water impacts are appropriately accounted for.

Progress against the Commission's 2011 recommendations is summarised on the following pages. A more complete discussion is provided in Appendix B.

Table 2: Summary of progress against 2011 recommendations

1. COAG to recommit to the NWI	COAG provided leadership on water reform, affirming and recommitting to the NWI as the guiding blueprint for sustainable water development to underpin sustainable economic growth in Australia. Through COAG, all jurisdictions endorsed the <i>Next Steps in National Water Reform: Preparation for the future</i> (a report by the Standing Council on Environment and Water), which outlines the National Water Reform Work Plan 2013–2017 as the next stage in the water reform agenda.
	At a national level COAG processes have facilitated water reform, providing critical governance structures, including a forum to identify priorities and track implementation of the NWI, and addressing emerging issues and challenges. However, changes to the structure of COAG standing councils in 2014 have included abolition of the Standing Council on Environment and Water (SCEW) and its Water Thematic Oversight Group (WTOG) of senior officials – creating uncertainty in how national cooperation on water reform will be achieved in future. A committee of senior officials is in the process of formation and, at its first meeting, proposed to reduce the previously agreed SCEW work program for national water reform. In addition, the absence both of incentives for jurisdictions to coordinate their efforts and a national ministerial council are likely to hinder the progress of future nationally significant reforms.
	The <i>Water Act 2007</i> (Cwth) is being reviewed and a report is due by November 2014. The terms of reference include the Act's effectiveness in achieving its objects and opportunities to reduce or simplify the regulatory and/or reporting burden while maintaining effective standards.
2. All NWI parties must resolve to stay the course on their reform commitments and give priority to delivering the significant unfinished actions identified by the 2011 assessment	All NWI parties have continued to address the priority areas identified in the 2011 assessment to varying degrees. These include the establishment of new statutory water plans, water planning frameworks, improved monitoring and evaluation processes, and the implementation of enhanced compliance and enforcement frameworks. In the Murray–Darling Basin work is also underway to remedy overused and overallocated systems through the recovery of water for environmental purposes in accordance with the requirements of the Basin plan. Those issues the Commission considers require further attention are discussed in Chapter 5.
3. Develop a shared understanding of why water reform is still vital	The recent abolition of the COAG council dealing with national water issues, combined with the lack of an organisational champion for water reform, may undermine shared understanding into the future.
 Strengthen community involvement in water planning and management 	Government engagement with communities is improving, with a shared understanding of the processes and outcomes of water reform developing. Community involvement in the development and review of water plans has occurred across all jurisdictions. The development of the Basin plan demonstrated what a challenging process this can be when action to recover from overuse or overallocation situations needs to be taken. Considerable community uncertainty and dissent was expressed during early development of the Basin plan. Initial missteps and misunderstandings were addressed to secure community acceptance of a final Basin plan in 2012, five years after the <i>Water Act 2007</i> (Cwth) was passed.

5. A stronger and more contemporary urban water reform agenda	In responding to the 2011 recommendations, the SCEW provided COAG with an enhanced urban water reform agenda identifying a range of priority actions. This agenda included reviews of the NWI pricing and COAG planning principles, as well as promoting awareness of the outcomes of research and analysis of urban water issues across governments through existing forums. Urban water reform across jurisdictions is not finished and progress has been mixed. Some jurisdictions have made amendments to regulation and planning, and reforms to existing urban water legislation. More substantial issues of economic regulatory reform and market structure are in early stages of discussion initiated largely by the industry itself, along with the Commission which has reviewed urban water issues as part of the evidence gathering for the 2014 assessment.
6. Water quality objectives should be more fully integrated into the reform agenda	Regulatory arrangements governing urban supplies have served Australia well, resulting in a very good record in the supply of safe drinking water. The Australian Drinking Water Guidelines were adopted in 2011 and updated in 2013. Urban water utilities have continued to improve the management of water quality and have consistently met the standards set by the guidelines. State and territory governments have reviewed water quality regulations with a focus on reducing regulatory inefficiencies and facilitating more consistent, coordinated and timely regulation.
	Progress since 2011 against water quality objectives in the rural sector has been mixed. Significant progress has been made within the Murray–Darling Basin, with the Basin plan establishing water quality objectives for Basin water resources. Arrangements to meet these objectives will be incorporated into jurisdictional water resource plans. Concerns still exist about the quality of water for small towns in the Basin.
	Actions to manage rural water quality outside the Murray–Darling Basin have demonstrated limited progress since 2011. In 2008 bilateral arrangements under the National Action Plan for Salinity and Water Quality ended, and no equivalent plan is in place to bilaterally address current issues such as outflows to the Great Barrier Reef, and waste discharges from mining and coal seam gas. The Queensland Government has put in place best-management-practice programs for cattle grazing and sugar cane growers to reduce sediment, nutrients and pesticides from Great Barrier Reef catchments.
 Greater coordination of water management and natural resource management initiatives 	Approaches to the coordination of water and natural resource management vary between the states and territories, with revised arrangements being implemented in several jurisdictions. Examples include the second-generation regional catchment strategies in Victoria



Image: Bryce Bradford under a creative commons licence

 Review existing mining and petroleum regulatory arrangements 	Since 2011 progress has been made to ensure that measures are in place to protect Australia's water resources from the impacts of extractive industries. However, in some jurisdictions water extracted or used in mining or unconventional gas operations remains outside of water planning and entitlement frameworks. Community confidence in the measures put in place for protecting water resources from the impact of unconventional gas extraction is also an ongoing issue. In 2012 the Commonwealth established the Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining Development (IESC). The Commonwealth also funded the National Partnership Agreement on Coal Seam Gas and Large Coal Mining Development with the purpose of ensuring future decisions would be informed by improved science and independent advice.
	In June 2013, amendments were made to the <i>Environment Protection and</i> <i>Biodiversity Conservation Act 1999</i> (EPBC Act) known as the 'water trigger', empowering the Commonwealth to assess coal seam gas and large coal mining developments which have significant impacts on a water resource and impose conditions on approvals for these developments. Recently the House of Representatives passed changes to the EPBC Act to outsource 'the water trigger' assessment process to the states and territories, although the Commonwealth will maintain oversight and can step back in if required.
	There has also been significant progress in jurisdictional development of policy and regulation to address water resource impacts from extractive industries. In May 2013, the Standing Council on Energy and Resources released the National Harmonised Regulatory Framework for Natural Gas from Coal Seams, providing guidance to regulators of the coal seam gas (CSG) industry.
9. Potential changes to water use as a result of climate change, including consideration of adaptation and mitigation initiatives	In April 2012 COAG endorsed the NWI Policy Guidelines for Water Planning and Management (the Guidelines). The Guidelines called for available information on the impacts of climate change to be incorporated into the planning process. A need to further enhance this content has been recognised and a new module to supplement the Guidelines is under development and due for completion in 2014 ² .

2 See *Next Steps in National Water Reform: Preparation for the future* (a report by the Standing Council on Environment and Water) at Appendix E.

10. Robust science and socio-economic information	Robust science and socio-economicInvestments at both the Commonwealth and state/territory levels have led to improved understanding of Australia's water resources. In addition to substa- programs run by states and territories, Commonwealth investment in progra- such as the Improving Water Information Program (IWIP), and investments i knowledge to underpin the Basin plan, have greatly increased the information available to policy makers, planners and managers.	
	COAG endorsed the National Water Knowledge and Research Platform in September 2012, some four years after it had requested its development. The platform targets water research and knowledge to inform key decisions on water policy, management and use. The platform is intended to establish priority research areas and coordinate the research effort but is unfunded and also not binding on governments. Implementation is yet to begin.	
	The Australian Government is strengthening the science underpinning regulatory decisions on the water-related impacts of CSG and large coal mining development through the IESC, which provides advice to Commonwealth and state regulators, and by funding bioregional assessments and other research.	
	Bioregional assessments are underway in subregions within New South Wales, Queensland, South Australia and Victoria to provide baseline information and an assessment of the cumulative impacts of CSG and large coal mining developments on water-related assets. Research projects aim to address key knowledge gaps related to CSG and coal mining, focusing on the priority areas of hydrology, ecology, chemicals and cumulative impacts.	
	Despite this program, reductions in the level of investment in water-related research have occurred across most jurisdictions during the past two years and many major research institutions and research programs are coming to a conclusion.	
11. Each of Australia's governments commit	Individual jurisdictions have progressed specific areas of reform, as identified in Chapter 3.	
to a program of specific actions	Agreement was reached on a modest program of national priorities for reform over the next five years with COAG endorsing the <i>Next Steps in National Water Reform: Preparation for the future</i> (a report by the Standing Council on Environment and Water) in 2013.	
	Since the disbanding of the former SCEW and WTOG, a committee of senior officials has been in the process of formation. At its first meeting in April 2014 a reduction in the COAG work program was proposed, including the discontinuance of several previously agreed actions.	
12. A new approach to incentives to encourage the delivery of nationally significant water reforms	Limited progress has been made in the consideration of an 'incentives based' approach to water reform outside of the Murray–Darling Basin. Inside the Murray–Darling Basin, the National Partnership Agreement on Implementing Water Reform in the Murray–Darling Basin provides for incentive payments to Basin states as Basin plan implementation milestones are achieved. No such incentive arrangements are in place for reform outside of the Murray–Darling Basin.	

2.6 Approach to the 2014 assessment

This assessment examines:

- progress made in the implementation of the agreed actions in the NWI and towards the achievement of its objectives since 2004
- the economic, environmental and social impacts of this water reform since 2004
- future priorities for water reform in Australia, identifying important challenges as well as any unfinished business.

The assessment of progress in the implementation of agreed actions in the NWI has drawn on Commission reports, as well as contributions by NWI parties who reported implementation activity in response to Commission requests for information.

Assessing the impacts of the NWI and subsequent water reforms involved the development of a program logic, including specific performance indicators (see Appendix D). Where direct measures of impact were not available, we have commented on the robustness of arrangements designed to deliver outcomes.

The prioritisation of areas for future reform efforts reflects the Commission's view as to those areas where continued efforts are required to improve outcomes, maintain the gains achieved to date or where optimal outcomes will be delivered from further development of water resources.

Several Commission reports provide further detail of matters discussed in this assessment, these are referenced in the following chapters.



Australian Government National Water Commission

Chapter 3 Progress

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3 Progress

This chapter discusses the progress of water reform in the 10-year period since the National Water Initiative (NWI) was agreed by Australian governments in June 2004³. Water reform efforts by jurisdictions have been robust and most areas under the NWI are substantially progressed. Continued reform efforts are required to ensure NWI-consistent, fit-for-purpose water planning that supports economic, environmental and social outcomes.

Sections 3.1 to 3.5 assess progress against the agreed implementation actions of the NWI and subsequent reform actions required by the *Water Act 2007* (Cwth), as below:

- 3.1 Water access entitlements and planning
- 3.2 Water markets and trading
- 3.3 Best practice water pricing and institutional arrangements
- 3.4 Water for environmental and other public benefit outcomes
- 3.5 Water resource accounting

Section 3.6 focuses on the progress of reform in the Murray–Darling Basin and Section 3.7 discusses urban water reform.

A more detailed examination of jurisdictional action against NWI commitments can be found in Appendix C.

3.1 Water access entitlements and planning

The NWI establishes a framework for a nationally compatible approach to water access entitlements and statutory-based water planning processes. This section focuses on progress made in the following areas:

- water access entitlements
- water planning
- environmental and other public benefit outcomes
- addressing overallocated and overused systems
- assigning risks for changes in allocation
- Indigenous access
- managing water-intercepting activities
- integrating surface water and groundwater management
- water use impacts of mining and unconventional gas.

³ Western Australia and Tasmania signed the agreement after 2004.

3.1.1 Water access entitlements

Under the NWI, statutory water entitlements establish a property right to water which is a share of the available resource. Entitlements, as outlined in the NWI, should be exclusive, unbundled from land, mortgageable, tradeable, and defined as a perpetual or long-term right to a share of the water available for consumption in a given system⁴. Entitlements are intended to deliver investment confidence and security for the environment and consumptive users. Legislation required to create secure, NWI-consistent water access entitlements has been enacted in the Australian Capital Territory, New South Wales, Queensland, South Australia, Tasmania, and Victoria (NWC 2011a).

There has been ongoing but incremental legislative improvement against NWI commitments. For example, Queensland has recently amended its legislation to extend the expiry date of existing licences and new licences to 30 June 2111 (unless otherwise specified in a water resource plan or a resource operations plan). This effectively creates perpetual entitlements in line with NWI requirements.

Varied interpretations of NWI requirements have led to alternative water rights arrangements for extractive industries in some cases. Water entitlements are not required for petroleum operations in Queensland or for mining and petroleum operations in the Northern Territory. There is a risk that these alternative arrangements may undermine parallel NWI-consistent arrangements for other sectors by reducing transparency and eroding confidence in the capacity of water entitlement and planning systems to effectively manage water for all users. This issue is further explored in Section 3.1.9.

With regard to bulk water entitlements, concerns remain over the degree to which shares of bulk entitlement held by Irrigation Infrastructure Operators (IIOs) are mortgageable. The establishment of water market rules developed by the Australian Competition and Consumer Commission (ACCC) under the *Water Act 2007* (Cwth) to improve transformation of shares into entitlements in a cost effective and efficient manner is intended to address these concerns.

Unbundling of water entitlements from land has mainly occurred in regulated river systems, with the exception of New South Wales which has also unbundled entitlement arrangements for groundwater systems covered by water sharing plans, and Queensland, where there is provision to unbundle groundwater in two water resource plans subject to resource operation plan amendments. Groundwater trading has been established in the Condamine through its declaration as a groundwater management area.

Unbundling of water entitlements—both from land title and into tradeable water and delivery share components—has provided flexibility for entitlement holders in the way they manage water assets. This includes the ability to manage entitlements to deal with variability in a water resource and accessing the full value of an entitlement. An unbundled water share becomes an asset which can be mortgaged, providing the ability to leverage an entitlement in a similar manner to any other property right.

Unbundling entitlements has progressed slowly since 2011 as governments continue to consider the merits of entitlement options. While recognising there are some catchments and aquifers in which the level of current use is so low that unbundling is not cost effective at this time, the Commission has observed:

 Surface water rights in regulated systems are generally unbundled from land, although only Victoria, New South Wales and Queensland have water rights unbundled into tradeable and delivery components.

⁴ NWI paragraph 25.

- South Australian entitlements are unbundled from land, but South Australia's Implementation of the Unbundling Water Rights policy, which applies to unbundling the entitlement into its functional components, is yet to be applied outside of the River Murray prescribed water course. The policy proposes unbundling in each water plan area on a case-by-case basis at the point of water plan review, and reviews have not yet occurred.
- While the Northern Territory's *Water Act 1992* provides for statutory water licences that are a share of the consumptive pool, they are only issued at the point of extraction (bore or river pump) and are usually issued for only 10 years at a time although they can be renewed. In October 2013, the Northern Territory announced the development of a new blueprint for water resource management, which includes a review of the Northern Territory's Water Act⁵.
- Under Western Australia's *Rights in Water and Irrigation Act 1914* entitlements are restricted to 10 years and water take requires legal access to land. In September 2013, Western Australia released the position paper *Securing Western Australia's water future* (DoW 2013a). The reform framework outlined will transition existing administrative plans to statutory allocation plans and unbundle entitlements, although provision is made for some licensing arrangements to be retained.

While the cost effectiveness of unbundling entitlements is clearly a consideration in smaller systems, or those with minimal consumptive use, unbundling has not occurred for all areas of high use. In particular, this is the case for entitlements to groundwater and some unregulated surface water systems.

The Commission welcomes the work undertaken by the Northern Territory and Western Australia to develop their respective policies. Business and economic benefits will be constrained until such proposals are formally adopted and recognised through legislative processes and subsequently implemented.

3.1.2 Water planning

All Australian governments have demonstrated a long-term commitment to water planning and each jurisdiction has developed its own framework, reflecting different priorities and challenges across the country. Water legislation in all jurisdictions prescribes a process for developing water planning instruments, with the exception of Western Australia. In Western Australia a water reform process has begun which, if implemented, will enable legislatively based water planning arrangements.

NWI parties agreed to consider the necessity of water plans for different areas and also to include a set of key elements within their water planning and entitlement frameworks⁶. Broadly NWI-consistent water planning arrangements have been put in place for the main areas of intensive water use across Australia and most jurisdictions have more than 80 per cent of water use managed under water plans (NWC 2014a). While some remaining areas need to be addressed as a matter of priority⁷, relatively few areas that experience intensive use of water lack adequate water planning arrangements.

⁵ Northern Territory Ministerial announcement 9 October 2013, available at http://notes.nt.gov.au/lant/hansard/ hansard12.nsf/WebbyMember/D0EE5A2609130A7F69257C78000E451F

⁶ NWI Schedule E.

⁷ For example in the Darwin rural area and the Oolloo and Tindall (Mataranka) aquifers in the Northern Territory, where plans have remained in draft form since 2011–12.



Figure 2: National map of water planning areas included in the National Water Planning Report Card 2013

Source: NWC 2014a

In most cases, the legislation governing water planning requires community engagement, the transparent development of water management arrangements and water plans that incorporate the best available information. Water plans draw on community input, socio-economic analysis and scientific information to establish the size of the consumptive pool and rules for extractive and environmental use. Importantly, water plans articulate the trade-off decisions made between economic, social and environmental values. Hydrological, environmental, social and economic assessments are now undertaken routinely at the plan development stage to inform water planning arrangements. Likewise, engagement processes ensure stakeholders have the opportunity to provide informed input to planning arrangements, and this is considered in the development and review of planning objectives and arrangements to meet those objectives.

More recent water plans generally contain clearer and more measurable objectives and there has been a marked improvement in our knowledge of water system function and response (NWC 2013a). However, monitoring, evaluation and reporting on progress in achieving stated social, cultural and environmental water planning objectives are rarely done well in practice – which can result in lost opportunities to improve water management (NWC 2013a). As a result, the transparency of decision-making in the prioritisation process for adaptively managing water planning arrangements has not been clear for most jurisdictions.

Water planning is not a static one-off process; it relies on scheduled reviews to be adaptive and relevant. An issue noted for the second and subsequent iterations of water plans is delays to reviews specified in legislation or the plan itself. Many jurisdictions have plans which have not been reviewed despite being many years past their original intended life (NWC 2014a). The resource requirements for the development, implementation and review of water plans can be a limiting factor and a cause for delay. Recent and proposed legislative changes in several jurisdictions are intended to streamline water planning arrangements and reduce the costs involved.

Changes to legislation in Queensland allow greater ministerial discretion to simplify water resource plan development processes, increase the plan reporting interval from annual to five-yearly, extend the life of plans from 10 to up to 20 years and exempt certain forms of take from requiring an entitlement. South Australia's *Natural Resources Management (Review) Amendment Act 2013* (SA) increased the maximum review period of water plans from five to 10 years. Victoria has reviewed the *Water Act 1989* (Vic) and the *Water Industry Act 1994* (Vic) with a view to reducing duplication and streamlining management. In Western Australia the Department of Water has shifted to internal annual evaluations and will only publish evaluation statements on plan performance every three years unless a significant change in water availability or management arrangements occurs.

These changes will require plans to be designed with adaptable management using sound monitoring arrangements and the use of review triggers to ensure that changing circumstances do not produce adverse outcomes under outdated management arrangements.

3.1.3 Environmental and other public benefit outcomes

The NWI established the environment as a water user that should be granted access to water and have at least the same level of security as other users, including consumptive users. This section describes the water entitlement and planning arrangements that provide water for the environment. Further information about environmental water in water markets is in Section 3.2, and the management and use of environmental water is discussed in Section 3.4.

Water for the environment is provided through a mix of rules-based and held planning arrangements. Rules-based provisions constrain the volume and timing of water extractions and are specified in water plans, or set as conditions on water access entitlements. Held environmental water is available as a water access right, a water delivery right or an irrigation right for the purpose of achieving environmental outcomes. Jurisdictions use different terminology to describe these provisions. For example, in New South Wales held environmental water is termed adaptive environmental water. This assessment attempts to use terminology consistent with national usage, but maintains the terminology used by a jurisdiction in discussion.

Under the NWI, water sources and dependent ecosystems are identified and protected through environmental objectives in water planning arrangements and the implementation of arrangements to meet those objectives, including the timing and volume of environmental flows. The NWI also requires that environmental water entitlements have at least the same level of security as those for consumptive purposes.

The security of environmental water has improved under the NWI, demonstrated by rules in water plans, the creation of environmental entitlements with the same level of security as that for most consumptive purposes and through the recovery of substantial quantities of water for the environment.

Within the Murray–Darling Basin, the Basin plan sets new long-term average diversion limits called Sustainable Diversion Limits (SDLs), which in most cases increase the water to be made available for environmental purposes. The Basin plan requires jurisdictional water plans to identify planned environmental water and associated rules and arrangements relating to that water, as well as to establish and maintain a register of held environment water. Annual environmental watering priorities for each jurisdiction consistent with the Basin plan have been identified since the start of the 2013–14 water year, with long-term watering plans due to be developed by November 2015. Further detail is provided in Section 3.4.

Outside the Murray–Darling Basin, there has also been progress towards articulating clear and measurable environmental objectives, supported by water planning arrangements. But monitoring, evaluation and reporting against these objectives is often insufficient or poorly targeted, hindering effective assessment of whether these objectives are being achieved.

3.1.4 Addressing overallocated and overused systems

Parties to the NWI agreed to return systems identified in National Competition Council-endorsed implementation programs to sustainable levels by 2005. It was also agreed that any other systems found to be overallocated and/or overused would be addressed in accordance with the relevant water plan to determine the precise pathways by which those systems would be adjusted to address the overallocation or overuse, and meet the environmental and other public benefit outcomes⁸.

In both the 2009 and 2011 assessments, the Commission found that this commitment had not been fully achieved and that many NWI parties remained reluctant to identify overuse or overallocation explicitly. In addition, the mechanisms used to manage systems that appeared to be at or above full allocation were often short term and put at risk the capacity to manage change into the future.

The Commission again notes that while all jurisdictions have made progress in the implementation of water plans that identify extraction limits, relatively few plans clearly identify overallocation or overuse. In systems identified as overallocated or overused, pathways to recovery have been established and there is evidence of extraction returning to more sustainable levels (NWC 2013b). However, in some areas the pathways have remained at the formative stage, and delays of several years have occurred in implementing identified reductions. There are also a small number of cases with clear evidence of overuse that are without specific planning or management arrangements.

The finalisation of the Basin plan has made the sustainable levels of extraction within the Murray–Darling Basin clearer, as well as the intended timeframes for achieving reductions in water use where required. The implementation of the Basin plan's SDLs will limit all surface water and groundwater use in the Murray–Darling Basin to environmentally sustainable levels, with the enforceable SDLs taking effect from 1 July 2019. Several Murray–Darling Basin catchments have been among the most overallocated systems in Australia, and these will now have strong pathways to sustainable levels of extraction to be implemented by 2019.

At the individual jurisdiction level, in some overallocated systems (e.g. the *Gnangara groundwater areas allocation plan* area and Lower Gascoyne in Western Australia), progress has been made in closing the gap between entitlement volumes and actual use levels by reducing sleeper or dozer entitlements (i.e. entitlements that are not used or are underused). South Australia has also made progress in reducing potential overallocation through the conversion of area-based to volumetric entitlements by assuming efficient levels of water use to determine the volumetric entitlement.

In New South Wales, several intensively used groundwater systems where overuse was identified have seen progress in establishing pathways that implement water recovery mechanisms through water plans (e.g. Upper and Lower Namoi, Lower Macquarie, Lower Lachlan, Lower Murray, Lower Gwydir and Lower Murrumbidgee). These mechanisms include the reduction of entitlements over a 10-year period supported by a \$135 million joint program of the New South Wales and Australian governments,

⁸ NWI paragraphs 41–45.

Achieving Sustainable Groundwater Entitlements, which offers financial assistance to eligible licence holders to help them adjust to the changes.

In Western Australia provisions under Statewide Policy No. 11 (DoW 2013b) have been applied (e.g. in the Lower Gascoyne) and progress is being made in reducing overallocation in some areas by bringing entitlement levels closer to usage levels.

Arrangements outside existing water plan processes, such as government infrastructure or compensation programs, have often been used to achieve more acceptable social and economic outcomes than would otherwise result from reduced consumptive use. Timeframes have been determined by the level and timing of available government funding and the willingness of water users to sell their water entitlements.

3.1.5 Assigning risks for changes in allocation

The NWI requires risks arising from changes to the consumptive pool other than those identified for the purpose of addressing known overallocation and/or overuse to be clearly assigned. The NWI allows for jurisdictions to adopt a specified NWI framework or an agreed alternative risk-sharing formula.

The NWI framework assigns risk between users and the government for reductions in water availability resulting from a range of circumstances, such as climate change and variability, bushfire, new knowledge and policy change. The risk assignment framework was important in gaining the irrigation sector's support for the NWI in 2004.

The framework was intended to apply in a context where the share-based water access entitlements framework had been established, water plans had been transparently developed, regular reporting of progress implementing plans was occurring and a pathway for dealing with known overallocation and/or overuse had been agreed. Under the NWI the risks of any reduction or less reliable water allocation under a water access entitlement, arising as a result of bona fide improvements in the knowledge of water systems' capacity to sustain particular extraction levels, were to be borne by users and the framework to establish these arrangements was to be in place by 2014. Risks arising under comprehensive water plans commencing or renewed after 2014 were to be shared over each 10-year period according to a prescribed formula.

While all jurisdictions have arrangements in place to deal with reduced water availability, adoption of the specific NWI framework has been minimal, limited to Queensland and New South Wales. This is perhaps because it is considered to be difficult to interpret and apply, and jurisdictions have generally reached other arrangements. Some jurisdictions seek to enable water users to manage risk through flexible market arrangements, such as the use of carryover or temporary trade, rather than through specific risk assignment. In the largest of the government water recovery efforts—under the Murray–Darling Basin Plan arrangements—the Commonwealth has accepted risk obligations resulting from reductions or changes in reliability based on the difference between the 2009 baseline diversion limits and the SDLs, which will come into effect from 2019.

The risk assignment framework was intended to ensure water access entitlements established through transparent processes were respected and could not be arbitrarily eroded to any significant extent without compensation, while also recognising that agribusiness is subject to a range of natural and climatic risks that are a normal part of doing business in that sector. The Commission considers that the poor uptake of the NWI framework is unlikely to change but that the alternative mechanisms which have been agreed are largely delivering the intended outcome for irrigators. A watch point is ensuring that water users outside of the Murray–Darling Basin do not receive less equitable arrangements with respect to risk compared with those within the principal area of Commonwealth investment.

3.1.6 Indigenous access

Before the NWI was established, Indigenous access to water resources was hindered by a lack of culturally appropriate mechanisms for Indigenous people to actively participate in water planning and management processes. Governments agreed that NWI-consistent water planning frameworks would provide for Indigenous access to water resources through Indigenous representation in water planning processes; water planning arrangements which included Indigenous social, spiritual and customary objectives; and strategies to achieve these.

Most jurisdictions have improved the amount and quality of consultations with Indigenous communities in water planning and management, but have generally failed to incorporate effective strategies for achieving Indigenous objectives in water planning arrangements. While recognition of Indigenous cultural values and associated water requirements has progressed, implementation of practical change remains variable, with most jurisdictions as yet not making specific provision for water access for Indigenous people.

In New South Wales, cultural access licences and the Aboriginal Water Initiative aim to ensure that Indigenous cultural and economic requirements are identified and built into water planning processes. The Basin plan provides for water planners and environmental water managers to have regard to Indigenous values and uses, and water resource plans must take into account the views of Indigenous people concerning cultural flows. Several Queensland water resource plans also include Indigenous water reserves, signalling the intent to provide for future Indigenous water use.

The development of a module on Indigenous engagement in water planning and management to supplement the NWI National Water Planning and Management Guidelines is due for completion in 2014. The module is intended to help jurisdictions develop and implement NWI-consistent water planning and management practices that support Indigenous social, spiritual and customary objectives.

In 2007 Murray Lower Darling Rivers Indigenous Nations (MLDRIN) developed a definition of cultural flows, which was later endorsed by the Northern Basin Aboriginal Nations (NBAN). A National Cultural Flows Research Project has been established which aims to 'secure a future where Indigenous water allocations are embedded within Australia's water planning and management regimes'. The project draws on scientific research methodologies and cultural knowledge to:

- provide a greater understanding of Indigenous values relating to water and other natural resources
- provide Aboriginal people with information to ensure that Aboriginal water requirements and preferences are reflected in water planning and management policy
- inform the development of new governance approaches to water management that incorporate aspects of Aboriginal governance and capacity building.

The project is supported by the NBAN, MLDRIN, the North Australian Indigenous Land and Sea Management Alliance (NAILSMA) and National Native Title Council, as well as the Commission and the Murray–Darling Basin Authority (MDBA).

Leadership on Indigenous water issues by bodies such as the Indigenous Water Advisory Committee, the former First People's Water Engagement Council and organisations including MLDRIN, NBAN and NAILSMA has been important to facilitate the inclusion of Indigenous interests into national and state water policy frameworks.

Until its conclusion in 2012, the First Peoples' Water Engagement Council provided advice on national Indigenous water issues to the Commission. The Indigenous Water Advisory Committee, established in 2012, provided advice on Indigenous water issues to the federal Department of the Environment, but was abolished on 30 June 2014. In this context continued and renewed support for Indigenous representation in water planning and management decisions is important so that Indigenous voices can continue to be heard in the national water debate.

Case study 1 Aboriginal Water Initiative

The Aboriginal Water Initiative (AWI) program is an important partnership between the New South Wales Government and Aboriginal communities to progress the incorporation of Aboriginal water needs in water planning and management processes. The AWI will establish monitoring arrangements to determine the success of water sharing plans in meeting Aboriginal-specific statutory requirements. These include the provision of water for native title rights and recognising the spiritual, social, customary and economic values of water to Aboriginal people.

The AWI commenced in 2012 and is being undertaken by the New South Wales Office of Water. It has received Australian Government funding of \$1.69 million per year for four years. Building on Aboriginal community consultation that the New South Wales Government has conducted since 2011, a key objective of the AWI is to ensure ongoing and effective statewide and regional engagement with Aboriginal communities in the development and implementation of water sharing plans. The program also aims to ensure that measurable Aboriginal water outcomes for both environmental and commercial use are achieved and appropriately reported under water planning processes.

Aboriginal communities play a crucial role in providing the knowledge required by the *Water Management Act 2000* (NSW) to monitor and review water sharing plans and this information will be collated in the Aboriginal Water Initiative System (AWIS) database. The database builds on previous work undertaken by the New South Wales Government to gather information on water-dependent cultural values and will make a valuable contribution to state water planning processes. This information is directly relevant to Aboriginal water access licences for cultural purposes, water for economic development of communities and rules to protect Aboriginal water-dependent cultural values. To respect Aboriginal customs, the data are appropriately secured through login protection and restricted access.

The AWI seeks to improve the cultural understanding of New South Wales Office of Water staff and develop the capacity of its Aboriginal staff. It also aims to consolidate business between the New South Wales Government and Aboriginal communities to underpin consistent points of engagement and identify clear Aboriginal water-specific environmental, social, cultural and economic opportunities and priorities for inclusion in water sharing plans, and to report on these objectives.



Our Water Our Country by Worimi Artist Krystal Hurst commissioned for the NSW Office of Water and reproduced with permission from the Aboriginal Water Initiative.
3.1.7 Managing water-intercepting activities

Changing land use has the potential to intercept significant volumes of surface water and/or groundwater. Under the NWI, jurisdictions agreed to plan for and regulate interception activities to maintain the integrity of water access entitlements and achieve environmental objectives for water systems.

While progress has been made in interception management across Australia, no state or territory has fully implemented interception arrangements that meet the requirements of paragraph 57 of the NWI. This is partially attributable to the prescriptive nature of the paragraph, which requires considerable effort to assess and manage interception in all catchments.

Interception management should be fit-for-purpose. If the risks to a water resource are assessed as low, the monitoring of risk level is likely to be sufficient. However, the management of interception activities in catchments which are assessed as overallocated, fully allocated, or approaching full allocation should be comprehensively implemented where interception has been identified as significant. Progress in this has been slow in many jurisdictions and the aggregate impacts of various intercepting activities on a catchment are not always accounted for.

Progress in interception management can be seen through advancements in planning and regulation. There is a broad acceptance of the need to manage intercepting activities, demonstrated in water plans that contain provisions for the management of significant interception or provide for plan amendment if interception becomes significant. Thresholds are gradually being introduced, although they are not always specific and their hydrological basis can be unclear.

Where such arrangements are in place, monitoring of interception activities is generally not comprehensive, even for systems that are identified as fully allocated, overallocated or approaching full allocation. One example of assessments included at the planning stage is in Western Australia, where a surface water and groundwater modelling system—the Planning and Allocation Tool—is used to incorporate interception by farm dams into setting allocation limits for catchments in the state's south-west. Diversions and interception scenarios are modelled to support planning and assess how the reliability of supply for existing and future users will be affected under different scenarios.

South Australia has made substantial progress in implementing clearly defined, secure and tradeable water licenses for plantation forestry. Interception by plantation forestry is being progressively regulated through the water allocation framework and will be subject to use limits and provisions in relevant plan areas through the requirement for declared plantation forestry operations to obtain a water access entitlement. This can be seen in the Lower Limestone Coast and the Eastern and Western Mt Lofty Ranges water allocation plans which were adopted in 2013.

In New South Wales, the 2012 Aquifer Interference Policy uses the criterion 'minimal impact considerations' to assess aquifer interference projects and determine their potential impacts on water resources. The assessment includes consideration of the potential impacts on connected systems, water-dependent assets and groundwater-dependent culturally significant sites. The impacts of individual activities and cumulative impacts are considered.

In Queensland, floodplain harvesting is the most developed form of interception management in the state, and storages generally require a water licence and development permit if they are over a threshold volume specified in the relevant water resource plan.

3.1.8 Integrating surface water and groundwater management

There has been substantial progress towards aligning groundwater and surface water management since 2004, despite management arrangements still being effectively separate in most areas. Improvements have been driven by a growing public awareness of groundwater and its importance during the Millennium Drought; steady advances in groundwater information, research and conceptualisation; legislative or policy changes in most jurisdictions; and investment by the Australian Government.

Since 2004, major improvements to foundational information requirements for better groundwater management have included:

- a better understanding of connectivity mechanisms and the science of hydraulically connected systems through published research. Examples include investigations into novel measurement methods for groundwater/surface water exchange and advances in geophysical techniques for groundwater exploration and characterisation
- a National Groundwater Information System (NGIS), developed by NWI parties in partnership with the Commission and the Bureau of Meteorology (BoM), which provides access to nationally consistent groundwater information for all states and territories
- the National Aquifer Framework which supports the NGIS by standardising hydrologic units throughout Australia for national consistency – important because groundwater systems often span jurisdictional boundaries
- the National Atlas of Groundwater-Dependent Ecosystems (the Atlas), completed in 2012, which
 is a tool to support consideration of ecosystem groundwater requirements in natural resource
 management, including water planning and environmental impact assessment. The Atlas represents
 substantial progress in mapping groundwater-dependent ecosystems but progress in determining
 their water requirements remains a priority.
- several national standards, guidelines and frameworks that provide nationally consistent and sound references for groundwater-related activities, such as the Australian Groundwater Modelling Guidelines, the revised Minimum Construction Requirements for Water Bores in Australia and the National Framework for Integrated Management of Connected Groundwater and Surface Water Systems.

Water planning arrangements in most states have enlarged the areas within which groundwater/surface water interactions are accounted for. The sophistication of water plans has also improved in recent years, with an increasing number of mechanisms employed to prevent cross impacts from occurring, and manage impacts if they do occur. There are several recent examples, particularly in Queensland, Western Australia, New South Wales and South Australia, of water plans that limit groundwater extraction explicitly to ensure minimum flow requirements are maintained in connected surface water systems. In Western Australia, where groundwater is a major source of water supply, groundwater-to-groundwater connectivity between aquifers is also a significant consideration in establishing appropriate allocation limits and monitoring impacts.

On an individual user or enterprise level, users holding both groundwater and surface water entitlements generally manage both parts of the resource together to maximise individual benefits, such as using whichever source has least pumping costs in times of plenty or has higher availability in dry times. This represents 'unplanned conjunctive use' which may not take into account cross impacts between groundwater and surface water or third-party impacts. Behavioural and water use drivers are limited to the individual's benefit rather than the whole-of-system level. In contrast, 'planned



Image: Esther Wieringa under a creative commons licence

conjunctive management' takes account of the whole system and aims to manage cross impacts between groundwater and surface water resources, third-party impacts and potential impacts on groundwater-dependent ecosystems or rivers. Planned conjunctive management can and should allow individuals to optimise their use, and can involve setting extraction limits on both surface water and groundwater resources that account for cross impacts and provide mechanisms to link groundwater and surface water take. This can be achieved either through an integrated water plan or through linked groundwater and surface water plans, where management at the whole-of-system level optimises productivity, equity and environmental sustainability.

While the number of water plans that recognise connectivity between groundwater and surface water is increasing, the number of plans that fully integrate groundwater and surface water resource management remains relatively small. Additionally, the uptake of new policies or new information depends on water plan review timeframes in each jurisdiction. In most jurisdictions, there is currently a significant uptake lag.

Case study 2 Water management in the Werribee Irrigation District

The Werribee Irrigation District is an important vegetable-growing area on the western fringe of metropolitan Melbourne. Using water from the Werribee River, the aquifer below and a recycled water scheme, more than 400 growers produce lettuces, broccoli, cabbages and many other vegetables for local consumption and export.

The Werribee Irrigation District benefits from one of the largest recycled water schemes in Australia. The scheme was designed to help overcome drought-related water shortages and to secure water for greater production in the future. Growers received the first deliveries of recycled water under the scheme in January 2005. Southern Rural Water delivers the recycled water (supplied by Melbourne Water) to participating growers through its existing irrigation channels and pipelines (Southern Rural Water 2014). The recycled water is treated through the standard wastewater treatment system and two additional disinfection systems - chlorination and ultraviolet light. The Victorian Department of Health has classified the Class A recycled water as safe for irrigation of food crops, including those eaten raw.

Melbourne Water is working to reduce the salinity of the recycled water, which at present needs to be mixed with water from the Werribee River. Water is also available from coastal aquifers, which supply about 10 per cent of demand towards the end of summer when surface water availability is lower. This situation creates a risk of vulnerability to seawater intrusion in the dry times at the end of the season, so more reliable, alternative surface water supply (i.e. recycled water) allows better management of the groundwater system to manage the risk of seawater intrusion.

The scheme also delivers an efficiency benefit: the recycled water used in this scheme would otherwise be discharged into Port Phillip Bay.

The scheme at least partially contributes to each of the major water management objectives that integrating groundwater and surface water can hope to achieve. It improves security of supply by providing an additional constant-volume source, maintains water quality by mixing water from different sources, manages groundwater drawdown and seawater intrusion (which manifest as third-party impacts), conserves resources and improves efficiency by minimising waste outfall, and allows groundwater of a suitable quality to be available when it is needed most.



3.1.9 Water use impacts of mining and unconventional gas

The nature of the water extraction requirements of the mining, petroleum and unconventional gas sectors—particularly for mine dewatering and depressurisation of coal seams—can lead to difficulties in predicting takes and managing impacts. While paragraph 34 of the NWI recognises flexible management arrangements may be required to deal with the specific circumstances of mineral and petroleum sectors, the Commission has previously called for the integration of mining into NWI-consistent water planning and entitlement arrangements to ensure that impacts on water resources, including cumulative impacts, are explicitly addressed (NWC 2011a). Different interpretations of paragraph 34 in various jurisdictions have, in some cases, resulted in water assessment, allocation and management for these industries which are inconsistent with NWI principles.

Since 2004, water reform in the minerals and petroleum sectors has led to improved management of water resources overall. Some jurisdictions have integrated the minerals and unconventional gas sectors' water use and management into water planning and entitlement frameworks, although legislative and regulatory barriers remain.

Mining operations are legislatively required to obtain a water access entitlement or a licence to take water in all jurisdictions, except the Northern Territory. In the Northern Territory mining operations continue to be exempt from water licence and permits provisions under Section 7 of the *Water Act 1992* (NT). A 2003 memorandum of understanding seeks to clarify the operational relationship between relevant agencies with the aim of ensuring water resource usage for mining purposes does not impinge on existing allocations for other uses and vice versa. However, this document does not require mining and petroleum proponents to obtain water entitlements or transparently account for water take within water plans.

The Commission considers that this agreement does not replace the need for transparent accounting for extractive industries through requirements to obtain water entitlements, which should be explicitly accounted for within statutory water plans.

Where there is the potential for significant impacts, project and water use assessment and approvals for coal seam gas (CSG) and large coal mining operations are now done on a state and Commonwealth level. Additional legislative and policy arrangements have been developed to identify and manage impacts to other users and the environment, on an ongoing basis.

In Queensland, where most CSG mining occurs, amendments to the *Water Act 2000* (Qld) were made in 2010 to manage CSG impacts on water resources using 'make good' arrangements for affected bore owners and monitoring and impact management strategies for springs. However, 'underground water rights' that are provided for tenure holders under the *Petroleum and Gas (Production and Safety) Act 2004* (Qld) are not volumetrically controlled and remain outside Queensland's water planning and entitlement processes. The Regional Planning Interests Regulation 2014 requires proposed CSG and other mining activities to have a strategy for the net replenishment of regionally significant water sources before they are approved, however at present this applies only to the Condamine Alluvium area.

Conversely, arrangements for the industry in New South Wales are NWI-consistent: minerals and unconventional gas operations are required to hold a volumetric licence for any water taken, regardless of its quality unless an exemption applies. Where systems are fully allocated, licences must be obtained through the market. New South Wales' Aquifer Interference Policy (2012) sets out a system of triggers for watertables and groundwater pressures. Where triggers are exceeded, additional studies, contingency plans and 'make good' arrangements are required.

Case study 3 Excess water solutions at Marandoo mine

Marandoo iron ore mine is located 45 km east of Tom Price in Western Australia's Pilbara region, adjacent to Karijini National Park. Commissioned in 1994, the mine is operated by Rio Tinto under a state agreement. The area will revert to national park after mining ceases.

In July 2010, following environmental impact studies, the Western Australian Minister for Environment gave approval for mining below the watertable with mining operations allowed to 2030. Hydrogeological modelling shows peak initial dewatering volumes to be about 100 ML/day, falling to 80 ML/day towards the end of the mine's life. An average of more than 80 ML/day is surplus to mine requirements. This meant that large volumes of good quality water required disposal.

Challenges

Historically, excess water from dewatering in the Pilbara was regarded as a by-product to be disposed of through discharge to surface water systems. In the case of the Marandoo mine, its sensitive location and the ephemeral nature of surface water flows means that surface water discharge is increasingly viewed as inappropriate by environmental regulators.

Further, uncertainty existed about the ability to adequately use surplus water as a beneficial use under the *Rights in Water and Irrigation Act 1914* (WA) and the *Mining Act 1978* (WA). The final scheme design also required



Location map - Marandoo mine in Western Australia

approvals outside traditional mine management frameworks; for example, pastoral diversification permits and drinking water source protection plans.

Solution

Rio Tinto investigated numerous disposal options. Because of the proximity of both Tom Price town and Rio Tinto's Hamersley Pastoral Station, the following integrated surplus water management scheme resulted in:

- supply to the mine operations up to 7 ML/day
- supply to Tom Price town and Tom Price mining operations—replacing water currently taken from the Southern Fortescue borefield—of up to 18 ML/day. This allows the Southern Fortescue borefield aquifer to replenish naturally, although the option to reinject with surplus water is available should supply and demand circumstances on the system require it
- supplying water to the Hamersley Agricultural Project (HAP) growing hay and oats from 40 ML/day in winter to 120 ML/day in summer
- contingency discharge into a nearby creek.

Under the scheme, Tom Price town and mine are prioritised for water, with remaining water available to the HAP. This provides the flexibility needed to respond to supply variability and ensure the mine plan.

Benefits

The dewatering of the mine enables safe operation and avoids discharge to the environment in a naturally ephemeral surface water system. The value of the resource is maximised through a range of beneficial uses. Supply to Tom Price town and mine, takes pressure off the Southern Fortescue borefield, which had been drawn down by up to 40 meters after 40 years of continuous use as the previous water supply. The water provided for fodder production at the HAP also supports the region's pastoral industry. The Western Australian Department of Water has since developed Strategic Policy 2.09: Use of mine dewatering surplus policy to clarify that surplus mine dewater can be used for beneficial and third party use, except where specific state agreements expressly prevent it.

In South Australia, under the *Natural Resources Management Act 2004* (SA), water allocation plans may be tailored to provide for unconventional gas and other unique circumstances, such as the ability to allocate additional water resources that may not already be accounted for within the plan's extraction limits. Volumetric constraints are not necessarily applied to unconventional gas operations, for example the Lower Limestone Coast plan has no volumetric limit on extraction for petroleum purposes.

Consistent with the NWI principles of efficient water use, jurisdictions have also implemented policies to enable beneficial use of co-produced water from CSG operations and excess water produced from mine dewatering. Queensland's Coal Seam Gas Water Management Policy (2012) prioritises, where feasible, the beneficial use of co-produced water by promoting supply to existing water resources, for example injection into deep aquifers, or supply to new water-dependent industries such as supplementary water for existing irrigation schemes. If other management options are not suitable, then co-produced water must be treated and disposed of in a manner that avoids or mitigates impacts to the environment. Recent water plans in Queensland have started to include beneficial use of co-produced water.

Western Australia has developed *Strategic Policy 2.09: Use of mine dewatering surplus* (DoW 2013b) to promote the appropriate use of dewatering surplus from mining operations for other purposes. Western Australia has also developed the *Western Australian water in mining guideline*, which aims to facilitate the licensing of mine proposals and ensure alignment with other approvals processes.

Water management is primarily a state and territory responsibility; however, ongoing community concern over large coal mines and CSG coupled with a lack of social licence for the CSG industry has resulted in several Australian Government initiatives including:

- the National Harmonised Regulatory Framework for Natural Gas from Coal Seam (2013) endorsed by the Standing Council on Energy and Resources
- the Department of the Environment's Bioregional Assessment program for understanding the impacts of large coal mines and CSG operations
- establishment of the Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining (IESC) through the 2012 amendment to the *Environment Protection and Biodiversity Conservation Act 1999* (Cwth) (EPBC Act). The IESC provides scientific advice to state and Commonwealth governments about relevant CSG and large coal mining approvals where they have significant impacts on water
- the EPBC Act now includes 'a water resource, in relation to CSG development and large coal mining development' as a matter of national environmental significance. This requires the Commonwealth to assess and approve developments which may have significant impacts on the water resource (commonly known as the 'water trigger'). At the time of writing, a bill before the Senate proposed amendments to the EPBC empower each state and territory to undertake this assessment and approval process under 'one stop shop' bilateral agreements and Commonwealth accreditation processes.

As of July 2014, bilateral agreements for assessment had been established with Queensland and New South Wales, and a draft assessment agreement with Western Australia is being developed. In addition, bilateral approval agreements with Queensland and New South Wales have also been released for public comment and are pending finalisation (DotE 2014a).

A more detailed discussion of water for mining and unconventional gas can be found in the Commission's *Water for mining and unconventional gas under the NWI* (NWC 2014b).

3.1.10 Concluding remarks

A robust statutory-based entitlements and planning framework is in place in most jurisdictions. This has established extraction limits, improved security of access to water resources and provided greater confidence in resource sustainability and security of entitlement to allow water trade. In systems identified as overallocated or overused, pathways are being established and implemented and there is evidence of extraction returning to more sustainable levels. A continued reform effort focused on fit-for-purpose water planning will ensure sustainable management of water resources across jurisdictions.

The areas where the Commission considers further progress is required are:

- legislative reform in Western Australia and the Northern Territory to support NWI-consistent entitlements and statutory water planning arrangements
- further unbundling of entitlements in unregulated surface water as well as groundwater systems subject to an evaluation of cost effectiveness
- the conduct of scheduled water plan reviews based on a transparent process involving monitoring, evaluation and public reporting on progress towards achieving water planning outcomes, including community input
- specific pathways to achieve Indigenous objectives through water planning
- in jurisdictions where this is not the current situation, the incorporation of all water uses, including that for extractive industries, within the one water planning framework.

3.2 Water markets and trading

Parties to the NWI agreed to create and facilitate efficient water markets, within and between states and territories. The agreed mechanisms to achieve this are the establishment of compatible entitlement, registry and regulatory arrangements that provide information to the market, and the provision of an appropriate mix of products based on water access entitlements. The NWI also requires markets to protect the needs of the environment and provide appropriate protection for third parties. The Commission's 2014 assessment focuses on progress that has been made against the following key areas:

- compatible entitlements, registry and regulatory arrangements
- removing barriers
- carryover
- water market rules
- an appropriate mix of water products.

3.2.1 Compatible entitlements, registry and regulatory arrangements

There has been improvement in the functionality of state registers since 2004. Victoria, New South Wales, Queensland and South Australia have online registers that have improved the efficiency of transactions and access to market information – with the Victorian Water Register currently the benchmark in this area. In other jurisdictions limited market information can be accessed online but it does not allow interrogation or processing of trades. There is still work to be done to improve public access to jurisdictional registers and to facilitate data searches within these registers. The obligation on those trading water to collect and report price information to the relevant jurisdiction across the

Murray–Darling Basin is contained in the Basin plan water trading rules. These rules became operational in July 2014, and are expected to increase the accuracy and coverage of information reported on water market prices.

At present, the availability and quality of water market price and volume data is less than optimal in all water market sectors. Market participants must gather information from various sources to inform their trading decisions.

In 2008 COAG endorsed the development of a National Water Market System (NWMS) to improve the efficiency and effectiveness of water markets by increasing the transparency of market information, reducing transaction costs and improving interoperability of state registers where water can be traded interstate. The NWMS was due to be completed in June 2012 and was allocated \$56 million from the Sustainable Rural Water Use Infrastructure Program (SRWUIP) managed by the federal Department of the Environment.

While development of the NWMS has provided support to jurisdictions to improve register interoperability, established a national portal for water market information and designed a common registry system, the project has fallen well short of its intended outcomes. Despite investment of more than \$30 million, there has been a lack of transparency in reporting on progress and it is unclear which actions have been implemented and what, if any, objectives have been achieved. Given the recent decision to terminate the project, it is also unclear whether the investment to date will improve market information and whether risks of significant duplication in relation to data collected by BoM will be addressed.

The *Water Act 2007* (Cwth) placed obligations on BoM to make water information collected under the Water Regulations 2008 publicly available, including on water rights and trade. BoM has performed this function to date within the capacity of jurisdictions to provide data. However, Commission assessments have highlighted that, in some cases, the data reported or provided to agencies by BoM is inconsistent with data held on state registries.

In the absence of a fully implemented NWMS, private water brokers are filling a gap in market information, providing a combination of publicly available data, and disclosing limited price and market information. This is having a significant positive impact on the availability of information in the marketplace as at least 60 per cent of trades occur through private water brokers.

3.2.2 Removing barriers to water trade

States and territories agreed in the NWI to the immediate removal of barriers to permanent trade out of irrigation areas, up to an annual threshold limit of four per cent of the total water entitlement of each area. The four per cent limit was established as an interim measure to allow irrigation communities time to adjust to the potential for water access entitlements to be traded out of irrigation areas.

Victoria's four per cent limit on the annual entitlement trade out of irrigation districts has been restrictive in the past, although less so recently with only one area affected in 2012–13 (NWC 2014c) and none in 2013–14. The Victorian Government removed the limit on 1 July 2014.

In January 2013 the New South Wales Government imposed a 10-year, three per cent per decade per valley limit on further buybacks of water licences for environmental purposes in the Murray–Darling Basin. The three per cent limit in New South Wales constituted a departure from commitments to remove impediments to trading in order to promote more open and efficient water markets. This limit was not reached and was removed when New South Wales signed the National Partnership Agreement on Implementing Water Reform in the Murray–Darling Basin in February 2014.

3.2.3 Carryover

Carryover allows water entitlement holders to take their unused water allocation in the following season. Carryover arrangements have been established in each of the Murray–Darling Basin jurisdictions to allow entitlement holders to maximise the value of annual allocations. A diversity of arrangements across jurisdictions and frequent changes to provisions has resulted in allocation trade to pursue the best carryover opportunities. It is widely accepted that the relatively favourable Victorian carryover arrangements were an important driver of water market behaviour in 2010–11 and 2011–12, which saw substantial late-season transfers of water allocations into Victoria. The Victorian arrangements were established to help irrigators manage the impact of drought when there was sufficient space in storages to accommodate the carryover provisions. Recent wet years reduced the air space capacity in dams which, coupled with the attractive carryover provisions available to Victorian entitlement holders, led to third-party impacts on allocations held in storages shared with Victoria.

Recent changes to Victoria's carryover provisions that limit carryover to 100 per cent of entitlement, use Hume Dam as the Murray spill trigger, and limit net trade from New South Wales to manage the risk to third parties. The third-party impacts (and subsequent trade suspensions) which resulted from different operating conditions act as a reminder for jurisdictions to consider the full range of scenarios, including across state boundaries, when introducing new arrangements.

3.2.4 Water market rules

The water market rules developed by the ACCC under the *Water Act 2007* (Cwth) aimed to reduce barriers to trade in the Murray–Darling Basin by providing clear rules to open trade into and out of supplied irrigation areas managed by IIOs. IIOs are the entities that operate water service infrastructure to deliver irrigation water. The rules can be summarised as follows:

- water market rules 2009: known as transformation rules, these were established to allow irrigators to transform their holding of an irrigation right in an IIO's bulk licence to an individual holding and, in doing so, prevent any unreasonable delays to the process
- water charge (termination fees) rules 2009: determined the pricing structure for the setting and implementation of termination fees when an entitlement holder terminated their delivery arrangements with an IIO
- water charge (planning and management information) rules 2010: requires IIOs to provide each licence holder with a breakdown of costs and charges for water planning and water management activities and how they were calculated
- water charge (infrastructure) rules 2010: requires the IIO to set out all regulated charges and how they are established – this varies depending on the volume of the bulk licence each IIO holds (ACCC 2014).

The ACCC is responsible for regulating the implementation and enforcement of these rules. While these market rules were established to apply in the Murray–Darling Basin there is no barrier to their application in non-Murray–Darling Basin jurisdictions.

The Basin plan water trading rules that came into effect on 1 July 2014 aim to establish a broader framework for trading across jurisdictions. The water trade rules will operate alongside the market rules and will set a consistent framework for water trading of surface water and groundwater across the states that will apply to all water market participants. The MDBA is responsible for the implementation and regulation of the Murray–Darling Basin trading rules.

The objectives of the water trading rules are consistent with the NWI and are set out in Schedule 3 of the *Water Act 2007* (Cwth):

- facilitate the operation of efficient water markets and create opportunities for trading within and between Basin states
- minimise transaction costs through good information flows and compatible entitlement, regulatory and other arrangements across the Murray–Darling Basin states
- enable the appropriate mix of water products to develop
- recognise and protect the needs of the environment
- provide appropriate protection of third parties.

The Commonwealth Environmental Water Holder (CEWH) is responsible for managing the Australian Government's water holdings, and there have been concerns that the CEWH's behaviour has the potential for considerable impact on the water market. The Commonwealth Environmental Water Trading Framework, which includes operating rules, procedures and protocols, governs Commonwealth water transactions. The trading framework is underpinned by the *Water Act 2007* (Cwth) and the Murray–Darling Basin Plan trading rules and seeks to ensure the CEWH considers impacts on the market when undertaking trading activities, is transparent in its dealings and meets all legislative requirements. Commission assessments have found no evidence of allocation trades by environmental water holders distorting market prices.

3.2.5 Appropriate mix of water products

The NWI allowed for the development of water products where a market might reasonably exist. Water access entitlements and allocations remain the foundational and most widely traded products. As some water markets have matured and trading has expanded to allow greater flexibility in water use, there is growing interest in the potential for even more flexible arrangements through the development of secondary markets.

Regulation enacted in 2014 ensures the trade of products such as allocations and entitlements is not considered a derivative under the *Corporations Act 2001* or a financial product under the *Australian Securities and Investments Commission Act 2001*. The new regulation also provides water traders with clarity as to what secondary market products are exempt from financial product regulation. This clarity has allowed for the expansion of certain secondary market products. For example, traders have now started to offer forward contracts for water products that result in settlement at the time of trade, enabling a more sophisticated market for water to develop.

3.2.6 Concluding remarks

Action to establish contemporary water markets and trading arrangements in Australia have been largely successful—especially within the Murray–Darling Basin—with the deepening of water markets delivering real benefits to irrigators, regional communities and the environment. Water trading has become a vital business tool for many irrigators in providing flexibility to respond to variable water availability and other market factors.

While the foundational elements of water markets are embedded in many areas, further refinement of entitlement, regulatory and market information frameworks are required to underpin effective water markets. While much of this is in place within the Murray–Darling Basin, there is still a need to bed down regulatory frameworks and improve information flow. In the development of new and emerging markets, particularly in northern Australia, the Commission calls on governments to ensure appropriate entitlement, regulatory and information frameworks are in place to maximise the benefits to all users.

3.3 Best practice water pricing and institutional arrangements

Pricing and institutional reforms have been major components of the national water reform agenda since the establishment of the Water Resources Framework in 1994.

In 2004, NWI parties agreed to implement enhanced arrangements that expanded the 1994 Water Resources Framework, to ensure sustainable revenue for service delivery, facilitate water markets and implement pricing reform. The purpose of pricing reform is to ensure that the cost of water, including the provision of services for its supply, is as economically efficient as possible. The NWI arrangements to achieve these outcomes include:

- the institutional separation of water resource management from regulation to allow for independent price setting and monitoring
- full cost recovery in price setting including lower-bound pricing mechanisms as a baseline and upper-bound pricing which includes the opportunity cost of capital in price⁹
- the use of market-based mechanisms for the release of unallocated water
- using regulation and where feasible markets and/or pricing to manage environmental externalities
- developing pricing policies for recycled water and stormwater, and policies to manage sewerage and trade wastes.

The reform arrangements have underpinned the progress towards achieving the economically efficient and sustainable use of water resources in Australia. However, implementation of these reforms has been inconsistent across Australia and there continues to be evidence of government interventions that weaken or reverse reforms.

In 2010, the Natural Resource Management Ministerial Council endorsed the NWI pricing principles. These principles provide a set of guidelines for pricing practices and allow jurisdictions to implement best practice water pricing commitments in a consistent way. The NWI pricing principles comprise four parts:

- recovery of capital expenditure
- setting urban water tariffs
- cost recovery for water planning and management activities
- pricing for recycled water and stormwater reuse.

A COAG review of the NWI pricing principles began in 2012 and was expected to be finalised in 2014. At the time of writing the review had yet to be finalised and its status as a COAG review remains unclear.

3.3.1 Urban

Most jurisdictions have made significant progress towards achieving full cost recovery. Increasing community concerns about 'cost of living' in response to recent price rises have caused several governments to respond with changes to regulatory and policy processes. Increases in water prices have arisen because of the significant investment in new water infrastructure to provide security. At the same time customers who are generally more efficient in their use of water find it difficult to reconcile low use with rising bills. Recent regulatory price paths to 2011–12 and 2012–13 suggest typical residential bills will continue to increase but not at the rate seen in recent years. In 2012–13, the typical residential bill increased for 56 utilities and decreased for three utilities. The national median increased from \$1097 to \$1184 per residential property per year, an increase of nine per cent.

⁹ Lower-bound pricing reflects the cost of operating, maintaining and replacing capital equipment used to deliver water and upper-bound pricing includes these costs plus the opportunity cost of capital. Refer to the Glossary of terms for a complete definition of these terms.

All jurisdictions have committed themselves to independent economic regulation, although the models and maturity of the regulators differ across jurisdictions. The Commission remains concerned that economic regulation of price is not effective in all jurisdictions as governments continue to blur their roles as owner, policy setter and regulator. This issue is further explored in Section 3.7.

3.3.2 Rural

Bulk water

Pricing of bulk water is consistent with lower-bound pricing practices across the country. While the NWI makes a call for bulk water managers to move to upper-bound pricing where practicable, this is yet to be widely adopted. Though bulk water operators are predominantly state owned and regulated it is difficult to identify the degree to which pricing is moving to upper-bound pricing, or whether price increases are reflecting a more comprehensive approach to cost recovery.

The transition to lower-bound pricing in some smaller systems has at times revealed a cost to the entitlement holder significantly higher than the previously subsidised price. The bulk water price path that the ACCC set in 2014 for regulated surface water in Peel Valley of New South Wales highlights the challenge for operators and regulators in managing the adjustment to avoid price shock and for governments to maintain their commitment to full cost recovery. The ACCC price path capped increases at 30 per cent over three years and committed the government to continue a significant subsidy. The submission from State Water indicates that full cost recovery will not be achieved without price increases of this magnitude over subsequent price determinations.

Distribution schemes

Approaches to pricing across distribution schemes vary according to the location, ownership arrangements and size of the scheme. The move to lower-bound pricing is largely complete in the Murray–Darling Basin; transparency around pricing arrangements monitored and reported by the ACCC in accordance with the water market rules established under the *Water Act 2007* (Cwth) (s92) have accelerated this process (discussed in 3.2.4). Across the rest of rural Australia, information about water pricing and the degree to which it recovers the costs associated with activity is generally poor and lacks transparency with a small number of exceptions including Harvey Water and Tasmanian Irrigation.

Cost recovery for planning and management

Rural water pricing in Australia generally applies to the cost of infrastructure operation and renewal, as well as water planning and management charges. There are no specific charges for the water itself (except for traded water which has a market price).

The application of water management and planning charges varies across the jurisdictions. New South Wales provides detailed information about the costs required to deliver water planning services, including a description of the resources required. These inputs have been reviewed and endorsed by the New South Wales Independent Pricing Regulator (IPART).

Victoria, South Australia and the Australian Capital Territory provide information on planning and management charges as required by their respective legislation, however there is no independent regulatory oversight of these charges. The remaining states and territories do not provide reports or information about the status of water planning and management charges.

The Water Charge (Planning and Management Information) Rules commenced in the Murray–Darling Basin in July 2010. They aim to ensure transparency in respect of cost recovery for water planning and management. As there are no enforcement provisions, the ACCC has monitored and reported on these activities since 2011 and found compliance with the rules.

Economic regulation

State economic regulators apply some level of control in New South Wales, Victoria and Queensland for rural water pricing. The ACCC administers the Water Charge (Infrastructure) Rules that apply within the Murray–Darling Basin.

In New South Wales IPART sets rural water prices for bulk water, although changes to the Commonwealth Water Act require the ACCC to undertake the next pricing determination (2014–15 to 2017–18) for valleys within the Murray–Darling Basin. As discussed in Section 3.2.4, the ACCC requires all IIOs be transparent in reporting on pricing arrangements subject to the volumes managed. IPART will continue to regulate bulk prices in non-Basin areas. The Essential Services Commission of Victoria (ESC) independently sets and reviews prices for all water providers in Victoria. (The ACCC has accredited the ESC to determine the regulated charges of infrastructure operators in Victoria). The Essential Services Commission of South Australia (ESCOSA) governs all water industry entities providing 'retail services' to South Australian customers. It is responsible for the economic regulation of water and sewerage including industry licensing, consumer protection and retail pricing. The first review of rural South Australian prices is due for completion in late 2014.

The independent regulator in both Western Australia and Queensland review and recommend prices for bulk water and government-owned schemes but the government sets the prices. Rural prices in the Northern Territory, Australian Capital Territory and Tasmania are not set or reviewed by an independent regulator.

Investment assessment

NWI parties agreed that any investment in new or refurbished water infrastructure must be assessed as economically viable and ecologically sustainable before being approved. While there has been progress, this remains a contentious issue in some respects (see also Section 3.7).

The past decade has seen a significant wave of capital investment in irrigation infrastructure modernisation, as a drought response, to recover water for the environment and for irrigation refurbishment and renewal. The cost implications of those investments will continue to be felt through price rises and there has been substantial debate about the cost effectiveness and viability of specific investment decisions. It is important that lessons from these investments are not lost; they should be taken into consideration when assessing new proposals, including for northern Australia.

Unallocated water

In some areas, recently completed or revised water plans can define a volume of water that is unallocated and available for consumptive uses. Parties to the NWI agreed that the release of unallocated water should be managed in a way that ensures sustainable and efficient use and does not undermine the value of existing property rights and market integrity. The release of unallocated water should only occur when alternative methods of meeting water demand have been fully explored, and to the extent practicable should be undertaken through a market-based mechanism. Where unallocated water continues to be made available for production at no or minimal cost it can lead to sub-optimal investment and allocation decisions.

Progress towards achieving this outcome has been made in New South Wales, Queensland and Victoria, which now use market-based mechanisms for releases of unallocated water. However, other jurisdictions deal with these issues in an *ad hoc* and inconsistent manner. Additionally, there is little evidence that alternative methods of meeting demands are being explored before releases occur. COAG's National Water Reform Work Plan 2013–2017 committed jurisdictions to developing a common approach on water resource development through a national framework, but at a recent Interim National Water Reform Committee meeting (April 2014) jurisdictions agreed to discontinue this work.

3.3.3 Environmental externalities

NWI parties agreed to measures that accounted for environmental externalities, including regulatory instruments, conducting feasibility studies into market-based mechanisms and implementing reforms that included externalities as part of an overall pricing structure (NWI paragraph 73).

The primary method adopted to manage the environmental costs and benefits of water use has been regulation, noting that some jurisdictions are beginning to use or explore pricing as an alternative.

In Victoria, an environmental contribution fee is levied on all water users and salinity management charges are levied on users where applicable. The Victorian Auditor-General's office reviewed the environmental contribution levy in 2014 and concluded that while there was sound project management and some good environmental results from the projects funded by the levy, the process for selecting projects was not robust due to a lack of criteria, guidelines and strategic priorities. They also found limited transparency due to minimal public reporting.

Similarly, the Australian Capital Territory collects water management funds through its Water Abstraction Charge, although the setting and regulation of this charge are not transparent.

New South Wales has established a regulatory system to manage externalities that sets costs transparently and is subject to independent review. South Australia applies levies for natural resource management regions and a River Murray levy, and recognises that work is required to quantify the externalities behind the levies. Queensland has also adopted a regulatory approach, but its setting of fees and charges lacks transparency. There has been no progress made in the Northern Territory, Tasmania or Western Australia towards understanding and setting costs for environmental externalities. These jurisdictions continue to use planning and regulation to manage any negative outcomes that arise.

3.3.4 Benchmarking efficient performance

Under the NWI states and territories agreed to the performance benchmarking of pricing and service quality, including undertaking annual public reporting of performance for all urban, regional and rural water delivery agencies (NWI paragraph 75). This benchmarking is to occur in the context of the development of a nationally consistent reporting framework. The production of National Performance Reports (NPRs), using a nationally consistent framework with benchmarking information supplied by each jurisdiction, has largely delivered on this outcome to date.

The Commission has coordinated jurisdictional reporting. The urban water utilities NPR has been produced annually from 2005–06 and represents all utilities with more than 10,000 connections, providing water to about 18.7 million Australians. The rural water providers NPR has been produced since 2006–07, covering the supply of almost 10,000 GL of irrigation water in 2012–13.

At the time of writing the future of reporting is uncertain. Jurisdictions and the urban water industry body, the Water Services Association of Australia, have identified that the urban NPR is considered to be an example of national and international best practice in performance reporting with benefits exceeding costs, and have expressed strong support for the continuation of a coordinated national urban performance report. However among jurisdictions and stakeholders there is relatively less support to continue a nationally coordinated rural report, with concerns expressed that despite the rural water sector accounting for about two-thirds of Australia's water use and being a beneficiary of significant government investment in irrigation efficiency upgrades, the current indicators and approach to reporting are not delivering material benefits.

case study 4 National performance reporting

Under the NWI governments agreed to prepare annual independent public reports on urban water utilities and rural water service providers, to benchmark pricing and service quality. The reports are produced jointly by the National Water Commission, state and territory governments, and in the case of the urban national performance report (NPR), the Water Services Association of Australia. The reports span all critical performance areas of water resources, including pricing, finance, customer service, asset management, environment indicators and health.

In 2014 the eighth urban water report (for 2012–13) in the NPR series covered 81 reporting urban utilities including all capital cities, major regional cities and many smaller water utilities. Combined, these utilities supply water services to about 18.7 million Australians. The utilities reported on about 150 performance indicators spanning critical performance areas including water resources, health, customer service, asset management, environment, finance and pricing.

During the past eight years the urban water industry has had to respond to high variability in climatic conditions: from extreme drought—resulting in many activities to curb demand, coupled with large-scale investment for new supplies of water—to extreme wet weather conditions. While the urban NPRs have identified the continuing increase in a typical residential water bill and, despite a push for greater efficiency, rising operating costs, they also reveal utilities have improved their service levels – particularly in the areas of security of supply, supply reliability, customer responsiveness and water quality.

Conversely, the rural NPR is hampered by the apparent reluctance of some jurisdictions to actively participate, which is in marked contrast to the level of engagement in urban reporting. Rural water use represents two-thirds of Australia's total consumptive water use and many hundreds of millions of dollars of Commonwealth and state funds have been spent on improving on farm water efficiencies, and the delivery of water to the 'farm gate'. Communicating the impacts and benefits of that funding to the tax payer, through reporting on the performance of rural water service provision in the rural NPR should have been, and should continue to be, an important aspect of program management at the Commonwealth and jurisdiction level.

During the past seven years of rural NPR reporting, the rural water service providers have had to respond to the same high variability in climatic conditions as their urban counterparts. The rural NPRs indicated greater delivery efficiency in 2012–13 even though the volumes delivered increased significantly. The increase in delivery efficiency from the conversion of open channel deliveries (paid for through the public purse) has netted results. The rural NPRs have also revealed the increased revenues—even in the face of increased operating costs—enjoyed by rural water service providers.



Coverage of urban National Performance Reports

3.3.5 Concluding remarks

Pricing and institutional reforms based on NWI pricing principles continue to encourage efficient water use. Progress in implementing these principles with appropriate transparency has been uneven for rural water pricing across the jurisdictions. Movement towards full cost recovery has seen the widespread adoption of lower-bound pricing, while the move to upper-bound pricing has been less complete and the application of all NWI pricing principles has been inconsistent. Price differences between areas are exacerbated by differences in scale and the mix of fixed and variable charges.

All jurisdictions now have in place some form of economic regulation. For urban water there are rising concerns about pricing for service efficiency and customer value. Concerns about affordability are also emerging. Transparent information on the pricing of water charges is lacking in several jurisdictions. The transparency of information affects all components of pricing, especially environmental externalities, and more effort is needed in the setting of appropriate and transparent costs and regulation to address environmental externalities.

While some progress has been made towards better management of unallocated water potentially available for production, many jurisdictions still use ad hoc or inconsistent allocation practices, with evidence of little investigation into possible alternative methods. Best practice pricing principles should continue to be used to encourage economically viable developments, while the use of market-based mechanisms for allocating new water should be applied where possible.

3.4 Water for environmental and other public benefit outcomes

The NWI sought to improve the security and cost-effective management of water for the environment, as well as the identification of environmental objectives in water plans. NWI parties agreed to introduce effective and efficient arrangements to deliver environmental outcomes. In cases where water needed to be recovered to do this, it was agreed that a mix of methods would be considered, including infrastructure, water purchase, investment in water management practices and through changing consumer behaviour.

All jurisdictions have made progress in implementing accountable environmental water arrangements with a range of legislative instruments and policies to give state and Commonwealth agencies responsibility for managing environmental water. Jurisdictions have well-established environmental water management arrangements for most of their high-risk resources and are moving into the development of second-generation plans in many areas.

Jurisdictions commonly establish annual allocation limits and access rules so as to 'leave behind' enough water to meet the desired environmental objectives. The volume and timing of water extractions are specified in water plans, or set as conditions on water access entitlements. Planned environmental water management provisions include cease-to-pump rules, flow sharing arrangements, passing-flow releases from water storages and environmental water allowances. The vast majority of significant water extractions in Australia are now undertaken within areas covered by water plans that specify extraction limits and environmental water management rules.

While environmental water objectives are primarily implemented across Australia through planned environmental water provisions in water plans, in some jurisdictions environmental water requirements are met through a combination of planned and held environmental water entitlements.

Environmental entitlements may be established under water plans, purchased on the water market or created through water savings. They are usually held by governments on behalf of the environment. Water available under environmental entitlements is delivered to achieve environmental objectives

identified on an annual basis. Held environmental entitlements are predominantly being used to contribute to achieving environmental objectives for specific systems or sites in the Murray–Darling Basin, where there has been a need to recover water to address overallocation.

At present environmental water in the Northern Territory, Western Australia, Tasmania and the Australian Capital Territory is provided through rules-based provisions only. Environmental water in Queensland is predominantly rules-based with the exception of environmental water entitlements held by the CEWH in the Murray–Darling Basin. New South Wales and South Australia implement rules-based environmental water provisions within their water plans and manage held environmental water entitlements within the Murray–Darling Basin. Victoria achieves environmental objectives through a combination of rules-based provisions and held environmental water entitlements.

The Northern Territory, Western Australia and Victoria are reviewing their water management legislation with the intention of consolidating their environmental water management arrangements. Longer-term security for environmental water provisions is intended for Western Australia through the progressive introduction of statutory water allocation planning and the transition of the current non-statutory plans to statutory plans (DoW 2013a). The Northern Territory has committed to developing a clear framework for water planning through the development of a Territory-wide water policy and progressing the development of water plans in high-risk areas¹⁰.

3.4.1 Identification of desired environmental and other public benefit outcomes

For rules-based environmental water, the development of environmental water management arrangements within water plans is usually informed by technical assessments that identify water-dependent ecosystems and their critical water requirements. Where such information is lacking, jurisdictions have usually taken a precautionary approach in setting provisions for environmental water. Generally, jurisdictions have put useful monitoring programs in place to ascertain which plan actions have been implemented and the extent to which the targeted water regimes and levels of entitlement security have been achieved, but assessment of progress towards high-level outcomes is often lacking (NWC 2013c). Ecological outcomes are often broad and cannot be achieved through management of flow regime alone. Jurisdictions such as Queensland, New South Wales, South Australia and Victoria are moving towards identifying ecological assets that have critical links to flow: this will allow assessment of progress towards outcomes to be better attributed to the effectiveness of the environmental flow management strategies in water plans. Greater focus on a subset of species that can be used to indicate the ecosystem's overall condition will also allow more targeted, cost-effective monitoring.

For held environmental water, water use options are developed on an annual basis in accordance with longer-term management plans that identify environmental assets and their water requirements. In some jurisdictions policy direction for considering held environmental water use options is evolving to explicitly include consideration of social and cultural outcomes that can be supported by environmental watering. The Victorian Waterway Management Strategy and Murray–Darling Basin Plan both stipulate that environmental watering should be undertaken with regard to opportunities to achieve complementary social, cultural and economic outcomes where they are consistent with environmental objectives.

¹⁰ Northern Territory Ministerial announcement 9 October 2013, available at http://notes.nt.gov.au/lant/hansard/ hansard12.nsf/WebbyMember/D0EE5A2609130A7F69257C78000E451F

3.4.2 Cross-jurisdictional arrangements in the Murray–Darling Basin

The finalisation of the Murray–Darling Basin Plan (Basin Plan) in 2012 represents a significant step forward in the management of environmental water at both the catchment and whole-of-Basin scales. It identifies environmentally sustainable levels of take for both surface and groundwater which are to be achieved through a combination of rules-based provisions in water plans and held environmental water entitlements. As at March 2014, 1899 GL of the 2750 GL required to be recovered for the environment under the Basin plan had been acquired under Australian and state government recovery initiatives.

The Basin plan's environmental watering plan provides high-level environmental objectives and targets to guide the management of environmental water in the Basin, as well as a common set of principles to be applied in environmental watering. The principles include, among other matters, the need to coordinate environmental watering between all holders and managers of environmental water and with existing flow events, including those regulated for consumptive use. The environmental watering plan also provides a common framework for determining environmental water needs at both the local and Basin scale, and on annual and longer-term timeframes. This includes the preparation of Basin and catchment annual environmental watering priorities, catchment long-term watering plans and a Basin-wide environmental watering strategy.

Further progress in the Murray–Darling Basin has been achieved through the maturing of environmental water portfolio management by the Commonwealth and Victorian Environmental Water Holders (CEWH and VEWH respectively), the NSW Office of Environment and Heritage and the MDBA (as manager of The Living Murray portfolio). These environmental water holders collectively hold around 20 per cent of all entitlements (by volume) in the Murray–Darling Basin and coordinated delivery of environmental water is occurring through the preparation of annual water use plans and publicly available frameworks for decision-making on environmental water. Annual priorities, water use plans and environmental watering actions are developed in consultation with the relevant state government agencies, river operators, regional natural resource management authorities, the MDBA, local governments, local environmental water advisory groups, irrigator groups, Indigenous communities and relevant landholders.

3.4.3 Monitoring, reporting and evaluation

The agencies responsible for held environmental water management typically publish reports that show how the water was used and, in some cases, the effect of its use on the targeted ecosystems (NWC 2013c). Examples include South Australia's annual River Murray environmental watering reports, the New South Wales Department of Planning and Environment's annual water use reports and annual publications by the CEWH and VEWH that describe watering activities and observed outcomes.

Other initiatives aimed at improving the rigour of ecological response evaluations include the Queensland Environmental Flows Assessment Program, Victorian Environmental Flows Monitoring and Assessment Program, the New South Wales Integrated Monitoring of Environmental Flows Program (now ceased), the Commonwealth Environmental Water Long-term Intervention Monitoring Program, the Murray–Darling Basin Ecological Outcomes of Flow Regimes Project, and CSIRO's Ecological Responses to Altered Flow Regimes Collaboration Cluster.

The Basin plan establishes several legislated reporting requirements for the MDBA, Basin states and the CEWH in relation to environmental water management. This includes annual reports on the identification of environmental water and the monitoring of its use and five-yearly reports on the achievement of environmental outcomes at an asset scale (Basin states) and Basin scale (MDBA and CEWH). This reporting is intended to support the MDBA's review of the Basin plan's environmental watering plan, which is required to be undertaken every five years. The CEWH is also subject to additional reporting requirements under the *Water Act 2007* (Cwth), including an annual report on achievements against the objectives of the Basin plan's environmental watering plan.

3.4.4 Trading environmental water

As noted above, for most jurisdictions environmental water that is provided through rules-based provisions is not tradeable. In jurisdictions where environmental water can be held as entitlements, these may be traded on a temporary or permanent basis subject to revenue being used to support the achievement of other priority environmental outcomes.

Since the entry of the VEWH and RiverBank (New South Wales) to the market, some small-scale state-based buying and selling of allocations by environmental water holders has taken place. In all jurisdictions where environmental water can be traded, the proceeds of disposal must be used to improve capacity to meet future environmental water needs.

As discussed in section 3.2.4, the *Water Act 2007* (Cwth) provides authority for the CEWH to trade allocations or entitlements under certain conditions. In early 2014 the CEWH began targeted selling of held water back into the market, guided by the Commonwealth Environmental Water Trading Framework and its associated protocols.

Jurisdiction	Responsible agencies
Australian Government	CEWH, MDBA (The Living Murray and Basin plan), Department of the Environment (environmental water recovery)
New South Wales	Office of Water (planned environmental water), Department of Planning and Environment (held environmental water)
Victoria	Catchment management authorities / Melbourne Water, Victorian Environmental Water Holder, Department of Environment and Primary Industries
Queensland	Department of Natural Resources and Mines
Western Australia	Department of Water
South Australia	Department of Environment, Water and Natural Resources
Tasmania	Department of Primary Industries, Parks, Water and Environment
ACT	Environmental Protection Authority, Environment and Sustainable Development Directorate
Northern Territory	Department of Land Resource Management (Controller of Water Resources)

Table 3: Agencies responsible for achieving environmental water management outcomes in each jurisdiction

Source: Adapted from Australian environmental water management: 2012 review (NWC 2013c)

3.4.5 Concluding remarks

Progress in implementing accountable environmental water management arrangements has been achieved in all jurisdictions. However, monitoring and reporting of the outcomes of environmental water use is in its infancy for many jurisdictions, and improvements in this area are needed for a transparent assessment of the return on investment in environmental water holdings and rules-based arrangements. Optimising the outcomes of environmental watering will require cooperation between agencies including cross-jurisdictional coordination for connected systems and shared resources such as the Great Artesian Basin and Murray–Darling Basin. The MDBA in particular has a role in the coordination of environmental watering activities across the Murray–Darling Basin to ensure the maximum benefit is gained through the use of environmental water, both held and planned. Over time, it is expected that these arrangements can be streamlined.

3.5 Water resource accounting

Adequate water information is fundamental to the sound planning and management of Australia's water resources. The NWI (paragraphs 80 to 89) commits parties to develop and improve water resource accounting so that measurement, monitoring and reporting systems are in place across all jurisdictions to support public and investor confidence in water being extracted and traded, as well as recovered and managed for environmental and public benefit outcomes. The *Water Act 2007* (Cwth) includes substantial provisions to improve the availability of water information. Part 7 of the Act requires BoM to collect, hold, manage, interpret and disseminate Australia's water information.

Since 2007, BoM has significantly expanded the range of available water information, such as water storage information, water accounts, streamflow forecasts, market information and water resource assessments. These information streams have been developed through the Improving Water Information Program (IWIP), which is funded for 10 years—from 2007–08 to 2016–17—at a cost of \$450 million. Following seven years of IWIP implementation, BoM is now the largest holder of Australian national water datasets and information.

The Australian National Audit Office (ANAO) undertook a performance audit of the effectiveness of BoM's implementation of the IWIP¹¹, concluding that 'although not complete, the BoM's current suite of water information products and services provide governments with important data to inform better policy decisions in relation to water services and infrastructure investment' (ANAO 2014). Based on 56 stakeholder responses, the report also noted that 'in general, stakeholders have indicated a positive view of the IWIP. Stakeholders have also suggested a need to increase the coverage and quality of products and services available' (ANAO 2014).

However, some jurisdictions have raised concerns with the Commission that it is timely to consider whether the BoM products are adequately serving the needs of water users and managers. It is clear from jurisdictional comments that concerns about the client benefits of these products exist. There is a need to examine further who are the end users, and how the products can meet user needs. This would direct the particular types and formats of data required, with a view to streamlining jurisdictional reporting. The products need to avoid being seen as an outcome in their own right, with limited functionality at the state and local level.

11 The audit did not assess how the IWIP has contributed to policy or decision making.

Case study 5

Audit of the Improving Water Information Program

ANAO published its audit report on the BoM's administration of the IWIP in February 2014 (ANAO 2014). ANAO's key findings are summarised below.

Planning, oversight and reporting:

Management and advisory structures established by the BoM were appropriate and consistent with a collaborative model of service delivery.

An appropriate approach to stakeholder communication and engagement has been established, but some risks, such as failure to develop effective systems for web-based delivery and data management, were underestimated.

Collaboration and compliance management:

The licensing of water data under Creative Commons Attribution licences has been effective in allowing users to freely copy, distribute, transmit and adapt water data. BoM's achievement of high participation (90 per cent as at October 2013) in these licensing arrangements has helped maximise use of BoM's water data by third parties and has increased the availability of water data to the Australian community.

Financial assistance to water data providers:

The monitoring and evaluation program was a key component of IWIP's implementation as it provided grant funding not only to enable data providers to modernise and extend their hydrologic monitoring networks, but also to improve the accuracy and quality of the water data submitted to BoM.

Data systems and collection and management:

BoM is receiving about 10,000 new data files containing time-series observations each day. It has been managing more than 21 million water data files containing more than four billion time-series observations since the Water Regulations came into effect on 30 June 2008.

There have been major challenges and constraints in using the Australian Water Resources Information System (AWRIS) to manage the data to produce new products and services. The development of AWRIS has been problematic, with unclear business and system requirements, inadequate technical solutions, shortcomings in governance arrangements, changes in design and approach, and unanticipated costs and delays that have limited the system's functionality.

The operational requirements for a national information technology system with maximum interoperability and flexibility have not been achieved.

The comprehensive data quality approach originally envisaged for end-to-end water data collection, management and analysis has not yet been realised. Standardising data from a large number of sources, and with considerable variation, has been a significant task even after six years of program implementation.

Extension of the Water Data Transfer Format would help BoM achieve greater consistency. However, an ongoing risk for BoM relates to decisions by data providers to reduce the number of monitoring stations that they maintain. Deterioration in the monitoring network has the potential to affect BoM's capacity to maintain or enhance data quality over time.

Water information products and services:

A broader range of better quality water information is available, although most products have been introduced later than BoM originally planned – with varying degrees of coverage and completeness.

The level of collaboration with many different agencies across Australia reflects well on the BoM's approach and suggests a wide degree of commitment to the program and its products and services.

In general, stakeholders have a positive view of the IWIP. There is, nevertheless, a gap between the expectations of users and BoM's capacity to deliver. Closer consultation with key agencies through established forums would further help manage expectations.

3.5.1 National water accounting

At present the National Water Account, prepared by BoM, covers 70 to 80 per cent of water extractions nationally. Complete geographic coverage is not envisaged or seen as cost effective. BoM is exploring whether a less detailed water account reporting approach can be applied to areas of lower use not currently reported on.

A similar water account at the national level is the Water Account Australia, prepared by the Australian Bureau of Statistics (ABS). The ABS collects, maintains and analyses water data and the Water Account Australia is one of its environmental–economic accounts. It reports on physical and monetary water supply and use within the economy at the state/territory and national level. The account describes who uses water in the Australian economy and for what purpose, how much was used and the monetary value derived from that water use at the state/territory and national level. The Water Account Australia has been produced annually from the 2008–09 reference period and before that was produced every four years from the mid-1990s. It is based on the System of Environmental–Economic Accounts framework, adopted in 2012 by the United Nations Statistical Commission as an international standard. The volume of water extracted from the environment for supply, consumption and production is the report's focus.

An issue for both agencies' water accounts is the lack of agreement between the data reported for the Murray–Darling Basin. As it stands, extraction data for the Basin is collected by both BoM and ABS, and will also be required for compliance purposes by the MDBA. Accounts for the Murray–Darling Basin were produced for 2008–09 and 2009–10 as a proof of concept trial. In the 2009–10 reporting period, BoM's National Water Account also reported on extractions for the Murray–Darling Basin, and the results differed by 500 GL between the two accounts.

Figure 4 below shows the overlap between the BoM's National Water Account and the ABS's Water Account Australia. This overlap encompasses the amount of water abstracted from the environment by the water supply industry and other economic activities.



Figure 3: The aspects of, and intersection between, the National Water Account and the Water Account Australia

Source: Australian Bureau of Statistics and Bureau of Meteorology, adapted from a paper prepared for the National Water Account Committee, October 2012

All states and territories collect and manage significant volumes of water data and information, which are used for water management within the respective jurisdiction, and provide the basis for the two national level water accounts. This data underpins most national level water data and information reporting. Part of BoM's almost \$80 million funding over five years to 2012 for the Modernisation and Extension of Hydrological Monitoring Systems Program was used to modernise and extend jurisdictional water monitoring systems benefiting jurisdictional data collection.

Jurisdictions still largely rely on their own data for management and planning purposes and have made only limited use of BoM products to date. To some extent this may be expected as BoM operates at a national to river-basin scale, which does not align with finer-scale jurisdictional catchments or the scale most relevant for water planning and management activities. The *Water Act 2007* (Cwth) and Water Regulations 2008 require data provision where data is collected as part of an organisation's business-as-usual practices, and BoM has provided \$12.8 million in project funding to facilitate the automation of data being provided to it. Nevertheless, several jurisdictions have reported that the cost and time spent collecting and providing data both to the BoM and MDBA continues to be an impost. While BoM does not require additional data collection by jurisdictions, it does direct the format in which jurisdictions must provide the data. This data provision format is not what jurisdictions use or require, therefore duplicate systems are maintained.

In its submission to the 2014 assessment, the National Irrigators Council stated a need to examine the reporting requirements 'to ensure that it serves a meaningful purpose, does not restrict the ability of stakeholders to fulfil the NWI objective and outcomes, nor does it become an expensive, and time consuming waste of time, effort and resources' (NIC 2013).

To help address this issue, the MDBA entered into a Commonwealth Heads of Agreement project with BoM (for the period 2013–17) that aims to maximise the reuse of data supplied under the Water Regulations 2008. The need to develop the appropriate metadata and collection systems for compatible datasets has been recognised and implemented with the new Water Data Transfer Format. This format covers about 80 per cent of data that BoM collects.

BoM has improved the timely delivery of its national water accounts, which enhances their value. Similarly the Australian Water Resource Assessment has made substantial progress. Additional value for NWI implementation would be gained if an assessment of the level of water stress in catchments and aquifers were provided – a key requirement for sustainable water management.

3.5.2 Groundwater information

The Commission views the historic and continued underinvestment in groundwater data and information as an area where effort and resources are required to bring the data and information up to an acceptable level, namely comparable with the status of Australia's surface water data and information. As noted in Section 3.1.8 and other Commission work, BoM's efforts in groundwater information are valued and useful. *The National Atlas of Groundwater Dependent Ecosystems* and the NGIS in particular are robust data sources, but further work is required to improve existing management arrangements using this new information.

Subject to licensing arrangements, groundwater data and analysis produced through the Australian Government's Bioregional Assessment Program will be made publicly available through an information portal.

3.5.3 Environmental water accounting

NWI parties agreed that an environmental water registry would be developed, with annual reports provided. Although the development of standards for environmental water accounting began in 2011, they remain incomplete. Only New South Wales and Victoria have developed environmental water registers. The New South Wales register includes adaptively managed environmental entitlements and non-quantitative descriptions of planned environmental water rules. The Victorian register includes environmental water data with entitlements listed, although rules-based arrangements are not available as a searchable resource.

The CEWH, VEWH, MDBA (as managers of water acquired for the environment under The Living Murray program) and New South Wales Department of Planning and Environment all maintain publicly available registers of their environmental water holdings. All report annually on the total volume of water delivered under these entitlements.

Environmental water provided through rules-based arrangements is reported in some jurisdictions as part of annual reporting on water plans. The delivery of planned environmental water is not often reported in volumetric terms and is generally inferred based on compliance with rules-based provisions for consumptive uses.

3.5.4 Metering and measuring

NWI parties agreed (NWI paragraphs 87 to 88) that metering and measurement should be developed on a consistent basis, and applied in a standardised way. Effective metering is important to improve the information base, market operations, water users' accountability for their consumption and equality among users. The accuracy of metering and metering coverage has significantly improved.

COAG has developed the National Framework for Non-Urban Water Metering (the Framework) (DotE 2014b) to meet NWI objectives, particularly in relation to requirements for national metering standards and a nationally consistent framework for water metering and measurement. The Framework requires that over time meters comply with the national metering standards.

All jurisdictions agreed to develop implementation plans to document priorities and targets for non-urban water metering in relation to areas such as meter deeming, upgrading meters and installations, certified workforce, implementation of national standards for non-urban meters, and review of jurisdictional legislation to ensure compliance. At present, all jurisdictions except Tasmania and the Northern Territory have developed implementation plans, with Tasmania having developed a draft implementation plan. In October 2012, the Queensland Government released a new policy for non-urban water metering for unsupplemented water extractions that assigns responsibility for the purchase, installation and maintenance of a meter to water entitlement holders. In 2014 further changes require holders to read and report on their meter, and the use of the national standards will not be required in some instances. In Western Australia, due to changes in policy since development of the implementation plans by jurisdictions, the implementation plan will be rolled out with a user-pays policy. The Australian Government is yet to finalise its national implementation plan.

Implementation of the Framework has been subject to substantial delays, in part because of difficulties having meters certified to the required standard. Pattern approved meters, which are those approved as suitable for installation under the Framework, have now become available and jurisdictions are looking to replace existing meters with approved meters over various timeframes where this is deemed to be cost effective.

As part of the Framework it was agreed that all NWI parties would report on implementation of the Framework, and non-urban water metering more broadly, and that the data would be collated, analysed and published every two years from 2012. At this time no reporting has been undertaken, and arrangements for this reporting are yet to be finalised between the Department of the Environment and the BOM¹².

3.5.5 Compliance

The introduction of the National Framework for Compliance and Enforcement Systems for Water Resource Management (the National Compliance Framework) in 2012 provided an opportunity to establish a nationally consistent approach by strengthening water compliance and enforcement within each state and territory.

The National Compliance Framework is a 2009 COAG commitment, which is being implemented by all states and territories to improve compliance and enforcement and therefore help protect Australia's water resources. A total funding package of \$60 million was committed for states and territories to manage improvements to compliance and enforcement capability and capacity, including a range of Commonwealth-led projects in support of its implementation.

The National Compliance Framework comprises six major components which support improvements to:

- water laws: each jurisdiction has agreed to 'use (its) best endeavours to introduce and pass legislation to adopt consistent offence provisions to minimise unlawful water take'
- risk assessment: all water resources are assessed according to a nationally consistent risk profile requiring minimum levels of compliance monitoring by the jurisdictions in line with increased risk
- toolbox: development of new and efficient processes and products to improve the efficiency of compliance activities and the skills of compliance officers
- stakeholder education: a structured approach to 'provide information to educate the public and the stakeholders on the importance of compliance and enforcement of water resources management to the environment and other water users'
- monitoring: more compliance officers in the field to 'carry out annual monitoring events equal to 10 per cent of the total number of water entitlement/licence holders of a water resource, using on ground officers'
- *reporting:* water agencies publish annual reporting and compliance strategies and statistics.

The Australian Government undertook a mid-term review of National Compliance Framework in 2013. Jurisdictions acknowledged the framework had accelerated compliance programs and capacity, although the review noted some criticism of it assuming a 'one size fits all' approach.

The latest available reporting on the National Compliance Framework was in May 2013, at which time most jurisdictions had made positive progress towards meeting their milestones. In December 2013 Victoria renegotiated its implementation plan by agreement between the state and Commonwealth water ministers due to early administrative issues affecting Victoria's ability to meet initially agreed timeframes. At present jurisdictions and the Commonwealth are in discussions about how to ensure progress made through the National Compliance Framework endures after Commonwealth funding ends.

¹² See http://www.environment.gov.au/resource/national-framework-non-urban-water-metering-policy-paper for more detail.

3.5.6 Concluding remarks

Water resource accounting generates the information required to enable water planning and management. While considerable resources have been allocated and effort spent, the impact of scale, incompatible systems, overlapping reporting requirements and limited participant benefits still hamper the collection and use of water data and information. For example, the generation of groundwater data is still significantly underfunded and poorly appreciated and environmental water accounting remains incomplete. In addition, metering and measuring provides the basis for water use accountability and allows water markets to function, but the National Framework for Non-Urban Metering has not been implemented. Development in northern Australia will need a robust data and information basis. While there are parts of northern Australia where significant investment in expanding the knowledge base of water resources has occurred, information frameworks are not at a stage that would support a large development effort.

3.6 Progress of reform in the Murray–Darling Basin

The Basin plan is a major step forward in NWI-consistent water management for one of Australia's most important river basins.

For the first time, there is a set of institutional and governance arrangements intended to deliver whole-of-Basin social, economic and environmental outcomes. These governance reforms are designed to shift the decisions about sustainable levels of extraction in the Murray–Darling Basin from the Basin state and territory governments to a single decision-maker, the Commonwealth Water Minister. In reality, achievement of the intended outcomes still relies on the cooperation of the Basin states and it will be a collaborative effort to give full effect to the Basin plan.

Implementation remains the key to securing the Basin plan's long-term benefits for the environment and for the communities within the Murray–Darling Basin. While good progress has been made with water recovery efforts, there have been delays in other areas. For example, New South Wales and Queensland signed onto the *Intergovernmental Agreement on Implementing Water Reform in the Murray–Darling Basin* in February 2014, well after the other Basin states.

Implementation of the Basin plan has been designed as a staged process, with SDLs not coming into effect until 2019, providing a seven-year transition period for communities to adapt to the reduced availability of water. Government investment of more than \$12.9 billion provides a pathway towards achieving the Basin plan's SDLs within this timeframe. The Australian Government has committed to the recovery of 2100 GL¹³ of water to meet the SDLs through water buy backs (capped at 1500 GL) and investments in infrastructure. While expensive per unit of water recovered, infrastructure measures such as improvements to on- and off-farm irrigation systems are intended to provide water for the environment without reducing the Basin's productive capacity.

The recovery of water for environmental use constitutes a significant action towards meeting the objectives of the Basin plan. Various programs conducted by the Australian and state governments have delivered a substantial volume of recovered and held water that is available for environmental use. As at 31 March 2014, 1899 GL of water had been recovered as part of 'bridging the gap', which represents 69 per cent of the 2750 GL required (see Figure 4).

¹³ To achieve the target reduction of 2750 GL, the Australian Government has committed to the recovery of 2100 GL to meet the SDLs through water buybacks and investments in infrastructure (with buybacks capped at 1500 GL), and an SDL adjustment of 650 GL through supply measures is assumed.

Figure 4: Summary of progress towards SDL targets



Notes:

1. Water recovery volumes quoted as at 31 March 2014, data sourced from Department of the Environment website http:// www.environment.gov.au/topics/water/rural-water/restoring-balance-murray-darling-basin/progress-water-recovery.

2. Supply measure equivalents to be determined after development and assessment of proposed project package.

Flexibility in achieving environmental objectives has been included in the Basin plan through an adjustment mechanism for surface water SDLs. SDL adjustment activities can be of two different types:

- Supply measures that enable the use of less water but can still achieve equivalent environmental
 outcomes. Supply measures may include environmental works and measures projects or rule
 changes. Supply measures to reduce water recovery targets by up to 650 GL will be proposed by
 Basin states, although the final volume will not be known until the entire package of projects has been
 developed and assessed by the MDBA (DSEWPaC 2012). Several supply measures are currently at the
 pre-feasibility stage of assessment http://www.mdba.gov.au/what-we-do/water-planning/sdl/proposals.
- Efficiency measures aim to increase the volume of water available for the environment by up to 450 GL while maintaining or improving social and economic outcomes. Efficiency measures include improving the efficiency of on-farm irrigation and transferring the water savings to environmental use. The Australian Government has committed up to \$1.5 billion for efficiency measures.

Achieving optimal environmental outcomes also relies on dealing with constraints within the system that otherwise prevent the periodic release of larger volumes of environmental water. As part of the process to address these constraints, the MDBA released its *Constraints Management Strategy 2013 to 2024* in November 2013. This is a high-level strategy document that aims to identify and describe the physical, operational and management constraints that are affecting environmental water delivery. The strategy outlines a staged process for development and implementation of projects to address constraints through until 2024. It also highlights the large amount of work to be done to overcome limitations to delivering the recovered water to maximum effect.

Early implementation activities have progressed since the Commission prepared its initial report on Basin plan implementation in 2013 (NWC 2013d) (see Table 4). While some good progress has been made, much remains to be done and significant public funding has already been invested. The large cost that has been incurred to restore the environmental balance in the Murray–Darling Basin is a salutary warning as to the expensive nature of dealing with overallocation. For Murray–Darling Basin communities and irrigators, the Commission considers that a period of consolidation and completion of the reforms initiated to date is required. A major objective of the NWI was investment confidence, and the protracted and contested planning process has had mixed outcomes in this regard. Bedding down the outcomes of that process is a high priority for the Murray–Darling Basin.

Table 4:	Basin plan wo	rk in progress	for priority in	nplementation	areas in the	Murray-Darling Basin
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Priority implementation areas	Work completed and in progress
Intergovernmental agreement on implementing water reform in the Murray–Darling Basin to be finalised	• All Murray–Darling Basin states have signed the intergovernmental agreement, with New South Wales and Queensland signing in February 2014, eight months after the other states.
A whole-of-Basin implementation strategy to be in place, together with attendant agreements, between the MDBA and Basin states	 The Murray–Darling Basin Plan 2012 Implementation Agreement has been developed. All Basin states have signed the implementation agreement. Establishment of the Basin Plan Implementation Committee and associated working groups.
Water recovery	• 1899 GL of surface water has been recovered across the Murray–Darling Basin, representing 69 per cent of the Basin-wide recovery target of 2750 GL.
Trading rules	 Basin plan water trading rules came into effect on 1 July 2014. Guidelines have been published to help Basin states, IIOs and individuals participating in the water market comply with the rules.
A constraints management strategy to be in place by the end of 2013	• The MDBA published two documents in 2013 relating to constraints. The first, published in July 2013, <i>Preliminary Overview of Constraints to</i> <i>Environmental Water Delivery in the Murray–Darling Basin,</i> includes a review of available technical information on physical constraints across the Murray– Darling Basin and an assessment of priority constraints (termed 'first-order constraints') to the delivery of environmental water for further investigation through the Constraints Management Strategy.
	• The second document, published in November 2013, <i>Constraints Management Strategy 2013 to 2024</i> , is a high-level strategy document that identifies and describes the priority physical, operational and management constraints that are affecting environmental water delivery.
Environmental water management processes have evolved, with annual Basin state priorities developed that take account of the Basin-wide	• In 2012–13, the process to establish the first Murray–Darling Basin-wide annual environmental watering priorities was developed. The Basin states provided their annual priorities for each water resource plan by the end of May and the MDBA published the first Basin-wide annual environmental watering priorities on 28 June 2013. To complement these priorities, the MDBA has also developed a guiding philosophy for environmental water delivery.
Environmental Watering Strategy	 The MDBA has also commenced work on a Basin-wide environmental watering strategy, due by November 2014.

Priority implementation areas	Work completed and in progress
Monitoring, evaluation and reporting	• The MDBA is preparing a draft evaluation framework technical document for consultation with stakeholders in 2014. This will describe how the MDBA intends to evaluate the Basin plan's effectiveness against its intended environmental, social and economic outcomes, objectives and targets.
	 The first Basin plan annual effectiveness report has been published which identified implementation activities for 2012–13.
	The Basin Plan Compliance Strategy was published in April 2014.
Significant progress to have been achieved towards identifying and assessing SDL adjustment proposals	 The SDL Adjustment Assessment Committee has been established. The MDBA has engaged a consortium, led by CSIRO, to develop an ecological scoring method to help assess projects brought forward by the states. The MDBA, in consultation with Basin states, is also developing a 'benchmark' model to enable adjustment proposals to be assessed.
Scheduled groundwater reviews should be completed within two years	• Two of the three groundwater reviews have been completed.
The northern Basin work program to be substantially completed by 2015	 Northern Basin Advisory Committee met regularly during 2012–13 and 2013–14. A Northern Basin Intergovernmental Working Group was formed. The MDBA, in conjunction with the advisory committee, has also consulted
	with several stakeholder groups across the northern Murray–Darling Basin on issues to consider in developing the work program.

3.7 Urban water reform

The urban water sector underpins public health and wellbeing, contributes to economic development and provides an underlying foundation for the liveability of Australian cities. In the past 10 years the Australian urban water sector has weathered new extremes in drought and flood. The provision of safe, secure, efficient and sustainable water and waste water services remains the primary driver for urban water reform. However the challenges and opportunities to improve nationally significant social, economic and environmental outcomes from urban water have evolved considerably. Jurisdictions, together with the sector, have engaged in a range of reform measures that aim to address these challenges.

The supply of water and wastewater services to most of urban Australia is largely undertaken by government-owned water authorities that operate as regulated monopoly businesses. Services are provided under a variety of industry structures and with different mixes of state and local government ownership.

More recently, the physical water, wastewater and stormwater systems supplying urban centres in Australia are becoming more complex and interconnected. A mixture of sources that are both dependent and independent of rainfall have been rolled out in towns and cities across Australia, linking physical infrastructure and natural waterways to form 'water grids'.

The evolving boundaries of the urban water sector, and greater interactions between natural and man-made systems, present both challenges and opportunities. Nexus issues between water, food security, urban planning and energy are emerging as key issues and, increasingly, liveability outcomes are shaping new urban water partnerships and changing the nature of the urban water sector.

3.7.1 Progress of reform

The 1994 National Competition Policy (NCP) framework for urban water embraced pricing reform based on the principles of consumption-based pricing and full cost recovery, the reduction or elimination of cross-subsidies and making subsidies transparent. Other priorities specific to the urban water sector included the adoption of market arrangements and competitive neutrality in water; institutional reform as it relates to the separation of roles for the owner, regulator and service provision; and improved public consultation and community participation.

The NWI was primarily focused on governance reform in the rural water sector but also included a call for jurisdictions to complete commitments under the 1994 COAG Water Reform Framework and further refined objectives as set out below:

- provide healthy, safe and reliable water supplies
- increase water use efficiency in domestic and commercial settings
- encourage the reuse and recycling of wastewater where cost effective
- facilitate water trading between and within the urban and rural sectors
- encourage innovation in water supply sourcing, treatment, storage and discharge
- achieve improved pricing for metropolitan water.

The following update on activity in the urban water sector addresses progress against NWI commitments including the NCP priorities, investment actions undertaken by jurisdictions in response to the Millennium Drought, regulatory and pricing reforms and the 2012 enhanced COAG urban water reform agenda.

3.7.2 Water efficiency

NWI parties have delivered substantial water efficiency gains through pricing reforms, public education, implementation and monitoring of the Water Efficiency Labelling and Standards Scheme, the Smart Water Mark for gardens, and water conservation rules and incentives (Table 5). While governments will always reserve the right to manage demand through restrictions, the Commission considers it more efficient to balance supply and demand through price signals.

Jurisdiction	Summary
NSW	Water Wise Rules have replaced water restrictions and apply to Sydney, the Blue Mountains, the Illawarra and lower Hunter region. Local council water providers also have a range of water restriction measures imposed during water shortages.
Vic.	Permanent water saving rules for the state took effect in December 2011. These form part of each water corporation's permanent water saving plan but do not preclude water restrictions during drought periods. Water restrictions are managed by Victoria's urban water corporations and are only applicable to customers on a reticulated supply. They do not apply to recycled, reclaimed, rain or grey water other than when supplemented by drinking water.
Qld	Water restrictions in place in Queensland during the previous drought period have now been lifted, including the requirement for large water-using businesses to develop water efficiency management plans (WEMPs). The amended <i>Water Supply (Safety and Reliability) Act 2008</i> allows South East Queensland (SEQ) water service providers to impose restrictions or require WEMPs, although the Act does not specify the circumstances in which these would be imposed.
	The government, together with Seqwater and the SEQ council water businesses, intends to develop a long-term restriction framework. Water savings targets for new houses and commercial and industrial buildings, which included rainwater tanks, have been reviewed.

Table 5: Summary of water efficiency measures across Australia from 2004 to 2014

WA	Restrictions are in place throughout Western Australia which prescribe outside water use conditions and limitations. The restrictions include permanent water efficiency measures, and can also include extra efficiency measures and restrictions as required.
SA	Water Wise Measures are in place across the state, replacing water restrictions. Penalties continue to apply for non-compliance. Conditional use is allowed for some areas such as irrigation of domestic gardens and lawns and sportsground irrigation.
Tas.	There are currently no water restrictions. TasWater reserves the option to enact water restrictions when storages become critically low due to unforeseen operational issues or due to drought conditions.
ACT	Permanent water conservation measures are in place when the ACT is not in a drought situation as determined by a range of publicly available criteria, in particular dam storage levels and pending weather conditions. When water supplies are scarce, a four-stage scheme of temporary water restrictions is enacted.
NT	The Northern Territory has programs in place to reduce water consumption rates in Darwin and Alice Springs. The Northern Territory Government, through the Power and Water Corporation, has recently launched Living Water Smart in the Darwin region. This is a five-year water conservation initiative, targeted at residential, business and government customers, with the objective of reducing Darwin's water use by 25 per cent. Alice Water Smart comprises several programs to support water conservation measures within Alice Springs, which aims to save 1.6 GL of water over two years.

3.7.3 Infrastructure investments

The Millennium Drought and the water sector's response raised community focus on the effectiveness of our capacity to meet the water needs of the community, and also the efficiency with which that capacity has been achieved.

During 2009–10 the urban water industry was overseeing water and wastewater projects with a value greater than \$14 billion (WSAA 2010). In the period 2007–12 every major city in Australia built desalination plants which are now augmenting drinking water supplies. Perth now has two plants capable of providing half of the city's drinking water needs (Water Corp 2013).

As governments emerge from the wave of capital investment in urban water supply and wastewater systems they have been confronted with new challenges relating to efficient and effective service delivery, institutional and regulatory alignment and community demands for sustainable and affordable supply solutions. Capital constraints, debt levels, asset renewals and an increasingly market-orientated sector are adding national dimensions to the efficiency challenge (Infrastructure Australia 2013).

Under current arrangements, in all states and territories there is dispersed responsibility for achieving safe, secure, sustainable and efficient water services. This has resulted in instances of poor coordination, duplication of processes, and the preparation of plans by water businesses that are not fully consistent with government objectives. Further, not all water supply and demand management options are appropriately considered, and opportunities for achieving greater efficiencies through private participation and innovation are hampered.

The major capital investments and demand management strategies have delivered more secure water supply for our major urban cities. The cost and in some cases appropriateness of those investments remain a key focus of public debate as water users face consequential price rises. Beyond this community discussion, stakeholders have continued to express concerns that existing planning and regulatory structures are not well placed to encourage optimal future long-term infrastructure and service

planning decisions. As noted in 2011, planning and investment decisions made under conditions of water scarcity have resulted in several large-scale investments across the country that have not been subject to the same rigorous approaches undertaken through economic regulation of water utilities.

3.7.4 Pricing

In 2008, all jurisdictions agreed to full cost recovery in line with the NWI's pricing principles and most have made progress in this area. A review of the pricing principles began in 2013 to assess the usefulness of the pricing principles and the extent to which the principles meet the intent of best-practice water pricing arrangements under the NWI. The review is to be completed in 2014.

Increases in water prices to pay for new water infrastructure places pressure on living costs and come at a time when customers continue to use less water than before the Millennium Drought. Recent regulatory price paths to 2011–12 and 2012–13 suggest typical residential bills will continue to increase in the coming years but not at the rate seen in recent years.



Figure 5: Typical annual residential water and wastewater bill and water consumption

Source: WSAA submission to NWC Urban water futures discussion paper

Where cost-reflective pricing has been fully implemented there exists some concern around affordability, and government subsidy, as water bills rise.

Independent price regulation provides customers with a level of reassurance that price increases are 'appropriate', while benefiting businesses by allowing sometimes complex and contentious pricing issues to be debated in an expert and objective forum.

Tasmania has embarked on an extensive reform of its governance arrangements across water and wastewater service provision. In response to concerns about poor water quality and the economic efficiency of service provision, the Tasmanian Government created one service corporation and three subordinate regional service provision utilities. In doing so, the related service areas from 29 local council areas were brought together.

While all jurisdictions have implemented reforms to deliver economic regulatory oversight, many governments continue to blur their roles as owner, policy setter and regulator. There is evidence that independence is not always maintained.

In January 2014 the Victorian Minister for Water announced the introduction of an efficiency program entitled Fairer Water Bills to drive down household water bills. This has raised questions regarding the independent regulatory process. An independent review of economic regulation, governance and efficiency in the Victorian water sector has been commissioned by the Victorian Government. Preliminary findings identify inefficiency across the regulatory framework and propose a revised regulatory framework which includes the government providing a detailed 'Letter of Expectation' setting out utilities' performance objectives against specific economic, social and environmental outcomes; performance monitoring arrangements to deliver greater transparency to both shareholders and customers; and seeking to drive efficiency in service delivery by moving from a cost-based method of regulatory oversight to one based on a price cap.

Conclusions from the Australian Capital Territory Auditor-General's Office Performance Audit Report of The Water and Sewerage Pricing Process found poor process and conflicts in roles.

In Western Australia, legislative arrangements provide that the independent economic regulator's assessments are advisory only, with government making pricing decisions. It is likely that such decisions, when taken by governments, will have regard to matters relevant to their multiple roles – potentially distorting pricing decisions

Notwithstanding concerns in respect to the role of economic regulation in many jurisdictions, the establishment of the Office of the Tasmanian Economic Regulator in 2010 and the first determination of price on 1 July 2012 is a positive commitment to the role of regulator in the urban water sector.

3.7.5 Regional and remote areas

Regional and remote service providers face their own range of economic, demographic and geographic challenges, and there have been incidents of non-compliance with drinking water standards. Boil-water alerts have been triggered in many regional and remote communities across Australia to manage public health during system failures.

The Tasmanian reforms to sectoral governance and regulatory arrangements addressed above are expected to drive significant improvements in regional service delivery. Where structural reform has yet to be achieved, greater collaboration has been found as one favourable avenue for smaller communities to improve the effectiveness and efficiency of service delivery. Several alliance models have proven to generate efficiencies across regional utilities (e.g. the New South Wales Central Region of Councils). This approach had been found to generate economies of scope from the ability to coordinate strategic land use planning and land use development control with infrastructure-intensive services such as water supply and sewerage services.

3.7.6 Water sensitive cities

NWI paragraph 92 particularly references the agreement to promote 'innovation and capacity building to create water sensitive Australian cities'. The emerging concepts of water sensitive and liveable cities recognise the opportunities presented by integrated urban water cycle solutions to enhance the sustainability and liveability of our urban landscapes (e.g. across water supply, wastewater and stormwater).

Different facets of the urban water cycle—such as water supply, drainage, water pollution control, groundwater, water recycling and water conservation and land use planning—are often managed by different departments, making it difficult to plan and implement urban water systems holistically. The segmentation of urban water management runs counter to the needs of sustainability and

liveability. It also prohibits the unified management of the urban water cycle. Such a situation has been exacerbated by reduced water availability, climate uncertainty, urban expansion and population growth. While much has been done to capture the principles of water sensitive cities in urban planning and policy instruments common issues have been identified across stakeholders including:

- the environmental value of water is widely recognised but not yet quantified in a way to drive efficient investment/usage; developers have no incentive to innovate
- Integrated Water Cycle Management (IWCM) regulatory frameworks are being pursued but are still in their infancy
- roles and responsibilities in delivering liveability outcomes remain unclear there is a disjunct between the drivers across the water and planning sector
- tension between economic regulators and utilities regarding efficient pricing and community value
- challenges in capturing the costs/benefits of non-financial impacts and benefits such as waterway health
- to date, there have not been many outcomes to support the NWI outcomes in relation to 'innovation and capacity building to create water sensitive cities'.

While many demonstration and research examples have illustrated the benefits of water sensitive urban design applications, there have not been many outcomes that can be attributed to this approach. Water sensitive urban design provides major opportunities for innovation and change, but there are several challenges associated with its incorporation as core business for the urban water sector. These include:

- defining the concepts and their application
- agreeing on objectives and determining how to make trade-offs between costs and benefits that are inherently difficult to measure
- agreeing on how far urban water policymakers and water businesses are responsible for broader liveability outcomes
- addressing institutional and regulatory barriers
- determining who should pay for certain outcomes (CRCWSC 2013).

Utilities are focusing on customers and seek to understand what consumers are prepared to pay, in terms of environmental sustainability and service quality. However tension exists between economic regulators and utilities regarding efficient pricing and community value.

In the pursuit of liveability, future reforms are focusing on:

- building understanding of the role of water in productive and liveable cities including interface issues between integrated urban water cycle management interactions and urban planning
- clarifying the roles and responsibilities across urban agencies in driving liveability and productivity
- supporting national approaches that reduce regulatory transaction costs across the urban water sector and the economy while driving innovation
- maximising social and economic participation in water to enable greater customer choice in how urban water supports liveability

- understanding the role of urban water in preparing cities for future extreme events and the relationships with other sectors during emergencies
- understanding the role of urban fringe areas in the provision for urban growth, water and food security.

In 2011 the Commission released the *Urban Water in Australia: Future Directions* report that called for a focus on customers, efficient institutional and regulatory arrangements and clarification of the urban sector's role in delivering on liveability outcomes.

This identified the need for the urban water sector to:

- understand and meet the long-term interests of all water consumers in the price, quality, safety, reliability and security of supply and wastewater services through the efficient use of, and investment in, systems, assets and resources
- protect public health and the environment by ensuring the impacts of the sector's operations and investments are managed cost-effectively in accordance with society's expectations and clearly defined obligations
- enhance its effective contribution to more liveable, sustainable and economically prosperous cities in circumstances where broader social, public health and environmental benefits and costs are clearly defined and assessed.

In addition to the Commission's 2011 Future Directions report, the Australian Productivity Commission held a public inquiry into the case for microeconomic reform in Australia's urban water sector. The inquiry identified opportunities for efficiency gains in the structural, institutional, regulatory and other arrangements that govern the sector.

In responding to the Australian Productivity Commission and the Commission's recommendations, the Standing Council on Environment and Water (SCEW) provided COAG with an enhanced urban water reform agenda in 2012 which identified a range of actions intended to improve economic, social and environmental outcomes. These included:

- review of the NWI Urban and Rural Pricing Principles (began 2012)
- review of the National Urban Water Planning Principles (began 2012)
- review of the NWQMS (finalised and considered by COAG in 2012).

Since 2011, governments and industry have pursued urban water reform and embarked on a series of public consultation and regulatory reviews examining new approaches to urban water legislation, regulation and planning.

These reviews seek to address a wide range of issues and reflect a commitment from jurisdictions to progress reforms identified by the Commission in 2011. The Commission has some concern that despite the effort, opportunities have been missed in integrating policy and regulatory instruments across economic, environmental and public health and some reviews have yet to be completed within reasonable timeframes. Table 6 summarises the state and territory reviews of legislation and regulation underway post-2011.


Image: Mal Booth under a creative commons licence

One of the key policy reforms intended to manage the risk of monopoly behaviour by utilities is the establishment of independent economic regulation. While concern has been expressed in relation to the degree of independence afforded regulators by government, the Commission has sought to inform later discussion on this issue by clarifying the role of utilities in the state budget and the tensions managed through regulatory decisions. Essay 1 by Jim Cox, at the end of this chapter, explores these issues. The essay draws on the experience of New South Wales – though the issues discussed are relevant to all jurisdictions.

3.7.7 Concluding remarks

The actions articulated within the NWI for urban water reform are now largely complete. Institutional reforms first identified in the 1994 Water Reform Framework have not been fully resolved. There is a need to clarify, and clearly articulate the role of government and in particular to separate the roles of owner, policy maker, regulator and price setter, and those which sit with the utility service provider.

Where governments look to recycle capital in the urban sector, the need to complete urban water governance reform is crucial to achieving the best return on assets on behalf of their communities and providing confidence that service standards will be protected. We address these issues further in Section 5.3.3 and the Commission's *Urban water futures* report (NWC 2014d).

Jurisdiction	Legislation or policy	Description	Status
MSN	Review of the Metropolitan Water Plan (began 2013)	The New South Wales Government's Metropolitan Water Plan outlines the mix of measures that ensure Sydney, the Illawarra and the Blue Mountains have enough water now and for the future.	The 2010 Metropolitan Water Plan is currently being reviewed and the revised plan is due mid-2014.
	Joint review of the <i>Water</i> Industry Competition Act 2006 and regulatory arrangements for water recycling under the <i>Local Government Act 1993</i> (began 2012)	 Key areas of reform to the <i>Water Industry Competition Act 2006</i> include: refocussing the Act to regulate utility-like services and high-risk schemes introducing entity-wide licensing separating scheme approval from licensing bringing certain metropolitan council-led schemes under the Act strengthening customer protection through last resort arrangements. 	On 18 June 2014, the Minister for Natural Resources, Lands and Water tabled the Water Industry Competition Amendment (Review) Bill 2014 into the NSW Parliament.
	Independent Local Government Review – strengthening the effectiveness of local government (2012 – present)	The objective of the local government review is to create a revitalised system of local government that will remain sustainable and fit-for-purpose well into the middle of the 21st century.	The panel produced a final report which was open for public comment in early 2014. The NSW Government is preparing its response.
	Review of the Building Sustainability Index (BASIX) target	The New South Wales Government is reviewing the BASIX target to ensure that it remains current and delivers household savings.	BASIX policy has been reviewed by key stakeholders and modelled outcomes, proposed targets and cost-benefit analyses were released for public consultation in January 2014. Submissions are now under review.
Vic.	Victorian Government's Living Victoria Policy (2010)	Living Victoria (2010) provides the framework for planning and servicing the urban water cycle – drinking water, stormwater, wastewater, the environment and urban amenity.	Undergoing implementation since 2010
	Melbourne's Water Future Strategy: Office of Living Victoria (2013)	Melbourne's Water Future objectives involve liveable and sustainable communities, protect the environmental health of urban waterways and bays, provide secure water supplies efficiently, protect public health and deliver affordable essential water services.	Published 2013 following a period of community consultation
	Vic Health Safe Drinking Water Regulatory Review	Survey of drinking water systems to examine current operational performance monitoring practices to determine how much change is needed.	The Safe Drinking Water Regulations 2005 are scheduled to sunset on 19 July 2015. The department has begun planning to determine arrangements post-July 2015.

Table 6: Summary of urban legislation and regulation since 2011

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Jurisdiction	Legislation or policy	Description	Status
Vic. (cont)	Review of the regulatory framework for alternative water supplies (Department of Health 2013)	In February 2013, the Department of Health released a discussion paper to seek feedback on the <i>Review of the public health regulatory framework</i> <i>for alternative water supplies in Victoria: Supporting the safe use of sewage,</i> <i>greywater and stormwater.</i>	Feedback from the review is now available on the Department of Health's website.
	Department of Environment and Primary Industries Water Law Review	Victorian Government undertook a comprehensive review of Victoria's water laws to deliver a streamlined and effective legislative framework for water management and use in Victoria.	The Bill is now before Parliament. If passed, the new Water Act will come into effect on 1 January 2016. The Government will consult stakeholders and the broader community when implementing changes that affect them.
	Victorian Government's independent review of <i>Economic regulation,</i> <i>governance and efficiency</i> <i>in the Victorian water sector.</i>	In February 2014 the Victorian Government appointed Professor Graeme Samuel AC to independently review the economic regulation, governance and efficient operation of the Victorian water sector.	Economic regulation, governance and efficiency in the Victorian water sector: Preliminary advice from the Independent Reviewer published May 2014.
QId	WaterQ: a 30-year strategy for Queensland's water sector	Deliver an integrated catchment-based, recreation, water supply, sanitation, irrigation and environmental services at the lowest cost.	Phase 1 was the release of the discussion paper in December 2012 for a three-month public consultation period (now closed). Phase 2 is the development of the strategy itself. WaterQ.: a 30-year strategy for Queensland's water sector was released on 24 June.
AM	Microeconomic reforms in WA: Economic Regulation Authority	To provide recommendations regarding the most advantageous package of microeconomic reform measures that the Western Australian Government could implement to improve the efficiency and performance of the state's economy.	An issues paper and period of public consultation will take place in 2014. The final report on the inquiry into microeconomic reform in Western Australia has been delivered to the Treasurer and will be released by the end of July 2014.
	Economic Regulation Authority: Review of water service operating licences	The review seeks to strengthen reporting standards and handling of customer complaints for water service providers.	Public consultation occurred end of 2013. Audit and review guidelines finalised 2014.
	The Water Services Act 2012	The Act strengthens reporting standards and handling of customer complaints.	Enacted 2012

Table 6: Summary of urban legislation and regulation since 2011 (continued)

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Jurisdiction	Legislation or policy	Description	Status
SA	Essential Services Commission: Economic Regulation of South Australia Water from 1 July 2016 – Draft Framework and Approach	The Commission has released its proposed framework for public consultation and approach to regulating South Australia Water's prices and service standards during the Second Regulatory Period, commencing 1 July 2016.	The Essential Services Commission released the framework in November 2013, endorsed by SA Water in August 2014. For Cabinet consideration in 2014.
	Essential Services Commission Inquiry into Drinking Water and Sewerage Retail Services Pricing Reform	Inquiry into pricing reform for drinking water and sewerage retail services provided by South Australia Water.	The Essential Services Commission has received public submissions in response to a series of issues papers it released as a part of its Inquiry into Drinking Water and Sewerage Retail Services Pricing Reform.
Tas.	House of Assembly Select Committee into the Tasmanian Water and Sewerage Corporations Reform of Tasmania's water and sewerage sector	The Bill provides for the transfer of assets, liabilities and employees of the existing water and sewerage businesses—Ben Lomond Water, Cradle Mountain Water, Southern Water and Onstream—to a new corporation.	Public consultation occurred in 2010–11. The new corporation is scheduled to commence full operations by 1 July 2013.
ACT	ACT Government: Review of regulated water and sewerage service in the ACT	Release of final report and price direction—regulated water and sewerage services in 2013—with the average water and sewerage bill for a typical Canberra household falling by around seven per cent in 2013–14.	The ACT Independent Competition and Regulatory Commission released its final report and price direction for ACTEW's water and sewerage services to apply from 1 July 2013.
	ACT Water Strategy 2014-2044: striking the balance	The ACT Water Strategy takes a long-term view (30 years) of water resource planning in the ACT. It considers all water sources and the needs of urban areas, the environment, industry and commercial development.	Community consultation opened 3 July 2013 and closed on 30 August 2013. The strategy was finalised in August 2014.
L Z	Northern Territory Government: Reforms to the Power and Water Corporation	The government's reform program for the Territory's utilities supply industry will address financial sustainability of the Power and Water Corporation, the lack of competition and the reliance on government to fund infrastructure to ensure reliability of supply.	From July 2014 the Power and Water Corporation was restructured to separate its monopoly and competitive businesses into standalone government-owned corporations with separate boards.

Table 6: Summary of urban legislation and regulation since 2011 (continued)

NWI outcome	Supply security	Efficient water services	Public and environmental health	Water sensitive cities
Objective statement	Urban water supplies are secure, resilient and deliver customer value	Urban water is managed efficiently, delivering maximum environmental and social benefit at least cost	Urban water supplies are safe, enhance the environment and fit for use	Urban water is managed within sustainable limits, delivering whole-of-water-cycle outcomes
Progress 2004–09	Severe water shortages – high risk with traditional supply options and planning frameworks. Growth of supply diversification but high level of public debate on supply options. Limited community engagement and reduction in public confidence in decision-making process. Restricted demand through severe and prolonged water restrictions – social inequality issues emerge. Very high costs of new infrastructure – price rises. Access rights and entitlements for urban water sources unclear – limited competition. Recycling targets developed by some states.	Legislation, rebates and incentives for conservation and recycling. Significant reduction in per capita water consumption. Reduced non-revenue water and improvements in metering and billing. Limited differentiation in services types (i.e. choice in water product). Assets not well maintained in some areas. Limited community engagement in policy and regulation. Limited resource sharing and integrated decision-making. Insufficient capacity and resources in some regional areas. Pricing increasingly reflective of cost across much of Australia. Subsidies exist but becoming increasingly transparent, 'postage stamp' pricing limits fully cost-reflective pricing.	New waste streams and interconnected urban systems challenging regulatory approaches. Poor asset and river conditions in some urban and urban fringe areas. Prescriptive, inflexible regulation – barriers to innovation and efficient regulation. Growth in uptake of risk-based regulatory approaches but patchy implementation. Limited pricing of social and environmental externalities. Energy/carbon-intensive water treatment. Regulatory reforms to implement complex risk-based approaches	Emerging but limited application of integrated solutions (water sensitive urban design, stormwater, recycling). Widely divergent views and approaches across water service providers. Interface issues not well understood between urban water and other urban sectors. Growth in research and development (R&D), including validation of new treatment systems but barriers to innovation exists. Inadequate cost-sharing arrangements where social and environmental externalities exist. Greater integration in the management of the urban water cycle but institutional and policy barriers remain.

Table 7: Summary of urban water reform progress in Australia

able 7: Summary of	urban water reform progress in Aus	ralia (continued)		
NWI outcome	Supply security	Efficient water services	Public and environmental health	Water sensitive cities
Objective statement	Urban water supplies are secure, resilient and deliver customer value	Urban water is managed efficiently, delivering maximum environmental and social benefit at least cost	Urban water supplies are safe, enhance the environment and fit for use	Urban water is managed within sustainable limits, delivering whole-of-water-cycle outcomes
Progress 2009–11	Development of planning tools and processes to deal with variability and extremes. Reliance on central planning but emergence of integrated solutions including centralised and decentralised portfolio planning. Unclear objectives, including inadequately defined supply security objectives. Policy and regulatory barriers for some supply options. Barriers to emerging urban markets.	Stronger institutional frameworks (e.g. independent economic regulation) but competing equity and efficiency objectives tensions. Insufficient transparency in some decisions – raising questions about the efficiency of expensive investments. Price rises are raising social equity concerns. Growing focus on water efficiency and improved customer choice in water services.	Some regulatory obligations lack transparency and are duplicative or inconsistent across departments –focus on 'reducing regulatory red tape'. Urban waterway stress from pressures of urban sprawl and population growth. Water cycle systems increasingly interconnected – emerging water quality risks and planning challenges. Growing application of energy recovery and renewable energy use in water.	Emergence of liveability ambitions but roles and responsibilities not clearly defined. Costs and benefits unclear – lot of R&D looking at economics frameworks for understanding social and environmental externalities. Strong R&D sector and science, policy, industry coordination/ knowledge sharing.

	Sunalv security	Efficient water services	Public and environmental health	Water sensitive cities
Objective statement	Urban water supplies are secure, resilient and deliver customer value	Urban water is managed efficiently, delivering maximum environmental and social benefit at least cost	Urban water supplies are safe, enhance the environment and fit for use	Urban water is managed within sustainable limits, delivering whole-of-water-cycle outcomes
Progress 2011–14	Long-term water security largely achieved in major urban cities – major investments delivered – focus on efficiency and productivity. Downscaling of water conservation programs – sector efficiency gains have plateaued in some places. Improved community engagement and scientific evidence to validate recycling. Reforms to legislation opening up the sector to contestability and competition in service delivery – but access rights and entitlements to urban water products remain unclear, stifling innovation. Community engagement embedded into pricing policies and economic regulation – but utilities are not fully capturing the individual needs/ wants of consumers and responding through tailored services. Cost recovery now embedded into the pricing structures for utilities. Some exceptions for regional and remote utilities. Significant capital required to meet greenfield growth and brownfield asset replacement.	Cost recovery embedded into pricing policy but affordability issues emerge as water bills rise. Maintaining infrastructure, improving operational efficiencies and demonstrating value for money – a key focus and challenge of water service providers. Innovative tariff choices being explored but limited in scope and uptake. 'Postage stamp' pricing remains in most cases. Independent economic regulation exists in most places to some degree. Significant water efficiency gains achieved – some hardwired. Vast majority of capital delivered is outsourced to the private sector – an increasing focus on leveraging private capital. Growth in regional alliances, competitive competition models and partnering in service provision – resulting in some economies of scale, particularly for regional councils. Focus on 'reduce regulatory red tape' and improving productivity.	Risk management is now the central mechanism for water duality regulation – most regulators mandating the ADWG and AGWR. Most utilities well advanced in the implementation of risk management processes – high quality of drinking water supplies in most cities and towns. Key developments among regional water providers in managing water quality – but distinct challenges remain. Focus on reducing regulatory inefficiencies but fragmentation and duplication of regulations still pose challenges for some water providers. Significant R&D investment – National Certification Framework released. National Validation Framework released. National Validation – large investments in point source upgrades and an increased focus on market-based mechanisms to tackle water pollution issues.	Environmental value of water is widely recognised but not yet quantified in a way to drive efficient investment/usage – developers are not incentivised to innovate. WCM regulatory frameworks are being pursued but still in their infancy. Utilities are increasingly engaging with customers to understand what they are prepared to pay, in terms of environmental sustainability and service quality. Roles and responsibilities in delivering liveability outcomes remain unclear – there is a disjunct between the drivers across the water and planning sector. Ongoing uncertainty in respect to utility role in delivering liveability outcomes often skews regulatory decisions to short-term, least-cost options at the expense of integrated solutions. Challenges in capturing the costs/benefits of non-financial impacts and benefits such as waterway health. To date, there has been growing effort to support NWI outcomes in relation to 'innovation and capacity building to create water sensitive cities' but outcomes tend to be restricted to demonstration sites and case studies at this stage.

Table 7: Summary of urban water reform progress in Australia (continued)

Essay 1

Water utilities and state government budgets

By Jim Cox*

Introduction

This essay discusses the importance of water utilities for state government budgets. The discussion focuses on New South Wales, although much of the discussion, and the lessons learned, are relevant to other states.

With some exceptions (e.g. the Sydney Desalination Plant), water and sewerage infrastructure is owned and controlled by state governments and appears on their balance sheets. The water agencies form part of the public trading enterprise sector of the government accounts. Investment by the water agencies adds to the state's assets. Equally, borrowing by the water agencies forms part of the total liabilities of the state. New borrowing by a water agency may affect the rating of its debt by a rating agency on a standalone basis, and may influence the overall credit rating of the state. Moreover, water agencies contribute to the budget of the state government's general government sector by paying dividends and tax equivalents. Water agencies may also receive subsidies from the general government sector.

This paper sets out to do three things. First, it illustrates the importance of water agencies to state government budgets by considering data from New South Wales. Some differences between New South Wales and other jurisdiction are noted. Secondly, it discusses some issues that regulators may need to face arising from the relationship between water agencies and state/territory budgets. Thirdly, it discusses how such tension can best be mitigated or resolved.

Some data

The following data illustrate the importance of the New South Wales water businesses in the total state sector. The relevant water businesses are Sydney Water, Hunter Water, the Sydney Catchment Authority and State Water. The total state sector comprises all entities and activities that are under the control of the New South Wales Government. It comprises the general government sector, public trading enterprises and public financial agencies. It excludes water agencies that are under the control of local government authorities. Water may therefore be a smaller component of the general government sector in New South Wales than in some other states.

Table A presents some indicators of the importance of the water sector in relation to the total public sector in New South Wales. To ensure consistency, the data have been drawn from the 2013 reports of the Auditor-General of New South Wales. The water businesses include both regulated and unregulated activities and the data reported here refer to the total water business. However it is likely that the regulated activities of the water business are a large proportion of their total activities.

Table A illustrates that the water agencies contributed 4.2 per cent of the revenues, 6.0 per cent of the assets and 10.0 per cent of the borrowings of the total state sector. The water agencies contributed 1.3 per cent of the revenue of the general government sector in dividends, income tax and government guarantee fees. This figure increases to 2.3 per cent of revenue if grants and subsidies paid to the state government are excluded from the revenue of the general government sector.

By way of comparison, the electricity industry contributed 12.9 per cent of the total assets and 12.3 per cent of the revenue of the total state sector. Contributions by the electricity industry amount to 3.7 per cent of the revenue of the general government sector.

One is left with the conclusion that the water sector makes an important, but not a major, contribution to the state government budget. While the contribution that the water sector makes is welcome, it would be relatively easy to replace it from other revenue sources were the contribution to be substantially reduced. However, the water sector is more important when considering the assets and especially the borrowings of the total state sector.

Table A: Measures of the importance of the water businesses in New South Wales state sector accounts for 2013

	Total water agencies (\$m)	Total state sector (\$m)	Water as % total state sector
Assets	19,422	322,500	6.0
Capital expenditure	817	12,586	6.5
Total borrowing	7640	76,601	10.0
Total revenues	3010	71,228	4.2
Contribution to general government sector	783	60,131	1.3
Contribution from general government sector	53		

Notes

Purchases of non-financial assets: Total revenue excluding grants and subsides is \$45,987 million for the total state sector. Revenues from the water agencies are 1.7 per cent of this total.

General government revenues: General government revenues excluding grants and subsidies are \$34,724 million. Contribution from the water agencies are 2.3 per cent of this total.

Source: NSW Auditor-General's Reports to Parliament. Volumes Three and Nine, 2013.

Policy issues

The government has a number of roles in the water industry. Typically it determines policy for the industry, owns and operates the industry's assets and regulates prices and standards of service. These roles may sometimes conflict. Low prices may be desirable on policy grounds but may not be consistent with earning a commercial return on assets. High service standards may be passed forward into high prices for customers, which may discourage use of water. A government may sell an asset at a high price because that price takes into account the profits that will be earned in future because (using its pricing powers) the government will set prices to customers too high. Indeed at times it has been argued that different state governments have set prices either too high or too low.

This is a familiar situation: there is a conflict between competing but desirable objectives. Some compromise between objectives is required. Such compromises are never entirely satisfactory and can always be criticised. Moreover, the best compromise may change through time depending on changing community priorities and the cost of meeting them.

Ultimately, it is the task of politics to provide compromise between competing but desirable objectives. So the government must be allowed the last word here. It may help if the separate roles of the government are assigned to separate agencies. This avoids conflicts of interest within the agencies and requires government at the highest level to balance objectives. The techniques of economic regulation can help here too. Economic regulators adopt careful, consultative processes, and provide reasons for their decisions. By doing so they can help to illuminate the trade-offs facing the community and the costs of meeting various objectives. The government may also, if it so wishes, delegate some of the task of balancing objectives to a regulator. In doing so, it may wish to provide some guidance to the regulator on how the task of balancing objectives is to be done.

To illustrate these points I will now consider, very briefly, some of the issues that have arisen in regulating the water industry in New South Wales.

Asset valuation

If prices are to be based on costs, capital costs must first be calculated. Depreciation and the return on assets depend on asset valuation. So assets must be valued. A common way to do this is to estimate the cost of replacing assets with modern equivalents. (However it should be noted that many assets in the water industry, such as dams and sewerage pipes, will be refurbished rather than replaced.) Basing prices on replacement costs of assets would result in a large increase in prices from current levels and has not been followed in the water industry. In New South Wales, existing assets were valued at a level that would be justified by the existing level of prices (line in the sand valuation). New assets are brought into the assets base at cost. This decision was made by the economic regulator. This process tends to increase asset values as new assets replace old ones. However, technological change and efficiency improvements are offsetting factors.

Asset sales

Asset sales are challenging for all concerned. The right to earn future profits based on a regulated price path is a key aspect of the asset being sold. The government, naturally, is concerned to obtain a good price in return for selling the asset. However, too high a price would be unfair to customers and would discourage use of water that is desirable on economic grounds. These issues were considered in the context of the long-term lease of the Sydney Desalination Plant (SDP) to Sydney Desalination Plant Pty Ltd. In this instance the regulator set the price path. IPART set a price that was below the existing component in retail prices for SDP related costs. In the event, the desalination plant was leased for a payment that was 1.15 times the regulatory asset value (in this case, the cost of construction).

Rate of return

Because of the importance of capital cost in the cost structure of a water business (around half of the total), it is not surprising that the rate of return is a contentious issue. Moreover, the correct rate of return for a water business can be known at any one time only with imprecision.

Nevertheless, there seems to be increasing (but not universal) acceptance that the owners of water assets are entitled to receive a return on these assets that is related to risk. The capital asset pricing model is typically used to work out what the return on assets should be. This results in a rate of return that exceeds the interest rate at which the government can borrow. The value of parameters within the capital assets pricing model remain controversial. Even here it is possible that the gradual accumulation of evidence and practice will lead to a resolution of many of these disagreements. The extent of disagreement that now exists should be seen, however, in the light of the agreement on the nature of the approach.

Credit ratings and financeability

If the rate of return is set correctly the water business will be able to recover the cost of its investments over time. Any short-term problems with cash flow can be addressed through borrowing. If longer-term problems exist, this may indicate that the rate of return has been set incorrectly. Having said that, governments have been concerned to ensure that the water business maintains an investmentgrade credit rating on a standalone basis. It should be noted that the water agencies' borrowing program forms part of the overall borrowing program of the New South Wales Government and that the debt of the water business is guaranteed by the government. However, regulators have in effect introduced another constraint in their decisions because of this concern to address financeability.

Regulators can address financeability through two approaches. First, they can check their decisions to ensure that sufficient revenue is generated to enable the business to meet its obligations to pay interest, taxation and dividends and to pay for a proportion of capital expenditure.

Secondly, they can estimate the value of the cash flow ratios that are used by credit rating agencies as an input into determining ratings. Because these ratings include qualitative as well as a quantitative components, it is difficult to predict the ratings themselves. Yet the value of the relevant ratios can be estimated and considered by regulators in making their decisions.

Expenditure assessment

Regulators periodically review the capital and operating expenditure of regulated businesses to ensure only the efficient cost of undertaking the activities that the businesses are required to do is passed on to customers. In the case of capital expenditure this involves investigating whether the right projects will be undertaken in the future at the right price. However, operating expenditure is in practice stickier downwards; for example, because commitments have been made to staff. This issue can be handled either by setting a path for operating expenditure that takes account of the rate at which operating expenditure can in practice be reduced, or by moving immediately to efficient operating cost. In this latter case, the owner will experience a lower rate of return during the period when costs are being reduced. Although there are arguments for and against both approaches, the second seems more consistent with the principle that customers should pay no more than the efficient cost of pricing the service.

Circumvention of regulation

As noted earlier, economic regulators exercise the authority that has been delegated to them by government. It follows that governments can take back this authority should they so choose. In New South Wales this has happened in two ways. First, the requirement to undertake certain expenditures (e.g. to construct sewerage in backlog areas) may be a condition of the water agency's operating licence. In this case, the economic regulator can enquire about whether the requirement is being undertaken efficiently but cannot question whether the activity produces benefits to society that exceed the costs. Secondly, section 16 A of the IPART Act enables the relevant Minister to direct IPART to include the efficient cost of a specified activity in prices when it makes a price determination. Once again the regulator cannot enquire about whether undertaking the activity is in society's best interest.

Section 16 A was introduced during the Millennium Drought to deal with government commitments, such as to construct the Sydney Desalination Plant, which were taken to the community during an election campaign. It is perhaps unavoidable that major commitments of this nature should be elevated out of the sphere of economic regulation. However, it is equally important that routine expenditure should be carefully examined by the economic regulator. Recent legislative changes, which require the agreement of the Premier before a section 16 A directive can be issued to IPART, are therefore welcome.

Conclusion

State and territory governments have many roles in water industry: as owner, operator, policy maker and regulator. Tensions arise in undertaking these activities because they are subject to desirable but competing objectives. Ultimately, the resolution of these tensions is the stuff of politics but in practice resolution often falls to economic regulators. Regulators can help by consulting widely and by providing reasons for decisions. In practice economic regulators have been successful in developing acceptable compromises between competing but desirable objectives.

For regulators to play this role all stakeholders (including governments) need to respect the regulator's role. This does not mean that water and sewerage should be taken out of politics. Rather, as far as possible, governments should specify the objectives to be achieved through regulation and allow the regulator to develop the best means of achieving the objectives. This requires stakeholders to have confidence in the ability and objectivity of the regulator. Such confidence should develop through time. Regulators adopt careful, consultative processes and give clear reasons for their decisions. This will help to generate confidence and trust. The quality of the individuals appointed to make regulatory decisions is also important.

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Australian Government
National Water Commission

Chapter 4 Impact

4 Impact

Implementation of the National Water Initiative (NWI) has influenced the economic efficiency of water allocation and use, the articulation of the environmental objectives of water management, and the way water is used to support economic, social and environmental outcomes. This chapter presents the Commission's assessment of the extent to which the NWI and associated reforms have supported the achievement of the NWI vision: *Water use in Australia optimises economic, social and environmental outcomes*¹⁴.

Assessing the impact of water reform on economies, the environment and communities is not straight forward. Water is an enabler of economic growth, but its impact can be difficult to quantitatively separate from other influencing factors such as commodity prices and terms of trade. Likewise, water availability plays a key role in the health of the environment, but other factors such as loss of habitat, water quality and land use practices also strongly influence environmental outcomes. Large variations in water availability resulting from extremes in climate have also complicated assessment of the role and impact of water reform. Given the lack of evaluation studies targeting the impacts of specific water reforms, this assessment has relied on generally available information, which is problematic due to the range of extraneous factors, and is largely qualitative in nature.

4.1 Summary of assessment

During the past 10 years all Australian governments have made very significant investments in improving Australia's water management. Water reform has resulted in economic gains, improved governance, enabled community engagement in water planning and established arrangements to ensure the future health of Australia's water resources.

Establishment of statutory-based entitlements, unbundling of water entitlements from land and the creation and operation of water markets have facilitated movement of water towards higher-value uses, particularly in times of scarcity. These changes, together with addressing overuse to preserve the productive base of the resource, have provided greater investment confidence, increased innovation and provided incentives to use water more efficiently.

There has been a significant improvement in both the technically and economically efficient use of water and the sustainability of water use. While gains are still to be made in the areas of pricing and regulation, the economy has benefited from water reform. The availability of data and information has been greatly improved under the NWI. In addition to substantial programs run by states and territories, Commonwealth investment in programs such as the Improving Water Information Program and the Raising National Water Standards Program, and investments in knowledge to underpin the Murray–Darling Basin Plan (the Basin plan) have increased the information available to policy makers, planners and managers¹⁵. This information has been used to improve water management decisions in all jurisdictions.

While there have been notable successes, the extent to which water reforms have supported a healthy environment is difficult to determine in some cases. Environmental outcomes can take many years to manifest and environmental water programs are not yet fully implemented. Monitoring and assessment has often been inadequate, or not well targeted, to determine whether environmental objectives established under water planning arrangements have been met.

¹⁴ Adapted from the NWI, paragraph 23.

¹⁵ For instance, the independent review of the RNWS concluded that 'The vast pool of technical knowledge and information created from projects will serve future research and development, water planning and management well'.

Water reform has also supported people and communities. Consultation requirements for the development of water planning arrangements have now been incorporated into state and territory legislation or policies, and applied in practice in most cases. As a minimum, these include provisions for the publication of water resource information and draft proposals, followed by an opportunity for stakeholder and public comment on proposals. In the urban context, the capacity for customers to provide input to service preferences and pricing structures has been improved, although it has a way to go.

Although issues still exist for regional and remote communities, drinking water quality largely meets the 2004 Australian Drinking Water Guidelines and security of supply has been greatly improved through investments in new water sources and less climate-dependent supply options.

The extent to which water reforms have supported the economy, the environment and communities are discussed in greater detail below.

4.2 Increasing the productivity of water use

Water facilitates much of Australia's economic activity. Industry uses of water account for as much as 89 per cent of Australia's total water consumption, with the agricultural industry consuming the largest volume of water (9418 GL in 2011–12) (ABS 2013a).



Figure 6: Water consumption in Australia

Source: Water Account, Australia 2011–12 (ABS 2013a)

The NWI implicitly recognises that a healthy environment supports a productive economy and that water extractions for consumptive purposes which exceed an environmentally sustainable level of take may, over the longer term, affect the productive capacity of the resource.

Reform measures such as the establishment of property rights for water through statutory water access entitlements, inclusive water planning arrangements, and the facilitation of markets have all contributed to positive economic gains at the community, regional and national levels. In practice water reform in Australia has empowered many entitlement holders, enhanced financial security, and provided greater flexibility and access to water resources. The adoption of statutory-based water access entitlements and planning arrangements has been found to increase the level of security and commercial certainty over water resources (NWC 2011a). Water access entitlements defined as a perpetual open-ended share of the consumptive pool have ascribed a recognised property right to water, which in turn has allowed the treatment of water as a financial asset.

Statutory water planning arrangements have provided certainty about the terms of access for consumptive users within an evidence-based, participatory and transparent process, including articulating the roles and responsibilities of both managers and users.

Assigning clear property rights and planning arrangements to water has produced several economic benefits, including increased access to business finance and the underlying financial incentive to progress efficient and effective water use.

The adoption of water access entitlements and planning frameworks throughout jurisdictions has provided a platform for the growth of water markets and trade. Water markets and trading arrangements are an important mechanism providing water users with greater flexibility, the capacity to move water to more productive and efficient uses, and the ability to better manage business risk arising from climatic variability. The ability to trade water allows for reallocation to its highest-value use and provides significant economic, social and environmental benefits.

For example, water markets have become essential for rice growers to take advantage of annual crop flexibility. When water is scarce, water moves to higher-value uses, but when water is plentiful, rice production expands and the industry makes a significant contribution to Australian agricultural exports and rural economies. Overall, water trading decisions by rice growers (purchases and sales) play a valuable role in moving scarce and variable water resources to their highest-valued uses (NWC 2011b).

The positive impacts of markets and trading activity for the economy were illustrated through the Millennium Drought. As water availability reduced, allocation trade increased – reflecting the movement of water to meet its highest-value uses. As a result sellers of allocation received much-needed cash injections that helped them cope with drought and manage debt, while purchasers were able to maintain production and keep permanent plantings alive (NWC 2010). While water trade alone cannot ameliorate the substantial and often negative social and economic impacts of drought, it has contributed to reducing some of these negative impacts.

Markets and trading have allowed irrigators to react to prevailing and unexpected conditions, with farm managers continually modifying their production and input decisions to maximise their financial position. The benefits of water trading revolve around the increased flexibility that trading gives individual water users. Water trading enhances irrigators' ability to optimise their water use. Through the Millennium Drought irrigators used the flexibility and autonomy offered by the water market to maintain their agricultural production, which provided economic benefits to both farmers and the broader community.

Water use and agricultural production data for the southern Murray–Darling Basin demonstrates that a reduction in water use in irrigation did not lead to a proportionate reduction in agricultural production. Between 2001 and 2006, the value of agricultural production in the southern Murray–Darling Basin (including dryland and irrigated agriculture) increased by nearly two per cent despite a 14 per cent reduction in water use (NWC 2010).

Despite many farms experiencing negative returns by 2006–07, consultations with irrigators broadly affirm conclusions from previous studies that water trading has helped individual irrigators manage and respond to external drivers including seasonal water availability, changes in commodity prices and input costs, government water policies, and social trends by allowing more flexible production decisions (NWC 2010).

This generally positive view should not obscure the concerns of those who feel the reforms have not yet bedded down and may have created uncertainty in some communities, revealing that the benefits have not been felt uniformly and the reform process is not considered 'finished'.

4.2.1 Secure access rights to water

The extent to which water supports the economy is underpinned by secure access rights and economically efficient water use. Secure legal rights of access separated from land enables water to be treated like any other property right, in turn encouraging investment in water as a resource, and allowing its treatment as a financial asset.

Enhancing security and commercial certainty around water resources is one of the NWI's fundamental objectives. To assess achievement of this outcome the implementation of various aspects of the NWI was examined, and in particular the water access entitlements and planning framework. Since 2004 NWI parties have worked towards incorporating elements of the entitlement and planning framework into their relevant legislative, management and planning processes.

Submissions to this assessment ranged from an acknowledgement of the NWI's role in the growth of water markets, to the lack of water provided to Indigenous communities for economic purposes. The National Irrigators Council stated that: 'National Water Initiative principles have resulted in an entitlements framework that supports entitlements holder's property rights; it also supported the development of both an annual and permanent water market. The NWI principles have therefore contributed to supporting our economic development, our communities and the environment'. The Barmah-Millewa Collective indicated 'there is still a lack of clear and specific measures to account for indigenous water values and to provide access to water resources'.

All Australian governments have demonstrated a long-term commitment to water planning, and each jurisdiction has developed its own water planning framework, reflecting various priorities and drivers for water management across the country (NWC 2014a).

Water planning coverage has substantially improved and most jurisdictions now have more than 80 per cent of water use managed under water planning arrangements that define the availability of water for consumptive use. Establishing agreed sustainable levels of consumptive use has delivered entitlement holders greater certainty and reduced the risk of arbitrary change.

Jurisdictions have also worked to establish either fully or partially unbundled water entitlements where they have identified it is in the public interest to do so (NWC 2014a). In some jurisdictions further unbundling has been identified and is scheduled, but this is a relatively small change from the status quo. The establishment of water access entitlements has delivered significant benefits for water users and water management by creating a more secure, recognised property right to water.

Water access entitlements and planning reforms have together increased access to business finance, made investment in water-efficiency measures more cost-effective, and provided flow-on benefits for communities (NWC 2011c). Increasingly water access entitlements are being used by entitlement holders as collateral for accessing finance. Survey data collected by the New South Wales Department of Primary Industries examined the extent of irrigators utilising water title as security over loans. The survey, involving more than 1000 irrigators, found that up to 35 per cent of irrigators were using water title as security over loans in 2010, an increase from 30 per cent in 2006 (DPI 2011).



Figure 7: Percentage of irrigators in NSW using water title as loan security

Financial arrangements typically take into consideration the type of entitlement in question, the level of water security attributed to the entitlement, a clear and unencumbered title, and are reviewed in the context of historical water availability and the market value of entitlements¹⁶. Increasing levels of finance are being taken out against water entitlements and the continuing growth in water market trade means the need to ensure security over water assets has gained momentum.

Compliance and enforcement is an important tool in providing protection and instilling a sense of confidence and certainty for water users and entitlement holders. Until recently different jurisdictions took varied approaches to compliance and enforcement. The introduction of the National Framework for Compliance and Enforcement Systems for Water Resource Management in 2012 provides an opportunity to enshrine a nationally consistent approach by strengthening water compliance and enforcement within each state and territory.

Since the National Compliance Framework was introduced a variety of new compliance activities has been undertaken in the jurisdictions, such as funding new technology to improve the speed, coverage and cost effectiveness of compliance activities, employment of additional compliance officers and additional licence inspections. Increased compliance activity not only provides a visible deterrent to unauthorised water use, but also contributes towards a shared sense of security over water resources, which in turn increases the confidence of users to invest in water (J Guilfoyle 2014, pers. comm., Department of the Environment).

While the majority of the evidence suggests that rights of access to water have become increasingly secure over time, this sentiment is not necessarily supported by all water users. Data analysed by the University of Canberra from the Regional Wellbeing Survey explores community perceptions and experiences of water reform. The survey notes that while elements such as water trade, investment, water use efficiency and upgrades to infrastructure have been received positively, aspects such as environmental watering and the sale of water entitlements within certain communities have evoked some uncertainty about the future within certain communities. As a result, more than 50 per cent of irrigators disagreed with the notion that their rights to access water (when it is available) are better protected than they used to be (Schirmer 2014).

Source: extracted from Monitoring economic and social changes in New South Wales water sharing plan areas (DPI 2011)

¹⁶ Evidence derived from a survey of National Australia Bank Agribusiness managers undertaken for this assessment, see Appendix D

4.2.2 Economically efficient water use

For water use to be economically efficient, water must be used efficiently as an economic input – both within specified activities and more broadly across systems. In economic terms water use efficiency can be characterised as water being directed to its highest economic value, in other words directed to the use which generates the greatest net benefit. Many factors influence water use efficiency including water availability, transactions costs, markets and trading, pricing mechanisms, technological innovation, infrastructure, and effective management and regulation.

Water planning arrangements define the volume of water available for consumptive purposes across most systems where there are significant demands for consumptive use. To ensure the defined extraction limits support sustainable economic development, most water plans include economic objectives supported by assessments of current and future consumptive demand as well as hydrological and environmental studies¹⁷. More detailed assessments of socio-economic impacts are usually undertaken in areas where overuse has been identified. Reporting arrangements vary by jurisdiction, however information on the availability and use of water for economic purposes is regularly reported.

The NWI articulates the need for a nationally-compatible water markets and trading system with key elements of the agreement underpinning this market-based approach. The Australian water market is a composite of many separate markets, each defined by water system boundaries. Jurisdictions have worked to develop markets, including removing barriers to trade, in an effort to facilitate a broadening and deepening of the water market within Australia.

Legislative and administrative arrangements are in place to facilitate water trading in every state and territory to some extent. Market trading and participation has increased over time; for example, between 2007–08 and 2012–13 the volume (GL) of allocation trade has more than quadrupled from 1293 GL to 6058 GL in the Murray–Darling Basin (NWC 2013e). These figures demonstrate the growing depth and confidence in Australia's water markets.



Figure 8: Entitlement and allocation trade in the southern Murray–Darling Basin, 2001–02 to 2012–13

Source: adapted from the Australian water markets report 2012-13 (NWC 2013e)

17 See Appendix D.

In 2012–13 the overall turnover in Australia's water markets was \$1.4 billion. The water market in the southern-connected Murray–Darling Basin remains the major water market in Australia, accounting for 78 per cent of trade in entitlements and 98 per cent of trade in allocations across the country. Markets also operated to a limited extent in parts of Queensland, New South Wales, Victoria and South Australia outside the Murray–Darling Basin as well as Western Australia and Tasmania (NWC 2013e).

Efficiency within a market relates to the movement of resources to their highest economic value. As such, growth in water trading activity can be viewed as the economic 'optimisation of our water resources in action'. For the most part this is true with markets optimising water use and producing economically beneficial outcomes for individual users and communities. A critical element of economically efficient water use, and a fundamental aspect of water markets, is the flow of high quality and timely information. For this to occur, sufficient information must be available to allow clear decision-making by market participants.

Water market participants obtain water market information from several sources, including water brokers and exchanges, private networks (formal and informal relationships), irrigation companies, state water registers, and publicly available reports (such as the Australian water markets reports). Market participants need both current information (to decide on buy and sell price triggers) and historical information (to understand market behaviour through the water year and in response to seasonal conditions). Information availability in the Murray–Darling Basin is expected to be further improved under the Basin plan water trading rules (which commenced in July 2014), which include information reporting requirements.

An important aspect of water market information is a clear price signal. Clear price signals allow users to make decisions on consumption when the full cost of supply is incorporated into overall pricing, encouraging changes in behaviour. Data analysed by the University of Canberra from the Regional Wellbeing Survey examined whether irrigators believed it was easy to access the information they needed to conduct water trades. This analysis indicates that ease of access is related to the level, development and sophistication of water markets. For example, within the southern Murray–Darling Basin 56 per cent of respondents agreed they had access to information, whereas in less developed water markets, such as those outside the Basin, only 16 per cent felt it was easy to access water trading information (Schirmer 2014).

Jurisdictions have continued to improve their water markets and trading processes, including the facilitation of interstate trade and the implementation of better service standards and transaction systems. Systems such as the Victorian Water Register set new benchmarks for this progress, delivering the ability to update information on a daily basis and publishing volume and price data regularly. However, not all jurisdictions have this level of accessibility or timeliness of data – which ultimately impacts on the efficiency of water markets.

Case study 6 Southern Murray–Darling Basin water market

Water markets and water trading have made a major contribution to the achievement of the NWI objective of optimising the economic, social and environmental value of water. Water markets have been enhanced by removing the requirement for water owners to own land. This has allowed water owners to more freely trade their excess water. In Australia the southern Murray–Darling Basin is where more than 80 per cent of water trade occurs.

Trade in water entitlement in the southern-connected Basin has increased quickly, from 40 GL in 2005–06 to a high of 763 GL in 2008–09 during the drought, before falling back to around 600 GL in 2011–12 with a further decrease to 455 GL in 2012–13.

The period 2009–10 to 2012–13 saw a sharp increase and then gradual reduction in the purchases of entitlements for environmental purposes. In 2011–12 environmental purchases peaked at 48 per cent of entitlement trades before scaling back to 39 per cent in 2012–13.

The allocation trade market is a different market from the water entitlement market. The drivers of water availability and immediate water requirements for crops are the fundamental drivers of the allocation market. Changes to the various carryover provisions in some states contributed to the volume of allocated water traded.

Progress in the water markets has not been without difficulty and several issues remain: stability of process and rules about carryover and the end-of-trade suspensions and limits are needed. Greater accuracy and timeliness around market information is also required to allow increased market efficiency to be achieved.

In spite of these shortcomings, the southern Murray–Darling Basin market has had an average turnover of \$1.8 billion per year since 2007–08 but recent data shows this amount is declining. In 2012–13 the annual turnover was \$1.1 billion, reflecting a substantial reduction of purchase activity by the Commonwealth and the exhaustion of pent up demand.

Market maturity has seen increased consideration of climatic conditions, crop production requirements, environmental deliveries, increased understanding of the system and how it responds to prices and demand, and greater broker activity. The market is also becoming familiar with the CEWH and realising that it will be a long-term participant in both the entitlement and allocation sectors of the market.

Much of the successful market reform implementation has been achieved through improved operating processes, increased compatibility of state water registers, reduced processing times for water trades, the gradual move to online lodgement, and an increasing understanding of what the market needs.

Allocation trades have steadily increased reaching 5478 GL in 2012–13. While these figures include both irrigation and environmental water, trade for irrigation purposes accounted for more than two-thirds of total allocation trade in 2012–13.

The post-drought expansion in annual cropping areas drove allocation trade volumes upwards. The 2011–13 period has also seen the transfer of water for environmental purposes add to allocation trade and contributed to record volumes of water allocation trade in the southern-connected Murray–Darling Basin. This is particularly evident with the volume of environmental water traded into South Australia, where the net delivery to South Australia has increased from 145 GL in 2007–08 to 925 GL in 2012–13.



Significant interzone allocation trading in the southern Murray–Darling Basin, 2012–13 (NWC 2014c)

Case study 7 Tasmanian Irrigation

Tasmanian Irrigation Pty Ltd (TI) was established on 1 July 2011 as single state-owned company responsible for the development and operation of publicly subsidised irrigation schemes. It is the successor company of the former Rivers and Water Supply Commission and the Commission's former subsidiaries, Tasmanian Irrigation Development Board Pty Ltd and Tasmanian Irrigation Schemes Pty Ltd.

The primary aim of the schemes developed by TI is to develop and enhance the productive capacity of the state's agricultural industries. TI develops schemes as public/private partnerships where the capital investment is publicly funded and private investment pays for the ongoing costs. The public investment-made up of \$140 million from the Commonwealth and \$80 million from the Tasmanian Government—is the result of a National Partnership Agreement with an objective to use water more efficiently. Private capital contributions are made through the purchase of tradeable water entitlements. Each candidate scheme is developed according to an agreed process that requires a feasibility study that matches demand with supply, a viable business case and advanced payments for water entitlement. The funding contribution from the Australian and Tasmanian governments has been justified on the basis of wider community benefit from increased economic activity that is expected to generate sustainable employment.

an average reliability of greater than 95 per cent. This reliability is supported by historical hydrology data and further tested against climate change using run-off models developed by the sustainable yields project completed by the CSIRO. Sustainability is further enhanced by a water supply condition that requires land to be managed in accordance with any recommendation or restriction identified in a mandatory farm water access plan.

A water market operates in Tasmania for permanent and temporary trade of water entitlement and trade of water allocation. TI operates a water register that records information on ownership of water entitlement, financial interests and transfers of water entitlement and price, but this information is not readily available. For schemes that are not fully allocated TI provides price information to potential buyers on application. In developed schemes, the monthly average price of water trades is published in local newspapers. Trade intensity is low, less than 100 per year, and water brokers are not active in the area.

The construction of TI schemes has developed and enhanced the productive capacity of the state's agricultural industries. This was achieved by scientific definition of a sustainable consumptive pool, the allocation of unbundled water entitlement by a market-based mechanism and effective institutional arrangements such as a fit-forpurpose water register that supports water trading.

Each irrigation scheme is based on a hydrologically connected area and a defined volume of unbundled water entitlement. Before each scheme is built, TI sells water entitlement by an open tender using a reserve price. Ongoing operating costs, including provision for asset renewal, are met by annual charges levied on water entitlement holders – although it is unclear as to whether the charges will support demands made on the asset renewal fund in the long term.

TI provides the technical, financial and project management skills to progress schemes from concept development through feasibility and construction to operations. Assets in each scheme have a design life of 100 years and deliver water at



Location of irrigation schemes in Tasmania

Advances in technology and infrastructure have driven increased technical efficiency, reducing the amount of water required for a given purpose and thereby increasing the water resources available for other uses. For example, Australia-wide megalitre per hectare application rates for irrigated agriculture, across all enterprise types, has fallen from 4.3 ML/ha in 2004 to 3.8 ML/ha in 2012, a drop of 10 per cent (ABS 2013b). In part this can be explained by gains in water use efficiency, especially in consideration of extended drought throughout the period. In addition, data from the Regional Wellbeing Survey supports that investment in water efficient infrastructure and practices, by both water service providers and users, has produced positive impacts for farmers and resulted in on-farm water use efficiency gains (Schirmer 2014). In reality, this progress has been achieved in multiple ways, including improvement of physical infrastructure, innovation, R&D, regulatory arrangements that promote efficiency and the use of technical solutions that factor in all externalities (including energy consumption).

In the urban context, defined levels of service support the efficient and sustainable delivery of water resources, encompassing 18.7 million Australians in 81 urban centres, including all urban centres with more than 10,000 connections. Many smaller urban centres also enjoy defined service levels for the supply of urban water. Service level measures, such as price (of water per unit), finance (the financial characteristics of the water utilities) and health (microbiological compliance) reported in the national performance reports have allowed consumers to compare the price of their water with other utilities' water, despite the quasi-monopoly status of (most) water utilities. Despite price increases, consumer satisfaction has increased, with complaints decreasing by 25 per cent between 2011 and 2013 (NWC 2014e).

4.3 Ensuring the environmental health of water systems

Environmental degradation and rapidly increasing water extractions were drivers of the original 1994 COAG water reform framework, and the 1995 cap on surface water extractions in the Murray–Darling Basin. The NWI seeks to ensure statutory provision for environmental and other public benefit outcomes and the return of overallocated and overused systems to environmentally sustainable levels of extraction¹⁸. Governments have sought to use water planning as the key tool to ensure that extractions are managed within agreed limits, with the resultant flow regime intended to protect the productive base of the resource as well as ensure the environmental health of surface and groundwater systems.

Where systems are identified as overused, water recovery arrangements have generally been put in place and over time improvements in the environmental condition of these systems would be expected. In other systems, where water recovery has not been deemed necessary, we would expect to see the maintenance of identified environmental values through appropriate water planning mechanisms.

Assessing the effectiveness of environmental watering strategies can be difficult given the environmental condition of rivers, wetlands and groundwater-dependent ecosystems is determined by many factors, including those related to land management. The environmental health of waterways depends both on the appropriate volume and timing of flows, and on complementary catchment management activities such as riparian restoration, invasive species management and land use practices that minimise impacts on water quality. Environmental monitoring programs that target ecological assets with critical linkages to flow regimes enable a more definitive assessment of whether environmental flow management strategies have been effective.

18 NWI, paragraph 23 (iii) and (iv).

The implementation of monitoring programs to inform the evaluation of environmental objectives in water plans has been variable both within and across jurisdictions. While there are good examples of environmental flows assessment programs that specifically target ecological assets with critical flow dependencies, the evaluation of environmental objectives often relies on statewide monitoring programs that are not designed to assess individual water plans. Hydrological monitoring data is often used to confirm whether environmental flows have been delivered as intended, however it cannot be used determine whether those flows have been appropriate for maintaining ecological health. Even where ecological monitoring programs are being implemented, responses to environmental watering may take years to reveal themselves. As such, it is difficult to provide a broad outcome-based assessment of water reform's contribution to the environmental health of water resources. Ongoing commitment to targeted ecological monitoring should, over time, reveal whether environmental condition is being maintained or improved and where adaptive management strategies are needed.

It is important to note that environmental policies, programs, objectives and actions are well developed in most jurisdictions. Where these are implemented fully and effectively, with appropriate monitoring and adaptive management in place, the Commission has confidence that the environmental sustainability of water resources will be significantly improved, providing the basis for better economic and social outcomes.

4.3.1 Environmental condition of water systems

Environmental condition has been reported at various scales across Australia. The *2011 State of the Environment Report* (DSEWPaC 2011) provides a broad assessment which indicates generally good environmental health levels where low levels of extractive water use occur, and poor to very poor levels of environmental health where consumptive water use is high. Streamflow, or the pattern of water flowing through our rivers, has also been found to be poor in many areas of high water use. The Murray–Darling Basin has the most impeded flows, although higher rainfall in recent years and recovery of entitlements for the environment has resulted in an improving trend (DSEWPaC 2011).



Figure 9: State of flows and ecological processes

Source: adapted from State of the Environment Report, 2011 (DSEWPaC 2011)

State of the environment reports are also produced at various intervals by several states and territories, usually with information about the state of river and wetland health. Victoria provides the most comprehensive example of such assessments, with a statewide assessment of river condition undertaken periodically since 1999 and an assessment of wetland health since 2009–10. The third Index of Stream Condition report provides a snapshot of river health for 29,000 km of major rivers and streams in Victoria, using data collected over a six-year period from 2004–10. Across Victoria, 23 per cent of river length assessed was in good or excellent condition. The report indicated no substantial change in statewide river condition had occurred between 2004 and 2010, a good result considering the period coincided with a severe drought and several extensive bushfires (DEPI 2013).



Figure 10: Percentage of river length in each condition category for Victorian waterways based on Index of Stream Condition

Source: adapted from the third Index of Stream Condition report (DEPI 2013)

The Murray–Darling Basin Authority's Sustainable Rivers Audit was carried out within the Murray–Darling Basin for the 2004–2007 and 2008–2010 periods. In 2008–2010 most of the 23 designated valleys assessed were in poor or very poor condition with only the Paroo rated as being in good condition. Major refinements to the methodology used to assess the status of the Basin's river ecosystem health were made for the second reporting period (2008–2010) and two new themes—vegetation and physical form—were included in addition to the fish, macro-invertebrates and hydrology themes. Due to these changes the results from the two reporting periods could not be directly compared, however an analysis of temporal patterns was possible for individual themes. From 2004–2010 the condition of fish communities improved significantly in seven valleys, declined in seven valleys and remained unchanged in the remaining nine valleys. There was an increase in flow alteration relative to reference condition in low flows, high flows and flow seasonality however this should be interpreted in the context of the sampling period occurring during the Millennium Drought. More data collected during the wetter period of 2011–13 should provide a wider range of baseline conditions to support understanding of the natural variability across the Basin.

4.3.2 Water planning arrangements

Commission assessments have found that more than 80 per cent of water use in most jurisdictions is managed under water plans and that almost all of these plans include limits on extractions for consumptive purposes (NWC 2014a), with the extraction limit generally based on trade-off decisions between consumptive and environmental uses. In water resources subject to higher levels of competition, decisions are usually informed by detailed scientific and socio-economic studies that consider stakeholders' concerns from an early stage and reflect trade-offs between economic, social and environmental outcomes.

However, some areas of high consumptive use remain without adequate planning arrangements in place, for example where water plans are yet to be finalised, or where the levels of unlicensed use put pressure on an identified extraction limit¹⁹.

Water plans also contain environmental water management arrangements in nearly all cases, although the basis for these arrangements varies. Many newer plans have sought to identify the environmental assets to be maintained and to assess the environmental water needs of those assets. This has been facilitated by improvements in knowledge about ecological responses to flow regimes resulting from state- or territory-wide programs such as the Victorian Environmental Flow Monitoring and Assessment Program and Queensland's Environmental Flows Assessment Program.

In addition, the national Aquatic Ecosystems Toolkit has been developed to provide a nationally consistent approach to the identification and classification of aquatic ecosystems and environmental assets, particularly in regions that cross-jurisdictional boundaries. The toolkit promotes the management of aquatic ecosystems for natural resource outcomes beyond the water management obligations identified through the NWI, and may enable closer integration of the environmental objectives in water plans with catchment management plans.

Yet in spite of these developments, the environmental water provisions within many water plans are not based on the watering requirements of identified assets, but rather on the assumption that mimicking natural hydro-ecological flow variability will protect aquatic ecosystems (NWC 2014a). It is noted that the Basin plan requires Basin states to prepare long-term watering plans identifying, for each plan area, priority environmental assets, ecosystem functions, and environmental watering requirements by 2015.

The Commission has found that environmental water arrangements, while present, are lacking in terms of coverage and quality for almost half of all water plans assessed (NWC 2014a). Most water plans contain environmental objectives but the lack of ongoing monitoring and evaluation has often prevented an understanding of whether the water plans are meeting these. There are many cases where commitments to undertake environmental monitoring, assessment and reporting have not been met due to resourcing constraints or other priorities. The Murray–Darling Basin Authority's Sustainable Rivers Audit has ceased (MDBA 2013a) and there has been only limited implementation of the National Framework for Assessment of River and Wetland Health (NWC 2011d), both of which are higher level assessments of river health. In some jurisdictions water plan reviews have been delayed or not undertaken at all, for example in Tasmania where none of the scheduled plan reviews have been completed, and reviews are on hold indefinitely as resources are prioritised to areas of greater need (NWC 2014a).

Recent developments in some jurisdictions have improved the level of information available to assess the achievement of water planning objectives, mainly due to a review of 31 older New South Wales water plans (NRC 2013), the publication of 14 water plan evaluations in Western Australia and the review and replacement of four water allocation plans in Queensland.

19 Examples include Berry Springs and Howard East in the Darwin rural area of the Northern Territory.

Case study 8

Environmental Flows Assessment Program – review of the Burnett Water Resource Plan

For most of Queensland, the Environmental Flows Assessment Program (EFAP) provides the science to inform an assessment of how water resource plans (WRPs) are providing for ecological outcomes. Targeted ecological monitoring projects identify and monitor ecological assets with critical flow dependencies to measure the effectiveness of environmental flow provisions in specific WRPs.

The EFAP's objectives are to:

- determine if current flow management strategies in a WRP are providing critical flow requirements for ecological assets
- determine the risk to ecological assets in a WRP area under various flow management scenarios
- evaluate if a WRP is achieving its stated ecological outcomes through current flow management strategies, or if changes or additional strategies are required.

The Burnett Basin is one of the largest basins in South East Queensland and discharges into the southern end of the Great Barrier Reef. A two-year Burnett Basin EFAP project was completed in 2012 as part of the review and replacement of the WRP; it identified ecological assets and processes with critical links to flow, as well as links to the ecological outcomes in the WRP. The project identified optimal flow regimes to support the following ecological assets:

- Australian lungfish
- white-throated (or southern) snapping turtle
- waterholes as refugia
- brackish estuarine species (banana prawns, barramundi, sea mullet and river mangrove).

Based on this knowledge, a comprehensive risk assessment was carried out using hydrological modelling to assess the risk to these assets, including the critical habitats and processes that support them, under a range of water allocation scenarios. Several changes to the environmental water management rules were adopted including changes to nominal operating levels of storages to support turtle nesting, provision of more stable water levels to provide optimal habitat for lungfish breeding, and



Burnett Water Resource Plan area

changing the seasonality of environmental flow releases to better align with estuarine fish breeding cycles.

The EFAP in the Burnett catchment demonstrates how targeted monitoring and assessment has effectively informed adaptive management and review to improve the environmental performance of water planning. A more detailed summary of the Burnett EFAP project is provided in the *Australian Environmental Water Management Review 2014* (NWC 2014f). The environmental assessment report for the Burnett Basin WRP review is publicly available at www.dnrm.qld.gov.au/water/catchments-planning/catchments/burnett-basin.

Where reporting has allowed an assessment, most plans were found to have made progress towards their environmental objectives to some extent, but only a small proportion were found to have fully met these objectives. The four Queensland reviews provide the most complete evidence against environmental objectives, with Queensland reporting that most environmental objectives in their water plans have been largely achieved (DNRM 2013). Where it was identified that environmental objectives had not been fully achieved or were difficult to measure, this resulted in changes to the environmental water management strategies in the second-generation plans.

The publication of the *National Atlas of Groundwater Dependent Ecosystems Atlas* (BoM 2012) has assisted the consideration of ecosystem groundwater requirements in water planning. More recent water planning arrangements have included rules around the volume, rate and location at which extractions can occur to protect identified groundwater-dependent ecosystems. However, the full impact of recent progress in mapping groundwater-dependent ecosystems is yet to be realised, due to widespread uncertainty about the ecological requirements of groundwater systems. In general, groundwater-dependent ecosystems are better managed in areas where there is surface expression, such as the South Australian Great Artesian Basin mound springs that host endemic flora and fauna.

4.3.3 Addressing overallocation and overuse

A 2012 investigation of the levels of stress in Australia's water systems revealed that several systems were under high levels of stress and were thus likely to be at a high level of risk of overallocation or overuse. Of the 10 surface water systems in this category, six were inside the Murray–Darling Basin and therefore required to be managed to the sustainable diversion limits (SDLs) defined by the Basin plan by 2019. Of the four surface water systems with high levels of stress outside of the Murray–Darling Basin, all had water planning arrangements in place including extraction limits and environmental watering arrangements. Likewise, all 44 of the most stressed groundwater management units had water plans in place or in draft²⁰.

Outside the Murray–Darling Basin, water recovery efforts have been limited to a small number of systems where overallocation or overuse has been identified by the relevant jurisdiction. In most of these cases pathways have been developed with substantial community input to enable a return to sustainable levels of extraction. While the timeframes for full implementation of these pathways often remains unclear, interim arrangements such as annual allocations have generally enabled extractions to be managed within targeted limits (NWC 2013b).

Within the Murray–Darling Basin much of the water reform effort has been directed towards improving the environmental condition of water systems by addressing the overuse and overallocation of water resources. This has been done through a combination of water recovery for the environment and investment in environmental works and measures, as well as irrigation upgrades. Water recovery for the environment began with The Living Murray program in 2003, although most environmental water recovery by volume has occurred since 2009 under the Sustainable Rural Water Use and Infrastructure Program (SRWUIP). Water recovery will continue under the SRWUIP until the SDLs incorporated into the Murray–Darling Basin Plan have been met.

Comprehensive outcome reporting for particular sites and for the Murray–Darling Basin as a whole are required under the Basin plan from 2017. While comprehensive reporting against outcomes at a Basin scale is yet to occur, positive ecological responses to watering events have already been demonstrated in several cases, including the Coorong and Lower Lakes where ecological monitoring has shown signs of improvement in the condition of fish, mudflat invertebrates and waterbird communities since the spring of 2010 (MDBA 2013b). The Commonwealth and Victorian Environmental Water Holders produce annual outcomes reports that describe the observed ecological response for each catchment where environmental water was delivered. Annual outcomes reporting has been generally based on observed changes, however there are examples of measured ecological responses to environmental watering, such as in the Lower Murrumbidgee Valley.

²⁰ Baroota, SA, has a water plan under development.

Case study 9

Selected findings from Assessing water stress in Australian catchments and aquifers

- Rivers in many regions are subject to hydrological alteration from water resource developments. Water stress is most prevalent in the Murray–Darling Basin, coastal Victoria, eastern Queensland and other isolated parts of the country. Rivers assessed in Tasmania, western Queensland and the Gulf of Carpentaria do not appear to suffer from significant hydrological stress.
- 2. Low flows have been the most impacted component of the surface flow regime across Australia, with the magnitude of low-flow events probably becoming more extreme in most cases, and the duration of these low-flow events becoming extended in a smaller number of cases. Biota, such as fish, that rely on river connectivity are known to be affected by these changes.
- 3. Medium-level high flows (typically one-in-one-year events) and, in some systems in the Murray–Darling Drainage Division, larger flood flows (typically one-in-four-year events) have been curtailed through dams and similar infrastructure. These changes are known to affect wetlands and floodplain vegetation and associated ecosystems that rely on these high flows.
- 4. More than half of the groundwater management units that were able to be assessed have low levels of water stress, while 15 per cent are most highly stressed.
- 5. Most of the water-stressed groundwater systems occur in the alluvial aquifers in the riverine plains of the Murray–Darling Drainage Division; coastal areas in Queensland, Western Australia and Gippsland (Victoria); the Great Artesian Basin; and in the semi-arid border of South Australia and Victoria.

Source: NWC 2012a

Case study 10

Environmental watering in the Murrumbidgee Valley

Environmental watering in the Murrumbidgee catchment has been delivered to several key areas of ecological significance, including the Murrumbidgee River channel, Lower Murrumbidgee floodplain and the wetlands between Balranald and the junction of the Murray River. Parts of these areas are of national and international environmental significance.

To maximise the environmental outcomes, it is important to coordinate all sources of environmental water. In the Murrumbidgee, sources of environmental water include entitlements held by the Commonwealth Environmental Water Holder (CEWH) and the NSW Office of Environment and Heritage (OEH), as well as water provided under the region's water sharing plan.

OEH produces an annual environmental watering plan for the Murrumbidgee Valley that outlines the objectives and potential actions for environmental water delivery in the Murrumbidgee catchment for the coming water year. The CEWH also develops annual water use options for the each region of the Murray–Darling Basin where there is Commonwealth environmental water, including the Murrumbidgee. OEH and CEWH develop these plans and undertake environmental watering in partnership with each other. They also work with and receive advice and input from a range of stakeholders, including the:

 Murrumbidgee Environmental Water Allowance Reference Group, an advisory group established to provide expert knowledge on environmental

Image: Commonwealth Environmental Water Holder Varend Creat Sydney & Pacific Ocean Mage Construction Bar

watering in the Murrumbidgee, including local knowledge and experience

- NSW State Water Corporation and its Murrumbidgee
 Customer Service Committee
- NSW Office of Water
- National Parks and Wildlife Service
- Local Land Services
- local land managers, landholders and water users.

In managing environmental water, consideration is also given to opportunities to combine environmental water deliveries with other sources of water, such as consumptive release.

During 2012–13, the CEWH and OEH partnered to deliver 156 GL in the Murrumbidgee catchment. The expected environmental outcomes from these environmental flows included contributing to the health of native fish in the Murrumbidgee River channel and the regeneration of habitat for waterbirds, fish and frogs in lakes and creeks located on the western floodplain.

Since 2011, short-term monitoring projects have been undertaken to provide a scientific assessment of the ecological benefits of environmental water use in the Murrumbidgee. Key outcomes identified through this work are that environmental water has contributed to:

- increased native fish numbers in rivers and wetlands of the Murrumbidgee
 - the productivity and biodiversity of fish and micro-crustaceans in the lower Murrumbidgee floodplain and river
 - connecting wetlands and creeks to rivers, enabling native fish and other animals to move around the system and have greater access to food and nesting sites
 - ecosystem functions such as nutrient and carbon cycling that support food chains in the basin.

Location map of Murrumbidgee catchment area

4.4 Servicing rural and urban communities

Community wellbeing is a broad term that encompasses economic, social and environmental values to the community. The impact of water on community wellbeing includes the flow-on effects of economic benefits, such as employment and viable community services, as well as the amenity and recreational benefits of a healthy environment. Specifically, the NWI called for the provision of safe and reliable drinking water supplies, for community involvement in water planning and management decisions, and for the inclusion of social objectives including Indigenous social, spiritual and customary objectives in water plans.

Water is an important contributor to community wellbeing when water is managed in ways that reflect community priorities and goals. An inclusive process is required to determine these community priorities and goals, and the desired mix of economic, social and environmental outcomes.

Separating the impact of water reform on people and communities from that of climate variability, or indeed from the multiple non-water-related factors that influence wellbeing at any given point in time, is not a simple matter. It is complicated by the influence of the Millennium Drought which continued for much of the NWI period for many irrigation communities. Drought has been shown to have measurable negative social impacts on communities, resulting in the closure of key services, financial hardship and negative health impacts (AIFS 2007). This means that community wellbeing during the past decade needs to be examined in light of climatic influences on the availability of water, as well as many non-water-related influences.

4.4.1 Safe and reliable urban water supplies

Australia's performance in providing safe drinking water remains high and drinking water is consistently safe and of a high quality. In 2012–13, all but three water utilities across Australia with 10,000 or more connections reported 100 per cent compliance with relevant microbiological standards. Of these three utilities, only one achieved less than 97 per cent compliance, due to an unforeseen event impacting on supply (NWC 2014e)²¹. Smaller utilities also performed well, although compliance with drinking water standards is less consistent than that in major towns and cities.

Supporting the overall positive outcome has been strict adherence to the 2004 Australian Drinking Water Guidelines in most towns and cities in Australia (NWC 2014e), advancements in risk management planning for water quality and transparency in reporting.

Regulation at the state and territory level sets standards and mandates a risk-based approach with strict tolerance levels. These regulations also require service providers to provide frequent and transparent reports on water quality standards. Most utilities are well advanced in the implementation of risk management processes, resulting in the high quality of drinking water supplies in cities and towns. Some small regional utilities still face particular difficulties in meeting economic, environmental and public health objectives due to financial viability, water regulation compliance and skills shortages – as noted by the Productivity Commission (PC 2011).

The supply of safe drinking water for remote Indigenous communities also poses a particular challenge, with drinking water quality in many small remote Indigenous communities often not meeting Australian Drinking Water Quality Guidelines (NWC 2012b).

²¹ Tasmania's Ben Lomond, New South Wale's Clarence Valley and Tamworth reported less than 99 per cent compliance with microbial limits.

Most of urban Australia experienced severe and prolonged drought during the 2000s. Despite demand management measures, low inflows over many years resulted in storage levels in urban water systems dropping dramatically, generating public concern about the ongoing security of water supplies. In South East Queensland storage levels dropped from 100 per cent in 2001 to less than 17 per cent in 2007.

Responses to the drought varied across Australia, but generally focused on water conservation campaigns, demand management programs and major supply augmentations, particularly desalination plants and other sources that diversified supplies. The Water Service Association of Australia identified that the industry was overseeing capital expenditure projects with a value of \$25 billion between 2005–06 and 2009–10 (WSAA 2011).

Major capital investments improved the security of water supply in Australia's urban centres through the augmentation and increasing diversity of available supply options. Despite the duration and severity of the drought, the responses by governments and the water industry ensured that no city ran out of water.



Figure 11: Supply of desalinated and recycled water

* Use data is sourced from the 2012–13 Urban NPR dataset and is the total for Sydney, Melbourne, south-east Queensland, Perth and Adelaide. Where data was missing for those utilities over the time series, the most recent year of data was used for the missing years.

Source: National Performance Report: Urban Water Utilities 2012-13 (NWC 2014e)

The Commission's *Urban Water Futures Discussion Paper* (NWC 2013f) reported that while the supply diversity measures have ensured cities have secure water supplies, this has come at a cost to the community. Government decisions about major infrastructure investment were not always well communicated in terms of the costs and benefits of the full range of options considered. This has undermined community confidence that it is receiving value-for-money services. Large-scale augmentation decisions taken in Victoria and South East Queensland have been particularly contentious because of a perceived lack of transparency in decision-making.

Water prices have risen considerably throughout Australia as the costs of these augmentation projects are now reflected in water and sewerage prices to customers. In many major urban centres, pricing is now the key customer concern to be managed, whereas previously it was security of supply.





Source: National Performance Report: Urban Water Utilities 2012–13 (NWC 2014e)

The long drought exposed deficiencies in long-term planning in several cities. The need for direct government intervention suggests that an effective long-term framework for managing security of supply risk was not in place, and that measurable objectives to provide a signal for risk-based investments were lacking. Of course this judgement is made with the clarity of hindsight – the reductions in inflows which faced many cities were unprecedented in their severity, and yet no city ran out of water.

Most jurisdictions have increased the amount of water they recycle to augment supply, with the total volume of recycled water supplied in Australia increasing by 25 per cent between 2005–06 and 2012–13 (NWC 2014e). While this figure has dropped since 2009–10 due to increased rainfall and flooding, the total volume supplied is expected to increase given that additional recycled water projects are underway in several jurisdictions.

Unlike the east coast of Australia, inflows in Perth have not recovered in recent years and the city has had to manage the twin pressures of population growth and a drying climate. Water supplies have been maintained through extensive groundwater extractions and additional supply from desalination is intended to supplement the use of recycled water. After a successful three-year trial, a large recycled water project has become operational in Perth. This project, known as the Groundwater Replenishment Scheme, takes treated wastewater effluents through an advanced water treatment process to recharge Perth's groundwater supplies. The project has the potential to provide up to 20 per cent of Perth's drinking water supplies by 2060 (Khan 2014).

4.4.2 Community involvement in water planning and management decisions

The establishment of water planning arrangements is a key opportunity for communities to participate in setting water allocation priorities.

In water resources subject to higher levels of competition, water planning arrangements have increasingly been informed by detailed scientific and socio-economic studies that consider stakeholders' concerns from an early stage and reflect trade-offs between economic, social and environmental outcomes (NWC 2014a). Information from resource, environmental and socio-economic assessments is in most cases provided to facilitate community input, and processes include public submissions on proposals or draft plans, public meetings and the provision of feedback on the reasons for final decisions (NWC 2014a).

While the Commission has found that consultation processes have improved in recent years, community expectations have also increased. Higher community and stakeholder expectations have tested the capacity of water planning agencies, resulting in protracted processes that at times contribute to planning decisions being drawn out well beyond expected timeframes.

Perceptions of inadequate consideration of community concerns remain and submissions to this assessment from a variety of stakeholder viewpoints outlined concerns with engagement processes for water planning. The New South Wales Irrigators' Council 'still encounters occasions where limited or non-existing stakeholder engagement/consultation takes place even though they concern important water resource management questions' (NSWIC 2013). Likewise, the University of Queensland's Institute for Social Science Research noted that 'while community involvement in goal-definition, planning and decision-making is recognised in the NWI as critical, guidance on when and how communities should be involved in considering water management activities is lacking. This situation can result in participatory processes being designed only as an afterthought, or an exercise in compliance. Combined with a lack of adequate resourcing, these factors reduce the quality of participatory processes and lessen genuine two-way communication' (Bettini & Head 2013).

Community perceptions of engagement during development of the Basin plan were examined in the Regional Wellbeing Survey. While most people who had views about the plan reported they felt able to access information about it, less than 40 per cent reported knowing how to communicate their views about the plan and a majority (58 per cent) did not feel their views about the plan would be listened to if they shared them²². The same survey, however, found that similar proportions of people lacked confidence that decision makers would listen to their views about issues other than water reform – suggesting the causes of lack of trust in decision makers are broader than consultation around the Basin plan.

Engagement has tended to decline after plans have been developed, with some communities expressing frustration at their inability to provide ongoing input and feedback during the implementation phase²³. The Commission notes that jurisdictions often seek stakeholder views as part of water plan review processes; for example, significant community input informed the New South Wales Natural Resources Commission review of the 2004 water sharing plans and the water resource plan review and replacement processes undertaken to date in Queensland.

Australian governments have become more aware of the water needs of Indigenous communities for cultural and spiritual purposes since 2010 (NWC 2014g). Jurisdictional initiatives for the engagement of Aboriginal people in water planning processes have included community meetings, consultation with representative Indigenous bodies and Indigenous representation on water advisory committees. Under the Basin plan all water resource plans will identify objectives and outcomes for the management of water resources desired by Indigenous people and the relevant consultation requirements. The Basin plan also requires environmental watering to be undertaken having regard to Indigenous values. Further demonstrating progress in this regard is the strengthening of relationships in Victoria's Waterway Management Strategy and a legislative requirement for Indigenous representation on water management committees in New South Wales.

Specific provision for Indigenous water use have been made in the form of cultural access licences in New South Wales and Indigenous water reserves in several Queensland water plans. However, to date there has been very little take-up of these provisions (NWC 2014g).

²² See Appendix D

²³ Views expressed at Commission workshops, 2013, see Appendix A.

Case study 11 Cultural water needs of Ban Ban Springs

Water resources in the Burnett Basin plan area are managed under the *Water Resource (Burnett Basin) Plan 2014.* This plan replaces the original 2000 plan and includes a new balance of economic, social and ecological outcomes.

Various locations in the plan area have important links to Indigenous people, past and present. The new plan recognises the cultural values of the area and input from traditional owners supported development of the new plan's outcomes and strategies. Culturally important objectives were determined in collaboration with traditional owners and arrangements have been proposed in the new plan to support cultural needs. The Ban Ban Springs is a significant site of the Wakka Wakka people and is within the plan area. The springs provided water and other resources for Indigenous clans and is a ceremonial site relating to birth, rites of passage and initiation (DNRM 2013). It is a major creation dreaming site. The new Coalstoun Lakes groundwater management area, incorporated into the new water resource plan, will help protect Ban Ban springs by establishing arrangements for managing take of groundwater that impact on spring flows.



Location map – Ban Ban Springs

Despite concern about the cost and pricing implications of investments in desalination plants, the capacity of urban customers to provide input into service preferences and pricing has progressed. Water utilities are obliged to undertake community consultation in developing their pricing submissions and service options. There is evidence that water utilities are seeking to understand what consumers are prepared to pay, in terms of environmental sustainability and service quality (Frontier Economics 2013).

Another form of choice that the incumbent water supplier may be able to offer to individual customers is an alternative product or source of supply (e.g. an option to take recycled water as an alternative to or partial substitute for potable water supply). Recent years have seen a significant increase in the supply of recycled water as an alternative to potable water for some customers. There have been a number of examples across several jurisdictions where developers or other parties have sought to offer an alternative supply to the traditional centralised solution offered by the incumbent water utility (Frontier Economics 2013).

Arguably the most direct form of customer choice is where customers can choose to switch from their current supplier to a new supplier. To date in Australia no jurisdiction has established retail competition for urban water services, although moves towards increasing competition have been initiated in some jurisdictions. The most significant reform to allow choice of supplier has occurred in New South Wales under the *Water Industry Competition Act 2006*, although several other states have also flagged similar reforms.

In regard to collective customer choice, water industry approaches to public consultation with customers and other stakeholders on service/price trade-offs continue to evolve. Often, however, the most significant service/price trade-offs relate to matters beyond the purview of the water utilities themselves.

4.4.3 Impact on rural and regional communities

Community perceptions on the impact of water reform were gathered during Commission discussions with community representatives. Concerns that water reforms would adversely affect community wellbeing were raised, particularly water recovery for the environment in the Murray–Darling Basin²⁴.

However, assessments of the social and economic impacts of Commonwealth and state water purchasing on communities show these water recovery programs have net positive outcomes for most irrigators and irrigation communities. The environmental water purchases have allowed irrigators to better manage their financial situation, realise farming objectives, and get through drought. Communities have also benefited directly as selling water entitlements has allowed for structural change and farm adjustment, and because the majority of the proceeds earned from selling water to the Commonwealth remains in the community from where the water is sold (MJA 2012).

Marsden Jacob and Associates were commissioned to examine trends for a variety of social wellbeing measures in 20 communities exposed to various levels of water reform. Additionally, information relating to perceptions of reform from the 2013 Regional Wellbeing Survey was examined (see Appendix A for methodologies). The results indicate that water-dependent communities were not measurably better or worse off due to water reforms, with no clear relationship between the incidence of national water reform and movements in most community socio-economic measures²⁵. Factors unrelated to water reform, such as population size, tended to be correlated with key measures of economic and social wellbeing, while exposure to water reform was not.

²⁴ Commission workshop Albury, 17 September 2013. See Appendix A for more detail.

²⁵ Marsden Jacob and Associates, see Appendix A for more detail.
The Regional Wellbeing Survey also found no direct correlation between the extent of water reform a community experienced in recent years, and either the wellbeing of individuals who responded to the survey in that community, or the assessment of individuals as to the overall wellbeing and future of their community. The survey results for individual communities further highlights the lack of association between either individual or community wellbeing, and extent of exposure a community has had to water reform.

These studies do not indicate that water reform has no effect on the wellbeing of individuals or communities. Rather, they suggest that the effects of water reform are not readily observed at an aggregate level, as any effect is confounded by the influence of other factors that have a greater effect on the wellbeing of individuals and communities.



Figure 13: Average individual and community wellbeing reported by residents living in communities with high, medium and low exposure to water reform in recent years

Source: Regional Wellbeing Survey (Schirmer 2014)



Australian Government National Water Commission

Chapter 5 Future of water reform

5 Future of water reform

5.1 Introduction

The blueprint for water reform outlined in the 2004 National Water Initiative (NWI) and the 1994 Council of Australian Governments (COAG) Water Reform Framework have enabled major advances in Australia's water management and remain sound policy frameworks to guide future water management. The 'holistic' economic, social and environmental focus of the NWI retains significant support among most governments and stakeholders. Economic efficiency is supported by implementation of the reform commitments, and the reform principles help avoid future economic and environmental costs which can be incurred by exceeding the sustainable limits of water extraction.

In the 10th year of the NWI, most of Australia's intensively developed areas find themselves once again confident in their water availability. The concerns about irrigation water entitlement security in 2004 have been replaced by concerns about the community impact of government interventions on behalf of the environment and 'green tape' reduction. The challenges to urban water supply have been met in the capital cities by major, expensive, supply augmentation. Future droughts and climate change notwithstanding, public questions today include affordability, reducing regulation, and opportunities for new development.

Substantial challenges remain but are less visible or more localised – stormwater management, regional and rural water quality, conjunctive management, attracting private capital to water infrastructure, and avoiding the mistakes of the past. All Australian governments are experiencing fiscal constraint. COAG no longer has a presence in national water policy with the abolition of the COAG Standing Council on Environment and Water and the Commonwealth is drawing back from its leadership role to a significant extent.

While the operating environment for water reform has become more difficult in the absence of a major looming crisis, the 2014 assessment shows that reform implementation is at a crucial point. Jurisdictions that have not yet fully embraced the reform agenda are moving forward, such as Western Australia's commendable efforts at legislative reform. In other jurisdictions, reduced government investment and deregulation has placed pressure on resourcing, and offer little assurance against backsliding on previous gains.

This chapter looks at risks to the gains made so far if the reform principles are not fully embedded in government and industry decision-making, the key unfinished business, and how the contemporary challenges of the next decade can be met by applying lessons from the past decade of reform implementation.

5.2 Embedding NWI reform

Many of the consultations for the 2014 assessment indicated that reform is at a tipping point, and effort should be focused on embedding, refining and communicating the benefits of reforms to avoid backsliding. Principles of reform need to be mainstreamed into the decision-making processes of government and national leadership on key issues maintained. In the rural sector, the reform agenda has been advanced but is not yet complete. In some areas a period of consolidation is required, while further progress is needed in others where the intended outcomes under the NWI have not yet been achieved. The external environment for water management continues to evolve and offer new challenges and opportunities – new technologies, economic restructuring, emerging industries and markets,

demographic shifts, and climate variability and change require that water management continues its journey of continuous improvement to remain capable of responding with the confidence and agility necessary to maintain a profitable and sustainable water sector. As the interest of many governments in water reform wanes, there is a tendency for this traditionally conservative sector to accept that the status quo will be good enough, but settling for partial implementation of the reform framework will not position Australia well for the future.

5.2.1 Governance

COAG has taken a leadership role in national water policy since 1994. The NWI is held in high regard internationally and domestically. Additionally, the *Water Act 2007* (Cwth) fundamentally shifted Commonwealth responsibility – giving it a much more direct role in several areas such as water information, and a decision-making role for the sustainable diversion limits (SDLs) in the Murray–Darling Basin.

With the recent abolition of the COAG Standing Council on Environment and Water and the closure of the National Water Commission at the end of 2014, the Australian Government is substantially withdrawing from an interest in water reform outside of the Basin plan, or proposals for new storages including in northern Australia. A committee of senior officials is in the process of formation and, at its first meeting, agreed to a reduction in the previously agreed COAG work program for national water reform²⁶. In addition, the absence of incentives for jurisdictions to coordinate their efforts and the lack of a national ministerial council are likely to hinder the progress of nationally significant reforms in the future.

A review of the Commonwealth Water Act is underway, with a report due by November 2014. The review's terms of reference include the effectiveness of the Water Act in achieving its objects and opportunities to reduce or simplify the regulatory and/or reporting burden while maintaining effective standards.

The Commission recognises the current drive to realign state and Commonwealth responsibilities and reduce overlap. Nonetheless we consider that there continues to be a role for national level engagement on water issues where:

- jurisdictions' actions impact on the communities, resources and productivity of other jurisdictions
- there are common issues across jurisdictions where joint action will promote synergies, information sharing and innovative solutions
- there are common issues across jurisdictions and a common policy and/or regulatory framework is in the national interest.

In the absence of the Commission's independent oversight and facilitation role and the coordinated national focus previously provided by COAG, there is a real risk of gradual backsliding on current progress, and a retreat from public accountability. Given the substantial investment in improvements undertaken to date, this would be regrettable.

The Commission also expects that any new dam infrastructure proposals or irrigation developments being investigated should be implemented within a sound cost/benefit framework, to minimise the risk of expensive over-investment in economically unviable or environmentally unsustainable options.

One of the challenges of water governance at the national level is where it falls within the bureaucratic and ministerial structure. While it is encouraging to see that water is being considered alongside energy and transport in ongoing audits of nationally significant infrastructure, at the Commonwealth level responsibility

²⁶ See Attachment E: Next Steps in National Water Reform: Preparation for the future (a report by the Standing Council on Environment and Water)

for water currently lies with the Department of the Environment. The Commission considers that the most pressing needs in water policy today are as much infrastructure, industry and market-related, and a more whole-of-government perspective would better recognise the economic value of water.

5.2.2 Water entitlements and planning

The entitlement systems agreed to under the NWI have not been implemented in all jurisdictions. Western Australia and the Northern Territory are yet to make the required legislative changes to enable fully NWI-consistent planning and entitlement arrangements.

Both the Northern Territory and Western Australia have applied conditions on water use with the intent of avoiding entitlements being held but not utilised. The Commission is of the view that jurisdictions would be better placed observing the intent of NWI entitlements and creating a disincentive to potential speculators by applying appropriate charges for entitlement, enabling trade where feasible and allocating new water through market-based mechanisms.

While entitlements in regulated surface water systems have largely been unbundled in most jurisdictions, entitlements in unregulated surface water and groundwater systems more often remain bound to land. Opportunities for further unbundling should be considered on a case-by-case basis where there is potential for a market to develop. Regardless of the entitlement type (bundled or unbundled), jurisdictions should ensure all significant water use within or associated with a system is accounted for and managed under a single framework. Conditions of water use associated with the entitlement should be suited to the level of development and risk to the resource.

A NWI-consistent approach to water planning aligns the level of effort invested in a particular area with a risk-based assessment. In intensively used systems, where all water must be accounted for and its use maximised, accurate information is essential to optimise management by running systems precisely and efficiently. In-depth knowledge about responses to management interventions underpins complex decision-making in these systems and is the foundation of innovation. Conversely, in less intensively used systems, development opportunities may be stifled by conservative management settings based on poor system understanding.

A significant practical challenge is that NWI partner governments are now working in a more resource-constrained environment which limits their ability to undertake planning that comprehensively implements the full NWI model (and the *NWI Policy Guidelines for Water Planning and Management*). However, the NWI has always included the capacity to up- or down-scale the intensity of planning to suit the level of development of water systems, projected future consumptive demand and the risks of not having a detailed plan, and allows for fit-for-purpose and innovative implementation approaches. Improving the cost effectiveness of planning and review processes without undermining the robustness of plans or losing the gains made is an ongoing challenge.

Planning also needs to be sufficiently flexible to respond in a timely manner to emerging issues and new industries. Water planning, entitlements and markets need to be managed and improved in an adaptive way to ensure water use is optimised. Adaptive management ideally requires well targeted, coordinated and adequately resourced programs that can assess progress towards planning outcomes. Monitoring of high-level outcomes is often confounded by the range of influences on those outcomes that extend beyond what can be achieved through water planning. Deficiencies in the basic information underpinning the plan are an obvious place to target monitoring effort. Better articulation of the benefits of targeted monitoring and evaluation is required to strengthen the case for resource allocation, including evidence of the potential social, economic and environmental costs that may result from poor decision-making due to an inadequate knowledge base.

5.2.3 Water markets

As governments seek to realise the productive potential of water resources in both established and new resources, water markets can help drive efficient water use and innovation. It is important that where markets are applied, governments draw on the lessons learned from the successful application of water markets in the Murray–Darling Basin and those outside the Basin including parts of Queensland, New South Wales, Victoria and the recently developed irrigation schemes in Tasmania. Markets are more challenging to develop in groundwater areas and in valleys where there are small numbers of water users, but the potential benefits available from water markets justify continued exploration of their feasibility.

The Commission urges governments to observe the principle of cost-reflective pricing when establishing charges for new irrigation supply systems or reviewing existing arrangements. Failure to identify and charge for the cost associated with water planning and management can lead to inefficiency and cross subsidisation. Cost-reflective pricing arrangements also discourage the holding of water entitlements without using them, an issue that has prompted some jurisdictions to apply conditions on use.

The water market may also benefit from the development of other tradeable products such as derivative products and shares for delivery and storage capacity. Recently, Irrigation Infrastructure Operators in southern New South Wales reported the need to limit supply during peak demand and it is feasible that some users will be prepared to sell their delivery share to others with a greater need at the time. Similarly, trading of storage capacity share held by entitlement holders in regulated systems should be explored.

The Australian Competition and Consumer Commission released a water monitoring report in May 2014 that called for further reform in water markets, including improved reporting of trade information, expanding trade between intermittently connected systems and ensuring that reforms under the Murray–Darling Basin Authority (MDBA) constraints management strategy were implemented to the benefit of all water holders, not only environmental water holders. The first reform is discussed in the information section below. The remaining two reforms present a number of challenges to implement and the costs and benefits from each reform will require a thorough analysis before the net effect can be accurately described.

State water market registers within the Murray–Darling Basin require further work to improve interoperability and reduce transaction times. Where prices of transactions are not captured in registers, this is a problem for market participants as it masks the value of water and pushes the cost of identifying price back onto participants. The National Water Market System (NWMS) program developed a design for a common register system that provides for interoperability of jurisdictional registers, however the benefits of developing the system further are unclear and it has been a very costly project with limited functionality to date. The Australian Government's decision to discontinue funding for the NWMS places the responsibility of improving registries—where it is required to improve transaction times, costs and interoperability—back on jurisdictions, some of which had delayed work on their own systems expecting that the NWMS would deliver useful results. The ongoing role of the NWMS portal is also unclear. The Bureau of Meteorology (BoM) should consider the value of using the portal to deliver against its objectives under the Water Act 2007 (Cwth). BoM's obligations to collect water trade information and make it available to the public remain important to track longer-term trends in the market. Water brokers are already providing web-based platforms with market information that draw on state registries, but governments have a role to complement reporting undertaken by the private sector to meet a range of transparency and stakeholder information needs.

Market participants continue to report difficulties with the availability of information about allocation announcements in some areas of the Murray–Darling Basin. Irrigators and other water users must make decisions in advance about the volume and product mix of water they are likely to have access to. Poor transparency about the allocation process may result in irrigators reducing plantings or accepting high levels of risk when they make subsequent adjustments to their water holdings. Continued attention is required by jurisdictions to ensure that inputs to allocation announcements and the processes used are readily available to the market.

5.2.4 Implementation of the Murray–Darling Basin Plan

The making of the Basin plan on 22 November 2012 was the culmination of a long and complex process for developing cooperative water management arrangements intended to deliver whole-of-Basin social, economic and environmental outcomes.

The Commission recognises that the Basin plan has only been in place for a relatively short period and there has been little time for implementation. However, many activities are underway across all Murray–Darling Basin states and in several Commonwealth agencies (see Table 4, Chapter 3).

Much has been achieved towards resetting water management in the Murray–Darling Basin, but risks to achieving the identified outcomes remain. The cooperative governance and independent oversight required to support the necessary changes to water management in the Basin are subject to significant challenges.

While in theory the *Water Act 2007* (Cwth) places the Commonwealth Minister for Water as the sole decision-maker on the Basin plan, in practice the achievement of Basin plan outcomes relies on cooperation between all of the Murray–Darling Basin state governments and the Commonwealth. There has been a chequered history of collaboration when it comes to water management in the Murray–Darling Basin and the Basin plan does not appear to have resolved a number of underlying issues. For example, there have been protracted negotiation processes to finalise the *Intergovernmental Agreement on Implementing Water Reform in the Murray–Darling Basin* and its associated *National Partnership Agreement on Implementing Water Reform in the Murray–Darling Basin*.

As part of the negotiations to finalise the Basin plan, it was agreed that greater flexibility would be built into it by incorporating a mechanism to adjust sustainable diversion limits (SDLs) and to develop a constraints management strategy. The suite of mechanisms associated with these measures includes:

- supply measures mechanisms to reduce the volume of water to be recovered for the environment
 provided that equivalent environmental outcomes can be maintained. Such projects would allow
 the Basin plan's 2750 GL recovery volume to be decreased, thereby reducing the social and
 economic impact of water recovery to achieve the Basin plan's SDLs. Supply measures to reduce
 water recovery targets by up to 650 GL will be proposed by Basin states, although the final volume
 will not be known until the entire package of projects has been developed and assessed by the
 MDBA (DSEWPaC 2012).
- efficiency measures mechanisms to increase the volume of water available for the environment by up to 450 GL provided that social and economic outcomes are maintained or improved. Efficiency measures include improving on-farm irrigation and transferring the water savings for environmental use. The Australian Government has committed up to \$1.5 billion for efficiency measures.
- constraints management strategy the strategy aims to improve environmental outcomes achievable beyond current operating conditions by allowing better use of environmental water while avoiding, managing or mitigating impacts to local communities and industries. The 'constraints' in this context include physical structures along the river (e.g. bridges, roads) that prevent water getting to some areas in the volumes and at the times it is most needed, and river practices that have been developed during the past century – mostly to support navigation and irrigation. Up to \$200 million has been allocated to ease or remove constraints.

The timing, cost and pathways to achieve SDLs remain uncertain, particularly in relation to the finalisation of SDL adjustments. In addition to the challenges associated with development, assessment and implementation of supply and efficiency measures, the successful operation of the SDL adjustment mechanism is contingent on the removal of unimplemented policy measures²⁷ which represent unresolved and potentially problematic issues.

Debate continues in the public domain about the relative merits of various mechanisms available for water recovery to achieve Basin plan outcomes (e.g. Dairy Australia 2013; Horne 2014). The Department of the Environment recently released a Water Recovery Strategy that confirms previous Commonwealth announcements of a cap on water recovery purchases of 1500 GL in favour of using infrastructure projects (DotE 2014c). Data comparing the cost of water yielded from major infrastructure projects funded by the Commonwealth against prevailing market prices shows that infrastructure recovery mechanisms cost the Australian Government between two and seven times more than entitlement purchases (DotE 2014c; Table 3). This is in line with the Australian Productivity Commission's findings that subsidising infrastructure is rarely cost effective in obtaining water for the environment (PC 2010).

Challenges also exist to the continuation of joint programs to manage the waters and assets of the River Murray system. The governance arrangements for the joint programs are set out in the Murray–Darling Basin Agreement originally signed in 1987. The MDBA is the agent to implement the decisions of the joint governments, which broadly cover:

- River Murray management to operate the River Murray system and manage assets to deliver water for irrigation and other uses
- natural resource management (NRM) designed to mitigate the effects of water use on the environment or address other NRM issues (e.g. salinity)
- an audit program accountability mechanisms as set out in the Murray–Darling Basin Agreement.

Uncertainty remains about the security of arrangements and the quantum of funding for the joint programs. In 2012, New South Wales advised that it would reduce its contribution for the joint programs in the financial year 2012–13, with additional cuts flagged in subsequent years (MDBA 2013c). In response, South Australia also indicated there could be substantial reductions in its contribution for the joint programs in coming years. According to advice published by the MDBA, under a significantly reduced funding scenario it would be necessary to allocate the entire joint program budget to River Murray operations, leaving no funding to coordinate other important programs (e.g. water quality monitoring, coordination of The Living Murray environmental water, Basin Salinity Management, Murray–Darling Freshwater Research Centre).

The Commission is concerned that reductions in joint program funding would have a disproportionate impact on monitoring, evaluation and auditing functions – leading to a weakening of accountability mechanisms and fewer opportunities for improvement through adaptive management. The continued uncertainty and ongoing delays associated with the joint funding programs is indicative of Basin states' difficulty reaching agreement even on foundational elements and suggests that more complex and challenging reforms could be at risk.

The Commission considers it critical that governments are in a position as early as possible to describe and demonstrate the social, economic and environmental value of the Murray–Darling Basin-wide framework that has been established. Tangible evidence will help build public confidence in the Basin plan's ability to deliver beneficial outcomes for the Murray–Darling Basin and its communities.

^{27 &#}x27;Unimplemented policy measure' means an anticipated measure consisting of a policy to credit environmental return flows for downstream environmental applications, or allow the call of held environmental water from storage during unregulated flow events. These are assumptions that were built into the original modelling runs.

The MDBA has the responsibility to evaluate and report annually on the effectiveness of the Basin plan and publish more in-depth evaluations every five years, including on environmental, social and economic outcomes. These reports will draw on information reported by Murray–Darling Basin states, Department of the Environment and the CEWH. This reporting schedule is set to begin in 2014 for the annual effectiveness reports and in 2017 for the five-yearly reports on impacts of the Plan. The first 10-year review of the Basin plan is scheduled to be prepared in 2022. Part 3 of the Water Act also provides that the Commission undertakes an audit of the effectiveness of the Basin plan's implementation at least every five years. Given the extent of work required in the short term to underpin effective Basin plan implementation, the Commission is of the view that the first full audit of implementation activities should occur in 2015, as recommended in the Commission's initial implementation report (NWC 2013d).

It will be important to see the continuation of robust and transparent processes for the delivery of commitments made under the Basin plan and rigorous, independent assessments of agreed milestones to ensure the achievement of identified objectives. However, in an increasingly resource-constrained environment the frequency and quality of monitoring and evaluation activities may be under threat. The Commission itself will be abolished at the end of 2014, and the future of the independent audit process for the effectiveness of implementation of the Basin plan is uncertain.

To maintain community and business confidence it will be essential to maintain the integrity of the monitoring, evaluation and auditing framework committed to under the Water Act and the Basin plan. A substantial volume of work remains to be done to ensure the effective operation of the SDL adjustment mechanism, while also developing and accrediting all 36 new Water Resource Plans (WRPs). It is our experience that implementation of water reform on this scale is unlikely to be achieved within the stated timeframe, particularly given the slow start by some jurisdictions in developing feasible supply measure projects. The Commission urges the Australian and Basin state governments to commit appropriate resources to secure the accountability mechanisms necessary for efficient development of WRPs and timely implementation of SDLs.

5.2.5 Indigenous participation in water planning and management

Through the NWI, Australian governments agreed that water planning frameworks will address Indigenous access to and management of water (NWI paragraphs 25(x), 52–54).

Work undertaken for the 2014 assessment has indicated that some jurisdictions have improved consultation with Indigenous communities in water planning and management processes, yet Indigenous participation in water management decisions continues to be patchy. While progress has been made in incorporating Indigenous social, spiritual and customary objectives into water plans, there has been no material increase in water allocation for Indigenous—social, economic or cultural purposes.

The requirement to include cultural objectives and outcomes in water plans to be accredited under the Basin plan will be a significant advancement. However many jurisdictions assume that water for environmental purposes will achieve Indigenous cultural and spiritual objectives, and even though there may be substantial commonality, this is rarely investigated and demonstrated in practice.

While Indigenous communities can enter the water market through normal entitlement, allocation and trade mechanisms, this is not an easy process for many communities. The knowledge and funds required to participate in the broader water market are still beyond the reach of most Indigenous communities. Water reserves for Indigenous purposes are included in several Queensland plans and provide an opportunity for economic returns to Indigenous communities, now and into the future.

The Cape York Land Council stated in its submission to this assessment that '... the NWI does not adequately provide for contemporary Indigenous economic aspirations, and therefore does not proactively support the Aboriginal people of Cape York to engage in economic development' (CYLC 2013).

While not expressly articulated in NWI principles, the Commission continues to support the allocation of water entitlements to Indigenous Australians to facilitate economic development. This action is considered a valid strategy to advance Indigenous business initiatives and potentially contributes to the Australian Government's Closing the Gap agenda. Indigenous Australians are potentially important economic water users and recognising the significance of Indigenous economic water use in planning now, avoids potential impacts on other users into the future. More work is required by governments to facilitate and expand the capacity and knowledge of Indigenous communities to enable their active participation in water planning and management.

Indigenous-led governance organisations representing Indigenous water interests, particularly at a national level, have been a strong driver of the debate on Indigenous water access. The conclusion of the Indigenous Water Advisory Committee in June 2014 leaves a gap in the provision of strategic advice to government. Continued support for leadership organisations such as the Northern Basin Aboriginal Nations and the Murray Lower Darling Rivers Indigenous Nations has proven valuable for Indigenous involvement in water planning and management in the Murray–Darling Basin. The Commission urges all Australian governments to ensure continuity and ongoing momentum for representative agencies to successfully integrate Indigenous water needs into water planning frameworks.

5.2.6 Water resource accounting

Governments agreed that improvements to water resource accounting were required to meet the information needs of water planners, managers and users so that water management decisions were soundly based. Progress has been made towards meeting this objective, as noted in Section 3.5. Areas which require further attention are:

- the need to improve alignment between jurisdictional systems as well as between various sources of information so that data can be collected once and used many times
- the provision of data and information at sufficiently fine scales and with adequate quality assurance to be of relevance for use in water planning and management by jurisdictions
- addressing ongoing funding issues to ensure high-value Improving Water Information Program (IWIP) products and the supporting monitoring infrastructure are maintained.

Where possible, BoM aims to obtain data through existing reporting mechanisms for its preparation of the National Water Account, however the information supplied by jurisdictions to support the accounts is not yet sufficient for the purposes of the MDBA. While BoM and MDBA have agreed to align their requirements as far as possible to reduce this duplication of effort, jurisdictions have reported that this has not resulted in a reduced reporting load to date.

The usefulness of the National Water Account information for the Murray–Darling Basin would also be enhanced if access were improved to the substantial amount of finer-scale disaggregated information —based on surface water and groundwater planning areas—currently contained in line item notes of this account. Given the source information is at the planning area level, the production of planning area information required by the jurisdictions and the MDBA for compliance purposes should be able to be amalgamated to produce Murray–Darling Basin level accounts, thus enabling information to be produced at various scales, and used for multiple purposes, with minimal rework. BoM has reported it is exploring improved ways to present finer-scale information within the larger account regions such as the Murray–Darling Basin and the Commission would urge that this occurs and that scale issues are agreed.

The accuracy and consistency of water data and information would be significantly improved if all data were collected to agreed guidelines and to related national and international standards. Standards and guidelines need to be fit-for-purpose, linked closely to business needs and common across state

boundaries. At present BoM is undertaking a range of activities to support the accuracy and consistency of water data, including a review of what guidelines and standards are being used to collect data, which should help inform what further action is needed. Despite BoM's efforts to assess user needs, some jurisdictions have commented that its information products have limited usefulness at the management scale, with several expressing the view that a review of the focus of the BoM work would be timely to ensure value for effort.

While BoM compiled a gap analysis to identify the needs and costs of maintaining monitoring networks across Australia at their present performance level in each of the jurisdictions in 2011 and 2012, there are currently no known additional resources committed to deal with the gaps identified²⁸. Gaps in monitoring lead to jurisdictions lacking sufficient information to effectively manage and account for water in systems. Accurate information from monitoring is essential for optimising decision-making both in complex and low-competition systems, and allows informed decisions to be made for the sustainable management of resources.

Groundwater data and information is a particular area where continued effort and resources are required to address historic underinvestment and to bring the data and information up to a level sufficient to meet business needs. Unless addressed, aging infrastructure is likely to result in even less information being available into the future. There is an urgent need to identify the infrastructure required to enable monitoring of long-term trends, and resources should be allocated to ensure the identified monitoring bores are maintained (SKM 2012).

There is potential for greater use to be made of mining water data, particularly the data required by Commonwealth and jurisdictional regulators. While there is a need for commercial sensitivities to be respected (as is done for hydro-electricity generators), this information could enhance and significantly increase water information in areas where there is minimal data collected by the jurisdictions and especially in remote areas where many mines are located. Jurisdictional budget reductions in water monitoring, in combination with the end of the IWIP in 2017, are threatening to reduce the value of the investments made by all parties. Assessments of the viabilities of the future development of land and water resources (including in northern Australia) may also be compromised.

5.2.7 Integrating groundwater and surface water management

Water planning and entitlement processes provide an opportunity to systematically consider the opportunities and benefits of the integrated water management of different water supply sources, including integrating groundwater and surface water use and management.

All Australian jurisdictions have made substantial progress towards recognising physically connected systems that display groundwater and surface water connectivity. Physical connectivity is just one type of connection – in practice supply and demand links occur even when systems are not physically interconnected.

Despite the success of some current arrangements in which integrated groundwater and surface water management is achieving multiple benefits, examples remain relatively isolated and *ad hoc* in nature. The inherent complexity of managing connected systems has contributed to a lack of identification of opportunities in jurisdictions, and an even greater lack of rigorous assessment of the costs and benefits of those opportunities.

²⁸ For example, the gap analysis in New South Wales identified more than \$25 million as being required over the next five years for category 1 (maintenance and upgrades) and category 2 (new) projects (NOW 2012).

The Commission encourages all governments with water planning and management responsibilities to focus on systematic consideration of the opportunities, benefits and options for further integration of surface water and groundwater resource management. Potential opportunities for integrating groundwater and surface water management are not limited to physically connected systems in which cross impacts are predicted or observed, or to systems where trade-off decisions need to be minimised. Systems with no hydraulic connection should also be included in the consideration of potential opportunities. This could be achieved through several means:

- including all potential water systems and users within a designated area, irrespective of water quantity and quality
- considering alternative options for storage and delivery of water, such as 'underground dams'
- formally considering potential groundwater and surface water integration in water planning processes, including in review processes to account for changing circumstances, technologies and economics
- improving flexibility in water entitlement and allocation frameworks to allow for groundwater and surface water exchange or offset
- considering any opportunities or limitations that connected groundwater and surface water systems may present to the operation of water markets
- aligning objectives across the various institutions that are involved in groundwater and surface water use and management.

Achieving objectives related to improving water system efficiency and resource conservation can be tackled by reducing losses (e.g. storage and delivery losses); improving transport and delivery energy efficiency by using underground flow paths; using plentiful resources in preference to (or to 'top up') scarce resources (e.g. harvesting and injecting or infiltrating a proportion of peak flood volumes for later use in dry times); or encouraging the use of unconventional resources such as water recycling (options that would otherwise not be available, or not receive community acceptance).

Objectives related to water storage and delivery may be facilitated by smoothing the cyclical differences between water availability and water demand. For example, the relatively slow nature of groundwater changes can be used to opportunistically store dam overflows and floods; smooth seasonal variation in irrigation water demand; and smooth daily or even diurnal variation in urban water demand. Subject to cost/benefit analyses, storing water efficiently could also be achieved by underground storage, either in natural aquifers or engineered systems, to reduce the evaporative losses involved in surface water storage. In addition, land requirements would be reduced because storage could spatially overlap with the productive or urban land it supports.

The benefits of integrated groundwater and surface water management are more likely to be achieved if systematic identification and consideration of the opportunities is undertaken. Where groundwater and surface water planning is currently separate, aligning review cycles and timeframes for surface water and groundwater planning may represent a no- or low-cost start, by allowing simultaneous consideration of opportunities and cross impacts.

5.3 Addressing contemporary challenges

Some areas of water reform identified in the NWI agreement have since been found to have received too cursory a treatment, or have increased in prominence in the decade since the agreement was signed. The NWI provided little guidance in the areas of water use for extractive industries and in dealing with urban water issues, while the appropriate level of regulation required to ensure optimal water use has recently received a great deal of attention in a number of jurisdictions.

5.3.1 Regulation in the water sector

Smart regulation is part of a wider movement for more efficient government. A smaller footprint is desired to minimise regulatory burden and ensure benefits of regulation exceed costs.

Most jurisdictions in Australia have formulated and published guidelines for developing regulation in accordance with COAG's 2008 National Partnership Agreement to Deliver a Seamless National Economy including the preparation of regulatory impact statements or assessments, which are now mandatory in all jurisdictions.

Efforts to reduce regulatory burden in the water sector have gained pace in the past two years, most notably in relation to water planning (see Section 3.1.2) and urban water management (see Section 3.7).

The Queensland Government, in its recently released WaterQ: a 30-year strategy for Queensland's water sector, outlined its commitment to reducing red tape by 20 per cent by 2018. The strategy outlined the following specific actions:

- reduce red tape and promote transparency and accountability
- encourage greater use of recycled water through risk-based regulation
- use a coordinated approach to support catchment-based, total water cycle solutions.

Queensland is reviewing its Water Act, incorporating regulatory burden reduction by streamlining arrangements for converting water licences to tradeable water allocations and allowing the environmental impact statement (EIS) process for large-scale water-related development opportunities to inform decisions under the Water Act.

The Australian Government has also flagged its intention to seek improvements in regulatory efficiency and effectiveness by including consideration of opportunities to reduce or simplify regulatory burden in the terms of reference for the current review of the *Water Act 2007* (Cwth).

Case study 12 Principles of smart regulation

To avoid unnecessary regulatory burden and where possible to cut red tape, the Organisation for Economic Co-operation and Development has proposed a smart regulation approach with the following principles:

- establishing whether there is a clear case for government intervention
- apply the four design principles of good regulation which focus on effectiveness, efficiency, equity and political acceptability
- prefer policy mixes that incorporate instrument and institutional combinations
- prefer less interventionist measures
- design capacity for gradual escalation of instruments from low to high intervention in an enforcement pyramid, depending on measured effectiveness and compliance
- widen the range of regulatory actors and empower participants, particularly those who are in the best position to act as surrogate regulators
- maximise opportunities for win/win outcomes by providing incentives for continuous improvement
- assess all impacts on all groups affected and ensure they are proportionate to the size of the problem

- be inclusive and consultative involvement by a broader range of stakeholders is more likely to produce better regulation
- focus on continuously reducing the compliance burden by making it easy to comply, reducing the number of regulations and considering alternatives to regulation (e.g. co-regulation, self-regulation, quasiregulation, performance-based regulation, education, better enforcement etc.)
- review and revise regulation from time to time by, for example, building review clauses or sunset clauses in regulations or seeking feedback from stakeholders (industry/public)
- leverage the role of enforcement
- coordinate with all levels of government and existing regulatory requirements so as not to increase burden and where possible reduce it
- design the implementation strategy for the regulation
- track compliance burden by introducing a cost of compliance index and a compliance burden index to track progress.

Source: *Designing Smart Regulation* – Neil Gunningham and Darren Sinclair 1998

https://www1.oecd.org/env/outreach/33947759.pdf

The NWI was set up to achieve a nationally compatible system of water management with an appropriate mix of planning, regulatory and market instruments to optimise social, environmental and economic outcomes.

The NWI's objectives are consistent with the principles of smart regulation including proportionality, accountability, consistency, transparency and the need to target risks. Examples include inbuilt objectives and actions aimed at delivering certainty of water entitlements, removal of unnecessary barriers to enable the establishment of an effective and efficient water market, and the setting up of a framework for measuring, monitoring and reporting water use.

In committing to the NWI, governments recognised that these principles and actions are fundamental to improving public confidence in water availability and management.

In light of the current deregulation efforts of NWI parties to cut red and green tape, the Commission urges that a smart regulation approach be adopted to ensure that hard-won gains achieved through NWI implementation are not put at risk.

The Commission endorses the streamlining of regulation where the costs of that regulation exceed the benefits, but not if it jeopardises triple bottom line outcomes. For example if taken too far the pursuit of economic objectives in isolation from social and environmental considerations can lead to a situation where short-term benefits (often to private interests) could be outweighed by longer-term costs (often born by the environment, community and/or taxpayer). The Commission also cautions NWI parties not to pursue arbitrary deregulation targets (e.g. cutting pages of legislation by 20 per cent) in isolation to the benefits and costs of those regulations, which could be counter to the principles of 'smart regulation'.

5.3.2 Extractive industries

The rapid growth of the mining and unconventional gas industries in many parts of the country has seen increased competition for water and concerns about cumulative impacts, water quality and aquifer integrity. It is important that water use within these industries, like any other water use industry, be managed in a sustainable and coordinated manner consistent with NWI principles to ensure the rights of other water users are not eroded.

The Commission recognises that the minerals and petroleum industries may require specific assessment, entitlement and management arrangements outside the scope of the NWI, as provided under paragraph 34 of the NWI. While jurisdictional water management approaches vary, the fundamental principles of water planning, entitlements, and management under the NWI should still be implemented in managing water for minerals and petroleum operations. These include:

- identification of clear, measurable, environmental and other public benefit outcomes before project and water use approval
- water use approvals conditioned on maintenance of environmental and other public benefit outcomes
- licensing of all water take accounted for under a coordinated planning and entitlements framework with all other users
- effective monitoring, management and robust enforcement regimes to ensure security of access for other users and to safeguard environmental assets (including obligations and arrangements to make good harm done to other users and valued environmental assets, during and post operations).

Groundwater is particularly important for the mining and unconventional gas industries. Groundwater data and understanding throughout the country, coupled with unclear data sharing arrangements between industry and water planning agencies, constrain water planners' ability to make informed

decisions on water allocation and management. An ongoing coordinated effort is required from water, resources and environment agencies, as well as industry, to develop greater understanding of groundwater systems and potential impacts to environmental and social values and planned outcomes. This also requires transparent data sharing arrangements.

In some jurisdictions water rights continue to be provided outside NWI-consistent water planning and entitlements processes. These arrangements reduce transparency in the water planning and allocation process, create inequity in water costs, and risk third-party impacts to entitlement holders and the environment. While conditions of use are likely to differ from other water users, water entitlements or licences for mining and unconventional gas operations should be transparently issued under the same entitlement framework as for all other users.

Differences in the required water quality can be a point of difference between some extractive industries and other users, and water plans may need to accommodate consumptive pools distinguished by different source quality. Minerals and unconventional gas operations often extract water of poor quality, and can use this kind of water for many functions.

Progress is being made in the management of co-produced water with the inclusion of provisions for beneficial reuse in recent Queensland water plans (the draft Fitzroy Basin and Condamine Balonne resource operation plans). Queensland's Coal Seam Gas Water Management Policy 2012 shifted the focus of coal seam gas (CSG) water management options from waste to resource and emphasised strategic management and use of CSG water (by prioritising beneficial uses) and saline waste.

Reductions in regulatory burdens could result from better linkages of water use approvals and regulation with water planning processes, relevant water plans and associated rules and outcomes. This applies to the proposed one stop shop arrangements for environmental assessment and approvals. The one stop shop policy aims to simplify the approvals process for businesses through reducing Commonwealth involvement, leading to swifter decisions while maintaining high environmental standards.

On 14 May 2014 the Australian Government introduced the Environment Protection and Biodiversity Conservation Amendment (Bilateral Agreement Implementation) Bill 2014 which enables the 'water trigger' to be included in bilateral agreements with jurisdictions, and therefore the one stop shop process. The Commission considers a one stop shop process will be most effective if:

- jurisdictional assessment and approval processes are clearly linked to water planning and entitlement arrangements
- governments continue to improve community confidence in decision-making through greater transparency of process and community education
- the provision of independent expert advice on project proposals, such as that provided by the Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining Development, remains in place to support jurisdictional agencies and provide ongoing independence and expertise. Appropriate time and resources must be afforded to ensure advice is credible and defendable.

Given the potential for significant impacts on other uses and the environment and the reliance on project approval conditions to mitigate these, governments should strengthen approval and entitlement conditions to ensure that where monitoring shows there will be an unacceptable impact to a defined outcome, clear statutory arrangements compel the proponent to modify operations to comply with agreed limits.

Ongoing monitoring and review of approval conditions and management arrangements is also necessary because detailed understanding of all potential impacts will not be known at the start-up of mining and unconventional gas projects. Further, community values and planned outcomes may change over time, potentially requiring amendments to management arrangements.



Image: Brian Rosenberg

The effectiveness of current regulatory requirements for impacts that require ongoing monitoring past the operational life of the industry, and for unforeseen impacts which are not covered by make good or mitigation arrangements are unclear. Governments should consider make good arrangements that are not fully reliant on environmental impact statement predictions of the scale and areal extent of impacts, but are precautionary and safeguard other users and the environment from potential unforseen wider implications and impacts.

More work is required to ensure all jurisdictions allocate and manage water for mining and unconventional gas in a coordinated and sustainable manner that both protects the interests of all other water users and removes any unnecessary regulatory burden. The Commission considers that future challenges for governments and industry include:

- developing co-ordinated approaches with industry and government agencies to improve understanding of water resources, system behaviour and potential impacts from operations
- linking water planning more effectively and clearly with project approval processes at state, territory and Commonwealth levels
- developing entitlement arrangements which account for industry water use and disposal/beneficial reuse requirements while enabling accurate accounting of water take, opportunities for trade, and management of third party impacts
- ensuring adaptive management measures safeguard other users and the environment through legislative and regulatory requirements linking project approval conditions to approval to operate.

Case study 13 Groundwater entitlement arrangements aligned with NWI – New South Wales entitlement approach

Allocation of water through entitlements for unconventional gas operations and mining in New South Wales is integrated within NWI-consistent water sharing plans, where they exist. The Commission considers the New South Wales approach to be a good example of efforts to ensure full integration of the mining and unconventional gas industries, because it provides the necessary legislative basis for entitlements and has planning arrangements which enable integration of extractive industries.

Section 60I of the Water Management Act 2000 (NSW) requires any activity, including unconventional gas operations in areas of water sharing plans, to hold a licence for any water taken regardless of its quality unless an exemption applies. The Water Act 1912 (NSW) applies to water sources outside of water sharing planning areas and also requires unconventional gas operations to hold a water licence. An application for a licence made under the Water Act 1912 (NSW) is assessed against the same considerations as an application for an access licence or approval made under the Water Management Act 2000 (NSW). The same assessment framework is used to provide advice on a development application decided under the Environmental Planning and Assessment Act 1979 (EP&A Act).

The New South Wales Government introduced the Aquifer Interference Policy (AIP) in September 2012 to address aquifer interference activities, including mining and petroleum activities regulated under the Water Management Act and EP&A Act. The AIP sets out how volumes of water taken should be licensed and accounted for, and outlines processes for mitigating and accounting for impacts on water sources, their users and dependent ecosystems. 'An aquifer access licence is required for all water taken from a groundwater source unless an exemption applies. Where an aquifer interference activity is taking water from a groundwater source, and that take of groundwater is causing the movement of water into that groundwater source from an adjacent, overlying or underlying groundwater source, separate aquifer access licences are required for the groundwater source and for each of the adjacent, overlying or underlying groundwater sources.' (NOW 2012b).

Volumetric water access licences are required to be held for all aquifer interference activities (including take for the life of the operation and for any post-closure take), except where an exemption applies under the Water Management (General) Regulation 2011. Separate licences are required for all affected water sources where aquifer interference activities take water from one groundwater source, but cause water to move (and therefore take) from a connected source, including both groundwater and surface water sources.

Water extraction limits for surface and groundwater are set out in water sharing plans. A water access licence must hold a sufficient share component and water allocation to account for the take of water from the relevant water source at all times. Allocations for consumptive uses across much of New South Wales have reached their limits, that is, the systems are fully allocated. Where systems are fully allocated, licences can be obtained through the market. Where groundwater is managed under the Water Management Act and unassigned water exists, an aquifer access licence may be acquired through a 'controlled allocation' process (by auction, tender, or other means) under Section 65 of the Water Management Act.

5.3.3 Urban water reform

Australia's population is predicted to grow by an extra 21.5 million within the next 50 years. Even on the most conservative population growth estimates, it is predicted that major urban centres will have an additional demand of more than 600 billion litres annually by 2026, and more than 1000 billion litres by 2056 (WSAA 2011).

The Commission acknowledges the significant reform undertaken within the urban water sector during the past two decades. That reform has delivered more commercially focused service providers, clearer and more effective regulation of the sector and improved arrangements for the long-term planning of water supply options. Reform has also delivered greater confidence in the quality of water delivered, better pricing signals for consumers and utilities, enhanced water security and improved productivity.

The pressures on the urban water sector, however, continue to evolve and the implementation of reforms has not been complete. In some cases reform has been confounded by government interventions inconsistent with the enduring reform policy principles.

The Commission believes priority areas for reform in the urban water sector remain, and that each of those identified below are critical and interdependent. Delivering on these reforms will further improve outcomes and help ensure the longer-term sustainability of the sector.

A customer focused sector

The urban water sector is in the early stages of a shift away from a compliance approach to performance, to a more active engagement with customers in determining service offering. It is crucial that governments, regulators and service providers give a greater voice to customers through exploring opportunities for customer choice in pricing and service delivery, improved engagement in objective setting and the determination of trade-offs, and improved customer protection frameworks. Improved engagement has the potential to open significant opportunities for innovation and economic efficiency.

Customers in the urban water context extend well beyond household units to include commercial and industrial businesses, developers and larger institutions (such as local or state government agencies) to whom they can deliver not just traditional water and wastewater services, but also amenity and environmental outcomes.

In the absence of significant opportunities for individual customers to express their preferences through individual customer choice, many decisions about water services are made by governments not only as policy makers and regulators in their roles in setting price, health or environmental targets, but also as utilities themselves.

While evidence suggests that the urban sector is in the early stages of the implementation of customer choice options, there is at least a stated commitment from governments through the utilities' statements of obligation which are being reflected to some degree through utility planning and investment frameworks.

There is still significant scope to improve the degree to which customers are able to influence customer service offerings, pricing outcomes, setting of strategic objectives and ensuring customer protection arrangements are in place. It is important that the sector learns from the innovations in customer engagement by utilities and regulators in the United Kingdom and similar initiatives in the Australian energy sector that allow for early and effective engagement of customers in decision-making.

Case study 14 The Scottish Customer Forum

The Scottish Customer Forum was established for the 2015–2021 price control by the Water Industry Commission Scotland (WICS) to seek agreement with Scottish Water on the priorities for future service levels and price paths for the 2015–2021 price periods. While the WICS as regulator still has overall responsibility for setting prices, the forum plays a central role in the price setting process.

The forum has been established as a separate entity and consists of a panel of eight members and an independent chair. The members are made up of five consumer representatives appointed by Customer Focus Scotland, two licensed provider representatives and a representative from the Scottish Council of Development and Industry (CFS 2012). The representatives come from diverse backgrounds, including former members of Scottish parliament and consumer councils. Their involvement strengthens the standing of the forum through providing extensive industry experience and credibility to any recommendations handed down. The forum will also provide input to Scottish Water's 25-year vision strategy (CFS 2012).

The forum is primarily focused on delivering water services affordability. The enhanced customer engagement has resulted in Scottish Water price rises below the Consumer Price Index, with rises limited to 1.6 per cent for each year from 2015 to 2018, with indicative price rises at the same level until 2021. The partnership between Scottish Water and the forum has ensured that charge levels will also allow Scottish Water to keep investing and improving service levels in the following key areas:

- spending on the delivery of higher quality drinking water
- improving waste water discharges to the environment
- spending on further reducing the number of properties affected by contaminated flooding
- improving supply standards including responses to leakages.

The presence of the forum has resulted in Scottish Water declaring its intention and willingness to listen and act on its customers' affordability problems. As stated in the WICS's Strategic Review of Charges 2015–21 (WICS 2014), typically when attempting to raise greater revenue, utilities have three options: to borrow money; increase prices and raise revenue through customers; or be more innovative and efficient over time. In this instance, Scottish Water has prioritised more innovative and efficient community engagement and increased understanding of its customers. WICS credits this decision as allowing customers the opportunity to engage directly with Scottish Water to make the trade-offs that are best for customers where there are choices on key service and price priorities.

Operating mandate

The role of water in urban communities has and continues to evolve as more sophisticated approaches to delivering integrated urban water cycle management and community liveability objectives develop. However, in many areas of Australia urban water utilities lack clear direction from governments about the role they should play in contributing to these objectives beyond their traditional 'core' water supply and wastewater management roles, and how such new roles should be funded.

Hence there is a continued need for governments to more clearly articulate the roles of utilities, so that appropriate and transparent levels of autonomy and concomitant accountabilities may be provided.

New ways of delivering water and supplying stormwater and wastewater services are required, and integrating these solutions to provide multiple benefits is essential. Urban planning and regulatory arrangements are generally not structured to enable a balanced assessment of the costs and benefits of decentralised approaches against more traditional centralised infrastructure solutions. Urban planning processes more generally, which are characterised by a multiplicity of stakeholders and decision makers, do not have well-developed mechanisms to ensure decision makers can see, let alone have regard to, the full costs and benefits of options before them.

Governments should review the structures in place to manage the interaction between water planning decisions and urban planning processes, with a view to ensuring that wherever possible across those interfaces the full costs and benefits of major decisions are considered by decision makers.

The Commission recommends that all state and territory governments clarify their expectations of utilities and recommit to separate policy, regulatory and service delivery functions. Governments should work to engage with the community in the development of these statements of expectations.

Robust regulation

While governments will always have a role in defining urban water policy, at present they are not uniformly allowing economic regulators the degree of independence they require to ensure pricing and revenue determinations drive efficient service delivery and are focused on customer and community values. Political intervention in independent economic regulatory determinations, whether motivated by shareholder-return considerations or short-term political dynamics, is deferring cost-reflective pricing and efficient price signalling. This behaviour is a clear barrier to the achievement of efficiency and innovation outcomes sought through corporatisation.

There remains a need for greater consistency across economic, health and environmental regulation. Several submissions highlighted the need for regulation to bring together the total water cycle with regulators understanding the consequences, and cost to the community, of decisions. Regulatory impact, whether it is price, public health or the environment, needs to be understood before implementation. The Commission believes there is room for improved sharing of information —and potentially joint consideration of key regulatory decisions—across the economic, health and environmental regulatory domains.

The lack of a consistent regulatory framework can unnecessarily increase costs, both in the management of regulation itself and in holding back productivity and innovation in the sector. In particular, multiple approvals based on different regulatory standards across the country represent a potentially significant barrier to entry for new, innovative solutions including private investment. Shared regulatory approaches or mutual recognition mechanisms should be adopted across jurisdictions wherever possible.

Unlocking private capital

Governments and communities are starting to discuss ways that increased private sector investment can enable existing public capital investments to be released for reuse in the water or other important infrastructure sectors.

There is the immediate challenge of maintaining or replacing aging infrastructure. While the costs associated with urban expansion are significant, poor pricing and cost recovery practices in the past have seen necessary investment in the maintenance or replacement of existing assets deferred. Delays in investment make infrastructure failure more likely and lead to inefficient investment and reduced customer service. Access to capital for renewal appears to be more difficult than access for new infrastructure.

As government spending is constrained, the urban water sector is looking for private investors to provide the capital required or for private service providers to enter the market. Attracting private capital to reduce the burden on government, however, requires new thinking and approaches.

Private sector involvement is presently restricted to specific contractual arrangements for activities including maintenance, operation, design and construction work – usually outsourced by government-owned utilities. The determination of the scope and form of private involvement therefore remains primarily determined by public entities. Procurement processes are often prescriptive, favouring centralised planning arrangements and large infrastructure developments. As a result, the opportunities for innovation and encouraging competitive forces across the urban water sector are limited.

Further, across jurisdictions regulatory and policy frameworks have evolved around a generally highly-centralised, publicly-owned monopoly industry structure. Planning arrangements often involve a set of iterative processes between governments and utilities seeking to manage their interlinked interests in balancing water security, environmental, health and quality targets against the capital and operational costs of meeting those targets.

Regulatory structures and processes also reflect the current reality that a single monopoly provider is managing the delivery of economic, health and environmental outcomes. Policy and regulatory mechanisms to address the risks of a more competitive marketplace (such as 'supplier of last resort' obligations) are often non-existent or not well developed.

These regulatory and policy structures are not well designed for enabling new, competitive entry or potential private capital investment in existing utilities. The relative lack of clarity about the respective roles of utilities and governments in key planning, regulatory and investment decisions represents a further challenge to encouraging private capital, at the very least increasing the risk profile for potential entrants.

The principles of good governance—clarity of objectives, roles and accountabilities—that are pre-conditions for the effective management of private ownership of urban water assets, are just as important for providing confidence to the community that the sector is delivering the best-possible outcomes in a public ownership model.

A regulatory framework that generates confidence is critical to encouraging the private sector to play an increased role.

Regional and remote services

Delivering urban water services across Australia's vast regional and remote areas presents its own range of complex economic, demographic and geographic challenges. The diversity of circumstances—ranging from larger, sometimes fast-growing regional centres to the most remote Indigenous communities— means that there is no 'one size fits all' approach to addressing these issues. Many challenges will also be enduring. In some areas the provision of appropriate water supply solutions will always depend on ongoing economic cross-subsidies and tailored community participation strategies.

The Commission expects, nevertheless, that the nationally applicable reforms across the urban water sector will lead to efficiency gains in the regional water sector. To the extent that some of the problems confronting these utilities are driven by the sub-optimal operating scale of businesses, there is a role for structural reform.

It is important that regional and remote communities have access to safe, secure, reliable and healthy water but this is often not the case. The size and location of some water service providers can also make it difficult to attract the necessary technical, managerial, financial and governance skills to ensure efficient and effective service delivery is achieved. While national reporting arrangements for economic, health and environmental indicators apply for larger utilities, there are inconsistent approaches for providing information on smaller providers, or the relative quality of services provided in regional and remote areas. This limits the capacity of policy makers and the community as a whole to assess the challenges faced in regional areas, as well as the quality of service delivered across the country.

Considering economies of scope and scale along with a constrained fiscal environment, greater collaboration has been found as one avenue for smaller communities to achieve effective and efficient service delivery. Several alliance models appear to have generated some efficiencies across regional utilities and the Commission would encourage the further development of these models. The performance of such strategies, particularly against alternative institutional reforms, should be assessed carefully and on an ongoing basis. They should not substitute for more effective but potentially more substantive institutional reforms.

In some cases, it may not be realistic to recover the full cost of water and sewerage services in smaller and more remote areas. It has long been acknowledged that state and territory governments should subsidise the provision of water supply and wastewater services in regional areas where it is uneconomic for the utility to provide these services safely and efficiently. Such subsidies operate both in jurisdictions with single utilities and in those with regional providers. Communities affected—and the community as a whole—should have transparent information about the extent of those subsidies and they should be subject to regular review.

Implementation: a national approach

Australia's urban water sector warrants national policy attention. It is a sector that provides essential services to almost all Australians, delivers a vital input to businesses across the industrial and services sector, and is playing an increasing role in enhancing the liveability of our urban communities. The efficiency and quality of its services can impact positively or negatively on our national economy. It is also a significant focus of government capital investment and the efficiency of the use of that capital deserves close attention.

While the Australian Government does not have a leadership role in urban water policy, there is a focus in federal processes on the effectiveness of our use of major infrastructure. The COAG Communiqué of December 2013 outlined key priorities for reform, including the need to investigate options to increase private sector investment in infrastructure projects, and cut excessive red tape with a focus on improving the efficiency and effectiveness of regulation.

In May 2014, the COAG Communiqué focused again on infrastructure investments to drive productivity and unlock economic growth, including for regional economies. A new agreement was signed by all parties on asset recycling, with the Commonwealth to provide incentive payments to the states and territories to privatise assets and reinvest proceeds into new infrastructure.

It is important that state governments, industry (both public and private) and the research community identify the opportunities for progress and continue the drive for reform in urban water, particularly as the Commonwealth no longer provides a specific framework for national collaboration through COAG.

National coordination can significantly reduce administrative and compliance costs, thus facilitating innovation. In addition, the sharing of leading practice is an often less recognised benefit of national mechanisms for policy and regulation. The benefits of national approaches are already established in several areas, including the urban water R&D community (through the Urban Water Partnership) and industry certification and training (through the industry-supported National Certification Framework). These efforts have significant potential to increase efficiencies across not only the urban water sector, but other sectors contributing to liveable and sustainable cities.

In the Commission's view, there are clear benefits to be delivered from greater levels of national collaboration and consistency. Such gains would benefit from, but should not depend on, the leadership of the national government. In the Commission's experience, successful national reforms typically involve leadership, coordination and facilitation. The Commission calls on Australia's state and territory governments to work together to deliver better outcomes for their constituents as well as the national economy.

5.3.4 Integrated management of environmental water

Recognising the considerable achievements that have been made in managing environmental water since the inception of the NWI, opportunities remain to maximise environmental outcomes both within the Murray–Darling Basin and broadly across all jurisdictions.

Closer integration of environmental objectives in water plans with river and wetland health objectives in catchment management plans offers opportunities for more cost-effective solutions to improve aquatic health or prevent further loss of condition. At the operational level, integration occurs at catchment scale in some jurisdictions, but can be *ad hoc*. Annual watering plans for held environmental water could also be more explicitly aligned with broader catchment management priorities. This is likely to be successful where catchment management authorities also have responsibility for developing or informing annual environmental watering priorities.

Water released from dams primarily to supply irrigation can provide environmental benefits as it flows to the point of extraction – if delivered in a manner that replicates a critical component of the natural flow regime. At present water managers and river operators cooperate to deliver environmental water, however further opportunities may exist to maximise environmental outcomes through aligning environmental and consumptive water delivery and planning processes. Environmental water savings may then be used at another time or elsewhere to achieve additional environmental benefit. More efficient use of environmental water may also qualify to offset part of the water recovery target under the Basin plan's SDL adjustment mechanism, ultimately benefiting all users.

Market-based recovery of environmental water has proven a successful mechanism for returning overallocated systems to sustainable levels of extraction, particularly in the Murray–Darling Basin. In addition, environmental water holders in the Basin are now trading allocations to optimise environmental outcomes. Few examples of water acquisition for environmental purposes currently exist outside of the Murray–Darling Basin. While some systems outside the Basin identified as overallocated or overused have pathways established and evidence of extractions returning to more sustainable levels, there are



Image: Scott Akerman under a creative commons licence

other systems where pathways remain at the formative stage and delays of several years have occurred in implementing identified reductions. For the most part the delays have been to gain community acceptance for water recovery and to address the economic and social impacts of water recovery. In parts of Australia that are trending towards drier climates and reduced water availability, capacity to achieve the desired environmental outcomes in future may need to be achieved through a combination of planned and held environmental water. Third parties may also aspire to enhance local environmental or cultural benefits through acquisition of entitlements. NWI-consistent entitlement frameworks should be established in all jurisdictions to allow enhanced environmental benefits to be achieved through participation in water markets.

Monitoring and reporting outcomes achieved is important for maintaining public confidence that the substantial investment in environmental water holdings is having beneficial outcomes. In addition to statutory reporting requirements, the cost of acquiring environmental entitlements places pressure on environmental water holders to demonstrate that the water is being managed well and is achieving valuable outcomes. This is also true for planned environmental water, where extractive use is restricted through rules-based mechanisms to maintain certain environmental values.

Adaptive water planning arrangements are required to ensure that management settings can effectively accommodate improved knowledge of water systems, new development proposals and changing community values in addition to the high levels of climate variability and anticipated impacts of climate change. Environmental and ultimately economic costs arise from overuse of water resources, and opportunity costs can be incurred by overly conservative estimates of extraction limits.

Case study 15

Commonwealth Environmental Water Holder better practice monitoring and evaluation example

Since 2008, the Australian Government has recovered water for the environment through a number of programs. Water entitlements acquired through these programs have become part of the environmental water holdings managed by the Commonwealth Environmental Water Holder (CEWH). The CEWH is required to act in accordance with, and perform its functions and exercise its powers in a way that is consistent with, the Murray– Darling Basin Plan's environmental watering plan. The CEWH's activities will support progress towards the environmental outcomes of the Basin plan.

Monitoring and evaluation activities undertaken by the CEWH are guided by a specifically developed Monitoring, Evaluation, Reporting and Improvement Framework. The framework provides a broad overview of the approach to monitoring and evaluation activities for the use of Commonwealth environmental water. While targeted monitoring of the environmental response to Commonwealth environmental watering actions has been undertaken since 2009 (Wassens et al. 2011), the CEWH is now transitioning to a longer-term, area-based strategy that aims to provide greater support for the evaluation of outcomes of environmental watering.

The CEWH Long-Term Intervention Monitoring Project commits to intensive intervention monitoring of selected areas over a five-year timeframe, which will be used to assess sequences of watering actions and enable the reporting of progress towards achieving the ecological objectives of the Basin plan's Environmental Watering Plan. The project is based on an environmental water outcomes framework which sets out the scientific and technical foundations for how environmental water contributes to the environmental watering plan objectives. The CEWH monitoring is planned at three levels at a range of spatial scales to align with the program logic hierarchy:

- operational level measures whether water is being delivered in a manner consistent with the stated water action objectives and without unintended consequences
- intervention level measures ecological response to watering activities at the environmental asset scale
- program level measures ecological condition at the Basin scale and trends over the long term.

Consistent with its role under the *Water Act 2007* (Cwth), the CEWH is focusing its activity on intervention monitoring, with a modelling approach used to evaluate the outcomes achieved at the program level.

A recent audit of the CEWH found that the principles, program logic and hierarchy of the monitoring and evaluation approach provided a sound basis to assess the performance of environmental watering and to integrate the CEWH's monitoring with the program-level monitoring to be undertaken by the MDBA (ANAO 2012). Successful implementation of the CEWH's monitoring and evaluation arrangements is also supported by the commitment of around \$23 million to the monitoring component of the program.

5.3.5 Water quality

In its 2011 assessment, the Commission recommended that water quality objectives be more fully integrated into the water reform agenda and better connections be made between water quality and water quantity in planning, management and regulation to achieve improved environmental outcomes. This recommendation is still pertinent.

One of the themes in submissions to the 2014 assessment involved concern that water quality had been inadequately dealt with in the past, and a push for better integration of land and water management in planning processes was required to address the issue, in both rural and urban contexts. For example ACTEW Corporation noted that 'risks to water quality that come at the catchment stage are very difficult for water utilities to mitigate. Water utilities rely on government restrictions of land use and recreational activities in the catchments that do not adequately consider water quality impacts.... A greater emphasis on gaining a common understanding between public health, land planning and environment protection authorities, and water utilities is required' (ACTEW 2013).

The NWI does not specify quality as a fundamental characteristic of water that should be recognised in water planning and property right arrangements. Nevertheless, water quality is as important in water management as volume, location and timing. Contemporary water management requires recognition of the interactions between water quality and quantity and the range of uses of water to achieve economic, social and environmental outcomes.

The National Water Quality Management Strategy (NWQMS) was incorporated into COAG's Water Reform Framework in 1994. The objective of the NWQMS is to achieve sustainable use of water resources by protecting and enhancing the quality of those resources. The NWQMS has non-mandatory guidelines for managing a range of water resources, and proposes that water quality plans be integrated into present-generation water allocation plans. A review of NWQMS implementation across Australia found the framework had proven to be a good, consistent process for water quality management (Bennett 2008). Through COAG, all jurisdictions endorsed the *Next Steps in National Water Reform: Preparation for the future* (a report by the Standing Council on Environment and Water) (Appendix E), which included water quality actions in the work program of the national water reform agenda.

The Commission's *National Water Planning Report Card 2013* highlighted the gap in understanding the water quality needs of environmental assets, as well as a lack of attention to water quality management and monitoring. This work identified that environmental water needs are largely focused on surface water flows and timing and that even where plans include water quality objectives, little attention is given to achieving broader water quality objectives other than specific salinity components.

The Commission believes that more cost-effective outcomes for water quality can often be achieved through catchment-based solutions rather than treatment options. The degree to which the full range of options can be considered in pricing determinations varies between jurisdictions. Improvements may require a closer integration of land management activities and the management of diverse sources of pollution across the landscape. For example, the Adelaide and Mount Lofty natural resource management plans in South Australia include a five-year target aimed at improving water quality through land management practices.

5.4 Applying NWI principles to new developments

Development opportunities in northern Australia and elsewhere are strongly linked to water resources. Management arrangements need to be NWI-consistent if such developments are to have positive long-term outcomes. Resource information is frequently inadequate for new development areas, posing a risk that developments may proceed without an appreciation of impacts or long-term viability. Economically efficient and sustainable use of water resources, water infrastructure assets, and government resources requires robust and transparent approaches to government investment in new water infrastructure to ensure that developments are likely to be financially viable into the future and that investment decisions consider non-market values (such as ecological and social costs and benefits). Paragraph 69 of the NWI commits governments to ensure that proposals for investment in new or refurbished water infrastructure are assessed as economically viable and ecologically sustainable before the investment is made.

While government investment in irrigated agriculture has been an historical feature of regional development, the Commission considers that private sector capital should have the greater role as a driver of new development. Where government investment is involved, difficulties often arise in assessing the merits of such investment.

The Commission considers that a policy gap remains in defining economic viability, and in regard to appropriately integrating social objectives into a cost/benefit analysis of proposed government investment. To assist in this analysis, all Australian governments seeking to justify government expenditure on major water infrastructure should provide a clear articulation of the objectives, including social objectives, of that investment so that targeted cost/benefit analyses can be undertaken and contested. This includes being clear about any subsidies involved to achieve stated social objectives. At present no federal, state or territory government has clearly articulated policy objectives or an agenda for development in northern Australia and there is no consistent methodology for quantifying social outcomes.

The Commission considers this an opportune time to reflect on Murray–Darling Basin experiences to ensure that the challenges and costs of corrective actions can largely be avoided in northern Australia. In identifying these key lessons, the Commission has drawn on its previous assessments and reports, as well as consultation with stakeholders, communities, government agencies and other experts in this area. The Commission has also drawn on Essay 2 by Tom Crothers and Rob Freeman.

To avoid repeating the mistakes of overallocation, overuse and non-coordinated management of water resources as occurred in the Murray–Darling Basin, it is essential that northern Australian jurisdictions consider the lessons learned from the various planning and management initiatives used in the Basin to the development of the northern region's surface and groundwater resources. Approaches based on these lessons include:

- a process that ensures stakeholders are engaged early in the water planning process, inclusive
 of all stakeholders and not just involving sectorial interests
- an integrated water planning approach that applies caps (as SDLs) on surface and groundwater diversions for river catchments and aquifers and uses the best-available science and information in developing these SDLs
- ensuring that water resource plans have clear objectives, that any threats to delivering these
 objectives are clearly identified and that the plan's monitoring and evaluation focus is linked to
 the plan's objectives and addresses the threats
- acknowledging that a consensus in water planning decision-making is not a realistic goal and that water planning 'trade-offs' may be required
- ensuring full transparency through the publication of information on decisions and the reasons supporting them
- applying water pricing and institutional arrangements which promote economically efficient and sustainable use of water resources, water infrastructure assets, and government resources devoted to the management of water
- the establishment of cross-jurisdictional institutional arrangements and protocols for guiding the development and implementation of consistent and high-integrity water resource plans.

Essay 2 Water development in northern Australia – lessons from the Murray–Darling Basin

By Tom Crothers* and Rob Freeman**

For decades, state and federal politicians as well as community and industry leaders in northern Australia have been calling for the region's water resources to be developed through an expansion of agriculture and mining activities.

Several projects to expand northern Australia's agricultural production through irrigation development have been challenged by the extremes of weather, invasion by animal pests and outbreaks of disease. The Humpty Doo Rice project in the Northern Territory and the Ord River irrigation scheme in Western Australia are projects that have either succumbed to or experienced these challenges. The construction of major taxpayer-funded infrastructure for the initial stage of the Ord River Scheme, which was completed in 1971, illustrates that the construction of irrigation infrastructure does not necessarily result in a viable irrigated agriculture industry being established within a timeframe that provides a commercial return on investment.

In June 2014, the Australian Government released *The Green Paper on Developing Northern Australia*. The Green Paper builds on the Government's pre-election commitment: The Coalition's 2030 Vision for Developing Northern Australia. It sets out the Australian Government's views on the major policy directions to develop northern Australia for comment and debate. The Green Paper, along with submissions received, will inform the *White Paper on Developing Northern Australia* due out later this year.

The Green Paper, together with initiatives being progressed by the three northern Australian state and territory jurisdictions, provides strong signals that the water resources of northern Australia are likely to undergo rapid development from agriculture and mining expansion. To enable that development to provide enduring benefits to the Australian and state/territory economies, it is imperative that the mistakes of water resource development in the Murray–Darling Basin are not repeated and that sustainable levels of consumptive take of water are applied by each of the jurisdictions responsible for the allocation and management of northern Australia's water resources.

History of water resource use and management in the Murray–Darling Basin

The initial development of water resources in the Murray–Darling Basin was as a drought-proofing measure to provide livestock and domestic water supplies in the southern rivers. During the 1870s, regular droughts encouraged landholders to experiment with irrigation through the use of weirs and steam-driven pumps. The 1895–1902 'Federation' drought was the catalyst for considerable debate and political lobbying for control of the nation's water resources. Victorian and New South Wales interests wanted water for irrigation and closer settlement and South Australia wanted enough water retained in the Murray River for navigation – to maintain its highly profitable river boat trade. It took another 13 years and another severe drought, when the Murray River ceased to flow, for South Australia, Victoria and New South Wales and the Commonwealth to sign the River Murray Waters Agreement. Subsequently the River Murray Commission was established in 1917 and tasked to implement the River Murray Waters Agreement.

For the next 60 years, water resource development for irrigation increased greatly across the Basin, without any collective recognition by the jurisdictions that the system was becoming overallocated. While some efforts were made by the southern Murray jurisdictions to address localised issues such as salinity and deteriorating water quality, there was no collective action for the sustainable management of the Basin's water resources.

Although a number of jurisdictional interventions in the management of the Basin's water resources were initiated before the 1980s, the most significant policy interventions occurred following the establishment of the Murray–Darling Basin Commission (MDBC) and Ministerial Council (MDBMC) in the mid-1980s. These included:

- 1988 agreement to the Salinity and Drainage Strategy, including salt-interception scheme construction and an accountability system of salinity credits and debits.
- 1993 an environmental water allocation provided to the Barmah-Millewa Forest was the first signal of a significant change to the management of the Basin's water resources.
- 1995 in response to declining water quality and outbreaks of blue green algae, Basin jurisdictions agreed to 'cap' surface water diversions at 1993–94 levels of development.
- 2000 a revised and expanded Basin Salinity Management Strategy was agreed, incorporating accountable end-of-valley salinity targets for all major rivers across the Basin.
- 2004 in conjunction with the signing of the NWI, The Living Murray program commenced with a 'First Step' funding commitment to recover 500 GL of water for the environment.
- January 2007 a \$10 billion National Plan for Water Security was announced to address overallocation, improve Australia's water efficiency and introduce institutional and governance reforms – particularly in the Basin.

- September 2007 the passage of the Water Act 2007 (Cwth) allowed the Australian Government to take a more prominent role in coordinating an integrated management approach to the Basin's water resources. This Act also established a new Murray–Darling Basin Authority (MDBA) with the responsibility to rebalance consumptive and environmental water use through a Basin plan.
- October 2010 Guide to the proposed Basin plan was released to significant community opposition. A prolonged period of consultation with communities and negotiation with Basin states followed.
- November 2012 the Basin plan was adopted and is being progressively implemented over the 2013–19 period and beyond.

In the long journey from the early 1900s to 2012, there have been many lessons learned in the delivery of a more sustainable framework for management of the Basin's water resources.

Lessons learned from the Murray–Darling Basin

1. Sound governance and institutional arrangements

One of the most important lessons learned from the Basin initiatives is the need to utilise sound governance and institutional arrangements to provide a forum for negotiating and addressing the water sharing challenges and tensions that emerge from the cross-jurisdictional management of shared water resources. While northern Australia's river systems are not part of a connected river system like the Murray– Darling, it is desirable that consistent governance and institutional arrangements for the northern Australia jurisdictions are adopted to prevent perverse outcomes such as encouraging development in an area by 'low cost' water or infrastructure being provided by government.

The establishment of cross-jurisdictional arrangements such as the MDBA, the MDBMC and the Independent Audit Groups all greatly assisted in dealing with any competitive and vested interest driven behaviour and helped avoid sub-optimal, inconsistent or incompatible outcomes in the Basin. These cross-jurisdictional arrangements were also instrumental in building bipartisan political support for the hard decisions that had to be made in the interests of the Basin. The strength of cross-jurisdictional arrangements in the Basin has also been underpinned by the regular and rigorous independent audits which provided an overview of who was or was not meeting their agreed commitments in the Basin, the locations of water management 'hot spots', and suggestions for improving the water planning and management arrangements. It should also be acknowledged that the National Water Commission played an important role in delivering independent oversight of cross-jurisdictional arrangements.

In achieving sustainable water resource management in northern Australia's river basins, the Basin experience has demonstrated that it is essential to develop bipartisan political support through strong cross-jurisdictional links and associated governance arrangements to deliver effective and sustainable water planning outcomes. The governance and institutional arrangements for the development of northern Australia's river systems should be robust enough to facilitate decisions and actions for what is in the best interests of the nation.

2. Stakeholder/community engagement

Another lesson learned from the Basin's water management interventions was the need to utilise a sound and effective community and stakeholder engagement process to secure the involvement and 'buy-in' of stakeholders.

The NWC's 2011 assessment identified a number of communities 'who felt that they had lost ownership of the rural reform agenda, that local knowledge was not being listened to and that trust in the decision-making processes had been eroded'. The 2011 assessment also identified that 'while consensus in decisions is not a realistic goal, a firm commitment to good processes that are transparent and enduring and are effectively implemented, will generate community confidence in water planning outcomes'. Clearly defined arrangements for the community's involvement in water management and planning are essential if there is to be certainty about roles and effective community engagement. The identification and use of a defined engagement process between the Commonwealth and the states, that spells out their specific and active roles for delivering collective actions and outcomes, has greatly assisted local communities to look beyond their own backyard and provide the essential leadership in advancing initiatives which elected members may find too hard to implement in their own right.

From the Basin water planning and management experiences, some of the key ingredients for effective stakeholder/community engagement include:

- early engagement of the stakeholders and the community
- the use of consistent engagement processes and skilled staff familiar with the history of local issues in the engagement process
- provision of sufficient time and budget allocation for the engagement process
- use of existing stakeholder arrangements where strong relationships are already in place
- use of an engagement process that is inclusive of all stakeholders and includes Indigenous Australians.

The engagement process needs to be a two-way street with stakeholder/community views being genuinely listened to and acted on, taking into consideration the following:

- stakeholders and community are treated with respect, honesty and integrity
- information on the social, economic and the environmental features in a planning area is made freely available to all stakeholders and the community
- information of the trade-offs in decision-making is fully transparent and made publicly available

 the engagement process must be independent and should not be seen to be just doing the bidding of governments.

It is imperative that any planning processes undertaken for the allocation of northern Australia's water resources should reflect the community engagement lessons from the Basin.

3. The importance of planning and entitlements framework

A major challenge in moving towards a sustainable framework for the allocation and management of water in the Basin was the setting of a consistent and secure water entitlements framework which underpinned an environmentally sustainable level of water take and established what the SDL for consumptive water would be.

The level of inconsistency between the Basin's state and territory jurisdictions in water planning policy, a water entitlements framework that established tradeable entitlements and allowed water to go to its highest-value use and water language all impeded the application of a rigorous and consistent policy approach across the Basin. These inconsistencies were

demonstrated in the lack of rigour in which the state and territory jurisdictions applied the 1995 Cap on Diversions and allowed further development. These issues have been addressed in the Basin plan through a requirement for state and territory jurisdictions to develop regional water resource plans that are consistent with a common Basin-wide water planning framework.

The Basin experience also demonstrated that one of the challenges in developing the Basin plan was the securing of a complete and consistent picture of the consumptive take of water through surface water and groundwater diversions, including interceptions by farm dams and forestry operations. The Basin's water allocation and management strategies require the state and territory jurisdictions statutory water resource plans to contain provisions for the allocation and management of all diversions for both surface and groundwater resources. Accordingly, the northern Australia state and territory jurisdictions' water resource plans must provide for secure and tradeable water entitlements which account for all diversions of surface and groundwater resources.



Figure 14: Areas in northern Australia with draft or operational water plans in 2013, including surface water and groundwater

Source: NWC 2014a

4. The role of information

Availability and guality of information/science: The Basin water planning experience has demonstrated that while there was a significant body of science and information held by the three tiers of government, as well as various institutions, the community and individuals in the Basin, there were also significant knowledge gaps – particularly in the area of formal social science and quality and consistent data on river flows, including the impacts of water extractions on river flows. This led to the Australian Government engaging the CSIRO to undertake the sustainable yields project to deliver high-quality and consistent hydrology for the Basin, before the development of the Basin plan. However, it is also important that water planners and decision makers do not fall into the trap of avoiding or postponing decisions and the development of statutory water plans on the basis of 'not having enough science'.

Given the fragility of the ecosystems and the paucity of science for a number of northern Australian surface and groundwater systems, particular emphasis should be directed to undertaking comprehensive water resource assessments. These would underpin robust water planning processes that are both transparent and based on best-available hydrological modelling, to clearly identify the 'shares of available water from surface water and groundwater sources' for consumptive and environmental purposes. Furthermore, the allocation of water from northern Australia's water systems without due consideration of the cumulative impacts is also a fast track to repeating the mistakes of the Basin. Accordingly, the water resource plans of northern Australia's state and territory jurisdictions should take a precautionary approach to the development of the region's water resources.

Information access: The building of community support for, and ownership of, the required management actions of the Basin plan was greatly assisted by provision of ready access to available baseline data and information used to develop the respective planning strategies. An example of this was the MDBA's initiation of a weekly report on the River Murray operations which provided the community with a more detailed and sophisticated level of information and understanding of how the system worked.

A major catalyst for the development of community support and action in the Basin has been the 'baseline assessments'. The baseline salinity investigations undertaken before the Salinity and Drainage Strategy was adopted, the baseline water audit conducted before the Cap on Diversions was set, and more recently the CSIRO sustainable yields study and other work before the Basin plan was developed, have all facilitated major evidence-based policy discussions and agreements on a way forward for better management of the Basin's water resources.

The Basin water planning experience also demonstrated that water planning decisions on trade-offs must be documented, be fully transparent and be freely available to all stakeholders. Hart (2014) also emphasises the importance of having all science used in the planning and decision-making processes 'peer reviewed' to confirm its integrity with the community. The ownership and commitment that northern Australia's stakeholders have to the water resource plans developed by the region's state and territory jurisdictions will depend on the willingness of these jurisdictions to make information publicly accessible during the development of their water resource plans.

Importance of ongoing information: Another lesson from the Basin was the need to implement an effective monitoring and evaluation program for the consistent collection of high-integrity data to identify the cumulative impacts of management actions and to support use of an adaptive management approach in undertaking future reviews of the Basin's water resource plans. Accordingly, the Basin plan has iterative management arrangements for the provision of environmental flows/flow regimes and other management actions.

Based on these experiences, in northern Australia consideration should be given to implementing a robust monitoring network

that will allow effective monitoring of water take, as well as a consistent data collection protocol to monitor the impacts of the development on the region's water resources. Data on rainfall, streamflows, aquifer levels, water use, water quality, the management of critical flows and events, the health of key ecosystems and the outcomes of monitoring and compliance operations should be collected and reported on. To further build on the Basin experiences, it would also be desirable for the northern Australian jurisdictions to adopt a common data collection protocol to provide a consistent reporting approach on the status of the development of northern Australia's water resources.

The challenges and costs of corrective action

Before human interference, the Basin had a mean annual flow of about 33,000 GL per year. The level of surface water diversion in the Basin (as of 2009) was about 13,620 GL per year. The MDBA's Basin plan proposes to achieve a level of take of 10,873 GL per year and a Basin-wide reduction of take of 2750 GL per year by 2019. This is an adjustment of about 22 per cent in the consumptive take of water from the Basin, which is being implemented through investment in water infrastructure efficiency and water allocation buybacks.

A reduction of this magnitude in the Basin's consumptive water take will result in some economic and social costs to the Basin communities, as well as significant costs to the taxpayer. Already more than \$11.7 billion has been committed to initiatives including The Living Murray (which redirected 500 GL of water from consumptive use to improve the health of the Murray system), the Basin Salinity Management Strategy, and the water efficiency and water recovery actions of the Basin plan.

The learning from the Basin is that it is a very difficult process and it may involve significant social, ecological and economic costs in water recovery for overallocated systems. Accordingly, water planning strategies for the allocation of northern Australia's water resources should take a cautious approach and avoid, at all costs, the need for future water recovery programs.

The Basin planning experiences have demonstrated that the NWI principles are still effective in determining the level of water extraction that delivers productivity, while at the same time maintaining healthy river and groundwater systems. Failure by the northern Australian state and territory jurisdictions to apply these principles could lead to perverse outcomes and the need for expensive corrective actions in the future.

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Abbreviations and acronyms

ABS	Australian Bureau of Statistics
ACCC	Australian Competition and Consumer Commission
ACT	Australian Capital Territory
ADWG	Australian Drinking Water Guidelines
AGWR	Australian Guidelines for Water Recycling
AIFS	Australian Institute of Family Studies
AIP	Aquifer Interference Policy (NSW)
ANAO	Australian National Audit Office
AWI	Aboriginal Water Initiative
AWIS	Aboriginal Water Initiative System
AWRIS	Australian Water Resources Information System
BASIX	Building Sustainability Index
BOM	Bureau of Meteorology
BDL	Baseline Diversion Limit
CEWH	Commonwealth Environmental Water Holder
CFS	Consumer Focus (Scotland)
COAG	Council of Australian Governments
CRCWSC	Cooperative Research Centre for Water Sensitive Cities
CSG	coal seam gas
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CYLC	Cape York Land Council
DEPI	Department of Environment and Primary Industries (Vic)
DNRM	Department of Natural Resources and Mines (Qld)
DotE	Department of the Environment
DSEWPaC	Department of Sustainability, Environment, Water, Population and Communities
EIS	Environmental Impact Statement
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
EFAP	Environmental Flows Assessment Program (Qld)
ESC	Essential Services Commission (Vic)
ESCOSA	Essential Services Commission of South Australia
GL	gigalitre
HAP	Hamersley Agricultural Project
IESC	Independent Expert Scientific Committee
IIO	irrigation infrastructure operator
IWCM	Integrated Water Cycle Management
IPART	Independent Pricing and Regulatory Tribunal (NSW)
IWIP	Improving Water Information Program
KL	kilolitre
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MDB	Murray–Darling Basin
MDBA	Murray–Darling Basin Authority
MDBC	Murray–Darling Basin Commission
MDBMC	Murray–Darling Basin Ministerial Council
MLDRIN	Murray Lower Darling Rivers Indigenous Nations
ML	megalitre
NAILSMA	North Australian Indigenous Land and Sea Management Alliance
NBAN	Northern Basin Aboriginal Nations
NCP	National Competition Policy
NGIS	National Groundwater Information System
NIC	National Irrigators Council
NOW	New South Wales Office of Water
NPR	National Performance Report
NRM	natural resources management
NSW	New South Wales
NSWIC	New South Wales Irrigators' Council
NT	Northern Territory
NWC	National Water Commission
NWI	National Water Initiative
NWMS	National Water Market System
NWQMS	National Water Quality Management Strategy
PC	Productivity Commission
OEH	Office of Environment and Heritage (NSW)
QLD	Queensland
SA	South Australia
SCEW	Standing Council on Environment and Water
SDL	Sustainable Diversion Limit
SDP	Sydney Desalination Plant
SEQ	South East Queensland
SRWUIP	Sustainable Rural Water Use Infrastructure Program
TAS	Tasmania
TI	Tasmanian Irrigation
VEWH	Victorian Environmental Water Holder
VIC	Victoria
WA	Western Australia
WICS	Water Industry Commission Scotland
WRP	Water Resource Plan
WSAA	Water Services Association of Australia
WTOG	Water Thematic Oversight Group

Glossary of terms

Allocation trade: trade in seasonal water allocations that involves transferring some or all of the water allocated for the current irrigation season or for an agreed number of seasons.

Baseline diversion limits (BDLs): BDLs establish a baseline from which to determine required reductions in diversions in the Basin plan. The baseline adopted is a combination of limits established by state law (e.g. existing water resource plans limits), defined levels of take where there are no established limits, and in some cases the limits established by the Murray–Darling Basin cap arrangements where those arrangements establish the lowest limit.

Bulk entitlement: water supplied by a water provider to another water provider.

Carryover: the option to hold in storage a portion of unused seasonal allocations for use in a later water year.

Commonwealth Environmental Water Holder: established under the *Water Act 2007* (Cwth) to manage the water entitlements that the Australian Government acquires.

Consumptive pool: the amount of water that can be made available for consumptive use in a given water system under the rules of the relevant water plan.

Consumptive use: the use of water for private benefit consumptive purposes including irrigation, industry, urban uses, stock and domestic use.

Desalination: the process of removing excess salt and other minerals from water in order to obtain freshwater suitable for human consumption and other purposes.

Entitlement trade: entitlement trade is the buying and selling of all or part of water entitlements.

Environmental and other public benefit outcomes: defined as part of the water planning process and specified in water plans. May include:

- environmental outcomes: maintaining ecosystem function (such as through periodic inundation of floodplain wetlands), biodiversity, water quality, river health
- other public benefits: mitigating pollution, public health (such as limiting noxious algal blooms), Indigenous values, cultural values, recreation, fisheries, tourism, navigation and amenity values.

Environmental flow: a water regime applied to a river, wetland or estuary to improve or maintain ecosystems and their benefits where there are competing water uses and where flows are regulated.

Environmental water planning: the process of determining environmental water outcomes, management mechanisms and monitoring and evaluation arrangements within the context of broader water planning.

Environmental water requirements: flow regimes (e.g. volume, seasonality, duration) that are needed to sustain the ecological values of aquatic ecosystems, including their processes and biological diversity.

Environmental watering: the process of managing and delivering water to achieve environmental objectives. The term environmental watering equally applies to all water received by rivers, lakes and floodplains from rainfall and run-off events.

Floodplain harvesting: collection, extraction or impoundment of water flowing across floodplains.

Groundwater-dependent ecosystem: ecosystems that depend on groundwater for their existence and health.

Held environmental water: water available under a water access right, a water delivery right or an irrigation right for the purpose of achieving environmental outcomes.

Interception: the interception of surface water or ground water that would otherwise flow, directly or indirectly, into a watercourse, lake, wetland, aquifer, dam or reservoir.

Lower-bound pricing: the price level at which, to be viable, a water business should recover at least its operational, maintenance and administrative costs, externalities, taxes or tax equivalents (not including income tax) and the interest cost on debt and dividends (if any), and make provision for future asset refurbishment or replacement. Dividends should be set at a level that reflects commercial realities and stimulates a competitive market.

Millennium Drought: a term commonly used to refer to the period between 1997 and 2009 when south-eastern Australia experienced the most persistent rainfall deficit since the start of the 20th century.

Overallocation: situations in which, with the full development of water access entitlements in a particular system, the total volume of water able to be extracted by entitlement holders at a given time exceeds the environmentally sustainable level of extraction for that system.

Overuse: situations where the total volume of water extracted for consumptive use in a particular system at a given time exceeds the environmentally sustainable level of extraction for that system. Overuse may arise in systems that are overallocated, or it may arise in systems where the planned allocation is exceeded due to inadequate monitoring and accounting.

Planned environmental water: defined in the *Water Act 2007* (Cwth) as water that is committed or preserved by water plans or other legislative instruments for the purpose of achieving environmental objectives. Also known as 'rules-based' environmental water.

Security: the legal status and tenure of a right to access water. This includes the frequency with which water allocated under a water access entitlement is able to be supplied in full.

Surface water: water that flows over land and in watercourses or artificial channels and is able to be captured, stored and supplemented from dams and reservoirs.

Sustainable Diversion Limit: the amount of water that can be taken for town water supplies, industry, agriculture and other human or 'consumptive' uses, while ensuring there is enough water to achieve healthy river and groundwater systems.

Sustainable level of extraction: the water able to be extracted from a water system over a defined period of time that allows for an optimal mix of economic, social and environmental outcomes, agreed through a water planning process.

Termination fee: a fee levied by an irrigation infrastructure operator when a delivery entitlement is surrendered to the operator to terminate any rights or obligations associated with that delivery entitlement (including any requirement to pay an access fee).

Unbundling: the separating of water rights from land as well as into distinct components, each of which confers specific rights on the holder, such as water take, water delivery, water use and works approval.

Unsupplemented: water supply not involving releases of water stored in infrastructure. Equivalent to an unregulated water supply.

Upper-bound pricing: the price level at which, to avoid monopoly rents, a water business should not recover more than operational, maintenance and administrative costs, externalities, taxes or tax equivalents, the cost of asset consumption and the cost of capital (calculated using a weighted average cost of capital).

Urban water sector: the Commission refers to the 'urban water sector' as the institutions responsible for, or impacting the supply of, a reticulated water or wastewater system and associated services to large cities, smaller cities and towns, and small communities, including some Indigenous communities. This includes the major urban services (50 000+ connections), the non-major urban services (10 000 to 50 000 connections) and the minor urban services (less than 10 000 connections).

Water access entitlement: defined in the NWI as a perpetual or ongoing entitlement to exclusive access to a share of water from a specified consumptive pool as defined in the relevant water plan.

Water allocation: the volume of water allocated to a water access entitlement in a given season, defined according to rules established in the relevant water plan.

Water-dependent ecosystems: ecosystems that depend on periodic or sustained inundation, waterlogging or significant inputs of surface water or groundwater to continue functioning.

Water plans: establish rules for sharing water between the environmental needs of the river or aquifer and water users, and also between different types of water use such as town supply, rural domestic supply, stock watering, industry and irrigation. Terminology used to describe water plans varies across jurisdictions and includes water resource plans (Qld), water sharing plans (NSW), water allocation plans (SA, WA, NT) and water management plans (Tas).

Water sensitive urban design: the integration of urban planning with the management, protection and conservation of the urban water cycle to ensure that urban water management is sensitive to natural hydrological and ecological purposes.

Water system: a water resource (surface and/or groundwater) that is internally hydrologically connected and defined (i.e. bounded) at the level appropriate for management.

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