



Australian Government
Productivity Commission

National Water Reform 2020

Productivity Commission Draft Report

February 2021

This is a draft report prepared for further public consultation and input. The Commission will finalise its report after these processes have taken place.

© Commonwealth of Australia 2021



Except for the Commonwealth Coat of Arms and content supplied by third parties, this copyright work is licensed under a Creative Commons Attribution 3.0 Australia licence. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/3.0/au>. In essence, you are free to copy, communicate and adapt the work, as long as you attribute the work to the Productivity Commission (but not in any way that suggests the Commission endorses you or your use) and abide by the other licence terms.

Use of the Commonwealth Coat of Arms

Terms of use for the Coat of Arms are available from the Department of the Prime Minister and Cabinet's website: <https://www.pmc.gov.au/government/commonwealth-coat-arms>

Third party copyright

Wherever a third party holds copyright in this material, the copyright remains with that party. Their permission may be required to use the material, please contact them directly.

Attribution

This work should be attributed as follows, *Source: Productivity Commission, National Water Reform 2020, Draft Report*.

If you have adapted, modified or transformed this work in anyway, please use the following, *Source: based on Productivity Commission data, National Water Reform 2020, Draft Report*.

An appropriate reference for this publication is:

Productivity Commission 2021, *National Water Reform 2020, Draft Report*, Canberra.

Publications enquiries

Media, Publications and Web, phone: (03) 9653 2244 or email: mpw@pc.gov.au

The Productivity Commission

The Productivity Commission is the Australian Government's independent research and advisory body on a range of economic, social and environmental issues affecting the welfare of Australians. Its role, expressed most simply, is to help governments make better policies, in the long term interest of the Australian community.

The Commission's independence is underpinned by an Act of Parliament. Its processes and outputs are open to public scrutiny and are driven by concern for the wellbeing of the community as a whole.

Further information on the Productivity Commission can be obtained from the Commission's website (www.pc.gov.au).

Opportunity for further comment

The Commission thanks all participants for their contributions to the inquiry and now seeks additional input for the final report.

You are invited to examine this draft report and comment on it by making a written submission by Wednesday 24 March 2021. Further information on how to provide a submission is included on the inquiry website: www.pc.gov.au/inquiries/current/water-reform-2020/make-submission#lodge.

The final report will be prepared after further submissions have been received, and will be submitted to the Australian Government by the end of June 2021.

Public hearing dates and details

In response to COVID-19, the Commission is holding hearings remotely using a video and teleconference service. Please contact us if you are unable to participate remotely; there will be limited availability for an in-person appearance in Melbourne or Canberra.

Dates	How to register
Monday 29 March 2021	Please visit the inquiry website to register your interest in participating in a hearing: www.pc.gov.au/water-hearings
Tuesday 30 March 2021	
Wednesday 31 March 2021	

Please note, public hearings are subject to interest and the number of dates may increase or decrease as a result. Check the link above for the latest information. Alternatively, call Marianna Olding on 03 9653 2194.

Commissioners

For the purposes of this inquiry and draft report, in accordance with section 40 of the *Productivity Commission Act 1998* the powers of the Productivity Commission have been exercised by:

Jane Doolan

Commissioner

Drew Collins

Associate Commissioner

Contents

Opportunity for further comment	iii
Abbreviations	ix
Executive summary	1
Draft reform advice on NWI renewal	5
1 About the inquiry	15
1.1 Context for the inquiry	15
1.2 The Commission's task	18
1.3 The Commission's approach	19
1.4 Conduct of the inquiry	20
2 Progress against the NWI and the case for continuing reform	21
2.1 Overview of the NWI reform agenda	22
2.2 Summary of progress against the agreement	23
2.3 Reforms have contributed to sizeable benefits	25
2.4 But the case for further reform is compelling	27
2.5 In summary: the case for renewed reform effort is convincing	39
3 NWI renewal: a refreshed intent	41
3.1 Why a national approach to water reform?	42
3.2 A modernised goal	43
3.3 Modernised overarching objectives	44
3.4 Modernised detailed objectives	44
3.5 Foundations set in overarching principles	47
3.6 Key elements	49
3.7 Updated acknowledgement of other initiatives	50

4	Building in good governance for a renewed NWI	51
4.1	The NWI's governance architecture has been significantly eroded	52
4.2	Characteristics of leading practice governance	53
4.3	A modernised agreement structure	54
4.4	Organisational 'best-fit' for governance functions	55
4.5	Incentivising reform	56
5	Water resource management — a fit-for-purpose framework	59
6	Water entitlements and planning	65
6.1	Room for improvement in entitlements regimes	66
6.2	Improvement in water planning	70
7	Water trading and markets	79
7.1	Trading has delivered significant net benefits	80
7.2	More detailed principles for stronger markets	81
7.3	Creating the foundations for leading practice	82
8	Environmental management	89
8.1	Progress on providing water for the environment	90
8.2	Requirements for achieving agreed outcomes in all systems	93
8.3	Additional requirements in systems with held water	99
8.4	Water system managers should use their best endeavours to achieve agreed outcomes	107
8.5	Effective monitoring, evaluation and reporting	108
9	Securing Aboriginal and Torres Strait Islander people's interests in water	111
9.1	Understanding of Traditional Owners' aspirations has evolved since the NWI was drafted	112
9.2	A new policy element developed through co-design	115
9.3	Achieving cultural outcomes through enhancing the influence of Traditional Owners in water management	116
9.4	Enabling access to water for economic use	118
10	Ensuring the integrity of water resource management	121
10.1	Confidence in water management has been tested	122

10.2	Ensuring integrity in water use	125
10.3	Ensuring the integrity of water system management	129
10.4	Building understanding of the broader water context	132
11	Urban water services	135
11.1	Australia has seen significant urban water reform	136
11.2	Much has been achieved but the case for further action is clear	136
11.3	NWI renewal is an opportunity to embed the foundations of success	140
11.4	Best-practice system planning should be a focus	141
11.5	Pricing and service outcomes — another focus	145
11.6	Tailored advice for regional and remote urban water services	152
12	Water reform in rural Australia	159
12.1	NWI-consistent reforms have delivered large benefits to rural users	160
12.2	Reforms have also prepared water users to address future challenges	161
12.3	A renewed NWI would lock in past benefits and enable adaptation	162
12.4	Community adjustment to lower water availability	163
13	Government investment in major water infrastructure	167
13.1	The NWI targets economically viable and ecologically sustainable infrastructure	168
13.2	Some past government commitments raise red flags	169
13.3	NWI renewal can contribute to improved decision making	172
14	Community engagement	181
14.1	The NWI has facilitated engagement but an update is needed	182
14.2	Embedding effective practice through a renewed NWI	183
15	Knowledge, capacity and capability building	187
15.1	Knowledge generation needs attention	188
15.2	Use of knowledge also needs to be optimised	190

Appendixes

A	Terms of Reference	193
B	Glossary	197
C	Inquiry conduct and participants	201
	References	209

Supporting papers

This report summarises analysis contained in the following supporting papers (SPs), which are available online at: www.pc.gov.au/water-reform-2020/draft.

- SP A Water entitlements and planning
- SP B Water trading and markets
- SP C Environmental management
- SP D Securing Aboriginal and Torres Strait Islander interests in water
- SP E Ensuring the integrity of water resource management
- SP F Urban water services
- SP G Urban water services: regional and remote communities
- SP H Water reform in rural Australia
- SP I Government investment in major water infrastructure
- SP J Community engagement
- SP K Knowledge, capacity and capability building

Abbreviations

ABARES	Australian Bureau Agricultural and Resource Economics and Sciences
ABC	Australian Broadcasting Corporation
ABS	Australian Bureau of Statistics
ACCC	Australian Competition and Consumer Commission
COAG	Council of Australian Governments
CRC	Cooperative Research Centres
CSO	community service obligation
GL	gigalitre
MDB	Murray–Darling Basin
MDBA	Murray–Darling Basin Authority
MDBCC	Murray–Darling Basin Compliance Compact
ML	megalitre
NPR	National Performance Report
NRM	natural resource management
NWC	National Water Commission
NWGA	National Water Grid Authority
NWI	National Water Initiative
NWRC	National Water Reform Committee

Executive summary

Water is critical to the wellbeing of Australian communities, the economy and the environment. But our highly variable rainfall patterns, coupled with frequent droughts and floods, make it a challenging resource to manage. Since the mid-1990s, governments have implemented a program of national water reform, with the most recent agreement — the National Water Initiative (NWI) — signed in 2004.

In May 2019, in response to the Productivity Commission’s 2017 inquiry on national water reform, the Australian Government agreed to renew the NWI and, in partnership with State and Territory Governments, has commenced the process of policy renewal.

This inquiry responds to the Australian Government’s request for the Commission to undertake its second triennial assessment of jurisdictions’ progress towards achieving the objectives and outcomes of the NWI, and to provide practical advice on future national water reform directions. Both the assessment and the Commission’s advice — aimed at providing detailed input for consideration in the policy renewal process — are summarised in this report.¹

Jurisdictions have made good progress against the reform agenda

The NWI is now seventeen years old and most jurisdictions have largely achieved their 2004 NWI commitments. All, except Western Australia and the Northern Territory, have enacted legislation to create secure, NWI-consistent water access entitlements for consumptive uses. Water planning arrangements have been established for all areas of intensive water use, and environmental sustainability has been supported by formal provisions of water for the environment. Water markets have been created, allowing water to be traded to higher-value uses. And water accounting is generally providing practical, credible and reliable information, however most States and Territories are still in the process of implementing non-urban metering policies.

Moreover, drinking water quality generally meets existing guidelines. But issues remain, particularly in some regional and remote communities and especially during drought. And economic regulation and urban service providers’ pricing processes generally meet NWI requirements, but Queensland, Western Australia and the Northern Territory do not have adequate independent economic regulation in place.

¹ The full assessment report and more extensive supporting papers that underlie the report’s chapters are available at www.pc.gov.au/inquiries/current/water-reform-2020.

Finally, all jurisdictions have sought to improve the scale and quality of their engagement with communities and Aboriginal and Torres Strait Islander people. That said, concerns have been expressed about the adequacy and effectiveness of some engagement efforts, particularly within the NSW part of the Murray–Darling Basin (MDB).

National water reforms have contributed to material benefits ...

... through improvements in water resource management

Adoption of NWI-consistent water planning and entitlement frameworks has created the foundations for efficient and sustainable resource management. Water planning has established transparent processes for deciding how the water in a system is shared between consumptive users (people and businesses) and the environment. Creation of water entitlements, separate from land, has provided clear and secure long-term property rights for both consumptive users and the environment. And together, these developments have provided the essential prerequisites for water markets and trading, and have established pathways to a more sustainable balance between consumptive and environmental use.

Material benefits have flowed from these reforms — lower average use by households, more efficient use by industry, more water for the environment and better adaptation to uncertainty.

Water entitlements have become a valuable asset — estimates put their value in the southern MDB at more than \$26 billion. This value, coupled with their legal backing and the development of water markets, means entitlements can now be used as collateral for loans.

Water trading has become a sizeable economic activity. In 2018-19, turnover was estimated at \$5.2 billion. Studies of the economic benefits of this activity, although dated, point to substantial value. For example, regional GDP in the southern MDB was estimated to be \$4.3 billion higher over the 5 years to 2010-11 than it would have been without trading.

Water trading and markets have created a valuable business management tool for irrigators, enabling more certainty in decision making, providing flexibility in dealing with changing market conditions and opening up new opportunities. Trade has seen water move to higher value uses and price signals have encouraged on-farm efficiency, freeing up water for other uses. These benefits have been particularly apparent during drought. Irrigators with flexible demands (such as rice and cotton growers) have been able to sell water to those with inflexible demands (such as horticulturalists with perennial crops). And entitlements holders have been able to sell water allocations to manage debt and realise income. Trading has allowed Australia's gross value of irrigated agricultural production to increase in most years over the past decade despite considerable variation in water use between wet and dry years.

Benefits are starting to be seen from water provisions for the environment including: improved native vegetation and wetland condition; protection of rare and threatened biodiversity such as in groundwater-dependent ecosystems; and the migration and breeding of native fish, frogs and waterbirds. Creation of refuges has been particularly important in

maintaining breeding grounds during drought, supporting ecosystem resilience until rain returned. Provisions have also helped to avoid even more widespread environmental degradation that would have otherwise occurred during the severe drought and bushfires of recent years.

Environmental water provision can also deliver a range of other public benefits including cultural outcomes for Aboriginal and Torres Strait Islander people, and economic and social outcomes for recreational and commercial fishers and the tourism industry. And, although difficult to quantify, healthy rivers, lakes and wetlands provide pleasure for those who use or view them.

... and through improvements in water service delivery

Reforms to institutional arrangements have brought significant benefits to water users and the broader community.

Widespread adoption of cost-reflective and consumption-based pricing in the urban water sector (along with restrictions and awareness campaigns during drought) have contributed to changes in water users' behaviour, supporting more efficient water use, better signalling of investment needs and a more financially sustainable sector. Household water use, for example, has fallen over the past two decades from an national annual average of 280 kilolitres in 2000 to about 190 kilolitres in 2019, while the average size of households has not changed. And most service providers now generate enough revenue from user charges for long-term financially sustainable operations without government subsidies, removing a burden on taxpayers.

Institutional separation of policy making, service delivery and regulation has improved accountability and transparency. Corporatisation of utilities has encouraged commercial behaviour, promoting efficient investment and lower prices for the benefit of water users. Independent economic regulation has supported more rigorous scrutiny of utilities' operational and investment decisions and reduced the risk of political interference in price setting and infrastructure investment processes. Benchmarking and reporting of urban water pricing and service outcomes enable customers to compare their provider with others — promoting questioning that can prompt improved outcomes.

Reform efforts have also led to improvements in water quality in many parts of the country.

For the irrigation sector, pricing, economic regulation and local ownership or management (especially by irrigators) of rural water service providers have improved the accountability, productivity, efficiency and responsiveness of these businesses to the needs of their clients.

But there is a compelling case for continued reform

Overall, the NWI has served Australia well, and reforms have been widely supported by the water sector, industry and stakeholders. But for reform to continue to be effective it needs to be adaptive — reflecting lessons learnt from experience, evolving as the broader policy context changes and proactively dealing with anticipated challenges.

Seventeen years of NWI implementation has provided a wealth of experience and knowledge.

Extensive and often contentious reform in the MDB offers insights into both best practice and areas where doing things differently could allay community concerns and mistrust. Instances of non-compliance with water licence conditions and concerns about the transparency of water management decisions in the MDB have undermined public confidence in how Australia's water resources are being managed.

Water managers have also had to deal with extreme and prolonged droughts. Australia experienced the worst years of the Millennium Drought after the NWI was signed in 2004, followed by large-scale flooding in several areas. Drought conditions re-emerged across southern Australia from mid-2017. By the end of 2019, many communities were living with record-breaking dry conditions. Agricultural production and incomes in affected regions fell. There were devastating environmental consequences including a number of fish death events, most notably in the Lower Darling River. Drought also forced towns and major cities to introduce water restrictions, with some regional areas having to cart in water as potable sources dried up. Additionally, there were record highs in fire danger weather.

Severe droughts and extreme water shortages fit with the signs of a changing climate — higher temperatures, more extreme events, changing rainfall patterns and reduced water availability. Long-term reductions in average rainfall have led to declining streamflows across many parts of southern Australia. Average inflows to Perth dams over the past decade were 75 per cent below the level of much of the 1900s. And records of River Murray inflows stretching back 125 years show median annual inflows over the past 20 years have been about half the level of the preceding century, with drier years much more frequent.

Changing expectations of Australian communities are adding further pressure. Urban water users' expectations of water service providers have extended beyond clean, reliable and affordable water and wastewater services to the role of water in creating urban amenity. Understanding of and support for Aboriginal and Torres Strait Islander people's aspirations for greater access to, and control over, water resources has grown. The importance of water to Aboriginal and Torres Strait Islander people has been recognised and commitments made in the 2020 National Agreement on Closing the Gap and the United Nations Declaration on the Rights of Indigenous Peoples.

Looking to the future, water resource management and service provision will have to respond to these changing demands within the context of a growing population and the effects of climate change. Capital city populations are projected to increase by 11 million people by 2050. And climate projections point to hotter, drier and more extreme weather

— particularly in southern Australia. This will likely mean material reductions in water availability for most of the country and an increase in the frequency and severity of droughts and floods across the nation. And it will accelerate change in irrigated agricultural production. The droughts and water scarcity experienced during the past 20 years are likely to be a harbinger of things to come.

The reality is that Australians will need to become even more adept at dealing with drought, and communities, industries and the environment will have to adapt to lower water availability and more uncertainty. This will be a dominating factor for water management in the future — water managers will need to be forward-looking, adaptive and agile in how they manage water resources to meet the community’s changing needs.

These lessons, changes and challenges provide a compelling case for continuing reform effort. Australia’s reform record provides confidence that governments, working together, can provide a forward-looking water policy framework to assist communities, industries and the environment to meet these challenges. And NWI, renewed and refocused, could form the basis for this effort.

Draft reform advice on NWI renewal

Much of the intent and framework of the current NWI remains relevant and should be retained. With some new content, reframing in some areas and refocusing overall to deal with future challenges, an agreement fit for the next 10 to 15 years could be created. This report provides detailed, practical advice on:

- modernisation of the goal, overarching principles, objectives and elements of the NWI
- governance arrangements for a renewed agreement
- for each of the proposed policy elements, the major issues to be considered, lessons learnt, best practice and potential policy directions.

Suggestions to modernise the agreement

The overarching goal for the NWI remains sound. The parties agreed to implement reforms:

... in recognition of the continuing national imperative to increase the productivity and efficiency of Australia’s water use, the need to service rural and urban communities, and to ensure the health of river and groundwater systems by establishing clear pathways to return all systems to environmentally sustainable levels of extraction. (paragraph 5)

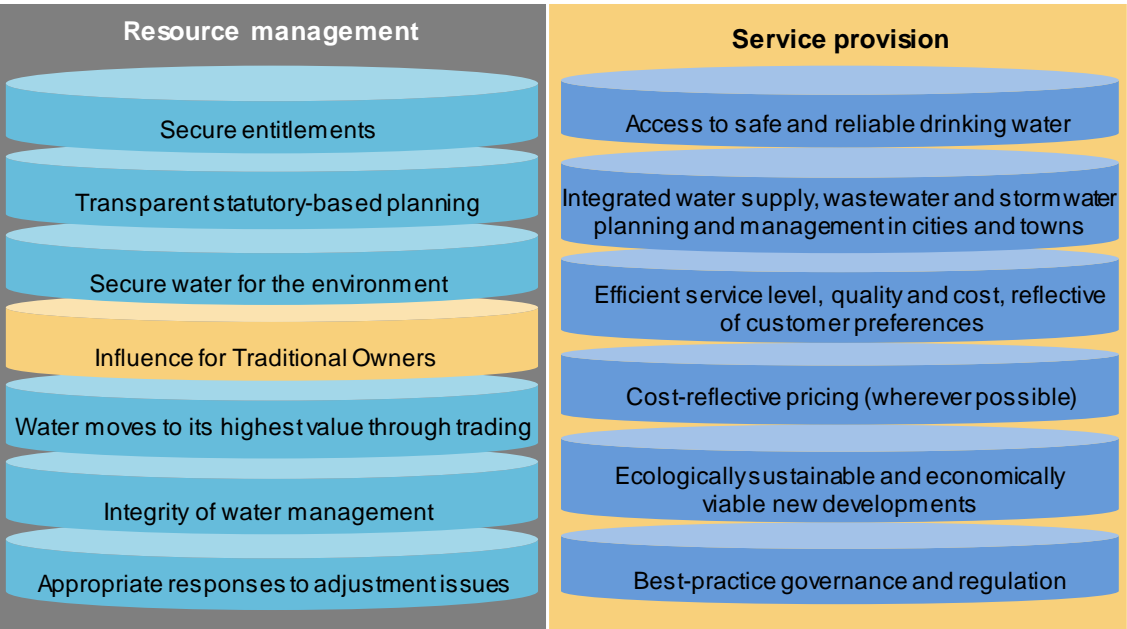
But, reflecting changes in the reform context, the renewed NWI should also reference the need to adapt to a changing climate and recognise the importance of water in the lives of Aboriginal and Torres Strait Islander people.

Experiences over the past 17 years suggest six overarching reform principles should be embedded in all policy areas: strong capacity to deal with droughts, floods and shocks and

to adapt to a changing climate; fit-for-purpose management and regulation; use of the best available information in decision making; innovation and adaptive management; effective community engagement; and information provision that enables that engagement.

The current NWI has a strong focus on water resource management. But reform in aspects of water service provision (water supply, wastewater and stormwater services) will be equally important to successfully navigating the challenges ahead. A renewed NWI should reflect the importance of both sustainable water resource management and effective, equitable and efficient water service provision — a more detailed set of objectives covering both spheres of policy focus is proposed (figure 1).

Figure 1 **Summary view of suggested new NWI objectives^{a,b}**



^a Yellow colouring represents new objectives. ^b The Commission’s advice includes additional detail for most of the current NWI water resource management objectives.

All eight elements of the current NWI remain highly relevant and should be retained (box 1).

Significant enhancements should be made to both the water accounting element, to build trust and confidence in water management (or system integrity); and the environmental management element, to reflect the need for more adaptive management that is integrated with waterway and catchment management, and to be responsive to a drying and more variable climate. And much more comprehensive treatment of urban water service provision is warranted.

Two new elements are proposed — one to recognise the interests of Aboriginal and Torres Strait Islander people in water resource management, the other to add a framework for major water infrastructure developments.

Box 1 Proposed elements of a renewed agreement

The overall goal and objectives of a renewed NWI should be delivered through the following elements:

Water resource management

1. Water access entitlement and planning frameworks
2. Water trading and markets
3. Environmental management^a
4. Aboriginal and Torres Strait Islander people's interests in water^b
5. System integrity^a

Water services provision

6. Pricing and institutional arrangements
7. Urban water services
8. New infrastructure development^b

Supporting arrangements

9. Community engagement, and adjustment
10. Knowledge, capacity and capability building

^a Significantly enhanced element. ^b New element.

Effective governance arrangements for a renewed NWI

The governance arrangements established for the NWI were key to progress in the early years of the agreement, but have been significantly eroded over recent years. The relevant Ministerial Council has been disbanded, the National Water Commission has been closed and states no longer prepare rolling implementation plans. A strengthened architecture that: emphasises the importance of government leadership on, and commitment to, national water policy; builds confidence in reform effort; and supports interjurisdictional cooperation needs to be included in a renewed NWI. This should include:

- water ministers convening periodically to oversee development of a renewed NWI and to consider and act upon advice that comes out of periodic reviews
- the preparation of three-year rolling implementation programs by jurisdictions describing how they aim to achieve the outcomes set out in the renewed agreement
- independent triennial assessments and reporting on the adequacy of and progress against these work programs, as well as the effectiveness of the broader agreement
- a comprehensive independent policy review of the agreement every 10 years
- on-going supervision of the agreement by the multi-jurisdictional National Water Reform Committee including joint work on issues of collective interest.

Detailed guidance for each policy element

The following discussion outlines the Commission's advice on major policy directions for each of the proposed elements of a renewed NWI. A compilation of the detailed advice is available in a companion document, and summaries of draft findings and recommendations and information requests, and NWI renewal advice are presented in tables 1 and 2, respectively, at the end of this executive summary.

Water entitlements and planning

The fundamental components of the NWI framework are largely in place. However, water entitlement frameworks need to consider all key water uses, including mineral and petroleum industries and interception activities (for example, farm dams and bores, floodplain harvesting and plantation forestry), and all water sources, including alternatives such as stormwater and recycled water.

Water planning processes need to be upgraded to best practice. And they need to have a strong focus on dealing with climate change. This should include provisions in water plans to deal with water scarcity arising from drought, incorporating priorities for water sharing and actions relating to meeting critical human and environmental needs. In relatively undeveloped and developing water systems, there is an opportunity to set consumptive and environmental shares in ways that manage the risk of future resource reductions. And in highly developed systems, triggers could be identified that indicate when there is a demonstrable need to rebalance environmental and consumptive uses.

Water trading and markets

Water trading and markets will become increasingly important in enabling entitlement holders to adapt to seasonal variability and climate change. The addition of principles that support best-practice governance, regulatory, operational and informational arrangements through NWI renewal would build on the 30 years of trading experience in the MDB, providing stronger foundations for developing markets elsewhere in Australia.

Environmental management

The NWI continued a reform agenda focused on establishing the environment as a legitimate water user, providing statutory environmental water provisions and improving the balance in overallocated systems. Although further work on rebalancing overallocated systems is required, significant progress has been achieved. The next phase of reform should provide the policy principles and institutional arrangements to make the best use of environmental water to achieve agreed (and where possible, better) environmental outcomes. This includes clearly specifying environmental objectives and outcomes; ensuring adequate low-flow provisions; integrating environmental water management with waterway and catchment management; identifying institutional responsibility for waterway management; creating

adaptive monitoring programs; and developing clear processes to adapt environmental management objectives as changes in climate necessitate.

Securing Aboriginal and Torres Strait Islander people's interests in water

Jurisdictions have been slow in implementing their NWI commitments. And, as noted above, there have been significant changes in the policy context for Aboriginal and Torres Strait Islander people's aspirations for access to water since 2004. A new NWI element should be developed by the recently formed Committee on Aboriginal Water Interests. To give issues associated with Aboriginal and Torres Strait Islander people's interests in water the status in policy making implied by the National Agreement on Closing the Gap, the committee should report directly to water ministers overseeing the development of the renewed NWI. The new element should include advice on water management measures to achieve cultural and economic outcomes for Aboriginal and Torres Strait Islander people and the inland waters and service delivery targets in the 2020 National Agreement on Closing the Gap. The Commission has provided some views on these issues for consideration by the committee.

Ensuring the integrity of water resource management

Recent experience in the MDB has shown the importance of developing and maintaining community trust in water management. This requires more than water accounting. The current element of the NWI needs to be broadened to support the provision of credible and reliable information and institutional processes. It should provide assurance that:

- entitlement holders are operating in line with their rights and water use is consistent with established rights and water plans — this requires metering and measuring of water take, reporting through fit-for-purpose water registers, and effective compliance and enforcement systems
- water systems are being managed to best effect for all users, including the provision of credible and accessible information and transparency of operations.

Urban water services

Urban water reform was the focus of an earlier COAG agreement, with the NWI maintaining but not greatly advancing those reforms. The joint pressures of climate change and population growth mean this needs to change. There needs to be greater focus on the provision of safe and reliable drinking water across the country. A renewed NWI could also establish a standard for best-practice urban water system planning, including adoption of integrated management of water supply, wastewater and stormwater. This would provide for community-driven objectives for water security, service standards, urban amenity and the environment. There also needs to be clear roles and responsibilities for decision making, and processes and incentives to facilitate collaboration between water utilities, governments, regulators, developers and land planners in planning. Small utilities can face unique challenges — specific guidelines for system and contingency planning are needed for them.

Best-practice pricing and institutional arrangements

Many of the relevant principles in the NWI remain sound — particularly, cost-reflective pricing and institutional separation. However, there is scope to expand their coverage to guide best-practice outcomes. Greater commitment to independent economic regulation (including national principles) is needed, along with enhancements to pricing principles (including stormwater management, developer charges and the role of community service obligations) and recommitment to monitoring, reporting and benchmarking. For small utilities, guidance could be provided to improve governance and government support (in the form of community service obligation payments).

New infrastructure development

Under the NWI, new and refurbished water infrastructure needs to be both economically viable and ecologically sustainable, with costs recovered from users in most cases. This principle should be retained, and the Commission has provided advice on criteria to assess compliance with these requirements. Feedback is sought on whether a third headline requirement — that planning processes for new infrastructure are culturally responsive — should be added to reflect requirements for deep consultation with Traditional Owners and protection of cultural assets.

From time to time, governments will seek to invest in water infrastructure to meet broader strategic objectives. When this occurs, good project selection is critical to ensure that these investments: are the best means of achieving those broader objectives; provide value for taxpayer funds; and avoid liabilities for future water users. Criteria are proposed for inclusion in the renewed NWI to achieve these outcomes. The remit of current national water investment programs should be broadened to allow funding for all major projects where there is a public good rationale for government involvement, such as on equity grounds in high-cost regional town water supply. Finally, consideration should also be given to reserving a share of entitlements from new infrastructure for Traditional Owners.

Community engagement and adjustment

Effective, thorough and well-informed community engagement is needed to support reform in all aspects of water resource management and water services provision. This is recognised in the current NWI. However, adaptation to a likely drier and more variable water future will require difficult decisions by governments, communities and individual entitlement holders. Given this, the commitment to community engagement should be enhanced in a renewed agreement with additional guidance on effective processes and quality. Commitment to the regular provision of accessible and comprehensible water information is also needed.

Clarity will be required on who bears the risk of climate change. The current NWI states that entitlement holders bear the risks of changes to the quantity or reliability of water allocations as a result of seasonal or long-term changes in climate and natural events such as bushfire and drought. This principle should be retained to provide certainty.

Inclusion of guiding principles in a renewed NWI would clarify how governments can best respond to any significant adjustment pressures faced by rural communities as a result of reform-induced reductions in water availability. These should point first to the generally available measures that target the welfare and skills of individuals, and to regional development planning to leverage community-level capabilities and competitive advantages. These are usually the best responses to adjustment pressures. Where specific assistance is warranted, governments should support change by focusing any direct assistance on building adaptive capacity in affected communities and securing employment or business opportunities for the most vulnerable individuals.

Knowledge, capacity and capability building

Knowledge generation has been integral to water reform achievements under the NWI, and will underpin the success of future water reform efforts. It provides a foundation for evidence-based decision making, innovation and continuous improvement in water management and service provision. The relevant principle should be recommitted to in a renewed NWI, with processes to: enable efficient government investment in relevant public good research; set research priorities and coordinate outcomes; and ensure that water utilities are able to invest in knowledge generation and application to support improved practices.

Table 1 Draft findings and recommendations, and information requests

Brackets present the numbers used to denote each item in the report

Findings

- Governance arrangements established for the National Water Initiative have been significantly eroded over recent years. A strengthened governance architecture that reflects the presence of national water policy leadership and ensures confidence in reform effort, needs to be included in a renewed agreement. (4.1)
- The Murray–Darling Basin demonstrates that, in highly developed systems, water trade monitoring ought to be integrated into system level resource management. By taking a broader and longer term system level view of water trade and operational risk within the water resource management context, jurisdictions can more proactively anticipate and identify emerging issues and be advised on regulatory responses where warranted. (7.1)
- Much more needs to be done to include Traditional Owners' interests in water in jurisdictional planning and the management of water. Slow progress against commitments made in the 2004 National Water Initiative, coupled with the contemporary context including the National Agreement on Closing the Gap and wide support for action, warrants inclusion of both a dedicated objective and new element in a renewed National Water Initiative. (9.1)
- The National Performance Report is not fit for purpose in benchmarking service quality, as envisioned under the National Water Initiative (NWI), nor is it adequate to assess progress against NWI commitments. The only measure for cost recovery, the economic real rate of return, is inconsistent with the NWI and the NWI Pricing Principles. The current review of the National Performance Report indicators is well placed to address these inadequacies. (11.1)

Recommendations

- Water ministers should meet periodically to oversee development of a renewed NWI and to receive, consider and act upon advice that comes out of any periodic review of the new agreement. (4.1)
- Natural resource management programs should give priority to the key environmental assets identified in water planning processes, provide funding and undertake the required works to protect those assets. During periods of water scarcity, natural resource management should focus on the protection of reserves and refuges and making sure that their regenerative capacity is protected. (8.1)
- State and Territory Governments, through the National Performance Report, should require urban water service providers to report a financial return metric consistent with the National Water Initiative Pricing Principles, alongside the existing economic real rate of return metric. This should include: an income measure that excludes developer charges and contributed assets; an asset base measure determined by a methodology consistent with the National Water Initiative Pricing Principles. (11.1)
- Australian Government investment in major water infrastructure should neither prioritise a particular sector or class of water user, nor be limited to providing water for primary industry. The National Water Grid Authority should broaden its Investment Policy Framework to allow funding for all projects where government involvement may be warranted, including supporting access to essential town water supplies. (13.1)

Information requests

- The Commission seeks feedback on suitable triggers for rebalancing environmental and consumptive shares in the context of climate change. What are the advantages and disadvantages of the different approaches? How could continuous adjustment be implemented in practice? Are there any other potential triggers that could be used? (6.1)
 - How could a refreshed National Water Initiative ensure that major water infrastructure investments most effectively promote the aspirations of Traditional Owners and protect Aboriginal and Torres Strait Islander people's heritage and cultural values? Should the principle guiding new infrastructure be amended to ensure that planning processes for developments are culturally responsive (in addition to those developments being environmentally sustainable and economically viable)? (13.1)
-

Table 2 Draft NWI renewal advice: high-level summary by area
 Brackets present the numbers of the boxes containing the detailed advice^a

A refreshed intent

- Modernise the NWI goal by including references to climate change and Traditional Owners. (3.1)
- Increase emphasis on water service provision, provide more detail for water resource management and refer to cultural outcomes in NWI objectives. (3.2, 3.3)
- Embed six overarching principles in all policy areas. (3.4)
- Develop new elements covering Aboriginal and Torres Strait Islander people's interests in water and new infrastructure development. Significantly enhance the environmental management and water accounting (system integrity) elements. (3.5)
- Update the paragraph covering interactions with other key initiatives. (3.6)

Governance of the agreement

- Water ministers should convene periodically to oversee development of a renewed NWI.
- The renewed NWI should link desired outcomes to objectives and limit prescriptive actions, instead setting out principles for best-practice, fit-for-purpose approaches.
- Jurisdictions should prepare 3-year rolling work programs, with progress independently assessed on a triennial basis.
- There should be a comprehensive policy review every 10 years.
- The National Water Reform Committee should provide on-going oversight of the agreement. (4.1)

Water entitlements and planning

- Remove exemptions for mineral and petroleum industries; establish a process to determine whether alternative water sources can be incorporated into water access entitlement frameworks; and recommit to a risk-based approach to managing significant interception activities. (6.1)
- Enhance water planning provisions to better reflect current best practice and include processes to better account for climate change, including risk allocation. (6.2)

Trading and markets

- Emphasise that the purpose of water trading and markets is as a tool within a water resource management framework to increase efficiency, manage scarcity and be fit-for-purpose. (7.1)
- Reshape principles covering governance, regulatory and operational arrangements for water trading and markets to provide leading practice foundations for developing markets. (7.2)
- Develop information to support efficient water markets. (7.3)

Environmental management

- Adopt best-practice development of environmental objectives and agreed environmental outcomes. (8.1)
- Integrate management of environmental water and complementary natural resource management. (8.2)
- Where not in place, establish a formal institutional oversight responsibility for wetland and waterway management. (8.3)
- Establish clear processes for reviewing progress on environmental outcomes. (8.4)
- Embed criteria for prioritising environmental watering, and objectives for environmental watering under different climate scenarios. (8.5)
- Ensure environmental water holders' trade strategies are in place and transparent. (8.6)
- Environmental water holders should pursue innovative market approaches. (8.7)
- Enable environmental water holders to vary their entitlement portfolio over time. (8.8)
- Actively pursue public benefit outcomes where they do not compromise environmental outcomes. (8.9)
- Independently audit the adequacy and use of environmental water entitlements every three years. (8.10)
- Obligate system managers to use their best endeavours to achieve agreed outcomes. (8.11)
- Commit to adaptive management. (8.12)

(continued next page)

Table 2 (continued)

Aboriginal and Torres Strait Islander people's interests in water

- Co-design a new NWI element dedicated to Aboriginal and Torres Strait Islander people's interests in water and involvement in water management. (9.1)
- Improve cultural outcomes using existing frameworks. (9.2)
- Improve access to water for economic development. (9.3)

System integrity

- Build system integrity through a renewed element. (10.1)
- Ensure system integrity through metering and measurement, registers and effective compliance and enforcement systems. (10.2)
- Ensure the integrity of water system management via effective information provision. (10.3)
- Ensure information on the broader water context aligns with users' needs. (10.4)

Pricing and institutional arrangements

- Improve pricing and service outcomes through guiding frameworks on the use of economic oversight. (11.3)
- Maintain the core principle of cost-reflective pricing and update the *NWI Pricing Principles*. (11.4)

Urban water services

- Update the *National Water Urban Planning Principles* and embed them in the NWI. (11.1)
- Include principles for best-practice economic regulation. (11.2)
- Subject all urban water service providers to monitoring and reporting. (11.5)
- Commit to ensuring access to at least a basic level of safe and reliable drinking water for all Australians. (11.6)
- Include principles for governance of regional and remote water services where local governments retain ownership of utilities. (11.7)
- Monitor and report on water quality and service outcomes in remote Aboriginal and Torres Strait Islander communities. (11.8)

New infrastructure development

- Develop an element to guide investment in water infrastructure. (13.1)
- Agree to criteria to demonstrate project adherence to the NWI requirements for infrastructure. (13.2)
- Clarify institutional roles and responsibilities underpinning the framework for government investment. (13.3)

Community engagement, and adjustment

- Include guiding principles clarifying how governments can respond to any significant community adjustment pressures resulting from policy-induced reductions in water availability. (12.1)
- Recommit to best-practice, cost-effective engagement with communities on all water matters. (14.1)

Knowledge, capacity and capability building

- Commit to a culture of evidence-based decision making, innovation and continuous improvement to underpin successful implementation. (15.1)

^a This table is a very high-level summary of the detailed policy advice presented in the report.

1 About the inquiry

In May 2020, the Australian Government requested that the Productivity Commission undertake its second triennial assessment of jurisdictions' progress towards achieving the objectives and outcomes of the National Water Initiative (NWI), and provide practical advice on future national water reform directions.¹ This report summarises the assessment and the Commission's advice.

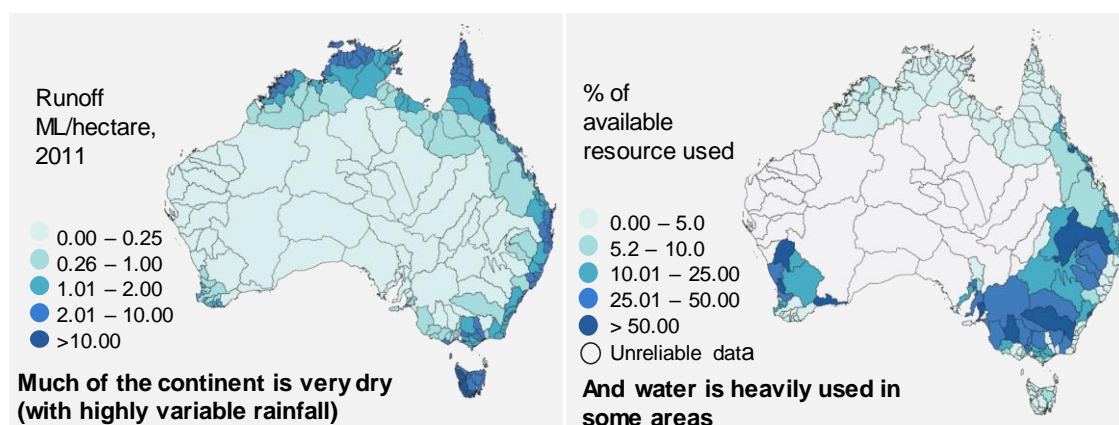
1.1 Context for the inquiry

Water presents significant policy challenges

Water is a particularly precious and challenging resource. Much of the Australian continent is very dry. Rainfall patterns tend to be highly variable. Recurrent and prolonged droughts and large floods are the norm. And in some catchments, water is heavily used (figure 1.1).

Water has to be stored, distributed as needed and carefully managed. Water infrastructure has been essential to meeting the needs of growing urban populations and expanding agricultural output, and water in landscapes is integral to the health of people and the environment (box 1.1).

Figure 1.1 **Water is a challenging resource for Australia**



Source: Prosser (2011).

¹ The terms of reference are presented in appendix A.

Box 1.1 **Key facts about the water sector**

- In 2018-19, there were 39 124 GL of entitlements on issue. Entitlements govern the amount of water available for use (including agricultural, industrial, urban and environmental uses) (BOM 2020a, p. 14).
- In 2018-19, 20 per cent of total water abstractions was supplied for urban use and 70 per cent was supplied for agricultural and 10 per cent industrial uses (BOM 2020e).
- Expenditure on services provided by the water sector was about \$10.1 billion in 2018-19. About 60 per cent of this expenditure was by households, and about 30 per cent by industry and agriculture (ABS 2020c).

Urban water services

- The urban water sector provides Australian cities and towns with potable (drinking quality) water, wastewater services and stormwater management.
- In 2018-19, the median typical residential water supply and sewerage bill was \$1460, with residential properties being supplied an average of 192 kilolitres of water (BOM 2020d, pp. 27, 32).
- The urban water sector is capital intensive — investment in water and wastewater assets was \$4.3 billion in 2018-19 (BOM 2020d, p. 37).

Water services for agriculture

- Expenditure on rural distribution services was over \$719 million in 2018-19 (ABS 2020c).
- These services contributed to irrigated agriculture production worth \$16.4 billion in 2018-19 (ABS 2020c), comprising 27 per cent of total agricultural production (based on ABS (2020a)).
- In 2018-19, the value of entitlements on issue in the southern Murray–Darling Basin was at least \$26 billion (Aither 2020).

Water for the environment

- Governments have provided water for the environment through water plans ('planned environmental water') and have also acquired entitlements that are managed for environmental benefit ('held environmental water').
- In the Murray–Darling Basin, the total volume of held environmental water entitlements (of varying reliabilities) in 2018-19 was 4635 GL, or 23 per cent of all entitlements on issue (BOM 2020b; MDBA 2020b, pp. 128, 135).
- The Commonwealth environmental water holdings total 2876 GL of registered entitlements as at 30 November 2020, with a long-term average annual yield of 1989 GL (CEWO 2020a).

Recent shocks have put significant pressure on Australia's water systems and communities.

After the NWI was agreed in 2004, Australia experienced the worst years of the Millennium Drought, followed by large-scale flooding in several areas. And then, from mid-2017, drought conditions re-emerged across much of New South Wales and parts of Victoria, Queensland, South Australia and Western Australia. By the end of 2019, many communities were facing their largest rainfall deficiencies on record. Agricultural production and incomes in affected regions fell (ABARES 2020), and there were devastating environmental

consequences including a number of fish death events throughout Australia, most notably in the lower-Darling River (DPI (NSW) 2020; Vertessy et al. 2019). Drought also forced towns and major cities to introduce water restrictions, with some regional areas having to cart in water as potable sources dried up.

Allegations of non-compliance with water licence conditions (in the ABC Four Corners program, *Pumped*, July 2017), and concerns about the transparency of water management decisions in the Murray–Darling Basin have further undermined public confidence in how Australia’s water resources are being managed. And extreme bushfires, as well as the COVID-19 pandemic, stretched the resources of the agencies responsible for maintaining water supply and water quality, and exposed a number of communities to severe water restrictions and service disruptions.

These challenges have shed light on aspects of the nation’s water resource management and water service provision frameworks that could be enhanced to increase the Australian water sector’s readiness to deal with extreme and unanticipated events.

Looking ahead, climate change and population growth present significant risks to the security of Australia’s water resources. Drought conditions are likely to become more frequent, severe and prolonged in some regions. Higher anticipated demand from a growing population, alongside reductions in supply, will increase water scarcity and put further pressure on all users (including the environment).

Communities will need the capacity to deal with droughts, floods and shocks, and to adapt to the effects of climate change, and significant investments will be made in the next few decades. Decisions made today in response to the current and future risks to Australia’s water security will have lasting effects on future generations.

Water has been a focus of significant reform effort

Reflecting the importance of water to the wellbeing of Australian communities, the economy and the environment, governments have implemented significant reforms since the mid-1980s. COAG’s 1994 Water Reform Framework, the 2004 NWI, the *Water Act 2007* (Cth) and the 2012 Murray–Darling Basin Plan have been key milestones.

The 2004 National Water Initiative

In signing the NWI, jurisdictions set out to establish greater certainty for investment and the environment through clearly specified water access entitlements (perpetual water rights), addressing overallocated water systems, and improving the economic efficiency and environmental sustainability of water management for both rural and urban water systems.

Independent, regular reviews of progress are a key requirement of the agreement. Initial reviews were undertaken by the former National Water Commission, with responsibility for

three-yearly reviews transferred to the Productivity Commission in 2015 under the Water Act. The Productivity Commission is also responsible for inquiring into the effectiveness of the implementation of the Murray–Darling Basin Plan on a five-yearly basis. The timing of the Commission’s inquiries is shown in figure 1.2.

In its first inquiry on national water reform conducted in 2017, the Commission recommended that the NWI be renewed with a focus on maintaining the key foundations, revising some policy settings to ensure contemporary and enhanced policy settings for urban water, environmental management and new infrastructure investment. In April 2019, the Australian Government accepted this recommendation and commenced the process of policy review and renewal.

Figure 1.2 Timeline for Productivity Commission water inquiries



1.2 The Commission’s task

In May 2020, the Australian Government asked the Commission to undertake its second inquiry on national water reform to assess the:

- progress of jurisdictions in adopting the principles, objectives and key outcomes set out in the NWI and any impacts where progress has not been made
- outcomes of reform efforts
- extent to which the NWI reforms are adequate to support government responses to challenges such as climate change.

The Australian Government also asked the Commission to provide practical advice to support jurisdictions in implementing a renewed NWI and on ways in which the agreement could be improved to support better social, economic and environmental outcomes.

The terms of reference also requested the Commission to consider:

- the interaction of water policy with other policy areas (such as climate, energy, agriculture, forestry, land use planning and urban development)

-
- the policy ramifications of climate change on water resources
 - the provision of reliable water services to regional, rural and remote communities
 - the principles to be satisfied for any government investment in major water infrastructure
 - issues identified in the Commission’s 2017 National Water Reform inquiry report
 - international experiences and examples.

In undertaking this inquiry, the Commission is avoiding duplication with:

- its 2018 inquiry into the effectiveness of the implementation of the Basin Plan (PC 2018). Murray–Darling Basin matters are only addressed where they relate to nationally relevant water policy issues
- the Australian Competition and Consumer Commission’s Murray–Darling Basin Water Markets inquiry (ACCC 2020).

1.3 The Commission’s approach

In addressing its task, the Commission has drawn on inputs from inquiry participants (section 1.4), responses from the Australian, State and Territory Governments to requests for information, published reports and publicly available data. Qualitative assessments inform the advice where quantitative information was not available.

In line with the terms of reference, the Commission’s conclusions are primarily presented as practical advice on NWI renewal, rather than findings and recommendations. This is aimed at providing detailed policy input for consideration in the current process being undertaken by jurisdictional governments on NWI renewal. To that end, the report:

- summarises progress against the NWI and the benefits of reform, and lays out the case for further reform through NWI renewal (chapter 2)
- proposes revisions to the NWI’s vision — the agreement’s goals, objectives and key reform elements (chapter 3)
- suggests arrangements for governance and implementation of a renewed NWI (chapter 4)
- presents a framework for water resource management that accounts for the diverse characteristics of water sources (chapter 5)
- identifies content for each suggested element of a renewed NWI. In doing so, the report summarises analysis contained in a suite of supporting papers (SPs):
 - SP A Water entitlements and planning (chapter 6)
 - SP B Water trading and markets (chapter 7)
 - SP C Environmental management (chapter 8)
 - SP D Securing Aboriginal and Torres Strait Islander interests in water (chapter 9)
 - SP E Ensuring the integrity of water resource management (chapter 10)

-
- SP F Urban water services (chapter 11)
 - SP G Urban water services: regional and remote communities (chapter 11)
 - SP H Water reform in rural Australia (chapter 12)
 - SP I Government investment in major water infrastructure (chapter 13)
 - SP J Community engagement (chapter 14)
 - SP K Knowledge, capacity and capability building (chapter 15).

The Commission’s assessment of progress against the NWI is detailed in *Assessment*. And a compilation of the advice in this report is presented in a companion document (*Findings, recommendations and renewal advice*).

Water terminology can vary from place to place, which can cause confusion. A glossary at appendix B defines some key terms.

1.4 Conduct of the inquiry

Terms of reference for the inquiry were received on 22 May 2020, and an issues paper was released on 26 May 2020, outlining topics on which the Commission was seeking feedback. The Commission also consulted widely in preparing this draft report, and:

- received 109 submissions in response to the issues paper
- held nearly 60 meetings with participants including government agencies, peak bodies, academics and representatives of Aboriginal and Torres Strait Islander communities
- met twice with a stakeholder working group, established as required under the Water Act as a forum to exchange information and views on issues relevant to the inquiry
- convened two roundtables, which addressed issues relating to access to water for Aboriginal and Torres Strait Islander people and water quality in remote communities
- received responses to detailed information requests on progress towards achieving the objectives and outcomes of the NWI from Australian, State and Territory Governments.

Submission authors, meeting attendees, stakeholder working group members and roundtable participants are listed in appendix C.

The Commission thanks all participants for their contributions to the inquiry to date. Submissions on this draft report are sought by Wednesday 24 March 2021.

2 Progress against the NWI and the case for continuing reform

Key points

- The National Water Initiative (NWI) established reform objectives and outcomes with the overall aim of supporting a nationally-compatible market, regulatory and planning based system of managing water resources that optimised economic, social and environmental outcomes.
- Jurisdictions have made good progress against the reform agenda. Most have largely achieved their commitments. And the NWI has served Australia well. Reforms have been widely supported by the water sector, industry and stakeholders, and have contributed to sizeable benefits.
 - Water planning and entitlements frameworks together with environmental provisions have provided the foundations for sustainable resource management.
 - Secure and tradeable water access entitlements enabled the introduction of water trading which encouraged more efficient use of water, and moved it towards its highest value use.
 - Improved pricing and institutional arrangements have strengthened the incentives for efficient resource development and service provision.
 - Widespread adoption of cost-reflective and consumption-based pricing have provided better market signals, changing water user behaviour (which has led to more efficient water use) and facilitating a more financially sustainable sector.
- But there is some unfinished business and scope for improvement where reforms have been implemented.
- Lessons from 17 years of NWI implementation highlight opportunities to better steward Australia's water resources. The case for renewed reform effort is further underscored by:
 - severe droughts, which have caused extensive pain in Australian communities and are expected to become longer, deeper and more frequent as the climate warms
 - climate change, which will likely reduce the amount of water available for consumptive and environmental uses over the long term
 - projected population growth, with accompanying increases in the demand for water
 - changing community expectations regarding the management of water, including support for greater recognition of the interests of Aboriginal and Torres Strait Islander people and realisation of the contribution that water makes to the amenity and liveability of communities.
- With best-practice policy settings, governments, water resource managers and water service providers will be as well placed as they can be to ensure that Australia's precious water resources are conserved and used to best effect.

2.1 Overview of the NWI reform agenda

The reform agenda established through the National Water Initiative (NWI) built on the work of its predecessor, the COAG Water Reform Framework (1994), with the aim of supporting a nationally compatible market, regulatory and planning based system of managing water resources that optimised economic, social and environmental outcomes. Ten objectives consistent with this aim were established (box 2.1). And agreed outcomes and commitments to specific actions were set out in eight reform areas or ‘elements’ (box 2.2).

Box 2.1 Objectives of the National Water Initiative

Jurisdictions agreed to work towards ten objectives through the National Water Initiative. These are:

- clear and nationally-compatible characteristics for secure water access entitlements
- transparent, statutory-based water planning
- statutory provision for environmental and other public benefit outcomes, and improved environmental management practices
- complete the return of all currently overallocated or overused systems to environmentally sustainable levels of extraction
- progressive removal of barriers to trade in water and meeting other requirements to facilitate the broadening and deepening of the water market, with an open trading market to be in place
- clarity around the assignment of risk arising from future changes in the availability of water for the consumptive pool
- water accounting which is able to meet the information needs of different water systems in respect to planning, monitoring, trading, environmental management and on-farm management
- policy settings which facilitate water use efficiency and innovation in urban and rural areas
- addressing future adjustment issues that may impact on water users and communities
- recognition of the connectivity between surface and groundwater resources and connected systems managed as a single resource.

Source: NWI paragraph 23.

Box 2.2 **Elements of the National Water Initiative**

Jurisdictions agreed to pursue the objectives (box 2.1) through reform actions in eight key areas.

1. Water access entitlements and planning frameworks
2. Water markets and trading
3. Best-practice water pricing and institutional arrangements
4. Integrated management of water for environmental and other public benefit outcomes
5. Water resource accounting
6. Urban water reform
7. Knowledge and capacity building
8. Community partnerships and adjustment.

Source: NWI paragraph 24.

2.2 **Summary of progress against the agreement**

Jurisdictions have made good progress against this agenda (table 2.1). Most have largely achieved their NWI commitments, but there is some unfinished business and some scope for improvement where reforms have been implemented. A full assessment of jurisdictions' progress since 2017 is presented in the *Assessment*.

Table 2.1 Summary of progress against the NWI

1. Water access entitlements and planning frameworks

- All jurisdictions, except Western Australia and the Northern Territory, have enacted legislation required to create secure, NWI-consistent water access entitlements for consumptive uses. Some progress has been made since 2017, particularly in the Northern Territory, where exemptions (from entitlements frameworks) for minerals and petroleum industries have been removed.
- Water planning arrangements have been established for all areas of intensive water use. Most jurisdictions have more than 80 per cent of water use managed under water plans. This means the sharing of water resources between consumptive uses and the environment has been established in consultative processes, and informed by scientific and other assessments. However there has been inadequate progress to incorporate climate change and extreme events into water planning.

2. Water markets and trading

- Water markets have been established, allowing water to be traded to higher-value uses. Further steps have been taken by jurisdictions to improve the efficiency of their functioning. The largest water markets are located in the Murray–Darling Basin (MDB) and may provide the largest efficiency gains from further reform.

(continued next page)

Table 2.1 (continued)

3. Best-practice water pricing and institutional arrangements

- Urban service providers are generally pricing at the levels required by the NWI, despite some instances of underpricing.
- Independent economic regulators set prices or revenues for major urban water service providers in New South Wales, Victoria, South Australia, Tasmania and the ACT. The independent economic regulator reviews and recommends prices upon the request of the respective State Government for the state-wide provider in Western Australia and the major bulk water provider in Queensland. The Northern Territory, Queensland (except the major bulk water provider) and much of regional New South Wales do not have independent economic regulation.
- Pricing for government-owned rural water providers is compliant with the 2010 NWI pricing principles in jurisdictions with independent economic regulation. In other jurisdictions, pricing objectives are compliant, however there is insufficient publicly available data to confirm if pricing outcomes are compliant. User-owned networks have incentives to price efficiently. There is limited independent scrutiny over the operations (including investment and renewal decisions) of cross-jurisdictional infrastructure providers.
- Some government-funded major water infrastructure is unlikely to be economically viable. Queensland, Western Australia and Tasmania could make better use of economic regulation for irrigation services.

4. Integrated management of water for environmental and other public benefit outcomes

- Environmental sustainability has been supported by formal provisions of water for the environment and progress has slowed on rebalancing overallocated systems.
- All jurisdictions have managers with responsibility for environmental water provision, and some arrangements are in place to coordinate water use for water resources shared across jurisdictions.
- The recent drought has exposed weaknesses in achieving agreed outcomes in some systems.

5. Water resource accounting

- Water accounting is generally providing practical, credible and reliable information, but there is room for improvement. Public demand for information and timely provision of it has increased over time. Most States and Territories are still in the process of implementing non-urban metering policies on the ground to meet the National Non-Urban Metering Framework and NWI requirements.
- Greater compliance and enforcement activity has occurred in some MDB jurisdictions, after existing arrangements were found to be insufficient to support investor and community confidence. The Northern Territory and Tasmania still do not publicly report on compliance activities.

6. Urban water reform

- Water reuse, water use efficiency, water-sensitive urban design and innovation have improved since the introduction of the NWI.
- Drinking water quality generally meets existing guidelines. Issues remain, particularly in some regional and remote communities and especially during droughts, and data are patchy. Tasmania has made significant progress in improving drinking water quality for regional and remote communities.

7. Knowledge and capacity building

- There have been advances in knowledge and capacity to support implementation of the NWI, although many jurisdictions lack a clear process for identifying knowledge and capacity building priorities.

8. Community partnerships and adjustment

- All jurisdictions have sought to improve the scale and quality of their engagement with communities and Aboriginal and Torres Strait Islander people. However, a range of concerns have been expressed through submissions and meetings about the adequacy and effectiveness of some engagement processes undertaken since 2017, particularly within the New South Wales part of the MDB.
-

2.3 Reforms have contributed to sizeable benefits

Progress in national water reform has appreciably improved how Australia's water resources are allocated, developed and supplied, and has delivered large benefits to the community.

Water resource management

Adoption of NWI-consistent water planning and entitlements frameworks has created the foundations for efficient and sustainable resource management (chapter 6). Water planning has established transparent processes for deciding how the water in a system is shared between consumptive users (people and businesses) and the environment. Creation of water entitlements, separate from land, has provided clear and secure long-term property rights for both consumptive users and the environment. And together, these developments have provided the essential prerequisites for trading and water markets and established pathways to a more sustainable balance between consumptive and environmental use.

Water entitlement holders have derived significant benefits from these reforms (chapter 12). Entitlements have become a valuable asset — estimates put their value in the southern Murray–Darling Basin (MDB) at more than \$26 billion (Aither 2020). This value, coupled with their legal backing and the development of water markets, means entitlements can be used as collateral for loans. A 2013 survey found that about 20 per cent of NSW irrigators had secured finance against their entitlements (Fenton and DTI (NSW) 2015).

Water trading and markets also represent a valuable business management tool for irrigators, enabling more certainty in decision making, providing flexibility in dealing with changing market conditions and opening up new opportunities (chapter 12). And they have fostered greater efficiency in water use. Trade has seen water move to higher-value uses and price signals have encouraged on-farm efficiency, freeing up water for other productive uses.

The benefits of water trading have been particularly apparent during drought. Irrigators with flexible demands (such as rice and cotton growers) have been able to sell water to those with inflexible demands (such as horticulturalists with perennial crops). And entitlement holders have been able to sell water allocations to manage debt and realise income.

Water trading has become a sizeable economic activity. In 2018-19, Australia's water markets were estimated to have generated \$5.2 billion in turnover (BOM 2020a, p. 7). Studies of the economic benefits of this activity, although dated, have pointed to substantial value. For example, regional GDP in the southern MDB was estimated to be \$4.3 billion higher over the five years to 2010-11 than it would have been without trading, and gains were largest in 2007-08 and 2008-09 at the height of Millennium Drought (NWC 2012, p. xii). And trading has allowed Australia's gross value of irrigated agricultural production to increase in most years over the past decade despite considerable variation in water use between wet and dry years (chapter 12, figure 12.1).

Provision of water for the environment has been another key achievement (chapter 8). Water planning aims to set the balance between environmental and consumptive use at an environmentally sustainable level — that is, a level that maintains key environmental assets and ecosystem functions while accepting a degree of ecological risk. In less developed systems, plans have capped consumptive use and specified environmental water provisions. In overallocated systems, additional water is being recovered for the environment. Recovery rates have slowed in recent years, but significant progress has been made. The long-term average annual yield of held environmental water in the MDB is 3000 GL (MDBA 2020b).

Benefits of these provisions for the environment are starting to be seen including: improved native vegetation and wetland condition; protection of rare and threatened biodiversity such as in groundwater-dependent ecosystems; and the migration and breeding of native fish, frogs and waterbirds (CEWO 2020b; Hart and Butcher 2018, p. 2; Thurgate et al. 2019). Provision of refuges has been particularly important in maintaining breeding grounds during drought (MDBA, sub. 23, pp. 13–14), supporting ecosystem resilience until rain returned.

Provisions have also helped to avoid major environmental degradation that would have otherwise occurred through unconstrained consumptive water access (Chen et al. 2020, p. H). For example, planned environmental water is likely to have mitigated the rate of habitat decline faced by platypus populations by maintaining river connectivity (Hawke, Bino and Kingsford 2020, p. 59).

Environmental water provision also has the potential to deliver a range of other public benefits including cultural outcomes for Aboriginal and Torres Strait Islander people, and economic and social outcomes for recreational and commercial fishers and the tourism industry (SP C *Environment*). And, although difficult to quantify, healthy rivers, lakes and wetlands provide amenity benefits — that is, pleasure for those who use or view them.

Water service delivery

Reforms to institutional arrangements have markedly improved the efficiency of water service delivery, bringing significant benefits to water users and the broader community.

Widespread adoption of cost-reflective and consumption-based pricing in the urban water sector (along with restrictions and awareness campaigns during drought) have contributed to changing water users' behaviour, supporting more efficient water use, better signalling of investment needs and a more financially sustainable sector (chapter 11). Household water use, for example, has fallen over the past two decades from a national annual average of 280 kilolitres in 2000 to about 190 kilolitres in 2019 (ABS 2004, 2020b), while the average household size has not changed (ABS 2002, 2017). And most service providers now generate enough revenue from user charges for long-term financially sustainable operations without government subsidies, removing a burden on taxpayers.

Institutional separation of policy making, service delivery and regulation has improved accountability and transparency. Corporatisation of utilities has encouraged commercial

behaviour, promoting efficient investment and lower prices for the benefit of water users (PC 2017a, p. 10). Independent economic regulation has supported more rigorous scrutiny of utilities' operational and investment decisions and reduced the risk of political interference in price setting and infrastructure investment processes. And benchmarking and reporting of urban water pricing and service outcomes enable customers to compare their provider with others' — promoting questioning that can prompt improved outcomes.

Assessment processes consistent with the NWI requirements that investments are economically viable and ecologically sustainable help to ensure that water service providers avoid uneconomic and potentially environmentally damaging decisions (chapter 13).

And water supplies in most communities are safe, healthy and reliable (*Assessment*). Tasmania and Western Australia have made progress over the past three years in addressing areas of water supply risk. But issues persist in the Northern Territory and drought has led to service quality issues in parts of New South Wales and Queensland, which indicates that more could be done to ensure communities are prepared for drought.

For the irrigation sector, economic regulation and local ownership and/or management (especially by irrigators) of rural water service providers have improved the accountability, productivity, efficiency and responsiveness of these businesses to the needs of rural water users (PC 2017b, p. 237).

2.4 But the case for further reform is compelling

National water reform has served Australia well. However, further reform should not be 'set and forget'. It needs to be adaptive — reflecting lessons learnt from implementation, changing as the broader policy context changes and proactively shifting to deal with anticipated future challenges.

Much has been learnt in the 17 years since the NWI was agreed. Implementation of the agreement has provided a wealth of knowledge and experience. Each jurisdiction has dealt with reform in ways suited to their level of development, communities and industries, providing insight into evolving best practice. This period included both the Millennium Drought and the recent severe drought affecting New South Wales and parts of Queensland, Victoria and Western Australia — highlighting issues and providing lessons on managing extreme water scarcity. And it included the recent extensive bushfires and COVID-19 experience, with the challenges they raised for water management.

The past 17 years have also seen shifts in community expectations, for example, about liveability and urban amenity, and about access to water for Aboriginal and Torres Strait Islander people.

Moreover, it has been a period of major reform in the MDB, with new institutional arrangements established under the *Water Act 2007* (Cth), the development of the Basin Plan and the investment of over \$13 billion in its ongoing implementation. Over the past 40 years,

the MDB has often been the proving ground for many of Australia's successful water reforms, which have then been emulated in other parts of the country. And it continues to offer useful insights in a number of areas — in the identification of best practice that could be applicable nationally and also areas where doing things differently could prevent or avoid the community concern that has recently occurred in parts of the Basin. All of this experience needs to condition thinking about NWI renewal.

Finally, a renewed NWI needs to identify the key issues that water management will need to deal with over the next 10 to 20 years to ensure proper stewardship of Australia's water resources. These will be dominated by the effects of climate change, coupled with the needs of a growing population.

The following sections paint the context for a renewed NWI. They discuss key issues observed in the recent droughts and the lessons they offer for the future. They then look at current climate conditions and finally discuss projections for both climate and population and the implications for water management across Australia.

Severe drought has caused extensive pain

Drought is one of the most feared and costly climate challenges faced by Australian water users (BOM 2020c). In rural areas, its direct consequences include crop failure and stock losses. Droughts also set the scene for bushfires, dust storms and land degradation. In urban areas, droughts can lead to water restrictions and shortages that threaten the wellbeing of communities. For the environment, while droughts are natural occurrences, their impacts are amplified by river regulation and water extraction and compounded by loss of habitat.

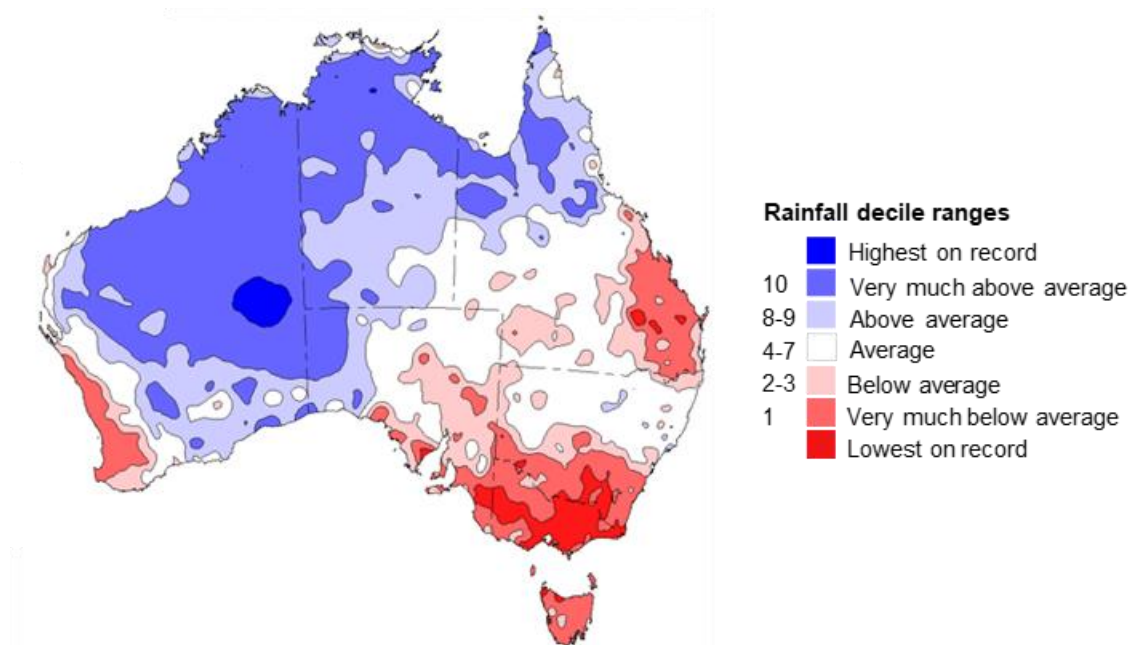
The Millennium Drought was only partway through when the NWI was agreed in 2004. Conditions were particularly severe in the densely populated southeast and southwest of the country (figure 2.1, panel a), greatly affecting rural and urban waters users alike. For urban water users, all capital cities except Darwin were affected to some degree (BOM 2020c). Governments responded with demand-management programs and increasingly severe and prolonged water restrictions, before intervening in a number of circumstances to take direct control of planning and investment. According to the National Water Commission (2011, p. 11):

[t]hose interventions were marked by stop-start policies and hurried planning with little transparency and community and customer engagement. While no city ran out of water, there were a number of close calls, and the response imposed significant financial and non-financial costs on customers, the community, water businesses, taxpayers and the environment.

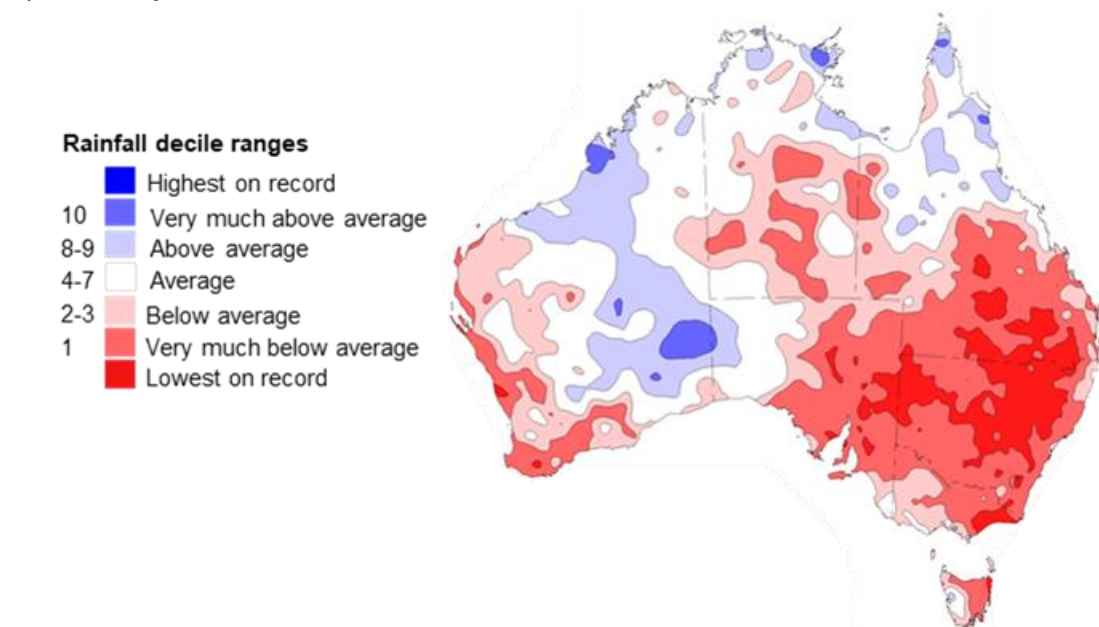
In recent years, drought has again caused extensive pain across southern Australia. From January 2017 to December 2019, the situation was particularly challenging in the MDB and New South Wales (figure 2.1, panel b), with record-breaking extreme dry conditions (BOM 2020c).

Figure 2.1 **Recent droughts have caused widespread and extensive pain**
Australian rainfall deciles for recent droughts compared with historical records^a

a) 1 April 1997 to 31 October 2009 (the Millennium Drought)^b



b) 1 January 2017 to 31 December 2019^c



^a A decile map shows where rainfall is above average, average or below average for the selected period, in comparison with selected historical records. ^b Historical records from 1900 to March 2015. ^c Historical records from 1900 to March 2020.

Sources: BOM (2015) (panel a); BOM (2020c) (panel b).

While drought was largely confined to southern Australia, the far north has not been immune to extreme dry conditions. For example, for the 2019–20 wet season, rainfall in Katherine¹ was the lowest recorded since 1951–52, and Darwin’s² rainfall in both the 2018–19 and 2019–20 wet seasons was also well down at about 70 per cent of the long-term average (BOM 2019, 2020f).

Costly consequences of the recent drought and dry conditions included:

- widely publicised fish deaths in the Darling River (for example ABC News (2019))
- water storage levels dropping to extremely low levels and many towns needing emergency relief in New South Wales (figure 2.2). For example, fifteen million dollars was allocated by the New South Wales Government for emergency water carting and work to secure town and household water supplies in the 2019–20 state budget (NSW Government 2019, p. 66)
- record highs in fire weather danger (as measured by the Forest Fire Danger Index) in parts of all States and Territories in 2019 and early 2020 (BOM 2020c).

These experiences have put extreme pressure on landscapes and communities, with lessons for NWI renewal. For example, shortcomings exposed in water management arrangements suggest that water plans must include improved and well-defined provisions to support communities in dealing with drought. Environmental distress, exacerbated by compliance failures and incomplete water recoveries, highlights the need for improvements in environmental management policy principles, frameworks and practices. Compliance failures point to the value of an enhanced focus on integrity. Inadequacies in planning and service delivery brought into sharp relief in some regional areas underscore the need for effective preparation and emergency response plans. And the recent drought has uncovered gaps in the understanding of water security for regional towns.

Droughts align with evidence of changing climates

Severe droughts and extreme water shortages fit with the signs of a changing climate, including higher temperatures, more extreme events, changing rainfall patterns and reduced water availability.³

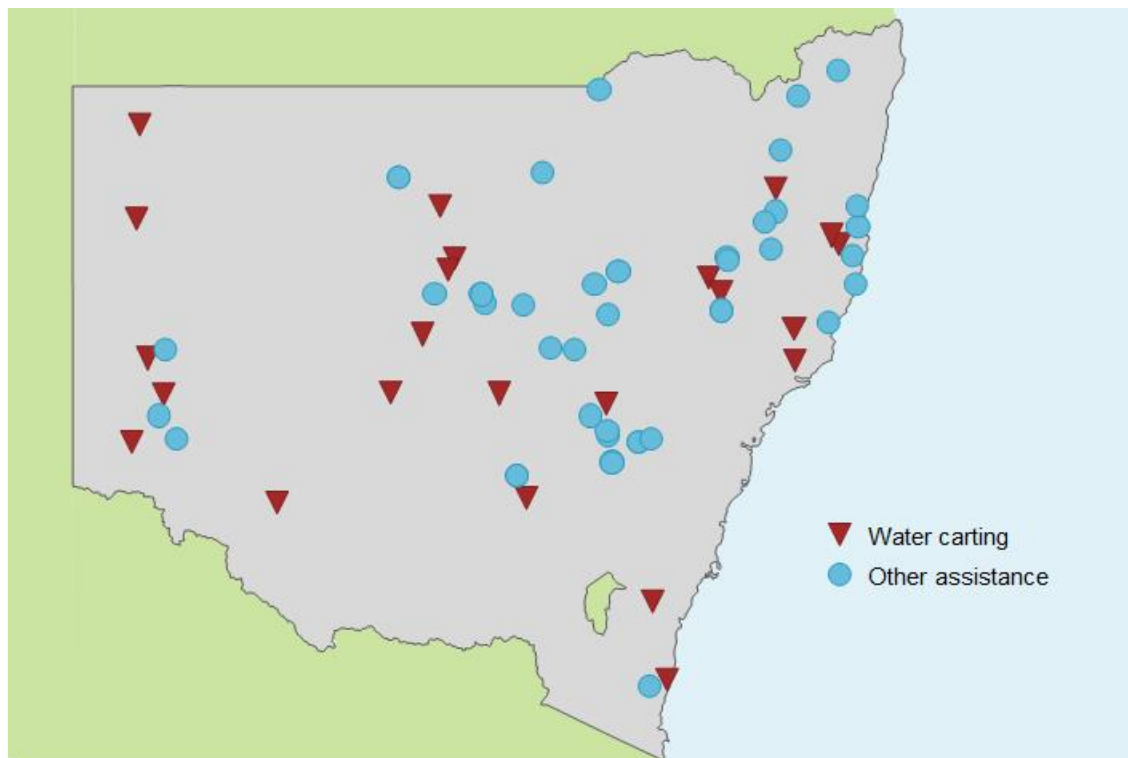
Australia’s climate is warming. Average temperatures have increased by 1.44 degrees Celsius since national records began in 1910 and warming has been observed ‘across Australia in all months with both day and night-time temperatures increasing’ (BOM and CSIRO 2020, p. 4).

¹ Katherine Council weather station (014902).

² Darwin Airport weather station (014015).

³ Much of this section draws on information published in *State of the Climate* (BOM and CSIRO 2020).

Figure 2.2 Many regional towns in New South Wales received emergency relief for town water supplies



Source: DPIE (NSW) (2020).

Increased temperatures have been accompanied by an increased frequency of extreme heat events, extreme fire weather and more intense rainfall. The length of the fire season has increased across large parts of Australia since the 1950s, especially in southern Australia. And increasingly severe rainfall events, particularly in northern Australia, have been associated with flash flooding, particularly in paved urban environments.

While rainfall is highly variable, shifts in long-term trends are evident. Average April to October rainfall levels in much of southern Australia over the past 20 years have been in the lowest decile of observations collected since 1900 (figure 2.3, panel a). In contrast, rainfall has increased in northern Australia throughout the year, especially in the northwest during the northern wet season (October to April) (figure 2.3, panel b).

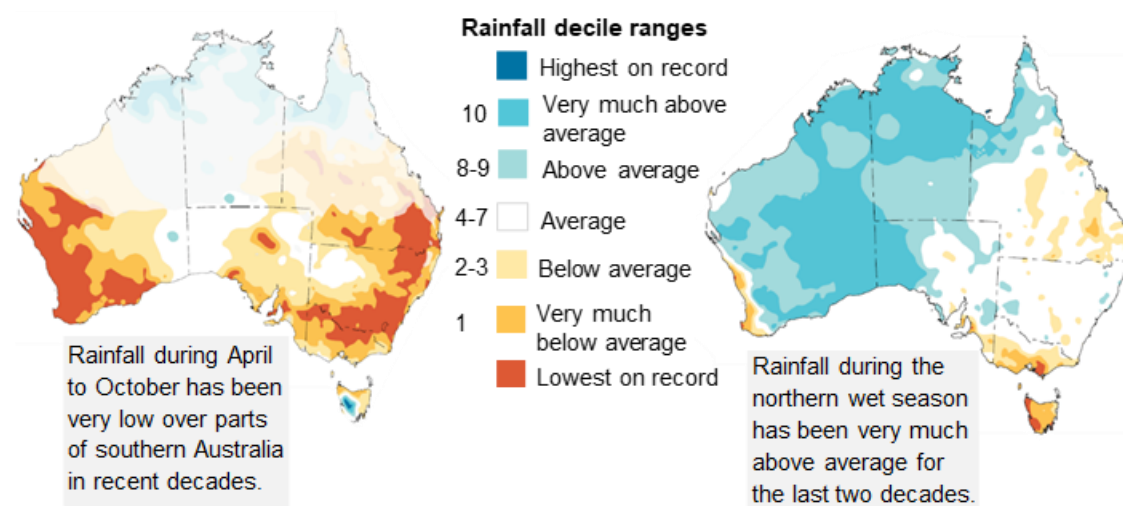
Long-term reductions in average rainfall have led to declining streamflows across many parts of southern Australia. More than three-quarters of hydrologic reference stations in the MDB have had a declining trend in streamflow since records began in 1970. Meanwhile, streamflows have increased in northern Australia around Darwin and much of the Northern Territory (BOM and CSIRO 2020, p. 9).

Figure 2.3 Drier southern winters and wetter wet seasons highlight the varied effects of Australia's changing climate^{a,b}

Rainfall deciles, 2000–2019 in comparison with the entire record from 1900

a) April to October

b) October to April



^a A decile map shows where rainfall is above average, average or below average for the selected period (2000–2019), in comparison with the selected historical record (1900–2019). ^b In panel a, areas across northern and central Australia that received less than 40 per cent of their annual rainfall during April to October are faded.

Source: BOM and CSIRO (2020, pp. 6–7).

Average inflows to Perth dams over the past decade were 75 per cent below the level of much of the 1900s (figure 2.4, panel a). And records of River Murray inflows stretching back 125 years show that low inflows have been much more common over the past 20 years (figure 2.4, panel b). Median annual inflows have been about half the level of the preceding century and drier years have been much more frequent (IIGMDB 2020, p. 7).

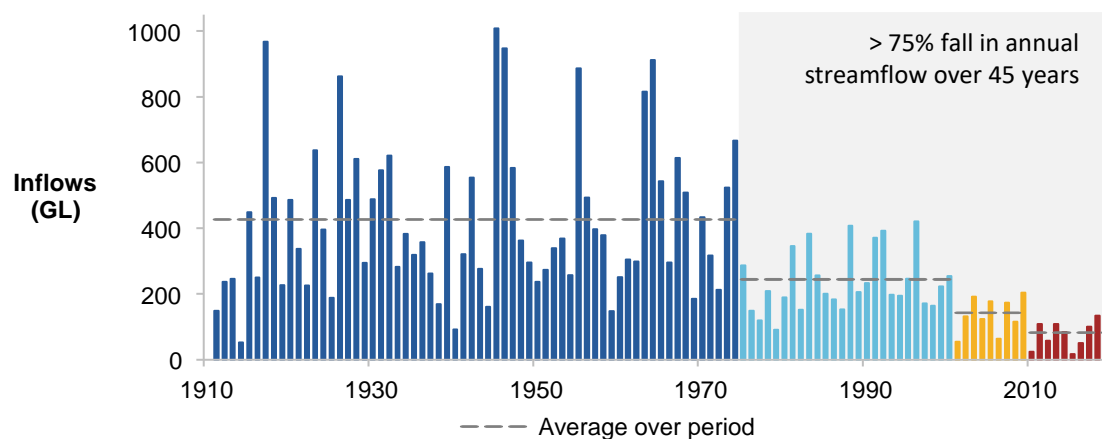
While there may be many factors contributing to the extent of observed inflow reductions, the lack of rainfall and runoff has been the primary driver for the conditions being experienced by many across the Basin in recent times. (IIGMDB 2020, p. 14)

Further, a recent assessment in southern Victoria found that the long-term average surface water availability had declined in all basins relative to previous estimates (figure 2.5). The assessment concluded that the period since 1975 provides a better reflection of Victoria's current climate than the full historical record used previously (DELWP (Vic) 2020, p. 43). Upstream interception from farm dams and plantations was one cause of lower water availability in recent decades, but much of the change was attributed to drier conditions.

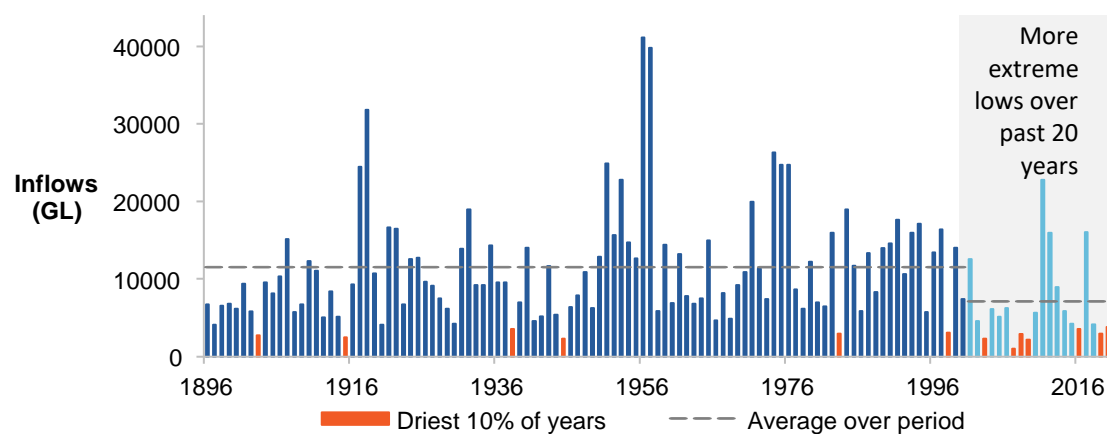
These trends are affecting how much water is available to meet both consumptive and environmental needs. And they indicate both the increasing uncertainty facing water managers and the growing need for managers to be adaptive in how they manage water resources.

Figure 2.4 Inflows have declined in large parts of southern Australia

a) Perth inflows



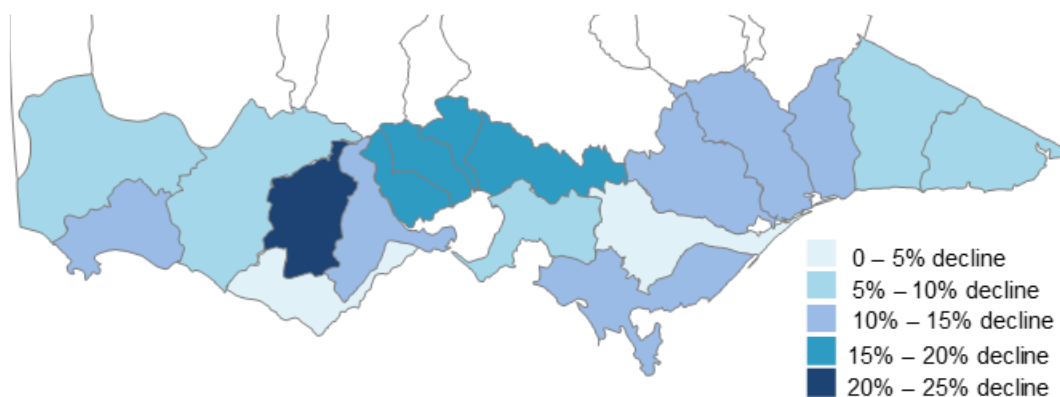
b) River Murray system inflows



Sources: Water Corporation (2020) (panel a); MDBA (2020a) (panel b).

Figure 2.5 **Surface water availability has declined in southern Victoria**

Long-term average for 1974-75 to 2016-17 compared with the long-term average from 1920-21 to 2004-05



Source: DELWP (Vic) (2020, p. 48).

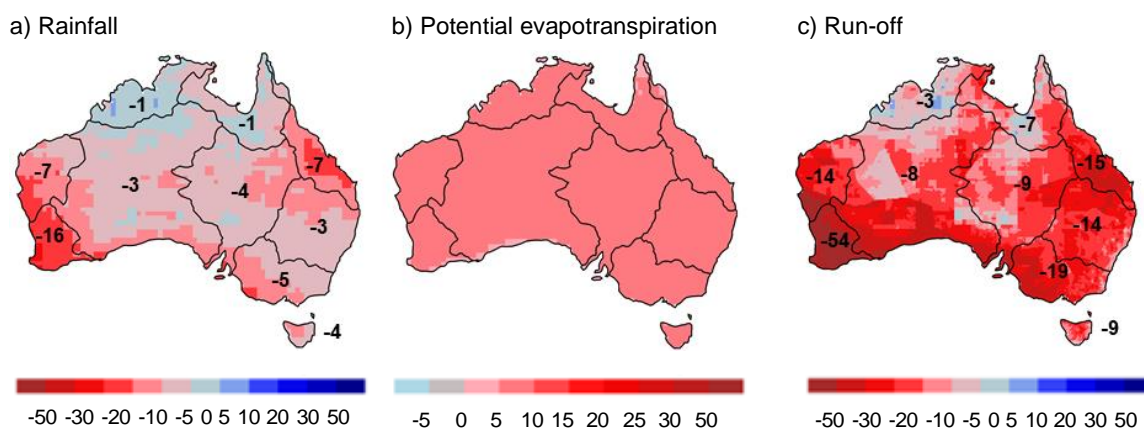
Projections point to reduced water supply across Australia

Projections of the future point to a hotter, drier and more extreme climate — particularly in southern Australia. The impacts of climate change are being driven by increased concentrations of greenhouse gas emissions in the atmosphere, and will likely result in increased average temperatures, higher-intensity rainfall and other extreme weather events. Recent modelling by CSIRO scientists (adapted from Zheng et al. (2019)) points to declines in water availability across Australia (figure 2.6). Reduced water availability is very likely in southern Australia due to declines in cool-season rainfall, increases in evapotranspiration and reductions in run-off. In parts of Australia, large declines are expected, with medium projections showing a 50 per cent drop in runoff in southern Western Australia and 19 per cent fall in Victoria. Rainfall in northern Australia is slightly more likely to decrease than increase, however a wide range of outcomes is possible.

Declining water availability will likely accelerate change in irrigated agricultural production. ABARES estimates that for the southern MDB — assuming a future in which planned recovery of water for the environment is complete, almond trees are mature and farm productivity has been increased through infrastructure upgrades — a further 11 per cent decline in surface water supply (relative to the already dry period of 2005-06 to 2018-19) would likely see production of traditional crops fall by between 15 and 30 per cent (Gupta et al. 2020, p. 19). Higher water prices would see water flow to higher-value crops (such as almonds at current commodity prices) (figure 2.7).

Figure 2.6 Australia's climate to dry with increased emissions

Median (50th percentile) projections of percentage change in average annual rainfall, potential evapotranspiration and run-off, 1976–2005 to 2046–75, under RCP 8.5 emissions profile^{a,b}



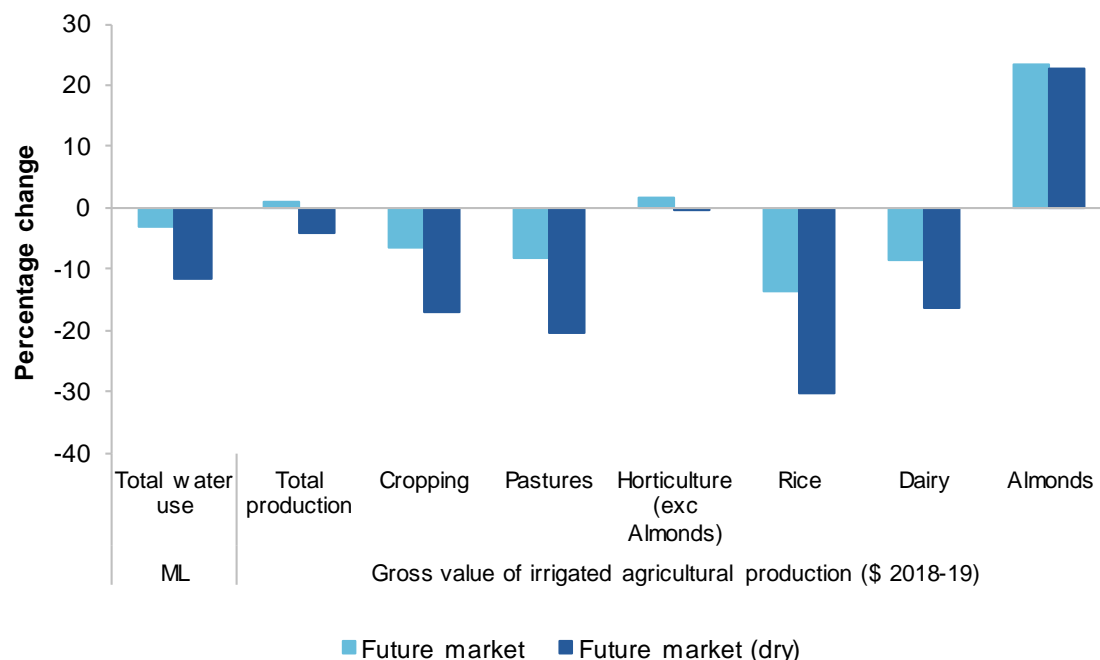
^a Projections are based on hydrological modelling informed by climate change projections from 42 global climate models. Median (50th percentile) values are the level at which half all model runs were above or below these values. As all median values for runoff are below zero, the modelling indicates that it is more likely than not that runoff will decline across Australia with increased emissions. For further information and 10th and 90th percentile projections of run-off, refer to Zheng et al. (2019). ^b RCP 8.5 — representative concentration pathway — the trajectory for greenhouse gas concentration underlying the projections presented in this figure.

Source: Adapted from Zheng et al. (2019).

The uncertainty in the extent to which the future climate will be drier, and the potential for significant changes in how water is used in Australia, point to the need for robust water planning and management processes to ensure systems can adapt effectively as baselines shift with climate change.

And while crops such as almonds are very profitable at current commodity prices, the future may look very different. Efficient and effective water markets will be essential to ensure that water keeps moving to where it is most valued. Experiences from 30 years in the MDB provide valuable lessons for reform renewal to better underpin market development in other parts of the country and avoid the potential downsides of trade, including risks of delivery shortfalls, unintended unseasonal flows and erosion (chapter 7).

Figure 2.7 Changes in southern MDB production with lower water availability and use^a



^a Results for all scenarios are averages based on the historical climate sequence from 2005-06 to 2018-19 (a relatively dry period). The 'current market' scenario holds all water market drivers fixed at 2018-19 levels. The 'future market' scenario accounts for planned future water recovery measures and an increase in demand. The 'future market (dry)' scenario assumes a further 3 per cent decline in rainfall and 11 per cent decline in allocation volumes (water supply).

Source: Gupta et al. (2020).

Increasing demands will accentuate pressures

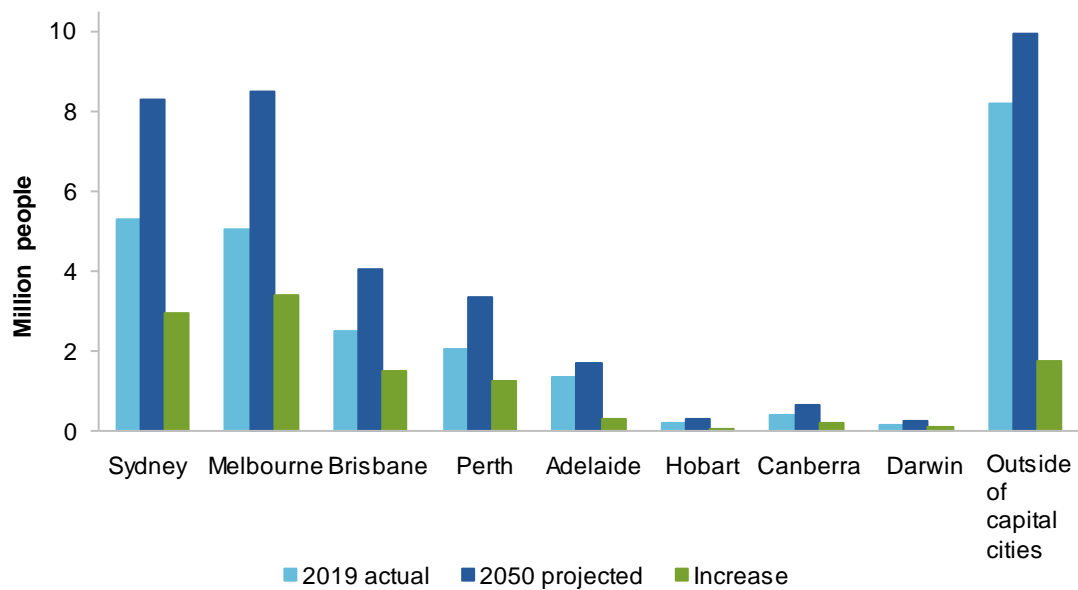
A growing population, with growing demand for water, is also putting increasing pressure on an already limited resource.

At the time of federation, Australia's population was about 4 million people and just over one-third lived in capital cities (ABS 2019b). By 2019, Australia was home to 25 million people and over two-thirds lived in capital cities (ABS 2019a, 2019c). Despite the growth in urban living, household consumption makes up a relatively small share of consumptive use (only about 20 per cent of total water taken was for urban water supply in 2018-19 (BOM 2020e)).

Nonetheless, Australian cities have been growing rapidly and are expected to continue to grow in the long term. In the year to June 2019, capital cities accounted for 79 per cent of Australia's total population growth (ABS 2019c). And while the long-term impacts of COVID-19 on future population growth are highly uncertain, projections made prior to the pandemic point to further population growth in capital cities (figure 2.8). By 2050 an

additional 11 million people are expected to live in capital cities, and almost half (45 per cent) of all Australians will live in Sydney and Melbourne (up from 41 per cent in 2019) (ABS 2018, 2019c). Notably — with the exception of Darwin — all of Australia’s capital cities are located in southern or eastern parts of Australia, which are regions likely to see future declines in water availability as the climate changes.

Figure 2.8 Capital city populations are expected to grow fastest^a



^a Years ending June.

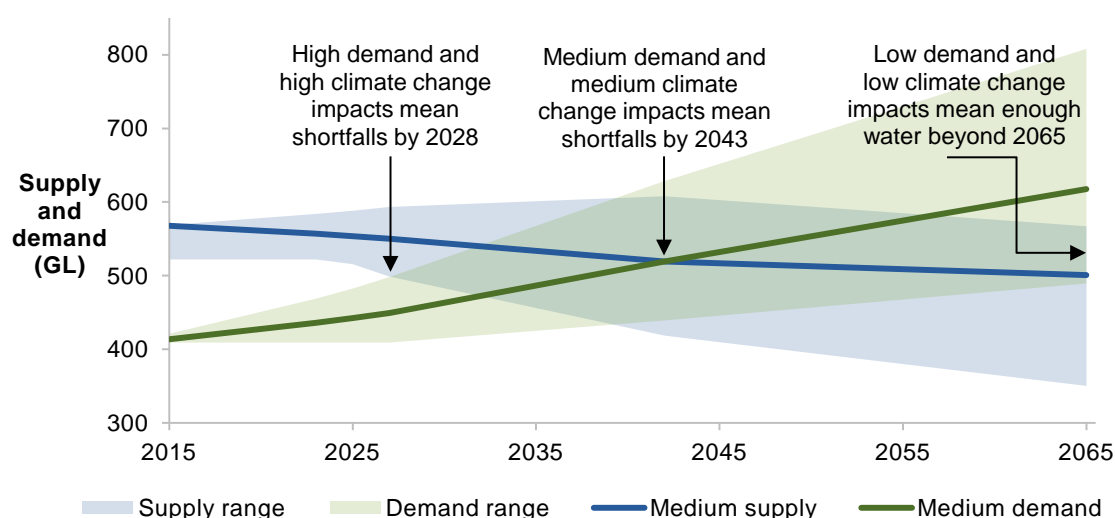
Sources: ABS (Regional Population Growth, Australia, 2018-19, Cat. no. 3218.0); ABS (Population Projections, Australia, 2017 (base) – 2066, Cat. no. 3222.0).

In major cities where readily-available supply sources have already been accessed, ongoing population growth is likely to create significant pressure on water supplies. Major supply augmentations will often be needed. Scenarios developed for Melbourne, for example, include a worst case of demand outstripping supply by around 2028. Uncertainty in the underlying climate and demographic models, however, means that Melbourne’s water security may last until well beyond the middle of the century (figure 2.9).

The changing expectations of Australian communities are adding further pressure. For instance, in recent years, urban water users’ expectations of water service providers have extended beyond clean, reliable and affordable water and wastewater services to the role of water in creating urban amenity (Infrastructure Victoria 2019, p. 3; WSAA 2014, p. 9; WSAA, sub. 88, p. 12). The Millennium Drought highlighted the dependence of both urban and rural communities on water and water environments — local lakes and streams dried up (particularly in regional communities) and urban communities had severe water restrictions which meant many public spaces could not be watered. Since then, both regional and urban

communities have developed a greater appreciation of the contribution that water management and water environments can make to amenity, liveability, recreation and regional tourism. And the value of urban water amenity has never been more relevant than since the beginning of the COVID-19 pandemic, as intermittent lockdowns have limited people's ability to travel outside cities to access natural water environments.

Figure 2.9 Water supply and demand projections for Melbourne



Source: Melbourne Water et al. (2017).

The expectations of Aboriginal and Torres Strait Islander people, and commitments made to Traditional Owners by governments, will also play an important role in determining how Australia's water resources are managed into the future.

Finally, extreme events such as the COVID-19 pandemic and bushfires will continue to test water resource managers, and potentially lead to changing patterns in both supply and demand.

Overall, urban water providers are likely to face significant pressures to augment and better manage water supplies. Here, too, past experience contains lessons for future reform settings and contributes to the case for NWI renewal. For example, instances of rushed investments into desalination and water recycling, and poor selection of major rural water infrastructure with attendant costs for taxpayers, highlight the need for best-practice planning and investment decision making. Utilities would be better able to pursue the full suite of water security, public health, environmental and amenity outcomes sought by communities if water supply, wastewater and stormwater planning and management were integrated and sitting within entitlement regimes, and all water supply options were able to be considered.

Stronger urban water policy settings that provide guidance on best-practice system planning, pricing and institutional arrangements will help the sector meet the challenges ahead.

2.5 In summary: the case for renewed reform effort is convincing

Water reform needs renewal. Significant progress has been made against the objectives and outcomes of the NWI over the 17 years since the agreement took effect, with sizeable benefits to Australian communities.

However, since the agreement was struck, severe droughts and extreme events have exposed vulnerabilities in water resource management and service provision. Management approaches have evolved in each of the jurisdictions. And experience has conferred significant knowledge. Modernisation of the NWI could draw on the lessons from this history to address the vulnerabilities, embed best practice and harness the value of new knowledge.

Renewal will also better position policy makers to confront the challenges from likely declines in water availability in much of the country, shifts in rainfall patterns, more frequent extreme events and increasing demands from water users. A proactive approach, with adoption of best-practice policy settings, will see Australia's resources conserved and managed to best effect. Failing to act will risk ad hoc and reactive responses, with greater costs to community wellbeing than need be.

The remainder of the report outlines the Commission's advice on NWI renewal. It covers the policy framework for a renewed NWI including the goal, objectives and key elements for a new agreement (chapter 3), proposed governance arrangements for a new NWI (chapter 4) and more detailed policy directions for the proposed key elements (subsequent chapters).

In drafting this advice, the Commission has taken an adaptive approach to reform — examining progress against the original NWI, taking into account issues identified during 17 years of implementation including the experience during droughts, understanding the experience in the MDB as it provides lessons for national applicability, noting changing community preferences and attitudes and using this to develop policy approaches to allow governments and communities to deal with future challenges and adapt to a drier and more uncertain future.

3 NWI renewal: a refreshed intent

Key points

- Renewal of the National Water Initiative (NWI) would address stakeholder views about the need for strong government leadership on water policy.
- The overarching goal for the NWI should be modernised to reference adaptation to a changing climate and to recognise the importance of water in the lives of Aboriginal and Torres Strait Islander people.
- The overarching objective for the NWI should be modernised to reflect both water resource management and water service provision. The objective should also include reference to cultural outcomes to recognise the aspirations of Aboriginal and Torres Strait Islander people.
- A more detailed set of objectives for water resource management and a separate set for water service provision are proposed for the renewed NWI.
- New water resource management objectives should include those that:
 - better account for the diverse characteristics of water sources; processes for water sharing and management during periods of water scarcity; triggers and processes for reviewing the balance; and clear identification of the environmental, cultural and other public benefit outcomes to be met through planning processes
 - extend statutory provisions for the environment to recognise a need for integration with natural resource management and the potential to achieve cultural and social benefits
 - enable ongoing standing and influence for Aboriginal and Torres Strait Islander people in water planning and natural resource management processes.
- Water service provision should include a substantially expanded set of objectives such as: drinking water quality; integrated management of water supply, wastewater and stormwater services; and processes to ensure that investments in major infrastructure clearly contribute to community wellbeing.
- Six overarching principles are proposed to be applied across all areas of water resource management and water service provision and cover: strong capacity to contend with drought and adapt, fit-for-purpose management and regulation, use of best available information, innovation and adaptive management, community engagement and capacity for communities to effectively engage.
- All eight elements of the NWI remain relevant and should be retained in a new agreement. Expansions should be made to the water accounting element to ensure trust and confidence in water management, and there needs to be much more comprehensive treatment of urban water services. Two new elements are proposed:
 - one to secure the interests of Aboriginal and Torres Strait Islander people in water resource management
 - the other, to include principles for efficient investments in major water infrastructure.

This chapter sets out the Commission’s advice on the intent of a new agreement — its goal, objective, underpinning principles and elements (reform foci). None of the related content from the 2004 National Water Initiative (NWI) is redundant. It should be retained. But it should be built on to create an agreement that is fit for today and for the next 10 to 15 years.

Three major themes run through all aspects of this advice, reflecting the fact that the lessons of the past 17 years and the profound challenges facing the water sector indicate that in the coming years communities are going to have to:

- be able to contend with droughts and withstand shocks
- know when and how to adapt to changes in the baseline — permanent shifts in resource availability — wrought by climate change
- adopt fit-for-purpose arrangements — that is, arrangements that address the diversity of circumstances across the country.

Before presenting this advice, this chapter makes the case for a national approach.

3.1 Why a national approach to water reform?

All governments need to collaborate to address major national challenges. In the case of the NWI, the benefits of a national approach are demonstrable (WSAA, sub. 88). The design and implementation of the agreement have contributed to its status, credibility and overall success (PC 2017b, p. 316). Similar benefits lie with renewed effort.

- The process of developing and committing to the agreement will enable governments to demonstrate leadership on a national priority issue — the management of water in Australia.
- Identification of key national priorities and a long-term policy agenda would help to depoliticise sensitive issues and create greater certainty for water users.
- Sharing of effort, information and knowledge of best practice stand to contribute to more effective and efficient policy design.
- Inclusion of clear objectives and outcomes, coupled with commitment to independent, publicly reported monitoring of progress against reform commitments would:
 - promote transparency and accountability
 - signal governments’ recognition of the importance of water reform
 - establish a collectively endorsed policy platform to guide government consideration of investment opportunities to deliver high value reform outcomes.
- Adoption of a principles-based rather than an overly prescriptive approach would provide jurisdictions with flexibility to ensure reforms suited local conditions.

-
- Commitment to community engagement would signal an intent to involve all water users, communities and environmental managers in decisions, and engender better outcomes from inevitable trade-offs involved in reform.

3.2 A modernised goal

Paragraph 5 of the NWI sets out jurisdictions' overarching goal for the agreement.

The Parties agree to implement this National Water Initiative (NWI) in recognition of the continuing national imperative to increase the productivity and efficiency of Australia's water use, the need to service rural and urban communities, and to ensure the health of river and groundwater systems by establishing clear pathways to return all systems to environmentally sustainable levels of extraction.

This goal remains sound, but merits two additions.

Since the NWI was agreed, the potentially devastating impacts of climate change on Australia's water resources have become clearer (chapter 2). Recognition that all aspects of water resource management and water service provision will need to adapt in the face of these challenges should be reflected in a renewed agreement.

Similarly, understanding of and support for Aboriginal and Torres Strait Islander people's aspirations for greater access to, and control over, water resources has grown (chapter 9), as has awareness of water service provision issues in remote communities (chapter 11). Moreover, the importance of water to Aboriginal and Torres Strait Islander people has been recognised in the 2020 National Agreement on Closing the Gap. Decisions about how Traditional Owners' aspirations are accommodated is a matter for governments, but in the spirit of the National Agreement on Closing the Gap, it would be appropriate to recognise in the overarching goal for a renewed NWI, the importance of water in the lives of Aboriginal and Torres Strait Islander people, and water service provision in remote communities.

DRAFT NWI RENEWAL ADVICE 3.1: A MODERNISED GOAL

The overarching goal of the National Water Initiative remains sound but should be modernised through reference to adaptation to climate change and recognition of the importance of water in the lives of Aboriginal and Torres Strait Islander people. Suggested wording follows:

The Parties commit to this renewed National Water Initiative in recognition of the continuing national imperative to increase the productivity and efficiency of Australia's water use, to service the changing needs of rural, urban and remote communities and to ensure the health of river and groundwater systems and their surrounding landscapes whilst adapting to a changing climate. In continuing to implement this agreement, the Parties also acknowledge the importance of water to the lives of Aboriginal and Torres Strait Islander people.

3.3 Modernised overarching objectives

Paragraph 5 also sets out the overarching objective of the agreement.

The objective of the Parties in implementing this Agreement is to provide greater certainty for investment and the environment, and underpin the capacity of Australia's water management regimes to deal with change responsively and fairly.

More detailed objectives are presented in paragraph 23, introduced by the message that:

Full implementation of this Agreement will result in a nationally-compatible, market, regulatory and planning based system of managing surface and groundwater resources for rural and urban use that optimises economic, social and environmental outcomes ...

Reflecting the emphasis of the NWI at the time, the statements focus on water resource management. Water service provision — which includes access to clean water, water for urban amenity and pricing rules among other features — receives relatively scant attention in the agreement. But reform in aspects of service provision will be equally important to successfully navigating the challenges ahead. The overarching objective should reflect this (and that navigation task). And, reflecting the arguments made above, it should also refer to cultural outcomes to reflect the aspirations of Aboriginal and Torres Strait Islander people.

DRAFT NWI RENEWAL ADVICE 3.2: MODERNISED OVERARCHING OBJECTIVES

The National Water Initiative has a strong focus on water resource management. A renewed agreement should give greater emphasis to water service provision and this should be reflected in the overarching objective. The objective should also include reference to cultural outcomes to recognise the aspirations of Aboriginal and Torres Strait Islander people. Suggested wording follows.

The overarching objectives of the Parties in implementing this Agreement are to:

- optimise economic, environmental, social and cultural outcomes through best-practice management of Australia's water resources. In the process, this will provide certainty for investment, water users and the environment
- enable entitlement holders, communities and the environment to contend with climate variability and adapt to a changing climate
- ensure effective, efficient and equitable provision of water services that meet the needs of customers and communities in a changing climate.

3.4 Modernised detailed objectives

Reflecting the lessons from experiences since the NWI was agreed, a more detailed set of objectives for water resource management and a separate set for water service provision are proposed.

DRAFT NWI RENEWAL ADVICE 3.3: MODERNISED OBJECTIVES

Full implementation of this Agreement will result in:

A — a nationally-consistent planning, market and regulatory based system of **managing surface and groundwater resources** for rural, urban and remote use that:

- optimises economic, environmental, social and cultural outcomes
- enables entitlement holders, communities and the environment to contend with climate variability and adapt to a changing climate

by achieving the following:

1. clear, nationally-consistent statutory systems for secure water access entitlements
2. transparent, statutory-based water planning that:
 - (a) is risk-based, matching the level of management with the level of water extraction in a system
 - (b) includes all sources of water, recognises connectivity between surface and groundwater, and takes into account water quality
 - (c) clearly identifies the agreed environmental, cultural and other public benefit outcomes to be met through the water planning process
 - (d) includes agreed processes for water sharing and management during periods of water scarcity
 - (e) includes clear pathways to an agreed and improved balance between the environment and consumptive water use in overallocated or overused systems
 - (f) includes clear triggers and processes for reviewing the balance between water for the environment and consumptive use, such as in response to the effects of climate change
3. statutory water provisions for the environment which are integrated with complementary natural resource management to achieve agreed environmental outcomes and where this does not compromise environmental outcomes, managed to also achieve cultural and social benefits
4. processes to enable Aboriginal and Torres Strait Islander people to have ongoing influence in water planning and natural resource management that affect Country and access to water consistent with the 2020 National Agreement on Closing the Gap
5. the capacity to trade water to promote its highest value use within the physical, ecological and social constraints of water systems in an open, transparent water market with a level of regulation that is proportional to the maturity of market development
6. a system of water metering, measurement and accounting, coupled with effective compliance, that promotes water user and community confidence in the integrity of water management and water markets
7. clarity on the assignment of risk arising from future changes in the availability of water for the consumptive pool and how future adjustment should be managed.

(continued next page)

B — effective, efficient and equitable **provision of water services** that meets the needs of customers and communities in a changing climate by achieving the following:

1. access to safe and reliable drinking water, including in remote communities
2. clear objectives for the level and quality of water services which reflect customer preferences
3. in cities and towns:
 - (a) integrated planning and management of water supply, wastewater and stormwater services
 - (b) efficient water services that deliver outcomes, including urban amenity and liveability, in line with customer preferences and willingness to pay
4. cost-reflective pricing of water services wherever possible, with transparent subsidies to high-cost regional and remote community services
5. institutional arrangements that:
 - (a) ensure the separation of policy setting, service delivery and regulation with clear roles for each
 - (b) incentivise water service providers to be efficient and innovative, and to deliver services in ways that are cost-effective and in the interests of their customers
6. processes that ensure that new water developments are ecologically sustainable, economically viable and culturally responsive.

The suggested objectives for water resource management build on those in the NWI. In particular, more detail is proposed for water planning to reflect the need for:

- *practices that better account for the diverse characteristics of water sources.* Effective system management requires governance, regulatory, operational and informational arrangements that are fit for purpose — across the diverse range of water systems, the level of effort should balance the expected costs and benefits of different management actions (chapter 5)
- *processes for water sharing and management during periods of water scarcity.* Shortcomings in water management arrangements exposed during the Millennium Drought and more recent droughts point to a need for communities to be better supported through water planning to deal with drought (chapter 6)
- *triggers and processes for reviewing the balance between water for the environment and consumptive use, such as in response to climate change* (chapter 6)
- *clear identification of the environmental, cultural and other public benefit outcomes to be met through planning processes.* The NWI has delivered more water to the environment and the benefits of rehabilitation are becoming evident. The focus of the next phase of reform should be to ensure that environmental water is managed efficiently

and effectively to deliver agreed (and, where possible, better) outcomes. For that aim to be achieved, desired outcomes must be clearly specified (chapter 8).

Further, the NWI objective:

- covering statutory provisions for the environment should be extended to recognise a need for integration with natural resource management and the potential to achieve cultural and social benefits (chapter 6)
- relating to trade should include reference to the constraints inherent in any water system and the need for fit-for-purpose market regulation (chapter 7)
- dealing with accounting should be augmented to cover compliance and system integrity (chapter 10).

Enabling ongoing influence for Aboriginal and Torres Strait Islander people in water planning and natural resource management should be an additional objective (chapter 9).

The NWI contains one objective relating to water service provision: ‘policy settings which facilitate water use efficiency and innovation in urban and rural areas’ (paragraph 23(viii)). Contemporary expectations of water service provision and the challenges facing providers (chapter 11) argue for a substantially expanded set of objectives. Suggested foci include: drinking water quality; integrated management of water supply, wastewater and stormwater services; and processes to ensure that investments in major infrastructure clearly contribute to community wellbeing.

Figure 3.1 summarises suggested new objectives for the NWI relative to current content.

3.5 Foundations set in overarching principles

The NWI recognised the importance of information (or knowledge) and community engagement to the successful design and implementation of reform (chapters 14 and 15). Successful reform is grounded in the best available evidence and the trade-offs that have to be made around how limited water resources are used, which means that effective engagement is crucial. Principles capturing best practice for these foundational elements should be included in a renewed agreement and applied across all areas of water resource management and water service provision.

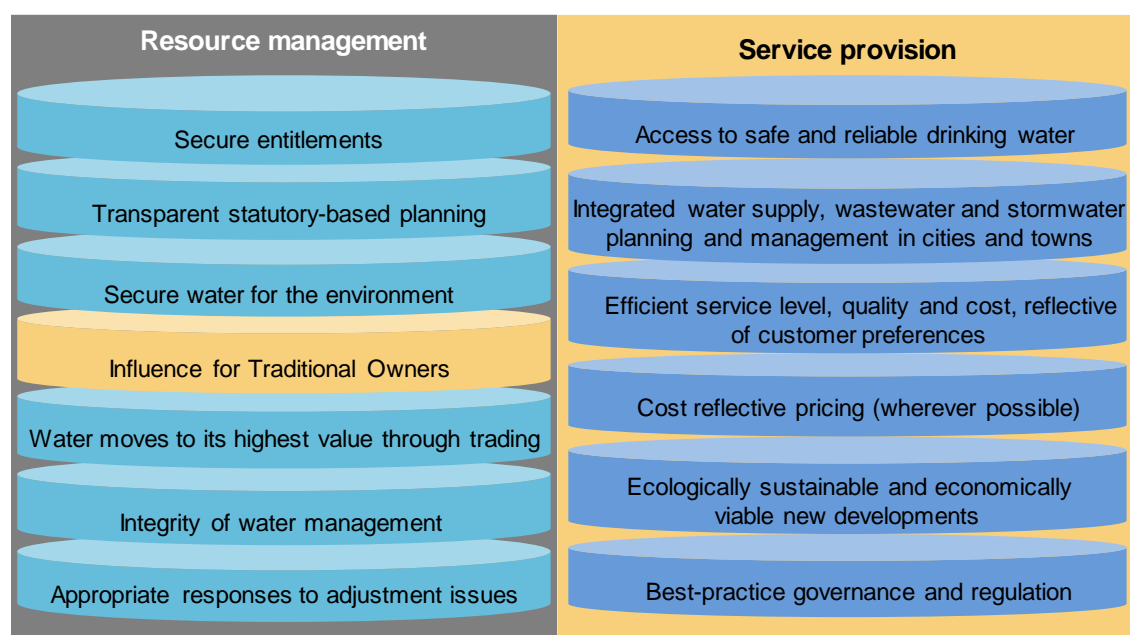
Experiences since the NWI was crafted suggest additional foundations, reflected in the themes mentioned above — a strong capacity to contend with drought and adapt to a changing resource availability baseline, and fit-for-purpose arrangements. These too merit a place in the principles that underpin the agreement.

DRAFT NWI RENEWAL ADVICE 3.4: OVERARCHING PRINCIPLES

In achieving the objectives outlined in previous advice, governments agree to the following principles and seek to apply them across all key areas of water resource management and water service provision:

1. Capacity to contend with droughts, floods and shocks, and to adapt to a changing climate, is strong.
2. Management effort and regulation are fit for purpose.
3. Decisions are based on the best available information.
4. Innovation and continuous improvement are encouraged and adaptive management is required.
5. Communities are engaged effectively in all aspects of water resource management and water service provision.
6. Communities have sufficient water literacy to engage effectively.

Figure 3.1 Summary view of suggested new NWI objectives^{a,b}



^a Yellow shading represents new objectives. ^b The Commission's advice includes additional detail for most of the current NWI water resource management objectives.

3.6 Key elements

The goal and objectives of the NWI were to be achieved through action across eight key elements. All remain relevant to the task of managing Australia's water resources to best effect and should be retained in a new agreement.

However, recent experiences highlight the need for a much stronger focus on compliance and enforcement (chapter 10). The water accounting element should be expanded with content that will ensure trust and confidence in water management, or system integrity. And it should be renamed to reflect this broader coverage. Similarly, as argued above, the NWI has an emphasis on water resource management with relatively little attention given to the equally important task of water service provision. A renewed agreement should include a comprehensive treatment of urban water services (chapter 11).

Two new elements are proposed: one to secure the interests of Aboriginal and Torres Strait Islander people in water resource management (chapter 9), and one to include principles for efficient investments in major water infrastructure. Arguments for the first addition are presented above. For investment, as noted in chapter 2, the challenges ahead mean that significant expenditure will likely be needed to safeguard the reliability and safety of supply. Experience suggests that the risks of rushed or ill-considered investments that impose unnecessary burdens on communities (and the environment) are very real (chapter 13), justifying a dedicated reform focus for this aspect of water service provision.

DRAFT NWI RENEWAL ADVICE 3.5: ELEMENTS OF A RENEWED AGREEMENT

The overall goal, objectives and principles will be delivered through the following elements:

Water resource management

1. Water access entitlements and planning frameworks
2. Water markets and trading
3. Environmental management
4. Aboriginal and Torres Strait Islander people's interests in water
5. System integrity

Water services provision

6. Pricing and institutional arrangements
7. Urban water services
8. New infrastructure development

Supporting arrangements

9. Community engagement and adjustment
10. Knowledge, capacity and capability building

The following chapters outline the Commission’s more detailed advice on the significant policy directions for these proposed key elements, identifying the major issues to be considered in each area, best practice, lessons learnt and the potential policies to be pursued in a renewed NWI.

3.7 Updated acknowledgement of other initiatives

Paragraph 7 of the NWI sets out key national initiatives that interact with the agreement. Developments since 2004 that merit inclusion in a renewed agreement include the *Water Act 2007* (Cth), the 2012 Murray–Darling Basin Plan and the 2020 National Agreement on Closing the Gap.

DRAFT NWI RENEWAL ADVICE 3.6: AN UPDATED STATEMENT OF INTERACTIONS

The current paragraph of the National Water Initiative covering interactions with other key initiatives needs to be brought up to date. Suggested wording follows:

Other initiatives with a significant water focus, subject to separate agreements by the Parties, include the *Water Act 2007* (Cth), the 2012 Murray–Darling Basin Plan, the Murray–Darling Basin Agreement and the 2020 National Agreement on Closing the Gap. These play an important and complementary role in improving the management of water in Australia. Continued linkages to the National Water Quality Management Strategy will also complement achievement of the objectives of this Agreement.

4 Building in good governance for a renewed NWI

Key points

- Australians need to be assured that water is being stewarded to best effect.
- Governance arrangements established for the National Water Initiative (NWI) in 2004, whilst key to progress in the early years of the agreement, have been significantly eroded over recent years.
- A strengthened architecture is needed as part of NWI renewal to ensure that leadership on national water policy is evident and effective, and that water sector participants and the broader community can have confidence in activity within this critical policy sphere.
- NWI renewal is an opportunity for governments to adopt a modernised agreement structure. In particular, use of prescriptive one-size-fits-all actions should be limited and parties should be afforded discretion to implement actions that suit conditions within their jurisdictions.
 - To that end, jurisdictions should develop rolling implementation plans that reflect local conditions and government priorities.
- Ownership of the renewed NWI should sit with a body of a status that conveys to water sector participants and the broader community that governments see water, and reforms to ensure it is used to best effect, as important. That role is best played by water ministers.
 - Water ministers should come together periodically to oversee development of a renewed NWI, and to receive, consider and act upon advice that comes out of any periodic review of the new agreement.
 - The National Water Reform Committee should provide on-going collective oversight of the agreement, initiating policy advice and guidance, if the need arises, and commission 10-yearly reviews of the agreement.
- Periodic and independent assessment has been a crucial contributor to the continuity, effectiveness and longevity of the NWI, and should be retained in a renewed agreement. Each jurisdiction's rolling implementation plan should form the assessment baseline.
 - Under the *Water Act 2007* (Cth), the Productivity Commission currently holds the function to assess and publicly report on the adequacy and progress of jurisdictional efforts to achieve the NWI, and the broader effectiveness of the agreement every three years.

Responsibility for water management rests with State and Territory Governments. Renewing the National Water Initiative (NWI) would signal that all governments are committed to working together towards the best possible water future for Australia. To that end, a renewed agreement should exemplify collective leadership on national water policy. It should also engender the trust and engagement of water sector participants and the broader community;

develop a framework that encourages and enables best practice in all jurisdictions; and harness the benefits of interjurisdictional cooperation.

Governance of the agreement needs to reflect this ambition and ensure that it delivers.

4.1 The NWI's governance architecture has been significantly eroded

At inception in 2004, the NWI was overseen by a Ministerial Council and supporting committees of senior officials. Parties to the agreement committed to developing implementation plans and to establishing the National Water Commission (NWC) to accredit those plans, assess and publicly report on progress, provide advice to COAG on actions to better realise the objectives of the agreement and assist in implementing the NWI. The NWC was also tasked with a comprehensive review of the agreement in 2010 (NWC 2011), and, over its life, coordinated a large investment in knowledge creation to support reform efforts.

These governance arrangements were key to progress in the early years of the agreement, but much of this architecture has been eroded over recent years. In 2013 the Australian Government disbanded the responsible Ministerial Council and subsequently abolished the NWC in 2014. Initial jurisdictional implementation plans lapsed many years ago and were never renewed.

Today, a senior water officials' committee — the National Water Reform Committee (NWRC) provides some oversight of the NWI amongst other matters. The Committee may provide policy advice and guidance back to Australian governments on NWI matters, as the need arises. The function of assessing progress against the objectives and intended outcomes of the NWI on a three-yearly cycle is held by the Productivity Commission under the *Water Act 2007* (Cth)¹. The Commission is also required to 'make recommendations on actions that parties to the National Water Initiative might take to better achieve the objectives and outcomes' of the agreement.²

These arrangements are inconsistent with the importance of national water policy to Australia — which will only increase over future years. A strengthened governance architecture is needed as part of NWI renewal to ensure that national water policy leadership is evident and effective, and that water sector participants and the broader community can have confidence in government action within this critical policy sphere.

¹ *Water Act 2007* (Cth), s. 88(2).

² *Water Act 2007* (Cth), s. 88(3)(b).

DRAFT FINDING 4.1

Governance arrangements established for the National Water Initiative have been significantly eroded over recent years. A strengthened governance architecture that reflects the presence of national water policy leadership and ensures confidence in reform effort, needs to be included in a renewed agreement.

4.2 Characteristics of leading practice governance

In 2015, in recognition of the global pressures on water and related sectors, the Organisation of Economic Co-operation and Development (OECD) developed principles on water governance (OECD 2015, p. 3). As it noted:

Coping with current and future challenges requires robust public policies, targeting measurable objectives in pre-determined time-schedules at the appropriate scale, relying on a clear assignment of duties across responsible authorities and subject to regular monitoring and evaluation.

While designed to cover all facets of water resource management and water service provision, and not specific to an intergovernmental agreement, these principles provide guidance on leading-practice water governance. The Commission has drawn on them in proposing characteristics for NWI governance consistent with an agreement that demonstrates national water policy leadership, engenders trust and engagement, provides a framework to encourage best practice and manages interjurisdictional cooperation (box 4.1).

Box 4.1 Dimensions of leading practice water governance

Drawing on the *OECD Principles on Water Governance* (OECD 2015) the Commission has identified the following as desirable characteristics for governance of a renewed National Water Initiative:

- oversight and policy leadership commensurate with the complexity of the water policy challenges inherent in climate change, population growth and more frequent extreme events
- clear assignment of roles and responsibilities for implementation and progress
- arrangements for interjurisdictional coordination and cooperation
- mechanisms to monitor and evaluate the policy context and enable adaptation of the agreement as conditions change
- frameworks and mechanisms that hold parties to the agreement accountable including:
 - periodic independent assessment of implementation
 - implementation actions and outcomes to be described in rolling work plans
 - transparent performance reporting
- promotion of informed and outcome-oriented stakeholder engagement.

Governance functions for a renewed NWI

The characteristics outlined in box 4.1 point to the essential governance functions needed for a renewed agreement:

- policy leadership and collective government ownership
- ongoing collective oversight of the agreement and its implementation
- rolling jurisdictional implementation plans that reflect local conditions and government priorities
- periodic and independent assessment of implementation progress using each jurisdiction's rolling implementation plan as the assessment baseline
- periodic independent policy review of the agreement
- capacity to coordinate and jointly work on issues of collective interest.

These functions reflect those originally established for the NWI and align with broader practice (reflected in the 2011 Intergovernmental Agreement on Federal Financial Relations) and other national agreements.

4.3 A modernised agreement structure

The format and content of the NWI reflect the approach taken by Australian governments to the preparation of intergovernmental agreements at the time it was drafted (across 2003 and 2004). The result is an agreement that captures the objectives and intended outcomes of the parties, and very clearly assigns the roles and responsibilities of the parties to the agreement or entities associated with its implementation.

However, the NWI now differs from the contemporary approach to intergovernmental agreements (set out in COAG (2011)) in its very prescriptive detailing of actions to be implemented by the NWI parties. Two oft heard criticisms arise from this. First, that there is insufficient discretion to allow fit-for-purpose tailoring of actions to deal with water management particularities in the differing jurisdictions. As observed by Western Australia in its submission:

Western Australia's experience of the National Water Initiative is that it does not adequately reflect or offer sufficient flexibility to account for the water resource management challenges and service delivery arrangements in the State ... The prescriptive measures in the National Water Initiative for achieving water management outcomes are most appropriate for large interconnected surface water systems such as the Murray-Darling Basin, and do not provide the tools required to meet the unique water management challenges in Western Australia. (Western Australian Government, sub. 62, p. 1)

Second, that once the vast majority of actions had been completed, the reform value of the NWI diminished considerably.

In renewing the NWI, there is an opportunity for governments to adopt a modernised governance structure for the agreement. In particular, a renewed NWI should:

- clearly link desired outcomes to objectives for the agreement
- limit the use of prescriptive one-size-fits-all ‘implementation actions’, and instead set out principles for best-practice approaches to achieving desired outcomes
- provide all parties to the agreement with sufficient discretion to implement actions that are fit for delivering agreed outcomes within their jurisdiction
- be drafted in a clear and transparent manner that builds community understanding of, and confidence in, its objectives and intended outcomes
- include a performance reporting framework focused on public accountability.

To this end, the Commission suggests that:

- each jurisdiction commits to preparing three-year rolling work programs specifying how they aim to achieve the outcomes set out in the renewed NWI
- the adequacy of, and progress against, these plans is independently assessed on a triennial basis (in line with the length of the current review cycle and a sufficient period for substantive progress to be made)
- that independent assessment is published.

Consistent with current arrangements, the organisation undertaking the assessment could also make recommendations on how to improve the agreement. And in line with good practice, a comprehensive review of the renewed agreement should be commissioned every 10 years.

4.4 Organisational ‘best-fit’ for governance functions

Policy leadership and collective ownership

No existing organisation exhibits the characteristics that should be held by the entity responsible for ownership of the agreement. While the NWRC is representative of governments, its members lack the authority to bind their governments as parties to an agreement. Long-standing practice in the conduct of Australian interjurisdictional affairs is that a Minister of the Crown can exercise such authority. Nor does the NWRC have the status that conveys to water sector participants and the broader community that governments see water, and reforms to ensure it is used to best effect, as important. That role is best played by water ministers.

A recent Australian Government review (PM&C 2020) has led to a streamlined intergovernmental structure. Within this, groups of Ministers can convene for specific tasks, with timeframes to be no longer than 12 months. The Productivity Commission recommends that water ministers come together at periodic intervals to oversee development of a renewed

NWI, and to receive, consider and act upon advice that comes out of any periodic review of the new agreement.

DRAFT RECOMMENDATION 4.1

Water ministers should come together periodically to oversee development of a renewed NWI, and to receive, consider and act upon advice that comes out of any periodic review of the new agreement.

Periodic and independent assessment of progress and effectiveness reviews

Independent assessment of jurisdictional implementation progress is critical. A feature of the governance architecture of both the 1994 COAG Water Reform Framework and the NWI, it plays a key role in holding governments to account for their performance (or lack thereof) against agreed commitments, including to their communities. Independent assessment has been a crucial contributor to the continuity, effectiveness and longevity of the NWI, and as such, should be retained in a renewed agreement.

The entity responsible for periodic assessment of the adequacy of jurisdictional plans, implementation progress and the review of the broader effectiveness of the agreement needs to be independent of government and the water sector, and to have both the capacity and capability to undertake public inquiries. The Productivity Commission currently holds the NWI assessment and review functions under the *Water Act 2007* (Cth).

Ongoing collective oversight of the agreement and its implementation

An entity needs to be assigned responsibility for the oversight of the agreement and its implementation. As the NWI is an interjurisdictional agreement, the entity given responsibility for this function should be authorised by, and representative of, the parties to the agreement. The flow-on benefit from such an arrangement is an enhanced capacity for the parties to coordinate and jointly work on issues of collective interest. The NWRC is the logical entity to perform this role on behalf of water ministers. Where issues requiring Ministerial leadership emerge, the NWRC is best placed to raise them. The NWRC is also best placed to initiate policy advice and guidance, and to commission a 10-year review of the agreement.

4.5 Incentivising reform

A key feature of the 1994 COAG Water Reform Framework were National Competition Policy payments from the Australian Government to State and Territory Governments for making satisfactory progress on the uptake and implementation of water reforms. Eligibility

for these payments was assessed annually by the National Competition Council, which made recommendations to the Australian Government. This approach was not continued in the 2004 NWI; though significant funding from the subsequent 2006 Australian Government Water Fund was directed to a range of state and territory projects which as part of their business case, sought to implement particular NWI outcomes (for example the establishment of a state water register).

A number of inquiry participants have suggested that some form of incentive mechanism should be attached to a renewed NWI agreement to encourage timely and consistent uptake of its agreed commitments. Given the likely scale and impacts of the water management challenges facing Australian governments, the Commission considers that there is an opportunity for the Australian Government to use its substantial water investments to encourage state and territory uptake and implementation of the reform commitments in a renewed NWI agreement. Indeed, such an approach would enable the Australian Government to gain greater benefit from these investments than would otherwise be the case. Such an approach could be applied in the first instance through appropriately conditioning the provision of Australian Government water-related infrastructure and program investments.

DRAFT NWI RENEWAL ADVICE 4.1: GOVERNANCE ARRANGEMENTS FOR A RENEWED NWI

A strengthened governance architecture that reflects the presence of national water policy leadership and ensures confidence in reform effort, needs to be included in a renewed agreement.

To that end, the Commission advises that:

- water ministers should convene periodically to oversee development of a renewed National Water Initiative, and to receive, consider and act upon advice that comes out of any periodic review of the new agreement
- the new agreement should clearly link desired outcomes to objectives and limit prescriptive actions, instead setting out principles for best practice, and fit-for-purpose approaches to achieving outcomes
- each jurisdiction should commit to preparing three-year rolling work programs setting out how they aim to achieve the outcomes set out in the renewed agreement
- there continue to be three-yearly assessment of the adequacy of these work programs, with public reporting on jurisdictional progress against them, and the effectiveness of the agreement, as per the functions the Productivity Commission currently performs under the *Water Act 2007* (Cth)
- a requirement for comprehensive policy review every 10 years should be written into the agreement
- the National Water Reform Committee should provide ongoing collective oversight of the agreement, initiating policy advice and guidance, if need arises, and commission the 10 yearly reviews of the agreement.

5 Water resource management — a fit-for-purpose framework

Key points

- Fit-for-purpose water resource management should be elevated in a renewed National Water Initiative (NWI).
- For water resource management in a system to be effective, governance, regulatory, operational and informational arrangements need to be fit for purpose — across the diverse range of water systems, the level of effort should balance the expected costs and benefits of different management actions.
 - Risks to the environment, water users and public confidence in water resource management should guide effort. Where risks are higher, more effort should be invested in management.
- For the purpose of framing the Commission’s NWI renewal advice, a fit-for-purpose framework is applied across the different areas of water resource management including interception, water planning, water trading, environmental water and ensuring system integrity.

Water systems are diverse. For example, surface water systems include: heavily regulated and highly developed rivers used for irrigated agriculture; unregulated rivers; large storages and interconnected infrastructure that supply urban areas; and heritage-listed unregulated rivers with high conservation value. Rivers can have highly variable flow, with extreme droughts and floods a regular occurrence in some parts of the country. And groundwater resources range from localised aquifers to the Great Artesian Basin.

Efficient water resource management accounts for this diversity, with the scope and scale of management effort varying with a water system’s characteristics.

Existing guidelines and frameworks support fit-for-purpose approaches for some elements of water resource management. For example, under the National Water Initiative (NWI), jurisdictions determine whether a water plan is prepared, the level of detail and resources committed ‘based on an assessment of the level of development of water systems, projected future consumptive demand and the risks of not having a detailed plan’.¹ The *NWI Policy*

¹ NWI paragraph 38.

Guidelines for Water Planning and Management provide more detail, setting out three broad classes of water systems for planning and management.

- Conservation water systems have little or no water resources development, retain a high degree of naturalness and are designed for protection.
- Low-development water systems have low levels of demand for water supply and low risks to ecosystems.
- High-development water systems are those where current or projected future demand for water is high, or the system is close to or overallocated (COAG 2010).

Similarly, the *National Framework for Compliance and Enforcement Systems for Water Resource Management* sets out risk-based categories for compliance and enforcement. It describes a risk-based compliance strategy as ‘one that identifies “at risk” water resources and targets breaches of water resources legislation most likely to further stress the resource or which undermine the public’s confidence in effective water resource management’ (COAG 2012, p. 5).

The benefits of adopting a fit-for-purpose approach for ensuring the integrity of water resource management have been observed by participants to the inquiry.

It is recognised that the standard for compliance, metering and monitoring is higher in a system like the Murray–Darling Basin than it would be in some smaller irrigation areas, such as some coastal rivers, where the irrigation take is generally supplementary and relatively small scale. (NIC, sub. 13, p. 13)

The importance of integrating local knowledge into the decision-making process has also been acknowledged.

Australia is a continent with many different climate zones and many different irrigation water use profiles ... In the case of water measurement and monitoring, because one size does not fit all, governments must have appropriate governance frameworks in place to ensure scheme-specific local knowledge is integrated into decision making processes. (Canegrowers, sub. 72, p. 2)

However, the existing guidelines only target specific areas of water resource management, and it is not always clear how they have been applied.

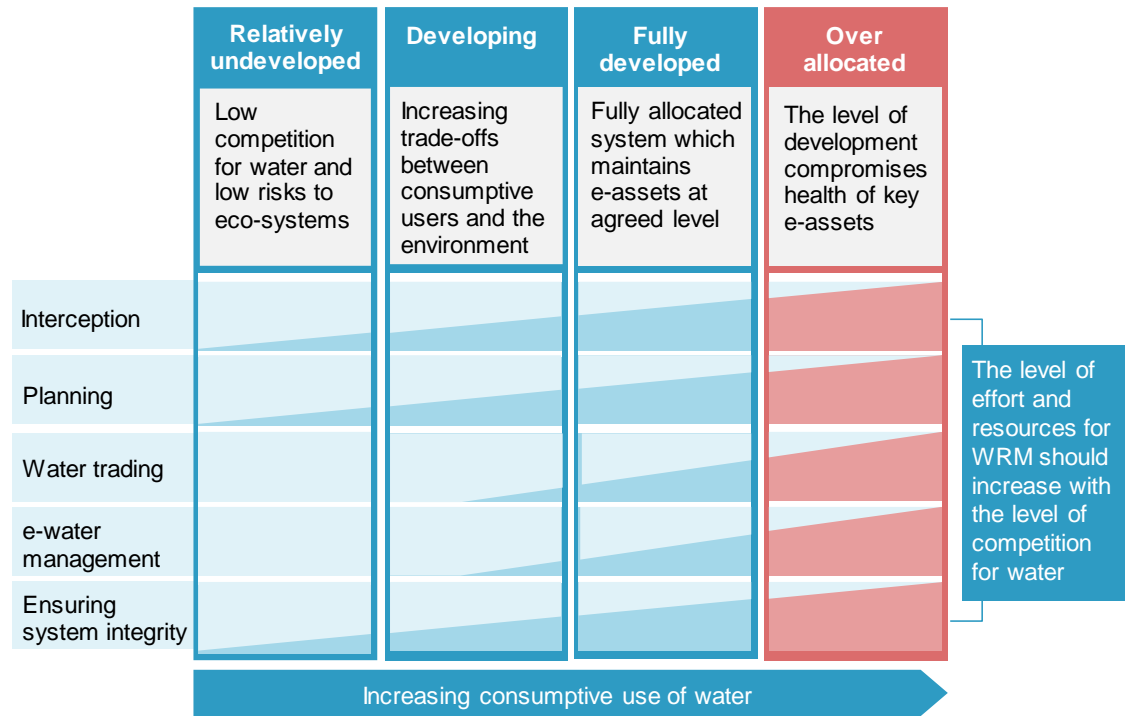
There is scope to elevate the concept of fit-for-purpose water resource management in a renewed NWI (with guidelines updated to reflect the agreed approach).

Water resource management can only function efficiently when there are effective governance, regulatory, operational and informational arrangements. And the implementation of these arrangements should be fit for purpose — across the diverse range of water systems, the level of effort should balance the expected costs and benefits of different actions.

A conceptual framework capturing changing levels of effort as system characteristics differ is set out below (figure 5.1). It is intended to apply broadly across all areas of water resource

management and can be used to guide thinking about when an action is justified and how much effort should be put into it. For example, when is a water plan needed and what level of detail is required? When should interception be included in the entitlement framework? What level of management is required for the system? What market arrangements are required to facilitate efficient trade of water? What compliance and enforcement actions should be undertaken?

Figure 5.1 **A conceptual framework for fit-for-purpose water resource management^a**



^a e-assets refers to environmental assets, e-water refers to environmental water, and WRM refers to water resource management.

The framework identifies four indicative water system classifications.

- Relatively undeveloped systems have low demand for water resources and low risks to ecosystems.
- Developing systems show increasing demand on their water resources and may include sites with proposed development potential. There is a trend of increasing trade-offs in these systems between consumptive users and the environment. In these systems, the rules should be clear and enabling.
- Fully developed systems are characterised by water resources being fully allocated between consumptive users and the environment, with effective sharing arrangements, market rules and system operating rules. Key environmental assets are maintained at the

agreed level (although climate change predictions may indicate a future risk to key environmental assets).

- Overallocated systems have high levels of demand for water, and the level of water allocations and associated development compromise key environmental assets. Under the NWI, water plans must define pathways for returning overallocated systems back to a sustainable level of water extraction that will protect agreed environmental assets (as determined in the water plan).

The level of management effort should increase as the level of development and consequent competition for the resource increases. It should take into account the risks to the environment, water users and the public's confidence in water resource management. The actions taken should aim to balance their expected costs and benefits. For each water system, analysis should be done to evaluate its unique characteristics and risk context, and the subsequent management regime should be tailored based on this assessment.

For the purpose of framing the Commission's NWI renewal advice, this fit-for-purpose framework is applied across the different areas of water resource management:

- Including interception in the entitlement framework — the cumulative impacts on water availability due to interception activities can be significant, and if unaccounted for and unlicensed, can undermine the integrity of the entitlements system. As water systems approach full allocation, interception activities should be increasingly monitored and regulated, and incorporated into entitlement frameworks (chapter 6).
- Water planning — in relatively undeveloped systems there is less pressure on the resource and a simplified approach may be adopted, with some basic precautionary measures in place. This could include setting a precautionary interim limit which, when reached, would trigger a more formal planning process. As the level of development increases, more effort and resources will be required for water planning. In overallocated systems, water plans must define pathways for returning to a sustainable level of water extraction that will protect agreed environmental assets (chapter 6).
- Water trading — in relatively undeveloped systems, sophisticated market arrangements are not required as new water needs can be met through new entitlements. In this case, demand for trading will be low. In contrast, the potential benefits from trade are more significant in fully developed and overallocated systems and more detailed trading rules and arrangements may be justified (chapter 7).
- Environmental water management — in relatively undeveloped systems, environmental water can be protected through precautionary interim consumptive limits. As consumptive water use and competition for the resource increase, there is a need to clearly specify agreed environmental outcomes through planning processes. In complex, fully developed and overallocated systems, planned environmental water can be supplemented with held environmental water, to achieve agreed (and where possible, better) environmental outcomes (chapter 8).
- Ensuring integrity of water resource management — as the level of development in a system increases, more effort and resources will be required for measuring and

monitoring, compliance and engagement with water users and the broader community. In addition, more information will need to be collected and provided by water system managers to sufficiently demonstrate that they are maximising benefits for water users and the environment (chapter 10).

Although there are differences in how the fit-for-purpose framework is applied across the above areas of water resource management, they share a key similarity — as consumptive use increases, the level of environmental risk will increase. Accordingly, the level of management effort will need to increase to ensure agreed outcomes can be achieved, provide assurance in the integrity of system management and enable community and investor trust in water resource management.

DRAFT NWI RENEWAL ADVICE 5.1: FIT-FOR-PURPOSE WATER RESOURCE MANAGEMENT

Embedding the concept of fit-for-purpose water resource management in a renewed National Water Initiative would support governments in thinking about the level of effort and resources to devote to the different facets of water resource management across different water systems and across time.

6 Water entitlements and planning

Key points

- Water access entitlements and planning arrangements are the basis for allocating water resources among consumptive water uses (such as irrigation, industry, urban, stock and domestic), and the environment. They aim to promote water supply security, investment confidence and sustainable and efficient water use.
 - Under the National Water Initiative (NWI) Agreement, States and Territories committed to establish water access entitlements and planning frameworks that adhere to specific principles on the basis this would optimise economic, social and environmental outcomes.
- The fundamental elements of the NWI framework are largely in place.
- Reforms to water access entitlements and planning should be maintained and enhanced. Key areas that warrant further attention in a renewed NWI include:
 - ensuring water entitlements frameworks consider all key water uses, including by mineral and petroleum industries and interception activities, and all water sources (including alternative water sources such as stormwater). A fit-for-purpose accounting and measurement regime, and risk-based decision making is required to better manage water use under entitlements frameworks, particularly for interception activities
 - ensuring that water planning adopts best-practice principles, including that it is fit for purpose, recognises the needs of Aboriginal and Torres Strait Islander people, clearly specifies environmental objectives and outcomes, is based on an assessment of the trade-offs between environmental, social and economic outcomes, involves appropriate engagement with stakeholders and communities, and is independently reviewed
 - establishing contemporary water plan processes that account for climate change. This should include provisions in water plans to deal with water scarcity arising from drought, including priorities for water sharing and actions relating to meeting critical human and environmental needs. In relatively undeveloped and developing areas, there is an opportunity to set consumptive and environmental shares in ways that manage the risk of future resource reductions. And, in highly developed systems, triggers could be identified that indicate the need to rebalance environmental and consumptive uses and reset the objectives from time to time.

This chapter summarises Supporting Paper A: Water entitlements and planning (SP A Entitlements and planning). Further detail and analysis can be found in that paper.

6.1 Room for improvement in entitlements regimes

Under the National Water Initiative (NWI), statutory water entitlements establish a property right to water — effectively as a share of the available resource. This is intended to deliver investment confidence and security of water access for the environment and consumptive users. All jurisdictions (except Western Australia and the Northern Territory) have established statutory-based entitlements that are fully consistent with the NWI (*Assessment*).

Secure property rights to water are a prerequisite to efficient water markets and trading. Entitlement holders such as irrigators can trade or borrow against them, giving them more choice and flexibility in managing their businesses and enabling them to plan longer-term investments with greater certainty (PC 2017b, p. 74). At a sector wide level, entitlements have enabled water trading that generates hundreds of millions of dollars in economic benefits each year (NWC 2010, p. v).

In renewing the NWI, the Commission advises that jurisdictions recommit to the key NWI outcomes related to water access entitlements, including ensuring that entitlements are statutory-based, that they provide a perpetual or an open-ended share of the consumptive pool, and that they are separate from land. Potential enhancements to the current agreement include the treatment of the minerals and petroleum industries, alternative water sources, interception, and, where fixed-term or other types of entitlements are used, ongoing processes that assess changing levels of risk (associated with the water resource).

Full incorporation of water use by mineral and petroleum industries

The NWI includes a special provision for mineral and petroleum industries. It states that ‘factors specific to resource development projects, such as isolation, relatively short project duration, water quality issues, and obligations to remediate and offset impacts, may require specific management arrangements’ that are outside the scope of the agreement.¹ This provision was intended to provide flexibility, given the nature of mineral and petroleum industries’ water extraction requirements, such as the use of saline or hypersaline water.

Most jurisdictions have incorporated mineral and petroleum industries into their entitlements and planning frameworks to some extent. In Queensland, however, alternative arrangements remain where resource tenure holders may be granted rights to take ‘associated water’², with the amount of water take permitted not determined by water plans and allocations. (Non-associated water take, for example for consumptive use, requires a licence and a specified water allocation under the *Water Act 2000* (Qld)).

Inquiry participants raised concerns about the special NWI provision for minerals and petroleum industries. For example, the National Farmers’ Federation (sub. 42, pp. 14–15)

¹ NWI paragraph 34.

² Groundwater taken or interfered with in the course of mining activity.

noted that the current approach leaves the NWI ‘exposed to criticisms that there are “two sets of rules” — one for farmers and the other for the resources industry’. The contrast between the two industries has become more apparent in light of increased resources development over the past few decades.

Bringing these industries within entitlements and planning arrangements would promote greater transparency and confidence in water rights, and incentivise trades to higher-value uses. And the potential to realise these benefits has increased from when the NWI was agreed to, as such industries have grown, leading to increased coexistence with other water users (NWC 2014, p. 2; PC 2017b, p. 81).

The Minerals Council of Australia (sub. 102, p. 10) raised several challenges to incorporating the minerals industry into existing arrangements, including that:

- geographical and geological constraints pose barriers
- many areas in which the industry operates are unsuitable for water markets and trading because there are few water users to trade with, or because the water resource is unsuitable for market development (for example, groundwater systems could be poorly connected)
- there may be overlap with other regulatory frameworks.

These issues should not prevent incorporation of minerals and petroleum industries within entitlements and planning arrangements. Exemptions for these industries should be removed, during NWI renewal, to ensure that entitlements for mineral and petroleum industries are assessed on their merits and issued under the same framework that applies to other consumptive users.

Incorporation of alternative water sources

Entitlements arrangements under the NWI focus on surface water and groundwater, and there is a lack of clarity about how alternative water sources (such as stormwater and wastewater) fit within the entitlements system — potentially impeding investment. For example, property rights for alternative sources are poorly defined.

- In the case of managed aquifer recharge — where stormwater or treated wastewater is injected into a groundwater aquifer for storage — the injected water may mix with existing groundwater, risking extraction by other groundwater users and reducing the attractiveness of investment in alternative sources.
- In the case of stormwater, capture by upstream local governments can affect availability downstream, reducing the incentive for downstream users to invest in stormwater harvesting.

There is also a lack of clarity about how alternative water sources — particularly stormwater — are managed within entitlements and planning frameworks. Frontier Economics (2008, p. 65) found that management roles and obligations were unclear, and the relevant legislation was complex. The Commission recently found that stormwater management in Australia

needs urgent review, and that the scope of this review should encompass an examination of the environmental objectives of stormwater management, the development of a framework for pricing, and an exposition about the role of regulation in stormwater management (PC 2020b, pp. 50–51).

Growing interest in and support for water recycling and integrated water cycle management (PC 2020b, p. 1) argues for addressing issues associated with alternative water sources in the course of NWI renewal.

Recommitment to a risk-based approach to managing interception

Interception refers to the capture of surface water or groundwater that would otherwise flow, directly or indirectly, into a waterway, lake, wetland, aquifer, dam or reservoir. Interception may occur because of farm dams and/or bores, overland flows (or floodplain harvesting), or plantation forestry. Interception (along with large-scale land use change that affects interception) can have a material effect on the amount of water available to entitlement holders and the environment. This can compromise the integrity of entitlements frameworks.

The NWI takes a risk-based approach to interception activities. An entitlement is required for activities that occur in water systems that are fully allocated, overallocated or approaching full allocation above an agreed threshold. In other systems, jurisdictions must: identify significant activities and estimate the amount of water likely to be intercepted; calculate a threshold below which an entitlement is not required; and monitor and report publicly on progress towards either full allocation or the identified threshold.

Jurisdictions have made progress in ensuring that interception is considered in water management and planning, but have not fully met the interception-related objectives of the NWI (*Assessment*). For example, Lifeblood Alliance (sub. 70, p. 3) noted that interception activities are not adequately incorporated into entitlements frameworks, even in water systems that are fully allocated or overallocated.

Among the improvements required is the need for more accurate estimates of, and information about, interception activities to support the implementation of entitlements arrangements (SP E *Integrity*). Interim measures may be needed while this work takes place (SP A *Entitlements and planning*).

Effective management of interception activities will become more important as Australia's climate changes, particularly for systems that are expected to have less water. While the risk-based approach outlined in the NWI is sound, more needs to be done to ensure that it can be effectively applied in practice. In renewing the NWI, jurisdictions should recommit to a risk-based approach to managing interception and its effects, and improve measurement and accounting of interception activities to support the implementation of entitlements arrangements for these activities.

Ongoing risk assessment for fixed-term or other types of entitlements

The NWI allows for ‘fixed term or other types of entitlements where demonstrably necessary’.³ Although all water use should ideally be managed under a single entitlements framework, use of other types of entitlements may be necessary where, for example, a water resource is poorly understood and/or less developed, such as in some areas in the Northern Territory. Where other types of entitlements are used, the NWI states that an ongoing process is required to assess associated risks.

Less comprehensive provisions in entitlement regimes are sound if ongoing processes are established to assess changing risks associated with the water resource. Where changes in a water system have been observed, appropriate responses should be considered and implemented, including moving towards fully NWI consistent entitlements, if necessary. To support this, a fit-for-purpose water accounting and measurement regime is required (SP E *Integrity*).

DRAFT NWI RENEWAL ADVICE 6.1: MANAGING WATER USE UNDER THE ENTITLEMENTS FRAMEWORK

In renegotiating the National Water Initiative, jurisdictions should recommit to the key outcomes and actions related to water access entitlements, which have been fundamental to the integrity of water management and a necessary prerequisite for water trading and markets. This includes ensuring that entitlements are statutory-based, that they provide a perpetual or an open-ended share of the consumptive pool, and that they are separate from land.

To improve on the entitlements framework, jurisdictions should:

- remove exemptions for mineral and petroleum industries from water access entitlements and planning arrangements, so that these industries are subject to the same water access entitlements frameworks that apply to other consumptive users
- establish a process to determine whether alternative water sources (including stormwater and recycled water) can be incorporated into water access entitlement frameworks, and the extent to which current management arrangements for alternative water sources create barriers to investment
- adopt a risk-based approach to managing significant interception activities under water access entitlement frameworks (including fit-for-purpose measurement and accounting of interception activities, and monitoring of the ongoing efficacy of the use of interim measures) and fixed term or other types of entitlements.

³ NWI paragraph 33.

6.2 Improvement in water planning

Parties to the NWI agreed to prepare statutory water plans for surface water and groundwater management systems which govern the management of entitlements. The water planning process establishes the shares of water available for consumptive uses (such as irrigation, industry, urban, stock and domestic) and the environment, along with the rules for system management and trading. Water plans have been established for the majority of areas of intensive water use, although coverage varies by jurisdiction (*Assessment*).

Embedding best-practice planning in a renewed NWI

Water planning reforms have provided significant benefits (chapter 2). To ensure these continue, State and Territory Governments should recommit to existing planning frameworks through a renewed NWI. However, there has been considerable experience in water planning since the NWI was agreed in 2004 — not least in the Murray–Darling Basin and as a consequence of severe droughts. As a result, there is now a body of contemporary best practice that should be drawn on in a renewed NWI (and reflected in updated guidelines) to enable fit-for-purpose water planning in the future. Best practice can be captured in five key principles:

- water planning is fit for purpose
- the needs of Aboriginal and Torres Strait Islander people are better recognised
- environmental objectives and outcomes are clearly specified
- trade-offs are made in line with community values
- planning processes include independent review.

Each of these are discussed briefly below. Reflecting overlap between planning and other aspects of water resource management, detailed discussion of some of these principles is also contained in other chapters.

Water planning is fit for purpose

NWI planning frameworks require that jurisdictions:

... determine whether a plan is prepared, what area it should cover, the level of detail required, its duration or frequency of review, and the amount of resources devoted to its preparation based on an assessment of the level of development of water systems, projected future consumptive demand and the risks of not having a detailed plan.⁴

In relatively undeveloped systems, only a simple approach may be required (albeit with precautionary interim limits which, when reached, would trigger more formal planning

⁴ NWI paragraph 38.

processes), whereas in fully developed and overallocated systems, more sophisticated arrangements may be required to balance competing needs, including those of the environment. The NWI also requires that plans for overallocated systems define pathways for returning to sustainable levels of water extraction that will protect agreed environmental assets. These fit-for-purpose approaches should be retained and made more explicit.

The needs of Aboriginal and Torres Strait Islander people are better recognised

Under the NWI, jurisdictions agreed that water access entitlements and planning frameworks would recognise the cultural needs of Aboriginal and Torres Strait Islander people in relation to water access and management through engagement. However, progress has been slow, and more can be done to achieve NWI outcomes (chapter 9). In terms of water planning, achieving NWI outcomes requires:

- good engagement with Traditional Owners (chapter 9)
- incorporating cultural values into water plans, and including clear, measurable and well-informed cultural objectives and outcomes. These should be specified in a way that can be monitored and reported against.

Further, many Aboriginal and Torres Strait Islander communities have articulated their aspirations for unconstrained water use (that is, for both cultural and economic purposes). As discussed in chapter 9, where governments determine that access to water is the best way to support Aboriginal and Torres Strait Islander economic development, that access should be facilitated as efficiently and transparently as possible within existing water entitlements frameworks. In relatively undeveloped and developing water systems, where the consumptive pool has not been fully allocated, governments should consider if allocations or reserves are appropriate as part of the water planning process.

Environmental objectives and outcomes are clearly specified

Under the water planning process, the goal is to protect the key environmental assets and functions agreed by stakeholders. To that end, environmental outcomes should be specific and well defined, with clear long-term performance indicators to enable monitoring of outcomes and objectives. Environmental objectives and outcomes should also be well-informed, transparent, logical and easily understood by stakeholders.

But, as noted in chapter 8, reaching agreement on objectives for environmental watering can be very difficult. Moreover, experience during recent dry conditions calls into question whether planning has adequately taken extreme scarcity into account. Chapter 8 details the Commission's advice for improving this aspect of planning.

Trade-offs are made in line with community values

Water planning inevitably requires trade-offs between environmental, social and economic outcomes, especially in fully developed or overallocated systems. Assessing and taking account of the relative values that a community places on these outcomes in decision making will maximise the overall benefits provided by a water resource. Several principles should frame the decision-making process including:

- effective community engagement (chapter 14)
- use of the best available scientific, social and economic data to inform decisions (chapter 15)
- transparency about all aspects of decision making (chapter 10).

Planning processes include independent review

Independent reviews of water plans improve transparency, hold governments to account and identify areas for improvement. Review processes may also provide opportunities to involve communities and to access more (and more diverse sources of) information, for example, through community submissions. Some inquiry participants highlighted the importance of independent reviews of water plans, for example, the Inland Rivers Network (sub. 86, p. 6).

Some jurisdictions undertake independent reviews of water plans. For example, in New South Wales, the Natural Resources Commission reviews plans to determine if environmental, social and economic outcomes have been achieved, and recommends improvements (NRC (NSW) 2020). In the Murray–Darling Basin, water resource plans are independently assessed by the Murray–Darling Basin Authority and accredited by the Commonwealth minister responsible for water (although the Productivity Commission (2018, p. 193) found that the accreditation process resulted in unnecessary costs).

The NWI could set out principles for independent reviews, promoting their need to: be robust and fit for purpose, focused on achieving net benefits and involve community participation.

Ensuring climate change is taken into account in water planning

Water planning processes will be challenged by climate change. The effects of likely reductions in catchment flows and more frequent, longer and severe droughts mean that, over time, the balance between environmental and consumptive uses agreed at the outset of a plan may no longer be appropriate, or that environmental, economic and cultural objectives may no longer be able to be achieved. Water planning will need to be able to account for and incorporate changes in the availability of water due to climate change.

A module to the NWI, *Considering Climate Change and Extreme Events in Water Planning and Management*, aims to provide information about regional climate projections and includes tools that can assist planners to understand risks and ways of incorporating climate

change into water planning. However, the Commission's 2017 assessment found that the module does not go far enough in ensuring water planning adequately accounts for climate change. Similarly, participants to the Commission's 2018 inquiry into the implementation of the Murray–Darling Basin Plan, as well as those to the current study, have raised concerns about how climate change is accounted for in water planning (IAH, sub. 15; MDBA, sub. 23; IWF, sub. 30; EDO, sub. 54; Inland Rivers Network, sub. 86).

A number of enhancements to the NWI would enable entitlement holders and the environment to better contend with drought within the term of a water plan, and, over the longer term, support adaptation of a water plan to a changing climate. The following discussion focusses on three key additions to existing water plan processes to deal with climate change. These are:

- clear and robust provisions to contend with drought
- setting consumptive shares in relatively undeveloped and developing areas
- water plan reviews and changing the balance between consumptive use and environmental use in response to climate change in highly developed systems.

Including provisions to contend with drought

The Millennium Drought and recent drought in New South Wales and Queensland revealed a number of shortcomings in the current water management arrangements in information, planning and compliance that exacerbated the impact of these droughts on environmental assets and other water users. The clear lesson is that future water plans must include very well-defined provisions to support communities in contending with drought, ensuring they have been negotiated and clearly understood by both entitlement holders and communities.

Plans should include provisions to deal with periods of water scarcity, priorities for water sharing and actions relating to meeting critical human and environmental needs. Provisions could also include rules in some rivers for limiting water extraction during critically low flows to protect ecologically important refuges, protecting the resumption of flows and managing connectivity across the landscape.

Water plans should also include clear roles and responsibilities for extreme scenarios where water sharing arrangements have not been detailed in the water plan, including clear processes and triggers for when ministerial intervention may be warranted. In addition, there needs to be a clear hierarchy of water uses, prioritising critical human needs, then critical environmental needs.

Consideration must also be given to water quality, in addition to quantity. In times of drought, the lack of available water can affect the water quality — for example, by creating the conditions for algal blooms or high salinity levels and low dissolved oxygen. This will affect all users of the systems, not only the environment. Changes in the quality of water due to drought can also affect stock and domestic supply and town water supplies that are the main or emergency water source for communities.

Risks to water quality need to be considered during the planning process, and any necessary linkages made with plans, actions and regulatory requirements undertaken through natural resource management and environmental protection frameworks (chapter 8). In particular, water planners should include water quality provisions in drought scenarios.

Addressing climate change in relatively undeveloped and developing areas

Effective water planning processes in relatively undeveloped and developing areas need to consider climate change, and the likely reduction in future surface water and groundwater availability. This will increase transparency of planning decisions, reduce the risks of future overallocation, help to maintain the reliability of entitlements and allow water users to better manage their risks.

There is an opportunity in these systems to set the consumptive and environmental shares in ways that manage the risk of future resource reductions. This can be done by using the best available suite of regional climate change projections (over a period of at least 20 to 30 years) to set consumptive and environmental shares in a way that balances risks to the reliability of consumptive entitlements and the ability to maintain environmental objectives, over that period and to provide for carryover where possible.

If this approach is implemented, it is possible that in the short term, there may be water that is neither part of the formal consumptive pool nor the formal environmental share required to achieve agreed outcomes. This water would be expected to diminish over time, but, while available, could be either reserved (which benefits the environment), or, subject to user demand, be made available for short-term consumptive use. In areas where there is a high degree of uncertainty as to climate change impacts or the extent of surface water and groundwater systems, a risk-based approach would take a conservative approach to providing access to unallocated water resources.

Reviewing water plans and rebalancing uses in highly developed systems

In highly developed systems, all water is currently allocated either to consumptive users or the environment and, in the event of significant reductions in the available resource, decisions will have to be made to determine if, when and how the balance between environmental and consumptive uses should be reviewed and new objectives set.

Water plans are subject to review processes, often every 10 years, with the national policy guidelines suggesting that this would include reviewing the balance between environmental and consumptive uses. However, reviews of the relative shares every 10 years could create unnecessary costs and controversy where no changes are needed. The focus of regular reviews of water plans should be on ensuring that water use and system operation are optimised to best meet the agreed environmental and consumptive objectives within the agreed allocation. The scope of reviews should be clear — in particular, that they are not

addressing the balance between environmental and consumptive uses each time. Rather, the focus is on improved operations within the current balance.

There then needs to be a mechanism to reassess the balance between environmental and consumptive uses when it is clear that this is required — for example, if climate change means that the previously agreed balance no longer meets the objectives for either the environment or consumptive users. Failure to do this would risk the balance becoming out of step with what is in the best interests of the community overall.

Any rebalancing due to climate change should occur only when there is sufficient evidence to support the change — that is, the benefits of rebalancing are expected to outweigh the costs. The Commission suggests that the need for change could be indicated by either a hydrological or ecological trigger.

- A hydrological trigger would require independent expert review and assessment of hydrological conditions (streamflows and groundwater levels) on a regular basis, to identify when predefined triggers for reconsidering the balance have been reached. Victoria has a process of this type through 15 year long-term water resource assessments. However, this approach may not reflect the actual ecological outcomes emerging as water availability changes.
- An ecological trigger would require ongoing monitoring of long-term environmental outcomes with regular public reporting. Where agreed long-term ecological outcomes are clearly not being achieved, a review would be triggered to identify why. If the investigation indicated that the outcomes observed were a direct result of insufficient water, the water planning process would need to reconsider the balance between environmental and consumptive uses. One key benefit of this approach is that it considers outcomes directly.

When the trigger is reached, it would set in train a process that includes:

- reviewing the plan's objectives and outcomes and reaching agreement to either retain or change them based on community engagement and a clear cost-benefit analysis
- identifying alternative hydrological options that meet the new objectives and agreed outcomes, and selecting the option that achieves this most cost-effectively
- agreeing a mechanism to transition to the new balance.

In addition, participants to this inquiry proposed another option — continuous adjustment (Wentworth Group of Concerned Scientists, sub. 68). Continuous adjustment could be implemented by reducing the consumptive pool according to a formula — either in terms of reliability or number of shares — in line with reduced water availability. While this may provide certainty, and allow gradual changes rather than large step changes, it essentially places an infinite value on marginal environmental outcomes, and similar to a hydrological trigger, may not reflect the actual ecological outcomes emerging as water availability changes. It would be possible to adjust the formula to share the reduced water availability between the consumptive pool and the environment, however this requires judgements on

the costs of marginal changes in both pools, across a large continuum of potential water availability scenarios, and without the benefit of knowing what other factors may impact those costs at that time.

A more detailed discussion of rebalancing environmental and consumptive shares in the context of structural change in water availability, and potential triggers for rebalancing, is provided in SP A *Entitlements and planning*.

INFORMATION REQUEST 6.1

The Commission seeks feedback on suitable triggers for rebalancing environmental and consumptive shares in the context of climate change.

What are the advantages and disadvantages of the different approaches?

How could continuous adjustment be implemented in practice?

Are there any other potential triggers that could be used?

Finally, there needs to be clarity about who bears the risks of any future declines in water availability for consumptive use due to revisions to the balance set in water plans. A renewed NWI should have clear provisions for assigning these risks, with water access entitlement holders continuing to bear the risks to the consumptive pool arising from climate change and periodic natural events (as reflected in paragraph 48 of the NWI). There is also a need to clarify how the risk provisions would interact with the adopted rebalancing approach, and to provide additional guidance on transitioning to the new balance when rebalancing is required.

DRAFT NWI RENEWAL ADVICE 6.2: WATER PLANNING

In renegotiating the National Water Initiative (NWI), State and Territory Governments should ensure that water planning provisions are maintained and enhanced.

Priorities to improve water planning are to:

- better specify measurable and well-informed cultural and environmental outcomes and improve engagement with Traditional Owners
- include principles to frame the process for assessing and reflecting the relative values placed by communities on environmental, social and economic outcomes to inform the trade-offs that have to be made in water planning. This process should be transparent, evidence-based and involve effective engagement with stakeholders
- include principles for independent review of water plans. While the review processes would be determined by jurisdictions, the NWI could set out principles for reviews to promote their need to be robust and fit for purpose, focused on achieving net benefits and to involve community participation.

Processes to better account for climate change are also required, including that:

- water plans include priorities, actions and rules that cover drought conditions, as well as mechanisms for dealing with more extreme scenarios, including clear triggers, roles and responsibilities for actions and a hierarchy of uses
- water quality issues are better incorporated into water planning, particularly in drought scenarios
- water planning processes in relatively undeveloped and developing water systems take climate change into account in ways that manage the risk of less water
- as water plans reach the end of their planning cycle, review processes promote improved water use and system operation to lessen risks in meeting the agreed environmental and consumptive objectives
- a process for rebalancing between environmental and consumptive uses as a result of climate change is developed. Rebalancing due to climate change should occur when there is sufficient evidence that the expected benefits will outweigh the likely costs. Where this occurs, governments should ensure that a water plan review reassesses the objectives of the plan (including environmental and consumptive objectives), leads to selection of the most cost-effective option for meeting them and agrees a pathway to transition to the new balance
- there are clear provisions for allocating risk, with water access entitlement holders continuing to bear the risks to the consumptive pool arising from climate change and periodic natural events (as reflected in paragraph 48 of the NWI).

7 Water trading and markets

Key points

- Reforms have facilitated the development of efficient water markets, which in turn have allowed a significant growth in trade over the past 30 years.
- A large majority of trade occurs in the southern Murray–Darling Basin (MDB) where hydrological connections and a large number of users create the key pre-conditions. Outside of the MDB, trade has increased gradually in some water systems where characteristics permit.
 - Queensland surface water markets and South Australian groundwater markets have seen particularly strong growth in entitlement trade volumes.
 - Development of Northern Australia could see the future development of trading in that region.
- Although relevant National Water Initiative (NWI) commitments have been achieved or largely achieved there is scope for further gains from incremental reform.
- Recommitting to the original NWI water trading and markets principles would support the objective that arrangements facilitate the efficient development and operation of markets, where system and water supply considerations permit. These principles will become increasingly important in enabling irrigators, in particular, to manage through drought and adapt to a changing climate.
- The addition of principles to support best-practice governance, regulatory, operational and informational arrangements would provide stronger foundations for developing markets elsewhere in Australia — and build on the lessons from 30 years of trading in the MDB.
- There is a gap at a system level in the proactive monitoring of water trading (particularly long-term market dynamics), and its interaction with resource availability and system constraints. No entity is responsible for overseeing trade operations within the broader, long-term water resource management and system operation context.
 - Where appropriate, jurisdictions could consider establishing such a function, distinct from the existing oversight, regulatory and compliance functions performed by various entities, to oversee trade operations within the broader, long-term water resource management and system operation context.
- A renewed NWI should also continue to provide principles on water registers to support jurisdictions' decision making about the provision of basic entitlements and trade data.

This chapter summarises Supporting Paper B: Water trading and markets (SP B Trading). Further detail and analysis can be found in that paper.

Reforms over the past 30 years including the creation of water rights separate from land, and caps on consumptive use, have supported the growth of water markets. Entitlement holders

can now trade their rights for a season (allocation trade) or permanently transfer them (entitlement trade). A growing range of diversified tradeable products enable the transfer of water access and use rights across space and time.

Trading volumes have grown markedly from small beginnings 30 years ago, primarily in the southern MDB where the key pre-conditions — extensive hydrological connections and a large number of users with heterogeneous water demands — are met. Outside the MDB, trade has been gradually increasing where the characteristics of water systems permit and is likely to grow in the future. Some trade occurs in all States, and Queensland surface water markets and South Australian groundwater markets have seen particularly strong growth in recent years. Creation of secure water rights as northern Australia develops could see the rise of new markets (IA 2016, p. 114).

7.1 Trading has delivered significant net benefits

Overall, the development and operation of trading have been a success, delivering significant net benefits. In 2018-19, Australia's water markets are estimated to have generated \$5.2 billion in turnover (BOM 2020a, p. 7). And for many farming businesses, water is not only an input to production but also a significant asset — for example, comprising between 25 and 40 per cent of capital assets of irrigated farms in the southern MDB (ACCC 2020, p. 9). Trading enables scarce water resources to move to their highest value use and aids in risk management. Markets provide short-term access to water, enhancing water users' capacity to manage through drought and weather shocks. And prices transmit information supporting adjustment of business models and practices to changing circumstances.

While benefits have accrued mainly to consumptive users, markets have also provided an efficient mechanism to rebalance water shares between the consumptive pool and the environment. In the MDB, governments have been able to recover water from private water users at market rates.

Looking ahead, climate change is likely to cause a long-term decline in water availability in many regions, as well as more frequent and intense periods of water scarcity. This will prompt adaptation within and between water user groups. Water trading will be an important and cost-effective part of a suite of adaptation strategies (Loch et al. 2013).

Increased trade volumes in the MDB have also had some downsides including: increasing risk of delivery shortfalls, unintended unseasonal flows and erosion caused by poorly coordinated movements of regulated surface water (Murray Irrigation, sub. 69, p. 8; SRI, sub. 77, p. 9; MVPD, sub. 101, p. 2).

Trade has also had complex flow-on impacts on other irrigators and adjacent industries (Whittle et al. 2020, p. 6). For example, where irrigators sell entitlements out of shared water distribution systems, delivery costs for other irrigators in the system increase. And businesses in smaller, irrigation-dependent communities, can experience flow-on demand impacts where

declining regional water use results in falls in agricultural output, regional processing and jobs. While a number of inquiry participants reaffirmed support for water markets (for example, CICL, sub. 7, p. 6; AgForce, sub. 24, p. 5), there is also evidence of declining confidence in water markets among some groups and communities (Wheeler et al. 2020, p. 150).

7.2 More detailed principles for stronger markets

The original National Water Initiative (NWI) objective for water markets and trading — an open trading market — remains relevant. However, the specific actions have largely been achieved and are therefore no longer driving reform. Moreover, many of those actions were focused on liberalising trade in the MDB. Since the NWI came into effect, a range of legislative instruments and agreements, including the *Water Act 2007* (Cth) and the Basin Plan, have been developed specifically to govern MDB water markets. A renewed NWI will drive further reform, although it will not be the policy lead in the MDB (that said, reform of the MDB water market arrangements will need to be consistent with NWI principles).

Water markets outside of the MDB are not as sophisticated, but lessons from the MDB experience provide valuable pointers for NWI renewal.

The NWI provides solid foundations for markets and trading. The intent of the relevant principles should be retained — arrangements should facilitate the efficient operation of markets, where system and water supply considerations permit. They should also: minimise transaction costs through good information flows; enable the development of an appropriate mix of products; recognise and protect the needs of the environment; and provide appropriate protection for third-party interests.

But a more detailed set of principles building on this foundation would better underpin the development of markets and trading in other parts of the country — and help to avoid the problems that have emerged in the MDB (*SP B Trading*). The principles outlined below reflect the fact that water trading and markets are a tool to increase efficiency — not an end in themselves. And they are applicable to diverse systems. That said, their application will vary with context and the level of development of a system.

Costs of the complex regime seen in the MDB (from well-resourced regulators, water registry services, trading rule enforcement, compliance activities, water market intermediaries and exchanges) are justified due to:

- the large volumes of trade
- the number of entitlement holders, the possibility of interstate trade (and associated regulatory differences)
- the value of entitlements, the water delivery distances (and managing associated losses)
- the level of investment and the significance of environmental assets.

Simpler arrangements that cost-effectively support efficient outcomes will be a better fit for less complex markets.

DRAFT NWI RENEWAL ADVICE 7.1: THE ROLE AND APPLICATION OF WATER TRADING AND MARKETS

A renewed National Water Initiative should emphasise that the purpose of water trading and markets is as a tool within a water resource management framework to increase efficiency.

There is no guaranteed supply of water by location, time, quality, and for given users, and given the trade-offs in the values people place on availability, markets can play an important role in allocating water efficiently.

The diversity of water system hydrology — regulated and unregulated surface water, groundwater and conjunctive (surface and groundwater) systems — coupled with other economic and institutional pre-conditions mean that the establishment of market arrangements need to suit their context. They need to be fit for purpose.

7.3 Creating the foundations for leading practice

After almost 30 years of operation, the MDB provides nationally-relevant lessons in the management and future development of water markets. Informed by the Australian Competition and Consumer Commission (ACCC) Murray–Darling Basin Water Markets inquiry, leading practice governance, regulatory and operational arrangements that are supported by sufficient and credible information, are key to ensuring that water markets operate efficiently.

Governance — who sets the rules and how

Market governance identifies the decision makers who shape the rules and processes for the trade of water products and associated services; and describes the processes by which decisions are taken and accountability mechanisms for those decisions (OECD 2015). Leading practice has a number of characteristics.

Roles and responsibilities of key parties are clearly defined. Core roles include policy design and implementation, and market regulation and operation. Clear assignment of roles and of the responsibilities of entities that hold them: provides clarity to market participants; prevents potentially wasteful duplication of effort; and avoids the risk of tasks ‘falling between the cracks’. Significant role fragmentation and overlap has been a criticism of arrangements in the MDB (ACCC 2020; PC 2018).

Effective governance also ensures that ***relevant parties’ activities are coordinated effectively.*** Coordination may need to span authorities within the water sector, jurisdictions, scales (for

example, water infrastructure, system and catchment), and adjacent sectors (for example, environment, agriculture and health).

Institutional arrangements remain in step with the level of market development. Changes in water availability, economic activity and information about system hydrology can lead to shifts in demand for water trading. These need to be monitored and evaluated to determine whether governance arrangements remain fit for purpose. ‘Many of the historical market settings and governance arrangements [in the MDB] are no longer suitable to deliver all of the potential benefits of trade’ (ACCC 2020, p. 7).

Integrate trade monitoring with system management in developed systems

While the NWI recognises and protects the environment and third-party interests, as noted above, greater trade has seen issues emerge in the MDB (PC 2018, p. 261).

These issues reflect the fact that there is no entity with responsibility for overseeing trade operations within the broader, long-term water resource management and system operation context. While delivery risk is managed by river operators, their objective is to manage short-term competing demands on their constrained infrastructure.

In developed systems, this gap in responsibility could be filled by creating a monitoring role to:

- proactively anticipate, identify and advise on responses to emerging risks in the context of third-party and environmental impacts of trading
- provide transparent reporting
- coordinate with other bodies in supporting trade.

Ideally the role would be undertaken by existing agencies — its similarity to existing functions in many jurisdictions would preclude the need to establish a new entity.

DRAFT FINDING 7.1

The Murray–Darling Basin demonstrates that, in highly developed systems, water trade monitoring ought to be integrated into system-level resource management. By taking a broader and longer-term system-level view of water trade and operational risk within the water resource management context, jurisdictions can more proactively anticipate and identify emerging issues and be advised on regulatory responses where warranted.

Regulation — the rules and their administration

Water trade regulation describes the rules within which trade can occur and the processes by which these regulations are implemented. Leading practice has a number of characteristics.

Regulation maximises overall community benefits. While the NWI targeted progressive removal of barriers to trade (where hydrology permits), some restrictions are likely to be needed. For example, they are warranted where trade results in negative impacts on other water users and the environment. Examples include conveyance losses (for example, evaporation and spillage during delivery), pumping impacts on water quality and flooding in constrained river segments. In most systems, third-party protections are provided by trade rules and approval processes. In some instances, markets can and have been developed to effectively price these impacts and internalise them into trading decisions. Ensuring restrictions are warranted and appropriate will maximise overall community benefits.

There are a number of considerations for water trade regulation that maximises overall community benefits.

- Trade between locations, whether between states and territories, valleys, or management zones, should not be limited by artificial administrative impediments. Water trading zones and groundwater management units should be defined in terms of the ability to transfer water physically from one area to another, environmental requirements and other third-party considerations, rather than historical administrative boundaries.
 - Consistent and compatible regulatory regimes would facilitate interstate trade where it is hydrologically feasible.
- Where the changing of trading rules is necessary and well-justified, clear and timely communication of these changes should seek to avoid disadvantaging certain market participants. There has been evidence of better resourced participants taking advantage of ‘first come, first served’ trade limit rules in the MDB, to the detriment of less informed participants (ACCC 2020).

Market access is open to all participants. The diversity of market participants in the MDB has grown as more brokers, domestic and foreign investors and other non user participants have entered these water markets. Some inquiry participants have argued that access for some should be restricted because, in the case of non users (for example, participants from the financial services sector), it reduces the volume of water available for use and drives up the price (ACCC 2020, p. 247; DPIPW (Tas) 2020a, p. 36; RAMJO, sub. 28, p. 2).

The Commission shares the conclusion reached by the ACCC that, while there may be a case for increased regulation of certain market behaviours, particularly those of market intermediaries, this should not preclude entire groups of participants from water markets. These participants offer several benefits, particularly in increasing the numbers of buyers and sellers, reducing transaction costs and providing a risk management function. Unfettered market access — particularly to investors and other financial sector participants — also provides a more diverse range of demands and products that support the management of access, delivery, storage, and risk across space and time.

Limits to intersectoral trade represent another potential barrier to market access to certain participants. Various State Governments continue to provide implicit or explicit direction to

water utilities not to purchase or transfer rural water for urban use (effectively placing a policy ban on this supply option).

Operation — how trades happen

Operational arrangements facilitate the buying and selling of water rights and related products. Leading practice requires that *efficient arrangements optimise transaction costs*.

A minimum set of tasks is required to give effect to water trades including: checks of sellers (for example, water holdings and delivery capacity); checks of buyers (for example, compliance with relevant environmental criteria and management plans); assurance to potential traders that payment and water transfer undertakings will be honoured; and minimum standard documentation setting out the obligations of buyers and sellers (NRMSC 2002, paragraph 29).

Irrespective of the level of development of a system and, therefore, the effort invested in these tasks, they will always involve some costs. Other things being equal, higher fees for trade applications will increase transaction costs, lowering the gains from trade. Effective pricing oversight is needed to ensure that cost recovery is efficient, and that approval fees are not imposing unnecessary transaction costs.

Similarly, transaction costs rise with lengthier trade processing times. Some jurisdictions have implemented service standards and targets to incentivise better performance. As the Commission (2017b, p. 128) noted, ‘there would be merit in reviewing service standards for trade approval processing times, with a view to tightening them’.

Trade-related services, provided by third parties, can also help to lower transaction costs. Exchanges, brokers and other water market intermediaries can assist sellers in finding buyers for their entitlements, lower costs of compliance and provide tailored information to participants. The recent ACCC interim report on MDB water markets found insufficient regulation of water brokers and possibly other water market intermediaries (2020, p. 34). But increased regulation would have the indirect effect of increasing transaction costs. As trade-related services are increasingly provided outside of the MDB, proposals for regulation should consider whether the potential costs might outweigh the benefits (for example, greater customer protections and lower rates of market misconduct by brokers).

DRAFT NWI RENEWAL ADVICE 7.2: LEADING PRACTICE GOVERNANCE, REGULATORY AND OPERATIONAL ARRANGEMENTS

Recommitting to the original National Water Initiative water trading and market principles would support the objective that arrangements facilitate the efficient operation of markets, where system and water supply considerations permit.

Reshaped principles covering governance, regulatory and operational arrangements for water markets and trading would provide stronger foundations for developing markets. Suggested principles include that:

- Roles and responsibilities of key parties involved in governance are clearly defined, and the parties' activities are effectively coordinated.
- Institutional arrangements are monitored and evaluated to ensure they remain in step with the level of a market's development.
- Trade is regulated to maximise overall community benefit (efficiency).
 - Arrangements protect against negative third-party impacts of water trades on other water users and the environment.
 - The boundaries of water markets should be shaped by hydrology; trade between locations or sectors should not be limited by artificial administrative impediments.
 - Regulatory consistency and compatibility apply where it is hydrologically feasible for interstate trade to occur.
 - Where the changing of trading rules is necessary and well justified, the communication of these changes should be clear, timely and accessible to the market.
- Market access is open to all participants.
 - Development of an appropriate mix of tradeable water products is enabled.
- Water market operations optimise transaction costs, including both monetary (for example, trade approval fees) and non-monetary (for example, from trade approval processing times and regulation of trade related services).

Jurisdictions could also consider integrating water trade monitoring with system management in highly developed systems. Such a role could focus on the long-term operation of the market within the water resource management system. In a changing climate, shared resources and connected systems will require consideration of the interaction between resource availability, system constraints and water trade; and the identification of risks as these interactions change.

Information provision — roles and responsibilities

Water registers and basic trade data should be provided by government

Governments have a role to play in the provision of information that supports the smooth functioning of water markets.

Under the NWI, jurisdictions agreed to implement ‘compatible, publicly accessible and reliable’ water registers. Guidelines included in the agreement remain relevant — publicly accessible records should capture the identity of all water access entitlement holders and the price and location of trades.

Victoria, South Australia and the Northern Territory have significantly improved their water registers since 2017 (*Assessment*). Queensland has made progress in improving access to its water market information, however, its registers do not meet all NWI standards. And New South Wales is currently consulting on possible reforms to increase transparency. However, there remains opposition from irrigators in Victoria and New South Wales to making personal information available and/or searchable (DELWP (Vic) 2019; NIC, sub. 27, p. 19).

Inquiry participants are divided on whether water registers meet user needs. The NSW Irrigators’ Council observed that, ‘the National Water Initiative requirements are largely satisfied’ given the current information available on New South Wales water registers (sub. 27, p 19). The Southern Riverina Irrigators, in contrast, argue that water registers are ‘grossly inadequate’ (sub. 77, p. 9).

A renewed NWI should continue to include guidelines on water registers to support jurisdictions’ decision making about the provision of basic entitlements and trade data.

In addition to these water register arrangements, the Australian Tax Office currently administers the Register of Foreign Ownership of Water Entitlements. The effectiveness, costs and benefits of this register are currently being examined separately by the Productivity Commission as part of a concurrent inquiry.

Governments’ role in providing broader water market information is limited

Other than the basic data, governments should be responsible for communicating market rules to participants — including a transparent rationale for their imposition. Information about water resource quality and accessibility of value to groups of market participants is another area where government has a role in provision.

Evidence from the MDB suggests that the effectiveness of government-provided information on water markets and resources could be improved. A common theme from participants in the ACCC’s (2020, p. 24) water markets inquiry was that MDB water markets were ‘not well-understood by users’. As markets and trade develop in other water

systems, the effectiveness of government-provided information should be monitored and improved where necessary.

Private providers are often able to lower transaction costs to market participants by providing tailored information. Where this applies, the case for government intervention is weak. Several brokers and exchanges are now providing these services in regions outside the MDB, in Queensland and in groundwater systems in South Australia.

Broader information requirements of water sector participants and the role that registers can play are discussed in chapter 10.

DRAFT NWI RENEWAL ADVICE 7.3: INFORMATION TO SUPPORT EFFICIENT WATER MARKETS

In efficient water markets:

- registers of all water access entitlements and trades are publicly-accessible, timely and reliable.
- basic trade data — including on prices (clearly specifying reasons for zero-price trades), volumes, dates, locations and product types — are publicly available.
- publicly-provided non-trade information covers market rules and the quality and accessibility of water resources.

8 Environmental management

Key points

- Water reform has delivered more water to the environment and the benefits are starting to be seen in environmental rehabilitation and recovery.
- But, recent challenges have hindered progress. Drought, incomplete water recoveries and governance and compliance failures in some Murray–Darling Basin jurisdictions have hampered environmental rehabilitation.
- Planning reforms and adaptive management are required, particularly in light of a changing climate and the likelihood of more frequent droughts.
- Whether environmental water is planned or held, the focus for the next phase of reform should be to ensure that environmental water is managed efficiently and effectively to deliver agreed (and where possible, better) outcomes. Principles reflecting current best practice should be embedded in a renewed agreement.
- In all systems (whether a simple unregulated river or a complex water system) management requirements that are important to achieve agreed outcomes include:
 - clearly specified environmental objectives and outcomes
 - adequate low-flow provisions
 - integration of environmental water, waterway and catchment management
 - effective compliance regimes (chapter 10)
 - clearly identified institutional responsibility for waterway management
 - processes to adapt environmental management objectives, when necessary, in a changing climate.
- In addition, in complex, highly developed regulated systems (with held environmental water), further requirements to achieve the best outcomes from the management of environmental water entitlements include:
 - effective outcomes-based planning and priority setting processes
 - coordinated water delivery in shared water systems (SP C *Environment*)
 - capacity to actively trade environmental water allocations, including between years
 - innovative market approaches
 - capacity to vary the entitlement portfolio to match ecological requirements
 - delivery of shared community benefits wherever compatible with achieving environmental outcomes
 - good governance, including the independence of environmental water holders and independent audit.
- Environmental management is a young discipline but is evolving rapidly. Effective risk-based monitoring, evaluation and reporting arrangements and a commitment to adaptive management are crucial, especially in the context of a drying and more variable climate.

This chapter summarises Supporting Paper C: Environmental management (SP C Environment). Further detail and analysis can be found in that paper.

As Australian cities, agriculture and industry grew during the late 1800s and 1900s, floodplains and river banks were progressively cleared, rivers were increasingly regulated and water extraction for consumptive use rose. Environmental degradation (erosion, sedimentation, salinity, toxic algal blooms and generally poor river and wetland health) followed (SP C Environment).

Governments started to concertedly tackle these issues from the 1980s, leading to a national approach from 1994. This COAG reform agenda sought to establish the environment as a legitimate water user, deliver legally-recognised provisions of water for the environment, and achieve a better balance in overallocated systems (that is, systems where allocation levels exceed an environmentally sustainable level of extraction). The National Water Initiative (NWI) continued and extended these policy directions, requiring governments to:

- identify the share of water for the environment in water planning
- return overallocated and overused surface water and groundwater systems to environmentally sustainable levels of extraction
- establish effective and efficient management and institutional arrangements to ensure the achievement of environmental and other public benefit outcomes.

8.1 Progress on providing water for the environment

All jurisdictions (except Western Australia) recognise provisions for the environment in legislation covering water plans or equivalent instruments.¹

Water planning aims to set the balance between environmental and consumptive use at an environmentally sustainable level — that is, a level that maintains key environmental assets and ecosystem functions while accepting a degree of ecological risk.

Environmental water provisions in water plans provide for the needs of both surface water and groundwater dependent ecosystems. Jurisdictions generally set allocation limits and access rules to ‘leave behind’ water to meet environmental outcomes (‘planned’ environmental water). These provisions do not require any active decision making on their use, but water managers must ensure consumptive users comply with the rules to ensure environmental outcomes are not jeopardised. Rules-based provision is the primary means of implementing environmental water objectives across Australia (figure 8.1).

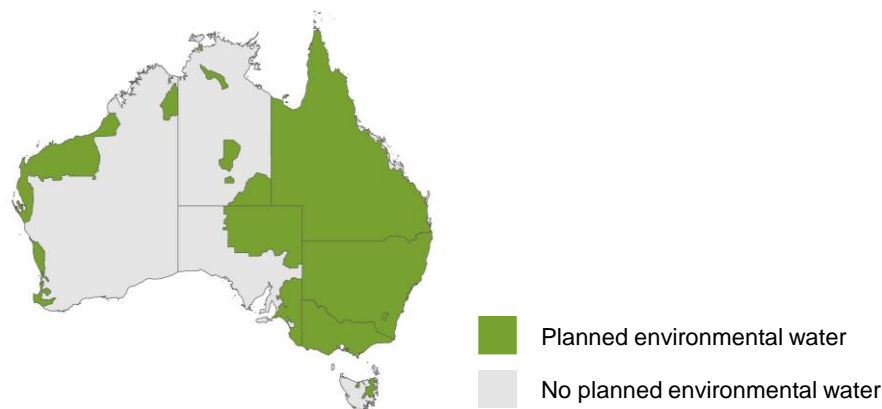
In the Murray–Darling Basin (MDB) and Victoria, planned water is supplemented with environmental entitlements (‘held’ environmental water), established through provision of

¹ Western Australia employs water allocation plans and extraction limits, but the lack of statutory backing of these arrangements makes environmental provisions less secure.

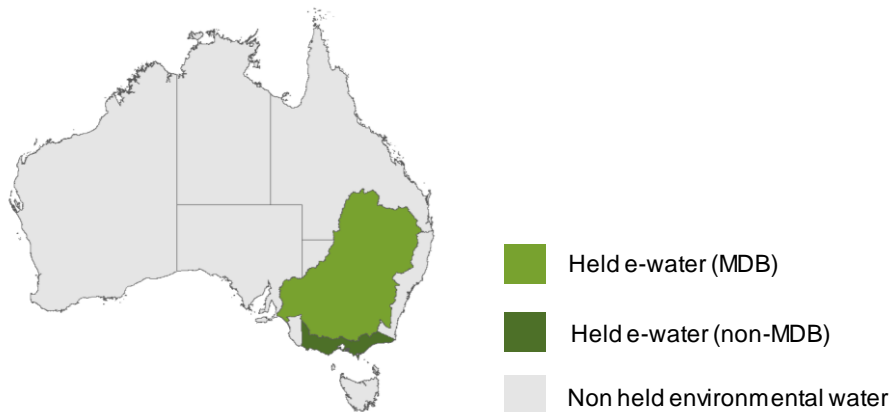
water access entitlements for environmental use. These generally have the same rights and conditions as entitlements owned by irrigators and other consumptive users, and are owned by the Australian, New South Wales, Victorian and South Australian Governments. In these cases, environmental water managers must make decisions on where and when to use water, and on whether to trade it or make use of ‘carryover’ provisions to keep it for use in subsequent years.

Figure 8.1 Most environmental water is ‘planned’

Systems with held environmental water^a



Systems with held environmental water^{b,c}



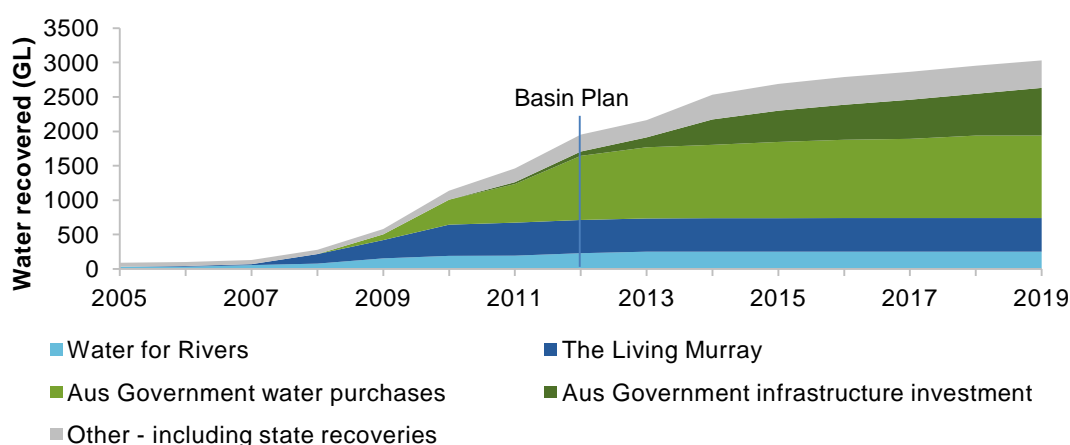
^a Each state manages environmental water through different planning mechanisms. For example, Victoria has a state-wide entitlement licensing system, and New South Wales manages planned water through valley-level water sharing plans. The map illustrates the geographical coverage of state-level planning that caps consumption to protect environmental water. In some cases, water plans do not cover all water sources within an geographic area. ^b The shaded areas illustrate the ownership of held environmental water by region but do not provide a precise spatial representation of entitlements. ^c Commonwealth holdings are as at 31 May 2020, Department of Primary Industries and the Environment (NSW) holdings are as at 30 June 2017, Victorian Environmental Water Holder holdings are as at 6 May 2020, Department of Environment and Water (SA) holdings are as at 29 June 2020.

Sources: ABS (2016), CEWO (2020a), DENR (NT) (2020), DEW (SA) (2020), DNRME (Qld) (2020), DPIE (NSW) (2019a), DPIWE (Tas) (2020b), DWER (WA) (2020), VEWH (2020).

Figure 8.1 **Most environmental water is ‘planned’**

Overallocation and environmental degradation have been particularly pronounced in the MDB, prompting a major Australian Government initiative to rebalance environmental and consumptive use (the 2012 Basin Plan) and to recover 2750 GL of water entitlements (or equivalent environmental outcomes) by 2024. Recovery rates have slowed in recent years, but significant progress has been made (figure 8.2).

Figure 8.2 **Held environmental water recovery in the Murray–Darling Basin^{a,b}**



^a Volumes recovered to 30 June 2019 in terms of long-term average annual yield. ^b State recoveries include programs such as New South Wales Riverbank and other small recoveries.

Source: MDBA (pers. comm., 30 September 2020).

The provision of water for the environment is starting to yield benefits. Positive ecological outcomes include: improved native vegetation and wetland condition; protection of rare and threatened biodiversity such as in groundwater-dependent ecosystems; and the migration and breeding of native fish, frogs and waterbirds (CEWO 2020b; Hart and Butcher 2018, p. 2; Thurgate et al. 2019). Provision of refuges has been particularly important in maintaining breeding grounds during drought (MDBA, sub. 23, pp. 13–14), supporting ecosystem resilience until rain returned.

Provisions have also helped to avoid environmental degradation that would have otherwise occurred through unconstrained water access (Chen et al. 2020, p. H). For example, planned environmental water is likely to have mitigated the rate of habitat decline faced by platypus populations by maintaining river connectivity (Hawke, Bino and Kingsford 2020, p. 59).

But, recent challenges have hindered progress in environmental rehabilitation. Drought, incomplete water recoveries, and governance and compliance failures in some MDB

jurisdictions have contributed to environmental stress. Fish deaths in the Lower Darling are the most prominent example. Others include the loss of Macquarie perch populations as ash and mud washed into the Snowy Mountains river system after the bushfires. And increased risks of algal blooms.

Moving forward, it is important for environmental water managers to understand the extent to which environmental decline in some systems (the MDB in particular) was an inevitable consequence of the severity and longevity of the recent drought (and outside the bounds of planning), a failure of environmental management or an indication that current environmental water provisions are inadequate.

8.2 Requirements for achieving agreed outcomes in all systems

The ultimate objective of providing water for the environment is to improve the health of rivers, wetlands and other water-dependent ecosystems — not simply a volume of water.

Whether environmental water is planned or held, the focus for the next phase of reform should be to ensure that environmental water is managed efficiently and effectively to deliver agreed (and where possible, better) environmental outcomes.

In the 17 years since the NWI was agreed, environmental management has evolved rapidly and a disconnect between the agreement and current management practices has emerged. Embedding current best-use principles in a renewed NWI, and ensuring that environmental water managers can continue to evolve their frameworks and practices through experience and adaptation to new knowledge, would provide a stronger platform for achieving agreed environmental outcomes.

Moreover, the recent drought has exposed weaknesses in environmental management policy principles, frameworks and practices. National principles for environmental management and underlying jurisdictional management frameworks and practices must also evolve and transform to enable the environment to best weather shocks such as drought, floods and bushfire and adapt to a changing climatic baseline.

The Commission's draft advice for NWI renewal follows.

Clearly specified environmental objectives and outcomes

Water planning processes should involve effective stakeholder engagement to identify the key assets and ecosystem functions that communities would like to protect, and any risks and potential trade-offs they are willing to tolerate in achieving those outcomes. Any discussions should be informed by science to ensure identified outcomes are objective and achievable. And, agreed outcomes should be clear, easily understood by stakeholders and

defined in a way that enables clear long-term performance indicators to be set and monitored. Overall, the process should include the prioritisation of environmental assets to guide planning and active management.

In practice, reaching agreement on objectives for environmental watering and associated outcomes can be very difficult, even if good collaborative processes are in place.

Given the high demand for water in many river basins it is often impossible to meet everyone's needs, and compromises are required. Reaching agreement can be very difficult if expectations are unrealistic, for example, if the river has been heavily managed and will continue to be so for local or national economic prosperity. Setting objectives for environmental water through stakeholder engagement is thus a socio-political process rather than a solely scientific procedure. (Acreman et al. 2017, p. 23)

To ensure some consistency of approach in the identification of key environmental assets, criteria for the prioritisation of environmental assets should be embedded in the NWI. Current practice in some jurisdictions provides guidance on a potential approach (incorporated in draft NWI renewal advice 8.1).

DRAFT NWI RENEWAL ADVICE 8.1: BEST-PRACTICE ENVIRONMENTAL OBJECTIVES AND OUTCOMES

Environmental objectives and outcomes agreed in water plans should be guided by criteria on the identification of key environmental assets and the values communities place on those assets.

- Waterways or water-dependent ecosystems should be considered high environmental priority if they have one, or more, of the following characteristics.
 - formally recognised significance (under Australian or State Government legislation)
 - the presence of highly threatened or rare species and ecological communities (under Australian or State Government legislation)
 - high naturalness values (for example, aquatic invertebrate communities or riparian vegetation)
 - vital habitat (for example, drought refuges or important bird habitats and key sites for connectivity).
- Environmental objectives and agreed environmental outcomes should then:
 - be set through a collaborative, stakeholder and community process that considers the relative community value of outcomes
 - be based on good scientific, objective and on-the-ground knowledge
 - clearly identify any risks and potential environmental trade-offs under different climate scenarios (including average and dry years)
 - be transparent, logical and easily understood by stakeholders
 - be specific and defined well, enabling clear long-term performance indicators to be set and monitored.

Moreover, recent dry conditions have called into question whether water planning has adequately considered the impacts of extreme water scarcity when establishing agreed environmental outcomes and objectives. Water planning should consider environmental objectives and agreed outcomes under different climate conditions (wet, average and dry years).

Best-practice principles to establish environmental objectives and agreed outcomes, including understanding any environmental trade-offs during dry climate scenarios, should be embedded in the NWI (draft NWI renewal advice 8.1).

Adequate low flow provisions

Environmental impacts of the recent drought in New South Wales have revealed an inadequate understanding of the importance of low-flow provisions to achieving environmental outcomes during periods of water scarcity.

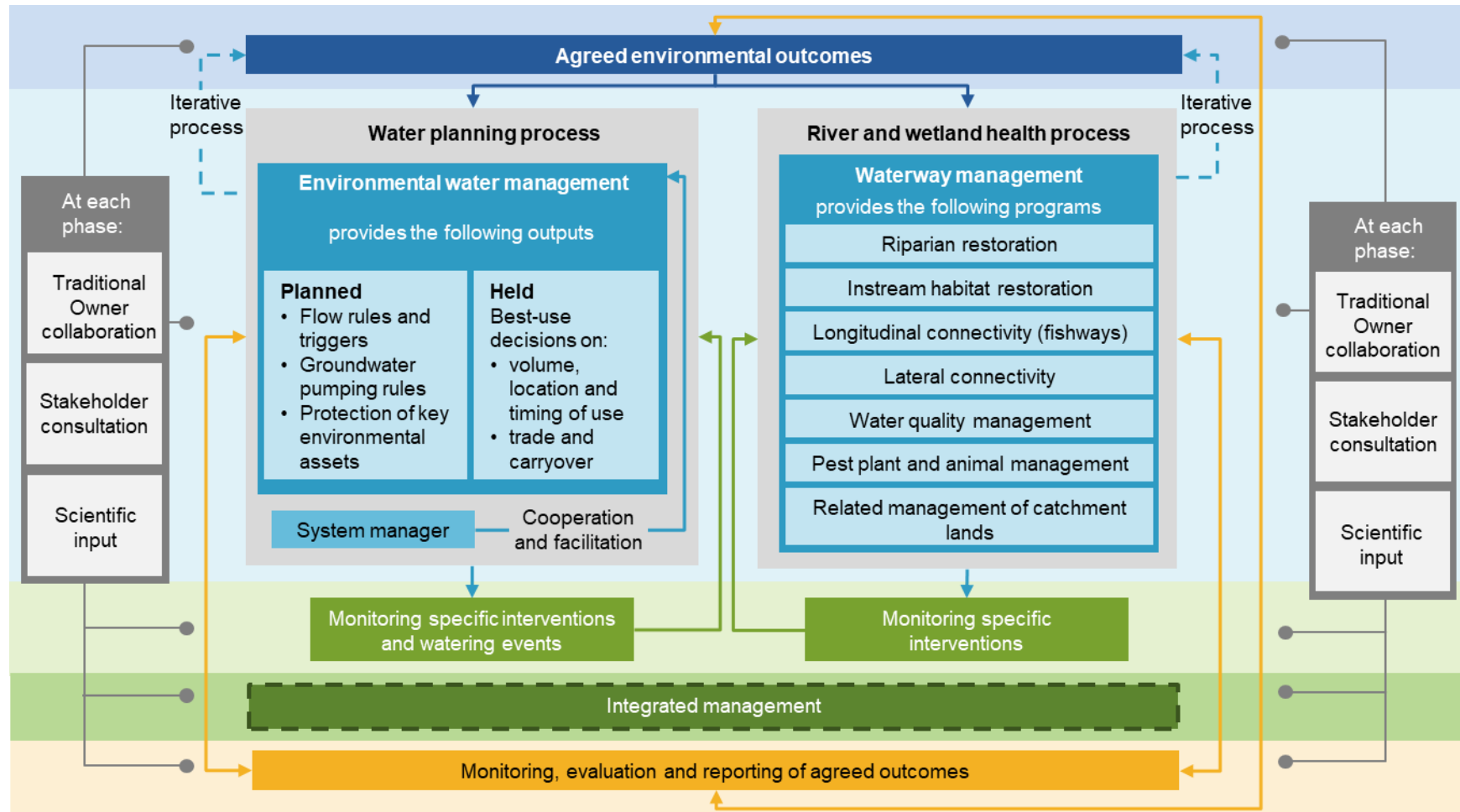
Flow targets to protect critical ecosystems and river health need to be managed not just for long-term averages, but for a range of climatic conditions including the very dry extremes. This includes managing water extraction during critically low flows to protect ecologically important refuges, protecting the resumption of flows, enabling small flushes at appropriate frequencies and managing connectivity across the landscape. The process for achieving this is through water planning. Future water plans and water reviews need to ensure that water sharing arrangements during low flow and prolonged dry periods are explicitly considered and clearly described. Best practice is considered in SP A *Entitlements and planning*.

Integrated environmental water, waterway and catchment management

The environmental condition of waterways — such as rivers, wetlands, floodplains and estuaries — is dependent on a range of factors in addition to water extraction including, land use and management within the catchment and riparian zone. Waterways face threats like nutrient pollution, salinity, increased sedimentation, habitat degradation and invasive species. Non-flow waterway management activities (such as water quality improvement, restoration of habitat and connectivity and the management of pest species) will have a critical impact on the achievement of environmental outcomes.

Environmental water management therefore needs to be part of an integrated river or wetland management program that includes complementary habitat and water quality management (figure 8.3). This is not adequately covered in the NWI.

Figure 8.3 The integration of environmental and complementary waterway management
At the local level, to achieve agreed outcomes



In the absence of integration, the long-term benefits of environmental water (including environmental rehabilitation and resilience) may be eroded or not realised. Providing environmental water to a particular wetland is likely to be more effective in increasing native fish populations if waterway managers maintain wetland vegetation, reduce weeds and install screens to exclude invasive species such as carp. Similarly, the benefits of providing water to stimulate regeneration of red gum forests may be completely eroded if grazing then eliminates the seedlings.

Complementary waterway management is also important for managing the effects of changing conditions. During periods of water scarcity, natural resource programs (NRM) should focus on the protection of reserves, refuges and making sure that the regenerative capacity of water-dependent ecosystems is protected. Actions can include banning of fishing in fish refuge pools, fencing of key refuge areas, captive breeding programs and increased compliance monitoring and enforcement.

Waterway managers are generally responsible for waterway and catchment management activities under State and Territory NRM frameworks but, except for Victoria, may not be involved in environmental water management.

DRAFT NWI RENEWAL ADVICE 8.2: INTEGRATED MANAGEMENT

The management of environmental water should be integrated with complementary waterway management at the local level by ensuring that consistent management objectives govern both the use of environmental water and complementary waterway management activities.

DRAFT RECOMMENDATION 8.1: NATURAL RESOURCE MANAGEMENT

Natural resource management (NRM) programs should give priority to the key environmental assets identified in water planning processes, provide funding and undertake the required works to protect those assets.

During periods of water scarcity, NRM should focus on the protection of reserves and refuges and making sure that their regenerative capacity is protected.

Clearly identified institutional responsibility for waterway management

Many actors can affect the environmental condition of a waterway or wetland. Effective management therefore requires the coordination of all waterway activities and will involve a range of people and organisations. Cooperative relationships between local communities, Traditional Owners, landowners, land managers, catchment groups, river operators, State and Territory government agencies, environmental water holders and scientists need to be established and maintained.

But a shared responsibility model can lack clarity over who is responsible when agreed outcomes cannot be met, such as during a prolonged period of water scarcity. Although no single agency can control all the factors affecting the condition of a waterway, to achieve agreed environmental outcomes, all jurisdictions should have in place an institutional oversight responsibility for wetland and waterway management that provides an interface between the management of waterways and environmental water. The type of agency responsible for waterway management may vary between jurisdictions and waterways but the broad roles and functions of a waterway manager should include those listed below (draft NWI renewal advice 8.3).

DRAFT NWI RENEWAL ADVICE 8.3: WATERWAY OVERSIGHT

Where not in place, State and Territory Governments should establish a formal institutional oversight responsibility for wetland and waterway management that provides an interface between the management of waterways and environmental water.

The roles and functions of a waterway manager should include:

- undertaking collaborative planning processes that result in clearly articulated environmental objectives, targets and priorities
- ongoing collaboration with Traditional Owners
- ongoing environmental risk assessment
- providing input to water planning processes on environmental priorities and impacts
- oversight of natural resource management actions to achieve agreed objectives
- working with the system manager to achieve agreed environmental outcomes
- facilitating on-ground delivery of environmental water management
- monitoring and reporting on environmental outcomes and risk management
- evaluation where environmental outcomes were not achieved
- providing opportunities for community participation, to facilitate change and awareness of waterway issues
- communicating policy changes to stakeholders.

Processes to adapt environmental objectives, when necessary, in a changing climate

Reductions in water availability and reliability with expected climate change are likely to result in many of our waterways and wetlands changing character over the long-term. Uncertainties associated with climate change compel the need for flexible, adaptable and risk-based environmental planning and management.

In some systems, climate change may make the realisation of agreed environmental outcomes unachievable based on existing water provisions. The process of resetting the balance, outlined in chapter 6 and SP A *Entitlements and planning*, will review what may be possible in some systems.

However, in many water systems, the scale of the predicted climate shifts mean that some environmental objectives are unlikely to be met over the longer-term, even if environmental water provisions were to increase relative to consumptive use.

To manage risk in a changing climate, environmental managers must establish clear processes for reviewing their progress on outcomes and determining if and when management objectives need to be revisited.

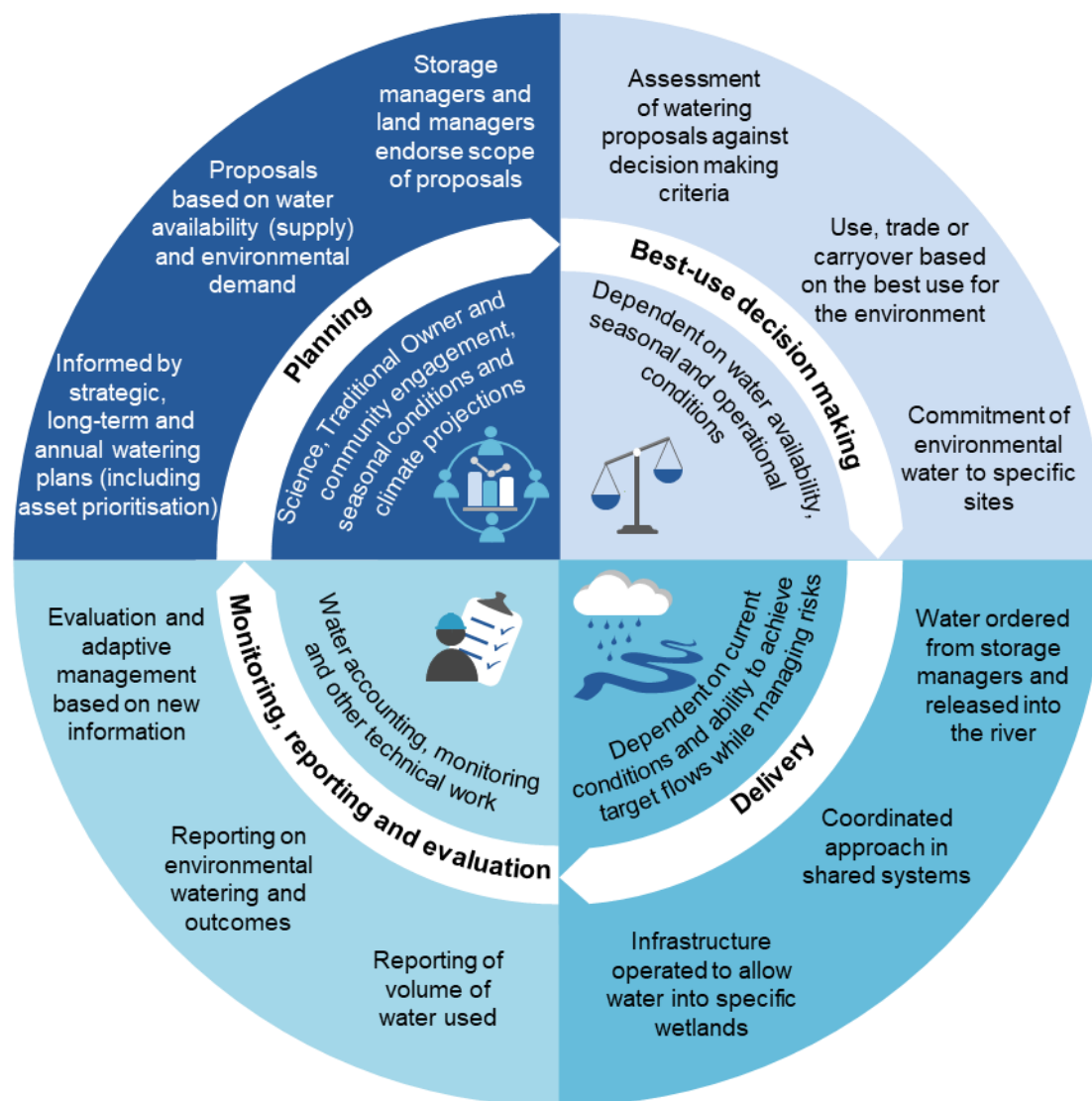
DRAFT NWI RENEWAL ADVICE 8.4: REVIEW PROCESSES FOR OUTCOMES

Clear processes should be established for reviewing progress on environmental outcomes, understanding their feasibility given climate induced changes in water availability and other factors (such as sea level rise and increased temperatures), and determining if and when management objectives should be revisited within planning review processes.

8.3 Additional requirements in systems with held water

In systems with held environmental water, environmental water managers make decisions on where, how and when that water should be used and whether it should be traded or carried over (that is, stored for use in the following year). And, in shared river systems (within the MDB), decision making also involves how environmental water managers should undertake coordinated actions. The overarching objective for these environmental water holders is to make decisions based on the best use of the billions of dollars of entitlements that they steward for the long-term health of the environment (figure 8.4).

Figure 8.4 The held environmental water active management cycle



Sources: Adapted from CEWO (2020c); VEWL (2015).

Effective outcomes-based planning and priority setting processes

Successful delivery of environmental water is a complex exercise. The water needs of environmental assets vary on a yearly basis, depending on antecedent conditions, watering history, environmental requirements and risk considerations. In a dry year, managers have to set priorities for the use of limited environmental water. The best mix of water use, trade and carryover will be different in each catchment and vary every year.

Frameworks, plans and strategies guide the management process, setting out:

- agreed ecological objectives and outcomes
- water regimes needed to achieve them under a range of climatic conditions
- principles for guiding the use of the relevant environmental entitlements to achieve them
- and, where compatible, any additional cultural and social benefits to be achieved.

Because environmental water needs are not consistent across years, and rainfall and water available under entitlements is also highly variable, environmental watering has evolved to the strategic use of available allocations. At an operational level, environmental water managers have to make risk-based decisions on watering environmental assets.

During periods of water scarcity (in particular), this is likely to involve difficult trade-offs between different:

- regions (deciding to commit water to a river or wetland in one region over a river or wetland in another region)
- river reaches or wetlands in one river system (deciding to commit water to one river reach or wetland over another in the same system)
- environmental flow elements in a particular river or wetland, for example, the creation of small summer flushes for water quality versus the maintenance of baseflows (VEWH 2015, p. 3).

These trade-offs establish priorities within agreed long-term water objectives and outcomes, and recognise that the role of held environmental water is to protect key environmental assets, not all water-dependent ecosystems in general. Prioritisation criteria are fundamental to achieving the best environmental outcomes. They should be embedded in the NWI to provide validity to current best practice and transparency to the community and other entitlement holders. Suggested criteria are presented in draft NWI advice 8.5.

In order to achieve the best use of held environmental water it is also important (given Australia's increasingly variable climate) that prioritisation criteria are used with objectives adapted to prevailing seasonal conditions. For example, in drought conditions, the general objective should be to protect at risk environmental values and avoid critical loss. Objectives for seasonal environmental watering under different climate scenarios should be embedded in a new NWI (draft NWI advice 8.5).

DRAFT NWI RENEWAL ADVICE 8.5: OBJECTIVES AND PRIORITY SETTING FOR HELD WATER

The overarching objective for environmental water managers managing held environmental water is to make decisions on where, how and when environmental water should be used (or whether it should be traded or carried over) based on the best use for the environment over the long-term.

Criteria for prioritising environmental watering should be embedded in a new National Water Initiative and include the:

- extent and significance of environmental benefit
- likelihood of success
- longer-term benefits
- urgency of watering needs
- feasibility of the action
- environmental or third-party risks
- cost effectiveness of the watering action
- efficiency of water use
- additional cultural, economic, social and Traditional Owner benefits.

Objectives for seasonal environmental watering under different climate scenarios should be embedded in a new National Water Initiative such as:

- avoid critical loss, maintain key refuges and avoid catastrophic loss during drought scenarios
- maintain river functioning and high priority wetlands and manage dry-spell tolerances during dry scenarios
- improve ecological health and resilience and recruitment opportunities for key species during average-climate scenarios
- restore key floodplain and wetland linkages and enhance recruitment opportunities for key species during wet scenarios.

Capacity to actively trade environmental water allocations

All governments with held environmental water are legally able to trade water allocations. Trade can provide opportunities to manage low flows as well as to top-up medium flood events for the benefit of water-dependent ecosystems. Trade can also help maximise environmental benefits by putting environmental water to better use in different locations or at a later time, to better match the hydrographs of environmental needs.

It is desirable that environmental water holders fully exploit trade in allocations to maximise benefits for water-dependent ecosystems. Under the NWI, parties agreed that water for the environment held as an access entitlement may be traded on the temporary market, when not

required to meet environmental and other public benefit outcomes and provided such trading is not in conflict with those outcomes.

This limit (placed on trade) is intended to ensure that trading arrangements are consistent with the use of the water for environmental purposes, and are not primarily aimed at raising revenue. But, the key concern is that environmental water holders may fail to maximise environmental and community benefits by trading too little. Environmental water holders do not routinely sell their allocations — for example, the Commonwealth Environmental Water Holder has only sold allocations on five occasions.

Decisions to sell environmental water allocations can be contentious. For example, in 2018 when the New South Wales Government sold 15 GL of environmental water allocation to irrigators within the Gwydir, Macquarie, Lachlan, Murrumbidgee and Murray–Lower Darling valleys in response to dry conditions, questions were raised as to whether this was the best use of the allocations for the environment (PC 2018, p. 294).

Decisions to sell or buy environmental water allocations require a robust and transparent framework to facilitate optimal outcomes and ensure clarity for communities and other stakeholders. Revenue from trading should also be put to best use to achieve environmental outcomes (box 8.1).

Box 8.1 Possible uses for revenue from environmental water trading

Revenue from trading should be held in a dedicated, ring-fenced account with the ability to carryover between years. The uses for revenue should be clearly defined and transparent. Examples include:

- trading costs
- acquisition of entitlements
- acquisition of allocations, including buying allocations or entering into lease, option or similar arrangements
- making use of market-like instruments such as ‘no-pump’ arrangements (discussed in the next section)
- works and measures that enable best use of environmental water or extend environmental water outcomes
- research and development relevant to enabling more efficient use of environmental water or extending environmental outcomes assisting with operations
- providing contingency funds to assist delivery of agreed environmental outcomes during periods of extreme water scarcity
- monitoring outcomes.

DRAFT NWI RENEWAL ADVICE 8.6: TRANSPARENT TRADE STRATEGIES

Environmental water holders should have in place transparent and publicly reported trading and carryover strategies and reporting statements for entitlements and allocations that show the best use of water to contribute to environmental outcomes as opportunities arise.

Revenue from trading should be held in a dedicated, ring-fenced account with the ability to be carried over and devoted to activities that enable the best use of environmental water over time. And, use of this revenue should be publicly reported.

Innovative market approaches

Water sharing is particularly time-sensitive in unregulated systems (waterways without significant dams or weirs). Users rely on rainfall events and run-off to access allocations. In these systems, innovative market instruments have the potential to move water across time in ways that would not be possible through standard allocation trade. Innovative approaches include no-pump contracts, store and release arrangements, option mechanisms and conditional leases (BDA Group and CSIRO 2017, p. 31).

Inquiry participants expressed support for increased use of innovative mechanisms to manage environmental watering. For example:

AgForce supports alternative approaches to the management and use of already held environmental water, such as the use of temporary water markets and mechanisms like ‘no-pump’ contracts to maximise the value of this water across a broader range of outcomes or shared benefits while not compromising environmental objectives. (sub. 24, pp. 6–7)

Environmental water holders should work with system managers and consumptive entitlement holders to pursue innovative market approaches, as opportunities arise. Innovative market approaches should be assessed relative to their contribution to achieving environmental outcomes. Establishment and transaction costs should be estimated and the risks of implementing the arrangement for all parties should be evaluated (CEWO 2011, p. 18).

DRAFT NWI RENEWAL ADVICE 8.7: INNOVATIVE MARKET APPROACHES

Environmental water holders should work with system managers and consumptive entitlement holders to pursue innovative market approaches.

Capacity to vary the entitlement portfolio to match ecological needs

The mix of different entitlement types held by environmental water holders determines the allocations available for use each year. Over time, structural entitlement portfolio issues (such as a mismatch between entitlement reliability and environmental demand) can emerge that nimble seasonal allocation trading cannot address.

To achieve the best environmental outcomes, environmental water holders may, from time to time, need the flexibility to rebalance entitlement portfolios. This will only become more important as climate change compels them to re-evaluate their approach to environmental management. However, environmental water entitlements are a major public asset and should not be sold at the cost of diminished environmental outcomes.

The selling of environmental water entitlements should only occur against a long-term plan of portfolio requirements, under clear guidelines, with cost–benefit analysis, consideration of possible consequential adjustments to catchment sustainable diversion limits and environmental provisions in water plans, a formal approvals process such as ministerial approval and reported trade activity. These processes would provide confidence that selling entitlements will provide net benefits for the environment. This cautious, risk-based approach would mean that entitlement transactions would be expected to be infrequent.

DRAFT NWI RENEWAL ADVICE 8.8: CAPACITY TO VARY ENTITLEMENT PORTFOLIO

Environmental water holders should be enabled to vary their entitlement portfolio over time to match ecological requirements in a changing climate.

Governments should develop clear guidelines on the criteria for selling environmental water entitlements including cost–benefit analysis, consideration of possible consequential adjustments to catchment sustainable diversion limits and environmental provisions in water plans, a formal approvals process and publicly reported trade activity.

Shared community benefits where compatible with environmental outcomes

Environmental watering can contribute to other public benefit outcomes.

- For Aboriginal and Torres Strait Islander people, healthy rivers and wetlands are essential to spiritual, cultural and physical wellbeing (chapter 9). Where environmental and cultural water outcomes intersect there are opportunities for environmental water holders to directly contribute to achieving cultural outcomes.
- Site-specific watering events can make a direct positive contribution to recreational opportunities such as fishing and canoeing and rowing regattas.
- Although difficult to quantify, healthy rivers, lakes and wetlands provide amenity benefits — that is, pleasure derived by those who use or view them.

Environmental water holders are increasingly taking into account public benefit outcomes when planning watering events. To maximise the benefits of environmental water, explicit consideration should be given to public benefit outcomes, provided agreed environmental outcomes are not compromised. This limit is important. The pursuit of other public benefit outcomes may not always align with the best use of environmental water to achieve environmental outcomes. If instances arise where competing public benefit outcomes are thought of more value to the community than the environmental watering and associated outcomes that would be forgone, then this needs to be the subject of discussion, agreement and the rebalancing of consumptive allocations in a water sharing plan review.

Environmental water holders have a responsibility to effectively collaborate and transparently communicate decision making on the delivery of shared benefits from environmental water. In particular, environmental water holders should improve engagement and transparency with Traditional Owners on cultural water decision making and outcomes in environmental water planning processes (chapter 9).

Public benefit outcomes from environmental watering may be more difficult to achieve during periods of water scarcity when environmental water allocations are reduced. Water holders should build upon their knowledge of the potential for environmental water to achieve public benefit outcomes under drying climate scenarios.

DRAFT NWI RENEWAL ADVICE 8.9: ACTIVELY PURSUE PUBLIC BENEFIT OUTCOMES

Environmental water holders should:

- give explicit consideration to other public benefit outcomes including cultural and social outcomes, where they do not compromise environmental outcomes
- improve collaboration and communication with Traditional Owners on cultural water decision making and outcomes in environmental water planning processes
- report on any instances where specific cultural outcomes were unable to be delivered because they were incompatible with agreed environmental outcomes
- build on their knowledge of the potential for environmental water to achieve shared community benefits under drying climate scenarios.

Good governance to protect environmental water

The stakes in environmental water management are high. Governments hold entitlements worth billions of dollars — the Commonwealth’s holdings alone are valued at over \$3.3 billion (PC 2018, p. 273). And, environmental water holders’ decisions affect regional environments and communities, and are of significant interest to other water users. Best-practice governance is essential, including independence from government so that decision making is free from political interference.

There are suggestions that the Australian and New South Wales Governments faced significant pressure to provide or sell environmental water allocations to irrigators during the recent drought (O'Donnell and Horne 2018). It has also been argued that the Commonwealth Environmental Water Holder's governance arrangements proved effective and robust (SMH 2018). In contrast, it is not clear whether the New South Wales Government's decision to sell 15 GL of environmental water allocation to irrigators within the Gwydir, Macquarie, Lachlan, Murrumbidgee and Murray–Lower Darling valleys in 2018 was best use for the environment (PC 2018, p. 294). The New South Wales Government should review governance arrangements to ensure that held environmental water is managed independently of government departments and political direction.

Independent auditing is also important. The NWI recognises a need for periodic independent audit of the achievement of environmental and other public benefit outcomes and the adequacy of the water provision and management arrangements in achieving those outcomes. But there is no consistent or regular basis for this activity. Governments with environmental water entitlements should put independent auditing processes in place.

DRAFT NWI RENEWAL ADVICE 8.10: INDEPENDENT MANAGERS AND AUDITING

Where governments own significant held environmental water that can be actively managed they should ensure that decisions on the use of this water are made by independent bodies at arm's length from government.

Governments with held environmental water entitlements should provide for independent auditing, on a three-yearly basis, of the adequacy and use of environmental water entitlements to achieve the best outcomes.

8.4 Water system managers should use their best endeavours to achieve agreed outcomes

Water system managers are responsible for managing bulk water resources and operating bulk water infrastructure. Essentially, their role involves maximising the benefits of water use for entitlement holders, the environment and other cultural, economic and social uses (where possible). Achieving agreed (and where possible, better) environmental and other public benefit outcomes requires a flexible and innovative system manager who is open to experimentation as opportunities arise. (The role of the system manager in water resource management is discussed further in SP E *Integrity*.)

It is in the interests of all entitlement holders and the community that all opportunities are taken to get the best environmental outcomes possible from the current share of water for the environment. The expectation that water system managers should use their best endeavours (while protecting third-party interests) to facilitate the achievement of environmental and other public benefits should be included in the NWI. In practice, this

could be achieved through a formal process such as inclusion of expectations for water system managers in a ministerial statement.

For transparency and accountability, governments should evaluate and report on system managers' activities.

Finally, to implement adaptive management through continuous improvement, system managers should reflect on successes and failures from experimentation and share knowledge to improve practices across systems.

DRAFT NWI RENEWAL ADVICE 8.11: THE SYSTEM MANAGER'S ROLE IN ENVIRONMENTAL MANAGEMENT

Water system managers should be obligated to use their best endeavours, while protecting third-party interests, to achieve agreed outcomes.

State and Territory Governments should report and evaluate system managers' efforts at facilitating the achievement of agreed environmental and other public benefit outcomes.

8.5 Effective monitoring, evaluation and reporting

Environmental water management is not set and forget — continual learning and adapting underpins sustainable management. Monitoring, evaluation and reporting against agreed outcomes should lead to more efficient and effective water use over time. Evaluation and reporting on outcomes that have not been achieved is particularly important. These activities will only become more important given the uncertainties of a changing climate.

Monitoring, evaluation and reporting are also key inputs to ensuring accountability and building public trust and credibility in the way water is managed. They allow informed judgements on the merits of government decisions to allocate water to the environment, whether through planning frameworks or entitlement acquisitions.

Monitoring and reporting of environmental outcomes has received greater focus in recent years (*Assessment*), but some inquiry participants reported gaps in some systems (SP C *Environment*).

Ecological complexity makes monitoring agreed environmental outcomes inherently difficult and costly. Therefore, monitoring, evaluation and reporting should be fit for purpose — that is, commensurate with the risk to, and value of, outcomes to the community.

In complex systems with held environmental water, adaptive management (one that learns from past experience to improve future decisions) requires greater attention. Managers must make decisions about water use despite significant uncertainty concerning future water availability, ecological responses to water provision and changing on-ground conditions.

This inevitably involves trial and error, so it is essential that past learnings are used effectively to inform future decisions. While adaptive management is widely recognised as a key overarching principle for effective water management, it is not reflected in the NWI and therefore warrants a greater focus in future reforms.

An ongoing commitment to adaptive management through monitoring, evaluation and reporting is key to achieving agreed outcomes. Governments should establish mechanisms to ensure adaptive management is implemented consistently and explicitly in practice. Jurisdictions should focus on outcomes, and publicly report on agreed outcomes that are not achieved, in addition to those that are, and the reasons why.

Finally, managers of held environmental water should use the results of monitoring, evaluation and research to improve water use as part of an adaptive management cycle. To achieve this, adaptive management should be adequately resourced.

DRAFT NWI RENEWAL ADVICE 8.12: COMMITMENT TO ADAPTIVE MANAGEMENT

In planned environmental water systems, State and Territory Governments should:

- establish mechanisms to ensure that adaptive management is implemented consistently and explicitly in practice
- ensure adequate monitoring, evaluation and reporting efforts on agreed environmental outcomes, and report openly about instances where these outcomes are not achieved.

Environmental water holders should:

- use the results of monitoring, evaluation and research to improve water use as part of an adaptive management cycle and ensure that this is adequately resourced
- publicly report on environmental water use, the outcomes of watering events, the achievement of ecological outcomes, and monitoring of objectives.

9 Securing Aboriginal and Torres Strait Islander people's interests in water

Key points

- The National Water Initiative (NWI) is a product of its time, with a focus on achieving cultural outcomes through engagement with Aboriginal and Torres Strait Islander people. Since 2004, Aboriginal and Torres Strait Islander people have articulated their aspirations for access to water for unconstrained use (that is, for both cultural and economic purposes).
- In 2020, all Australian governments signed the National Agreement on Closing the Gap. One desired outcome is that Aboriginal and Torres Strait Islander people maintain their distinctive relationship with water. A target for inland waters is also to be developed.
- Consistent with the co-design approach committed to in the National Agreement on Closing the Gap, a Committee on Aboriginal Water Interests with Aboriginal membership has been established to develop a new NWI element covering Aboriginal and Torres Strait Islander people's interests in water. This approach could be strengthened.
 - Given the importance of its work, the committee should report directly to water ministers.
 - There should be coordination between the committee and Coalition of Peaks members involved in implementing the National Agreement on Closing the Gap to ensure the water outcome and inland waters target from the National Agreement on Closing the Gap is reflected in a renewed NWI.
- The delivery of cultural outcomes could be improved through existing frameworks while the new NWI element is being developed, as well as being incorporated into the renewed NWI.
 - Clear, measurable and well-informed cultural outcomes should be agreed in water plans. Monitoring and reporting arrangements that promote accountability and foster learning about what works should also be in place.
 - Cultural outcomes should be pursued through environmental watering where they are consistent with achieving agreed ecological obligations.
 - Local catchment or land management authorities should establish long-term relationships with Traditional Owners and engage with them on the management of cultural assets.
- Where governments determine that access to water is the best way to support economic development, that access should be facilitated within existing entitlement frameworks.
 - Where the consumptive pool is fully allocated, water should be bought from the market.
 - Where the consumptive pool has not been fully allocated, reserves can be created in systems, as has happened recently in the Northern Territory and Queensland.
 - Where governments invest in new water infrastructure, consideration should be given to reserving a share of any new water rights for Traditional Owners where this would be consistent with, and support, targets under the National Agreement on Closing the Gap.

This chapter summarises Supporting Paper D: Securing Aboriginal and Torres Strait Islander people's interests in water (SP D Cultural access). Further detail and analysis can be found in that paper.

Water is an essential part of connection to Country for Aboriginal and Torres Strait Islander people. Many water sources are featured in the Dreaming (oral histories of creation) and have significant spiritual value. They also support economic activity, including food production, and provide potable water — with cultural significance accompanying each water use. Special places near water have been sites for large gatherings for ceremonial, social or economic purposes. Rivers, creeks and lakes mark boundaries between groups and nations. And waterways have been transportation routes, with travel and trading partnerships defined by cultural relationships (National Cultural Flows Research Project 2014, p. v). In other words, the water needs of Traditional Owners span a wide range of cultural and economic purposes and:

[Traditional Owners'] involvement in the management of water is essential for [Traditional Owners'] physical, spiritual, cultural, environmental, social and economic health. (NBAN, sub. 17, p. 2)

9.1 Understanding of Traditional Owners' aspirations has evolved since the NWI was drafted

Parties to the National Water Initiative (NWI) committed to consultation with Traditional Owners in water planning (wherever possible) and inclusion of social, spiritual and customary objectives (or cultural values) in water plans. But progress against these commitments has been slow and objectives have not been fully achieved (*Assessment*). In 2017, the Commission concluded that most jurisdictions had 'routinely failed to identify and provide for Indigenous cultural values and objectives in water plans' (PC 2017b, p. 99). Stronger requirements through the Murray–Darling Basin Plan have led to better engagement, but Traditional Owners aspire to much greater access to, and control over, water resources.

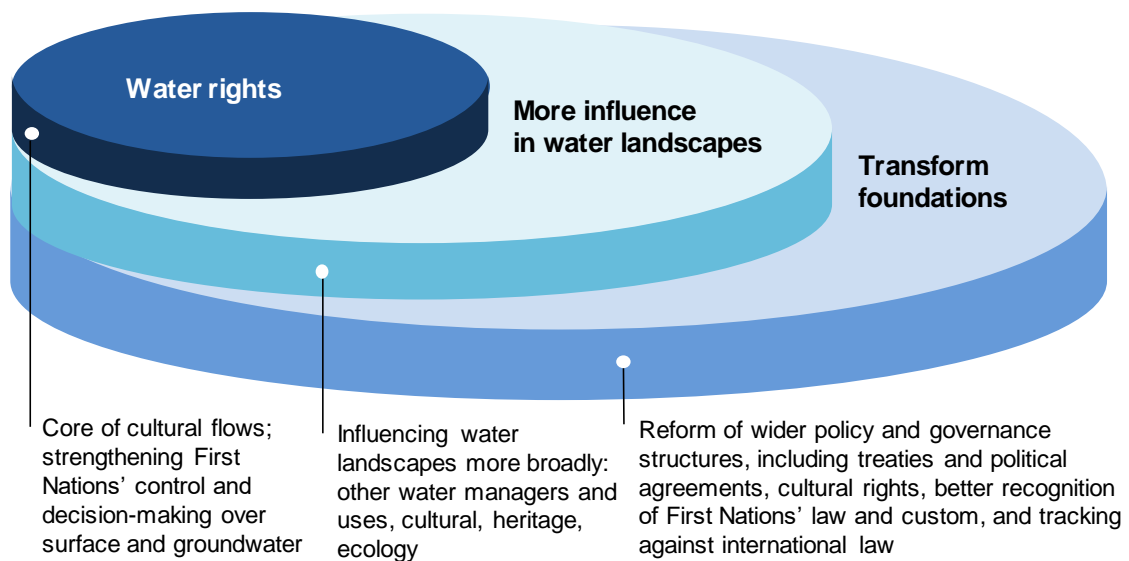
Since the NWI was agreed, Aboriginal and Torres Strait Islander people have articulated their thinking on water in a number of publications. For example, in 2007, 31 Nations in the Murray–Darling Basin endorsed a statement — the Echuca Declaration — on their rights and aspirations, using the term cultural flows to describe:

... water entitlements that are legally and beneficially owned by the Indigenous Nations of a sufficient and adequate quantity and quality to improve the spiritual, cultural, environmental, social and economic conditions of those Indigenous Nations. This is our inherent right. (MLDRIN 2007, p. 2)

A key difference between the NWI and the Echuca Declaration was that the latter explicitly broadened cultural outcomes (which were to be achieved by the provision of cultural flows) to include economic development.

The subsequent National Cultural Flows Research Project (2018) articulated how the broader idea of cultural flows might be implemented. The project, a collaboration between peak Aboriginal organisations, Australian Government agencies and private organisations, developed a framework to conceptualise how the aspirations of Aboriginal and Torres Strait Islander people could be met through legal and policy reforms (figure 9.1).

Figure 9.1 The National Cultural Flows Research Project framework introduced three legal and policy approaches to cultural flows



Source: National Cultural Flows Research Project (2018).

The broader policy context has also changed

Two other key developments of relevance to cultural flows have occurred since the NWI was agreed. In 2009, Australia adopted the United Nations Declaration on the Rights of Indigenous People. Articles 25 and 26 state that Indigenous peoples have rights to waters that they have traditionally owned, including the right to own, use and develop those resources (UN 2007). And in July 2020, all governments signed a National Agreement on Closing the Gap.

The National Agreement on Closing the Gap establishes four priority reforms to transform the way governments work with Aboriginal and Torres Strait Islander people: strengthening and establishing formal partnerships and shared decision-making; building the Aboriginal and Torres Strait Islander community-controlled sector; transforming government organisations so they work better for Aboriginal and Torres Strait Islander people; and improving and sharing access to data and information to enable Aboriginal and Torres Strait Islander communities to make informed decisions.

The National Agreement on Closing the Gap has implications for a new NWI in two key ways. First, the four priority reform areas transform the wider policy and governance context in which any new policy affecting Aboriginal and Torres Strait Islander people would be negotiated. These broad reform areas effectively reflect progress in the third component of the National Cultural Flows Research Project framework (transform foundations) and set the context within which a new NWI would be developed. Second, the Agreement includes several water-related commitments. One outcome sought is that ‘Aboriginal and Torres Strait Islander people maintain a distinctive cultural, spiritual, physical and economic relationship with their land and waters’ (Australian Governments and the Coalition of Peaks 2020, p. 34). And a new target is to be designed to:

... measure progress towards securing Aboriginal and Torres Strait Islander interests in water bodies inland from the coastal zone under state and territory water rights regimes. This will include data development to identify a nationally consistent measure for inland waters encompassing, for example, water licences, water rights and water allocation plans. (p. 36)

A target will also be developed for service provision for communities (chapter 11). A renewed NWI will have to meet these government commitments — both in the way it is developed and its policy content.

The NWI needs to much better reflect Traditional Owners aspirations

Understanding of Traditional Owners’ aspirations has evolved, and it has become clear that cultural values include the potential for economic development. Participants in this inquiry showed support for these aspirations. But provision of water for economic development requires the provision of entitlements to Traditional Owners — something not adequately covered by the NWI.

The focus on Traditional Owners’ interests in water should be elevated in a renewed NWI through a dedicated objective and new element. This is to take account of the water-related outcome and targets under the National Agreement on Closing the Gap, the disparity between the NWI and Aboriginal and Torres Strait Islander people’s aspirations, and the slow progress on improving recognition of Traditional Owners’ interests in water for much of the life of the NWI.

Many inquiry participants expressed support for action of this type (for example, MDBA, sub. 23, p. 9; ANU’s Institute for Water Futures, sub. 30, p. 7; Jackson, sub. 61, p. 1; Water RA, sub. 98, p. 4).

The Commission’s advice on a renewed NWI is framed in a way that reflects the National Cultural Flows Research Project’s framework through: ensuring that a renewed NWI is developed through a process that reflects the broad reform priorities of the National Agreement on Closing the Gap (largest circle); strengthening Aboriginal and Torres Strait Islander people’s influence in water management systems to achieve cultural outcomes

(second circle); and finally, addressing water rights consistent with commitments under the National Agreement on Closing the Gap (smallest circle).

DRAFT FINDING 9.1

Much more needs to be done to include Traditional Owners' interests in water in jurisdictional planning and the management of water. Slow progress against commitments made in the 2004 National Water Initiative, coupled with the contemporary context including the National Agreement on Closing the Gap and wide support for action, warrants inclusion of both a dedicated objective and new element in a renewed National Water Initiative.

9.2 A new policy element developed through co-design

Reflecting the National Agreement on Closing the Gap and its commitment to partnership, the new element for the NWI should be developed through a co-design process with Aboriginal and Torres Strait Islander people. Consistent with this, the National Water Reform Committee has recently established a Committee on Aboriginal Water Interests (the committee) for that purpose with Aboriginal members. The Commission supports this approach, but notes that to give issues associated with Aboriginal and Torres Strait Islander people's interests in water the status they warrant in policy making, the committee should report directly to water ministers overseeing the development of the renewed NWI (chapter 4).

A diverse group on the committee is essential. Consistent with this, the committee has members who bring a deep understanding of water resource management and a variety of perspectives. It also includes representatives from multiple States and Territories to cover variation in governance models due to differences in geography and culture, and has a gender balance to cover both Men's and Women's Business.

Content of the new element will need to align with governments' commitments under the National Agreement on Closing the Gap — actions consistent with the water outcome and targets could be included. There would therefore be significant benefits from coordination between the committee and the Coalition of Peaks members involved in developing the implementation arrangements for the National Agreement on Closing the Gap, particularly development of the inland waters target. The Commission also recognises the committee's experience and knowledge in water resource management. To ensure this knowledge is available to the Coalition of Peaks if required, the committee's terms of reference should allow for it to advise on, and contribute to, development of the inland waters target if requested.

The renewed National Water Initiative (NWI) should include both an objective and a new element dedicated to Aboriginal and Torres Strait Islander people's access to water and the involvement and participation of Aboriginal and Torres Strait Islander people in water management. The Commission supports the establishment of the Committee on Aboriginal Water Interests to develop the new NWI element.

In developing the new element, the committee should:

- ensure alignment between commitments under the National Agreement on Closing the Gap and new NWI content
- have a terms of reference that allows for an advisory role to the Coalition of Peaks
- report directly to water ministers.

9.3 Achieving cultural outcomes through enhancing the influence of Traditional Owners in water management

Cultural values relating to water are complex and diverse, and may vary significantly between Aboriginal and Torres Strait Islander peoples. But a common feature is that cultural values are inextricably linked to the environmental condition of Country. Given this, the most effective way of achieving cultural outcomes is through enhancing the influence of Traditional Owners in the water management processes that most affect their Country. These include water planning where the trade-offs between social, economic, environmental and cultural outcomes are agreed, and environmental water management and natural resource management in which on-ground action is taken to achieve agreed environmental outcomes. States and Territories can improve cultural outcomes through adjustments under the current water management arrangements, as well as through the development of a renewed NWI.

Water planning is a key vehicle for achieving cultural objectives. In 2017, the Commission found that most jurisdictions had taken steps towards providing for cultural values in water planning processes but more could be done. While many jurisdictions have made at least some progress since then, it remains insufficient. For example, according to the Murray Lower Darling Rivers Indigenous Nations:

... to the best of our knowledge, few, if any, statutory allocation or water sharing plans in the Basin provide rules for the protection of culturally significant water dependent values or clear, secure or meaningful volumetric allocations of water for cultural purposes or even for the purposes of exercising limited Native Title rights to water. (sub. 105, p. 8)

Reiterating the Commission's conclusion from its 2017 assessment, States and Territories should ensure both the specification of clear, measurable and well-informed cultural objectives in water plans, and monitoring and reporting arrangements that promote accountability and foster learning about what works (PC 2017b, p. 38).

Pursuit of cultural objectives through environmental water management is particularly feasible in the Murray–Darling Basin and southern Victoria where there is held environmental water and environmental water managers make active decisions on the key locations and timing for its use. For example, environmental flows could be planned to support bird breeding, fish movement or recruitment, or vegetation regeneration, which may be aligned with cultural objectives.

Engagement of Aboriginal and Torres Strait Islander people in environmental watering, and reporting on those activities, has broadly improved in recent years. A renewed NWI could build on this by requiring environmental water holders to seek to deliver cultural objectives through environmental watering where they are consistent with ecological obligations.

The provision of water for the environment is a critical element in achieving agreed environmental (and aligned cultural) outcomes, but it is not sufficient. It needs to take place within a broader natural resource management (NRM) program which aims to manage land and water in an integrated way to reduce environmental degradation and to achieve agreed community objectives.

Engaging Traditional Owners in NRM is the key avenue to recognise and strengthen their connection to Country. Involvement in NRM also provides an opportunity for Traditional Owners and catchment or land management authorities to partner in the management of cultural assets.

Achievement of cultural objectives through water planning, management of environmental water and NRM will rest on deep engagement with Traditional Owners, fostered through the development of long-term relationships around the management of Country. While all jurisdictions have mechanisms to engage Traditional Owners, inquiry participants have pointed to shortcomings in the quality of that engagement. For example:

Indigenous involvement in existing water planning can encompass a spectrum of involvement that encompasses limited engagement, active participation, through to formal and extended collaboration. There are currently significant variations across time and jurisdictions in the structure, process and consistency of implementation of existing regimes. (Indigenous Reference Group (IRG) to the Ministerial Forum on Northern Development, sub. 103, p. 16)

Principles for engagement, formal partnership and shared decision making that governments committed to in the National Agreement on Closing the Gap should also be reflected in a renewed NWI. This will help ensure cultural objectives are agreed and can be achieved through water planning, environmental water management and broader NRM.

In developing a new National Water Initiative element, the Committee on Aboriginal Water Interests should consider content that ensures that:

- cultural objectives are explicitly identified and provided for in water plans and progress in achieving those objectives is regularly monitored and reported publicly
- environmental water holders seek to deliver cultural outcomes whenever consistent with their ecological obligations
- natural resource managers incorporate cultural objectives into river and wetland plans and work with Traditional Owners in on-ground management programs to achieve them
- Traditional Owner engagement in water planning, environmental water management and natural resource management is of high quality and fostered through the development of long-term relationships (Draft NWI renewal advice 6.2, 8.3 and 8.9).

9.4 Enabling access to water for economic use

Aboriginal and Torres Strait Islander people consider that not only should cultural values be protected, but that there is also a need for water entitlements for community and economic development.

The NWI provided constrained recognition of Indigenous interests in water ... recognition was limited to social, spiritual and customary interests, not, as many indigenous leaders have argued economic interests. (Indigenous Reference Group (IRG) to the Ministerial Forum on Northern Development, sub. 103, p. 7)

A number of States and Territories have established, or are considering, specific provisions to enable access to water for economic use. For example, the:

- Australian Government has allocated \$40 million for purchases of entitlements in the Murray–Darling Basin (DAWE 2019)
- Northern Territory’s Strategic Aboriginal Water Reserves Policy sets aside a percentage of water in a water allocation plan for holders of Aboriginal land rights to use for economic development (Northern Territory Government 2017)
- Queensland Government has provided Traditional Owners with over 485 gigalitres of water per year through the Cape York Water Plan, enabling Traditional Owners to determine how the water is allocated and managed to achieve economic and cultural aspirations (SP D *Cultural access*).

Once developed, the target for inland waters under the National Agreement on Closing the Gap will likely also contribute to furthering access to water for economic use, through actions in the jurisdictional implementation plans associated with the agreement.

Where governments determine that access to water is the best way to support economic development, that access should be facilitated as efficiently and transparently as possible within existing entitlement frameworks. Where the consumptive pool is fully allocated, water should be bought from entitlement holders on the market to retain system integrity. And reserves for exclusive use can be created in systems where the consumptive pool has not been fully allocated. Transparency through these processes will be important in sustaining confidence in water rights and the development of efficient water markets.

As discussed in chapter 13, governments are also considering significant water infrastructure investments. The NWI calls for demonstration of environmental sustainability and economic viability of a major development before it is approved. Consideration could be given to extending the NWI criteria for major water infrastructure investments to ensure they are also *culturally responsive* — that is, the aspirations and concerns of Traditional Owners are understood, discussed and considered in developing plans for major infrastructure; and proponents specifically identify and account for impacts on Aboriginal and Torres Strait Islander heritage and other cultural values associated with water. Where a dam is approved, particularly in undeveloped areas, governments should give consideration to whether reserving a share of any new water rights for Traditional Owners would be equitable in light of identified impacts on Aboriginal and Torres Strait Islander communities, and/or contribute to the development of those communities and the achievement of targets set under the National Agreement on Closing the Gap.

Whatever approach to facilitating access is adopted, supporting arrangements will be needed to maximise the longer-term benefits from water holdings. Access to water is not the only barrier that Aboriginal and Torres Strait Islander people potentially face in taking advantage of economic development opportunities. Other factors, such as access to specialist skills and knowledge, experience with water-related businesses and the infrastructure and financial capital needed to make best use of water are also important. Water access arrangements are likely to produce the greatest value when they are part of a broader strategy for community development, which may include investment in education, training and business development.

Good policy design principles would also support success in providing water for economic purposes: effective engagement through co-design; a clear and measurable policy objective; consideration of the range of ways in which the objective could be met (including via the provision of resources other than water); transparent evaluation of each option; and policy review to test what works. Given the value of water to other users including the environment, governance arrangements and clear accountabilities for water provided to Traditional Owners should also be established.

Finally, for transparency and to demonstrate progress against NWI and other commitments, governments should regularly report publicly on water provided for economic development and the outcomes supported by those allocations.

DRAFT NWI RENEWAL ADVICE 9.3: IMPROVING ACCESS FOR ECONOMIC DEVELOPMENT

In developing a new National Water Initiative element, the Committee on Aboriginal Water Interests could consider content that ensures that, where State and Territory Governments have decided that providing access to water is an effective way to support the economic development of Aboriginal and Torres Strait Islander communities, access is provided by:

- sourcing water within existing water entitlement frameworks, such as by purchasing water on the market or as part of transparent processes for assigning unallocated water
- ensuring adequate supporting arrangements (such as training and business development) are in place to enable Aboriginal and Torres Strait Islander communities to maximise the value of the resource for their needs and uses
- actively involving Aboriginal and Torres Strait Islander communities in program design.

This would be supported by:

- specifying and implementing governance arrangements for such water
- regularly monitoring and publicly reporting on the inland waters target under the National Agreement on Closing the Gap.

Where governments invest in new water infrastructure, particularly in undeveloped areas, governments should consider whether reserving a share of any new water rights for Traditional Owners would be consistent with plans for future community development and assist in meeting targets set under the National Agreement on Closing the Gap.

10 Ensuring the integrity of water resource management

Key points

- Given the demands on water in Australia, water users and the broader community need to be able to trust that it is being managed to best effect.
- Recent reviews into compliance and enforcement in the Murray–Darling Basin found numerous shortcomings around governance, practice and resourcing. Growing mistrust and a lack of confidence in water system management during the drought were a consequence.
- While such problems have not been seen elsewhere, the Murray–Darling Basin experience contains important lessons for national policy, and recent government responses offer insights on best practice.
- Credible information about how water is used, by whom, when and why, combined with robust institutional processes, underpins the integrity of water management systems.
- A renewed National Water Initiative (NWI) would be strengthened by broadening the water accounting element to ensure the provision of credible and reliable information and institutional processes that provide assurance that:
 - entitlement holders are operating in line with their rights and water use is consistent with established rights and plans
 - water resource systems are being managed to best effect for all users.
- Provision of trusted information on the broader water context is also needed to improve understanding of key water resource challenges and potential risks, enabling entitlement holders, industry and communities to better plan for the future.
- To ensure the integrity of water use, a renewed NWI should require fit-for-purpose:
 - metering and measurement of surface water and groundwater take
 - registers and reporting on use that reflect the benefits of this information for water resource management and support compliance and enforcement systems
 - compliance and enforcement systems, including a focus on proactive regulation to increase entitlement holders' awareness of their obligations.
- To promote trust and confidence, a renewed NWI should require water system managers to:
 - take a risk-based approach to developing and maintaining information and data collections
 - ensure information and data sources are publicly available and effectively communicated
 - implement transparent quality assurance processes to ensure information is credible
 - ensure that information about their operations is transparent.
- Information regarding the broader water context (which enables entitlement holders, industry and communities to better plan for the future) must align with users' needs.

This chapter summarises Supporting Paper E: Ensuring the integrity of water resource management (SP E Integrity). Further detail and analysis can be found in that paper.

10.1 Confidence in water management has been tested

Given the demands on water in Australia, water users and the broader community need to be able to trust in water resource management. They need to have confidence that water users are complying with their obligations and that water managers are managing this valuable resource to best effect. In other words, system management needs to have integrity.

The National Water Initiative (NWI) recognised this through a water accounting element. Parties agreed that:

... the outcome of water resource accounting is to ensure that adequate measurement, monitoring and reporting systems are in place in all jurisdictions, to support public and investor confidence in the amount of water being traded, extracted for consumptive use, and recovered and managed for *environmental and other public benefit outcomes*.¹

The agreement included actions to ensure that:

- water accounts provide credible information on whether water use (both for consumption and by the environment) is consistent with established rights and water plans
- a consistent approach to metering of water use was adopted across the country
- systems to monitor and enforce compliance were effective.

Further, in 2009 COAG agreed to a *National Framework for Non-Urban Water Metering* (the Non-Urban Metering Framework) to help jurisdictions meet their metering commitments (DAWR 2009), and development of a *National Framework for Compliance and Enforcement Systems for Water Resource Management* (the National Compliance Framework) to improve compliance and enforcement efforts (COAG 2012).

Recent events show that these frameworks have not been enough to safeguard the integrity of water resource management. The 2017 ABC Four Corners program *Pumped* focused a spotlight on issues in the Murray–Darling Basin (MDB) (particularly in New South Wales and Queensland²) and was a wake-up call to many stakeholders and communities around the country (SP E Integrity: section 1.2). Multiple reviews followed³, finding:

- shortcomings with the transparency, independence and effectiveness of the agencies responsible for regulating access entitlements for water resources

¹ NWI paragraph 80.

² The 2017 review into compliance found that Victoria and South Australia had strong compliance systems and cultures in place with the main issues being an inadequate suite of penalties and sanctions and an ageing meter fleet respectively (MDBA 2017, pp. 12–13).

³ (ICAC (NSW) 2020; Matthews 2017; MDBA 2017; NSW Ombudsman 2018; SA Government 2019; Waldron, Tan and Johnson 2018)

-
- lack of commitment to accurate metering and measurement⁴ of water take
 - low levels of compliance resourcing and a weak compliance and enforcement culture
 - an inappropriate range of penalties and sanctions available for enforcement
 - a preference for customer service over regulation.

New South Wales and Queensland have since initiated reforms, and in 2018 MDB jurisdictions signed the Murray–Darling Basin Compliance Compact (MDBCC) to implement the many recommendations coming out of the reviews and try to restore confidence in water management.

The reviews also revealed growing mistrust and a lack of confidence in water system management fuelled by inadequate information, poor communication of the information that is available, and difficulties for stakeholders in accessing, navigating and reconciling available data collections. A lack of transparency around water system managers’ decision making, operations and performance contributed to concerns that they are not being held accountable, and about water availability, worsening the relationship between communities and water system managers (and the governments that fund them) (IIGMDB 2020, p. 40).

The MDB experience highlights the importance of establishing credible and trusted water management before systems become highly contested, and provides insights into how trust and confidence in water resource management can be gained and maintained.

A framework for trusted and credible water resource management

Trusted water resource management is underpinned by credible and reliable information and robust institutional processes that provide assurance that:

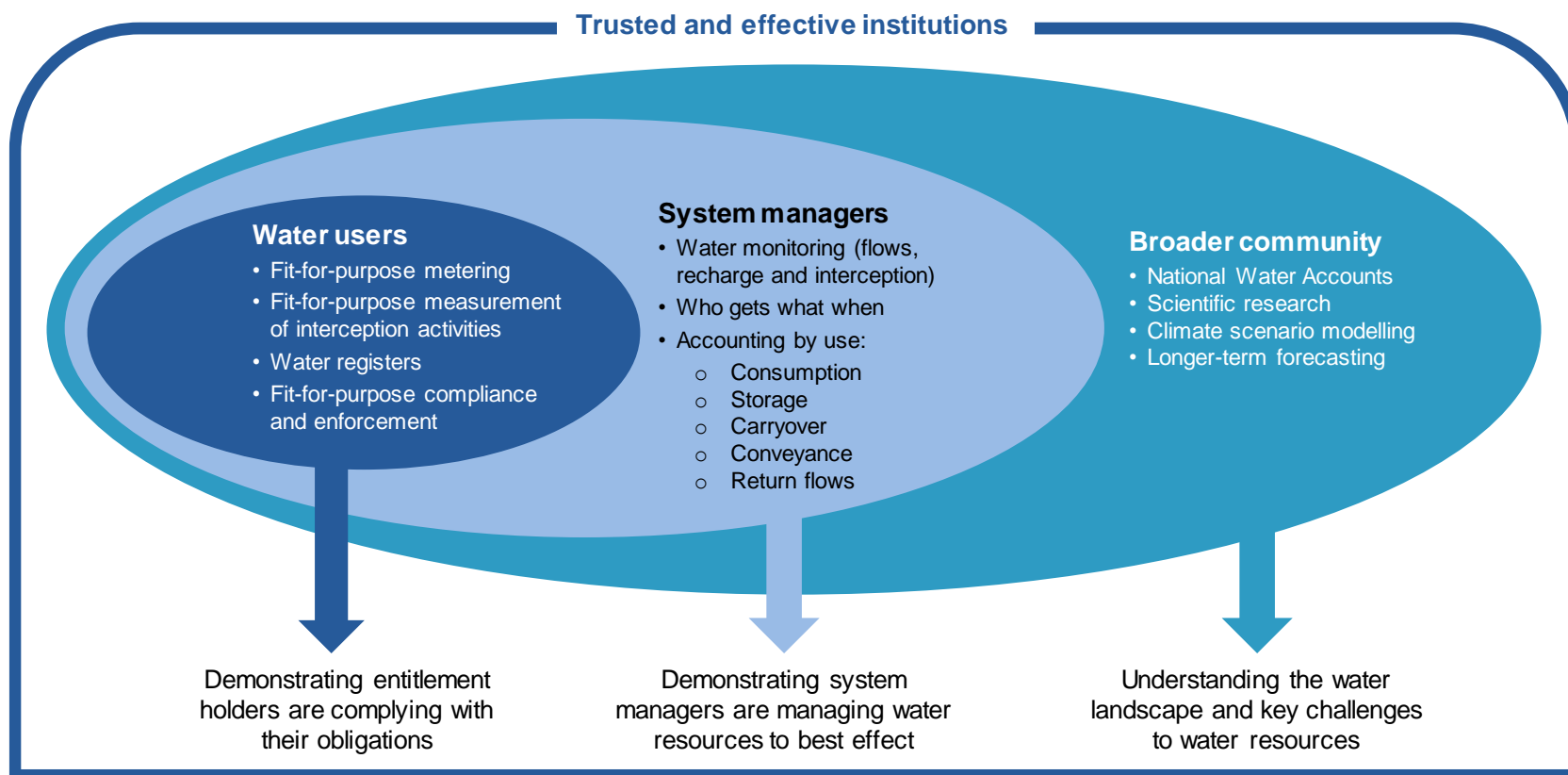
- entitlement holders are operating in line with their rights and that water use is consistent with established rights and water plans
- water systems are being managed to best effect for all users.

Trust is also influenced by the availability, and understanding, of information about the broader water context. This information helps water sector participants understand water challenges and potential risks, enabling them to effectively plan for the future.

Figure 10.1 conceptualises the requirements needed to ensure the integrity of the entitlements system and water resource management more generally.

⁴ Measurement is given effect through the use of meters to assess the volume of water taken from surface water or groundwater resources and estimates of the water taken when metering is not practical, such as interception of water through farm dams, forestry or floodplain harvesting.

Figure 10.1 Framework for ensuring integrity in water resource management^a



^a Water use includes access through entitlements, stock and domestic use, interception activities, environmental use (planned), cultural use and community use through drinking water, recreation and liveability.

In short, efforts to ensure integrity need to go well beyond water accounting. Given this, and the issues raised through recent reviews, a renewed NWI would be strengthened by including a new ‘system integrity’ element with content that ensures the integrity of water use and water system management, and includes best-practice principles for information collection on the broader water context.

DRAFT NWI RENEWAL ADVICE 10.1: BUILDING SYSTEM INTEGRITY THROUGH A RENEWED ELEMENT

A renewed National Water Initiative would be strengthened by acknowledging that ensuring the integrity of water resource management requires more than robust water accounting. To build integrity into system management, consideration should be given to broadening the water resource accounting element to ensure that the provision of credible and reliable information and robust institutional processes provide assurance that:

- entitlement holders are operating in line with their rights and that water use is consistent with established rights and water plans
- water systems are being managed to best effect for all users.

The provision of information regarding the broader water context is also needed to improve understanding of key water resource challenges and potential risks, enabling entitlement holders, industry and communities to better plan for the future.

10.2 Ensuring integrity in water use

Fit-for-purpose metering and measurement is required

Metering and measurement are integral to effective water resource management. They not only provide a record of how much water has been taken, when and where but also provide the means to implement an effective compliance and enforcement regime.

Despite progress in recent years, states and territories have not fully implemented the requirements of the Non-Urban Metering Framework (*Assessment*: section 5; Irrigation Australia, sub. 3, pp. 3–6; SRI, sub. 77, p. 12).

While MDB jurisdictions have revised their non-urban metering policies under the MDBCC to meet requirements consistent with the Non-Urban Metering Framework and the NWI, concerns remain, for example, about floodplain harvesting in the Northern Basin and unauthorised use of diversions (SP E *Integrity*: section 3.1). Non-MDB jurisdictions are at various stages in metering implementation, and inquiry participants raised a lack of compliance with national meter standards and the Non-Urban Metering Framework. For example, in Western Australia approved meters do not have to comply with Australian

Standard 4747¹ and in Tasmania there is no reporting on metering, so it is unclear if metering standards are being enforced (Irrigation Australia, sub. 3, p. 7).

Best-practice guidelines for minimum metering thresholds have recently been developed collaboratively by the Murray–Darling Basin Authority (MDBA) for all states and territories, including a risk-based approach to setting thresholds (MDBA 2019). The MDBA is currently coordinating a review of the Metrological Assurance Framework (requirements in the Non-Urban Metering Framework to ensure confidence in meter performance) and the revised framework will look to include a greater use of risk management to prioritise metering implementation and management requirements (pers. comm., MDBA, 23 November 2020).

A renewed NWI should reflect any changes that result from this review so that metering and measurement requirements are fit for purpose.

Registers and reporting on use

Water registers provide a public record, capturing the identity of all water access entitlement holders and the price and location of trades. While water register data on entitlements and trade provide information that supports the smooth functioning of water markets (chapter 7), registers are also a critical source of information for water system managers, environmental water managers, regulators, policy analysts, infrastructure operators and the wider community. They enable understanding of who has an entitlement and how they are using it over time in a clear and transparent way — underpinning the integrity of the water entitlement system.

Technological innovations are improving options for accessing and using water register data in cost-effective ways, bringing a range of benefits.

While water registers have progressively improved over the years in response to the evolution of water markets and needs of water users (*Assessment*: section 2), only one guideline out of six on water registers in the NWI explicitly acknowledges the critical function they provide to water resource managers to monitor trade and water use as an input to water accounting systems. In addition to supporting trade decisions, a renewed NWI should consider reflecting the benefits that water registers can deliver more broadly for water resource management, and in supporting compliance and enforcement systems.

Commitment to leading-practice compliance and enforcement

While the National Compliance Framework laid out good foundations for compliance and enforcement systems (for example, monitoring and reporting), the MDB reviews uncovered

¹ Under the *Rights in Water and Irrigation (Approved Meters) Order 2009*, s.3, the Department of Water does not advise on selection of a preferred type, make, model or water meter manufacturer. Selection of a water meter is based on a ‘fit for purpose’ rule considering the local water and environmental considerations, cost effectiveness, maintenance and system operating requirements (Government of Western Australia 2009, p. 4).

gaps including the absence of a strong, independent compliance culture and insufficient resourcing and capability — critical components of leading-practice systems.

Many of the required MDBCC elements (box 10.1) are consistent with good governance, such as transparency, enabling of technologies, secure funding and support for capability.

Box 10.1 Compliance framework requirements for Murray–Darling Basin jurisdictions

Two key commitments made by each Murray–Darling Basin jurisdiction and the Murray–Darling Basin Authority through the Basin Compliance Compact were to:

1. publish a revised compliance framework addressing the following requirements from recommendation six of the Murray–Darling Basin Compliance Review:
 - (a) a risk-based strategy for guiding compliance monitoring effort
 - (b) annual audit priorities
 - (c) an escalation pathway to apply once non-compliance is detected
 - (d) a mandatory protocol for entitlement holders to follow in the event of meter failure
 - (e) a statement of the penalties and sanctions regime, and any improvements required
 - (f) annual reporting of data on compliance activities by location including the timeliness with which allegations are addressed
 - (g) provisions to ensure compliance staff are adequately trained
 - (h) a program to ensure information about entitlements, allocations, licence conditions, meter readings, account balances and so on are easily accessible to the public in real time
 - (i) a program to ensure meters are identified by a unique reference number, and entitlement and pump details are publicly accessible
 - (j) a commitment to effectiveness and efficiency, including the adoption of new technologies
 - (k) adequate resourcing based on a cost-recovery pathway, with compliance budgets protected from the normal exigencies of government budgets.
2. establish a network of water compliance practitioners, co-ordinated by the Murray–Darling Basin Authority, to promote best practice and innovation in water compliance.

Sources: MDB Ministerial Council (2018, p. 4), MDBA (2017, pp. 21–22).

The MDBCC also provides a good blueprint for accountability principles — compliance with arrangements ‘will be measured, publicly reported on in a timely manner and independently verified’ (MDB Ministerial Council 2018, p. 3). Transparency and accountability of governance arrangements considered in the MDBCC (action 1.1) to ensure a strong culture of compliance included publication of:

- a statement of obligations for non-urban water management
- Ministerial letters of expectations (including an expectation of regulatory best practice)
- compliance metrics as a performance indicator.

Renewal of the NWI provides an opportunity to embed leading-practice principles for compliance and enforcement effort, including good governance and clear regulatory objectives. Adoption of leading practice would facilitate confidence and trust in the institutions responsible for supporting water entitlement property rights. The MDBCC requirements provide a sensible starting point. Supporting frameworks (such as a revised National Compliance Framework) could provide guidance on fit-for-purpose risk-based implementation.

Water users need to understand their entitlement obligations

The complexity of water legislation and water management in most Australian jurisdictions means that many water users may be unintentionally non-compliant with their licence conditions. It also complicates the compliance task.

The water regulatory system in NSW, and indeed the Commonwealth, is exceptionally complex. Not only are the relevant state and Commonwealth water Acts and Regulations long, detailed and interdependent, there are many different [Water Sharing Plans], each with unique and contingent rule settings and historical precedents. Monitoring and enforcing compliance with market rules is therefore a significant challenge. (ICAC (NSW) 2020, p. 157)

As part of the NWI renewal process, jurisdictions should consider: investigating the extent of unintentional non-compliance stemming from the complexity of their water laws; whether existing strategies to educate and engage with entitlement holders on their obligations are effective; and whether a broader review of their legislation might be warranted.

Resourcing also merits attention. The MDBA's (2017, p. 14) review found that New South Wales and Queensland both had low levels of compliance resourcing, and that this was a contributing factor to New South Wales' ineffective and inconsistent compliance regime. While funding for regulating non-urban water use has been forthcoming in the MDB jurisdictions in the past two years, concerns remain for the longer term (ICAC (NSW) 2020, p. 158 EDO, sub. 54, p. 8). As long as funding is subject to annual budget processes, there is a risk that regulatory agencies will need to prioritise reactive over proactive regulatory activities.

DRAFT NWI RENEWAL ADVICE 10.2: ENSURING THE INTEGRITY OF WATER USE

To ensure the integrity of water use, a renewed National Water Initiative would be strengthened by requiring fit-for-purpose:

- metering and measurement of surface water and groundwater take
- registers and reporting on use that reflect the related benefits for water resource management and support compliance and enforcement systems
- compliance and enforcement systems, including a focus on proactive regulation to increase entitlement holders' awareness of their obligations.

Inclusion of leading-practice compliance principles would also strengthen the agreement. Compliance framework requirements from the Murray–Darling Basin Compliance Review provide good foundation principles, but consideration should be given to augmenting them with requirements consistent with leading-practice governance.

10.3 Ensuring the integrity of water system management

Generally, water system managers' key objective is to operate water systems to best effect, to maximise benefits for entitlement holders and the environment. In highly developed and regulated catchments, they may need to balance other objectives including flood management, and have regard for economic, social, environmental and cultural activities and the values of communities using the water system (MDBA 2018, pp. 10–11). It is a complex task requiring judgement — built on information collection and system knowledge, informed by modelling and refined through operational practice. Ensuring trust in water system management requires action on a number of fronts.

Access to a range of information

System managers need a deep understanding of their system, how it behaves under different climate conditions and the key risks to the water resource. However, there are gaps in data collections. For example, several inquiry participants highlighted a lack of information on interception activities (farm dams and bores, floodplain harvesting and large-scale plantation forestry), and that where information is collected, it is not being shared with the public (MDBA, sub. 23, p. 5; IWF, sub. 30, p. 9; LBA, sub. 70, p. 4).

While information gaps can hamstring managers, collecting, processing and analysing data can entail significant costs. For example, it has taken many years and more than \$37 million to develop the databases and models needed to regulate floodplain harvesting in New South Wales (DPIE (NSW) 2019b, p. 1).

A risk-based approach should be employed in weighing up the costs and benefits of meeting information needs. For example, in water systems that are highly developed and fully

allocated, the costs of inadequate information (and the risks of mismanagement) are likely to be higher than in a water system that is less developed. In the former systems, the benefits of collecting adequate information are likely to outweigh the associated costs.

Effective communication and sharing of information

While water system managers need to collect the right data to inform their operations, simply collecting data is not enough to assure the broader community that managers are doing a good job.

[A] great deal of mistrust in governments and between stakeholders could be avoided if more information was made publicly available (and in an accessible format). (EDO, sub. 54, p. 9)

Water system managers provide a large amount of information through reports and websites — however, there are concerns that important and relevant information is not always made publicly available (IWF, sub. 30, p. 9; EDO, sub. 54, pp. 9–11). Where information is provided, it can be difficult to access, navigate and understand (IIGMDB 2020, pp. 25, 29). Inconsistencies across sources is a further problem. This is largely an issue in the MDB where a number of agencies are responsible for management and river operations (IIGMDB 2020, p. 40). Information related to a specific water system needs to be available and easily accessible in one location. And water system managers should be responsible for this. In the case of the MDB, greater collaboration between system managers is needed to ensure that data and language are consistent, and that information is accessible from a single website.

Quality assurance to enhance the credibility of information

Water information is most trusted and valued when it is quality assured. However, ‘[e]ven when information is provided, there is a lack of trust in the agency providing the information’ (MDBA, sub. 23, p. 14).

This issue particularly applies to water information generated through modelling. Although model estimates are always approximate, work is needed to promote trust and confidence in the underlying work, particularly because a significant amount of water cannot be directly measured. To build credibility, water system managers need to ensure their models are: regularly tested; evaluated and updated to encourage ongoing improvement; peer reviewed; and in shared systems, accredited.

Currently, there are no national guidelines that classify water data quality or support improvements in water data and information quality. Nor are there formal quality assurance procedures for water data. In renegotiating the NWI, jurisdictions should agree to have formal quality assurance processes in place for information collected and used by water system managers. There could be merit in a standardised national approach for determining and reporting data quality for key types of water information.

Transparency to hold water system managers to account

Given the potential impacts of water system managers' decisions on water users and the broader community, processes need to be in place to hold them accountable.

First, appropriate governance arrangements (which outline processes for decision making and implementation) are needed. A comprehensive review of governance arrangements for all system managers is beyond the scope of this inquiry, but the Commission has not heard evidence suggesting concerns about the arrangements that are in place.

Second, water system managers need to publish sufficient information about how they make operating decisions. However, there are concerns that this is not happening. For example, Steinfeld et al. (2020, p. 11) found that some management rules were omitted from agency reports, and that public records regarding resource assessment processes, how allocation decisions were made, and justification of management rules were not available. Further, there may be a lack of transparency around the performance of water system managers. For example, while independent annual assessments of the MDBA's performance in managing the River Murray system are undertaken, only the most recent assessment is publicly available (IRORG 2020, p. vi). Making independent audit reports publicly available would promote accountability and improve transparency.

Finally, system managers need to be responsive to public concerns and engage with stakeholders to improve information provision. Those that do not respond, or respond slowly, to community concerns may contribute to diminished transparency and increased uncertainty, misperceptions or misappropriation of information — which is what has been observed in the MDB (IIGMDB 2020, p. 38). Engagement with stakeholders would help system managers determine if available information adequately demonstrates to the public that water systems are being managed to best effect.

DRAFT NWI RENEWAL ADVICE 10.3: ENSURING THE INTEGRITY OF WATER SYSTEM MANAGEMENT

To ensure the integrity of water resource management, a renewed National Water Initiative would need to require water system managers to:

- adopt a risk-based approach to developing and maintaining information and data collections necessary for effective water system management. These collections should include information about how much water is in a system, where it is, how much is extracted (including by interception activities), how much is carryover, and who gets what and when
- ensure that information and data sources are publicly available and information is accessible and effectively communicated. Where multiple agencies are responsible for a system's management, collaboration is needed to ensure that data and language are consistent and information is accessible from a single online source
- implement quality assurance processes for information and data sources to enhance the credibility of information, including independent audits for highly developed and regulated systems
- ensure information about their decisions, operations and performance is transparent and that public concerns and information requests are responded to expediently.

Stakeholder engagement would improve information provision and help system managers determine if available information adequately demonstrates to the public that water systems are being managed to best effect.

10.4 Building understanding of the broader water context

Information that meets the needs of water users and communities

Inquiry participants raised concerns that information on the broader water context does not meet the needs of water users and communities. For example, the MDBA noted that:

... there is a need for governments to reconsider the way information is shared. The focus must shift from providing more information about “what Governments are doing” to providing better information addressing “what water users need” to navigate the system, run their businesses and have confidence in management arrangements. (sub. 23, p. 12)

System water accounts (that provide information related to a specific system) and national water accounts (information made available at a national scale) received particular comment. For example, with respect to system accounts, public access to water-related information (including for licensing and allocation details, applications and approvals for trades and statutory permits) is lacking or non-existent in some jurisdictions (EDO, sub. 54, p. 9). This makes it difficult to scrutinise approvals and assess their lawfulness. And stakeholder engagement continues to find that the needs of water users, communities and the broader public are not being met (MDBA, sub. 23, p. 12). Water system managers need to engage with water users and communities to ensure that system accounts are relevant and useful (chapter 14).

And, while national accounts are generally providing practical, credible and reliable information, largely without duplication of efforts by jurisdictions (*Assessment*: section 5), there is scope to improve them. For example, connectivity between surface water and groundwater systems is only accounted for in some areas and is not typical (Turner, Vanderbyl and Kumar 2019, pp. 22–23). Campbell (sub. 60, p. 1) noted that the Bureau of Meteorology’s integrated groundwater data collection has lost value due to a declining monitoring network that provides the data. And inquiry participants criticised gaps in the accounts and the lack of independent auditing (IWF, sub. 30, p. 8; EDO, sub. 54, p. 6; LBA, sub. 70, attach. 1, p. 2). It was suggested that a national water audit would verify, check, evaluate and interpret catchment and basin-wide water accounts (IWF, sub. 30, p. 11). However, an audit would not identify gaps in information — a broader review with stakeholder engagement is required.

A renewed NWI should advocate for information on the broader water context to be shared in an accessible, timely and user-focused way and ensure it meets the needs of water users and communities. The information needs of water users and communities may change over time (MDBA, sub. 23, p. 12) — system water accounts and national water accounts will need to be periodically reviewed and updated accordingly.

DRAFT NWI RENEWAL ADVICE 10.4: ENSURING INFORMATION ON THE BROADER WATER CONTEXT ALIGNS WITH USERS’ NEEDS

In renegotiating a renewed National Water Initiative, jurisdictions should commit to providing information on the broader water context that meets the needs of system participants (including water planners, managers, users and communities).

National and system water accounts should be reviewed. In undertaking these reviews, system participants must be engaged to ensure useful and meaningful information is reflected in accounts in the future.

A renewed National Water Initiative should acknowledge the utility of national water accounts and require their regular publication and avoidance of unnecessary duplication of effort in their preparation.

11 Urban water services

Key points

- Under the 2004 National Water Initiative (NWI), all jurisdictions committed to: implement best-practice pricing and institutional arrangements for urban water services; pursue urban water reform; and undertake specific actions as part of these endeavours. COAG subsequently endorsed the *National Urban Water Planning Principles* (2008) and the *NWI Pricing Principles* (2010).
- Urban water reform has brought significant benefits. Good progress has been made towards improving urban water service outcomes, as well as efficient and financially sustainable service provision. But there are shortcomings in pricing and the application of economic regulation, and there is a strong case for NWI renewal to help address emerging challenges.
 - Climate change, population growth and changing community expectations will place pressure on urban water service providers, necessitating changes to business-as-usual water services provision.
 - Safe and reliable drinking water can be more challenging and costly to supply to regional and remote communities than to major cities. Drought, bushfires and COVID-19 have brought service delivery issues into sharp relief, including water security challenges in regional New South Wales and Queensland, and drinking water quality issues in some remote communities.
- A renewed NWI should include significantly enhanced treatment of urban water, including best-practice system planning, pricing and institutional arrangements. This could help the sector adjust and avoid imposing unnecessary costs on customers.
- Best-practice system planning should: be guided by agreed levels of service that establish long-term supply objectives; incorporate an integrated approach across water supply, wastewater and stormwater management; embody a commitment to ensuring all options are on the table; and set out clear roles and responsibilities for governments, utilities, regulators, developers and land-use planners.
 - State and Territory Governments should also commit to defining and ensuring access to a basic level of service, based on safe and reliable drinking water, which would guide government subsidies for high-cost regional and remote water services.
- A renewed NWI should recommit to cost-reflective pricing and look to further improve pricing and institutional arrangements across all water service provision by:
 - developing national principles to improve the quality of independent economic regulation, with formal regulation of large providers and light-touch economic oversight of small providers, based on a framework that guides the coverage of economic regulation
 - recommitting to (and improving) public monitoring, reporting and benchmarking of pricing and service quality outcomes, especially in remote communities.

This chapter summarises both Supporting Paper F: Urban water services (SP F Urban) and Supporting Paper G: Urban water services: regional and remote communities (SP G Regional). Further detail and analysis can be found in those papers.

11.1 Australia has seen significant urban water reform

Reform from the 1990s drove major changes to pricing practices, institutional arrangements and ownership structures in the urban water sector (Salisbury, Head and Groom 2017), and the 2004 National Water Initiative (NWI) built on this effort. Signatories committed to:

- *best-practice pricing and institutional arrangements* to promote the efficient and sustainable use of urban water sources, infrastructure and government resources devoted to water management
- *urban water reform* to ensure healthy, safe and reliable water supplies, encourage water use efficiency and innovation, achieve improved pricing and facilitate water trading between the urban and rural sectors.

Further guidance came with the:

- *National Urban Water Planning Principles* (DAWE (Cth) 2019) in 2008 — designed to help governments and water utilities plan the development of water and wastewater services
- *National Water Initiative Pricing Principles* (NRMMC 2010) in 2010 — technical guidance to improve how jurisdictions set water charges; particularly, for recovering capital costs in line with NWI requirements.

11.2 Much has been achieved but the case for further action is clear

Past water reforms have provided significant benefits for urban water users. Widespread adoption of cost-reflective and consumption-based pricing has provided better signals to consumers to use water efficiently, contributing to change in water user behaviour, as well as ensuring reliable revenue streams to secure the financial sustainability of service providers. Institutional separation of policy making, service delivery and regulation has improved accountability and transparency in the sector. And corporatisation, alongside the introduction of independent economic regulation, has encouraged commercial behaviour — promoting more efficient investment decisions by providers (and lower prices for customers).

Although these foundational reforms have delivered benefits, most of them were delivered by the early 2000s with a period of relative inaction since. And there is no guarantee that they will be adequate for the future. Shortcomings of the NWI, alongside unfinished reform business and the challenges emerging from changing water supply and demand, create an imperative to reinvigorate the urban water reform effort.

Blind spots in the NWI, and unfinished reform business

The NWI included only a few actions specific to urban water (now largely completed or outdated) while a number of key areas were overlooked at the time.

- Although they contain sound guidance, the 2010 *National Urban Water Planning Principles* do not form part of the NWI. Jurisdictions are not required to comply with the principles, and they have been unevenly embedded in utility planning (DOE (Cth) 2015).
- Pricing and institutional commitments were quite detailed in some areas, but relatively minimal in others (such as independent economic regulation). Further, they applied only to water and wastewater services, although there was a commitment to develop stormwater pricing policies, stormwater management was not mentioned.
- Beyond a high-level commitment to ‘safe, healthy and reliable water’, the agreement said little about water service quality.

The lack of detailed actions pertaining to the urban water sector, alongside lessons from subsequent extreme events, have made the NWI largely irrelevant to the sector.

For many in the sector, and governments more broadly, the National Water Initiative (NWI) has become an irrelevant factor in planning and investment decisions. Lessons from the Millennium Drought, which exposed poor planning and an absence of accountability, remain largely unaddressed, and progress in water pricing reform is inadequate. (Infrastructure Partnerships Australia, sub. 71, p. 2)

Further, there is still unfinished business against the NWI — principally within pricing practices and in the application of economic regulation. The Commission’s assessment found that some pricing practices — such as setting rates of return below a commercial rate of return, price freezes, and cross-subsidisation of water supply and wastewater services — are inconsistent with the NWI requirement of full cost recovery. And the lack of alignment between available data and the *NWI Pricing Principles* prohibited an assessment of full cost recovery in some cases (*Assessment*: section 3.1).

The significant costs of addressing the challenges ahead reinforce the need for clear national guidance

Challenges confronting water management in Australia are significant (chapter 2). A changing climate threatens long-term urban water security. ‘[O]f all the forms of infrastructure, the potential risks and costs of climate change are greatest in the water sector’ (IA 2019, p. 601). Extreme events (including floods and bushfires) are also likely to occur more frequently, and these water supply shocks will especially challenge the ability of smaller regional and remote service providers to maintain water quality and availability.

Demand for water services is also increasing, with rising populations in major cities and regional centres (chapter 2: figure 2.8).

Growth impacts for the water sector include obvious needs like greater water supply, but it also means more hard surfaces, increased wastewater discharges to manage within environmental protection constraints, large and costly new treatment infrastructure, and considerations of stormwater and flood management as the urban footprint expands. (WSAA, sub. 88, p. 13)

In some areas, for example in the Hawkesbury–Nepean River catchment in Sydney, the expanding populations in Sydney’s western growth corridor mean local waterways are increasingly important for recreation. More generally, communities have rising expectations of water services, with increasing recognition of the importance of liveability and urban amenity to health and wellbeing. COVID-19 lockdowns have accentuated this awareness and:

The community will maintain its desire for high quality open space, interaction with healthy waterways, and preservation of bushland and the natural environment as they seek opportunities for local recreation, and seek refuge from increasing threats, such as urban heat. (Sydney Water, sub. 94, p. 10)

Governments and urban water utilities are aware of these pressures, and of the associated need for significant investment. Across the Australian urban water sector, data to 2022-23 show capital expenditure rising to over \$6 billion a year, with a significant increase in renewals and maintenance expenditure for water supply and wastewater assets (Deputy Executive Director, WSAA, pers. comm., 10 December 2020). The planned expenditure also covers anticipated supply augmentation investments. Decisions over these investments are complicated by uncertainty over the likely timing and nature of climate change-induced shifts in water availability (chapters 2 and 13). Future investment in stormwater infrastructure (which is usually under the purview of local government) is also likely to be substantial — Melbourne Water has proposed \$244 million of capital expenditure for waterway and drainage services each year from 2021-22 to 2026-27 (Melbourne Water 2020, p. 197).

The billion dollar capital investment pipeline in major cities presents opportunities and risks — opportunities to improve water service outcomes for customers, as well as broader community outcomes like liveability and urban amenity; but with the risks of inefficient investments imposing legacy costs on water customers, or failing to secure an adequate level of service. Strong urban water policy settings that provide guidance on best-practice system planning, pricing and institutional arrangements will help the sector meet those challenges, in turn, helping to manage the impact of these investments on water prices, service outcomes and broader community outcomes, yielding the best overall outcomes possible for customers.

Water service provision can be more complex (and costly) outside major cities

Regional and remote urban water systems face additional challenges.

Regional towns are smaller, with connections typically spread over a large area, such that fewer users are serviced by (and pay for) fixed infrastructure, such as water treatment plants.

This leads to higher costs per connection and can mean a particular level of service is more expensive to provide in regional areas (Engineers Australia, sub. 63, p. 17).

Although regional and remote service providers face less onerous pricing commitments under the NWI than major utilities, compliance with the agreement has nonetheless been mixed. A number of smaller utilities in New South Wales and Queensland are not achieving full cost recovery, and cross subsidies are not always transparent. Most State government funding provided to these local utilities does not meet the NWI's criteria of a transparent community service obligation (CSO) payment (*Assessment*: section 3.1).

Climate conditions vary significantly across regional and remote Australia, but rainfall can be less frequent or reliable, particularly in inland areas, and there may be fewer alternative supply options (such as seawater desalination or potable groundwater). Some remote communities are entirely reliant on a single groundwater source, without opportunity to access surface water resources or to share bulk infrastructure (such as dams). And water quality issues can arise from many causes, including bushfires, algal blooms and other contaminants (NHMRC, sub. 93, p. 4). A lack of alternative water sources can make a water supply system vulnerable in the face of a water quality issue.

Access to safe and reliable water is also an issue, particularly in some remote Aboriginal and Torres Strait Islander communities, with limited access to adequate quality drinking water in some places (*Assessment*: section 6.1). This can be due to poor quality water sources, inadequate water distribution and treatment infrastructure, and fragmented arrangements for service delivery.

The recent drought has brought shortcomings in planning and service delivery into sharp relief in some regional areas. Persistent drought and severe bushfires across eastern Australia have stretched local water supplies, and led to emergency water carting and infrastructure works in New South Wales and Queensland. Although these drought conditions were, in some ways, unparalleled, some government responses indicated a lack of preparation, or inadequacies in the emergency response plans in place prior to the drought.

Looking ahead, a changing climate will threaten long-term water security in regional and remote Australia, just as in major cities (SP F *Urban*). Extreme events (including floods and bushfires) are also likely to occur more frequently. And unanticipated water supply shocks will challenge the ability of regional providers (especially smaller ones) to maintain water quality and sustain reliable water services.

11.3 NWI renewal is an opportunity to embed the foundations of success

An enhanced urban water element in support of refreshed objectives

NWI renewal is an opportunity for jurisdictions to develop agreed objectives for the urban water sector and include national principles for best practice in the planning, pricing and delivery of urban water services. It also provides an opportunity to improve service delivery in regional and remote areas, including facilitating commitments made under the National Agreement on Closing the Gap towards equity in access to essential services.

The Commission has proposed modernised objectives for the urban water sector, in support of an overall aspiration for water service provision of ‘effective, efficient and equitable provision of water services that meet the needs of customers and communities in a changing climate’ (chapter 3).

The minimalist *Urban Water Reform* element under the original NWI should be expanded significantly to outline an agreed aspiration for the sector, along with clearer guidelines for best-practice urban water planning. A renewed NWI should also recommit to the *Best Practice Pricing and Institutional Arrangements* under the existing NWI, and build on those reforms to support improved pricing and service outcomes across both urban and rural (irrigation) water services.

A stronger focus on best-practice planning

Governments and urban water utilities are working to understand and plan for potential shifts in water supply and demand.

In some parts of the country, significant supply augmentation decisions have already been undertaken. Water Corporation, Perth’s major urban utility, explored a range of options in response to long-run declines in stream inflows in Perth’s catchments (chapter 2), eventually incorporating groundwater, desalination and groundwater replenishment into the city’s water supply network.

In other cases, events have overtaken the planning process. The Millennium Drought across eastern Australia (1997 to 2009) posed water security risks to most major cities, but a lack of effective planning and poor execution resulted in rushed investments into desalination and water recycling (BOM 2015; IA 2019, p. 623). These investments then sat idle for some years, ‘fuelling backlash against what was widely perceived as unnecessarily expensive water infrastructure’ (CRCWSC, sub. 83, p. 4). The recent drought has put some of these schemes into action, but this does not mean that planning could not have been better, nor that those schemes were necessarily the best augmentation options.

Water system planning (and the associated billion-dollar investment pipeline) is already underway. NWI renewal presents an opportunity through inclusion of principles on best-practice planning to both improve water services and contribute to liveability and urban amenity, as well as avoid poor choices that would impose unnecessary costs on customers or fail to secure an adequate level of service.

Continuation of best-practice pricing and institutional arrangements

Many of the NWI principles for water services pricing, and the institutional arrangements underpinning service delivery, remain sound and should be retained within an updated *Best Practice Pricing and Institutional Arrangements* element. The pricing and institutional reforms under the NWI apply to all water services, including rural (irrigation) water services. Some improvements could be made — particularly, to improve the quality and coverage of independent economic regulation in the urban water sector, to improve monitoring, reporting and benchmarking of urban water providers, and to outline principles for governance and funding of regional and remote urban water services.

11.4 Best-practice system planning should be a focus

Urban water system planning has developed significantly from the Millennium Drought, but progress towards integrated system planning remains slow. Best-practice system planning — that is, planning that integrates water supply, wastewater and stormwater planning and management — should form the basis of a significantly enhanced *Urban Water Services* element in a renewed NWI. Good quality plans help utilities to efficiently pursue the full suite of water security, public health, environmental and amenity outcomes sought by the communities they serve.

While the *National Urban Water Planning Principles* are a good foundation, a focus on three areas that have not yet been widely adopted would take utilities closer to best practice. In addition, guidance on some aspects of planning could also help regional and remote utilities improve their planning practices and better align with regional water resource planning.

First, adopt an integrated approach that aligns with community preferences, connects across scales and with land planning, and incorporates stormwater

Traditional water service delivery treats water supply and wastewater management separately. And stormwater is often managed by a separate entity, with a focus on ensuring drainage of urban areas rather than treating stormwater as a resource.

Integrating these elements of water cycle management could deliver lower-cost solutions to multiple water management objectives. Moving to an integrated water management

approach is complex, and may take substantial amounts of investment in planning and workforce capability over several years to implement. For smaller utilities, the costs may outweigh the benefits in the short-term, particularly if there are challenges with existing service delivery.

But for major utilities, an integrated approach can enhance the resilience of water systems by increasing the diversity of sources — potentially delaying the need for expensive augmentations of the water supply and distribution system (PC 2020a, p. 23). More specifically:

- water demand could be met using fit-for-purpose supply sources rather than just potable water
- wastewater could provide a climate-independent source of fit-for-purpose water for a range of consumptive, amenity and/or environmental uses
- stormwater could be managed in ways that keep water in the landscape and contribute to urban amenity, create urban habitat, improve the health of rivers and wetlands, reduce localised flooding and/or provide alternative sources of water supply.

Effective integrated system planning has a number of pre-requisites.

Clear objectives for levels of water security and quality, the environment and urban amenity are agreed. These objectives should be established by governments and grounded in effective engagement with customers and communities to uncover their preferences. And they should then serve as the foundation for planning, keeping governments accountable to the planning process.

Water planning is linked across scales. At the city-scale, water system planning has traditionally focused on centralised infrastructure for water and wastewater services. At the local scale, water planning has traditionally involved connecting the centralised infrastructure to end users; local wastewater management has provided fit-for-purpose recycled water for local uses; and stormwater management services are delivered by local governments (PC 2017a, p. 184). This fragmented approach — where city-scale and local-scale considerations are managed differently — means that supply augmentation options that require an understanding of the costs and benefits across the scales may be overlooked. Recycled water is an example. It may not be cost-effective at city-scale but might be fit-for-purpose at a local level. Under an integrated approach, water system planning now needs to incorporate both centralised and local systems to best effect.

Water planning is linked with land-use planning. Identifying the best options for water services in growth corridors and major new developments, particularly to enhance urban amenity, requires formal links between land-use planning and local water planning at a range of spatial scales (including city, growth corridor, precinct and development) and at the appropriate times. Unfortunately, formal processes linking water planning and land-use planning are rare (PC 2020a, p. 47).

Stormwater management is incorporated. In major cities, stormwater is generally managed by local governments rather than water utilities. Stormwater management has not been subject to the same level of detailed, consistent policy direction, nor economic and environmental regulation, as water supply and wastewater management. Breaking down silos between stormwater and other water service functions would unlock stormwater as a water source, enable more water in the landscape for urban amenity and improve the efficiency and effectiveness of stormwater management.

Second, consider all options — including demand management

In working to balance declining surface water availability with increasing water demand, water service providers may have a number of supply augmentation options: surface water, groundwater, stormwater harvesting, purified recycled water for drinking, non-potable recycled water, desalination or transferring water between sectors or regions. Conversely, they can look to increase water distribution efficiency or directly manage water demand to avoid (or delay) the need for major augmentations. This requires a commitment to ‘all options on the table’.

Ensuring all options are on the table, and can be deployed when required, is likely to be essential for governments and operators to effectively and efficiently ensure secure supply over the long term. (IA 2019, p. 623)

Credible decisions on whether to augment supply, increase water distribution efficiency or directly manage water demand will be supported by rigorous, consistent and transparent comparison of the relative costs, benefits and risks of alternative approaches to balancing supply and demand. The option assessment that generates the largest net benefit should be the one chosen, recognising that the optimal solution may be a suite of water supply and demand options balancing reliability, timing and cost. Policy bans prohibit choices by imposing unnecessary restrictions, such as on purified recycled water for drinking (making non-potable recycled water more expensive due to the need for separate distribution systems). Such policy bans are rarely appropriate and, in general, should be removed.

Third, assign clear roles and responsibilities for relevant entities and encourage collaboration

Integrated system planning involves utilities, state and local governments, regulators, urban planners and developers — raising the risk that a task will ‘fall between the cracks’.

Current institutional arrangements have resulted in complicated governance arrangements where no one party has full responsibility for managing all aspects of the urban water cycle. (WSAA, sub. 88, p. 28)

With poorly defined roles and responsibilities, entities may neglect elements of the planning framework, potentially causing delays and leading to ad-hoc solutions that are not in the long-term interest of customers.

An effective integrated approach requires clarity concerning the roles and responsibilities of each relevant planning entity. Governments are ultimately accountable for delivering the full suite of outcomes sought by the community through the policy and regulatory processes that they establish. These processes need to enable and incentivise collaboration such that each planning entity can leverage their expertise and contribute to integrated outcomes. But current arrangements do not always support this.

Key entities operate according to the obligations set for them by their enabling legislation and decision-makers. This necessarily diverse operating environment limits the ability to deliver integrated outcomes. (VPA, sub. 20, p. 2)

Last, develop guidelines for system and contingency planning in regional and remote areas

In line with best-practice system planning principles for major utilities, the NWI could also include guidelines for both long-term system planning and contingency planning for regional and remote communities to assist smaller providers in maintaining service standards. Any guidelines should be consistent with best-practice planning under the NWI, but emphasise the importance of fit-for-purpose water supply options at the local scale, in line with relevant levels of service, and ensuring that local planning is integrated with system-level water resource planning.

System planning should be undertaken at the right regional scale necessary to ensure all supply augmentation options (including transferring water between sectors or regions) can be identified and the most cost-effective option (or options) selected. This would allow scope for collaboration between small providers to share infrastructure and realise economies of scale, alongside State or Territory government involvement.

Contingency planning should ensure that responses to extreme events are determined in advance, consistent with water resource planning, and aligned with realistic timeframes for planned augmentations under the long-term system plan. They should also clarify if, when and how State and Territory Governments intervene to alleviate critical supply shortages as a provider of last resort.

Other issues concerning regional urban water planning relate only to a few jurisdictions, and do not form part of the Commission's NWI renewal advice. These are discussed in *SP G Regional*.

DRAFT NWI RENEWAL ADVICE 11.1: BEST-PRACTICE URBAN WATER SYSTEM PLANNING

Updating the *National Urban Water Planning Principles* and formally embedding them within the National Water Initiative would establish a standard for best-practice urban water system planning. A renewed National Water Initiative should include the following principles:

- Integrated management of water supply, wastewater and stormwater is embedded in urban water planning and management systems.
- Planning decisions align with system objectives for levels of water security, service quality, the environment and urban amenity.
- System objectives are discovered through a transparent and consultative approach and approved by governments in line with customer and community preferences.
- Urban water planning connects water planning across different scales and with land-use planning.
- All supply options are considered and their relative merits subject to a rigorous, consistent and transparent assessment of costs and benefits.
- Roles and responsibilities in the planning and management process are clearly assigned between relevant governments, utilities and other planning entities.
- Utilities, governments, regulators, developers and land-use planners collaborate effectively in planning.

To support efficient service delivery by smaller providers, jurisdictions should consider developing national guidelines for both long-term system planning and contingency planning for regional and remote water systems.

11.5 Pricing and service outcomes — another focus

Although many of the principles guiding water service provision remain sound — particularly, cost-reflective pricing and institutional separation — there is scope to expand their treatment in the NWI to guide best-practice outcomes. This should include:

- more detailed guidance on independent economic regulation
- enhancements to pricing principles
- recommitment to monitoring, reporting and benchmarking.

The quality and coverage of independent economic regulation could be lifted

Best practice should be defined and then encouraged

Best-practice independent economic regulation delivers transparent scrutiny of the water sector, while supporting customer preferences and avoiding excessive costs on regulated

entities, users or taxpayers. It prevents urban water service providers from exploiting their monopoly position by charging excessive prices and/or providing poorer service quality. It also reduces the risk that government-owned corporations may be directed to keep water prices low (meaning less resourcing for maintenance and renewals and deferral of investment in ways that undermine long-term planning). And it drives governments to provide clear policy direction by outlining their expectations for service providers, while improving the transparency of planning, investment and management decisions.

Under the NWI, governments agreed to use independent bodies to set or review prices on a case-by-case basis. This has allowed for significant diversity in the quality of independent economic regulation across the water sector and inquiry participants have highlighted shortcomings: VPA (sub. 20, p. 3) noted that the current model has constrained innovation; LGAQ (sub. 32, p. 5) supported it in principle, but experience has shown that it can be ‘an expensive exercise which added to retailer costs’ without demonstrating effectiveness; and WSAA (sub. 88, p. 38) noted that further improvements are needed to meet best practice.

Best-practice independent economic regulation has a number of characteristics, and principles in line with these could be included in a renewed NWI.

- *Regulators’ primary objective is to promote the long-term interests of customers.* Best-practice regulators focus on ensuring that customers receive services of the desired quality at the lowest sustainable cost, while encouraging innovation if customers ultimately benefit — that is, *utilities face incentives to innovate and increase efficiency.*
- *Regulation incorporates proposals for meeting customer and community preferences, determined through transparent engagement with the community by utilities.* This enables utilities to tailor their services to what customers value.
- *Prices reflect efficient costs.* Pricing below the full cost of service provision tends to impose higher costs in the future through inflating demand for water, imposing fiscal costs on governments or constraining the ability of utilities to invest sustainably to maintain and replace their assets. Moreover, while regulatory decisions typically constrain prices, *regulatory decisions do not compromise the financial viability of utilities.* Financial viability is assessed so that borrowing and dividend decisions made by government shareholders are scrutinised as part of the regulatory process, in order to minimise the risk of shareholders extracting dividends through overpricing.
- *Regulatory processes facilitate competition.* Processes do not affect whether services are delivered by incumbent monopoly utilities or alternative providers. To support competition, they make the costs of sub-components of the water supply chain transparent, allowing providers to compete on a level playing field to supply different components. This should include consideration of an access regime for private participants to access monopoly infrastructure.
- *Regulators’ processes are transparent and feedback is accommodated.* In particular, the rationale underlying any regulatory decisions is detailed and regulatory frameworks can adapt where feedback suggests it would promote customers’ interests.

Regulators must also be supported by appropriate governance and institutional arrangements. Ensuring that economic regulation is transparent and independent provides accountability, better aligning regulatory decisions with long-term consumer interests. And institutional separation, with a clear relationship between utilities and their government shareholders and regulators, remains important and should be retained as a principle under the NWI.

DRAFT NWI RENEWAL ADVICE 11.2: PRINCIPLES FOR BEST-PRACTICE INDEPENDENT ECONOMIC REGULATION

The following national best-practice principles would improve the quality and consistency of independent economic regulation in the urban water sector.

- Decisions are guided by the objective of promoting the long-term interests of customers.
- Utilities have incentives to innovate and improve their efficiency.
- Regulatory decisions include effective customer and community engagement.
- Prices reflect the full efficient cost of service provision.
- Regulatory decisions consider the long-term financial viability of utilities.
- Regulatory processes facilitate effective competition in potentially contestable parts of the industry.
- Regulatory processes are transparent to allow scrutiny.
- Regulatory frameworks are adaptable and flexible.

Economic regulation needs to be fit for context

Some aspects of economic regulation, such as setting prices or revenues, are complex and costly processes. These costs are generally outweighed by the wider benefits for larger service providers, but this is less likely to be the case for smaller entities. Hence the NWI allows for independent oversight ‘on a case-by-case basis’.¹ Potential lower-cost alternatives to price or revenue-setting include price monitoring, public reporting and benchmarking, regular audit and/or licensing. But these alternatives only provide a degree of transparency that may lead to public or political scrutiny, which (alongside the threat of more stringent regulation) can encourage providers to improve.

In practice, ‘case-by-case’ application of oversight varies significantly across the country — which is not to say that economic regulation *should* be imposed symmetrically on all

¹ NWI paragraph 77(i).

providers. But the justifications for particular models are not consistent, without a clear basis, and some large utilities are not subject to independent oversight.

- Unlike most major water utilities, jurisdiction-wide providers in Western Australia and the Northern Territory, as well as retailer-distributors in south-east Queensland, are not subject to independent price or revenue determinations.
- Regional utilities in New South Wales and Queensland are not subject to any independent economic oversight, whereas economic regulators licence small utilities in Western Australia and South Australia.

Instead of the current case-by-case application of independent economic regulation, the NWI should include a framework to guide where different models of economic oversight can be applied, based on context.

In the Commission's view, all large providers should be subject to best-practice independent economic regulation, unless a transparent analysis of regulatory costs and benefits shows that economic regulation imposes net costs. Where costs do outweigh benefits (often the case for smaller urban water providers; *SP G Regional*), jurisdictions should agree to a consistent assessment framework to inform decisions concerning the type of economic regulation to apply, based on the risk (and potential impact) of a utility exploiting market power, and the cost of regulation.

This commitment should extend to 'light touch' independent economic oversight of small providers. Independent economic licencing of small providers could be more widely used to provide assurance of utility capability.

The assessment of whether to apply full price regulation, or a lighter-touch model of economic regulation, should take the form of a transparent cost-benefit analysis that considers:

- the risk of a utility exploiting its market power, based on the scope and costs of that abuse
- the costs of different economic oversight models (to regulated entities and taxpayers)
- ownership and governance of the utility (for example, State or Local government ownership)
- other forms of oversight imposed on utility operations.

Irrespective of the model selected, the principles for best-practice economic regulation should guide regulatory processes wherever possible.

DRAFT NWI RENEWAL ADVICE 11.3: IMPROVING PRICING AND SERVICE OUTCOMES

The National Water Initiative should include a framework to guide where different models of economic oversight can be applied, based on context. All large providers should be subject to best-practice independent economic regulation, unless a transparent analysis of regulatory costs and benefits shows that economic regulation imposes significant net costs. Where costs do outweigh benefits, jurisdictions should agree to a consistent assessment framework to inform decisions concerning the type of economic regulation to apply, based on the risk (and potential impact) of a utility exploiting market power, and the cost of regulation.

Jurisdictions should commit to light touch independent economic oversight for all regional and remote water service providers.

There is scope for improvement in some pricing practices

In the first instance, the core principles of cost-reflective, consumption-based pricing, along with institutional separation of water resource management, standard setting and regulatory enforcement from service delivery, should be maintained in a renewed NWI. But there is also scope to encourage jurisdictions to better use pricing mechanisms to improve the efficiency of the urban water sector.

While the *NWI Pricing Principles* provided guidance on pricing recycled water and stormwater as a water source, progress on including these sources in pricing frameworks has been slow. A pricing regime for stormwater management (coupled with entitlement reforms in chapter 6) would help enable stormwater to be considered as a water supply option on a basis consistent with other water sources, allowing for the lowest-cost source of fit-for-purpose water to be utilised in a particular context.

The *NWI Pricing Principles* also included guidance on setting, capping and using revenue from developer charges (NRMMC 2010, p. 11), but some State and Territory Governments have policy settings in place that suppress them. Charges levied on developers allow utilities to recover the costs of investments required to service a new development from the beneficiaries, rather than all water users. Where cost-reflective, they provide incentives for innovative water supply approaches (Langford, sub. 91, p. 5). But when set below cost-reflective levels, they blunt incentives to invest in smaller-scale supply options. For example, a precinct developer is less likely to consider a water recycling scheme if the cost of connecting to the existing potable network is in effect subsidised.

In redeveloping the *NWI Pricing Principles*, jurisdictions could also give greater consideration to nodal pricing and flexible pricing approaches, where they present opportunities to improve the efficiency of the urban water sector.

DRAFT NWI RENEWAL ADVICE 11.4: IMPROVING PRICING AND SERVICE OUTCOMES

Jurisdictions should maintain the core principle of cost-reflective pricing and update the *National Water Initiative Pricing Principles*. In doing so, they should:

- develop improved, practical guidance on funding stormwater management and incorporating stormwater into pricing frameworks
- recommit to the principle that developer charges are cost reflective.

Jurisdictions should maintain institutional separation of water resource management, standard setting and regulatory enforcement from service delivery, including where local governments are owners.

Benchmarking and reporting pricing and service outcomes should be maintained

The NWI actions on benchmarking efficient performance for urban water services are currently implemented through the National Performance Report (NPR) under the stewardship of the Bureau of Meteorology. Benchmarking and reporting of pricing and service outcomes provides transparency in the absence of formal price-setting or price-monitoring processes. It can inform customers about how their provider compares with others, potentially leading to scrutiny over apparent underperformance that can improve pricing and service outcomes. And it provides information to support the Commission's triennial assessment of progress against NWI commitments.

The NPR, however, has shortcomings. It does not report on service providers with fewer than 10 000 connections. It lacks the data needed to assess urban water service providers' progress towards full cost recovery: the only measure for cost recovery, the economic real rate of return, is inconsistent with the NWI and the *NWI Pricing Principles*. And there are shortcomings in data quality: according to the Goldenfields Water County Council (sub. 25, p 2), 'data referring to local water utility management within the NPR is either incorrect, very limited or not available'.

Overall, the NPR is not fit for purpose in benchmarking service quality, as envisioned under the NWI, nor is it adequate to assess progress against NWI commitments. An *NPR Indicator Review* is scheduled for completion in March 2022. It is well-placed to address these shortcomings.

DRAFT FINDING 11.1

The National Performance Report is not fit for purpose in benchmarking service quality, as envisioned under the National Water Initiative (NWI), nor is it adequate to assess progress against NWI commitments. The only measure for cost recovery, the economic real rate of return, is inconsistent with the NWI and the *NWI Pricing Principles*. The current review of the National Performance Report indicators is well-placed to address these inadequacies.

DRAFT RECOMMENDATION 11.1

State and Territory Governments, through the National Performance Report, should require urban water service providers to report a financial return metric consistent with the *National Water Initiative Pricing Principles*, alongside the existing economic real rate of return metric. This should include:

- an income measure that excludes developer charges and contributed assets
- an asset base measure determined by a methodology consistent with the *National Water Initiative Pricing Principles*.

Irrespective of the shortcomings of the NPR, there are sound reasons to maintain the requirements to benchmark and report on service provider performance in a renewed NWI — particularly to improve the transparency of service delivery for users. Key performance indicators, including operational and financial indicators, should be publicly reported for providers of all sizes to contribute to economic oversight and policy making.

Performance data should also be collected or overseen by an independent body, particularly where that information is used to calculate or determine eligibility for CSO payments, and to feed into economic oversight. An independent body should also scrutinise outcomes and highlight where performance improvements are required, particularly for regional and remote providers.

Monitoring and reporting should allow for independent oversight of utility performance, calculation of CSO funding (where relevant), contribute to State and Territory government policy decisions, and enable regular assessments of progress against the NWI.

DRAFT NWI RENEWAL ADVICE 11.5: IMPROVING PRICING AND SERVICE OUTCOMES

All urban water service providers, including those with fewer than 10 000 connections, should be subject to jurisdictional monitoring and public reporting.

Through the National Water Initiative, jurisdictions should recommit to independent, public and annual reporting of key pricing and service quality indicators at a national level for all major urban water service providers. Monitoring and reporting should be designed to:

- increase transparency of service delivery
- feed into economic oversight, including by promoting competition by comparison through benchmarking, and by highlighting where performance improvements are required
- contribute to State and Territory government policy decisions
- underpin regular assessments of progress of National Water Initiative implementation.

11.6 Tailored advice for regional and remote urban water services

As noted above, it can be more costly, per consumer, to provide safe and reliable water supplies in regional and remote communities and there are fragilities in some supply systems. Local circumstances (such as population density and water source availability) affect the delivery of affordable and reliable water services.

As in major cities, there is ultimately a trade-off between service quality (including drinking water quality, the reliability of water supply and the expected frequency of water restrictions) against the affordability of the service for each community. Maintaining levels of service in some regional and remote communities will require some combination of external funding, a sharp increase in operational efficiency, and/or higher user charges.

The Commission has considered tailored reform advice for regional and remote urban water services, centred on a commitment to a ‘basic level of service’ to guide State and Territory government assistance for high-cost areas.

Governments should ensure access to a basic level of service

To support planning by smaller utilities, and to give effect to international commitments to provide safe drinking water (SP G *Regional*), State and Territory Governments should define a ‘basic level of service’ which would specify the minimum standard of safe drinking water that the government would commit to making available to all households.

The precise definition of a basic level of safe and reliable water is a decision for each State and Territory Government, based on their own circumstances (although a definition of ‘safe’ water should align with existing health guidelines under the Australian Drinking Water Guidelines). Service reliability could encompass judgments at the local scale over the quantity of water available, the frequency of water restrictions, and/or clear arrangements to maintain services during extreme events.

A commitment to a basic level of service does not necessarily imply government funding of that service — most services should still be fully funded through user charges. And communities could, of course, agree to a higher standard of service, but this should similarly be funded through higher user charges.

State government funding of high-cost urban water systems

In some regional and remote areas, the high cost of providing a basic level of service may make it uncommercial — that is, a commercial service provider would not provide the service as consumers would be unwilling (or unable) to pay prices that would meet the full cost of supply (inclusive of a competitive return on capital and management).

Even where a service is available, high prices can mean members of a community may be unable to afford their basic water needs — payment may represent an unacceptable cost burden, or some households might underutilise what is an essential service, with health and welfare implications. Although some vulnerable groups can be targeted through rebates (as already occurs for pensioners), other community members may also face affordability issues. In these circumstances, operational subsidies may be warranted.

This can warrant a State or Territory government operational subsidy to reduce prices and prevent onerous cost imposts on consumers. Under the NWI, this should be provided as a transparent and untied CSO payment. But beyond stating a preference for support in the form of CSO payments, the NWI does not specify how payments to unviable urban water systems are to be calculated, nor did it define scheme viability, leaving both as decisions for State and Territory Governments.

The lack of prescription has allowed State and Territory Governments to approach funding decisions in ways that reflect the diversity in their service delivery models. But it has also meant that there are no agreed principles on how to fund regional and remote community services — which has arguably enabled inefficient funding processes (such as capital grants) in jurisdictions with many smaller regional providers. Capital grants introduce a number of distortions: they are often poorly targeted on the basis of need; can be at risk of political interference; and introduce ‘capital bias’ by linking funding to infrastructure projects, rather than other forms of operational expenditure.

There is therefore a case to include principles in a renewed NWI to guide CSO payments to unviable areas, with a focus on how governments can sustainably fund smaller providers while maintaining incentives for efficient service delivery.

Suggested principles

CSO payments to local government-owned utilities should conform to a number of principles.

First, they should be *designed to ensure access to a basic level of service (as defined by the relevant State or Territory Government) in those communities where such service provision would otherwise be unviable*. In the absence of a market or economic regulation, establishing that a service is commercially unviable requires a judgment on the service standard that *should* be provided (which forms the basis of the government objective) and the willingness of the community to meet the associated cost, given both their ability to pay and level of access to alternative supplies. A basic level of service (as outlined above) should form the basis of the government's CSO objective.

Second, the level of CSO payments provided should be *adequate to ensure a basic level of service is considered affordable*. That is, CSO funding should provide operational subsidies that allow the utility to achieve and maintain lower bound cost recovery, subject to:

- there being no other more cost effective means to supply a basic level of service (such as self-supply)
- the utility charging a price considered to be affordable.

Ultimately, assessing affordability is a decision for government, depending on its budget priorities. Any specific affordability concerns for vulnerable community members should continue to be addressed through separate policy tools, such as the concessional rebates provided by governments for groups such as pensioners.

Third, the process of determining the cost of a basic level of service (and the associated CSO funding) should be *based on a credible estimate of efficient service costs, subject to a degree of independent oversight, following State or Territory government involvement in system planning*. These are difficult estimations, and there are a number of ways to determine the cost of providing a CSO (IC 1997). As such, a high-quality estimate is needed to ensure the estimate of commercial viability is credible, and that the subsidy is set at a prudent level and does not overly burden taxpayers.

Fourth, CSO payments should be *calculated in a predictable fashion to provide a reliable source of funding*. This would help provide certainty for long-term water system planning by regional and remote providers.

Finally, CSO payments should be *conditional on ongoing operational improvements, such as improvements to utility governance, better service outcomes (based on performance benchmarking), compliance with guidelines for system and contingency planning, or for pursuing collaboration*. This would allow the State or Territory Government to leverage the subsidy to improve utility efficiency, and maintain incentives for local utilities to efficiently deliver services.

DRAFT NWI RENEWAL ADVICE 11.6: ENSURING ACCESS TO A BASIC LEVEL OF SERVICE

A renewed National Water Initiative should include a commitment to ensure access to at least a basic level of safe and reliable drinking water to all Australians. State and Territory Governments could each develop a definition of, and commit to ensure access to, a basic level of service for each community in their jurisdiction.

Cost-reflective user charges should remain the default arrangement, but some regional and remote services in high-cost areas will require operational subsidies to maintain a basic level of service to all customers. Any subsidies to those areas should be provided as transparent community service obligation payments. Payments to local government-owned providers should be:

- designed to ensure access to a basic level of service in those communities where such service provision would otherwise be unviable
- adequate to ensure a basic level of service is considered affordable
- based on credible data on efficient service costs, subject to a degree of independent oversight, following State or Territory government involvement in system planning
- calculated in a predictable fashion to provide a reliable source of funding
- conditional on ongoing operational improvements, such as improvements to utility governance, better service outcomes (based on performance benchmarking), compliance with guidelines for system and contingency planning, or for pursuing collaboration.

Governance of regional and remote water services

As under the current NWI, institutional separation represents best practice in ensuring efficient water service delivery. Service providers should continue to adopt a commercial focus to supplying services in line with the needs of their customers, while complying with the standards set by governments.

However, governance arrangements for local government-owned water services are more complex; clarity could be provided in the NWI. Ideally, water service providers should be fully distinct entities, however institutional separation is not always warranted. At a minimum, there should be financial separation, with utility finances ring-fenced from local government finances, and any cross-subsidies transparent. The roles of State and Territory Governments, including setting and enforcing health, safety and environmental standards, building capacity and (in limited cases) operating as a provider of last resort to ensure a basic level of service, should also be clarified.

Further, governance of water service provision in remote Aboriginal and Torres Strait Islander communities can be fragmented and opaque, particularly where the roles of different service providers are not clear. Clarifying these arrangements would contribute to improved outcomes in those communities.

A renewed National Water Initiative should contain agreed principles for governance of regional and remote water services where local governments retain ownership of utilities. Financial separation should be maintained, with utility finances ring-fenced from local government finances. Clear roles for State and Local Governments during extreme events should be defined.

Water quality issues in remote Aboriginal and Torres Strait Islander communities require attention

Remote Aboriginal and Torres Strait Islander communities may be serviced by state-wide providers, regional water utilities or be self-supplied. Although data are patchy, evidence from state-level data and case studies suggest that water quality problems persist in many of these communities, with chemical and biological contamination, palatability issues and water security concerns.

A lack of safe and reliable water and sanitation can increase the risk of preventable, hygiene-related infections in these communities. A lack of access to safe water and adequate sanitation can also worsen existing health issues. Furthermore, clean water is needed for the treatment of some health conditions, such as dialysis to treat kidney disease. In addition to addressing health concerns, provision of higher quality water services can lead to economic benefits, both from reductions in the burden of disease on individuals and communities, and in reductions of the burden on health systems.

Governments have made a number of commitments to provide healthy water in remote communities. The NWI calls for the provision of ‘healthy, safe and reliable water supplies’. The United Nations Sustainable Development Goal 6 focuses on improving outcomes in water and sanitation. The National Agreement on Closing the Gap will include a target on community infrastructure, and the Australian Drinking Water Guidelines provide for safe drinking water supplies.

However, consultations have highlighted a number of specific barriers to the provision of safe water in remote Aboriginal and Torres Strait Islander communities. Water sources can be of especially poor quality in remote areas and often require additional treatment to ensure drinking water is safe for human consumption. Government arrangements for delivery of safe water supplies and associated infrastructure for remote communities can be complicated and fragmented. In some jurisdictions, multiple agencies need to come together and coordinate activities to provide required services. This sort of complexity can result in confusion, reduce transparency and lessen public accountability.

Although many water service delivery issues in remote Aboriginal and Torres Strait Islander communities are similar to those experienced elsewhere, the consequences of poor water

service provision can be more serious in these communities. More tailored policy attention is needed to ensure access to safe and reliable water supplies.

Coupled with a commitment to a basic level of service, a renewed NWI could help ensure safe and reliable water in remote communities by ensuring the National Agreement on Closing the Gap community infrastructure target is reflected in the renewed agreement. Monitoring, reporting and benchmarking activities under the NWI could also be aligned with data collection and reporting undertaken as part of the National Agreement on Closing the Gap.

DRAFT NWI RENEWAL ADVICE 11.8: MONITORING AND REPORTING ON REGIONAL AND REMOTE SERVICE QUALITY

Monitoring and reporting of water quality and service outcomes in remote Aboriginal and Torres Strait Islander communities should be coordinated with the development of data collection required to measure progress against the community infrastructure target under the National Agreement on Closing the Gap.

12 Water reform in rural Australia

Key points

- Over the past 25 years, reforms promoting the efficient use of water have enabled significant gains for rural water users.
- A drying climate and more variable seasonal conditions will place challenges on irrigators and communities. Entitlement holders are well positioned to deal with future challenges and adapt to lower water availability. The ability to trade entitlements allows businesses to adjust their water portfolios to better reflect their risk profiles and water needs.
- NWI renewal is an opportunity to strengthen the foundations of water resource management and better support rural water users. For example:
 - risk-based frameworks for managing water uses within entitlement regimes would better promote efficient management of shared resources
 - a new integrity element would build greater confidence in water resource management
 - stronger trading foundations and better market information would provide greater support for commercial decision making.
- Inclusion of guiding principles in a renewed NWI would clarify how governments can best respond to any significant adjustment pressures faced by rural communities as a result of reform induced reductions in water availability.
 - Generally-available measures targeting the welfare and skills of individuals, and regional development planning to leverage off community level capabilities and competitive advantages, are usually the most appropriate responses to adjustment pressures.
 - Where specific assistance is warranted, governments should facilitate change by focusing any direct assistance on building adaptive capacity in affected communities and securing employment or business opportunities for the most vulnerable individuals.
 - Assistance should reflect the needs of communities and be backed by a commitment to public monitoring and evaluation of outcomes.

This chapter summarises Supporting Paper H: Water reform in rural Australia (SP H Rural). Further detail and analysis can be found in that paper.

National water reform has transformed water resource management and water service provision in rural Australia, and delivered substantial benefits. However, recent droughts, long-term declines in inflows across southern Australia and the risks posed by climate change have created significant challenges for irrigators and other rural water users and their water-dependent communities. Looking forward, irrigators will likely need to contend with more frequent and severe droughts, and their businesses and communities will need to adapt

to a world with less water. Current national water policy settings, strengthened as suggested in this report, will leave irrigators well placed to deal with these challenges.

12.1 NWI-consistent reforms have delivered large benefits to rural users

Secure property rights, separate from land, provide the foundations for better management of water resources. Water trade and markets, enabled by these rights, provide irrigators with flexibility in running their businesses and open up new opportunities. They can make decisions about water-dependent aspects of their business with greater certainty, including decisions to change production or exit irrigated agriculture. And irrigators can now own valuable assets that are able to be used as collateral for loans. The value of entitlements in the southern Murray–Darling Basin (MDB) is estimated at more than \$26 billion (Aither 2020, p. 5).

Water reforms have also led to significant efficiency gains by changing where and how water is used in rural Australia. Across the agricultural sector, water resources are now able to move to higher-value uses, resulting in thriving new irrigated industries. On-farm efficiency has been encouraged by price signals that highlight the true value (or opportunity cost) of water (ACCC 2020, p. 84), freeing up water for other productive uses.

Market-driven water trade has also enabled equitable water recovery for the environment, and the strength of water property rights has been fundamental to addressing overallocation, particularly in the MDB, where farmers have been compensated for water recovery through a mix of market purchases and on-farm water efficiency measures.

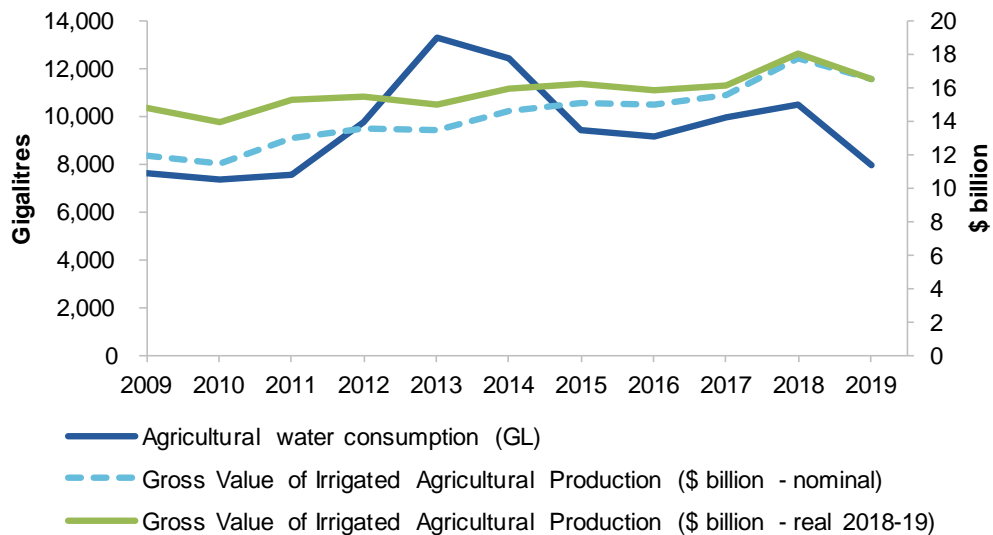
Economic regulation and local ownership and management (especially by irrigators) of rural water service providers have improved the accountability, productivity, efficiency and responsiveness of providers to the needs of rural water users (PC 2017b, p. 237).

Reform benefits have been particularly evident during droughts. Entitlement holders are now able to sell water allocations to provide revenue to support production changes, farm maintenance and debt management; purchasers have been able to maintain high-value production and permanent plantings. Allocation trade in particular allows water to move from producers with flexible irrigation demands (such as rice and cotton growers) to those with inflexible demands (such as horticulturalists with perennial crops) as water availability varies from year to year.

Studies of the economic benefits of water trading, although dated, have pointed to substantial value. For example, regional GDP in the southern MDB was estimated to be \$4.3 billion higher over the five years to 2010-11 than it would have been without trading. Gains were largest in 2007-08 and 2008-09 at the height of Millennium Drought (NWC 2012, p. xii). And trading has allowed Australia's gross value of irrigated agricultural production to

increase in most years over the past decade despite considerable variation in water use between wet and dry years (figure 12.1).

Figure 12.1 Australia's gross value of irrigated agricultural production increased in most years despite variable water use^{a,b}



^a Year ending 30 June. ^b Commission estimates of the real 2018-19 gross value of irrigated agricultural production using December quarter values for the consumer price index.

Sources: ABS (*Water Account, Australia, 2016-17, table 12*, Cat. no. 4610.0); ABS (*Water use on Australian Farms, 2017-18 and 2018-19, table 1*, Cat. no. 4618.0); ABS (*Water Account, Australia, 2018-19, table 13.1*, Cat. no. 4610.0); (*Consumer Price Index, Australia, Sep 2020, Series ID A2325846C*, Cat. no. 6401.0).

12.2 Reforms have also prepared water users to address future challenges

Looking forward, irrigators will likely need to adapt their farming practices in response to changing water availability (due to changing rainfall patterns) and commodity market trends. Trade will help businesses adjust their water portfolios to better reflect their water needs and risk profile.

A continued shift towards higher-value industries will help to maintain the value of irrigated agricultural production. For example, Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES) analysis for the southern MDB examined a scenario where current trends led to a 3 per cent reduction in water use compared with recent years, and estimated that the value of production could be maintained through shifts in the composition of production, supported by water trading (Gupta et al. 2020, pp. 14, 19). And,

with a further 12 per cent reduction in water use, ABARES estimated a fall in the average annual production value of only 4 per cent.

12.3 A renewed NWI would lock in past benefits and enable adaptation

Attention to a number of issues through NWI renewal would lock in the benefits of reforms to date and provide greater support to irrigators when they need to adapt to change. These issues include the management of interception activities, planning provisions to deal with a drying climate and extreme events, safeguarding the integrity of water management systems, strengthening water market frameworks and better guidance on assessing the merits of water infrastructure investments.

Inaccurate measurement of interception activities (for example, on-farm dams and plantations) pose a risk to water availability and undermine the integrity of the entitlements system (chapter 6 and 10). Specifying a risk-based approach for managing interception within entitlement regimes would increase transparency and promote efficient management of shared resources.

Planning provisions proved inadequate to deal with the Millennium Drought and the recent drought in New South Wales and Queensland, and processes for rebalancing water use in response to climate change are unclear (chapter 6). Provisions to deal with low flows in water plans, and increased robustness in processes for adjusting the relative shares between consumptive users and the environment, would give greater certainty to rural water users. And, adoption of best-practice principles for community engagement (chapter 14) would help to ensure that water planning processes and outcomes consider and reflect the diverse needs of rural communities.

A lack of commitment by some governments to monitoring and compliance has undermined investor and community confidence and trust in water resource management (chapter 10). A focus on safeguarding the integrity of water use and system management would help to address this issue.

Experiences from water markets and trading in the MDB highlight the opportunity to strengthen market frameworks and information to better enable businesses to confidently make decisions (chapter 7). Actions by jurisdictions to proactively anticipate, identify and manage market risks would help ensure water markets are fit for the future. And, improvements in the timeliness, transparency and completeness of market information would better support rural water users in making informed decisions in response to short- and long-term challenges and opportunities.

Finally, better guidance on what constitutes economically viable and environmentally sustainable water infrastructure investments would ensure that investments aimed at

supporting irrigators and rural communities do not leave a financial burden for future users or have unacceptable impacts on downstream communities and environments (chapter 13).

12.4 Community adjustment to lower water availability

Rural communities and economies are dynamic — continually adjusting in response to changing market forces and policy settings. Change, uncertainty and adjustment will continue to be a fact of life for irrigators and irrigation-dependent communities. Indeed, the NWI (paragraph 48) expects that entitlement holders bear the risks of changes to the quantity or reliability of water allocations as a result of seasonal or long-term changes in climate, and natural events such as bushfires and drought.

The NWI recognised that water policy reform would lead to reduced water for consumptive use in some communities, contributing to adjustment pressures. In 2004, jurisdictions agreed:

... to address significant adjustment issues affecting water access entitlement holders and communities that may arise from reductions in water availability as a result of implementing the reforms proposed in this Agreement. (paragraph 97)

Since 2004, concerns about significant adjustment issues associated with water reforms have mainly arisen in the MDB, where most highly-developed water resources are located, and where there has been significant water recovery efforts by government. Although governments implemented water recovery in ways they considered would moderate impacts, there have still been significant effects in some communities, and governments have provided assistance in response. By 2018, government spending on specific assistance programs was \$189 million (PC 2018, p. 114), and in 2019 the Australian Government approved further funding of up to \$39 million for MDB communities (*Assessment*).

But there is little evidence that past programs have been effective in supporting communities to adjust (PC 2018, p. 116). Many inquiry participants cited inadequate monitoring and public reporting of program outcomes, and observed that programs had been poorly implemented and/or ineffective. And a recent assessment has highlighted the ongoing adjustment challenges facing some MDB communities (Sefton et al. 2020a).

Governments have a role to play in supporting communities to adjust to change where it is policy induced. Previous work by the Commission (PC 2001, 2017c) provides some general guidance on how this can be achieved most effectively.

As a first step, evaluation of the potential socioeconomic impacts of a major policy proposal can help identify the types of support a community might need. Critical to this is effective community partnerships and engagement, and building an understanding of the wider context shaping regional communities other than, or in addition to, water availability.

When adjustment pressures emerge, governments have a range of regular supports available. The social security and tax systems (primarily the responsibility of the Australian

Government) provide support to individuals and families where adjustment pressures lead to falls in income. And measures such as education and training and advice about business opportunities (usually a State or Territory Government responsibility) help individuals transition to new employment.

For wider communities, regional development policy and strategic planning (the responsibility of State, Territory and Local Governments) are also important for identifying priorities for transition and development that leverage regional capabilities and local competitive advantages.

Nevertheless, in some circumstances, policy changes that are beneficial to the wider community can impose increased risk of permanent disadvantage for some groups that cannot be adequately addressed through generally-available adjustment assistance. In these rare circumstances, additional support may be warranted — particularly if it improves the efficiency of the adjustment process by addressing impediments to change.

This support could take the form of policy modification, but this risks conferring benefits on a minority, and larger-than-necessary costs on the broader community. For example, recovering water by modernising infrastructure in the MDB, rather than directly purchasing entitlements, is estimated to have increased the budgetary cost by about \$2 billion (PC 2018, p. 81). Moreover, it has put entitlement holders who participated in earlier water market purchases and the communities that depend on them at a relative disadvantage.

Farms, farming regions and towns that have more water recovered through on-farm irrigation infrastructure upgrades have gained a competitive advantage compared with farms, farming regions and towns that have sold more of their water to the Australian Government through open tender buybacks. (Sefton et al. 2020a, p. 22)

Better outcomes could be achieved at a lower cost by addressing adjustment separately from the main policy reform. For example, Wittwer (2020, p. 18) found that each dollar spent on human services (the health, education and community care sectors) creates four times as many jobs as spending on water infrastructure upgrades.

Before establishing new stand-alone community assistance programs, jurisdictions should consider how existing regional and economic development programs (not related to water) could support the adjustment process. They should also consider whether broader policies and regulations (not directly related to water) unnecessarily impede change. Options for assistance need to be considered on a case-by-case basis and consider all factors affecting a community (not just changing water availability). The chosen option should be the one that is expected to deliver the largest benefits relative to costs.

Any further assistance should build on existing support and be focused on supporting communities to adapt to a future with less water. Measures should aim to improve adaptive capacity and secure employment or business opportunities and be targeted to individuals who are most vulnerable (at risk of permanent disadvantage). For example, this could include targeted programs to help people gain new skills and find employment in more profitable and viable industries or occupations (within or outside of their community).

Industry assistance and subsidies should be avoided as they have a tendency to lead to inequitable outcomes or lock in inefficient production (which is subsidised by taxpayers and diverts resources from other uses in the region or the broader economy).

Monitoring and publicly reporting evaluations of outcomes of any assistance programs should also be part of any specific response to adjustment issues. Without an understanding of the outcomes of past assistance initiatives, and what drove them, it is difficult to improve future initiatives. Evaluation information from past assistance programs also enables stakeholders in community consultations to have more informed input into decision-making processes. Finally, project evaluations serve an important transparency and accountability function that can deter future poor decisions on adjustment assistance.

DRAFT NWI RENEWAL ADVICE 12.1: HELPING COMMUNITIES DEAL WITH ADJUSTMENT PRESSURES

Inclusion of guiding principles in a renewed National Water Initiative would clarify how governments can respond to any significant community adjustment pressures resulting from policy-induced reductions in water availability.

- The socioeconomic impacts of any major potential policy change be assessed to identify possible community needs. Effective community partnerships and engagement are critical to understanding the wider context.
- Generally-available measures targeting the welfare and skills of individuals, and regional development planning and initiatives to leverage community capabilities and competitive advantages, are usually the most appropriate responses to adjustment pressures.
- In rare circumstances it may be appropriate to take additional steps to address adjustment issues if policy changes that are beneficial to the wider community impose increased risk of permanent disadvantage for groups of individuals. Where generally-available measures will be inadequate — particularly if more support could improve the efficiency of the adjustment process by addressing impediments to change.
- Where further support is warranted:
 - consideration should be given to how existing regional development programs support the adjustment process and whether policies and regulations not directly related to water unnecessarily impede change
 - options for further support need to be considered on a case-by-case basis and consider all factors affecting a community (not just changing water availability) and the chosen option should be the one that delivers the largest benefits relative to costs
 - measures that are likely to build adaptive capacity and secure employment or business opportunities should be the focus, and targeted to the most vulnerable individuals (those at risk of permanent disadvantage)
 - industry assistance and subsidies should be avoided
 - a commitment should be made to public monitoring and evaluation of the effectiveness of any assistance.

13 Government investment in major water infrastructure

Key points

- Under the National Water Initiative (NWI), all jurisdictions agreed that proposals for new and refurbished water infrastructure (such as dams and irrigation distribution networks) would be assessed as both economically viable and ecologically sustainable prior to any investment occurring, and that costs would be recovered from users in most cases.
 - Failure to abide by these requirements can burden taxpayers with ongoing costs, discourage efficient water use and result in long-lived impacts on communities and the environment.
- Multiple governments are planning major investments in water infrastructure — including some projects that have not demonstrated compliance with the NWI requirements.
- Although the NWI requirements are sound, and should be retained, the agreement has little to say on criteria for demonstrating adherence with them, or the rationale for government funding or financing of infrastructure. Poor project selection and funding decisions still occur.
- Creation of the National Water Grid Authority suggests that future Australian Government-funded projects will receive greater scrutiny but the Authority's remit is limited to water for primary industry. This limitation should be removed. Moreover, the Authority's project assessment criteria are relatively broad and may allow subsidisation of private industry.
- A renewed NWI should address poor project selection and funding decisions through a new water infrastructure element that establishes:
 - a commitment to all options being on the table, including both infrastructure and non-infrastructure options where these can meet the investment objective
 - criteria for how project proposals demonstrate adherence to the NWI requirements, including conditions for environmental sustainability and economic viability, as well as principles for cost sharing between users and (in limited cases) governments
 - a framework for government investment in major water infrastructure, including project assessment and selection processes and institutional arrangements.
- Governments should also consider how to ensure new infrastructure development is culturally responsive to the aspirations of Traditional Owners.
- Where governments choose to subsidise major water infrastructure in pursuit of broader strategic objectives, such as regional development, additional scrutiny is necessary to ensure water infrastructure is the best means of achieving that objective compared with alternatives.
 - Any investments made in pursuit of regional development must align with high-quality regional strategic planning, and only occur where water infrastructure has been shown to be a critical component of the most effective regional development option compared with alternatives (including those not reliant on new water infrastructure).
- State and Territory Governments should have primary responsibility for major water infrastructure, with a limited (if any) role for the Australian Government. Independent bodies should assess major business cases prior to funding decisions, and publish their findings.

This chapter summarises Supporting Paper I: Government investment in major water infrastructure (SP I Infrastructure). Further detail and analysis can be found in that paper.

Major water infrastructure (including dams, weirs, distribution networks, desalination plants and water recycling facilities) is essential to delivering water services. But it is costly to build, maintain and ultimately replace, and can have significant (and at times detrimental) environmental, social and cultural impacts.

Many of these costs are borne upfront, while the benefits accrue over a long period and may be difficult to estimate in advance, creating uncertainty over the viability of any proposed development. Anticipated shifts in the availability and use of water resources with climate and demographic change compound this uncertainty.

This uncertainty reinforces the need for good decision making — particularly by governments, who must look to maximise the benefits of taxpayer funding and avoid facilitating developments that are not in the best interests of the community.

13.1 The NWI targets economically viable and ecologically sustainable infrastructure

The desire to avoid burdening water users and taxpayers with the costs of uneconomic investment decisions was one of the key drivers of national water reform. To guide investment in water infrastructure, signatories to the National Water Initiative (NWI) agreed:

... to ensure that proposals for investment in new or refurbished water infrastructure continue to be assessed as economically viable and ecologically sustainable prior to the investment occurring.¹

The NWI requires that, in most cases, the costs of infrastructure construction should be borne by users. Under the *NWI Pricing Principles* (NRMMC 2010, p. 6), user charges are to be set to achieve full cost recovery of capital expenditures — but net of any offsets for assets contributed by government (or another party, such as a housing developer) and transparent community service obligations. In these latter cases, the government investment, or an infrastructure subsidy, does not need to be recovered from users — taxpayers bear a share of the cost.

Most infrastructure investment decisions are the responsibility of corporatised water service providers (urban water utilities, bulk water providers and irrigation operators). Their decisions are, ideally, guided by assessments of the infrastructure needed to provide an agreed level of service to their customers, and the benefits and costs of alternative options. Economic regulators (in most cases) scrutinise proposed investments, contributing to confidence in their economic viability. And proposals are then subject to environmental, social, cultural heritage and other government approval processes — including water planning — which help demonstrate the proposed infrastructure is ecologically sustainable.

¹ NWI paragraph 69.

13.2 Some past government commitments raise red flags

Outside of these processes, government enthusiasm for investing in new water infrastructure (particularly for irrigated agriculture) is strong. Up to \$3.5 billion in Australian Government funding is available through the 10-year National Water Infrastructure Development Fund (NWIDF) for projects that deliver water to agriculture and primary industry (NWGA 2020, p. 10). Water projects are also eligible for concessional finance from the \$5 billion Northern Australia Infrastructure Facility.

Government infrastructure decision making has not always demonstrated the rigour of water service providers' processes. Since 2017, governments have committed to two major water projects (Rookwood Weir and Haughton Pipeline Stage 2) with business cases demonstrating benefit–cost ratios of less than 1 — that is, the projects are likely to impose net costs on the community. Other projects are anticipated to deliver marginal economic benefits, or have been committed to without a robust business case (*Assessment*).

These decisions reflect a suite of weaknesses in decision making by governments, including those highlighted by inquiry participants.

- Project selection processes do not always identify a clear issue, or consider the full suite of options (including non-infrastructure) to address that issue (Smit et. al., sub. 31, p. 3).
- Business cases are not long-term or comprehensive, and assumptions are not always rigorous or transparent (IWF, sub. 30, pp. 16–20, FNQROC, sub. 51, pp. 2–3; Engineers Australia, sub. 63, p. 19; Wentworth Group of Concerned Scientists, sub. 68, p. 5).
- Decision-making processes lack transparency. For example:

There is insufficient publicly available information to assess 21 projects (with a total Australian Government funding commitment of \$1.15 billion) against all NWI criteria. (IWF, sub. 30, p. 16)

Further concerns include that Australian and State government infrastructure priorities are not clear, consistent or aligned, leading to unnecessary duplication, and that multiple projects are being proposed in the same catchment without consideration of interdependencies. Some funding commitments (such as for Rookwood Weir) disregard the recommendations of Infrastructure Australia's independent project evaluations.

According to the Institute for Water Futures (sub. 30, p. 17), seven projects have received Australian Government funding commitments prior to business case development and environmental approvals. This is of particular concern; commitments of public funding *before* publication of robust business cases (which substantiate whether the infrastructure is in the public interest) put governments in a situation where they are unlikely to back away from these commitments, even if a project is shown to impose significant costs, creating a risk that projects that are not in the best interests of the community are funded.

Indeed, it is common for the costs of major water infrastructure projects to increase substantially between early feasibility work and final construction. As outlined by the Institute for Water Futures (sub. 30, p. 17):

Best-practice processes for public investment are particularly important for construction of new large dams because these projects are highly susceptible to major cost overruns (see Ansar et al. 2014 for a global review). In an Australian context, Petheram et al. (2019) found that the median and mean cost overruns (relative to immediate pre-construction estimates) were 49% and 120% respectively for a sample of 40 historical projects where sufficient data was available.

The process to date for the proposed Dungowan Dam (on the Peel River in New South Wales) characterises many of the above failings in project assessment and selection (box 13.1).

The case for rural water infrastructure subsidies is not clear

In principle, government subsidies can be warranted where projects generate public benefits — for example, where non-users receive economic benefits from the infrastructure (indirect beneficiaries), or where it would be too costly (or inequitable) to identify and charge each individual user. In these cases, an upfront government funding contribution would not be fully recovered from users. The presence of public benefits may lead to under-provision of otherwise worthwhile infrastructure if investment funding is left solely to the private sector (PC 2014, p. 110). Similarly, in cases of high-cost regional urban water supply, a degree of government subsidy may be justified on equity grounds to ensure access to a basic essential service (chapter 11).

While the creation of a dedicated Australian Government body to assess water infrastructure projects suggests that future funding decisions will face greater scrutiny, the National Water Grid Authority's (NWGA's) recently released *Investment Policy Framework* (NWGA 2020) takes a relatively broad view of the rationale for government investment, with an emphasis on regional development. The NWGA (2020, p. 4) will consider Australian Government funding for projects that are:

... of demonstrable public benefit and have a national interest element, including through securing the nation's water security, building resilience to future drought, supporting primary industries and promoting regional prosperity, including through the creation of jobs.

Unless governments recover the cost of major water infrastructure from users, funding major water infrastructure for the benefit of primary industries would amount to subsidising a commercial operation. This is the case for both new developments, and for projects that aim to improve reliability for existing users.

Box 13.1 **Flawed decision making for Dungowan Dam**

In 2016, the New South Wales and Australian Governments committed a total of \$150 million to the construction of Dungowan Dam on the Peel River (ANZIP 2020). The rationale for the project was that growth in Tamworth's urban water demand would affect reliability for general security irrigators in the Peel, as well as downstream licences in the Namoi (WaterNSW 2018, p. 26).

A 2017 feasibility study estimated a benefit–cost ratio of 1.06 for constructing a new dam, albeit with a far higher project cost of \$484 million (GHD 2017, p. i). The study's preferred option was to construct a new 22.5 GL dam, increasing water availability by 6 GL a year on average. Most of the anticipated benefits derive from improving Tamworth's water security, with increased irrigated agricultural production representing less than 2 per cent of the project benefits (GHD 2017, p. 68).

In 2019, the governments agreed to each provide half of the \$484 million construction cost. Early works were scheduled to commence in October 2020, with the final business case to be completed by June 2021 (WaterNSW 2020).

Discussion

The feasibility study underpinning this funding commitment has three key shortcomings.

- The benefit-cost ratio of 1.06 is marginal and contingent on optimistic assumptions (such as the willingness of Tamworth residents to pay for fewer water restrictions). Any further increases in construction cost would likely result in the project becoming unviable.
- Non-infrastructure options were excluded from the analysis (GHD 2017, p. 14). Some of these options may be considerably more cost-effective — for example, the cost of securing Tamworth's water supply by directly purchasing general security entitlements is estimated at just 2 per cent of the Dungowan Dam construction cost.^a
- The project scope was narrowly defined. Although the study was prompted by pressure on Tamworth's bulk water supplies during the Millennium Drought, the analysis focused on long-term water supply, rather than ensuring water security during extreme events. As noted by the NSW Water Directorate (sub. 37, p. 7), the 2017–19 drought highlighted that the seasonal water allocation process under the catchment water plan was not as effective as it could be in protecting town water security, even with significant investment in water security infrastructure to date. Indeed, in the year prior to Tamworth's level 5 restrictions, more water was allocated to general security licence holders than for urban water use (WaterNSW 2019).

In terms of these latter points, the proposed dam is a costly way to protect general security licences, relative to the value of the water. The dam is estimated to provide an additional 6 GL of water (annual average) which has a current market value of only \$11 million. By comparison, if the additional water was issued as entitlements to general security irrigators at full cost, it would be valued at more than \$60 000/ML, relative to current prices of about \$1341/ML.^b Irrigators are unlikely to be willing to pay for the additional water, highlighting the poor viability of the project.

Moreover, the prospect of 'new' water is illusory. Because the proposed project is within a fully-allocated water system, it will result in an implicit (and expensive) transfer of water. Any infrastructure that improves reliability for one user will affect water availability for others. In this case, the feasibility study identified that a larger storage on the Peel would lead to the water sharing plan cap becoming binding, reducing supplementary access (water extractions during infrequent high-flow events) for Namoi River irrigators (GHD 2017, p. 19).

^a Based on 75 per cent reliability and a Peel General Security entitlement price of \$1341/ML, and a maximum potential shortfall of 5.5 GL by 2065. ^b Weighted average 2018-19 Peel General Security entitlement price (Aither 2019).

The NWGA framework excludes projects that supply water for the exclusive use of a private business or individual, and it does prioritise investments that ‘provide the highest net benefit of all options available to increase access to water, taking into account economic, social and environmental impacts’ (NWGA 2020, p. 4). While selecting the option with the highest net benefit is good practice, the framework does not require a *positive* net benefit. Moreover, it excludes solutions that may address the investment objective through non-water infrastructure means, such as inter-sectoral trade, or changes to seasonal water allocation policies.

In addition, the NWGA framework includes a broad ‘national interest’ test to guide investment decisions. Some of the framework’s objectives, such as promoting regional prosperity, are not considered as part of a strict economic viability test, but this does not necessarily justify an infrastructure subsidy. All public investment will create some flow-on economic impacts, but these often represent a transfer of resources and jobs between regions.

With governments looking to increase infrastructure spending, a ‘just add water’ approach assumes that increasing access to water through a subsidy for new or expanded infrastructure, in itself, is a cost-effective way to deliver the government’s objectives. The availability of Australian Government funding through the NWIDF risks biasing State and Territory priorities towards infrastructure solutions — ignoring other, more cost-effective means (outside of water infrastructure) to enable regional economic growth or improve water security.

This approach also assumes that additional water will be put to productive use and generate employment — an assumption that is not always borne out.² Major water infrastructure tends to create few jobs, and often at a high cost.

13.3 NWI renewal can contribute to improved decision making

Maintaining the past approach to major infrastructure project selection will likely impose more unnecessary costs on taxpayers, water users and the environment.

The terms of reference ask the Commission to consider the ‘principles to be satisfied for any government investment in major water infrastructure projects’.

The existing principles of economic viability, ecological sustainability and user pays are sound and should be retained. If adhered to, they would ensure that government investment occurs rarely and only where clearly justified. But a lack of specificity in the NWI about when government subsidies should be provided has left it ineffective in ensuring that only the most beneficial projects are selected (or funded) by governments.

² For example, in 2017 the Commission noted that 85–90 per cent of the water made available by the construction of Paradise Dam had not yet been sold to users (PC 2017b, p. 275). As of May 2020, 80 per cent of the Paradise Dam entitlements still remained unsold (SunWater 2020, p. 9).

Given the gaps in the NWI, and observed issues with project selection, a new element devoted to water infrastructure investments should be included in a renewed agreement. It should include an agreed framework to guide government decision making concerning major water infrastructure. Content should aim to: improve project selection processes; clarify how adherence to the requirements of economic viability and ecological sustainability can be demonstrated; and set out principles for cost-sharing (including government subsidies). These enhancements should be underpinned by clear institutional arrangements.

Some shortcomings in decision-making processes may be addressed through other recently released policy frameworks, including some State-based infrastructure prioritisation publications, as well as the NWGA's 2020 *Investment Policy Framework* noted above, which includes NWI compliance as a principle — provided those frameworks are implemented. Endorsement of a decision-making framework in the NWI would ensure a framework that represents an agreed position with all State and Territory Governments, embedding it as part of longer-term water reform and ensuring government decisions can be held to account in implementing the framework.

DRAFT NWI RENEWAL ADVICE 13.1: A NEW WATER INFRASTRUCTURE ELEMENT

In renegotiating the National Water Initiative, jurisdictions should develop an element to guide investment in water infrastructure.

The new element should restate the high-level principle that all infrastructure is to be assessed as economically viable and environmentally sustainable prior to the commitment of funding, with cost recovery from users as the norm. Jurisdictions should agree to criteria on how adherence with the principle can be demonstrated.

The new element should also include an agreed framework to guide government investment in major water infrastructure.

The following discussion proposes content for the water infrastructure element in a renewed NWI.

1. Project assessment and selection processes

The objective of project selection should be to ensure that any major water infrastructure development is in the public interest, and that the option conferring the highest positive net benefit for the community is selected. To that end, project proponents should ensure that they:

- identify and quantify a clear problem or opportunity, with reference to existing long-term planning
- undertake options assessments and feasibility studies to identify the most promising solutions (which may not involve new water infrastructure, nor government investment — all options should be on the table)
- develop a robust business case to establish whether those options are economically and/or commercially viable (based on criteria discussed below)

-
- subject the business case to public and/or independent critique
 - select the most worthwhile option based on that business case.

Each stage of the decision-making process should be coupled with meaningful stakeholder engagement, including with local governments, communities, natural resource management bodies, Traditional Owners, water service providers and infrastructure advisory bodies. Then government funding or financing for a project should only be committed following assessment of all potential funding sources after a business case is prepared. Finally, a post-completion review should be undertaken, with the aim of using insights to support improvements in future assessment and selection processes.

These requirements align with a set of principles developed by Infrastructure Australia to guide infrastructure decision-making processes across all sectors (SP I *Infrastructure*: box 5). These principles would provide a sound basis for water infrastructure project selection processes and adherence to them would help avoid uneconomic investments.

An agreed approach to project assessment and selection should form the basis of the framework for government investment in major water infrastructure under a renewed NWI.

2. Criteria for economic viability and environmental sustainability

Economic viability

The economic viability of any new infrastructure should be established through development of a business case. Transparent and rigorous assessment should be used to identify the option with the greatest positive net benefit to the community (and those entailing a net cost, which should be avoided), alongside an assessment of non-infrastructure options that may address the issue. Cost–benefit analysis, which allows ‘the economic, social and environmental merits of a project proposal to be identified, measured, valued and compared’ (IA 2018, p. 18), is the key tool.

Many benefits and costs will be difficult to quantify. Public scrutiny can help ensure that any estimates are robust; business cases should be published as a matter of course. This is not currently the case in all jurisdictions (*Assessment*: section 3).

At a minimum, governments should not fund projects with a benefit–cost ratio less than one (except in very limited cases, discussed below). Further, projects with marginal benefit–cost ratios should not be considered as economically sound unless sensitivity analysis is undertaken to test the strength of assumptions (and to address the risks of overly optimistic demand assessments). This analysis should consider the impacts of alternative scenarios — such as climate change and regional economic change — on demand and supply for water.

It should also be common practice to secure demand for any new irrigation infrastructure upfront through entitlement pre-sales — as has been done in the Tasmanian Irrigation program. And the potential social and distributional impacts of a project should be assessed

to help governments manage any negative adjustment pressures that might arise if the project goes ahead (chapter 12).

Environmental sustainability

While the environmental sustainability of a proposed development should be identified through environmental assessments as part of the business case, a project's ecological sustainability should also be contingent on a high-quality water plan (based on the best available information) being in place *before* infrastructure is constructed. The plan should:

- establish the environmental water provisions necessary to meet agreed environmental outcomes against anticipated regional-scale climate changes
- set out the social, economic and cultural outcomes sought from the water plan
- clearly define the expected reliability of water rights, taking into account the likely impacts of climate change on the region
- be developed with robust community engagement to reflect community values.

Where a major development is approved in an area without a water plan in place, the relevant State or Territory Government should develop a plan that accounts for the impact of that development, and ensure that the plan is in place before the infrastructure is commissioned.

A project should also comply with State, Territory and/or Australian Government environmental approval processes (which occur after project selection).

Culturally responsive infrastructure development processes that incorporate Aboriginal and Torres Strait Islander people's values

Currently, proponents must account for impacts on Aboriginal and Torres Strait Islander people's heritage and other cultural values associated with water through State, Territory and Australian Government project approval processes. However, there is a case to elevate these values in a renewed NWI.

A renewed NWI should ensure that processes around new developments are culturally responsive to the aspirations of Traditional Owners. The Commission considers that jurisdictions should ensure new developments are undertaken with high quality engagement with Aboriginal and Torres Strait Islander people. Further, governments should consider providing Indigenous access entitlements in undeveloped systems where this would be consistent with and support the inland water target under the National Agreement on Closing the Gap.

The Commission welcomes views on how this might be given effect in the new water infrastructure element — noting that this should not pre-empt the co-design process for a new element on Aboriginal and Torres Strait Islander people's water access (chapter 9).

INFORMATION REQUEST 13.1

How could a refreshed National Water Initiative ensure that major water infrastructure investments most effectively promote the aspirations of Traditional Owners and protect Aboriginal and Torres Strait Islander people's heritage and cultural values? Should the principle guiding new infrastructure be amended to ensure that planning processes for developments are culturally responsive (in addition to those developments being environmentally sustainable and economically viable)?

Principles for cost sharing between users and taxpayers

Funding and financing arrangements, including any government subsidies, should only be determined once a project has met all other criteria through the development of a business case.

As under the current NWI, any government subsidies for infrastructure must be provided transparently. In addition, all subsidies should have a clearly expressed policy rationale. The following high-level principles are suggested to guide cost sharing.

- Investments that are both economically and commercially viable should be undertaken by the relevant water service provider, with full cost recovery from users and generally without government subsidy.³ This should be the norm.
 - The role of government should be limited to project approval, except in cases of substantial public benefits that impose costs best borne by governments.
 - Public benefits can include flood mitigation and recreational use of dams, but do not extend to regional development or similar strategic investments.
- Major water infrastructure that is not economically viable should not proceed, except where an equity argument supports provision of an essential service.
 - Government funding should be transparent, and water service provider planning should guide investments. (However, a transparent community service obligation payment is generally preferable to infrastructure expenditure (chapter 11).)
- Where governments choose to subsidise infrastructure in pursuit of a strategic objective, including in support of projects that are not commercially viable, additional scrutiny is required to maximise the effectiveness of that investment while minimising the costs and risks to taxpayers.

³ Economic viability requires a benefit–cost ratio exceeding one, as determined by the business case, whereas commercial viability is determined by whether infrastructure users are willing (and able) to pay the full costs of infrastructure construction and maintenance — simply put, whether the benefits that accrue to infrastructure users are sufficient for them to fund the project without a subsidy, in which case a commercially-focused service provider would have incentive to provide the infrastructure.

Government infrastructure funding in pursuit of strategic objectives

At times, governments choose to fund major water infrastructure in pursuit of broader strategic objectives, which may include:

- regional or industry development, such as enabling irrigated agriculture or job creation in a particular region
- ensuring access to a basic essential service, such as town water supply (where supply of a basic level of service is considered unaffordable; discussed in chapter 11)
- short-term stimulus in response to an economic shock.

Decisions to invest in pursuit of such objectives are ultimately a matter for governments — but this should not provide a blank cheque to bypass robust project selection processes.

Ultimately, governments should look to maximise their chance of successfully achieving their objectives, while minimising the costs and risks to taxpayers. As a principle, they should justify how water infrastructure is the most effective means of achieving any broader strategic objectives, compared with alternative infrastructure or non-infrastructure options.

A key shortcoming with current decision making is the propensity of governments to view rural water infrastructure in isolation from other options to promote regional development. All public expenditure will create *some* degree of economic activity — but governments must direct their limited funds to projects that provide the greatest return on public investment over the long term.

The practical reality is that the evidence of job creation from large regional infrastructure projects is often weak. Further, the success of water infrastructure in supporting regional development is often dependent on factors like transport infrastructure and supporting industries. These may not be in place — or considered in infrastructure proposals — and are often a more substantive barrier to regional development than the absence of water infrastructure.

To help address these issues, governments should demonstrate that major development forms part of a comprehensive and public regional strategic plan, and that any necessary supporting infrastructure is (or will be) in place to maximise the benefits of the investment.

Water allocation

Where a major project creates additional water rights, State and Territory Governments must decide how those rights are assigned between different users.

The NWI suggests that market-based mechanisms should be used ‘to the extent practicable’, although acknowledges that allocations are a decision for State and Territory Governments. This remains sound as an approach: market-based approaches encourage movement of water

to its highest-value use. And market-based mechanisms include the pre-sale of entitlements prior to construction, which avoids optimism bias (overestimates of net benefits).

That said, as chapter 9 suggests, where governments invest in new water infrastructure, they should consider reserving a share of any new water rights for Traditional Owners where this would be consistent with and contribute to targets under the National Agreement on Closing the Gap.

Institutional arrangements

Institutional roles and responsibilities for government investment in major water infrastructure should be clearly established as part of the framework in a renewed NWI.

State and Territory Governments should have primary responsibility for proposing (and overseeing) major water infrastructure developments in their jurisdictions. This corresponds with their current ownership of bulk water service providers (in many cases), as well as their responsibilities for water resource management, infrastructure development, regional development and most stages of project approval.⁴

The Commission does not see a national interest argument that justifies a general or ongoing role for the Australian Government in water infrastructure decision making. An exception may be in shared systems, where the benefits of infrastructure are divided across multiple jurisdictions. And agencies funded by the Australian Government (for example, the Bureau of Meteorology and CSIRO) can have a role in providing credible information on climate change and water resource availability (chapter 15).

Any Australian government funding should only be provided where it aligns to nationally-significant priorities (identified by Infrastructure Australia or a similar independent body), or where State and Territory prioritisation processes identify and select major projects with significant public benefits that accrue outside of that jurisdiction.

⁴ The Australian Government has some responsibilities for major developments under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth).

DRAFT NWI RENEWAL ADVICE 13.2: ASSESSMENT CRITERIA FOR WATER INFRASTRUCTURE

As part of the new infrastructure element, jurisdictions should agree to criteria on how projects can demonstrate adherence to the NWI requirements for infrastructure.

Economic viability should be demonstrated by a positive benefit–cost ratio determined through a transparent and rigorous cost–benefit assessment, with:

- an assessment of a range of options, including non-infrastructure options where these can meet the investment objective, and selection based on the highest (positive) expected net benefit
- transparency supported by publication of business cases as a matter of course (except where commercially-sensitive data limits publication, in which case the business case should be reviewed by a qualified independent body)
- use of entitlement pre-sale to limit optimism bias
- robust estimates of social and distributional impacts.

Environmental sustainability should be demonstrated through environmental, social, and Aboriginal and Torres Strait Islander people’s cultural heritage impact approvals, and compliance with a high-quality and NWI-consistent water plan that:

- establishes the environmental water provisions necessary to meet agreed environmental outcomes under a changing climate
- sets out the social, economic and cultural outcomes sought from the water plan
- clearly defines the expected reliability of water rights, taking into account the likely impacts of climate change.

Costs should be recovered from users as the norm, except where government funding is provided through a transparent subsidy. This should be limited to situations where:

- substantial public benefits associated with water infrastructure impose additional costs that are best borne by governments
- an equity argument exists to support access to an essential service (for example, high-cost regional town water systems where the cost of supplying a basic level of services is considered unaffordable).

Governments should not subsidise major water infrastructure for strategic objectives, such as regional development, unless they demonstrate that the project is the most effective means of addressing that objective. This requires alignment with broader high-quality and long-term strategic regional planning processes.

Jurisdictions should maintain the principle supporting use of market mechanisms for allocating water. However, they should consider allocating entitlements in undeveloped systems to Traditional Owners, and ensure that project assessment processes are culturally responsive.

And Australian Government funding for major water infrastructure should not exceed the contribution of the relevant State or Territory Government. This helps ensure buy-in from the relevant government, supports consistency in priorities between levels of governments,

and reflects the comparative advantage of State and Territory Governments in aligning any water infrastructure with local regional development planning.

Such funding, if warranted, should be sector-blind; that is, Australian Government investment in worthwhile projects should not be limited to providing water for agriculture if there are material net benefits in investing in other sectors, such as in regional urban water projects. Projects that provide water for urban needs, without an irrigated agricultural component, are currently ineligible for funding under the NWGA's *Investment Policy Framework*. This limitation should be removed.

DRAFT RECOMMENDATION 13.1

Australian Government investment in major water infrastructure should neither prioritise a particular sector or class of water user, nor be limited to providing water for primary industry. The National Water Grid Authority should broaden its *Investment Policy Framework* to allow funding for all projects where government involvement may be warranted, including supporting access to essential town water supplies.

Finally, a qualified institution should review the business cases for major water projects and demonstrate the analyses are rigorous (or otherwise). This requirement is in place for Australian Government investments — all water infrastructure proposals requesting more than \$250 million of Australian Government funding are reviewed by Infrastructure Australia. However, the increase in the review threshold to \$250 million (from \$100 million prior to 2021) will reduce the number of major water projects that are subject to independent scrutiny. The NWGA's assessment processes, including the role of the National Water Grid Advisory Body (which provides expert advice to the NWGA on water infrastructure), must be transparent to ensure proper scrutiny over projects below that threshold.

DRAFT NWI RENEWAL ADVICE 13.3: INSTITUTIONAL ARRANGEMENTS

A new water infrastructure element should clarify relevant institutional roles and responsibilities underpinning the framework for government investment.

- State and Territory Governments should have primary responsibility for proposing (and overseeing) major water infrastructure developments in their jurisdictions.
- Australian Government funding should not exceed the contribution of the relevant State or Territory Government.
- Independent infrastructure advisory bodies should transparently review the business cases of major projects.

14 Community engagement

Key points

- Effective, thorough, well-informed community engagement is needed to support reform in all aspects of water resource management and water services provision.
- The National Water Initiative (NWI) commits Australian governments to ensuring that community engagement happens, but provides little guidance on how they should go about it.
- Practice has improved since 2004, however its quality remains inconsistent.
- In redesigning the Community Partnership element of the NWI, Australian governments should consider developing an organising framework based on the following objectives:
 - continuously improving and sustaining government engagement effort across all aspects of water resource management and service provision
 - ensuring that engagement effort and resourcing is fit for purpose taking into account the scale of the proposed change or reform, its sensitivities and its impacts, and that governments are clear about the purpose of their engagement and the role of communities in decision making
 - improving the effectiveness of community engagement through enhancing:
 - water information accessibility and comprehensibility (chapter 10)
 - community water literacy (chapter 10).
- Characteristics of effective community engagement include: inclusiveness, timeliness, partnership, respect, access to information, transparency, responsiveness and continuous improvement. These represent a foundation for guidance on best practice in a renewed NWI.

This chapter summarises Supporting Paper J: Community engagement (SP J Engagement). Further detail and analysis can be found in that paper.

Water reform can be contentious. Water is a valuable input to many business activities, particularly agriculture, and supports a range of environmental and other public benefit outcomes. Accordingly, difficult decisions have to be made that trade off the benefits of more water for some uses with less water for others. Given this, effective engagement is crucial to successful reform. As the National Farmers' Federation reflected:

Genuine and meaningful consultation processes are required to address complex, interdependent and often contentious water reform processes. The trade-off of poor consultation is often the erosion of trust and confidence from communities which has long-term implications for achieving further reform processes. (sub. 42, p. 7)

Done well, engagement ensures that the views of those who might be affected are seriously considered, and that all understand why decisions have been made (even if they do not agree with the outcomes). Done poorly, it can create distress and resistance to change.

Australian governments have successfully implemented a wide range of water reform initiatives over the past half century, with community engagement an important enabler. Looking ahead, many difficult decisions will have to be made to deal with the challenges facing water resource management and water service provision. Effective community engagement will be key to achieving the best possible outcomes.

14.1 The NWI has facilitated engagement but an update is needed

The importance of community engagement is recognised in the NWI. This element commits governments to engage water users and other stakeholders in achieving the objectives of the Agreement by:

- improving certainty and building confidence with reform processes
- transparency in decision making
- ensuring sound information is available to all sectors at key decision points.

However, there is little guidance on how governments should go about this task. And, the associated actions covering consultation and information provision are dated and focus only on specific aspects of water resource management (overallocation, water planning, entitlement security and water use sustainability). These aspects were clearly key reform priorities in 2004. However, the range and nature of water management reform priorities has broadened considerably. Engagement is highly relevant to all aspects of water resource management and water service provision.

Discussion of issues with information provision and renewal advice to address them are presented in chapter 10. And engagement with Aboriginal and Torres Strait Islander people is discussed in chapter 9. This chapter focuses on engagement more broadly.

Evidence on engagement practice is mixed

While governments are largely meeting their NWI commitments (*Assessment*), inquiry participants and others have noted poor practice, generally within the New South Wales portion of the Murray–Darling Basin. Criticisms include inadequate inclusion:

Across the [Murray–Darling] Basin trust in governments — particularly federal and state — to deliver good long-term policy and support rural and regional communities has been severely diminished. This fall in trust has resulted from a failure to adequately include people in conversations about government policy and their future, especially those who have not been on the upside of change. (Sefton et al. 2020b, p. 1)

And, a lack of influence among those who are included.

Many clients tell us that they do not think that they are able to influence outcomes through consultation processes (as they perceive outcomes as being largely pre-determined). Put differently, for many people the process itself lacks legitimacy which in turn means that they are suspicious of, and unwilling to accept, outcomes. (EDO, sub. 54, p. 20)

Practice also tends to involve discrete and issue-based consultation. This is suitable for some water matters, but many of the water management challenges facing communities require ongoing engagement. A more effective approach in these instances would be an ongoing conversation with communities about the management of these challenges. Reflecting this, the National Farmers' Federation observed that:

While significant progress has been made in jurisdictions to improve consultation processes, many elements of the Basin Plan are complex, interdependent and contentious (particularly the implementation of the supply measures) and require committed and extensive consultation with communities, and other relevant stakeholders, over a reasonable timeframe. (sub. 42, p. 7)

14.2 Embedding effective practice through a renewed NWI

As for other elements of the NWI, recent Murray–Darling Basin experience offers lessons for renewal. In the case of engagement, inclusion of a principles-based framework to provide guidance on how to conduct effective engagement practice on water matters would be of value.

There are many guidelines for best-practice community engagement, for example, from the Office of Best Practice Regulation (2016) and the OECD (2017). Synthesising the available advice, characteristics of effective practice include: inclusiveness, timeliness, partnership, respect, access to information, transparency, responsiveness and continuous improvement.

And the approach adopted needs to be fit for purpose. A commonly cited spectrum for community engagement ranges from information provision to empowerment (figure 14.1), with increasing community influence on outcomes across the spectrum. The most appropriate approach will be context specific. For example, involvement might be sufficient for determining community objectives for water service provision. In contrast, collaboration and empowerment are more consistent with contemporary approaches to policy design with Aboriginal and Torres Strait Islander people (chapter 9). A key point is that governments must be honest and transparent with communities about the purpose of their consultation and their role in decision making.

Figure 14.1 IAP2 Community engagement spectrum^a

Increased community influence on decisions					
	Inform	Consult	Involve	Collaborate	Empower
Participation goal:	To provide the public with information to help them understand issues and opportunities	To obtain feedback	To work with the public to ensure that concerns are understood and considered	To partner with the public in each aspect of the decision	To place final decision making in the hands of the public
Participation promise:	We will keep you informed	We will keep you informed, listen to concerns and seek feedback	We will work with you to ensure your concerns and aspirations are reflected in the alternative options developed	We will look to you for advice and incorporate your advice to the maximum extent possible	We will implement what you decide

^a IAP2 is the International Association for Public Participation's framework for community engagement.

Source: IAP2 (2019).

A useful starting point for Australian governments in redesigning the community partnership element of the NWI would be to develop an organising framework focused on:

- continuously improving and sustaining government engagement effort across all aspects of water resource management and water service provision
- ensuring that engagement effort and its resourcing are fit for purpose taking into account the scale of proposed change or reform, its sensitivities and its impacts, and that governments are clear about the purpose of their engagement and the role of communities in decision making
- improving the effectiveness of community engagement through enhancing:
 - water information accessibility and comprehensibility (chapter 10)
 - community water literacy (chapter 10).

Development of best-practice principles to support achievement of each of these objectives should aim to establish a platform enabling:

- effective consideration of diverse interests and expectations
- design of engagement processes that are fit for purpose and offer participants genuine opportunities to influence decisions

-
- in line with the IAP2 spectrum, the participation promise, or planned level of engagement, should be clear at the outset of any process
 - participants to access the information, analysis and time to participate and contribute
 - building of an engagement culture where stakeholders' views are valued
 - communication of decisions in an open, transparent and accessible manner
 - regular review and reporting by governments of their engagement efforts to ensure ongoing effectiveness.

Development of principles specifically for Aboriginal and Torres Strait Islanders could be included within the terms of reference for the newly created Committee on Aboriginal Water Interests. Effective engagement of Traditional Owners in key areas including water planning, natural resource management and environmental water planning will need long-term relationships with local agencies working on country.

DRAFT NWI RENEWAL ADVICE 14.1: COMMUNITY ENGAGEMENT FRAMEWORK

Australian governments should recommit to best-practice, cost-effective engagement with their communities on all water matters. To achieve this, a renewed National Water Initiative should develop a community engagement framework focused on:

- continuously improving and sustaining government engagement effort across all aspects of water resource management and water service provision
- ensuring that engagement effort and its resourcing are fit for purpose taking into account the scale of proposed change or reform, its sensitivities and its impacts, and that governments are clear about the purpose of their engagement and the role of communities in decision making
- improving the effectiveness of community engagement through enhancing:
 - water information accessibility and comprehensibility
 - community water literacy.

The characteristics of inclusiveness, timeliness, partnership, respect, access to information, transparency, responsiveness and continuous improvement represent a best-practice foundation for guidance on effective community engagement and information provision practice in water resource management and water service provision.

15 Knowledge, capacity and capability building

Key points

- Knowledge generation has been integral to water reform achievements under the National Water Initiative. And ongoing investment will underpin the success of future water reform efforts, particularly in the face of emerging challenges such as climate change.
 - It will provide a foundation for evidence-based decision making, innovation, continuous improvement and the development of community water literacy to, for example, support water planning, inform decisions about the use of environmental water and help utilities meet growing water and service demands.
- Efficient investment would be supported by a formal process of research priority setting and improved coordination between jurisdictions.
- Inclusion of an expectation in governing documents that regulated utilities invest in research and development activities to improve service delivery would empower utilities and ensure that economic regulators include associated expenditure when making price determinations.
- Provision of good information is not enough to realise evidence-based policy.
 - Decision makers need to know information exists. Success requires sound relationships between knowledge generators and users. Institutional mechanisms like communities of practice and Cooperative Research Centres can support the development and maintenance of these relationships.
 - Decision makers also need the capacity and capability to use information. Governments need to ensure that water planners, managers, regulators and policy makers have both the resources and the knowledge, skills and experience required to effectively implement the National Water Initiative. The staff of water utilities also need support, training, skills and qualifications to be able to effectively discharge their functions.

This chapter summarises Supporting Paper K: Knowledge, capacity and capability building (SP K Knowledge). Further detail and analysis can be found in that paper.

Knowledge is the foundation of evidence-based decision making, innovation, continuous improvement and the development of community water literacy. Parties to the National Water Initiative (NWI) recognised its importance through two outcomes — one covering knowledge and capacity building to support implementation of the Agreement; the other, coordination of the national water knowledge effort.

Research and knowledge building efforts have been integral to water reform achievements. For example, water planning trade-off decisions have been underpinned by understanding of

hydrology and hydrogeology, climate change modelling, understanding of ecological assets and their water requirements, economic and cultural values and the evolution of more efficient irrigation practices. The provision of safe drinking water required human health and toxicology studies; research across chemistry and engineering helped to develop efficient water treatment technologies; and utilities have used innovative community engagement techniques in pricing submissions.

Looking ahead, ongoing effort will be needed. Inquiry participants highlighted the underpinning role played by knowledge. For example:

We suggest that further reform of the NWI should be supported and underpinned by independent, nimble and well funded research, that can provide additional decision support to allow for sound responses to either sudden system shocks (such as climate emergencies or pandemics) or more gradual changes over time that warrant more systematic addressing. (WaterRA, sub. 98, p. 2)

15.1 Knowledge generation needs attention

Governments have a role to play in funding water-related research. This includes where research is a public good or is supporting government delivery of public goods (PC 2007, p. 74). The management of water resource systems, environmental water management and the development of water quality standards are all examples of public goods. Without government support, research related to these services would be under provided, risking inefficient or poor provision and failure to achieve objectives. In the past, governments have invested to support water-related knowledge generation. For example, research on the hydrological characteristics of water resources, cultural values and environmental objectives has informed water planning processes; research into the impacts of pollutants and toxicants on human health has informed the setting of drinking water standards and guidelines for the use of recycled water.

Funding to support evidence-based decision making will be needed

Inquiry participants have identified some knowledge gaps and noted low funding levels.

- The Inland Rivers Network (sub. 86, p. 18) reported that ‘significant knowledge gaps have been recognised’ in the Great Artesian Basin . Water plans for the region require accurate calculation of planned environmental water and improved knowledge of annual recharge and flux due to the complexity and fragility of the Murray–Darling Basin.
- WWF Australia (sub. 50, p. 5) observed that the Queensland Department of Natural Resources, Mines and Energy’s ability to assess environmental outcomes in water plan areas is undermined by poor data and knowledge gaps.
- WSAA (sub. 88, p. 16) noted that recent drought conditions and declining water supplies have exposed gaps in understanding of water security.

-
- The Australian Academy of Technology and Engineering and the Australian Academy of Science (sub. 90, p. 6) stated that current funding levels are near historic lows after the peak levels seen in the mid-2000s.

Additionally, many of the programs of water-related research and development initiated since the NWI was agreed have ended and not been replaced, including Land and Water Australia, five different Cooperative Research Centres (CRCs), the National Program for Sustainable Irrigation, the Raising National Water Standards Programme, the Australian Water Recycling Centre of Excellence, and the National Centre for Excellence for Desalination.

Ongoing government investments in knowledge generation will be key to filling existing gaps, supporting reform processes and designing effective responses to emerging challenges.

Priorities would guide efficient effort ...

While knowledge and capacity building needs were identified in the NWI, and the National Water Knowledge and Research Platform (since defunded) identified priority themes in 2012, today, few parties to the NWI have a clear process for identifying and updating water research priorities.

Funding to support water-related knowledge generation will always compete with other areas of public expenditure. Setting priorities would help to secure funding and direct effort to areas of strategic importance and policy relevance, maximising the value of investments.

A number of priority candidates for research effort have been identified through the inquiry, including groundwater knowledge, issues for Aboriginal and Torres Strait Islander people and potential implications of a changing climate for water resource management and service provision (SP K *Knowledge*).

The potential benefits from investments in water knowledge warrant a national process for identifying and reporting research priorities. An effective process would involve all jurisdictions and draw on input from the research community and research users. The National Water Reform Committee is considered an appropriate body to initiate and oversee this work. To remain current, priorities would need to be updated regularly — for example, on a three-yearly basis. And priorities should be provided to the Australian Research Council and other relevant research providers to help inform decisions on the provision of Australian government funding for water-related research.

... as would coordination between jurisdictions

While some water knowledge needs are specific to a particular location or region, many are shared across jurisdictions. Coordination between jurisdictions on research and the sharing of findings could have a number of benefits, including avoiding duplication of effort, pooling

of resources to realise more activities, greater knowledge dissemination and stronger consensus on common issues.

But there is no national platform to coordinate knowledge generation and sharing. NWI renewal is an opportunity to establish something fit for purpose, and the National Water Reform Committee appears well placed to coordinate research efforts by bringing jurisdictions together.

Economic regulation should allow for investment by water utilities

Some aspects of water knowledge generation are best funded by businesses. A clear example is research that supports continuous improvement in the operation of water service utilities. Improvements in understanding of urban water use, values and systems have the potential to lead to efficiency improvements, better outcomes and possibly lower service provision costs.

Inclusion of an expectation that regulated utilities will invest in research and development activities relevant to their businesses in statements of obligations, or similar governing documents, would empower utilities and ensure that economic regulators include associated expenditure when making price determinations.

15.2 Use of knowledge also needs to be optimised

Creation of knowledge is not enough to ensure that decision making is based on the best available evidence. Decision makers need to know information exists. And they are more likely to use information if they trust its source and have confidence in its quality. The flow of information between producers and users need to be fostered (PC 2010, p. 19).

Strong partnerships facilitate best-practice use of evidence

A short-term need for knowledge characterises many policy situations. Decisions frequently need to be made quickly and decision makers will draw on available information. Data from regular monitoring activities are likely to be useful as well as the results of systematic reviews and expert opinion. Investments in data gathering and monitoring activities, and in establishing durable links between decision makers and the research community, position decision makers to use the best available evidence in such situations.

For the medium term, decision makers can create new knowledge. Filling gaps provides opportunities to establish and build on collaborative relationships. Over the longer term, researchers have the opportunity to investigate ongoing, new and emerging areas of interest for policy. Long-term knowledge building should be strategic and directed at developing the knowledge, models and data likely to be helpful in meeting policy needs and identify the issues and opportunities of the future. Knowledge of water systems under a changing climate

is a good example. Long-term research activities also help generate and maintain the skill and knowledge base that supports short- and medium-term work.

Successful approaches to establishing and maintaining constructive relationships across disciplines include communities of practice and CRCs. However, few institutional mechanisms now exist to regularly bring water decision makers and researchers together, risking a disconnect between science and policy.

Over time the CRC program has progressively shifted toward a commercial focus. This is likely to mean fewer successful water-related CRC bids, despite the model being well-suited to the needs of the sector. As the Commission has previously noted ‘[t]he original objectives of the program should be reinstated — namely, the translation of research outputs into economic, social and environmental benefits, rather than focusing public support on the commercialisation of industrial research alone’ (PC 2007, p. xxix). If water sector programs with a strong public good focus are not eligible under the CRC program, consideration could be given to alternative research investment models that share the features of CRCs.

Capacity and capability building are also important

Without adequate capacity and capability, new knowledge generated will be of little value. To effectively implement a renewed NWI, water planners, system managers, regulators and policy makers will need both capacity and capability — that is, resources to find knowledge products and the requisite knowledge, experience and skills to evaluate and use them.

The staff of water utilities also need support, training, skills and qualifications to discharge their functions. Meeting these needs is primarily within the remit of the utilities. However, given the importance of the sector to community wellbeing, governments have a responsibility to monitor and ensure appropriate systems are in place to maintain capability.

Although the recent drought, bushfires and COVID-19 challenged the industry, there is little evidence to suggest that current capacity and capability are inadequate. On a principles basis however, the recognition of capacity in the current NWI should be retained, and a commitment to capability development added, through NWI renewal.

DRAFT NWI RENEWAL ADVICE 15.1: EFFECTIVE KNOWLEDGE GENERATION

Commitment to a culture of evidence-based decision making, innovation and continuous improvement will underpin successful implementation of a renewed National Water Initiative. Inclusion of the following principles in a renewed National Water Initiative would bring that to effect.

- Knowledge building priorities are identified through processes that involve all jurisdictions and draw on input from the research community and research users.
- Governments invest in knowledge generation activities that align with identified priorities and serve the public good.
- Investments are streamlined through effective coordination between jurisdictions.
- Utilities are empowered to invest efficiently in knowledge generation.
- Strong, durable partnerships between decision makers and knowledge generators are developed and actively managed.
- Decision makers have the capability and capacity to use knowledge effectively in making evidence-based decisions.
- Water utility staff have the capacity and capability to discharge their functions.

A Terms of Reference

National Water Inquiry

I, the Hon. Joshua Frydenberg MP, Treasurer, pursuant to Parts 2 and 3 of the *Productivity Commission Act 1998*, hereby request that the Productivity Commission (Commission) undertake an Inquiry into progress with the reform of Australia's water resources sector. The Inquiry should have a particular emphasis on the progress of all Australian governments in achieving the objectives, outcomes and timelines anticipated under the Intergovernmental Agreement on a National Water Initiative (NWI).

Background

The Commission conducted its first national water reform Inquiry in 2017. The Commission found that Australia is managing its water resources well, given our dry and highly variable climate, and the importance of water to our economy. However there remains further work to do. Governments need to complete unfinished business from the NWI, including fully implementing entitlement and planning reforms, and respond to the challenges posed by population growth, climate change and changing community expectations.

In April 2019, the Australian Government responded to the Commission's 2017 Inquiry, including a commitment to the Commission's recommendation of renewing the NWI. The Australian Government is now working with state and territory governments to progress this matter.

State and territory governments are primarily responsible for the management of water resources within their jurisdictions. The Commonwealth has played a role in funding the acceleration of reform, providing leadership and coordination, and management of some transboundary resources where agreed by relevant jurisdictions.

Reform of the water sector has been ongoing over several decades, reflecting the fundamental importance of water to our economy and the significant challenges involved in managing a shared natural resource often impacted by periods of scarcity. A national approach to water reform started in 1994 through the landmark COAG water reform framework and has continued through subsequent initiatives such as the NWI (2004), the *Water Act 2007* (Cwth) and the Murray-Darling Basin Plan (November 2012).

The Inquiry into the reform of Australia's water resources sector will fulfil the statutory requirement for the second of the Commission's triennial assessments of progress towards

achieving the objectives and outcomes of the NWI required by section 88 of the *Water Act 2007* and these terms of reference should be read in conjunction with that Act.

Scope of the inquiry

The Inquiry should assess progress towards achieving the objectives and outcomes of the NWI. As the NWI was agreed in 2004, the scope of the Inquiry is broader than that explicitly required by legislation. The Inquiry should also continue to examine whether the water reforms agreed in the NWI, along with any other subsequent reforms adopted by COAG, are achieving their intended outcomes.

In undertaking the Inquiry, the Commission should assess:

- progress in jurisdictional adoption of NWI principles, objectives and key outcomes, and where these have not been adopted, the impacts and opportunity costs of not doing so
- the outcomes to date of the NWI and related water reform efforts, taking account of other drivers of reform
- the extent to which the NWI reforms are adequate to support government responses to emerging or changing water management challenges such as climate change, and
- provide any further practical advice on addressing the joint governments' priorities for implementation of a renewed NWI, and
- provide specific practical advice on ways in which the NWI could be improved to support better social, economic and environmental outcomes.

The Commission should also consider:

- the interaction of water policy with other policy areas such as climate, energy, agriculture, forestry, land use planning and urban development
- the policy ramifications of emerging climate change impacts on water resources
- the provision of reliable water services to regional, rural and remote communities
- the principles to be satisfied for any government investment in major water infrastructure projects
- issues identified in the Commission's 2017 Report, and
- international experiences and examples.

In order to enhance transparency, the Commission should also assess the progress of water planning across Australia to improve clarity around the complex and often not well understood water planning processes within each jurisdiction. There should be a focus on policy and legislative processes for water planning in each jurisdiction, rather than detailed on-ground implementation arrangements. The Commission should seek to identify areas of better practice and areas where improvement is required. The Commission should consider the format for reporting this assessment to clearly convey its findings to a broad audience,

including those stakeholders seeking to understand the state of water planning in their regional area.

The Commission should make recommendations on actions that the parties to the NWI might take to better achieve the NWI objectives and outcomes, and recommendations for future reform priorities. In making its recommendations, the Commission should provide specific, practical advice on ways in which the NWI could be improved, including specific advice to assist governments' progress their commitment to renew the NWI.

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

The Commission should again avoid any duplication between this Inquiry and the Inquiry into the effectiveness of the implementation of the Basin Plan and the state and territory water resource plans.

Process

The Commission should undertake a comprehensive consultation process including establishing a stakeholder working group in accordance with section 89 of the *Water Act 2007*, holding hearings, inviting public submissions and releasing a draft report to the public. The Commission should consult with Commonwealth, state and territory governments, and consumer, environmental, industry and Indigenous stakeholders.

In conducting the analysis, the Commission should have regard to the submissions and reports of all relevant inquiries and government responses. The Commission should also take into account reform initiatives at the jurisdictional level relevant to the scope of the inquiry.

The final report is to be provided to the Government by 31 December 2020.

THE HON JOSH FRYDENBERG MP

Treasurer

[Received 22 May 2020]

Extension

The media release announcing the inquiry noted it would be completed in early 2021. That timeline has been extended to mid-2021 to provide households, businesses and governments with more time to engage with the Commission on the inquiry.

B Glossary

Adaptive management	An iterative process of learning from experience and using new information to improve environmental management.
Bulk water services	The harvesting and storage of water using infrastructure (such as dams), and the transport of that water to users (primarily through natural waterways, pipes or channels) often over large distances. Bulk water infrastructure can supply water for both urban and irrigation use.
Carryover	The option to hold a portion of unused seasonal water allocations for use at a later date. This typically involves storing the allocated water in physical storage, such as a dam.
Community Service Obligation	Obligations placed on businesses to provide services that cannot be funded entirely from user charges.
Complementary waterway management activities	Activities that protect or enhance waterways such as rivers, wetlands and estuaries, whether fed through surface water or groundwater. These include the management of land use, vegetation, fauna, recreational uses of water and water quality, but exclude the provision of environmental flows.
Consumption based pricing	Water pricing where a charge is applied to each unit of water consumed.
Consumptive pool	The amount of water resource that can be made available for consumptive use in a given water system under the rules of the relevant water plan.
Conveyance loss	Water that is lost in transit and not available for use due to evaporation or leakage.
Corporatisation	The creation of a separate legal entity (a corporation) to undertake specific functions.
Direct potable reuse	Mixing treated wastewater or stormwater directly into drinking water supplies.
Distribution services (irrigation)	Transporting water via a network of pipes and/or channels to properties serviced by the system and located away from a waterway.

Environmental flow	A flow regime applied to a river, wetland or floodplain to improve or maintain environmental outcomes (and other public benefit outcomes, where possible).
Environmental outcomes	Maintaining ecosystem function (for example, through periodic inundation of floodplain wetlands); biodiversity; water quality; and river health targets (defined under the National Water Initiative).
Environmental transfers	Water allocations owned by an environmental water holder that are transferred within or between water systems to achieve environmental watering objectives.
Environmental water	The water provided to achieve environmental outcomes (and other public benefit outcomes, where possible), which may derive from surface water or groundwater and be provided as planned environmental water or held environmental water.
Environmental watering	The delivery or use of held environmental water to achieve environmental outcomes (and other public benefit outcomes, where possible).
Externalities	The effects of consumption or production decisions on people other than those directly involved.
Flow regime	The volume, location and timing of water provided by water managers.
Gigalitre	One billion (1 000 000 000) litres.
Groundwater	Water located underground in permeable soil or rock. It includes both naturally occurring water and water pumped underground for storage. However, it does not include water held in underground tanks, pipes or other works.
Held environmental water	Water entitlements held and used (usually by governments) for the purpose of achieving environmental outcomes (and other public benefit outcomes, where possible).
Indirect potable reuse	When treated wastewater or stormwater is added to a water body such as a dam, with the intention that it will mix with other sources and be used to supply drinking water. It differs from ‘direct potable reuse’ by being stored in a water body before reuse.
Integrated water cycle management	A range of approaches to supplying or managing water that considers all aspects of the water cycle. These include reusing wastewater or stormwater, or managing stormwater using ‘water sensitive urban design’.

Interception	The interception of surface water or groundwater that would otherwise flow, directly or indirectly, into a waterway, lake, wetland, aquifer, dam or reservoir.
Liveability	The extent to which a place meets the social, environmental and economic needs of its inhabitants.
Megalitre	One million (1 000 000) litres.
Merits review	Reconsidering an administrative or regulatory decision, where the review body has the ability to impose a preferable decision in place of the original decision, and has the same powers and discretions as the original decision maker.
Outcomes-focused regulation	Regulations that specify the outcome to be achieved without prescribing the means to achieve that outcome.
Other public benefit outcomes	Mitigating pollution, public health (for example, limiting noxious algal blooms), Indigenous and cultural values, recreation, fisheries, tourism, navigation and amenity values (defined under the National Water Initiative).
Overallocation	Where 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	Where the total volume of water actually 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	Rules contained in water plans that constrain the volume and timing of extractions, in order to ‘leave water behind’ for the environment. Examples of rules-based provisions include minimum stream flows, cease-to-pump rules and groundwater access rules.
Planned potable reuse	The deliberate reuse of wastewater or stormwater to augment drinking water supplies. It can either be ‘direct’ or ‘indirect’. It contrasts with unplanned potable reuse, which occurs when treated wastewater enters a natural water system from which other users draw drinking water.
Potable water	Water that is safe to drink or use for food preparation.
Regulated system	A surface water system in which water can be stored and flow levels can be controlled through the use of structures such as dams or weirs.
Riparian	The land next to a river or stream.

Surface water	Water that flows over or collects on land and in natural or artificial waterways.
Sustainable diversion limit	The limit on quantities of surface water and groundwater that can be taken for consumptive use from Murray Darling Basin water resources, having regard to environmental, social and economic impacts.
Unregulated system	A surface water system that is not controlled through the use of infrastructure to store and release water.
Water access entitlement	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 (also known as a ‘water entitlement’).
Water accounting	Identifying, recognising, quantifying, reporting and assuring information about water, the rights or other claims to that water and the obligations against that water.
Water allocation	The specific volume of water allocated to water access entitlements in a given season, defined according to rules established in the relevant water plan.
Water planning processes	A planning process that establishes rules for sharing surface water or groundwater between the environment and consumptive water users, and also between different types of consumptive water use such as town supply, rural domestic supply, stock watering, industry and irrigation.
Water recovery	The acquisition of a water access right for the purpose of achieving an environmental outcome.
Water sensitive urban design	Designing buildings and landscapes to reduce or slow stormwater runoff (including by increasing the extent to which water infiltrates the soil) and providing opportunities for stormwater reuse.
Water system	A system that is hydrologically connected and described at the level desired for management purposes, such as a catchment, basin or aquifer, or sub-components of these.
Water use right	A right to use water at a specific location and/or for a specific purpose.

C Inquiry conduct and participants

This appendix describes the stakeholder consultation process undertaken for the inquiry and lists the organisations and individuals that have participated.

- An advertisement was placed in *The Australian* newspaper and a circular was sent to identified interested parties following receipt of the terms of reference on 22 May 2020.
- An issues paper was released on 26 May 2020 to assist those wishing to make a written submission to the inquiry. The Commission received 109 submissions (table C.1) and 3 brief comments (table C.2) prior to the release of this draft report. These submissions and brief comments are available online at www.pc.gov.au/inquiries/current/water-reform-2020/submissions.
- As detailed in table C.3, consultations were held with representatives from Commonwealth, State and Territory government agencies, peak bodies, directorates, businesses, consumers, academics and researchers. Roundtables were also held and are listed in table C.4.
- In accordance with section 89 of the *Water Act 2007* (Cth), the Commission has established a stakeholder working group (SWG) for this inquiry. The SWG is an important avenue for consultation. It provides a forum to exchange information and views on issues relevant to this inquiry. The SWG members are listed in table C.5. The first SWG meeting was held on 9 June 2020 and the next on 5 November 2020.
- The Commission welcomes further submissions to discuss the content of the draft report, including responses to draft recommendations and NWI renewal advice. Submissions are due by **24 March 2021**. Public hearings will be held in late March 2021.

Table C.1 Submissions^a

<i>Participant</i>	<i>Submission number</i>
Aboriginal Health Council of Western Australia (AHCWA)	97
Ag Institute of Australia (AIA)	58 #
AgForce	24
Australian Academy of Science (AAS)	95
Australian Academy of Technology and Engineering (ATSE) and the Australian Academy of Science (AAS)	90
Australian Dairy Farmers (ADF)	43
Australian Floodplain Association (AFA)	45
Australian Forest Products Association (AFPA)	19
Australian Petroleum Production and Exploration Association (APPEA)	73
Australian Water Association (AWA)	89 #
Beer, Jan	8
BHP	26
Business NSW	36
Campbell, Grahame	60 *
CANEGROWERS	72
Central Land Council (CLC)	35
Central NSW Joint Organisation (CNSWJO)	55 #
Chapman, Dale	5
Coleambally Irrigation Co-operative Limited (CICL)	7
Cooks River Alliance	10
Cooperative Research Centre for Water Sensitive Cities (CRCWSC)	83
Crase, Prof. Lin	1
Crowe, Damian	100 *#
Dharriwaa Elders Group and Walgett Aboriginal Medical Service (WAMS)	104
Duncan, Phil – Traditional Owner, Gomeroi Nation	67
Engineers Australia	63
Environment Protection Authority Victoria (EPA)	107
Environmental Defenders Office (EDO)	54
eWater	14
Far North Queensland Regional Organisation of Councils (FNQROC)	51
Flow Systems	4
Friends of Latrobe Water (FLoW)	76
Georges Riverkeeper	57
Gladwin Legal	12
Goldenfields Water County Council (GWCC)	25
Grayson, Jim	9
Greater Shepparton City Council (GSCC)	34
Hall, Dr. Nina; Hoy, Prof. Wendy; Ward, Prof. James; Lee, Prof. Amanda; and Ferguson, Dr Megan	84

(continued next page)

Table C.1 (continued)

<i>Participant</i>	<i>Submission number</i>
Healthy Land and Water (HLW)	65
Holley, Prof. Cameron; Kelly, Assoc. Prof. Bryce; Andersen, Assoc. Prof. Martin; Baker, Prof. Andy; Roshan, Dr. Hamid; Triantafilis, Assoc. Prof. Cameron; and Regan, Georgia	46
Hunter H ₂ O	87
Indigenous Reference Group (IRG) to the Ministerial Forum on Northern Development	103
Infrastructure Partnerships Australia	71
Inland Rivers Network (IRN)	86
Institute for Water Futures (IWF) – Australian National University	30
International Association of Hydrogeologists (IAH)	15
Irrigation Australia	3
Jackson, Prof. Sue	61 #
Jensen, Dr. Anne	39
Knee, Ross; and Butt, David	56
Koerner, Dr. Richard	49 #
Lachlan Valley Water (LVW)	40
Langford, Prof. John	91 #
Leeton Shire Council	29
Lifeblood Alliance (LBA)	70 #
Local Government Association of Queensland (LGAQ)	32
Local Government NSW (LGNSW)	75
Martowarra Fitzroy River Council and Water Justice Hub	80 #
Melbourne Water	109 #
Minerals Council of Australia (MCA)	102
Monash Sustainable Development Institute	81
Murray Darling Association (MDA)	78
Murray Irrigation	69
Murray Lower Darling Rivers Indigenous Nation (MLDRIN)	105 #
Murray Valley Private Diverters (MVPD)	101 #
Murray-Darling Basin Authority (MDBA)	23
National Farmers' Federation (NFF)	42
National Health and Medical Research Council (NHMRC)	93
National Irrigators' Council (NIC)	13
National Water Grid Authority (NWGA)	64
Northern Basin Aboriginal Nations (NBAN)	17
NSW Aboriginal Land Council (NSWALC)	96
NSW Government	41
NSW Irrigators' Council (NSWIC)	27
NSW Water Directorate	37
OneWater Advocates (OWA)	2

(continued next page)

Table C.1 (continued)

<i>Participant</i>	<i>Submission number</i>
Pratley, Prof. Jim	16
Queensland Law Society (QLS) and Caitlin McConnel	92
Queensland Water Directorate (qldwater)	47
Riverina and Murray Joint Organisation (RAMJO)	28 #
Smit, Michael; Jones, Adam; Fane, Simon; Philpot, Chris; and Butler, Reid	31
Smith, Eleanor	52
South Australian Chamber of Mines and Energy (SACOME)	18
South Australian Council of Social Service (SACOSS)	74 #
South East Water	106
Southern Riverina Irrigators (SRI)	77
Stormwater Australia	38
SunRice and Ricegrowers' Association of Australia (RGA)	82
Sustainable Population Australia (SPA)	33
Sydney Coastal Councils Group (SCCG)	21
Sydney Water	94
TasWater	11
Turnour, Andrew	79
Unitywater	44
Urban Utilities	85
Urban Water Cycle Solutions; Kingspan Water and Energy	59
Venville, Eliza	22
Victorian Farmers Federation (VFF)	99
Victorian Government	108 #
Victorian Planning Authority (VPA)	20
VicWater	66
Water Industry Operators Association of Australia (WIOA)	53
Water Research Australia (WaterRA)	98
Water Services Association of Australia (WSAA)	88 #
Wentworth Group of Concerned Scientists	68
Western Australian Government	62
WWF Australia	50
Zanker, Mark	48
Zero Mass Water Australia	6

a An asterisk (*) indicates that the submission contains confidential material NOT available to the public. A hash (#) indicates that the submission includes attachments.

Table C.2 **Number of brief comments**

<i>Pre-draft</i>	<i>Total</i>
3	3

Table C.3 Consultations

Participant

ACCC
ACT Environment, Planning & Sustainable Development Directorate (EPSDD)
Australian Academy of Technology and Engineering (ATSE)
Australian Government Department of Agriculture, Water and the Environment (DAWE)
Bureau of Meteorology (BOM)
Commonwealth Environmental Water Office (CEWO)
CSIRO
EnHealth's Water Quality Expert Reference Panel (WQERP)
Infrastructure Australia (IA)
Interim Inspector-General of Murray Darling Basin Water Resources (IIGMDB)
Murray-Darling Basin Authority (MDBA)
Murray Irrigation (MIL)
Murray Lower Darling Rivers Indigenous Nations (MLDRIN)
National Health & Medical Research Council's Water Quality Advisory Panel (NHMRC WQAP)
National Indigenous Australians Agency (NIAA)
National Water Grid Authority (NWGA)
NSW Natural Resources Access Regulator (NRAR)
Northern Basin Aboriginal Nations (NBAN)
Northern Territory Department of Environment & Natural Resources (NT DENR)
NSW Department of Planning, Industry & Environment's Biodiversity & Conservation Division (DPIE BCD)
NSW Department of Planning, Industry and Environment's Water Division (DPIE Water)
NSW Independent Pricing & Regulatory Tribunal (NSW IPART)
NSW Natural Resources Commission (NRC)
NSW Water Directorate
Poelina, Dr Anne (University of Notre Dame, WA); and Taylor, Dr Kat (ANU, ACT)
Queensland Competition Authority (QCA)
Queensland (DNRME)
Queensland Department of Natural Resources, Mines and Energy's Water Engagement Forum
Queensland Water Directorate
Ricegrowers Association of Australia (RGA)
South Australian Department of Environment and Water (SA DEW)
SunRice
Tasmanian Department of Primary Industries, Parks, Water & Environment (DPIPWE)
Tasmanian Irrigation
TasWater
Victorian Department of Environment, Land, Water & Planning (DELWP)
Victorian Environmental Water Holder (VEWH)
Victorian Essential Services Commission (ESC)
Victorian Planning Authority (VPA)
VicWater
Water Services Association of Australia (WSAA)
Wentworth Group
Western Australian Department of Water and Environmental Regulation (DWER)
Western Australian Water Corporation

Table C.4 **Roundtables**

Participant

24 August 2020 – Access to water

ANU	Dr Virginia Marshall
Griffith University	Prof. Sue Jackson
Martuwarra Fitzroy River Council (MRFC)	Dr Anne Poelina
University of Canberra	Assoc. Prof. Brad Moggridge
Murray Lower Darling Rivers Indigenous Nations (MLDRIN)	Grant Rigney
Murray Lower Darling Rivers Indigenous Nations (MLDRIN)	Rene Woods
Murray-Darling Basin Authority's Basin Community Committee (BCC)	Phil Duncan
National Native Title Council (NNTC)	Jamie Lowe
Northern Basin Aboriginal Nations (NBAN)	Fred Hooper
NSW Aboriginal Land Council (NSW ALC)	Yuseph Deen
Six Seasons Advisory	Joe Morrison
Victorian Environmental Water Holder Commissioner (VEWH)	Rueben Berg
Walgett Aboriginal Medical Service (WAMS), National Aboriginal Community Controlled Health Organisation (NACCHO), Coalition of Peaks	Christine Corby

25 August 2020 – Household Water Services

Desert Knowledge Australia	Dan Tyson
Healthabitat and Nganampa Health Council	Paul Torzillo
NT Central Land Council (CLC)	Josie Douglas
NT Northern Land Council (NLC)	Trish Rigby
School of Public Health, Faculty of Medicine, University of Queensland (UQ)	Dr Nina Hall
Telethon Kids Institute, and Chair of the Roundtable on Water in Remote Aboriginal Communities	Mara West
University of Sydney	Liam Grealy
Walgett Aboriginal Medical Service, National Aboriginal Community Controlled Health Organisation, Coalition of Peaks	Christine Corby

Table C.5 Stakeholder working group

Participant

9 June 2020 - Meeting 1

Australian Academy of Technology and Engineering (ATSE)	Dr Rob Vertessy
Australian Conservation Foundation (ACF)	Paul Sinclair
Australian Local Government Association (ALGA/Qld)	Subathra Ramachandram
Australian Local Government Association (ALGA/NSW)	Sanjiv Sathiah
Australian Local Government Association (ALGA/NSW)	Shaun McBride
Australian Water Association (AWA)	Corrine Cheeseman
Australian Water Association (AWA)	Paul Smith
Environmental Defenders Office (EDO)	Dr Emma Carmody
Minerals Council of Australia (MCA)	Robyn Quinn
National Aboriginal Community Controlled Health Organisation (NACCHO) / Coalition of Peaks	Christine Corby
National Farmers Federation (NFF)	Warwick Ragg
National Farmers Federation (NFF)	Les Gordon
National Health & Medical Research Council (NHMRC)	Jennifer Savanake
National Irrigators Council (NIC)	Steve Whan
Water Services Association of Australia (WSAA)	Adam Lovell
Water Services Association of Australia (WSAA)	Stuart Wilson

5 November 2020 – Meeting 2

Australian Academy of Technology and Engineering (ATSE)	Dr Rob Vertessy
Australian Local Government Association (ALGA/Qld)	Subathra Ramachandram
Australian Local Government Association (ALGA/NSW)	Sanjiv Sathiah
Australian Local Government Association (ALGA/NSW)	Shaun McBride
Environmental Defenders Office (EDO)	Dr Emma Carmody
Australian Petroleum Production & Exploration Association (APPEA)	Matthew Paull
Australian Water Association (AWA)	Corrine Cheeseman
Coalition of Peaks (NSW ALC)	Peter Lalor
Minerals Council of Australia (MCA)	Robyn Quinn
National Farmers Federation (NFF)	Warwick Ragg
National Health & Medical Research Council (NHMRC)	Jennifer Savanake
National Irrigators Council (NIC)	Steve Whan
Water Services Association of Australia (WSAA)	Adam Lovell
Water Services Association of Australia (WSAA)	Stuart Wilson

References

- ABARES (Australian Bureau of Agricultural and Resource Economics and Sciences) 2020, *Agricultural overview: March quarter 2020*, www.agriculture.gov.au/abares/research-topics/agricultural-commodities/mar-2020/agriculture-overview (accessed 4 March 2020).
- ABS (Australian Bureau of Statistics) 2002, *Basic Community Profile*, Cat. no. 2001, Canberra.
- 2004, *Water Account, Australia, 2000-01*, Cat. no. 4610.0, Canberra.
- 2016, *State and Territory (STE) ASGS July 2016 Digital Boundaries in ESRI Shapefile Format*, Cat. no. 1270.0.55.001, Canberra.
- 2017, *2016 Census of Population and Housing: Time Series Profile*, Cat. no. 2003, Canberra.
- 2018, *Population Projections, Australia, 2017 (base) - 2066*, Cat. no. 3222.0, Canberra.
- 2019a, *Australian Demographic Statistics, Jun 2019*, Cat. no. 3101.0, Canberra.
- 2019b, *Historical Population 1901 to 2016*, Cat. no. 3105.0, Canberra.
- 2019c, *Regional Population Growth, Australia, 2018-19*, Cat. no. 3218.0, Canberra.
- 2020a, *Value of Agricultural Commodities Produced, Australia, 2018-19*, www.abs.gov.au/statistics/industry/agriculture/value-agricultural-commodities-produced-australia/latest-release (accessed 25 January 2021).
- 2020b, *Water Account, Australia, 2017-18*, 6 May, Cat. no. 4610.0, Canberra.
- 2020c, *Water Account, Australia, 2018-19*, www.abs.gov.au/statistics/environment/environmental-management/water-account-australia/2018-19 (accessed 25 January 2021).
- ACCC (Australian Competition and Consumer Commission) 2020, *Murray-Darling Basin Water Markets Inquiry*, Interim report, Canberra.
- Acreman, M., Jain, S., McCartney, M. and Overon, I. 2017, 'Drivers and Social Context', *Water for the Environment: From Policy and Science to Implementation and Management*, 1st edn, Elsevier.
- Aither 2019, *Water Markets Report: 2018-19 Review and 2019-20 Outlook*, Melbourne.
- 2020, *Water Markets Report: 2019-20 Review and 2020-21 Outlook*, Melbourne.
- ANZIP (Australia & New Zealand Infrastructure Pipeline) 2020, *Dungowan Dam Replacement*, <https://infrastructurepipeline.org/project/dungowan-dam-replacement/> (accessed 18 December 2020).
- Australian Governments and the Coalition of Peaks 2020, *National Agreement on Closing the Gap*.

-
- BDA Group and CSIRO 2017, *A Comparative Assessment of Event-Based Mechanisms for Providing Water to the Narran Lakes*, Prepared for the Commonwealth Environmental Water Office, Canberra.
- BOM (Bureau of Meteorology) 2015, *Recent Rainfall, Drought and Southern Australia's Long-Term Rainfall Decline*, Melbourne.
- 2019, *Seasonal Climate Summary for Northern Territory: October to April 2018-19*, www.bom.gov.au/climate/current/season/nt/archive/201904.summary.shtml (accessed 6 January 2021).
- 2020a, *Australian Water Markets Report 2018–19*, Melbourne.
- 2020b, *BOM Water Markets Dashboard*, www.bom.gov.au/water/dashboards/#/water-markets/national/state/at?s=National (accessed 20 August 2020).
- 2020c, *Drought Knowledge Centre - Previous Droughts*, www.bom.gov.au/climate/drought/knowledge-centre/previous-droughts.shtml (accessed 2 December 2020).
- 2020d, *National Performance Report 2018-19: Urban Water Utilities*, Melbourne.
- 2020e, *National Water Account*, www.bom.gov.au/water/nwa/2019/index.shtml (accessed 25 January 2021).
- 2020f, *Seasonal Climate Summary for Northern Territory: October to April 2019-20*, www.bom.gov.au/climate/current/season/nt/archive/202004.summary.shtml (accessed 6 January 2021).
- and CSIRO (Bureau of Meteorology and Commonwealth Scientific and Industrial Research Organisation) 2020, *State of the Climate 2020*, Melbourne.
- CEWO (Commonwealth Environmental Water Office) 2011, *Commonwealth Environmental Water - Trading Arrangements, Discussion Paper*, Canberra.
- 2020a, *Environmental Water Holdings*, www.environment.gov.au/water/cewo/about/water-holdings (accessed 10 September 2020).
- 2020b, *Recent Highlights from the Flow-MER Program*, www.environment.gov.au/water/cewo/monitoring/highlights (accessed 17 September 2020).
- 2020c, *Water Management Plan 2020-21*, Canberra.
- Chen, Y., Colloff, M.J., Lukasiewicz, A. and Pittock, J. 2020, 'A trickle, not a flood: environmental watering in the Murray–Darling Basin, Australia', *Marine and Freshwater Research*, no. MF20172, p. A-S.
- COAG (Council of Australian Governments) 2010, *NWI Policy Guidelines for Water Planning and Management*, Canberra.
- 2011, *Intergovernmental Agreement on Federal Financial Relations*, Canberra.
- 2012, *National Framework for Compliance and Enforcement Systems for Water Resource Management*, Canberra.

-
- DAWE (Cth) (Department of Agriculture, Water Resources and Environment (Cth)) 2019, *National Urban Water Planning Principles*, www.agriculture.gov.au/water/urban/policy-reform-urban-water/planning-principles (accessed 1 October 2020).
- DAWE (Department of Agriculture, Water and the Environment) 2019, *Improving water access for Indigenous people living in the Murray-Darling Basin*, www.agriculture.gov.au/water/mdb/basin-plan/commitments/indigenous-water-access (accessed 2 October 2020).
- DAWR (Department of Agriculture and Water Resources) 2009, *National Framework for Non-urban Water Metering: Policy Paper*, Canberra.
- DELWP (Vic) (Department of Environment, Land, Water and Planning (Vic)) 2019, *Closing the Loop Report - Water Market Transparency*.
- 2020, *Long-Term Water Resource Assessment for Southern Victoria*.
- DENR (NT) (Department of Environment and Natural Resources (NT)) 2020, *Water Allocation Plan*, <https://nrmaps.nt.gov.au/nrmaps.html> (accessed 8 October 2020).
- DEW (SA) (Department for Environment and Water (SA)) 2020, *South Australian River Murray WRP Held Environmental Water Register (June 2020)*, www.environment.sa.gov.au/topics/river-murray/improving-river-health/environmental-water#:~:text=There%20is%20no%20held%20environmental,areas%20as%20of%20June%202020. (accessed 8 October 2020).
- DNRME (Qld) (Department of Natural Resources, Mines and Energy (Qld)) 2020, *Water plan areas - Queensland*, <http://qldspatial.information.qld.gov.au/catalogue/custom/detail.page?fid={8DCF83BC-A683-4403-B8C9-F07DE7838640}#> (accessed 8 October 2020).
- DOE (Cth) (Department of the Environment (Cth)) 2015, *Review of the National Urban Water Planning Principles - Final Report*, Canberra.
- DPI (NSW) (Department of Primary Industries (NSW)) 2020, *Fish kills in NSW*, www.dpi.nsw.gov.au/fishing/habitat/threats/fish-kills (accessed 25 March 2020).
- DPIE (NSW) (Department of Planning, Industry and Environment (NSW)) 2019a, *Cumulative water for the environment holdings ('held') recovered to 30 June 2017 (megalitres)*, www.environment.nsw.gov.au/topics/water/water-for-the-environment/about-water-for-the-environment/current-water-holdings (accessed 8 October 2020).
- 2019b, *Floodplain Harvesting Action Plan*, Parramatta.
- 2020, *Emergency relief for regional town water supplies*, www.industry.nsw.gov.au/water/water-utilities/technical-assistance/emergency (accessed 12 January 2021).
- DPIPWE (Tas) (Department of Primary Industries, Parks, Water and Environment (Tas)) 2020a, *Rural Water Use Strategy: Position Paper*, Water and Marine Resources Division, Hobart.
- 2020b, *Water Management Plan Areas*, <https://listdata.thelist.tas.gov.au/opendata/> (accessed 8 October 2020).
-

-
- DWER (WA) (Department of Water and Environmental Regulation (WA)) 2020, *RIWI Act Proclaimed Areas*, <https://atlases.water.wa.gov.au/idelve/dowdataext/download/default.html> (accessed 8 October 2020).
- Fenton and DTI (NSW) (Fenton and Department of Trade and Investment (NSW)) 2015, *Monitoring Economic and Social Changes in NSW Water Sharing Plan Areas*, Department of Trade and Investment (New South Wales).
- Frontier Economics 2008, *Review of Urban Water Entitlements in Australia*, Joint Steering Committee for Water Sensitive Cities, Melbourne.
- GHD 2017, *Dungowan Dam and Peel Valley Feasibility Study Feasibility Assessment Report*, Report to WaterNSW.
- Government of Western Australia 2009, *Rights in Water and Irrigation (Approved Meters) Order*, Fact Sheet, Department of Water (Western Australia), Perth.
- Gupta, M., Hughes, N., Whittle, L. and Westwood, T. 2020, *Future Scenarios for the Southern Murray-Darling Basin, Report to the Independent Assessment of Social and Economic Conditions in the Basin*, Report 20.2, Australian Bureau of Agricultural and Resource Economics and Sciences, Canberra.
- Hart, P.B. and Butcher, D.R. 2018, *Commonwealth Long-Term Intervention Monitoring Project: Stage 1 Mid-Term Review and Evaluation*, Department of Agriculture, Water and the Environment.
- Hawke, T., Bino, G. and Kingsford, R.T. 2020, *A National Assessment of the Conservation Status of the Platypus*, Prepared for the Australian Conservation Foundation, WWF-Australia and Human Society, University of New South Wales.
- IA (Infrastructure Australia) 2016, *Australian Infrastructure Plan: Priorities and reforms for our nations future*, Sydney.
- 2018, *Assessment Framework*, March, Sydney.
- 2019, *An Assessment of Australia's Future Infrastructure Needs: The Australian Infrastructure Audit 2019*, Sydney.
- IC (Industry Commission) 1997, *Community Service Obligations: Policies and Practices of Australian Governments*, Staff Information Paper, Canberra.
- ICAC (NSW) (Independent Commission Against Corruption (NSW)) 2020, *Investigation into Complaints of Corruption in the Management of Water in NSW and Systemic Non-compliance with the Water Management Act 2000*, Sydney.
- IIGMDB (Interim Inspector-General of Murray-Darling Basin Water Resources) 2020, *Impact of Lower Inflows on State Shares Under the Murray-Darling Basin Agreement*, Canberra.
- Infrastructure Victoria 2019, *Reforming Water Sector Governance: Key findings to inform the update of Victoria's 30-year infrastructure strategy*, October, www.infrastructurevictoria.com.au/wp-content/uploads/2019/10/Reforming-water-sector-governance-October-2019-Final-report.pdf (accessed 22 January 2020).

-
- International Association for Public Participation 2019, *IAP2 Published Resources*, <https://iap2.org.au/resources/iap2-published-resources/> (accessed 3 December 2020).
- IRORG (Independent River Operations Review Group) 2020, *Review of Performance against Objectives and Outcomes 2019/20*.
- Kilvert, N. 2019, 'Drought, Climate Change and Mismanagement: What Experts Think Caused the Death of a Million Menindee Fish', *ABC News*, 16 January.
- Loch, A., Wheeler, S., Bjornlund, H., Beecham, S., Edwards, J., Zuo, A. and Shanahan, M. 2013, *The Role of Water Markets in Climate Change Adaptation*, Final Report, National Climate Change Adaptation Research Facility.
- Matthews, K. 2017, *Independent Investigation into NSW Water Management and Compliance: Interim Report*, New South Wales.
- MDB Ministerial Council (Murray-Darling Basin Ministerial Council) 2018, *Murray-Darling Basin Compliance Compact*, An Agreement between Commonwealth, New South Wales, Victoria, Queensland, South Australia, Australian Capital Territory, Canberra.
- MDBA (Murray-Darling Basin Authority) 2017, *The Murray-Darling Basin Water Compliance Review*, Canberra.
- 2018, *Objectives and Outcomes for River Operations in the River Murray System*, May 2017 (Updated June 2018), Canberra.
- 2019, *Best Practice Guidelines for Minimum Metering Thresholds*, Guidelines agreed between the governments of New South Wales, Victoria, Queensland, South Australia, Australian Capital Territory and the Australian Government, Canberra.
- 2020a, *River Murray System Annual Operating Outlook: 2020-21 Water Year*, Canberra.
- 2020b, *Transition Period Water Take Report 2018-19*, Report on Cap Compliance and Transitional SDL Accounting, 38/20, Canberra.
- Melbourne Water 2020, *Melbourne Water Price Submission 2021: 1 July 2021 to 30 June 2026*, Melbourne.
- , City West Water, South East Water and Yarra Valley Water 2017, *Water for a Future-Thriving Melbourne*, Melbourne.
- MLDRIN (Murray and Lower Darling Rivers Indigenous Nations) 2007, *Echuca Declaration*, Melbourne.
- National Cultural Flows Research Project 2014, *Cultural Flows Literature Review*.
- 2018, *A pathway to cultural flows in Australia: Law and Policy Summary*.
- Northern Territory Government 2017, *Strategic Aboriginal Water Reserve: Policy Framework*, version 13/10/17.
- NRC (NSW) (Natural Resources Commission (NSW)) 2020, *2019-2020 Water sharing plan reviews*, www.nrc.nsw.gov.au/2019-2020-wsp-reviews (accessed 12 March 2020).

-
- NRMMC (Natural Resource Management Ministerial Council) 2010, *National Water Initiative Pricing Principles*.
- NRMSC (Natural Resource Management Standing Committee) 2002, *A National Approach to Water Trading*, Canberra.
- NSW Government 2019, *NSW Budget 2019-20: Budget Paper No. 1 Budget Statement*, Sydney.
- NSW Ombudsman 2018, *Water: Compliance and Enforcement*, A Special Report to Parliament under section 31 of the Ombudsman Act 1974, New South Wales.
- NWC (National Water Commission) 2010, *The Impacts of Water Trading in the Southern Murray-Darling Basin*, Canberra.
- 2011, *The National Water Initiative — Securing Australia’s Water Future: 2011 Assessment*, Canberra.
- 2012, *The Impacts of Water Trading in the Southern Murray-Darling Basin Between 2006-07 and 2010-11*, Canberra.
- 2014, *Water for Mining and Unconventional Gas under the National Water Initiative*, Canberra.
- NWGA (National Water Grid Authority) 2020, *National Water Infrastructure Investment Policy Framework*, Canberra.
- OBPR (Office of Best Practice Regulation) 2016, *Best Practice Consultation*, Guidance note, Canberra.
- O’Donnell, E. and Horne, A. 2018, ‘Giving environmental water to drought-stricken farmers sounds straightforward, but it’s a bad idea’, *The Conversation*, 18 September.
- OECD (Organisation for Economic Co-operation and Development) 2015, *OECD Principles on Water Governance*, www.oecd.org/governance/oecd-principles-on-water-governance.htm (accessed 21 September 2020).
- 2017, *Leading practice community engagement guidelines*, Paris.
- PC (Productivity Commission) 2001, *Structural Adjustment: Key Policy Issues*, Commission Research Paper, Canberra.
- 2007, *Public Support for Science & Innovation*, Research Report, Canberra.
- 2010, *Strengthening Evidence-Based Policy in the Australian Federation*, Roundtable Proceedings, Productivity Commission, Canberra.
- 2014, *Public Infrastructure*, Report no. 71, Canberra.
- 2017a, *National Water Reform*, Report no. 87, Canberra.
- 2017b, *National Water Reform*, Report no. 87, Canberra.
- 2017c, *Transitioning Regional Economies*, Study Report, Canberra.
- 2018, *Murray-Darling Basin Plan: Five-year Assessment*, Report no. 90, Canberra.

-
- 2020a, *Integrated Urban Water Management - Why a good idea seems hard to implement*, Research Report, Canberra.
- 2020b, *Integrated Urban Water Management: Why a good idea seems hard to implement*, Commission Research Paper, Canberra.
- PM&C (Department of the Prime Minister and Cabinet) 2020, *Review of COAG Councils and Ministerial Forums*, Canberra.
- Prosser, I. 2011, 'Chapter 1: Current Water Availability and Use', in Prosser, I. (ed), *Water: Science and Solutions for Australia*, CSIRO, Collingwood, Victoria.
- SA Government (South Australian Government) 2019, *Murray-Darling Basin Royal Commission*, 29 January, Bret Walker SC Commissioner, South Australia.
- Salisbury, C., Head, B.W. and Groom, E. 2017, *Australian Urban Water Reform Story: with Detailed Case Study of New South Wales*, World Bank, Washington, DC.
- Sefton, R., Peterson, D., Woods, R., Kassebaum, A., McKenzie, D., Simpson, B. and Ramsay, M. 2020a, *Final Report: Independent Assessment of Social and Economic Conditions in the Murray-Darling Basin*, Panel for Independent Assessment of Social and Economic Conditions in the Murray-Darling Basin, Melbourne.
- 2020b, *Panel report: Independent assessment of social and economic conditions in the Basin - Draft Report*, Melbourne.
- SMH (Hannam) 2018, 'Federal agency pushes back at Barnaby Joyce's environmental water grab', *Sydney Morning Herald*, 29 August.
- Steinfeld, C.M.M., Sharma, A., Mehrotra, R. and Kingsford, R.T. 2020, 'The human dimension of water availability: Influence of management rules on water supply for irrigated agriculture and the environment', *Journal of Hydrology*, vol. 588, p. 125009.
- SunWater 2020, *Fact Sheet: Bundaberg Water Supply Scheme*, Brisbane.
- Thurgate, N., Mynott, J., Smith, L. and Bond, N. 2019, *Murray-Darling Basin Environmental Water Knowledge and Research Project*, Synthesis Report, p. 41.
- Turner, G., Vanderbyl, T. and Kumar, S. 2019, *Final Report of the Independent Panel's Review of the Sustainable Diversion Limit (SDL) Water Accounting Framework*, Canberra.
- UN (United Nations) 2007, *United Nations Declaration on the Rights of Indigenous Peoples*, Geneva, Switzerland.
- Vertessy, R., Barma, D., Baumgartner, L., Mitrovic, S., Sheldon, F. and Bond, N. 2019, *Independent Assessment of the 2018-19 Fish Deaths in the Lower Darling*.
- VEWH (Victorian Environmental Water Holder) 2015, *What does environmental watering involve?*, www.vewh.vic.gov.au/__data/assets/pdf_file/0004/342535/4.2.04-FS04_What-does-environmental-watering-involve_SWP_FS.pdf (accessed 20 June 2020).
- 2020, *Where do environmental water entitlements exist in Victoria?*, <https://vewh.vic.gov.au/watering-program/how-much-water-is-available> (accessed 8 October 2020).

-
- Waldron, T., Tan, P.-L. and Johnson, I. 2018, *Independent Audit of Queensland Non-Urban Water Measurement and Compliance*, Brisbane.
- Water Corporation 2020, *Perth Streamflow / Current & Annual Statistics*, www.watercorporation.com.au/Our-water/Rainfall-and-dams/Streamflow (accessed 7 January 2021).
- WaterNSW 2018, *20 Year Infrastructure Options Study - Rural Valleys*, Summary Report, Parramatta.
- 2019, *Water Balance Report: Peel Valley 2018-2019*, Parramatta.
- 2020, *Dungowan Dam*, www.watarnsw.com.au/projects/new-dams-for-nsw/dungowan-dam (accessed 18 November 2020).
- Wheeler, S.A., Zuo, A., Xu, Y., Haensch, J. and Seidl, C. 2020, *Water Market Literature Review and Empirical Analysis*, 29 May, Prepared for the Australian Competition and Consumer Commission (ACCC), The University of Adelaide.
- Whittle, L., Galeano, D., Hughes, N., Gupta, M., Legg, P., Westwood, T., Jackson, T. and Hatfield-Dodds, S. 2020, *Economic Effects of Water Recovery in the Murray-Darling Basin*, Issue no. 7, Australian Bureau of Agricultural and Resource Economics and Sciences.
- Wittwer, G. 2020, *Modelling Variants of the Murray-Darling Basin Plan in the Context of Adverse Conditions in the Basin*, Centre of Policy Studies, Victoria University, Melbourne.
- WSAA (Water Services Association of Australia) 2014, *The Role of the Urban Water Industry in Contributing to Liveability*, 1 March, Occasional Paper 30, Water Services Association of Australia, Sydney.
- Zheng, H., Chiew, F.H.S., Potter, N.J. and Kirono, D.G.C. 2019, 'Projections of water futures for Australia: an update', presented at the *23rd International Congress on Modelling and Simulation (MODSIM2019)*, Canberra.