National Competition Council

New South Wales: allocation of water to the environment

National Competition Policy Deferred 2003
Water Reform Assessment

June 2004

ISBN 0-9751434-6-8

Inquiries or comments on this report should be directed to:

Communications Officer
National Competition Council
9/128 Exhibition Street
MELBOURNE VIC 3000

Ph: (03) 9285 7474
Fax: (03) 9285 7477
Email: info@ncc.gov.au

An appropriate citation for this paper is:

National Competition Council 2004, *New South Wales: allocation of water to the environment, National Competition Policy Deferred 2003 Water Reform Assessment*, AusInfo, Canberra.

The National Competition Council

The National Competition Council was established on 6 November 1995 by the *Competition Policy Reform Act 1995* following agreement by the Commonwealth, State and Territory governments.

It is a federal statutory authority which functions as an independent advisory body for all governments on the implementation of the National Competition Policy reforms. The Council's aim is to 'improve the well being of all Australians through growth, innovation and rising productivity, and by promoting competition that is in the public interest'.

Information on the National Competition Council, its publications and its current work program can be found on the internet at www.ncc.gov.au or by contacting National Competition Council Communications on (03) 9285 7474.

Table of contents

Abbreviations

ANZECC	Australian and New Zealand Environment and Conservation Council
ARMCANZ	Agriculture and Resource Management Council of Australia and New Zealand
CMA	Catchment management authority
CoAG	Council of Australian Governments
ECA	Environmental contingency allowance
NCP	National Competition Policy
SWMOP	State Water Management Outcomes Plan

Introduction

Under the 1994 Council of Australian Governments (CoAG) strategic framework for the reform of the water industry (CoAG water reform agreement), governments undertook to establish comprehensive systems of water entitlements including allocations to the environment to maintain the health and viability of river systems and groundwater basins. For river systems that are overallocated or are deemed to be stressed, governments agreed to provide a better balance in water resource use, including appropriate allocations to the environment to enhance/restore the health of river systems (see box 1).

Box 1: Provision of water to the environment

Governments are to establish a sustainable balance between the environment and other uses, including formal provisions for the environment for surface water and groundwater. In doing so, governments are to have regard for the ARMCANZ/ANZECC National Principles for the Provision of Water for Ecosystems (see appendix A).

Environmental requirements are to be determined wherever possible on the best available scientific information and governments are to have regard to the intertemporal and interspatial water needs required to maintain the health and viability of river systems and groundwater basins. For river systems that are overallocated or deemed to be stressed, governments are to provide a better balance in water resource use, including appropriate allocations to the environment to enhance/restore the health of river systems.

Governments should also consider environmental contingency allocations, with a review of allocations five years after they have been initially determined.

The January 1999 tripartite meeting — between representatives of the National Competition Council, the High Level Steering Group on Water (augmented by representatives from ARMCANZ and ANZECC) and the Committee on Regulatory Reform — clarified the commitment to provide water for the environment and reform timeframes:

For the second tranche [1999], jurisdictions submitted individual implementation programs, outlining a priority list of river systems and/or groundwater resources, including all river systems which have been over-allocated, or are deemed to be stressed, and detailed implementation actions and dates for allocations and trading to the NCC for agreement, and to Senior Officials for endorsement. This list is to be publicly available.

For the third tranche [2001], States and Territories will have to demonstrate substantial progress in implementing their agreed and endorsed implementation programs. Progress must include at least allocation to the environment in all river systems which have been over-allocated, or are deemed to be stressed.

By 2005, allocations and trading must be substantially completed for all river systems and groundwater resources identified in the agreed and endorsed individual implementation programs.

Reference: CoAG water reform agreement, clauses 4(b)–4(f); and 1999 tripartite meeting (recommendations subsequently endorsed by CoAG senior officials).

In allocating water to the environment, governments are to have regard to the work undertaken by the Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ) and the Australian and New

Zealand Environment and Conservation Council (ANZECC). The ARMCANZ/ANZECC National Principles for the Provision of Water for Ecosystems are summarised in appendix A.

The 1999 tripartite meeting (the recommendations from which were subsequently endorsed by CoAG senior officials) determined that progress should include allocations to the environment in all stressed and overallocated river systems by 2001. By 2005, governments must have substantially completed allocations to the environment for all river systems and groundwater resources identified in their endorsed implementation programs.

New South Wales has gazetted its State Water Management Outcomes Plan (SWMOP) and 35 (of 39) first-round water sharing plans covering about 80 to 90 per cent of the State's water. In previous NCP and related supplementary assessments, the Council acknowledged that the water sharing plans would provide improved environmental outcomes in most cases, but the limited information provided by New South Wales meant that the Council could not determine whether the plans satisfy the CoAG obligation that governments provide appropriate allocations of water to the environment. In particular, New South Wales provided insufficient information on the basis of the allocations of water in the plans for consumptive and environmental uses and the nature and extent of socioeconomic trade-offs from recommended environmental flows (ARMCANZ/ANZECC national principles 4, 5 and 7).

This deferred 2003 NCP assessment considers New South Wales's implementation of the CoAG water reform obligations concerning the allocation of water to the environment, focusing on the State's regard for ARMCANZ/ANZECC national principles 4, 5 and 7.

- Principle 4. In systems where there are existing users, provision of water for ecosystems should go as far as possible to meet the water regime necessary to sustain the ecological values of aquatic ecosystems whilst recognising the existing rights of other water users.

- Principle 5. Where environmental water requirements cannot be met due to existing uses, action (including reallocation) should be taken to meet environmental needs.

- Principle 7. Accountabilities in all aspects of management of environmental water should be transparent and clearly defined.

Considering compliance with the obligation to allocate water to the environment

In considering governments' arrangements for allocating water to the environment, in the light of the guidance provided by the 1994 CoAG water reform agreement and the ARMCANZ/ANZECC national principles,[1] the Council looks for governments to establish arrangements that:

1. are based on the best available science, wherever possible, and use strategic and applied research (principles 2 and 11);

2. achieve a balance between environmental needs and human use that provides the water needed to sustain healthy aquatic ecosystems, while recognising, in systems where there are existing users, the existing rights of those users (principles 1, 4, 5, 6 and 9);

3. involve monitoring and adaptive management where the regular assessment of ecosystem health guides water management processes (principle 8); and

4. involve stakeholder consultation and transparent processes that are robust, involve the timely provision of relevant information to all interested parties and allow wide public consultation (principles 7 and 12).

As this deferred 2003 NCP assessment considers New South Wales's regard for ARMCANZ/ANZECC national principles 4, 5 and 7, it focuses on the second and fourth points.

A balance between environmental needs and human uses

CoAG's reference to the work of ARMCANZ/ANZECC in the section of the 1994 water reform agreement that deals with environmental allocations indicates that water management arrangements should aim to ensure the long-term sustainability of aquatic ecosystems (national principle 2). This intent is also reflected in the National Water Initiative, which seeks to 'ensure ecosystem health by implementing regimes to protect environmental assets at a whole-of-basin, aquifer or catchment scale' (CoAG 2003). Within this objective of achieving a sustainable balance between environmental and

[1] ARMCANZ/ANZECC national principles 3 and 10 are not directly relevant to governments' decisions on environmental allocations. The Council considers water pricing (national principle 10) in assessing progress with urban and rural pricing and the legal recognition of environmental water provisions (principle 3) in assessing governments' implementation of obligations on water entitlements.

human uses, the ARMCANZ/ANZECC national principles call for governments to adopt arrangements for providing water to the environment that recognise the existing rights of other water users.

In some surface and groundwater systems, long-term sustainability may be achieved by maintaining existing ecological values. In systems where there are existing users, however, there will generally have to be trade-offs between the needs of the environment and those of other (human) users. While a return to pristine or natural conditions is rarely feasible, improving the ecological health of stressed rivers is likely to require more water for environmental purposes, possibly by reallocating water from existing users. Similarly, it may be necessary to reallocate water from entitlement holders to the environment in systems that are currently overallocated. The possibility that reallocation may be necessary is recognised in national principle 5.

To determine whether water use is at a level that ensures the sustainable ecological health of aquatic systems, the Council considered the meaning of the term 'ecological health'. The ANZECC (2000) National Water Quality Management Strategy and the National River Health Initiative (DEH 2002) define ecological health as:

> *The ability of an ecosystem to support and maintain key ecological processes and organisms so that their species compositions, diversity and functional organisations are as comparable as possible to those occurring in natural habitats within a region.*

The phrase 'within a region' in the above definition recognises that Australia is a diverse continent and that aquatic systems in different bioregions have varying characteristics.[2] Bioregions are large land areas characterised by broad, landscape-scale natural features and environmental processes that influence the functions of entire ecosystems. The bioregion concept recognises that ecosystems vary with topographic, climatic and geomorphic features, rather than political or social boundaries. Aquatic systems in different bioregions therefore have different ecological characteristics and needs (for example, river systems in the Australian Alps region will have different characteristics and needs from those of the Darwin Coast). As a consequence, assessment of environmental water requirements and water regimes needs to be considered from relevant bioregional contexts.

While the ANZECC (2000) definition is useful, it relates only to the ecological health or integrity of an ecosystem in isolation from human use. It may therefore be important for determining a baseline condition, but less practical where there are human use constraints or where systems are highly modified and unlikely to be able to return to pristine condition. To this end, the Scientific Reference Panel established by The Living Murray Initiative (2003)

---

[2] The concept of regionality or bioregions has been further defined by Environment Australia (now Department of Environment and Heritage) (see Environment Australia 2000).

defined the term 'healthy working river' as a river that is managed to provide a sustainable compromise between the condition of the river and the level of human use. A water regime based on the healthy working river approach would not return an aquatic system to pristine condition. It would, however, sustain ecological objectives indefinitely. The Living Murray Initiative advocates a holistic approach, with the water regime, condition of floodplain wetlands and in-channel habitats and water quality all considered. The end point will not be a pre-European flow regime. Rather, it will be one that meets the tests of long-term ecological sustainability.

The CoAG National Water Initiative also reflects the approach of defining specific ecological objectives for individual systems. The terms of reference for the National Water Initiative (CoAG Team 2) include the development of specific ecological objectives for individual systems based on their ecological, social and economic values.

Environmental water may be obtained from a range of sources, including a reduction in delivery losses through the upgrading of infrastructure and pipelining, increased water use efficiency on farm and changes in land-use practices. In some systems, however, there may be no alternative to obtaining water for the environment from reallocations from existing users. The Living Murray Initiative First Step decision, which is to provide an average of 500 gigalitres per year of 'new' water after five years for environmental purposes, recognises that this water could come from a range of sources, including reallocations. Similarly, the CoAG National Water Initiative recognises a range of mechanisms for recovering water for the environment, including reallocations.

The essential point is that the CoAG water reform agreement obliges governments to take action, sometimes including reallocation, to achieve sustainable ecological systems. The Council's approach is to consider whether governments are establishing allocation arrangements that are likely to achieve a sustainable balance. Consequently, the Council looks for governments' water management arrangements to demonstrate the following characteristics.

- Ecological sustainability objectives should be specific to individual systems and contextually consistent with the relevant bioregion.

- The allocation of environmental water in aquatic systems where there are existing users should be sufficient to achieve a 'healthy working river'.

- The allocation of environmental water in aquatic systems where ecological health is adequate should be at a level that maintains ecological health.

The Council accepts that it may not always be possible for governments to introduce arrangements that achieve a sustainable balance immediately, particularly in systems where the volume of water already allocated for consumptive use is significant. Notwithstanding this, in systems where there is significant consumptive use, the Council looks for governments to introduce arrangements that achieve a sustainable balance within a reasonable

timeframe, taking account of socioeconomic and environmental benefits and costs.

Stakeholder consultation and transparent processes

The national principles imply that water management processes should be transparent, consultative, include representative decision-making processes and be based on full and robust information and analysis.

The Council considers CoAG's emphasis on robust public processes to mean that governments' decisions on environmental allocations should be based, wherever possible, on comprehensive, relevant and rigorous information about the ecological requirements of ecosystems and the impacts of changes in management arrangements. Any analysis, whether of an ecological, economic or social nature, that is material to the allocation decision should be defensible and robust and, where possible, have been independently reviewed. Governments should ensure that interested stakeholders (including the affected community) have timely access to all relevant information, including scientific information on the water regime required to sustain ecological values (consistent with a healthy working river); information on the extent of any socioeconomic trade-offs and the rationales for the trade-offs; and science-based information on the expected impact of any trade-offs on ecological values.

Stakeholders should have the opportunity to provide input and feedback into the water management process. Decision-making bodies should be broadly representative of the interested stakeholders and the affected community. This may be achieved, for example, through balanced representation on decision-making bodies or at least ensuring that particular interest groups are not overrepresented.

NCP assessments of New South Wales's actions to allocate water to the environment

Because the CoAG water reform agreement obliged governments to establish environmental allocations in stressed and overallocated systems by 2001 and in all systems on jurisdictional implementation programs by 2005, the Council has considered the New South Wales Government's progress with this obligation in annual assessments since 2001 and in associated supplementary assessments.

In April 2003, the Council conducted a supplementary 2002 assessment of the New South Wales Government's compliance with the CoAG obligations on the provision of water to the environment.[3] In that assessment, the Council indicated that, for the 2003 NCP assessment, New South Wales needed to have:

- substantially progressed (or preferably finalised) the four remaining first-round water sharing plans;
- published, or at least made available to the Council, the information required for the Council to finalise its assessment of whether New South Wales has had due regard in its water sharing plans for ARMCANZ/ANZECC national principles 4, 5 and 7;[4]
- finalised the implementation programs needed for the gazetted water sharing plans to commence in July 2003; and
- committed to a satisfactory process (ensuring effective community consultation) and timetable for developing water sharing plans (or other appropriate arrangements) for the State's remaining stressed or overallocated river systems.

At the time of the 2003 NCP assessment, New South Wales had published summary guides and fact sheets on almost all of the 35 completed water sharing plans. While the guides summarise the environmental water provisions in the plans, few provide information on the extent to which the plans are expected to lead to the sustainable use of the water source. New South Wales advised, however, that it intended to provide further information on the environmental benefits of the water sharing plans.

New South Wales was also still to complete the other actions identified in the supplementary 2002 assessment and deferred commencement of the water sharing plans by six months to 1 January 2004. Given that the deferral was to accommodate CoAG work on national water industry arrangements, the Council considered it appropriate to defer this element of the 2003 NCP assessment for New South Wales. On 28 October 2003, New South Wales

---

[3] In the 2002 NCP assessment, the Council accepted that New South Wales was facing a difficult and complex task in balancing the wide ranging views and opinions of interest groups with the technical information required to make appropriate allocations in the water sharing plans. The Council considered it reasonable for New South Wales to have more time to finalise the SWMOP and the first round of water sharing plans, and thus deferred its consideration to a supplementary assessment.

[4] In the supplementary 2002 assessment, the Council could also not conclude on the New South Wales Government's regard for ARMCANZ/ANZECC national principle 9 (that all water uses should be managed in a manner that recognises ecological values). However, it considered this issue in assessing the State's implementation of integrated catchment management and the National Water Quality Management Strategy in the 2003 NCP assessment.

announced a further six-month deferral of the water sharing plans to 1 July 2004 but indicated it did not anticipate any change to their essential content.

Although the water sharing plans are yet to commence, given New South Wales expects their essential content to remain unchanged, the Council proceeded with this deferred 2003 NCP assessment.[5] The deferred assessment focuses on New South Wales's progress in addressing the matters (identified above) that were outstanding at the time of the 2003 NCP assessment.

Progress by New South Wales since the 2003 NCP assessment

At the time of the 2003 NCP assessment, New South Wales had published summary guides and fact sheets on most of the 35 completed water sharing plans. Since the assessment, it has published the guides and fact sheets for the remaining plans. For this deferred assessment, New South Wales also provided some additional information on the action it has taken to allocate water to the environment. This included:

- a copy of the Integrated Monitoring of Environmental Flows State Summary Report 1998–2000 (DIPNR 2003) — this includes the results of environmental flow monitoring in key river catchments (the Gwydir, Namoi, Lachlan, Murrumbidgee and Hunter rivers); and

- a discussion paper that provides a science-based assessment of the environmental water requirements for the Kangaroo River catchment (DLWC 2002b).

New South Wales has progressed, but not finalised, the four first-round water sharing plans that were unfinished at the time of the 2003 NCP assessment.

- Hunter Regulated River — The plan has been drafted and is awaiting Ministerial approval and gazettal. (This was also the status of the plan at the time of the 2003 NCP assessment.) New South Wales expects the plan to be ready to commence on 1 July 2004.

- Orara River — The plan has been drafted and is due to be reviewed by relevant agency staff. Following public consultation, the plan is expected to be gazetted in late 2004. New South Wales expects the plan to

[5] The Council also deferred the 2003 NCP assessment of New South Wales's implementation of its access licensing system and registry. As the outstanding obligation is for New South Wales to implement the new licensing system and registry, the Council will consider this element of the deferred 2003 assessment in the 2004 NCP assessment.

commence on 1 July 2005, given the practical difficulties of commencing a plan during a 'water year'. (In New South Wales, water years commence on 1 July.)

- Lower Murray Groundwater — A draft plan has been prepared, but does not include a mechanism for reducing water entitlements to the sustainable yield of the groundwater system. This issue is under negotiation at Ministerial level. New South Wales expects the plan to commence in July 2005.

- Great Artesian Basin — An early draft of the plan has been prepared. The plan will not be completed until some critical data have been confirmed. New South Wales expects the plan to commence in July 2005.

In addition, New South Wales advised that it completed implementation programs for all of the gazetted water sharing plans and these are awaiting Ministerial approval. It provided copies of the programs for the sample of 10 water sharing plans on which the Council has previously focused. The programs detail the timetables and milestones for key activities needed to implement the water sharing plans. New South Wales indicated that it may be necessary to amend the programs if there are any amendments to the *Water Management Act 2000* or the water sharing plans, for example, as a result of the CoAG National Water Initiative. Following any necessary amendments, New South Wales expected the programs to commence on 1 July 2004 (with the exception of the programs for five of the groundwater sources — see below).

New South Wales is developing implementation manuals that will detail the operations, processes and procedures required for the commencement of the water sharing plans and the licensing and approvals provisions of the Act. New South Wales advised that the critical elements of the manuals will be completed by 1 July 2004. The final procedures to be included in the manuals will be developed over the first year of operation of the water sharing plans.

For the unregulated rivers and groundwater sources not covered by the 39 water sharing plans, New South Wales advised that it is developing 'macro plans', with the order of priority based on the level of stress or overallocation in these systems. For the unregulated rivers, the macro plans will encompass entire coastal river catchments or large groups of inland subcatchments. For the groundwater sources, the macro plans will cover geological units (such as coastal sands or fractured rocks) within each hydrogeological region. The macro plans will establish a minimum level of environmental protection, consistent with the stress or conservation value of the water source, with provision for higher levels of management at the sub-catchment or aquifer level over the life of the plans if certain triggers are met. New South Wales is conducting two pilot studies to inform the macro planning method: for the unregulated rivers of the Richmond catchment and the coastal sandbed aquifers on the North Coast. Using this approach, New South Wales is aiming to ensure that water sharing arrangements for the remaining unregulated rivers and groundwater sources are in place in a reasonable timeframe. It expects the pilot macro plans to be ready for public consultation in June 2004.

Following the consultation process, it will commence the plans for the remaining areas.

On 12 May 2004, New South Wales announced that it was deferring the commencement of the gazetted water sharing plans for five groundwater sources (the Lower Gwydir, Upper and Lower Namoi, Lower Macquarie, Lower Lachlan and Lower Murrumbidgee), along with the still to be completed plan for the Lower Murray groundwater source, until July 2005. The Minister for Natural Resources stated that:

> … *the State's major inland groundwater sources, the Namoi, Gwydir, Murrumbidgee, Murray, Lachlan and Macquarie, are among the most stressed in New South Wales. It is clear that reductions in access are necessary in those systems to ensure the sustainability of groundwater sources and the survival of their dependent communities. … the Government is reviewing its approach to reducing water access in those systems, and is considering ways of assisting users in those systems to ease the burden of change and avoid social dislocation.* (Minister for Natural Resources 2004)

The Minister indicated that the New South Wales Government is holding discussions with the Australian Government on the issue of adjustment assistance and that he expected an announcement to be made in the near future. He stated that the deferral of the six water sharing plans was to allow time for these issues to be resolved.

At the same time, the Minister introduced the Water Management Amendment Bill 2004 into Parliament, which includes several amendments of relevance to the water sharing plans.[6] The Minister stated that one of the key objectives of the legislative amendments is:

> … *to provide a transparent water planning process where any future changes to access share entitlements are based on an independent assessment of catchment outcomes and socioeconomic impacts …* (Minister for Natural Resources 2004).

The following are the proposed amendments of most relevance to this deferred 2003 assessment.

- Catchment management authorities (CMAs) will be given the capacity to administer environmental water as an integral part of overall catchment management. The CMAs will be able to hold access licences for environmental water and establish trust funds for acquiring and managing the environmental water (including its sale in seasons when it

[6] The Bill also includes changes to: introduce perpetual access share entitlements, consistent with the National Water Initiative; support the State's water access licence register; permit leasing of entitlements; and clarify other aspects of water rights and water management. The Council will consider these changes in the 2004 NCP assessment.

is not needed for the environment). New South Wales envisages that the CMAs will be able to address some water management issues through catchment action plans rather than the establishment of new water management plans. However, some issues that involve the definition of basic statutory rights, such as water sharing, will continue to require stand-alone regulatory plans.

- The recently established, independent Natural Resources Commission, which will advise the Minister on progress in meeting the targets and standards in the State's catchment action plans, will be required to review the water sharing plans before the end of their 10-year life. New South Wales intends the overall health of the catchment to be the key reference point for determining future water sharing. The commission will advise the Minister on whether the provisions in the water sharing plans are materially affecting the achievement of the targets and standards in the catchment action plans. The commission will be required to invite and consider public submissions. It will also be able to examine the socioeconomic impacts of the water sharing plans and any proposed amendments. The commission will report the results of the review to the Minister, including any recommendation on whether a water sharing plan should be remade or extended. The Minister will be required to make the commission's report public within six months. The Minister will only be able to extend a water sharing plan if this is consistent with the commission's recommendations. To amend or remake a water sharing plan, the Minister will require the concurrence of the Minister for the Environment.

- A Water Innovation Council will be established to advise the Minister and the CMAs in identifying and pursuing opportunities for water conservation and environmental protection (including opportunities for recovering water for the environment, water reuse and water use efficiency).

In outlining the new role for the Natural Resources Commission in reviewing the water sharing plans, the Minister stated:

> *Through this process users will gain considerably more certainty from the knowledge that future decisions on water will be based on the best available scientific and socioeconomic information, collected by regionally based catchment management authorities and assessed through open review processes conducted by the Natural Resources Commission. … this process is a significant leap forward over the current provisions in the Act.* (Minister for Natural Resources 2004)

Submissions

The Council received two submissions to the 2004 NCP assessment that raised issues relevant to New South Wales's compliance with CoAG

obligations on the provision of water to the environment. As the Council received the submissions while conducting this 2003 deferred assessment, it considered relevant elements in this assessment.

The NSW Irrigators' Council considered that New South Wales has made significant progress in providing water for the environment but was concerned that:

> *… the benefits of these actions are still to be measured, or even observed, in many cases. The development of Water Sharing Plans … need[s] to be given time to work, as do the results of the implementation of the first step of the Living Murray decision.* (p. 5)

It made the following comments on the provision of water to the environment through the water sharing plans.[7]

- New South Wales has adopted the ARMCANZ/ANZECC national principles to varying degrees in the water sharing plans.
  - Principles 2 and 4. In the development of most of the water sharing plans, there has been acknowledgment of the limited scientific information and understanding of ecological processes, particularly for groundwater sources. Some plans have included permanent reductions in entitlements without sufficient scientific justification.
  - Principles 8 and 11. It has not been possible to determine the Department of Infrastructure, Planning and Natural Resources' financial commitment and (five to 10 year) program for the necessary environmental monitoring and research to support the water sharing plans and enable continued improvement in the understanding of environmental water requirements. A Statewide monitoring system will not be adequate in assessing valley by valley rules and specific environmental requirements. Monitoring requirements have not been specified for the environmental releases and operating rules in the plans. Environmental releases are being made in some valleys without monitoring of performance against targeted outcomes.
- The water sharing plans could have ensured environmental outcomes with far less social and economic impact by adopting a more flexible approach. Rather than cutting entitlements immediately, the impacts of water use could be monitored and the limits specified in the plans regularly reviewed as more information is gathered.

---

[7] The NSW Irrigators' Council also commented on The Living Murray Initiative, including the 'health working river' concept adopted by the Scientific Reference Panel for the initiative. The National Competition Council will consider these aspects of the submission in the 2004 NCP assessment.

- Most of the plans have done little to define the environmental outcomes sought through the management of environmental flows. As a result, it will be difficult to develop meaningful environmental performance indicators and monitoring programs. While some plans include targets, these are mainly specified as hydrological rather than environmental outcomes. The focus should be shifted onto how to manage flows to achieve environmental outcomes most efficiently.

In a joint submission, the Nature Conservation Council of NSW and the Inland Rivers Network (NCC/IRN) stated that:

> *Under the 1994 CoAG Water Reform Framework, states are to have in place water plans that strike an appropriate balance between environmental and consumptive uses, and establish firm pathways for returning over-allocated systems to sustainability, by 2005. In New South Wales plans have been developed and gazetted (although not implemented), but unfortunately those plans fail to meet the criteria for adequacy.* (p. 2)

On the water sharing plans for the regulated rivers, the NCC/IRN considered that:

- the environmental flows are mostly defined in negative terms (that is, the plans establish consumptive use limits, generally based on existing uses, with the residual becoming the system's environmental water);

- the environmental flows are not based on a scientific determination of the ecological requirements of the system and, in some cases, scientific advice on system needs was put aside;

- the plans do not set timelines for moving from the status quo to sustainable extraction levels; and

- the plans do not set adequate limits on supplementary water extractions, reducing the environmental benefits of high flow events.

For the groundwater sources, the NCC/IRN stated that the plans: do not reduce licensed entitlements to 100 per cent of the sustainable yield; do not fully recognise the interconnection of groundwater and surface water resources; provide inadequate protection for groundwater-dependent ecosystems; and make inadequate provision for reserving annual recharge for the environment.

Discussion

Compliance of completed water sharing plans with CoAG obligations on the provision of water to the environment

In line with its approach in the supplementary 2002 assessment, for this deferred 2003 assessment the Council considered a subset of 10 of the 35 water sharing plans that New South Wales gazetted in 2003. The Council selected the 10 plans to enable a sufficiently broad investigation of the approaches being taken by New South Wales to addressing its environmental obligations across different types of water sources. The subset of plans comprised five regulated river plans, two unregulated river plans and three groundwater source plans (see box 2). The Council notes that New South Wales is reviewing its approach to reducing water access in two of these groundwater sources (the Upper and Lower Namoi and the Lower Lachlan) and that these two plans will not commence until July 2005.

Box 2: Water sharing plans considered in the supplementary 2002 assessment and deferred 2003 assessment

Regulated river plans
Gwydir Regulated River Water Source
Namoi Regulated River Water Source
Lachlan Regulated River Water Source
Murrumbidgee Regulated River Water Source
New South Wales Murray and Lower Darling Regulated Rivers Water Sources
Unregulated river plans
Upper Brunswick River Water Source
Kangaroo River Water Source
Groundwater plans
Upper and Lower Namoi Groundwater Sources
Lower Lachlan Groundwater Source
Stuarts Point Groundwater Source

The Council considered the key elements of the 10 water sharing plans relevant to the CoAG obligation to provide water to the environment (summarised in appendix B). The appendix focuses on the environmental water provisions and related rules in the plans, particularly in relation to considering New South Wales's regard for ARMCANZ/ANZECC national

principles 4, 5 and 7. The plans, summary guides and fact sheets are available on the Department of Infrastructure, Planning and Natural Resources' web site (www.dipnr.nsw.gov.au).

In the 2003 NCP assessment, the Council summarised its findings from the supplementary 2002 assessment on New South Wales's regard for ARMCANZ/ANZECC national principles 4, 5 and 7 as follows.

- Under principle 4, governments need to go as far as possible to provide water to sustain ecological values, while recognising the existing rights of water users. In the 2002 supplementary assessment, the Council acknowledged that the appropriate allocation of water for consumptive and environmental purposes is ultimately a matter for judgment based on full information about the ecological requirements of systems and the socioeconomic impacts. Without information for each plan on the anticipated environmental impacts and on the extent of and reasons for any trade-offs from science-based environmental allocations, the Council could not determine whether New South Wales had gone as far as possible to meeting environmental objectives.

- Under principle 5, where environmental water requirements cannot be met due to existing uses, governments must take action (including reallocation) to meet environmental needs. In the supplementary 2002 assessment, the Council noted that the water sharing plans for some stressed regulated and unregulated rivers and groundwater sources provide additional water for environmental requirements. New South Wales argued that the rules in several other plans provide for improved environmental outcomes without taking additional water from users, and that the extraction levels under the existing environmental flow rules are appropriate for some rivers and have been reflected in the relevant water sharing plans. New South Wales had not, however, provided the Council with information to explain how the plans meet environmental needs or with evidence on the appropriateness of existing environmental flows.

- Under principle 7, accountabilities in all aspects of the management of environmental water provisions should be transparent and clearly defined. While the Government undertook considerable public consultation during the preparation of the water sharing plans, at the time of the supplementary 2002 assessment it had not provided the Council with information on the manner in which it had considered environmental science in developing the plans, particularly for surface water. There was also little information available on the extent to which the various rules and limits in the plans are expected to achieve environmental outcomes.

Appendix C provides extracts from the Council's supplementary 2002 assessment. These offer additional detail on the Council's views at the time concerning New South Wales's regard for ARMCANZ/ANZECC national principles 4, 5 and 7.

In relation to the socioeconomic trade-offs, in the supplementary 2002 assessment, the Council noted the results of the independent assessment of

the economic impacts of the draft water sharing plans undertaken by ACIL Consulting for the New South Wales Government (ACIL Consulting 2002). ACIL considered the economic consequences to be minor in regional and statewide terms.[8] In releasing the ACIL study, the Minister for Land and Water Conservation stated that:

> *The report has concluded that adoption of the plans would result in minimal economic loss to the State's agriculture sector … This contrasts greatly with claims by some producer groups that the plans would cost … $1.7 billion in a reduction in regional output.* (Minister for Land and Water Conservation 2002)

The New South Wales guides and fact sheets provide useful information on the plans for licence holders and the wider community. However, while the guides summarise the environmental water provisions in the plans, few provide information on the extent to which environmental flows (or recharge) will be improved and/or examples of the expected environmental benefits. Only a few (mostly the guides for the groundwater plans) indicate the extent to which New South Wales expects the extraction limits and other rules in the plans to lead to the sustainable use of the water source. None of the guides provides information on the extent of the trade-offs made in deciding on the environmental allocations or on the rationales for the trade-offs. The guides generally also contain little information on the manner in which the water management committees considered and incorporated the environmental science in developing the plans. In the 2003 NCP assessment, New South Wales advised that it did not intend the guides and fact sheets to provide detailed information on the environmental benefits of the water sharing plans. It proposed, however, to issue more detailed information on these benefits subsequently.

For this deferred 2003 assessment, New South Wales provided a submission restating its view that the first round of plans 'provide an appropriate amount of water for the environment and were developed giving sufficient regard to the national principles'. New South Wales considered the flow rules in the plans (such as the rule in the Namoi Regulated River plan governing the frequency of flooding) as 'a very significant factor in the environmental gains made by the plans'. Further, it considered that it had developed the plans using a rigorous and representative process that took account of scientific and socioeconomic information. New South Wales stated that:

> *The water sharing plans were developed through an open and transparent process, which involved balancing environmental and*

[8] In a 'normal' climatic year, ACIL found that the irrigation water losses arising from the adoption of the plans could result in a $2.4 million per annum reduction in agriculture's contribution to the State's economy (measured in value added terms). It estimated that the reduction could amount to $6.8 million per annum during a severe drought. ACIL noted that the gross state product of New South Wales is well in excess of $200 billion per annum, with the gross regional product of a river valley of 100 000 people being as much as $3 billion a year.

> *socio-economic considerations. For example, the plans were made on the advice of regional water management committees, which included representatives of a range of interests such as the irrigation industry, environmental interests, Indigenous communities, local Catchment Management Boards, local councils and government agencies. The committees recommended water sharing rules to Government following debate on competing environmental and socio-economic objectives. These recommendations were informed by expert scientific advice and, for regulated rivers, assessments of the expected river flow and extraction outcomes for the large number of water sharing plan scenarios considered. Before finalising the plans, the Government also considered the results of a State-wide socio-economic assessment of the impact of the plans.* (p. 1)

Despite this statement concerning the scope of information considered and the rigour of the development process, the New South Wales submission provided little additional information on the environmental outcomes of the plans or the trade-offs made in their development.

To assist New South Wales, the Council undertook an initial analysis of the subset of 10 water sharing plans against the CoAG obligations on the allocation of water to the environment. The Council provided its analysis to New South Wales in early April 2004, together with a request for New South Wales to explain how each of the 10 plans will deliver sustainable outcomes. It also asked New South Wales to advise on expected outcomes for particular water sources where the available public evidence on ecological health (generally the published work of the former New South Wales Department of Land and Water Conservation) suggested that the relevant water sharing plan would not satisfactorily address ecological problems.

The Council delayed the deferred assessment until the end of June 2004 to provide additional time for New South Wales to supply the requested information. However, New South Wales did not respond formally to the Council's request.

The Council has explained its approach to assessing governments' arrangements for allocating water to the environment against the 1994 CoAG water reform agreement and the ARMCANZ/ANZECC national principles in previous assessments, including the supplementary 2002 assessment for New South Wales. As summarised in the section on 'considering compliance with the obligation to allocate water to the environment' above, for this deferred 2003 assessment of New South Wales's regard for ARMCANZ/ANZECC national principles 4, 5 and 7, the Council looks for arrangements that:

- achieve a balance between environmental needs and human use that provides the water needed to sustain healthy aquatic ecosystems, while recognising, in systems where there are existing users, the existing rights of those users (principles 4 and 5, together with principles 1, 6 and 9);

- involve stakeholder consultation and transparent processes that are robust, involve the timely provision of relevant information to all

interested parties and allow wide public consultation (principle 7, together with principle 12).

The Council considers that the CoAG water reform agreement obliges governments to take action, sometimes including reallocation, to achieve ecologically sustainable aquatic systems. While the Council agrees with the New South Wales Government about the importance of appropriate decision-making processes, it would not consider a process that results in water sharing arrangements that will not (over a reasonable period) achieve a sustainable aquatic system as sufficient because the process would not have achieved CoAG's objective of maintaining the health and viability of the water source or, in the case of a stressed river, enhancing or restoring the health of the system.

The CoAG obligations do not imply a return to pristine or natural systems: rather the test is that governments establish allocation arrangements that are likely to achieve a sustainable balance between consumptive and environmental uses. Consequently, the Council looks for governments to demonstrate that under their water management arrangements: the allocation of environmental water in aquatic systems where there are existing users is sufficient to achieve a 'healthy working river'; and the allocation of environmental water in aquatic systems where ecological health is adequate is at a level that maintains ecological health. The Council considers that it is only through examining the details of the environmental water provisions in a representative sample of water sharing plans that it can establish whether a government has met this element of its CoAG water reform obligations.

In the 2003 NCP assessment, the Council accepted that there are several aspects of the water sharing process in New South Wales that are likely to lead to better environmental outcomes than were achieved under the State's previous processes. The plans allocate water for extractive and environmental purposes, hence recognising the environment as a legitimate user of water. For the unregulated rivers, the plans provide the first formal allocation of water to the environment. The plans were developed by water management committees, which had access to a range of scientific and other information, and involved an extensive public process. The plans incorporate processes for monitoring environmental outcomes and provide for increased environmental allocations (though within specified limits) if monitoring outcomes indicate this is warranted.

While accepting that the water sharing plans will provide improved environmental outcomes in most cases, in previous assessments the Council was not able to conclude, from the information provided by New South Wales, that the plans meet the conditions in the CoAG water reform agreement: that there is an appropriate amount of water allocated to the environment, determined wherever possible on the basis of the best available science and accounting for the existing rights of other water users. As noted above, for this deferred assessment, New South Wales provided little information to support the sustainability of the extraction limits and other rules in the water sharing plans or the basis for any socioeconomic trade-offs from recommended environmental water provisions.

Moreover, the information on the 10 water sharing plans that the Council has been able to obtain (primarily from the former New South Wales Department of Land and Water Conservation — see appendix B) indicates that the environmental water provisions in several of the plans will not be sufficient to address existing ecological problems. Further, while some plans provide for review of the environmental water provisions during their 10-year life, under the limits placed on any amendments permitted to the plans, the available evidence suggests that environmental needs are unlikely to be met. The Council summarises its findings on the 10 plans as follows.

- In two cases (the plans for the Lower Lachlan groundwater and Stuarts Point groundwater) the guides to the plans explicitly state that the extraction limits are equivalent to the estimated sustainable yields of the water source. However, New South Wales did not provide evidence to substantiate the sustainable yield estimates. Only one of these groundwater plans (for the Lower Lachlan groundwater) provides for amendment of the estimated recharge and long-term extraction limit (within specified limits, after five years) in response to further studies. In addition, New South Wales is reviewing its approach to determining the volumes of water for consumptive and environmental uses in this groundwater source before the plan's deferred commencement in July 2005.

- In one case (the plan for the Murray and Lower Darling regulated rivers), the guide to the plan notes that the plan's ability to protect the river system is limited because of the impact of water extractions outside of the plan area on river flows, the constraints of intergovernmental agreements and arrangements, and because the plan can only affect water under the direct control of New South Wales. However, the maintenance and enhancement of the health and viability of this river system is being considered as part of a wider intergovernmental process under The Living Murray Initiative.

- In four cases (the plans for the Gwydir and Namoi regulated rivers, Kangaroo River and the Upper and Lower Namoi groundwater sources), the available evidence indicates that the environmental water provisions and rules in the plans will not be sufficient to meet environmental needs (see box 3). New South Wales did not provide evidence to substantiate the adequacy of the environmental water provisions and rules in these plans. Two of the plans (for the Gwydir and Namoi regulated rivers) do not provide for the long-term extraction limit or the environmental water provisions to be reviewed or amended during their 10-year lives. While the other two plans do provide for such a review, under the limits placed on any amendments permitted to the plans, it is probable that environmental needs may still not be met. However, in the case of the Upper and Lower Namoi groundwater sources, New South Wales is reviewing its approach to determining the volumes of water for consumptive and environmental uses before the plan's deferred commencement in July 2005.

- In the other three cases (the plans for the Lachlan and Murrumbidgee regulated rivers and the Upper Brunswick River), the Council could not determine whether the environmental water provisions and rules in the plans will meet environmental needs. New South Wales did not provide evidence to show that the environmental water provisions and rules in these plans are sufficient to address environmental needs. Only one of the plans (for the Murrumbidgee River) provides for amendment of the environmental water provisions (within its first year of operation), with any change to the long-term extraction limit restricted to not more than 0.5 per cent.

Box 3: Water sharing plans that do not satisfactorily address ARMCANZ/ANZECC national principles 4 and 5

Gwydir Regulated River

The progress report of the Gwydir River Management Plan (DLWC 1998a) estimated that extractions from the Gwydir River averaged 220 000 megalitres per year (ML/year) between 1990 and 1998, ranging from less than 50 000 ML/year to nearly 400 000 ML/year. The report stated that: 'there is clear evidence of increasing environmental stress within the river and, in particular, in its important wetland areas' (p. 1). This indicates that the ecological health of the river and its associated wetlands was in decline at an average level of water extraction of 220 000 ML/year.

The indicative long-term average extraction limit under the water sharing plan is estimated at 388 000 ML/year. While this represents a reduction of 6.5 per cent compared to the Murray–Darling Basin Ministerial Council Cap on diversions, it is still nearly twice the average annual extraction from 1990 to 1998. The plan does not provide for a general review of the long-term extraction limit or the environmental water provisions during its 10-year life.

New South Wales did not provide evidence to support the sustainability of the long-term extraction limit or other rules established under the plan.

Namoi Regulated River

The progress report of the Namoi River Management Plan (DLWC 1998e) estimated that extractions from the Namoi River average 180 000 ML/year between 1990 and 1998. The report stated that: 'there is clear and increasing evidence of the problems our water use is causing to the health of our waterways, wetlands and billabongs in the Namoi and elsewhere' (p.1). This indicates that the ecological health of the river and its associated wetlands was in decline at an average level of water extraction of 180 000 ML/year.

The indicative long-term average extraction limit under the water sharing plan is estimated at 238 000 ML/year. While this represents a 7 per cent reduction in extractions relative to the Murray–Darling Basin Ministerial Council Cap on diversions and a 4 per cent reduction on the 1998 interim environmental flow rules for this system, it is almost one-third higher than the average annual extraction from 1990 to 1998. The plan does not provide for a general review of the long-term extraction limit or the environmental water provisions during its 10-year life.

New South Wales did not provide evidence to support the sustainability of the long-term extraction limit or other rules established under the plan.

Kangaroo River

The water sharing plan establishes four flow classes and sets total daily extraction limits for each class. The plan permits water extractions from very low flows for basic rights holders and by access licences in all categories only from years two to eight of the plan.

The draft water sharing plan reported that the water management committee sought the advice of an inter-agency scientific panel (comprising New South Wales National Parks and

Wildlife Service, New South Wales Fisheries and the then Department of Land and Water Conservation) regarding the environmental health water requirements for the Kangaroo River (Part A, p. 11). The scientific panel employed a holistic approach to determining environmental flows and its findings were externally peer reviewed by national experts in the field. The scientific panel undertook a risk assessment of a number of different flow scenarios and recommended a minimum environmental health water volume of 7 ML/day (ie the cease-to-pump limit that should apply to very low flows). The panel considered that below 7 ML/day there is an increasing risk of not meeting some of the objectives recommended by the committee, most notably the protection of pool and riffle habitats of aquatic dependent biota.

The final water sharing plan adopts a lower figure for the very low flow class, but provides for it to be amended to not greater than 7 ML/day (and not less than 4 ML/day) based on field verification. No extraction is permitted from very low flows during years one, nine and 10; 2 ML/day during year two (50 per cent of the upper limit of very low flows); 3.4 ML/day during years three to five (63 per cent of the upper limit of very low flows); and 2.44 ML/day during years six to eight (45 per cent of the upper limit of very low flows).

The independent external peer review of the scientific panel suggested that the data could support a higher cease-to-pump limit than the 7ML/day proposed by the panel (DLWC 2002b). In addition, in terms of the protection of threatened biota, the most significant species for the Kangaroo River is the Macquarie Perch recorded in the lower reaches. It was not clear to the panel that the minimum environmental health water volume of 7 ML/day would meet the requirements of the Macquarie Perch. The Healthy Rivers Commission also made recommendations on minimum environmental flows. It recommended a cease-to-pump at the 98th percentile flow (5 ML/day) and restricted access at flows of less than 17 ML/day (DLWC 2002b).

New South Wales did not provide evidence to support the sustainability of the flow rules/extraction limits established under the final plan.

Upper and Lower Namoi Groundwater Sources

At commencement, the plan estimates the water requirements for extraction under access licences to be 172 187 ML/year for the Lower Namoi and 301 922 ML/year for the Upper Namoi. The water requirements for domestic and stock rights are estimated at an additional 6126 ML/year. The plan provides no estimate of the volume of water required for environmental needs.

The plan estimates recharge (the additional water that becomes available to the aquifers, usually by infiltration) to be 86 000 ML/year for the Lower Namoi and 122 100 ML/year for the Upper Namoi Groundwater Source.

The extraction limit in the Lower Namoi is set at 100 per cent of the recharge (86 000 ML/year) plus the water available under supplementary water access licences. In the Upper Namoi, the extraction limit is 125 per cent of recharge in zones 1 and 5, and 100 per cent of recharge in the other zones, plus the water available under supplementary water access licences.

Until 30 June 2012, the Minister can issue supplementary access licences to licence holders who have a history of extraction greater than their amended access licence share component (or volume) (or, in zones one and five, 80 per cent of the amended access licence share component) to increase access entitlements to historical use. Access to supplementary water will be phased out by the 10th year of the plan.

Under these provisions, no portion of the recharge is set aside for environmental purposes at the commencement of the plan, and overallocation of the resource is permitted during the 10-year phasing out of supplementary water use. The long-term storage component of the groundwater sources will be maintained for the environment only by the end of the 10-year term of the plan. By not reserving a portion of recharge for the environment, the plan is inconsistent with the State's Draft Groundwater Dependent Ecosystems Policy (New South Wales Government 2000). The draft groundwater policy recommends 30 per cent of average annual recharge for the environment where the environmental requirements are not known.

By the end of the plan, extractive use in the Upper Namoi Groundwater Source zones 5, 6, 7, 9, 10, 11 and 12 could increase from the level of historical use. Based on published estimates of the sustainable yields (DLWC 2000a), extractions in zones 1, 2, 3, 4, 5, 7, 8 and 12 are expected to exceed sustainable yields at the end the plan.

The plan provides for the Minister to amend the long-term extraction limits for zone 1 of the Upper Namoi after 30 June 2005 and for the other 11 zones of the Upper Namoi and the Lower Namoi after 30 June 2007. It specifies that the Minister can vary the extraction limit in each groundwater source to between 75 per cent and 125 per cent of the current recharge estimates. The maximum volume of water that could be made available to the environment under this provision is therefore 25 per cent of current recharge estimates. In two zones of the Upper Namoi (zones 4 and 12), the extraction limits, even with maximum provision for the environment, would exceed the estimated sustainable yields.

New South Wales did not provide evidence to support the sustainability of the post-2012 long-term extraction limits or other rules established under the plan.

Source: Appendix B

The legislative amendments recently introduced by the New South Wales Government offer the prospect of greater transparency in the water planning process in future, through the proposed involvement of the Natural Resources Commission. The commission will have a key role in advising the Minister on whether the provisions in the water sharing plans are materially affecting the achievement of the targets and standards in the State's catchment action plans and in recommending on whether a water sharing plan should be remade or extended. Importantly, it will also be able to examine the socioeconomic impacts of the water sharing plans and any proposed amendments. The commission's expertise, independence and transparent processes (including public submissions and published reports) should enable greater public scrutiny of the socioeconomic trade-offs made in the water sharing plans and the expected environmental outcomes. The process will also be reinforced by the requirement that, in amending or remaking a water sharing plan, the Minister for Natural Resources obtain the concurrence of the Minister for the Environment. These improvements are, however, 10 years away, given that the commission's reviews will be towards the end of each water sharing plan's life. The commission does not appear to have a role in reviewing new plans (such as the water sharing plans that are still to be gazetted or the proposed macro plans) before they take effect.

In the meantime, two of the other changes recently announced by New South Wales offer scope for improved environmental outcomes during the life of the existing water sharing plans. In particular, the CMAs will be able to administer environmental water as an integral part of overall catchment management. This will include holding access licences for environmental water and establishing trust funds for acquiring and managing the environmental water. In addition, the proposed Water Innovation Council will assist the CMAs in identifying and pursuing opportunities for recovering water for the environment. New South Wales did not, however, advise on the level of funding that it will provide to the CMAs for these additional activities. The extent of any potential improvement in environmental outcomes, for the subset of 10 water sharing plans and the gazetted water sharing plans overall, is also unclear.

Progress on other matters

New South Wales has progressed, but not finalised, the other matters identified by the Council in the 2003 NCP assessment.

Of the four remaining first-round water sharing plans, one plan (for the Hunter River) was finalised but not gazetted at the time of the 2003 NCP assessment. At the time of this deferred assessment, the plan was still to be gazetted, but New South Wales expected it to be ready to commence on 1 July 2004. New South Wales has progressed the other three plans and expects these to commence in July 2005. The Orara River plan is the only first-round non-groundwater plan still to be completed.

New South Wales has completed the implementation programs for all of the gazetted water sharing plans. While these are awaiting Ministerial approval, New South Wales expects the programs to commence on 1 July 2004 (with the exception of the programs for the five gazetted groundwater plans that have been deferred to July 2005).

For the unregulated rivers and groundwater sources not covered by the 39 water sharing plans, New South Wales intends to develop 'macro plans' within a 'reasonable timeframe'. Two pilot plans are to be ready for public consultation in June 2004. Although New South Wales provided only limited information to the Council on its proposed approach, macro plans appear to offer a more cost effective and timely means for New South Wales to implement its water management arrangements for lower priority unregulated rivers and groundwater sources. New South Wales did not advise whether the water management arrangements for the remaining regulated rivers on its 1999 implementation program would be addressed through additional water sharing plans or the macro planning process.[9]

Assessment and recommendations

Under the CoAG strategic water reform framework, governments needed to have made substantial progress in implementing arrangements to provide water to the environment by 2001, including allocations in all river systems that they identified in 1999 as overallocated or stressed. CoAG established a deadline of 2005 for the substantial completion of allocation and trading arrangements for all river systems and groundwater resources on governments' 1999 implementation programs. In past assessments, the Council accepted some delay by New South Wales in finalising its

[9] New South Wales's 1999 implementation program included the following regulated rivers that do not appear to be covered by the 39 first-round water sharing plans: Dumaresq/Barwon/Macintyre rivers; Peel River; Belubula River; and Barwon–Darling rivers.

arrangements for allocating environmental water in the stressed and overallocated rivers on its 1999 implementation program because the State was making progress towards achieving its obligations in this area and, in the 2003 NCP assessment, in recognition that CoAG work on national water industry arrangements may have implications for New South Wales's approach.

At the time of the 2003 NCP assessment, New South Wales had completed its SWMOP and 35 (of 39) first-round water sharing plans but had deferred commencement of the water sharing plans to 1 January 2004. While New South Wales had published summary guides and fact sheets on almost all of the 35 completed plans, it had not provided the information on expected ecological health outcomes that the Council needed to finalise its assessment of whether New South Wales had satisfactorily addressed CoAG obligations, and in particular the regard shown by New South Wales for ARMCANZ/ANZECC national principles 4, 5 and 7. New South Wales was also still to finalise the implementation programs needed for the gazetted water sharing plans to commence and to commit to a satisfactory process and timetable for developing water management arrangements for the State's remaining stressed or overallocated river systems.

Since the 2003 NCP assessment, New South Wales has:

- deferred commencement of 30 of the 35 gazetted water sharing plans to 1 July 2004, but advised that it would not alter the essential content of each plan;

- deferred commencement of five gazetted groundwater plans to 1 July 2005, and indicated that it is reviewing its approach to reducing water access for these plans;

- published the guides and fact sheets for the remaining gazetted water sharing plans and provided some additional information to the Council on the action it has taken to allocate water to the environment;

- progressed, but not finalised, the four remaining first-round water sharing plans, with the Orara River plan the only first-round non-groundwater plan still to be completed;

- completed the implementation programs for the 35 gazetted plans (which are now awaiting Ministerial approval); and

- commenced a process to develop 'macro plans', within a 'reasonable timeframe, for the unregulated rivers and groundwater sources not covered by the 39 first-round water sharing plans.

New South Wales now has mechanisms — the water sharing plans and implementation programs — for allocating water (including to the environment) and facilitating trading in place and ready to commence for almost all water resources. However, the available evidence indicates that New South Wales has not gone as far as possible to provide water to sustain

ecological values (including by reallocating water), while recognising the existing rights of water users (in line with ARMCANZ/ANZECC national principles 4 and 5).

- For four of the water sources covered by the water sharing plans examined by the Council, the evidence (primarily from the former New South Wales Department of Land and Water Conservation) indicates there are significant environmental challenges that are unlikely to be satisfactorily addressed by the gazetted water sharing arrangements. New South Wales made no statements concerning sustainable water use in the four water sources and provided no information to show how the relevant water sharing plans would address environmental problems (though for one plan New South Wales is reviewing its approach to allocating water before the plan's deferred commencement in July 2005). New South Wales also provided no information on the extent of, and rationale for, any trade-offs it made for social and economic reasons in setting the extraction limits for these water sources.

- For several of the other water sharing plans examined by the Council, New South Wales stated that extraction limits are set at levels that will sustain ecological values. However, despite several opportunities, New South Wales provided minimal information that was insufficient to support these statements.

Information on the ecological sustainability of the water sources and the socioeconomic trade-offs made in developing the water sharing plans may become publicly available through the proposed role of the Natural Resources Commission in reviewing the water sharing plans. While the commission's involvement should significantly improve the process, it could be 10 years before the existing water sharing plans are subject to its scrutiny.

Accepting that it may sometimes not be possible for governments to introduce arrangements that achieve a sustainable balance immediately, particularly in systems where the volume of water already allocated for consumptive use is significant, the Council took account of possible changes in water allocation arrangements that might enable a sustainable balance to be achieved during the 10-year life of the New South Wales plans. The Council's assessment is, however, that the constraints on permitted amendments to the four water sharing plans that do not satisfactorily address CoAG objectives relating to environmental allocations mean there is little, if any, prospect that New South Wales can change the plans during their 10-year life to satisfactorily address current environmental challenges. While the recently proposed role for CMAs in managing environmental water (and trust funds) offers scope for improved environmental outcomes during the life of the water sharing plans, New South Wales did not provide any information on the expected extent of potential improvements.

The Council considers there is also a question about the regard shown by New South Wales for ARMCANZ/ANZECC national principle 7. Under this principle, accountabilities in all aspects of the management of environmental water provisions should be transparent and clearly defined. While New South

Wales undertook considerable public consultation during the preparation of the water sharing plans, there is very little public information on the manner in which the Government considered environmental science in developing the plans. New South Wales also provided little information on the extent to which it expects the various rules and limits in the plans to achieve environmental outcomes. The proposed involvement of the Natural Resources Commission goes only part of the way to addressing the gap in the process, given that its role appears to be limited to reviewing plans that are already in place, and then only towards the end of each plan's life.

The Council considers that New South Wales has not met its CoAG obligation to provide appropriate allocations of water to the environment in stressed and/or overallocated rivers. Acknowledging CoAG's 1994 statement that action needed to be taken to address widespread natural resource degradation occasioned in part by water use and its considerable concern (expressed in August 2003) over the pace of securing adequate environmental flows and adaptive management arrangements to ensure ecosystem health in Australia's river systems, the Council attaches a great deal of importance to this matter. As a result, it considered recommending a significant reduction in New South Wales's 2003-04 competition payments in this deferred 2003 assessment, which would continue in subsequent years until New South Wales implements arrangements that will deliver appropriate environmental allocations.

For various reasons, the Council's consideration of this matter has been delayed beyond the timeframe originally envisaged for finalising the deferred 2003 assessment. In this regard, the Council provided considerable opportunity to the New South Wales Government either to provide information to show that its water planning will deliver appropriate environmental allocations (in line with the 1994 CoAG water reform strategic framework) for its surface and groundwater systems or to further develop its arrangements so that CoAG obligations are likely to be met.

The Council is currently conducting the 2004 NCP assessment, in which it is considering all governments' progress with implementing the CoAG obligations on allocations and trading. The Council proposes to finalise its recommendations on competition payments to New South Wales regarding compliance with CoAG obligations on environmental allocations in the 2004 NCP assessment. Accordingly, the Council makes no recommendations on competition payments to New South Wales for 2003-04 in this deferred 2003 assessment. In the 2004 NCP assessment, the Council will consider recommending a substantial suspension or reduction in competition payments to New South Wales, to apply from 2004-05, unless New South Wales:

- provides evidence to show that its water sharing arrangements go as far as possible to meeting the water regimes necessary to sustain the ecological values of aquatic ecosystems while recognising the existing rights of other users; or

- commits (as part of the 2004 NCP assessment) to further developing its arrangements by 1 July 2005 to improve the likelihood that they will achieve the above objective within a reasonable timeframe.

Appendix A: ARMCANZ/ANZECC National Principles for the Provision of Water for Ecosystems

Principle 1: River regulation and/or consumptive use should be recognised as potentially impacting on ecological values.

Principle 2: Provision of water for ecosystems should be on the basis of the best scientific information available on the water regimes necessary to sustain the ecological values of water dependent ecosystems.

Principle 3: Environmental water provisions should be legally recognised.

Principle 4: In systems where there are existing users, provision of water for ecosystems should go as far as possible to meet the water regime necessary to sustain the ecological values of aquatic ecosystems whilst recognising the existing rights of other water users.

Principle 5: Where environmental water requirements cannot be met due to existing uses, action (including reallocation) should be taken to meet environmental needs.

Principle 6: Further allocation of water for any use should only be on the basis that natural ecological processes and biodiversity are sustained (that is, ecological values are sustained).

Principle 7: Accountabilities in all aspects of management of environmental water should be transparent and clearly defined.

Principle 8: Environmental water provisions should be responsive to monitoring and improvements in understanding of environmental water requirements.

Principle 9: All water uses should be managed in a manner which recognises ecological values.

Principle 10: Appropriate demand management and water pricing strategies should be used to assist in sustaining ecological values of water resources.

Principle 11: Strategic and applied research to improve understanding of environmental water requirements is essential.

Principle 12: All relevant environmental, social and economic stakeholders will be involved in water allocation planning and decision-making on environmental water provisions.

Appendix B: Summary of selected water sharing plans

In line with the approach it adopted in the supplementary 2002 assessment of water reform in New South Wales, for this deferred assessment the Council considered a subset of 10 of the 35 water sharing plans that New South Wales gazetted in 2003. The Council selected the 10 plans to enable a sufficiently broad investigation of the approaches being taken by New South Wales to addressing its environmental obligations across different types of water sources. The plans considered comprise five regulated river plans, two unregulated river plans and three groundwater source plans. The plans are available on the Department of Infrastructure, Planning and Natural Resources' web site (www.dipnr.nsw.gov.au).

This appendix summarises the key elements of the 10 water sharing plans relevant to the CoAG obligation to provide water to the environment. It focuses on the environmental water provisions and related rules in the plans (including rules to manage local impacts) that the Council considers are relevant to principles 4, 5 and 7 of the ARMCANZ/ANZECC National Principles for the Provision of Water for Ecosystems. (The plans' provisions relating to water trading will be considered in the 2004 NCP assessment.) The plans make provision for water to be provided for the environment under the three classes defined by the *Water Management Act 2000*:

- environmental health water — water committed for fundamental ecosystem health at all times and which may not be taken or used for other purposes;

- supplementary environmental water — water committed for specific environmental purposes (for example, wetland flooding) at specific times (or in specific circumstances), but which may be used for other purposes at other times; and

- adaptive environmental water — water committed for specific environmental purposes through an access licence.[10]

In accord with the Water Management Act, each water sharing plan states its vision, a set of objectives and strategies to meet those objectives. For each of the plans, an appendix lists performance indicators and how performance

[10] Through the Water Management Amendment Bill 2004, New South Wales proposes to change these classifications to provide for only two kinds of environmental water: that provided according to rules in a water sharing plan, referred to as planned environmental water; and that provided through water access licences, referred to as adaptive environmental water. The changes will not affect the rules in plans that have already been gazetted.

against the indicators will be measured. Many of the indicators relate to trends, such as in numbers of particular events, such that change will trigger investigation. Each of the plans has an implementation program. These programs include details of the timing of the collection of information, to support each of the performance indicators, and for the analysis and reporting of changes in the indicators.

All of the plans provide for a review in their fifth year to determine whether their provisions remain adequate to ensure the implementation of the water management principles of the Act. The Act also requires each plan to be audited at intervals of no more than five years to ensure that its provisions are being implemented. In addition, several of the water sharing plans require further studies and reviews to improve the understanding of environmental water requirements. In these cases, the plans can be amended following the reviews, within specified limits.

Regulated river plans

Gwydir Regulated River

The Gwydir River system, located in north-west New South Wales, rises near Uralla and travels some 700 kilometres before joining the Barwon River. The Water Sharing Plan for the Gwydir Regulated River Water Source applies to all regulated sections of the Gwydir River system running from the upper limits of Copeton Dam downstream to the Gwydir wetlands and the junction of Mehi, Carole/Gil Gil and Moomin Creeks with the Barwon River.

The guide to the water sharing plan states that:

> *The volume and the pattern of flows in the water source have been significantly altered by the extraction of water and by the operation of Copeton Dam and other water control structures in the water source. These changes have contributed to a range of effects on the environmental health of the river and its wetlands, and to water quality problems.*

The vision of the water sharing plan is:

> *… to have a sustainable, healthy river system that provides reliable water through flow management for the community, environment, agriculture and industry.*

The plan's objectives are to:

- protect, maintain and enhance the environmental values of the water source;

- manage the water source to ensure equitable sharing of water between all uses;
- protect the water source by ensuring extraction minimises any adverse impacts;
- improve water quality;
- provide opportunities for ecologically sustainable market-based trading of surface water entitlements in the water source;
- manage the water source to preserve and enhance basic water rights;
- ensure extraction is managed properly within the Murray–Darling Basin Ministerial Council Cap; and
- manage the water source to preserve and enhance cultural and heritage values.

Environmental water provisions

The plan makes provision for water to be provided for the environment under the three classes defined by the Water Management Act: environmental health water, supplementary environmental water and adaptive environmental water. At the commencement of the plan, no access licences are committed to an environmental purpose as adaptive environmental water. An access licence holder may, however, commit all or part of their licence as adaptive environmental water at any time.

Environmental health water

The plan establishes two environmental health water provisions, a general allocation of the water volume in excess of the long-term extraction limit and a specific allocation of minimum flows to the Gwydir wetlands.

The long-term extraction limit is defined as the lesser of:

- the long-term average annual extraction from the water source that would occur with the water storages and water use development that existed in 1999-2000, the share components at the commencement of the plan and the water management rules defined in the plan [condition (a)]; or
- the long-term average annual extractions that would occur under the Murray–Darling Basin Ministerial Council Cap baseline conditions [condition (b)].

The plan does not specify the exact volumes of water that will be available in practice, as they are dependent on rainfall and other climatic factors, and will be calculated annually using a computer model of the Gwydir River system (the Gwydir Integrated Quantity and Quality Model). Notes in the plan state

that an indicative long-term average annual extraction limit under condition (a) would be 388 000 ML and under condition (b) would be 415 000 ML. Extractions under condition (a) would represent a 6.5 per cent reduction on the cap and result in 56 per cent of the flow being provided for environmental purposes.

The minimum flow to the Gwydir wetlands is to be the lesser of:

- the sum of flows in the Horton River at Rider, Myall Creek at Molroy and Halls Creek at Bingara, plus any other water spill or pre-release for flood mitigation purposes from Copeton Dam; and
- 500 ML/day.

The plan does not provide for changes to the extraction limits and flow rules during its 10-year life.

Supplementary environmental water

The plan sets up an environmental contingency allowance (ECA) which is an account for supplementary environmental water. The account is to be credited whenever an available water determination for regulated river (general security) access licences is made. The volume credited to the ECA is to be the lesser of:

- 45 000 ML multiplied by the percentage of share component specified in the available water determination for general security access licences; and
- 90 000 ML minus the volume currently in the account.

This water may be released for any of the following purposes:

- to support a colonially nesting native bird breeding event that has been initiated in the Gwydir wetlands following natural flood inundation;
- to provide additional inundation in the Gingham and Lower Gwydir wetlands during or following periods of extended dry climatic conditions;
- to provide inundation of higher level benches in the river reaches between Copeton Dam and the Gwydir River at Gravesend;
- to provide short-term inundation of the wetlands to promote germination of hyacinth as part of a weed management strategy involving a wetting and drying cycle;
- to provide flows for environmental purposes in effluent streams;
- to support native fish populations and habitat;
- to support invertebrates and other aquatic species;

- to support threatened species; and
- to maintain aquatic ecosystem health.

Supplementary environmental water is to be managed by an ECA Operations Advisory Committee which will consist of one member each from the Department of Infrastructure, Planning and Natural Resources, the Department of Environment and Conservation, NSW Fisheries, the Gwydir Valley Irrigators Association, landholders on the Gingham watercourse, landholders on the Gwydir watercourse and a non-government environmental organisation. The Government is considering a proposal to also include two independent scientists.

Other environmental measures

In addition to the environmental water provisions, the plan includes rules that provide environmental benefits.

Supplementary water extraction rules ensure that 50 per cent of high flow events are reserved for the environment and allowed to pass through the system. The guide to the water sharing plan lists the environmental benefits of this rule as:

- protection of important rises in water levels;
- maintenance of wetland and floodplain inundation; and
- maintenance of natural flow variability.

The supplementary water extraction rules also restrict extraction of water on the Mehi River and Carole Creek to meet the requirements of the Interim Unregulated Flow Management Plan for the North West with respect to fish passage and suppression of blue-green algal blooms.

The system operating rules provide for replenishment flows (flows provided to refill pools and water holes in effluent river systems downstream of the water source, as well as water for household and town use and stock). Under these rules, the following replenishment flows are to be provided if required:

- up to 6000 ML/year to the Gingham watercourse;
- up to 4000 ML/year to the Gwydir River downstream of this water source;
- up to 6000 ML/year to Mallowa Creek;
- up to 4000 ML/year to Thalaba Creek; and
- up to 500 ML/year to Ballinboora Creek.

Discussion

Environmental health water

The progress report of the Gwydir River Management Plan (DLWC 1998a) stated that the average extraction from the Gwydir River between 1990 and 1998 was 220 000 ML/year; ranging from less than 50 000 ML/year to nearly 400 000 ML/year. The report also stated that:

> *There is clear evidence of increasing environmental stress within the river and, in particular, in its important wetland areas.* (p. 1)

The plan's statement that there is evidence of increasing environmental stress implies that the ecological health of the river and its associated wetlands was in decline at an average level of water extraction of 220 000 ML/year.

Although the plan does not define the volume of secure water available to the environment, it states that the indicative long-term average extraction limit is 388 000 ML/year. This is nearly twice the average annual extraction from 1990 to 1998.

The regulation and extraction of water from the Gwydir River has led to changes in seasonal patterns and a reduction in flow variability (DLWC 1998a). The very high flows are reduced to only 10 per cent of low development flows and the very low flows are often increased to ten times low development levels (DIPNR 2003). Flow variability is important for fish, invertebrates, water birds, aquatic vegetation, floodplains and geomorphic processes.

New South Wales did not provide evidence to support the sustainability of the long-term extraction limit and other rules established under the plan, including to show that the plan adequately addresses seasonality and flow variability.

Supplementary environmental water

The plan provides for supplementary environmental water of 45 000 ML multiplied by the percentage of share component specified in the available water determination for general security access licences (or an alternative lower limit). The supplementary environmental water provided under the plan is not guaranteed and is dependent on the availability of water in any given year. The possible volume of supplementary environmental water can be estimated using the indicative long-term extraction limit and the share components of access licences reported in the plan.

The total water volume specified on all rights and access licences is 712 874 ML/year, comprised of:

- 6000 ML/year for domestic and stock rights;
- 4245 ML/year for licences for domestic and stock supply access licences;
- 3836 ML/year for local water utility supply access licences;
- 19 293 ML/year for regulated river (high security) access licences;
- 509 500 ML/year for regulated river (general security) access licences; and
- 170 000 ML/year for supplementary water access licences.

According to the rules for allocation within the plan, rights are given first priority, followed by access licences for domestic and stock, local water utility supply and regulated river (high security) access licences. If 100 per cent of the share component is provided to each of these categories, then the remainder of the long-term extraction volume is available for regulated river (general security) access licences. Based on the indicative long-term extraction limit of 388 000 ML, 354 626 ML would be available for general security access licences. This equates to 69.6 per cent of their share components under this scenario. Similarly, the ECA would be credited with 69.6 per cent of 45 000 ML (31 300 ML) for environmental purposes.

The New South Wales Government's assessment of the plan against the SWMOP targets noted that the National Parks and Wildlife Service considers the environmental flow rules provide only the minimum necessary to protect wetland and floodplain dependent threatened bird species. The rules include the ECA of 45 000 ML.

The Nature Conservation Council, in its dissenting letter to the draft Gwydir water sharing plan, referred to the Mitchell report in 1996, which recommended that the following volumes are required to flood the Gwydir wetlands:

- drought year (1 in 10 years) 0 ML;
- dry year (3 in 10 years) 45 000 – 155 000 ML;
- normal year (5 in 10 years) 90 000 – 230 000 ML; and
- wet year (1 in 10 years) 170 000 – 300 000 ML.

The Nature Conservation Council also stated that NSW Fisheries considered that 45 000 ML/year is insufficient to deliver native fish outcomes and that the National Parks and Wildlife Service indicated that 170 000 ML is required to appropriately manage waterbirds and ecosystem health. The Gwydir Regulated River Management Committee endorsed a figure of 70 000 ML/year prior to an 'out of session' process that reduced this to 45 000 ML/year.

New South Wales did not provide evidence to show that the ecological requirements of the downstream wetlands and the native flora and fauna of the system would be met.

Reallocation

ARMCANZ/ANZECC national principle 5 requires that:

> *Where environmental water requirements cannot be met due to existing uses, action (including reallocation) should be taken to meet environmental needs.*

Historical extractions over the period from 1990-91 to 1997-98 averaged 220 000 ML/year (ranging from less than 50 000 to nearly 400 000 ML/year). Extractions under the Murray–Darling Basin Ministerial Council Cap are limited to 415 000 ML/year. While the plan's indicative long-term extraction limit under condition (a) (388 000 ML/year) represents a reduction of 6.5 per cent compared to the cap, it is still nearly double the average extractions over the past decade.

Namoi Regulated River

The Namoi River, located in north-west New South Wales, rises in the Great Dividing Range and travels some 350 kilometres before joining the Barwon River. The Water Sharing Plan for the Namoi Regulated River Water Source applies to two water sources: the Upper Namoi Regulated River and the Lower Namoi Regulated River. The Upper Namoi includes the regulated river sections between Split Rock Dam and Keepit Dam. The Lower Namoi includes the regulated sections downstream of Keepit Dam to the Barwon River.

The guide to the water sharing plan states that:

> *The volume and pattern of flows in the Namoi River have been significantly altered by the extraction of water and the operation of these water storages and other water control structures in the water source. The frequency of all but the largest flood events in the Namoi catchment has been reduced. Flows at the end of the system are also lower. Average monthly flows in summer have increased and average monthly flows in winter have decreased. These changes have contributed to a range of effects on the environmental health of the river and its wetlands and to water quality problems.*

The draft water sharing plan stated that algal blooms are a regular occurrence in major storages and that 50 per cent of sites assessed for river health during a 1998 study were in poor condition.

The vision of the water sharing plan is:

> *… to have a sustainable, healthy river system that provides equitable water access for all uses and users through flow management.*

The plan's objectives are to:

- protect, preserve, maintain or enhance the important river flow dependent environmental features and Aboriginal, cultural and heritage values of the water sources;
- manage the water sources to ensure equitable sharing between all users;
- protect basic landholder rights;
- provide opportunities for market-based trading of regulated water entitlements, within sustainability and system constraints;
- provide sufficient flexibility in water account management to encourage responsible use of available water; and
- contribute to the maintenance of water quality.

Environmental water provisions

The plan makes provision for water to be provided for the environment under the three classes defined by the Water Management Act: environmental health water, supplementary environmental water and adaptive environmental water. At the commencement of the plan, no access licences are committed to an environmental purpose as adaptive environmental water. An access licence holder may, however, commit all or part of their licence as adaptive environmental water at any time.

Environmental health water

The plan establishes environmental health water as a general allocation of the water volume in excess of the long-term extraction limit.

The long-term extraction limit is defined as the lesser of:

- the long-term average annual extraction from the water source that would occur with the water storages and water use development that existed in 1999-2000, the share components existing at the commencement of the plan and the water management rules defined in the plan [condition (a)]; or
- the long-term average annual extractions that would occur under the Murray Darling Basin (MDB) Ministerial Council Cap baseline conditions [condition (b)].

The exact volumes of water are not specified in the plan, as they depend on rainfall and other climatic factors, and will be calculated annually using a

computer model of the Namoi River system (the Namoi Integrated Quantity and Quality Model). Notes in the plan state that an indicative long-term extraction volume under condition (a) would be 238 000 ML and under condition (b) would be 256 000 ML. Extractions under condition (a) would represent a 7 per cent reduction on the cap and result in 73 per cent of the flow being provided for environmental purposes.

The plan does not provide for a general review of the long-term extraction limit or the environmental water provisions during its 10-year life.

Supplementary environmental water

The plan provides for supplementary environmental water to protect end-of-system flows. In the months of June, July and August, a minimum daily flow, equivalent to 75 per cent of the natural 95th percentile daily flow for each month, is to be maintained in the Namoi River at Walgett. Supplementary environmental water is not guaranteed, however, and its provision in any given year depends on water being available.

The supplementary environmental water contributes to the following environmental outcomes:

- protecting important rises in water levels;
- maintaining wetland and floodplain inundation; and
- maintaining natural flow variability.

Other environmental measures

In addition to the environmental water provisions, the plan includes rules aimed at providing environmental benefits.

Supplementary water extraction rules (covering the taking of what was previously termed 'off-allocation' water) ensure that supplementary water access is only permitted from uncontrolled flows. The guide to the water sharing plan lists the environmental benefits of these rules as:

- protection of important rises in water levels;
- maintenance of wetland and floodplain inundation; and
- maintenance of natural flow variability.

The supplementary water extraction rules also restrict extraction of water on the Lower Namoi Regulated River to meet the requirements of the Interim Unregulated Flow Management Plan for the North West with respect to fish passage and suppression of blue-green algal blooms in the Barwon and Darling rivers.

Discussion

Environmental health water

The total water volume specified on all rights and access licences is 376 289 ML/year, comprised of:

- 1936 ML/year for domestic and stock rights;
- 2013 ML/year for domestic and stock supply access licences;
- 2421 ML/year for local water utility supply access licences;
- 3498 ML/year for regulated river (high security) access licences;
- 256 421 ML/year for regulated river (general security) access licences; and
- 110 000 ML/year for supplementary water access licences.

The progress report of the Namoi River Management Plan (DLWC 1998e) stated that the average extraction from the Namoi River between 1990 and 1998 was 180 000 ML/year. The report also stated that:

> … *there is clear and increasing evidence of the problems our water use is causing to the health of our waterways, wetlands and billabongs in the Namoi and elsewhere.* (p.1)

The statement in the progress report implies that the ecological health of the river and its associated wetlands was declining with water extraction averaging 180 000 ML/year.

Although the plan does not clearly define the volume of secure water provided to the environment, the indicative long-term extraction limit is stated as 238 000 ML. While this represents a 7 per cent reduction in extraction relative to the Murray–Darling Basin Ministerial Council Cap and a 4 per cent reduction on the 1998 interim environmental flow rules for this system, it is almost one-third higher than the average annual extraction from 1990 to 1998.

The regulation and extraction of water from the Namoi River has altered seasonal patterns and diminished flow variability (DLWC 1998e). The supplementary access licences will allow pumping of water from uncontrolled flows (that is, flows exceeding those needed to meet the plan's environmental provisions, basic landholder rights and water required by general security access licences and higher priority licences in the system). These extractions are limited to 10 per cent of the flow between 1 July and 31 October and 50 per cent of the flow between 1 November and 30 June. This rule is intended to protect a proportion of high to medium flows, especially during times critical for native fish breeding.

In addition to flow variability, the protection of low flows and the maintenance of pool environments are essential for native fish and aquatic macroinvertebrates. Fish are obligate aquatic organisms and pool environments are essential summer habitat, providing diverse feeding grounds. Protecting low flows is essential, particularly in summer, to link pool environments, ameliorate poor water quality and provide riffle habitats for native fish and aquatic macroinvertebrates (DNRE 2002). The access rules within the plan permit pumping to below the 95th percentile of end-of-system flows (with a minimum flow at Weeta Weir of 10 ML/day).

New South Wales did not provide evidence to support the sustainability of the long-term extraction limit and other rules established under the plan, including to show that the plan adequately protects low flows.

Supplementary environmental water

The plan provides for supplementary environmental water to maintain a proportion of end-of-system flows between June and August of each year (the non-irrigation season). This timing contrasts with the natural climatic patterns for the region. High rainfall events and flooding occur during late spring and early summer, which is the time for wetland inundation and flow-triggered fish and waterfowl breeding. The supplementary access rules within the plan allow extraction of 50 per cent of water from uncontrolled flows over the summer (November to June). This has the potential to affect the freshes and high flows that provide environmental benefits such as water quality improvements, floodplain wetland inundation and connectivity for fish migration.

New South Wales did not provide evidence to show that the plan addresses the water needs of the floodplain wetlands.

Reallocation

ARMCANZ/ANZECC national principle 5 requires that:

> *Where environmental water requirements cannot be met due to existing uses, action (including reallocation) should be taken to meet environmental needs.*

A comparison of extractive use from the Namoi River system shows:

- average extraction between 1990-91 and 1997-98 — 180 000 ML/year (DLWC 1998e);
- extraction limit under the Murray–Darling Basin Ministerial Council Cap — 256 000 ML/year;
- extraction limit under the 1998 interim environmental flow rules — 249 000 ML/year; and

- extraction limit under the water sharing plan — 238 000 ML/year.

As noted above, the plan sets an extraction limit that is 7 per cent lower than the Murray–Darling Basin Ministerial Council Cap and 4 per cent lower than the 1998 interim environmental flow rules for this river system. However, the extraction limit is almost one-third (or 58 000 ML/year) higher than the average annual extraction during the early to mid 1990s, when New South Wales considered the Namoi River to be stressed and overallocated.

Lachlan Regulated River

The Lachlan River, located in the central west of New South Wales, rises near Goulburn and travels some 1500 kilometres before joining the Murrumbidgee River. Minimal water reaches the Murrumbidgee River, however, except during flood events. The Water Sharing Plan for the Lachlan Regulated River Water Source applies to all regulated sections of the Lachlan River from the upper reaches of Wyangala Dam to the junction with the Murrumbidgee River, a number of effluent creeks in the Condobolin area, including Bumbuggan Creek, parts of Goobang and Island creeks and Willandra Creek.

The Lachlan River has high levels of both hydrological and environmental stress (DLWC 1998b). The draft water sharing plan stated that regulation and water extraction contribute to the degradation of instream habitat and floodplain vegetation and affect the nationally and internationally significant wetlands associated with the Lachlan River system. Fish populations have declined. The draft water sharing plan identified reversal in flow patterns and loss of natural flow variability, as well as the reduced frequency, duration and magnitude of floods, as contributing factors.

The vision of the water sharing plan is:

> *… to achieve a healthy Lachlan River that provides a dynamic and sustainable environment for native plants and animals, that is enjoyed and valued by the community and that is managed for the socio-economic interest of the people of the Lachlan catchment.*

The environmental objective of the plan is to maintain or restore the key environmental features of the Lachlan River system by a river flow regime that, as much as possible, mimics natural conditions in order to make provisions for the following outcomes:

- a diversity of natural in-stream and riparian habitat and biota;
- the restoration, by naturally triggered flooding, of the riverine floodplain to its previous mosaic of ecosystems;
- the improved health and function of wetlands as frequency and duration of inundation is restored;
- an abundance and diversity of native aquatic species;

- an abundance and diversity of native waterbirds;
- the restoration of water quality that supports aquatic ecosystems; and
- the recovery of threatened species, communities and populations.

Environmental water provisions

The plan makes provision for water to be provided for the environment under the three classes defined by the Water Management Act: environmental health water, supplementary environmental water and adaptive environmental water. At the commencement of the plan, no access licences are committed to an environmental purpose as adaptive environmental water. An access licence holder may, however, commit all or part of their licence as adaptive environmental water at any time.

Environmental health water

The plan establishes environmental health water as a general allocation of the water volume in excess of the long-term extraction limit.

The long-term extraction limit is defined as the lesser of:

- the long-term average annual extraction from the water source that would occur with:
  - the water storages, private water management infrastructure and cropping mix that existed in 1999-2000,
  - the share components existing at the commencement of the plan,
  - the maximum crop area and planting behaviour adopted as representative of baseline conditions used for assessment of the Murray–Darling Basin Ministerial Council Cap, and
  - application of the water rules defined in the plan [condition (a)]; or
- the long-term average annual extractions that would occur under the Murray–Darling Basin Ministerial Council Cap baseline conditions [condition (b)].

The exact volumes of water are not specified in the water sharing plan, as they depend on rainfall and other climatic factors, and will be calculated annually using a computer model of the Lachlan River system (the Lachlan Integrated Quantity and Quality Model). Notes in the plan state that an indicative long-term extraction volume under condition (a) would be 305 000 ML/year and under condition (b) would be 315 000 ML/year. The extraction limit under condition (a) is approximately the same volume as the average annual extraction since 1998, but is 3.2 per cent less than under the cap and 15 per cent less than the average annual extraction over the period

1990 to 1998. An estimated 75 per cent of the flow is to be provided for environmental purposes.

The plan does not provide for changes to the extraction limit and environmental health water provisions during its 10-year life.

Supplementary environmental water

The plan provides for supplementary environmental water in the form of translucent releases, a water quality allowance and two environmental contingency allowances (one in Wyangala Dam and one in Lake Brewster).

Translucent releases occur when a proportion of dam inflows is released coincidentally with their occurrence. The plan provides for translucent releases from Wyangala Dam between 15 May and 15 November provided a minimum of 250 000 ML has entered Wyangala Dam from 1 January each year. (This minimum entry constraint may be reduced, but not increased, before the end of year five of the plan following a review of the environmental benefits and socioeconomic impact.) Volumes of translucent releases vary from 3500 ML/day to 8000 ML/day depending on water volumes in Wyangala Dam and Lake Brewster and flows from tributaries. The maximum translucent release within a year is 350 000 ML, as measured at Brewster Weir. These releases are intended to improve lower system flows and winter/spring flow variability.

The water quality allowance is credited with 20 000 ML on 1 July each year. This water may be released for any water quality management purpose, but in particular for reducing salinity and mitigating the impact of blue-green algae. Rules for determining releases are to be established by the Minister.

The two ECAs are to be credited with 10 000 ML each when the total volume of water in the water allocation accounts of regulated river general security access licences exceeds 50 per cent of the total volume of general security access licence share components at the beginning of the water year or exceeds 75 per cent during a water year. This water may be released for purposes such as waterbird or fish breeding, wetland watering or increasing flow variability. The rules for determining releases are also to be established by the Minister.

Discussion

Environmental health water

The progress report on the Lachlan River Management Plan (DLWC 1998c) stated that changes in flow rates and seasonality have led to a decline in ecological values within the Lachlan River. The water sharing plan's environmental objectives include restoring the frequency and duration of inundation and naturally triggered flood events. On a long-term average

basis, the plan provides 75 per cent of the flow for environmental water, though in any given year dam spills and translucent releases will depend on the level of extraction by irrigators. New South Wales did not explain how the plan will deliver these environmental objectives.

Supplementary environmental water

The supplementary environmental water provided under the plan (in the form of translucent releases, a water quality allowance and environmental contingency allowances) is not guaranteed and is dependent on the availability of water in any given year.

The total water volume specified on all rights and access licences is 652 169 ML/year, comprised of:

- 4211 ML/year for domestic and stock rights;
- 13 100 ML/year for licences for domestic and stock supply access licences;
- 15 539 ML/year for local water utility supply access licences;
- 26 472 ML/year for regulated river (high security) access licences; and
- 592 847 ML/year for regulated river (general security) access licences.

There is no provision for supplementary water access licences.

Under the plan, rights have first priority, followed by access licences for domestic and stock, local water utility supply and regulated river (high security). If these rights and share components are met in full, then the remainder of the long-term extraction volume is available for the share components of regulated river (general security) access licences. Based on the indicative long-term extraction limit of 305 000 ML/year, 245 678 ML would be available for general security access licences. This equates to 41.4 per cent of their share components, which is less than the 50 per cent level required to trigger credits to the ECAs. Consequently, in an average year, no water would be credited to the ECAs. The New South Wales Government's assessment of the plan against the SWMOP targets raised concerns about the reduction in water available for the environment in such circumstances.

The interim environmental flow rules established in 1998 provide a 20 000 ML ECA that is not linked to water allocations for consumptive use. Subsequent monitoring indicated that this was highly successful in triggering fish and waterbird breeding events and inundating floodplain wetlands. The draft water sharing plan documentation indicated that there were shortcomings in the 1998 rules in that the ECA was used to address water quality problems rather than ecological health outcomes. To overcome this, the water sharing plan establishes a separate water quality allowance of 20 000 ML/year, which is not linked to consumptive use targets.

Reallocation

The plan will reduce annual extractions by 3 per cent relative to the Murray–Darling Basin Ministerial Council Cap, and by 15 per cent from historical use. It will result in 75 per cent of the flow being provided for environmental purposes.

Murrumbidgee Regulated River

The Murrumbidgee River, located in south-west New South Wales, has its source in the Snowy Mountains and travels some 1600 kilometres before joining the River Murray. The Water Sharing Plan for the Murrumbidgee Regulated River Water Source applies to all regulated sections of the Murrumbidgee River from the upper reaches of Burrinjuck Dam to the junction with the River Murray, the Tumut River from Blowering Dam to its junction with the Murrumbidgee River and the Yanco/Billabong Creek system from the offtake at Yanco Creek to the junction of Billabong Creek with the Edward River.

The guide to the water sharing plan states that:

> *The volume and pattern of flows in the Murrumbidgee River have been significantly altered by the construction of Burrinjuck Dam on the Murrumbidgee River and Blowering Dam on the Tumut River, the operation of these dams to supply water to downstream users, the diversion of water from the Snowy River through the Snowy Mountains Scheme into the Murrumbidgee River and the extraction of water along the Murrumbidgee River.*
>
> *These changes have contributed to a range of effects on the environmental health of the river and its wetlands and to water quality problems.*

The vision of the water sharing plan is:

> *… to provide for equitable sharing of limited water resources to sustain a healthy and productive river and the welfare and well being of Murrumbidgee regional communities.*

The plan's objectives are to:

- protect and restore in-river and riparian habitats and ecological processes;
- provide for appropriate watering regimes for wetlands;
- sustain and enhance population numbers and diversity of indigenous species;
- protect basic landholder rights, including native title rights;

- maximise early season general security allocations;
- protect town water supply;
- protect end-of-system flows;
- provide for commercial consumptive use;
- provide for identified recreational water needs;
- protect identified indigenous and traditional uses of water; and
- within the ability of the plan, promote the recovery of known threatened species.

The total water volume specified on all access licences is 2 993 428 ML/year.

Environmental water provisions

The plan makes provision for water to be provided for the environment under the three classes defined by the Water Management Act: environmental health water, supplementary environmental water and adaptive environmental water. At the commencement of the plan, no access licences are committed to an environmental purpose as adaptive environmental water. An access licence holder may, however, commit all or part of their licence as adaptive environmental water at any time.

Environmental health water

The plan establishes two environmental health water provisions: a general allocation of the water volume in excess of the long-term extraction limit and a specific allocation of minimum end-of-system flows to the River Murray at Balranald.

The long-term extraction limit is defined as the lesser of:

- the long-term average annual extractions from the water source that would occur with the water storages and water use development that existed in 1999-2000, the share components at the commencement of the plan and the water management rules defined in the plan [condition (a)]; or
- the long-term average annual extractions that would occur under the Murray–Darling Basin Ministerial Council Cap baseline conditions [condition (b)].

The plan does not specify the exact volumes of water that will be available in practice, as these depend on rainfall and other climatic factors, and will be calculated annually using a computer model of the Murrumbidgee River system (the Murrumbidgee Integrated Quantity and Quality Model). Notes in

the plan state that an indicative long-term annual extraction volume under condition (a) would be 1 925 000 ML/year and under condition (b) would be 1 980 000 ML/year. Extractions under condition (a) would represent a 2.8 per cent reduction on the cap. After the fifth year of the plan, extractions will be limited to 1 890 000 ML/year, a 4.5 per cent reduction on the cap. The guide to the plan states that, on a long-term average basis, approximately 56 per cent of annual flows will be protected for the maintenance of environmental health.

The minimum end-of-system flow to the River Murray is to be between 200 ML/day and 300 ML/day for the first five years of the plan. The 200 ML/day minimum applies when the available water determinations for the current year, and carryovers from the previous year, for regulated river general security access licences total less than 80 per cent of the general security access licence share components. The 300 ML/day minimum applies when at least 80 per cent of access licence share components are available.

From 1 July 2008, the minimum end-of-system flow will increase. The minimum flow at Balranald is to be 300 ML/day, plus an amount equivalent to 40 per cent of the 95th percentile natural daily flow rate (less the 300 ML already allocated), irrespective of available water determinations to regulated river general security access licences. This is intended to introduce flow variability and more closely reflect the natural flow pattern.

Supplementary environmental water

The plan provides for supplementary environmental water in the form of transparent and translucent releases and three environmental water allowances.

Transparent releases occur when all dam inflows are released coincidentally with their occurrence (that is, water entering into the dam is allowed to pass through to the downstream waterway, simulating natural flow conditions). The plan provides for transparent releases from Blowering Dam of up to 560 ML/day and from Burrinjuck Dam of up to 615 ML/day. These releases are designed to provide low flows in the upper reaches of the system.

Translucent releases occur when a proportion of dam inflows is released coincidentally with their occurrence. The plan provides for translucent releases from Burrinjuck Dam between 22 April and 21 October of between 300 ML/day and 615 ML/day, with actual volumes dependent on climatic conditions and dam storage levels. These releases are intended to provide winter flow variability.

The three environmental water allowances are credited according to a number of triggers and rules. The first allowance of up to 50 000 ML in any year is credited when the available water determinations for the current year, and carryovers from the previous year, for regulated river general security access licences total at least 60 per cent of the general security access licence share components. The second allowance is credited with water in relation to

transparent and translucent flows in Burrinjuck Dam and the third allowance is credited according to differences in transparent releases contained in two schedules to the plan.

The water may be released from the three allowances for wetland inundation, fish or bird breeding or water quality management according to release rules which are developed before the start of each year. The water is to be managed by a reference group that will consist of a member from each of: the Nature Conservation Council, Murrumbidgee Field Naturalists, Murrumbidgee Customer Service Committee (upper river), Murrumbidgee Customer Service Committee (mid river), Lowbidgee League, the Department of Infrastructure, Planning and Natural Resources, the National Parks and Wildlife Service, NSW Fisheries and State Water.

The plan provides for the supplementary environmental water rules to be amended following a review within the plan's first 12 months of operation. The aim of the review is to simplify the operation of the rules, maximise the accrual of water and early season access to environmental water allowances, minimise forfeiture from the allowances and improve environmental outcomes by better matching natural flow variability and seasonality. Any change to the long-term extraction limit resulting from the review is limited, however, to not more than 0.5 per cent. The plan also provides for changes to: the access rules for supplementary water access licences after a review of the environmental impacts of water extractions; and the rules controlling diversion of flows into the Lowbidgee Flood Control and Irrigation District, after development of a water management plan for the district.

Discussion

Environmental health water

The progress report of the Murrumbidgee River Management Plan (DLWC 1998d) stated that the average extraction from the Murrumbidgee River between 1990 and 1998 was 2 200 000 ML/year (excluding water diverted to the Lowbidgee area). Although the provision of secure water to the environment is not clearly defined in terms of volume in the plan, the indicative long-term extraction limit is estimated at 1 925 000 ML, which would represent a reduction of approximately 12.5 per cent on average extractions over the previous decade. Water is also provided under the environmental health classification for end-of-system flows. These are set as minimum flows under current conditions, with provision to increase the volumes after 1 July 2008.

The New South Wales Government's assessment of the plan against the SWMOP targets found that the plan does not meet the target for end-of-system flows. The plan includes rules that improve low flows at the end of the system after year five, so that flows drop below the predevelopment 95th percentile flow 20 per cent of the time rather than 41 per cent of the time at the commencement of the plan. However, the SWMOP target is for protection

of these flows to be extended up to at least the predevelopment 95th percentile. New South Wales did not provide evidence to support the sustainability of the extraction limits and other rules established under the plan.

Supplementary environmental water

The plan establishes a complicated system of allocating supplementary environmental water for transparent and translucent flows as well as for crediting the environmental water allowance accounts. This water is not guaranteed and is dependent on the availability of water in any given year.

The Murrumbidgee catchment contains a number of wetlands that are of international and national significance. Fivebough and Tukerbil swamps have been nominated for Ramsar listing and there are twelve wetlands on the Australian Directory of Important Wetlands, including the Lowbidgee floodplain, the Mid Murrumbidgee Wetlands and the Lower Mirrool Creek Floodplain. In addition, a number of fish and waterbird taxa that are listed as threatened under national and state legislation are known to occur in the Murrumbidgee River system, including the endangered aquatic ecological community of the natural drainage system of the Lower Murray River catchment. Threats to these listed species and to their wetland habitats include altered flow patterns, reduced flooding and changes in the seasonality of flow within the Murrumbidgee River. The New South Wales Government's assessment of the plan against the SWMOP targets notes the following.

- The system is in the Lower Murray area which has been listed as an endangered ecological community, with river regulation specifically identified as a major cause. (For example, eight aquatic species in the Murrumbidgee are listed as threatened.) The plan will not eliminate this problem.

- The environmental flow rules focus on wetland inundation in the middle reaches. The flow rules do not appear to improve flow variability outcomes in other parts of the system. The frequency of the highest flows in the Tumut junction to Carrathool reach, for example, will be marginally reduced compared to the cap.

The New South Wales Government's assessment indicates that the plan does not meet the SWMOP targets for protection and restoration of aquatic habitats and, apart from the middle reaches, does not improve flow regimes or flow variability. In addition, the results of monitoring over the 1998 to 2000 period, during which environmental water provisions were similar to those provided under the plan, indicate that the frequencies of wetland flooding were substantially lower than natural levels and there was no measurable improvement in ecological health (DIPNR 2003).

New South Wales did not provide evidence that the environmental water provisions will meet the ecological requirements of the system's wetlands and the native flora and fauna of the system.

The total water volume specified on all rights and access licences is 2 997 988 ML/year. This is comprised of:

- 4560 ML/year for domestic and stock rights;
- 35 572 ML/year for access licences for domestic and stock;
- 23 403 ML/year for access licences for local water utility supply;
- 298 021 ML/year for regulated river (high security) access licences;
- 2 043 432 ML/year for regulated river (general security) access licences;
- 243 000 ML/year for the Murrumbidgee Irrigation (conveyance) access licence;
- 130 000 ML/year for the Coleambally Irrigation (conveyance) access licence; and
- 220 000 ML/year for supplementary water access licences.

The water supply system is to be managed to enable available water determinations to:

- fully meet the requirements for domestic and stock, and local water utility access licences through a repeat of the worst period of low inflows on record; and
- meet 95 per cent of requirements for regulated river high security access licences in such circumstances.

An available water determination will not be made for regulated river general security access licences in any year until the 95 per cent requirement for high security access licences is met. A water determination for general security access licences is to be made at the commencement of each water year if water is available. If there is insufficient water for the general security access licences, further water determinations will be made monthly. A water determination for a supplementary water access licence share component is also to be made at the start of each water year.

The rules for calculating share components are complicated, making it difficult to determine the share component of the regulated river general security access licences and therefore the amount of water that may be available for the first environmental water allowance. However, based on the indicative long-term extraction limit of 1 925 000 ML, it is unlikely that more than 60 per cent of the share components will be available for general security access licences. At 60 per cent of the general security share components, there would be only 10 000 ML to 25 000 ML available for the first environmental water allowance account (considerably less than the 50 000 ML maximum).

In addition, the New South Wales Government's assessment of the plan against the SWMOP targets noted that there are no triggers for the release of water from the environmental water allowances. Under the arrangements that preceded the plan, there were no environmental water allowance releases during 1998-99 or 1999-2000 despite there being provisions for such releases to improve the environmental health of the river and associated wetland systems (DIPNR 2003).

The Minister's notes on the draft plan (Part A, p. 45) and the Nature Conservation Council (in a dissenting letter in response to the draft plan) questioned the adequacy of the volume of water likely to be available to the Lowbidgee district. Under the plan, water is provided to the Lowbidgee district only if the available current year water determinations and carryovers from the previous year for regulated river general security access licences total at least 60 per cent of the general security access licence share components. This suggests that there will be little if any water available for the Lowbidgee district in most years. The Lowbidgee wetlands are listed on the Australian Directory of Important Wetlands. The Murrumbidgee and Lowbidgee systems are highly connected and the Lowbidgee wetlands are reliant on water from the Murrumbidgee River. The guide to the plan states that the Lowbidgee's requirements will be addressed when the water sharing plan for that district is developed by 2006. The Murrumbidgee River water sharing plan provides for changes to its rules controlling the diversion of flows into the Lowbidgee district after development of a water sharing plan for the district.

Notes to clause 60(4) of the plan indicate that there is approximately 300 000 ML of environmental water available for the Lowbidgee area (though the plan is not clear whether the environmental water is within or additional to the extraction limit and New South Wales did not clarify this point). Assuming that the environmental water available to the Lowbidgee area is in addition to the long-term extraction limit, the average extraction from the Murrumbidgee River under the plan would fall by 12.5 per cent compared with the previous decade and the proportion of water preserved for the environment would represent 49 per cent of the total average flow. (Alternatively, if the Lowbidgee diversion is within the extraction limit, then average extraction under the plan would fall by 26 per cent and the water preserved for the environment would represent 56 per cent of the total average flow.)

The plan appears to make no provision for consideration of environmental needs in relation to setting supplementary water access licence extraction rules. It provides, however, for changes to the access rules for supplementary water access licences after a review of the environmental impacts of water extractions.

Reallocation

The plan reallocates water from consumptive to environmental uses. The indicative long-term extraction limit for the first five years of the water

sharing plan is estimated at 1 925 000 ML. If the water available to the Lowbidgee district is additional to the extraction limit, this represents a reduction of approximately 12.5 per cent on average extractions over the previous decade. It also represents a 2.8 per cent reduction on the Murray–Darling Basin Ministerial Council Cap. After the fifth year of the plan, the long-term extraction limit will be further reduced to 1 890 000 ML/year, a 4.5 per cent reduction on the cap. The plan also includes a range of other rules aimed at delivering water for environmental needs.

Murray and Lower Darling Regulated Rivers

The River Murray, the border between New South Wales and Victoria, has its headwaters in the Snowy Mountains and discharges to the Southern Ocean in South Australia. The Darling River runs through central and northern New South Wales and much of south-western Queensland. The water sharing plan for the Murray and Lower Darling Regulated Rivers Water Source applies to the River Murray from Hume Dam to the South Australian border, the Edward and Wakool Rivers and a number of tributaries; and the Darling River from the main weir storage to where it joins the Murray at Wentworth, including the Menindee Lakes and Tandou Creek. The Great Anabranch is excluded from the plan.

The River Murray ecosystem has been in decline for more than 100 years (Scientific Reference Panel 2003). The ecological threats to the health of the River Murray have been identified as:

- the altered flow regime;
- reduced in-channel and floodplain connectivity;
- degradation and loss of physical habitat;
- catchment and floodplain management that is damaging the river ecosystem;
- degraded water quality (including salinity); and
- exotic and invasive plants and animals (Thoms *et al*. 2000).

The Murray–Darling Basin Ministerial Council Cap, introduced in 1997, limits the volume of water that can be diverted from rivers in the basin for consumptive uses. Since its introduction there is evidence that the river system has continued to degrade (Scientific Reference Panel 2003).

The water sharing plan for the Murray and Lower Darling Regulated River Water Sources was developed by the Murray Lower Darling Community Reference Committee to ensure that the needs of the New South Wales Murray and Lower Darling River system are addressed and to provide secure conditions for maintaining community values and water user entitlements. The guide to the plan states that the water in the Murray and Lower Darling

River systems is shared between New South Wales, Victoria and South Australia according to the Murray–Darling Basin Agreement and consequent arrangements. The plan deals, however, only with sharing of the water in the New South Wales Murray and Lower Darling systems that is within the direct control of New South Wales.

The vision of the water sharing plan is:

> *… to achieve a healthy River Murray and Lower Darling system, sustaining communities and preserving unique values.*

The plan's objectives are to:

- improve opportunities for natural regeneration and breeding cycles and ecological processes reliant on seasonal patterns, in particular by reinstating more natural wetting and drying cycles;
- increase the connectivity between the river and floodplain during spring and early summer;
- contribute to the maintenance or enhancement of the physical habitats of the river system;
- improve the opportunities for breeding native fish and other native organisms by encouraging the migration of native fish and allowing access to spawning sites, food sources and improved water quality, including correct thermal conditions;
- promote the recovery of threatened species, populations and ecological communities;
- contribute to the expansion and diversification of river bank habitat;
- contribute to the maintenance of bank stability;
- assist in maintenance of the ecological health of anabranches and billabongs, particularly for habitat that may not be provided in the main river channel;
- contribute to the maintenance or improvement of water quality to downstream water environments;
- protect basic landholder rights to access water; and
- enhance the viability, sustainability and security of primary and secondary, recreational and tourist industries and the communities of the Murray–Lower Darling region.

Environmental water provisions

The plan makes provision for water to be provided for the environment under the three classes defined by the Water Management Act: environmental health water, supplementary environmental water and adaptive environmental water.

Environmental health water

The plan establishes an environmental health water provision as the water volume in excess of the long-term extraction limit.

The long-term extraction limit is defined as the lesser of:

- the long-term average annual extraction from the water source that would occur with the water storages, share components and water use development that existed in 2000-01, and the water management rules defined in the plan; or

- the long-term average annual extractions that would occur under the Murray–Darling Basin Ministerial Council Cap baseline conditions.

The exact volumes of water are not specified in the plan, as they depend on rainfall and other climatic factors, and will be calculated annually using a hydrological computer model that is approved by the Department of Infrastructure, Planning and Natural Resources. There is no indication in the plan of the approximate volume of the long-term extraction limit, although the example simulation model in the draft plan calculates an extraction volume of 1 854 000 ML/year for the River Murray and 124 000 ML/year for the Lower Darling River; giving an overall total of 1 978 000 ML/year. The estimated extraction volume under cap conditions for the same model is 1 912 000 ML/year in the River Murray and 119 000 ML/year in the Lower Darling River (2 031 000 ML/year in total). The modeled extraction limits under the plan, therefore, represent a 3 per cent reduction in the River Murray over cap conditions, and a 4 per cent increase in the Lower Darling River, with an overall 2.6 per cent improvement if the system is considered as a whole. The total reduction in average long-term extractions equates to 53 000 ML/year.

The plan does not provide for a general review of the long-term extraction limit or the environmental water provisions during its 10-year life. It provides, however, for the long-term extraction limit to be adjusted as a result of system efficiency savings made as a consequence of the release of water to the Snowy River under the Snowy Water Inquiry Outcomes Implementation Deed.

Supplementary environmental water

The plan provides three supplementary environmental water provisions as follows.

- New South Wales Barmah–Millewa allowance — to provide a flood event for an important wetland system, where up to 50 000 ML/year is to be made available and credited to the allowance each year. The maximum credit that can be held in the allowance is 350 000 ML and releases in the form of overdraws are permitted. (This volume represents the contribution by New South Wales and does not include the contribution by Victoria.) Whenever Hume Dam spills, and the volume in the allowance at the time of the spill exceeds 100 000 ML, the allowance is debited by a volume equal to the lesser of the New South Wales share of the volume of water spilled, or the volume held in the account at the commencement of the spill minus 100 000 ML. Releases of water are timed to coincide with natural high river flows in spring once the flow at Yarrawonga has exceeded a set trigger level (500 000 ML) in a four week period. Water in the allowance is borrowed for irrigation purposes whenever water available to general security access licences is less than 30 per cent of the total volume of the share components of all Murray water source regulated river general security access licences.

- Lower Darling allowance — to provide flushing flows whenever the Minister announces a high blue-green algal alert level for the Lower Darling water source, as set out in the Sunraysia regional algal contingency strategy. No water is credited to the allowance if the volume stored in the Menindee Lakes is less than 480 000 ML or if the volume has not risen above 640 000 ML since the volume stored last fell below 480 000 ML. Otherwise, 30 000 ML is provided to the allowance minus any water released during the current water year.

- New South Wales Murray regulated river water source additional allowance — to provide water to address the environmental health objectives of the plan. The maximum credit held in the allowance at any time is equal to 15 per cent of the total volume of the share components of regulated river high security access licences. The allowance is to be credited with a volume equivalent to 3 per cent of the total volume of the share components of Murray water source high security access licences at the end of any water year when the sum of allocations to the high security access licences for the water year has not exceeded 97 per cent.

In the supplementary 2002 assessment, New South Wales advised that the supplementary environmental water provisions are primarily aimed at wetland health and were based on advice from the New South Wales Murray Wetland Advisory Committee. New South Wales considered that, while the plan does not provide any significant additional environmental water other than for the wetlands, there had been significant increases in flows to wetlands in the preceding four to five years.

Adaptive environmental water

Under the adaptive environmental water provisions, the plan provides for the granting of a regulated river (conveyance) access licence with a share component of 30 000 ML and a regulated river (high security) access licence with a share component of 2027 ML. The management of water allocations accruing to these access licences must accord with a protocol established by the Minister in consultation with the Minister for the Environment.

Discussion

New South Wales is the largest extractor of water from the River Murray. Extractions amount to 81 per cent of New South Wales run-off to the River Murray and 292 per cent of run-off to the Barwon–Darling Lower Darling system (MDBC 2003). The total water volume specified on all New South Wales Murray and Lower Darling access licences is 3 078 421 ML/year, comprised of:

- 15 119 ML/year for licences for domestic and stock supply, with 14 518 ML/year from the River Murray and 601 ML/year from the Lower Darling River (additional current requirements for domestic and stock rights are estimated to be 2118 ML/year from the River Murray and 3727 ML/year from the Lower Darling);

- 43 496 ML/year for local water utility supply, with 33 336 from the River Murray and 10 160 ML/year from the Lower Darling River;

- 206 010 ML/year for regulated river (high security) access licences, with 198 011 from the River Murray and 7999 ML/year from the Lower Darling River;

- 1 983 796 ML/year for regulated river (general security) access licences, with 1 953 508 from the River Murray and 30 288 ML/year from the Lower Darling River;

- 330 000 ML/year for regulated river (conveyance) access licences from the River Murray; and

- 500 000 ML/year for supplementary water access licences, with 250 000 ML/year from each of the River Murray and Lower Darling River systems.

Depending on the volume of water provided under supplementary access licences, general security access licences can expect to receive between 35 and 70 per cent of share component volumes (based on a long-term extraction limit of 1 978 000 ML/year). Extraction under supplementary access licences may not be permitted if supply requirements for South Australia have not been met or if salinity levels in the River Murray at Morgan are above a set level. In addition, extractions will only be permitted if the Minister considers that the water that will be taken would not assist in reducing existing

medium or high blue-green algae alerts, or would not prevent or threaten the success of a waterbird breeding event. The plan also includes constraints directed at the provision of fish passage and beneficial flooding of riverine ecosystems.

The Scientific Reference Panel's report indicates that, at current levels of extraction, the Murray and Lower Darling rivers are suffering the continued effects of degradation in ecosystem health. The water sharing plan reduces extractions by only 3 per cent relative to the Murray–Darling Basin Ministerial Council Cap. Moreover, as noted in the guide to the plan, the plan's ability to protect the Murray and Lower Darling water sources is limited because of the impact of water extractions outside of the plan area on river flows, the constraints of intergovernmental agreements and arrangements, and because the plan can only affect water under the direct control of New South Wales.

The maintenance and enhancement of the health and viability of the river and its dependent ecosystems is being considered as part of a wider intergovernmental process under The Living Murray Initiative. At its meeting on 14 November 2003, the Murray–Darling Basin Ministerial Council agreed to a First Step decision for The Living Murray, focusing on the protection of six significant ecological assets along the river (the Barmah–Millewa forest, the Gunbower and Koondrook–Perricoota forests, Hattah Lakes, Chowilla floodplain, the Murray mouth, Coorong and Lower lakes, and the River Murray channel), with specific ecological objectives and outcomes for each asset. The Ministerial Council expected that this decision would require an estimated 500 gigalitres of water per year on average, depending on drought and flood events. A community consultation process concerning the First Step decision is under way. As part of the National Water Initiative, funding is to commence from 1 July 2004 from the $500 million made available to address water overallocation in the Murray–Darling Basin announced by CoAG on 29 August 2003 and through realignment of the previously announced capital works program to effectively manage water to the six significant ecological assets (Murray–Darling Basin Ministerial Council 2003).

Unregulated river plans

Upper Brunswick River

The Upper Brunswick River is a major subcatchment of the Brunswick River located on the far north coast of New South Wales. It is bounded to the west and north by the Burringbar Range and to the south by the Koonyum Range. The Water Sharing Plan for the Upper Brunswick River Water Source applies to the Upper Brunswick River and its tributaries.

The Upper Brunswick catchment is characterised by high diversity rainforest as well as wet and dry sclerophyll forest. Agriculture is limited in the headwaters, but more extensive on the narrow and fertile floodplain. The draft water sharing plan reported that the system is highly stressed and that there is a high risk of harm to the environment and the dependent water users. The major problems are associated with poor water quality (high nitrogen concentrations and faecal contamination) and inadequate protection of flows (particularly low flows). The area is rich in biodiversity and instream habitat values, however, there have been declines in fish populations in association with increased development of water resources. The draft plan noted that pumping of unregulated flows during dry periods and a loss of drought refuge habitat are contributing factors. The guide to the water sharing plan notes that during dry periods the river is reduced to a string of natural pools, especially in the upper catchment. There is high connectivity between the pools because of groundwater within the river bed.

The vision of the water sharing plan is:

> *… that the environment of the Upper Brunswick River Water Source receives the necessary water to sustain healthy, functioning ecosystems and to provide flows for downstream sub-catchments, and that an informed, water efficient community is provided with water to meet its needs.*

The plan's objectives are to:

- provide opportunities for access to water for domestic and stock purposes, while encouraging and supporting efficient, innovative water use, alternative water sources and drought management strategies;

- ensure Aboriginal cultural needs are considered in flow management decisions, to enable maintenance and protection of values and places of importance under traditional laws, customs and practices;

- protect the variability of natural flow conditions thereby maintaining and improving the overall health of the water source and related ecosystems, including threatened species;

- preserve and maintain the functions of natural low flows, particularly during dry periods;

- provide opportunities for access to water for irrigation and other commercial purposes;

- enhance the downstream health of the lower Brunswick River by ensuring adequate flow contributions to the estuary; and

- protect and improve water quality through the management of flows.

Environmental water provisions

The plan makes provision for water to be provided for the environment under the three classes defined by the Water Management Act: environmental health water, supplementary environmental water and adaptive environmental water. At commencement, the plan commits no supplementary environmental water for specified environmental purposes and no access licences are committed to an environmental purpose as adaptive environmental water. An access licence holder may, however, commit all or part of their licence as adaptive environmental water at any time.

Environmental health water

The plan establishes three flow classes:

- very low flows where flow is at or less than 2 ML/day;
- medium flows (class B) where flow is greater than 2 ML/day and at or less than 9 ML/day; and
- high flows (class C) where flow is greater than 9 ML/day.

Water is provided to the environment in each of the flow classes as follows:

- in very low flows, the flow minus 0.006 ML/day (the amount of water estimated at the commencement of the plan for basic landholder rights);
- in B class flows, the flow minus 4.056 ML/day (the total daily extraction limit for B class flows plus basic landholder rights at the commencement of the plan); and
- in C class flows, the flow minus 5.010 ML/day (the total daily extraction limit for C class flows plus basic landholder rights at the commencement of the plan).

At the commencement of the plan, the water requirements for extraction under access licences are estimated to be 526 ML/year. The water requirements of domestic and stock rights are estimated at an additional 2.3 ML/year (with a further 6 ML/year estimated to be required over the life of the plan, but to be accommodated by reduced access for unregulated river access licences).

During the operation of the plan, there is provision for further allocations to existing licence holders up to a maximum of 250 ML/year, resulting in an overall extraction limit of 784 ML/year. The additional entitlements are contingent on licence holders surrendering their entitlement to take water during medium flows in exchange for up to twice the entitlement during high flows.

The plan does not provide for changes to the flow rules during its 10-year life.

Discussion

The definition of B class flows encompasses a daily flow of less than the permitted total extraction (including basic landholder rights) of 4.056 ML/day. This suggests it is possible that no water may be available for environmental purposes when the flow is less than 4.056 ML/day if the permitted total extraction is taken up.

During the supplementary 2002 assessment, New South Wales confirmed that, if all users take their daily access, there may be no environmental share under B class flows. However, it considered this would be a very unlikely event which, in any case, would probably trigger a lower flow class and possibly a cease-to-pump notification. The Department of Infrastructure, Planning and Natural Resources also intends to encourage irrigators to establish water user groups, if one does not currently exist, for the purpose of rostering. New South Wales advised that the five-yearly review of the plan and the annual reviews of its related implementation program would ensure action is taken if problems arise.

The draft plan identified water quality and a decline in ecosystem health as problems under current levels of extraction. Current extractive water use in the Upper Brunswick River Water Source totals 458 ML/year, with an additional 70 ML/year in inactive licences.

The average annual extraction limit under the plan is estimated at 784 ML/year, which is a 70 per cent increase on current extractions. The increase is, however, contingent on licence holders switching from extractions during medium flows to high flows. Allowing increased extractions at high flow periods appears to be aimed at reducing the environmental impact from current extraction levels during medium flows.

The plan protects low flows by permitting water extractions at low flows only for domestic and stock rights, with the remainder allocated to the environment. The low flow environmental health provisions are to provide drought refuge for fish and other aquatic species.

The environmental provisions also provide protection for end-of-system flows and natural flow variability. The provisions amount to 55 per cent of flows at the upper limit of medium flows and range upwards from 45 per cent during high flows. This will provide natural variability and contribute to the maintenance of river health and aquatic fauna lifecycle processes.

Kangaroo River

The Kangaroo River, located on the south coast of New South Wales, is a tributary of the Shoalhaven River. The Water Sharing Plan for the Kangaroo River Water Source applies to three main tributaries that converge near the Kangaroo Valley township: the Kangaroo River, Brogers Creek and Barrengarry Creek.

The upstream reaches of the Kangaroo River water source include parts of Morton and Budderoo national parks. The guide to the water sharing plan notes that the maintenance of water in the river during very low flows is essential to provide refuge areas for fish and aquatic species.

The vision of the water sharing plan is:

> *… that water sharing arrangements contribute to the protection and rehabilitation of the Kangaroo River Water Source and its dependent ecosystems, whilst the social, cultural and economic future of the community of the Kangaroo River is recognised, maintained and fostered.*

The plan's objectives include to:

- keep the pools of the water source full during periods of low and very low flows, with natural drying processes maintained during periods of no flow;
- protect indicator riffles during periods of low and very low flows;
- provide for the passage of low and very low flows through new and existing in-river works and activities;
- maintain the natural flow variability of a proportion of freshes as they pass through the water source;
- ensure equitable access to water for household consumption, stock watering and gardening (in this order of priority) at all times, except during periods of very low and no flows;
- support recreational opportunities, river health and the aesthetic appeal of the water source through the maintenance of pools, riffles and flow variability;
- protect and enhance the cultural presence of the community of Aboriginal and non-Aboriginal peoples that may be affected by river flow, including places of heritage and spiritual significance, scientific and educational opportunities and rural industries;
- contribute to the requirements of water users and other water sources and their dependent ecosystems downstream of the water source through agreed water sharing arrangements for this water source; and
- contribute to the achievement of water quality to support the environmental values of the water source.

Environmental water provisions

The plan makes provision for water to be provided for the environment under the three classes defined by the Water Management Act: environmental health water, supplementary environmental water and adaptive

environmental water. At commencement, the plan commits no supplementary environmental water for specified environmental purposes and no access licences are committed to an environmental purpose as adaptive environmental water. An access licence holder may, however, commit all or part of their licence as adaptive environmental water at any time.

Environmental health water

The water sharing plan establishes four flow classes and sets total daily extraction limits for each class. These classes and limits, and other rules in the plan, are intended to protect water for the environment by limiting both the volume of water extracted and the rate of extraction in different flow ranges.

At the commencement of the plan, the water requirements for extraction under access licences are estimated to be 4313 ML/year. The water requirements of domestic and stock rights are estimated at an additional 1.047 ML/day and native title rights at 0.073 ML/day.

The long-term average annual extraction limit is set at the total of:

- the quantity of water specified in entitlements immediately before the commencement of the Water Management Act for this water source; and

- an estimate of the annual extraction of water under domestic and stock rights, and native title rights, in the water source at the commencement of the plan.

The plan permits water extractions from very low flows for basic rights holders and by access licences in all categories from years two to eight of the plan. The provision for the environment amounts to 40 per cent of flows at the upper limit of low flows, 66 per cent at the upper limit of medium flows and ranges upwards from 77 per cent during high flows. The four flow classes and total daily extraction limits established in the plan are:

- very low flows: in the first year, up to 2.96 ML/day on a falling river and up to 4 ML/day on a rising river; in the second year, up to 4 ML/day on a falling river and up to 5.4 ML/day on a rising river; and in years three to 10, up to 5.4 ML/day on a falling river and up to 7 ML/day on a rising river — no extraction is permitted during years one, nine and 10; 2 ML/day during year two (50 per cent of the upper limit of very low flows); 3.4 ML/day during years three to five (63 per cent of the upper limit of very low flows); and 2.44 ML/day during years six to eight (45 per cent of the upper limit of very low flows);

  – where extractions are permitted after seven consecutive days of flow conditions under which pumping is not permitted, extraction is required to cease when flow is at or below 2 ML/day (for years two to five) and 2.96 ML/day (for years six to eight) or after 10 days of consecutive access to very low flows;

- A class (low) flows: in the first year, from 2.96 ML to 30 ML/day on a falling river and from 4 to 30 ML/day on a rising river; in the second year, from 4 to 30 ML/day on a falling river and from 5.4 to 30 ML/day on a rising river; and in years three to 10, from 5.4 to 30 ML/day on a falling river and from 7 to 30 ML/day on a rising river — with extractions of up to 18 ML/day permitted (60 per cent of the top of A class flows);

- B class (medium) flows: from 30 ML/day to 118 ML/day — with extractions of up to 40 ML/day permitted (34 per cent of the top of B class flows); and

- C class (high) flows: greater than 118 ML/day — with extractions of up to 48 ML/day permitted (based on 23 per cent of the 30th percentile flows in December).

Water is allocated for the environment in each of the flow classes:

- in very low flows: in years one, nine and 10, the flow minus 1.12 ML/day (the amount of water estimated at the commencement of the plan for basic landholder rights); in the second year, the flow minus 3.12 ML/day; in years three to five, the flow minus 4.52 ML/day; in years six to eight, the flow minus 3.56 ML/day (which, for years two to eight, is the amount of water estimated at the commencement of the plan for basic landholder rights and the very low flow daily extraction limit);

- in A class flows: the flow minus 19.12 ML/day (the total daily extraction limit for A class flows plus basic landholder rights at the commencement of the plan);

- in B class flows: the flow minus 41.12 ML/day (the total daily extraction limit for B class flows plus basic landholder rights at the commencement of the plan); and

- in C class flows: the flow minus 49.12 ML/day (the total daily extraction limit for C class flows plus basic landholder rights at the commencement of the plan).

The plan allows the provisions for very low flows to be amended based on field verification. Any such variation is not to result in the very low flow class (the flow on a falling river at which pumping is to cease) being less than 4 ML/day or greater than 7 ML/day. The field verification is to be undertaken before the five-yearly review of the plan.

Discussion

The definition of A class flows encompasses a daily flow of less than the permitted total extraction (including basic landholder rights) of 19.12 ML/day. This suggests it is possible that no water may be available for environmental purposes when the flow is less than 19.12 ML/day if the

permitted total extraction is taken up. A similar outcome is possible for B class flows.

During the supplementary 2002 assessment, New South Wales confirmed that, if all users take their daily access, there may be no environmental share under A class and B class flows. However, it considered this would be very unlikely during medium (B class) flows which, in any case, would probably trigger a lower flow class and possibly a cease-to-pump notification. The Department of Infrastructure, Planning and Natural Resources also intends to encourage irrigators to establish water user groups, if one does not currently exist, for the purpose of rostering. New South Wales advised that the five-yearly review of the plan and the annual reviews of its related implementation program would ensure action is taken if problems arise.

The draft water sharing plan reported that the water management committee sought the advice of an inter-agency scientific panel (comprising New South Wales National Parks and Wildlife Service, NSW Fisheries and the then Department of Land and Water Conservation) regarding the environmental health water requirements for the Kangaroo River (Part A, p. 11). The scientific panel employed a holistic approach to determining environmental flows and its findings were externally peer reviewed by national experts in the field. The scientific panel undertook a risk assessment of a number of different flow scenarios and recommended a minimum environmental health water volume of 7 ML/day (that is, the cease-to-pump limit). The panel considered that below 7 ML/day there is an increasing risk of not meeting some of the objectives recommended by the committee, most notably the protection of pool and riffle habitats of aquatic dependent biota.

The final water sharing plan adopts a lower figure for the minimum low flow (cease-to-pump limit) but provides for this to be amended to not greater than 7 ML/day based on field verification. The independent external peer review of the scientific panel suggested that the data could support a higher cease-to-pump limit than the 7ML/day proposed by the scientific panel and adopted in the final plan (DLWC 2002b). In addition, in terms of the protection of threatened biota, the most significant species for the Kangaroo River is the Macquarie Perch recorded in the lower reaches. It was not clear to the scientific panel that the minimum environmental health water volume of 7 ML/day would meet the requirements of the Macquarie Perch. The Healthy Rivers Commission also made recommendations on minimum environmental flows. It recommended a cease-to-pump at the 98th percentile flow (5 ML/day) and restricted access at flows of less than 17 ML/day (DLWC 2002b). New South Wales did not provide evidence to support the sustainability of the flow rules/extraction limits established under the final plan.

The draft plan also stated that the flow rules proposed probably will not meet the requirements of fish at very low flows, but are a trade-off between environmental needs and the social and economic needs of water users. However, the draft plan indicated that a cease-to-pump limit for both basic rights holders and licensed users would help to ensure that pools remain connected to one another (allowing limited fish migration) and water quality

(particularly dissolved oxygen levels) is maintained during dry periods (Part A, p. 14).

ARMCANZ/ANZECC national principle 5 requires that:

> *Where environmental water requirements cannot be met due to existing uses, action (including reallocation) should be taken to meet environmental needs.*

While the establishment of the flow rules and extraction limits provides for allocations to the environment, as noted above New South Wales did not provide evidence to show that the rules and limits are set at levels that will meet environmental needs. The available information does not make clear whether the extraction limits in the water sharing plan represent any reallocation from consumptive uses to the environment.

Groundwater plans

Upper and Lower Namoi Groundwater Sources

The Namoi Groundwater Source, located in north-west New South Wales, comprises two management units: the Upper Namoi Groundwater Source (upstream of Narrabri) and the Lower Namoi Groundwater Source (downstream of Narrabri). The Lower Namoi is to be managed as a single unit. The Upper Naomi is divided into 12 zones based on hydrogeology. The hydrological subsystems for both sources are comprised of the Narrabri and Gunnedah aquifers, with the Great Artesian Basin underlying both of these aquifers in the Lower Naomi. The Water Sharing Plan for the Upper and Lower Namoi Groundwater Sources applies to the groundwater contained in all of the unconsolidated sediments along the Namoi River and its tributaries.

The aquifers of the Namoi Groundwater Source have a long history of extraction. In many zones, there is evidence of unsustainable extraction, leading to declining water quality (particularly increasing salinity in some zones of the Upper Namoi Groundwater Source and in the Lower Namoi Groundwater Source), declining water levels and compaction of aquifers (DLWC 2000a and b).

New South Wales identified no significant groundwater dependent ecosystems for the Upper and Lower Namoi Groundwater Sources while developing the water sharing plan. The New South Wales Government will investigate groundwater dependent ecosystems further during the first five years of the plan.

The vision of the water sharing plan is to have:

> *… ecologically sustainable groundwater sources that provide an assured supply of good quality groundwater for the social and economic benefit of the people in the Namoi Valley.*

The plan's objectives are to:

- protect, maintain and, where practicable, enhance ecosystems dependent on groundwater and the cultural and spiritual values of groundwater, by minimising the impacts on these of groundwater extraction;

- protect the structural integrity of the aquifers and groundwater quality, by ensuring groundwater extraction does not result in any aquifer compaction, aquitard compaction, land subsidence or change in the beneficial use of the aquifer;

- manage access to the extraction limits to ensure that there are no long-term declines in water levels;

- preserve basic landholder rights access to these groundwater sources and ensure the fair, equitable and reliable access to groundwater through the management of local impacts or interference effects;

- contribute to the protection, maintenance and enhancement of the economic viability of groundwater users and their communities in the Namoi Valley;

- ensure opportunities for market-based trading of groundwater access licence entitlements within sustainability and interference constraints; and

- ensure sufficient flexibility in account management to encourage efficient use of these groundwater sources and to manage the groundwater sources to account for climatic variation.

At commencement, the plan estimates the water requirements for extraction under access licences to be 172 187 ML/year for the Lower Namoi and 301 922 ML/year for the Upper Namoi. The water requirements for domestic and stock rights are estimated at an additional 6126 ML/year. The plan provides no estimate of the volume of water required for environmental needs.

The plan estimates recharge to be 86 000 ML/year for the Lower Namoi and 122 100 ML/year for the Upper Namoi Groundwater Source. Recharge is the additional water that becomes available to the aquifers, usually by infiltration.

Environmental water provisions

The plan makes provision for water to be provided for the environment under the three classes defined by the Water Management Act: environmental

health water, supplementary environmental water and adaptive environmental water. At commencement, the plan commits no supplementary environmental water for specified environmental purposes and no access licences are committed to an environmental purpose as adaptive environmental water. An access licence holder may, however, commit all or part of their licence as adaptive environmental water at any time.

Environmental health water

The plan establishes two environmental health water provisions:

- the long-term average storage component of the groundwater source less the extraction for basic landholder rights and supplementary water access; and

- the potential for a future provision of a proportion of recharge.

Access licence holders in these groundwater sources who have a history of extraction greater than their amended access licence share component (or, in zones 1 and 5, 80 per cent of the amended access licence share component) will be issued with a supplementary water access licence. The initial share component of each supplementary water access licence will be equivalent to the history of extraction under the access licence minus the amended access licence share component. Access to supplementary water will be phased out by the 10th year of the plan.

The extraction limit in the Lower Namoi is set at 100 per cent of the recharge (86 000 ML/year) plus the water available under supplementary water access licences. In the Upper Namoi, the extraction limit is 125 per cent of recharge in zones 1 and 5, and 100 per cent of recharge in the other zones, plus the water available under supplementary water access licences.

Under these provisions, no portion of the recharge is set aside for environmental purposes at the commencement of the plan, and overallocation of the resource is permitted during the 10-year phasing out of supplementary water use. The long-term storage component of the groundwater sources will be maintained for the environment only by the end of the 10-year term of the plan. In the supplementary 2002 assessment, New South Wales advised that the phasing arrangements are required to assist structural adjustment in the region. It considered that environmental risks were adequately taken into account in determining the phasing arrangements.

The plan provides for changes to the environmental health water provisions (and recharge estimates) based on any subsequent studies of groundwater dependent ecosystems and Aboriginal cultural values. It notes that priority will be given to recharge reviews for groundwater zones that do not have a numerically based model. These are zones 1, 2, 4, 5, 11 and 12 in the Upper Namoi Groundwater Source. If new information becomes available, priority is to be given to reviewing and updating existing models for zones 3 and 8 in the Upper Namoi. The Minister may include a proportion of recharge as

environmental health water after 30 June 2005 for zone 1 of the Upper Namoi and after 30 June 2007 for the other 11 zones of the Upper Namoi and the Lower Namoi.

Other environmental measures

To address water level or quality problems at the local level, the plan requires new bores to be certain distances from existing bores and from groundwater dependent ecosystems, and provides for restrictions on the amount of water that can be extracted within an area for a period of time. For example, except for the supply of basic landholder rights, a new or replacement bore cannot be constructed within 400 metres of an existing bore, 500 metres of a wetland or 200 metres of a river. In the supplementary 2002 assessment, New South Wales advised that these different exclusion limits are based on technical assessments and local knowledge of the strength of connectivity between the groundwater source and the various extraction points.

Discussion

The plan defines water provided to the environment as the long-term average storage component of the groundwater contained in the aquifers minus extractions for basic landholder rights and supplementary water access. Although the plan sets a limit on the amount of water for extraction under access licences (100 per cent of average recharge, or 125 per cent for zones 1 and 5), until 30 June 2012 the Minister can issue supplementary access licences to increase access entitlements to historical use if share components are less than historical use. Historical use is defined as the greater of:

- average metered extraction in the water years 1992-93 to 1996-97; and
- average metered extraction in the water years 1991-92 to 2000-01.

Water will not be permitted to be extracted under supplementary water access licences from 30 June 2012.

Because of the long history of unsustainable extraction and resultant environmental problems in many zones, the then Department of Land and Water Conservation calculated sustainable yields for all zones in the two systems (DLWC 2000a and b). Sustainable yields estimate the maximum volume of water that can be extracted annually with no change in the level of groundwater reserves.

Table B1 compares the sustainable yields, annual recharge, estimated extraction during the plan (pre 30 June 2012) and maximum extraction permitted from 30 June 2012 (assuming the Minister provides no additional environmental water). By the end of the plan, extractive use in the Upper Namoi Groundwater Source zones 5, 6, 7, 9, 10, 11 and 12 could increase from the level of historical use. Further, as indicated by the shaded areas of the

table, extractions in zones 1, 2, 3, 4, 5, 7, 8 and 12 are expected to exceed estimated sustainable yields.

Table B1: Sustainable yields and estimated extraction for the Upper and Lower Namoi Groundwater Sources, shading indicates extraction in excess of sustainable yield

Zone	*Annual recharge (ML/year)*	*Sustainable yield[a] (ML/year)*	*Estimated extraction pre-2012[b] (ML/year)*	*Estimated extraction post-2012 (ML/year)*
Zone 1	2100	2000	2625	2625
Zone 2	7200	6500	9466	7200
Zone 3	17 300	15 200	24 531	17 300
Zone 4	25 700	15 000	30 129	25 700
Zone 5	16 000	19 800	14 572	20 000
Zone 6	14 000	14 000	1821	14 000
Zone 7	3700	3300	1045	3700
Zone 8	16 000	14 400	18 424	16 000
Zone 9	11 400	11 400	1009	11 400
Zone 10	4500	4500	168	4500
Zone 11	2200	2200	411	2200
Zone 12	2000	1000	668	2000
Lower Namoi	86 000	86 000	109 283	86 000

a DLWC (2000b)

b DLWC (2002a)

The draft plan does not reserve a portion of annual recharge for the environment. As such it does not accord with the State's Draft Groundwater Dependent Ecosystems Policy (New South Wales Government 2000), which recommends 30 per cent of average annual recharge for the environment where the environmental requirements are not known.

ARMCANZ/ANZECC national principle 5 requires that:

> *Where environmental water requirements cannot be met due to existing uses, action (including reallocation) should be taken to meet environmental needs.*

The plan provides for an assessment of the environmental water requirements during its first five years, after which the Minister can amend the extraction limits (within specified boundaries) to provide environmental water. The Minister may amend the long-term extraction limit for zone 1 of the Upper Namoi after 30 June 2005 and for the other 11 zones of the Upper Namoi and the Lower Namoi after 30 June 2007. The plan specifies that the Minister can vary the extraction limit in each groundwater source to between 75 per cent and 125 per cent of the current recharge estimates. The maximum volume of water that could be made available to the environment under this

provision is therefore 25 per cent of current recharge estimates. In two zones of the Upper Namoi (zones 4 and 12), the extraction limits, even with maximum provision for the environment, would exceed the estimated sustainable yields (see table B2) (DLWC 2000a and b). New South Wales did not provide evidence to support the sustainability of the extraction limits established under the plan post-2012.

Table B2: Variations to extraction limits permissible under the Upper and Lower Namoi Groundwater Sources plan and current recharge and sustainable yield estimates

Zone	*Annual recharge (ML/year)*	*Sustainable yield (ML/year)*	*Possible variation to extraction limits (ML/year)*
Zone 1	2100	2000	1575 to 2625
Zone 2	7200	6500	5400 to 9000
Zone 3	17 300	15 200	12 975 to 21 625
Zone 4	25 700	15 000	19 275 to 32 125
Zone 5	16 000	19 800	12 000 to 20 000
Zone 6	14 000	14 000	10 500 to 17 500
Zone 7	3700	3300	2775 to 4625
Zone 8	16 000	14 400	12 000 to 20 000
Zone 9	11 400	11 400	8550 to 14 250
Zone 10	4500	4500	3375 to 5625
Zone 11	2200	2200	1650 to 2750
Zone 12	2000	1000	1500 to 2500
Lower Namoi	86 000	86 000	64 500 to 107 500

The then Department of Land and Water Conservation found evidence of declining water quality and increasing salinity in zones 1, 3 and 8 of the Upper Namoi and in the Lower Namoi Groundwater Source (DLWC 2000a and b). Salinity problems are likely to be exacerbated by increased extraction, as more saline water from outside the extractive zones infiltrates the systems.

The groundwater systems of the Namoi Valley are connected to the Namoi River system. The foreword to the draft plan stated that the major regulated stream, the Namoi River, is essentially a 'losing' stream, where surface water flows towards the groundwater system, while the lower end of the Namoi regulated river system towards Walgett appears to be a 'gaining' stream, where groundwater flows towards the surface water system. The top of the Quirindi, Phillips and Werris Creek surface water systems, in the upper reaches of the Upper Namoi groundwater management area, appear to be 'gaining' streams and it is also possible that the Lower Namoi groundwater system contributes base flow to the Barwon River at the lower end of the Namoi.

The extent of water movement between groundwater and surface water is to some extent influenced by the amount of water extracted from both surface water and groundwater sources. Because of the connectivity of the sources, extraction from groundwater increases during times of low surface water flow (that is, when extraction of surface water is low). In the supplementary 2002 assessment, New South Wales advised that it uses buffer zones to manage connectivity and protect low flows in the river. It stated that during high flows, the surface water plan for the region limits extractions and therefore protects the level of recharge.

Lower Lachlan Groundwater Source

The Lower Lachlan Groundwater Source, located in central-west New South Wales, covers an area of 29 770 square kilometres to the west of Lake Cargelligo. There are three hydrological subsystems comprising this groundwater source. The Shepparton Formation is the shallowest and least utilised source, because supply is unreliable and the water has elevated salinity. Underlying this formation is the Calivil Formation, which is used for extractive purposes, and the deeper Renmark Group which produces the highest yielding supplies. The Water Sharing Plan for the Lower Lachlan Groundwater Source applies to the groundwater contained in all of the unconsolidated sediments along the Lachlan River and its tributaries, but not to the deep or fractured rock aquifers.

The guide to the water sharing plan states that the Lower Lachlan Groundwater Source contributes to groundwater dependent ecosystems, such as wetlands, terrestrial vegetation and base river flows. While New South Wales has not conducted a detailed assessment of the needs of the Lachlan groundwater dependent ecosystems, the draft water sharing plan reported that an expert panel had identified wetlands and floodplain vegetation along the Lachlan River and prior streams as likely to be groundwater dependent. The groundwater source also discharges to the Lachlan River.

The vision of the water sharing plan is:

> *… to achieve a healthy environment and prosperous community through:*
>
> - *sustainable and equitable groundwater use for all users,*
> - *protection of groundwater dependent ecosystems,*
> - *protection of groundwater quality, and*
> - *community ownership of groundwater management.*

The plan's objectives are to:

- protect ecological processes and biodiversity dependent on groundwater;

- determine resource access and clarify reliability for groundwater users;
- recognise and protect community needs that rely on groundwater; and
- provide for the recognition and protection of heritage sites and cultural values associated with groundwater.

At the commencement of the plan, the water requirements for extraction under access licences are estimated to be 215 417 ML/year. The water requirements of domestic and stock rights are estimated at an additional 4000 ML/year.

Environmental water provisions

The plan makes provision for water to be provided for the environment under the three classes defined by the Water Management Act: environmental health water, supplementary environmental water and adaptive environmental water. At commencement, the plan commits no supplementary environmental water for specified environmental purposes and no access licences are committed to an environmental purpose as adaptive environmental water. An access licence holder may, however, commit all or part of their licence as adaptive environmental water at any time.

Environmental health water

The plan establishes two environmental health water provisions:

- the long-term average storage component of the groundwater source less the extraction for basic landholder rights; and
- 20 per cent of the long-term average annual recharge.

With average annual recharge estimated to be 120 000 ML/year, the plan reserves on average 24 000 ML/year as environmental health water, which is in addition to the water contained in the aquifer in excess of basic landholder rights. The guide to the plan states that the extraction limit of 80 per cent of recharge at the start of the plan (on average 96 000 ML/year) is equivalent to the estimated sustainable yield of the groundwater source.

The plan provides for further studies of groundwater recharge, ecosystem dependency and Aboriginal cultural heritage. Accounting for these studies and the advice of a water management committee (consisting of representatives of extractive users, Aboriginal and environmental groups), the Minister may vary the estimated recharge and long-term extraction limit specified in the plan on 30 June 2007. The plan limits any variation in the long-term extraction limit to between 73 500 ML/year and 215 393 ML/year (that is, between approximately 61 per cent and 180 per cent of the current estimate of annual recharge).

Other environmental measures

The plan establishes minimum distances between new bores and existing bores, and between new bores and groundwater dependent ecosystems. It prohibits, for example, licensed extraction from within 40 metres of any creek and from within 200 metres of wetlands. In the supplementary 2002 assessment, New South Wales advised that the different exclusion limits are based on technical assessments and local knowledge of the strength of connectivity between the groundwater source and the various extraction points.

In addition, the plan allows the Minister to declare local access rules to apply in a defined area to protect water levels and/or water quality within the groundwater source.

Discussion

Historically, annual extraction from the Lower Lachlan Groundwater source has been below the annual recharge estimate of 120 000 ML/year. Water use from 1991-92 to 2000-01 averaged 24 782 ML/year, although it rose from 7720 ML in 1991-92 to 49 831 in 2000-01. Licensed entitlements and domestic and stock rights (219 417 ML/year) are significantly higher than extractions.

Despite extraction being less than the annual recharge, there is evidence of declining water levels in the Renmark and Calivil aquifers. Hydrographs from bores in the Renmark Group indicate that these declines coincided with increased pumping in the mid to late 1990s. In the Calivil Formation, the bores that are away from the direct influence of the river have shown evidence of declining water levels. In addition, there is evidence that the more saline water contained in the Shepparton Formation may be infiltrating the lower, productive aquifers with corresponding declines in water quality (MDBC in print). New South Wales did not provide information on how it is addressing increased salinity.

The plan reserves a lower proportion of annual recharge for the environment (20 per cent of average annual recharge) than recommended in the State's Draft Groundwater Dependent Ecosystems Policy (New South Wales Government 2000) for groundwater systems where the environmental requirements are not known (30 per cent of average annual recharge). While the guide to the plan states that the extraction limit at the start of the plan is equivalent to the estimated sustainable yield of the groundwater source, New South Wales did not provide evidence to support this statement. The plan provides, however, for the recharge estimates and the long-term extraction limit to be varied on 30 June 2007. The Minister may vary the extraction limit to between 73 500 ML/year and 215 393 ML/year, after accounting for further studies of groundwater recharge, ecosystem dependency and Aboriginal cultural heritage and the advice of a water management committee. The upper limit of the allowable variation is 180 per cent of current recharge estimates.

While a detailed assessment of connectivity between the groundwater source and the Lachlan River has not been undertaken, the draft plan indicated that during times of high river or stream flow water moves from the surface system to the groundwater source and during low river flow water moves from the groundwater source to the surface system. The extent of water movement between groundwater and surface waters is to some extent influenced by the amount of water extracted from both the surface water and groundwater sources. The connectivity is complicated by the pattern of use, with extraction from groundwater increasing during times of low surface water flow and therefore low surface water extractions (WRC 1986). The plan does not appear to address conjunctive use and its potential implications for the sustainability of extractions in both surface and groundwater systems.

While the total share components (or water volumes) specified on access licences at the commencement of the plan (215 417 ML/year) are substantially in excess of the average annual recharge (120 000 ML/year), the plan provides for these to be phased down between year five and year 10. At the end of the plan, the total share components will amount to 125 per cent of the extraction limit (which equates to the estimated recharge of 120 000 ML/year), but actual water extractions will be managed within the long-term average extraction limit.

ARMCANZ/ANZECC national principle 5 requires that:

> *Where environmental water requirements cannot be met due to existing uses, action (including reallocation) should be taken to meet environmental needs.*

Average extractions have been significantly below the extraction limit set in the plan, which the plan's guide indicates is equivalent to the estimated sustainable yield of the groundwater source.

Stuarts Point Groundwater Source

The Stuarts Point Groundwater Source, located on the mid north coast of New South Wales north-east of Kempsey, covers an area of 1480 hectares to the west of the Macleay Arm, between Grassy Head and the Macleay River estuary. The water sharing plan for the groundwater source applies to the groundwater contained in all of the unconsolidated sand formation, but does not include the basement rock.

The guide to the water sharing plan notes that the area contains a number of groundwater dependent ecosystems including forest, wetland and woodland heath ecosystems, as well as the adjoining estuarine ecosystems (such as salt grasses and salt marshes) that are dependent on groundwater being discharged to the estuary. The groundwater source has salt water on two sides.

The vision of the water sharing plan is:

> *… to address the water needs of the whole Stuarts Point/Fishermans Bend/Grassy Head community, and to ensure the environment receives the necessary water quality and quantity to maintain, or re-establish where necessary, healthy functioning ecosystems.*

The plan's objectives are to:

- ensure no long-term lowering of groundwater levels to maintain the highest possible quality through the management of groundwater extraction;
- provide secure, potable water supplies for the village of Stuarts Point and surrounding districts, by managing extractions;
- preserve forest, wetland, woodland and heath ecosystems that occur on the sand plain around Stuarts Point, by ensuring groundwater extractions do not cause water levels in the area to fall below the natural tolerance levels of these vegetation communities;
- preserve estuarine ecosystems that require groundwater inputs, such as seagrasses and salt marshes, by ensuring groundwater extractions do not cause a significant reduction in the amount of groundwater being discharged to the estuary;
- ensure salt water from the Macleay Arm and estuary, which adjoins the groundwater source does not contaminate the fresh groundwater, by limiting extractions;
- ensure extractions are managed so that groundwater is available to contribute to the inundation of potential acid sulphate soils;
- maintain basic rights of property owners in the village of Stuarts Point and surrounding areas, without compromising the health of the groundwater source;
- recognise and protect Aboriginal heritage sites and values in water access licensing decisions;
- provide opportunities for local irrigation industries, including Aboriginal developments, to access water from the groundwater source;
- manage extractions in order to maintain the beneficial use categories of the groundwater source; and
- ensure that water in the groundwater source is maintained at the highest possible quality by limiting extractions around contamination sources.

The water sharing plan estimates the sustainable yield of the water source at 3868 ML/year. Current extractive water requirements total 1676 ML/year.

Notwithstanding current extractive water requirements being less than half the sustainable yield, the draft water sharing plan stated that the groundwater source is at risk from over extraction and from water quality contamination, in particular, high levels of nitrate and elevated levels of arsenic. It also stated that groundwater dependent ecosystems may be threatened and consumptive uses, such as drinking water and water for horticulture, may be at risk if extractions increase beyond the current level.

Environmental water provisions

The water sharing plan makes provision for water to be provided for the environment under the three classes defined by the Water Management Act: environmental health water, supplementary environmental water and adaptive environmental water. At commencement, the plan commits no supplementary environmental water for specified environmental purposes and no access licences are committed to an environmental purpose as adaptive environmental water. An access licence holder may, however, commit all or part of their licence as adaptive environmental water at any time.

Environmental health water

The plan establishes two environmental health water provisions:

- the long-term average storage component of the groundwater source less the extraction for basic landholder rights; and
- 45 per cent of the average annual recharge.

These provisions are aimed at ensuring the long-term sustainability of several groundwater dependent ecosystems including the Macleay River estuary, Fishermans Bend Nature Reserve and Yarrahapinni Wetland.

The plan does not quantify the long-term average storage component of the aquifer — the amount of water in the aquifer in excess of basic landholder rights. With average annual recharge estimated to be 7032 ML/year, the plan reserves on average 3164 ML/year as environmental health water, which is in addition to the water contained in the aquifer in excess of basic landholder rights. The guide to the plan states that the extraction limit of 55 per cent of recharge (on average 3868 ML/year) is equivalent to the sustainable yield of the groundwater source.

Other environmental measures

The water sharing plan recognises that groundwater extraction may cause problems in localised areas even though total extractions are within the extraction limit. To address these potential problems, the plan places restrictions on the construction of new bores, and on increases in extraction

from existing bores, within specified distances of high priority groundwater dependent ecosystems. All new bores are subject to drawdown limits on groundwater levels, which are aimed at maintaining the water level in the aquifers.

In addition, the Minister can declare local access rules for specific local impact areas to restrict extractions from all water supply works (bores) if water levels in any part of the groundwater source decline to such an extent that an adverse impact is occurring, or is likely to occur. The restrictions may apply to the extent, and for the duration, necessary to mitigate or avoid the impact. The department is to identify monitoring bores, specify the target levels (in consultation with stakeholders) and determine the method for specifying an affected area.

Discussion

The water sharing plan provides 45 per cent of the average annual recharge to the environment, in addition to the water contained in the aquifer in excess of basic landholder rights. This environmental allocation exceeds the 30 per cent recommended in the State's Draft Groundwater Dependent Ecosystems Policy.

The draft water sharing plan identified several problems with the Stuarts Point Groundwater Source at current extraction levels including:

- potential health risks for domestic water supply;
- threats to the quality of the town water supply from over extraction by horticulturalists; and
- risks to groundwater dependent ecosystems from increased levels of extraction, particularly during dry periods.

Current extractive water requirements in the Stuarts Point Groundwater Source total 1676 ML/year, comprising:

- 75 ML/year for basic landholder rights; and
- 1601 ML/year for access licences (including 300 ML/year for town water supply).

The average annual extraction limit under the plan is 3686 ML/year, which is more than double current extractions. While the guide to the plan states that the extraction limit is equivalent to the sustainable yield of the groundwater source, New South Wales did not provide evidence to support this statement. Assuming that the extraction limit is set at the sustainable yield of the groundwater source, and that current entitlements are well below this level, New South Wales is able to provide environmental water without having to reallocate water from existing users.

Appendix C: Extracts from the supplementary 2002 assessment

The following extracts from the supplementary 2002 assessment summarise the Council's findings on New South Wales's regard for ARMCANZ/ANZECC national principles 4, 5 and 7.

Extract on national principle 4

Principle 4: In systems where there are existing users, provision of water for ecosystems should go as far as possible to meet the water regime necessary to sustain the ecological values of aquatic ecosystems whilst recognising the existing rights of other water users

The water sharing plans provide for allocations to the environment and water for extraction.

For each of the river and groundwater sources, the plans set an annual extraction limit to apply over their 10-year life. In addition, extractions for the unregulated rivers are based on the sharing of daily flows subject to a daily extraction limit. The flow regime is typically split into three or more flow classes, with daily extraction limits applying separately to each flow class.

In the regulated river plans, extractions are to be managed so as not to exceed the average long-term extraction limit set in each plan. While the volume of water specified in access licences (the licence share component) may significantly exceed the extraction limit, extractions under access licences are managed through announced water determinations, which control the amount of the share component that can be taken in any year by a licence holder.

For all of the regulated rivers in the Murray–Darling Basin, the extraction limit is set at the lesser of the extractions permitted under the Murray–Darling Basin Ministerial Council Cap on diversions or the extractions permitted under the specific rules established in the plan. The latter limit prevails in all of the plans. This means that, for all of the plans, the extractions are to be lower than those permitted under the Murray–Darling Basin Ministerial Council Cap on diversions. Under the plan for the Murray and Lower Darling Rivers, extractions by New South Wales are reduced by approximately 3 per cent relative to diversions under the cap (down from 2036 to 1973 gigalitres per year). For the Murrumbidgee River, the plan provides for a reduction of approximately 3 per cent, rising to 4.5 per

cent by the fifth year. The largest improvement in environmental allocations, relative to diversions established under the cap, is approximately 10 per cent for the Macquarie and Cudgegong Rivers.

In the unregulated river plans, the lowest of flows (at or above the 95th percentile) are typically protected through the application of 'cease-to-pump' rules. The cease-to-pump rules are, for some users in some plans, phased in over the life of the plan. Typically, access to flows below the cease-to-pump level is for the most part not permitted after year five of the plan. The proportion of flows reserved for the environment in the other flow classes varies for each plan and for each class. In the plan for the Kangaroo River, for example, 40 per cent of the upper limit of low (A class) flows is protected from extraction. This represents an 18 per cent improvement over pre-plan conditions. However, in most instances, the Council has not been able to determine the extent of change expected to result from the rules established in the plans relative to pre-plan conditions. In the Kangaroo River plan, the flow protected from extraction amounts to 66 per cent for the upper limit of medium (B class) flows and ranges upwards from 77 per cent for high (C class) flows. In the plan for the Upper Brunswick River, no A class flows are established. At the upper limit of B class flows, 55 per cent of flows are protected and, at the upper limit of C class flows, 70 per cent of flows are protected. The plans manage extractions by the assignment of total daily extraction limits, with individual daily extraction limits specified for each flow class.

In the groundwater source plans, with the exception of the Upper and Lower Namoi, the long-term average storage component (less extraction for basic landholder rights in some cases) is set aside for the environment. Where groundwater dependent ecosystems have been identified, the plans have also provided a portion of annual aquifer recharge to meet identified environmental requirements. Under the plans, the amount of recharge set aside ranges from zero (Upper and Lower Namoi) to 90 per cent (Dorrigo Basalt). The proportion of recharge set aside for the environment is intended to reflect the degree of ecosystem dependency on the groundwater source. In most cases, such as for the Upper and Lower Namoi where no significant groundwater dependent ecosystems have been identified, further studies of groundwater ecosystem dependency are proposed and the plans permit modification of the amount of recharge set aside for the environment as a result of those studies. As for the surface water plans, the share component specified in access licences may significantly exceed the extraction limit, but extractions under access licences are managed to the extraction limit.

New South Wales considers that, compared to the position before the planning process began, the water sharing plans have: reinstated seasonal flow patterns; increased the frequency of inundation of wetlands; protected low flows and pools; increased medium and high flows; provided specific regimes for listed species and communities; and reduced total diversions.

New South Wales advised that, in developing the environmental allocations in the plans, the water management committees (and, subsequently, the Government) have taken into account social and economic considerations, in

addition to environmental requirements. In general, the parameters in the water sharing plans reflect trade-offs between socioeconomic factors and the needs of the environment. New South Wales emphasised that it considers the CoAG strategic framework, taken as a whole, clearly intended that a range of factors – social, economic and scientific – should inform the water reforms of jurisdictions, including on the provision of water to the environment.

The making of trade-offs is evident from the Government's assessment of the contribution each plan has made to the targets established in the SWMOP. The Government's assessment is reported in a schedule to each of the plans. For some of the key environmental targets in the SWMOP, the Government has generally assessed the water sharing plans to have made only a low or partial contribution to achieving the target.

While the national principle requires the existing rights of water users to be recognised, it also states that the provision of water for ecosystems should go 'as far as possible' to sustaining the ecological values of the ecosystems. On the information available, the Council has not been able to determine the extent to which the allocations provided in the water sharing plans address environmental needs. During the 2002 assessment, New South Wales indicated that the first round of water sharing plans was unlikely to deliver all of the water needed for the environment within the first SWMOP (NCC 2002, p. 2.53).

Whether the water sharing plans go 'as far as possible' to meeting environmental needs, while recognising the existing rights of water users, is ultimately a matter for judgment. New South Wales advised that the exhibited draft plans provided a context for assessing the trade-offs made by the water management committees and that these trade-offs were explained in public meetings. However, New South Wales has not provided the Council with specific information on the extent of the trade-offs made in the final water sharing plans. The Council notes that ACIL Consulting considered the economic consequences of the draft plans would be minor in regional and statewide terms.

Without more information, the Council is not in a position to conclude on the nature and extent of the trade-offs made in the water sharing plans and, in particular, the extent to which ecological values are likely to be sustained.

At this stage, the Council is unable to conclude whether New South Wales has had due regard for this principle.

Extract on national principle 5

Principle 5: Where environmental water requirements cannot be met due to existing uses, action (including reallocation) should be taken to meet environmental needs

As discussed under principle 4, all of the regulated river plans in the Murray–Darling Basin considered by the Council provide more water for the environment than required under the Murray–Darling Basin Ministerial Council Cap on diversions.

For the Murray–Darling Basin regulated rivers, the water likely to be available under the rules in the water sharing plans builds on the environmental allocations attained under the 1998 interim environmental flow rules established by New South Wales.

- In terms of total flows for the environment, the greatest improvement appears to be achieved in the Namoi River plan. While the interim environmental flow rules represented a 3 per cent improvement over the cap on diversions, the Namoi River water sharing plan provides for a 7 per cent improvement.

- In contrast, the water sharing plan for the Lachlan River does not appear to provide for any significant improvement in total flows for the environment relative to the interim environmental flow rules. However, New South Wales considers that the rules in the plan provide for significantly better environmental outcomes for the river without taking additional water from users. New South Wales stated that the plan also eliminates access to off-allocation (supplementary) water and provides for a review that may result in further environmental benefits.

- The plan for the Murray and Lower Darling Rivers does not appear to provide any significant additional water for the environment relative to that available before gazettal of the plan. The largest supplementary water allocation in the plan, the Barmah-Millewa environmental water allowance, was already operational before gazettal of the plan.

- The plans for the Murray and Lower Darling Rivers and the Murrumbidgee River contain provisions permitting the extraction limit to be reduced as a result of system efficiency savings made to supply additional water to the Snowy River under the Snowy Water Inquiry Outcomes Implementation Deed. However, neither of these plans includes a mechanism to adjust the extraction limit in response to any future decision by the Murray–Darling Basin Ministerial Council to provide for further environmental flows in the River Murray.

- The Murrumbidgee River plan makes additional water available to increase end of system flows. This provides for some increase in flows in the River Murray and goes some way to addressing in-stream river health

concerns for the Murrumbidgee River. Supplementary water provisions in the Murrumbidgee River plan are targeted at increasing flows for mid-system wetlands. No water has been specifically targeted at the wetlands of the lower Murrumbidgee. New South Wales indicated that the water available to these wetlands is adequate, given their degraded state, but needs to be better managed. A study of how best to manage the wetlands is being undertaken with a view to preparing a management plan.

For the unregulated river systems, the water sharing plans provide the first formal allocation of water to the environment. Typically, in these rivers the greatest environmental stress arises from extractions during very low and low to medium flows. The plans considered by the Council provide some protection of low flows by imposing 'commence-to-pump' and 'cease-to-pump' limits when flows reach levels set in the plan. Many plans allow nominated water users to have access to the very low flows for the first five years of the plan. In the Tenterfield Creek plan, there is a review of the access to low flows at year five and a decision made as to whether this should be allowed to continue to year eight. Under the Kangaroo River plan, access to low flows is conditional and does not apply all of the time. New South Wales advised that, based on historical modelling, access to low flows will occur only once every six years. New South Wales indicated that these restricted access conditions will have a significant impact on water users.

Above the very low flow classes, each plan provides for a portion of the flow to be extracted for consumptive use, with the remainder of the flow class allocated to the environment. As indicated under principle 4, for the unregulated rivers, in most cases the Council has not been able to determine the extent to which the amount of water going to the environment will change as a result of the new rules in the plans.

For the groundwater plans considered by the Council, the long-term average storage component (less extraction for basic landholder rights in some cases) has been set aside for the environment. With the exception of the Upper and Lower Namoi groundwater sources, the plans also provide a portion of annual aquifer recharge to meet identified environmental requirements. In some plans, such as for the Upper and Lower Namoi, and the Lower Lachlan, groundwater sources, extractions for consumptive use have been wound back to provide for environmental requirements. The plans also provide for declaration of local management areas where the Minister can require pumping to cease if evidence arises that extractions, under the rules in the plans, are damaging nearby ecosystems.

In summary, the water sharing plans for some stressed regulated and unregulated rivers and groundwater sources provide additional water for environmental requirements.

For other stressed regulated rivers (for example, the Lachlan and the Murray and Lower Darling), in terms of total flows, it appears that no additional environmental water has been provided, relative to that currently available under the interim environmental flow rules. The Council notes New South Wales's advice that, for the Lachlan, the rules in the water sharing plan

provide for improved environmental outcomes without taking additional water from users. New South Wales also advised that, in some cases, it considers the extraction levels associated with the environmental flow rules introduced in 1998 to be appropriate, and therefore the water sharing plans do not provide additional environmental water. New South Wales has not, however, provided information to the Council to demonstrate how the rules in the water sharing plans meet environmental needs or to support its advice concerning the appropriateness of 1998 flows.

For the unregulated rivers, the water sharing plans provide the first formal allocation of water to the environment. However, insufficient information is available to determine whether the amount of water going to the environment, particularly above the very low flow classes, will in practice change as a result of the unregulated river plans.

At this stage, the Council is unable to conclude whether New South Wales has had due regard for this principle.

Extract on national principle 7

Principle 7: Accountabilities in all aspects of management of environmental water provisions should be transparent and clearly defined

New South Wales released a draft of each water sharing plan for public consultation, in line with the requirements of the Water Management Act. The draft plans listed physical characteristics related to the water source and provided details of the use of the water source by the community (for both social and economic purposes). The draft plans also described what was known about possible water dependent ecosystems.

The approach to determining environmental water allocations was generally open and transparent for plans covering groundwater sources. However, for the surface water plans, the amount of technical information made available to the broader community on how a water management committee determined relevant rules and limits in the plans (such as the environmental health water and supplementary environmental water provisions) was variable. While each draft plan contained technical information and further details were presented at public meetings, the manner in which environmental science has been considered and incorporated in the process is not transparent. There is also little information available on the extent to which the various rules and limits will achieve environmental outcomes.

The Government provided reports and studies on the environmental condition and requirements of the relevant water sources where such documents were available, as well as policy advisory notes, to the water management committees. Experienced regional agency staff also provided input. In

addition, the Government assisted the committees by modelling the effects of the various options being considered where models were available.

The Council has no information, however, on how water management committees weighed up the relevant information to reach decisions on the balance between environmental and consumptive uses. New South Wales has not made available to the Council information on the deliberations of the water management committees (or documentation on the modelling results).

At this stage, the Council is unable to conclude whether New South Wales has had due regard for this principle.

References

ACIL Consulting 2002, *Economic Impacts of the Draft Water Sharing Plans, An Independent Assessment for the NSW Department of Land and Water Conservation*, Canberra, 12 September.

ANZECC (Australian and New Zealand Environment and Conservation Council) 2000, *National Water Quality Management Strategy: Australian and New Zealand Guidelines for Fresh and Marine Water Quality*, Canberra.

CoAG (Council of Australian Governments) 2003, *Communiqué,* 29 August.

DEH (Department of Environment and Heritage) 2002, National River Health Initiative, http://www.deh.gov.au/water/rivers/nrhp/monitoring.html

DIPNR (Department of Infrastructure, Planning and Natural Resources) 2003, *Integrated monitoring of environmental flows: State summary report 1998–2000*, Sydney.

DLWC (Department of Land and Water Conservation) 1998a, *Building a more secure future for the Gwydir*, Progress Report, Sydney.

—— 1998b, *Stressed rivers assessment report*, State Summary, Sydney.

—— 1998c, *Building a more secure future for the Lachlan*, Progress Report, Sydney.

—— 1998d, *Building a more secure future for the Murrumbidgee*, Progress Report, Sydney.

—— 1998e, *Building a more secure future for the Namoi*, Progress Report, Sydney.

—— 2000a, *Upper Namoi Valley groundwater status report*, Barwon Region.

—— 2000b, *Draft status report for the alluvial groundwater resources of the Lower Namoi Valley NSW*, Barwon Region.

—— 2002a, *Water Management Act 2000: structural adjustment for Namoi groundwater users*, Sydney.

—— 2002b, *Environmental water requirements for the Kangaroo River catchment revision III*, Sydney.

DNRE (Department of Natural Resources and Environment) 2002, *FLOWS: A method for determining environmental water requirements in Victoria*, Melbourne.

Environment Australia 2000, *Revision of the Interim Biogeographic Regionalisation for Australia (IBRA) and Development of Version 5.1 — Summary Report*, Canberra.

MDBC (Murray–Darling Basin Commission) in print, Murray-Darling Basin Groundwater Status Report.

—— 2003, *Water resources fact sheet*, http://www.mdbc.gov.au/publications/factsheets/water_resoucesver2.html.

Minister for Land and Water Conservation 2002, *Independent report on water sharing plans,* Media Release, 18 September.

Minister for Natural Resources 2004, *Water Management Amendment Bill, Second Reading Speech, NSW Legislative Assembly Hansard*, 12 May.

Murray–Darling Basin Ministerial Council 2003, *Communiqué*, 14 November.

NCC (National Competition Council) 2001, *Assessment of government's progress in implementing the National Competition Policy and related reforms: New South Wales water reform,* Melbourne.

—— 2002, *Assessment of governments' progress in implementing the National Competition Policy and related reforms, Volume two: Water reform*, AusInfo, Canberra.

—— 2003a, *Assessment of governments' progress in implementing the National Competition Policy and related reforms, Volume three: Water reform*, Melbourne.

—— 2003b, *Water reform in New South Wales,* National Competition Policy supplementary 2002 water reform assessment, Melbourne.

New South Wales Government 2000, *Draft groundwater dependent ecosystems policy*, Sydney.

Scientific Reference Panel (Prof. Gary Jones, Chair) 2003, *Ecological assessment of environmental flow reference points for the River Murray system*, Interim report prepared for the Murray–Darling Basin Commission Living Murray Initiative, Cooperative Research Centre for Freshwater Ecology, Canberra.

Thoms, M. *et al.* 2000, *Report of the River Murray Scientific Panel on environmental flows: River Murray — Dartmouth to Wellington and the Lower Darling River,* Murray Darling Basin Commission, Canberra.

WRC (Water Resources Commission) 1986, *Investigation of the Groundwater Resources of the Lachlan Valley Alluvium*, Sydney.