

Tracking success



Chapter 7

The *Water Act 2007* (Cwlth) provides for the integrated and sustainable management of the Murray–Darling Basin’s water resources under the Basin Plan, and establishes a governance framework to ensure the plan’s successful implementation. The framework will include measures to assess the appropriateness, effectiveness and efficiency of the plan, promote compliance with the plan’s requirements, and provide for its adaptive management and improvement. These measures will include:

- promoting and enforcing compliance with the plan’s provisions by all regulated parties
- monitoring and evaluating change in ecological, social and economic terms
- ensuring transparent reporting
- reviewing the plan’s provisions.

The Water Act establishes a range of obligations relating to the Basin Plan’s provisions and water resource plans (Part 2) and provision of information to the Murray–Darling Basin Authority (MDBA) (ss. 238–239). MDBA is the enforcement agency for these provisions and will promote compliance by regulated parties by:

- helping them to understand and meet their obligations through education, communication, incentives and audit
- enforcing compliance with obligations where necessary through transparent, consistent and accountable use of enforcement powers, supported by powers to investigate and gather information and evidence, available under the Water Act.

The Basin Plan must set out the principles and framework to monitor and evaluate its effectiveness in achieving its purpose, objectives and outcomes. The monitoring and evaluation framework will be required to include reporting requirements for the Commonwealth and Basin states, and five-yearly reviews of the targets in the Water Quality and Salinity Management Plan and the Environmental Watering Plan. As well as being a legislative requirement, monitoring and evaluation will provide a rigorous process for the plan’s adaptive management and continuous improvement using the best available science (biophysical, social and economic).

By the end of 2014, the Water Act’s operation must be reviewed — in particular whether the Basin Plan’s management objectives and outcomes are being met. This review will be required to consider the extent to which the water market is operating effectively and efficiently, and whether long-term average sustainable diversion limits (SDLs) are being met. The National Water Commission will periodically report on the plan’s implementation, while MDBA will continue to monitor and evaluate the impact of plan provisions. The plan must be reviewed after 10 years or at the request of the Commonwealth Water Minister or all of the Basin states.

7.1 Compliance and enforcement

The *Water Act 2007* (Cwlth) sets out a new role for the Commonwealth in water resource regulation, compliance and enforcement, operating in parallel with Basin state legislation. When the Basin Plan takes effect, existing transitional and interim Basin state water resource plans will take precedence, to the extent that they include provisions inconsistent with the Basin Plan. New water resource plans, however, must be submitted to the Commonwealth Water Minister for accreditation on the advice of the Murray–Darling Basin Authority (MDBA).

MDBA is the appropriate enforcement agency for contraventions of the Water Act in relation to the Basin Plan and water resource plans (Part 2) and provision of information to MDBA (ss. 238–239). Basin states will continue to implement water resource plan compliance and enforcement under Basin state water legislation. MDBA will collaborate with Basin states regarding the concurrent regulation of water users under state, territory and Commonwealth water legislation.

The Basin Plan will clearly and unambiguously indicate:

- what obligations apply
- to whom the obligations apply
- whether the obligations are imposed by the Basin Plan or whether the plan requires water resource plans to impose the obligations.

The Basin Plan’s features will enable the regulated entities to identify their obligations, and enable MDBA to enforce them.

It is expected that enforcement of water resource plans by Basin states will be the primary means of compliance with water resource plan rules. While this will be the responsibility of Basin states, it is expected that MDBA will collaborate to help the Basin states through the application of consistent principles, a risk-based approach, training and support systems, and the provision of information. Where Basin Plan or water resource plan obligations are contravened, a range of enforcement powers are available to MDBA (Water Act Part 8), supported by powers to investigate and gather information and evidence (ss. 238–239).

This section sets out the framework that will be used to give the Basin Plan legal and practical effect, and to achieve compliance by the Commonwealth, Basin states and other regulated entities. This framework is presented in Figure 7.1. More specific and detailed arrangements are set out for the diversion limit compliance method (see Section 7.2), as required by the Water Act (s. 22(1) item 8).

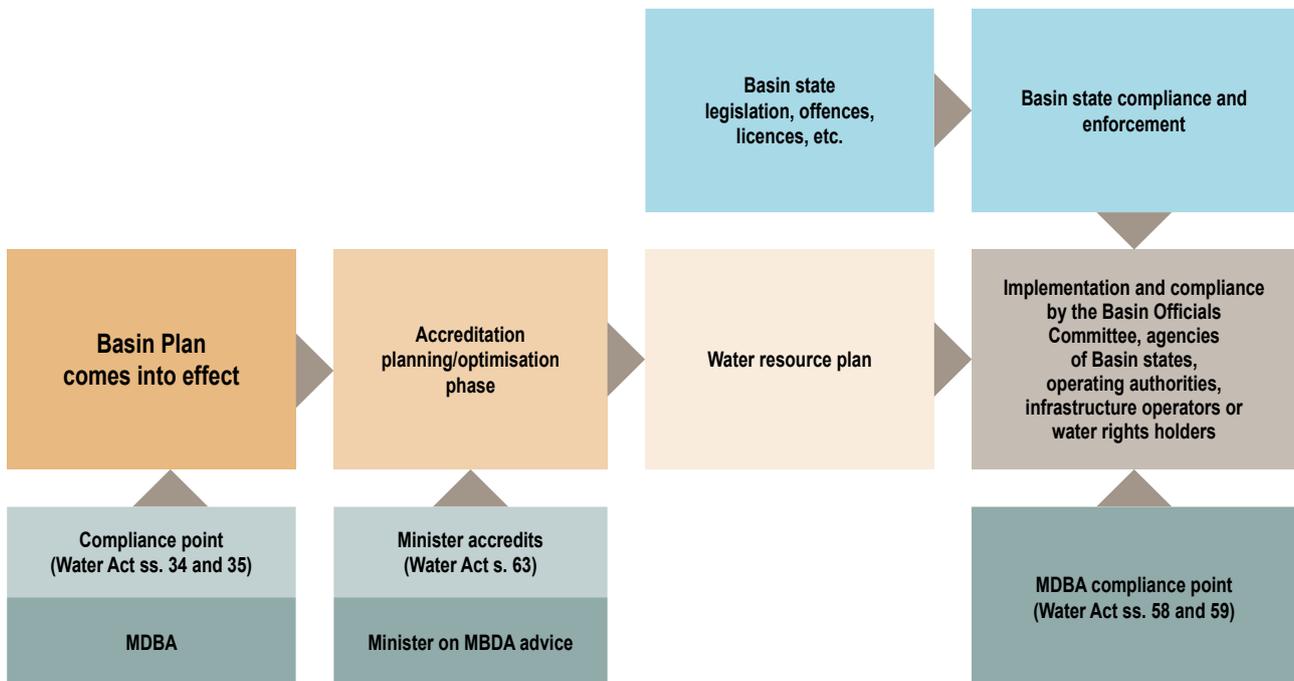


Figure 7.1 The compliance framework as provided for in the Water Act

Direct Basin Plan compliance and enforcement

The Basin Plan will directly impose obligations (enforceable via the Water Act ss. 34–35) where the same or a similar obligation is not required to be imposed by water resource plan requirements (Water Act s. 39). MDBA will enforce obligations imposed directly by the Basin Plan. The Basin states will not have an enforcement role in this regard.

The Basin Plan will directly impose obligations concerning the following items, provided similar obligations are not imposed via water resource plan requirements:

- the Environmental Watering Plan will require Basin states to develop long-term and annual environmental watering plans in consultation with managers of held and planned environmental water, consistent with the Environmental Watering Plan's objectives and framework
- the Monitoring and Evaluation Program reporting requirements will oblige the Commonwealth and Basin states to report data and information
- the water trading and transfer rules will apply directly via the Basin Plan to Basin states and water rights holders
- the Water Quality and Salinity Management Plan will oblige operating and infrastructure authorities to apply certain principles in the management of water flows.

Obligations imposed by the Basin Plan can apply from when the plan takes effect (from 2011), but transitional or interim water resource plans take precedence over the Basin Plan, to the extent of any inconsistency.

Compliance through water resource plan rules

The Basin Plan's principal items to be enforced through water resource plans (Water Act ss. 58–59) are the long-term annual diversion limits, as determined by applying the method for deciding whether there has been compliance with that diversion limit (Water Act s. 22(1) item 8, s. 22(3)(b)(c) (d)), including those water resource plan rules that implement the diversion limit. This includes rules for allocation, management and delivery of water, as well as rules to ensure compliance with the diversion limit.

Obligations required to be imposed by water resource plans will not apply until the water resource plan is accredited. These obligations will generally be enforced by Basin states through state and territory water legislation. Under certain circumstances MDBA will enforce water resource plan obligations under the Water Act, particularly compliance with those obligations by Basin states and the Commonwealth.

Water resource plan requirements

The Basin Plan will require water resource plans to specify clearly what obligations apply and to whom, so MDBA can enforce those obligations and regulated entities can identify the nature of their obligations against the Water Act (ss. 58–59).

MDBA will apply this requirement when considering its accreditation advice to the Commonwealth Water Minister to ensure it can enforce water resource plans.



Lock 9 on the Murray River downstream of Wentworth, Victoria

For example, it may be necessary to require the following kinds of provisions in a water resource plan to provide certainty and a clear obligation under the Water Act:

- a water rights holder must not take more water than allocated
- a water rights holder must not take water in contravention of access rules
- a Basin state must apply water resource plan rules to achieve compliance with the long-term diversion limit, consistent with the method to determine compliance.

Enforcement of water resource plans by MDBA

MDBA will primarily regulate Basin state and Commonwealth agencies' compliance with water resource plan rules. This will be key to ensuring the Basin Plan's outcomes are achieved, and will involve:

- Basin states designing water resource plan rules that meet outcomes specified in the Basin Plan (through accreditation requirements)
- Basin states being obliged to implement those water resource plan rules
- MDBA regulating state compliance with those water resource plan rules.

MDBA can take enforcement action in relation to all contraventions relating to management of Basin water resources (ss. 19–86), including contraventions by water rights holders. In general, MDBA will lead enforcement action on water rights holders' compliance with water resource plan rules where:

- a contravention involves a Basin state or Commonwealth agency
- a contravention involves an interstate matter
- the Basin state and MDBA agree that MDBA leads the matter (for example, where the evidence and circumstances favour successful action under Commonwealth legislation but are unlikely to do so under state or territory legislation)
- the Basin state fails to take action and the matter is demonstrably relevant to Commonwealth powers (for example, relevant to international treaty obligations).

Basin states will continue to enforce compliance by water rights holders, operating authorities and infrastructure authorities, under state and territory water legislation.

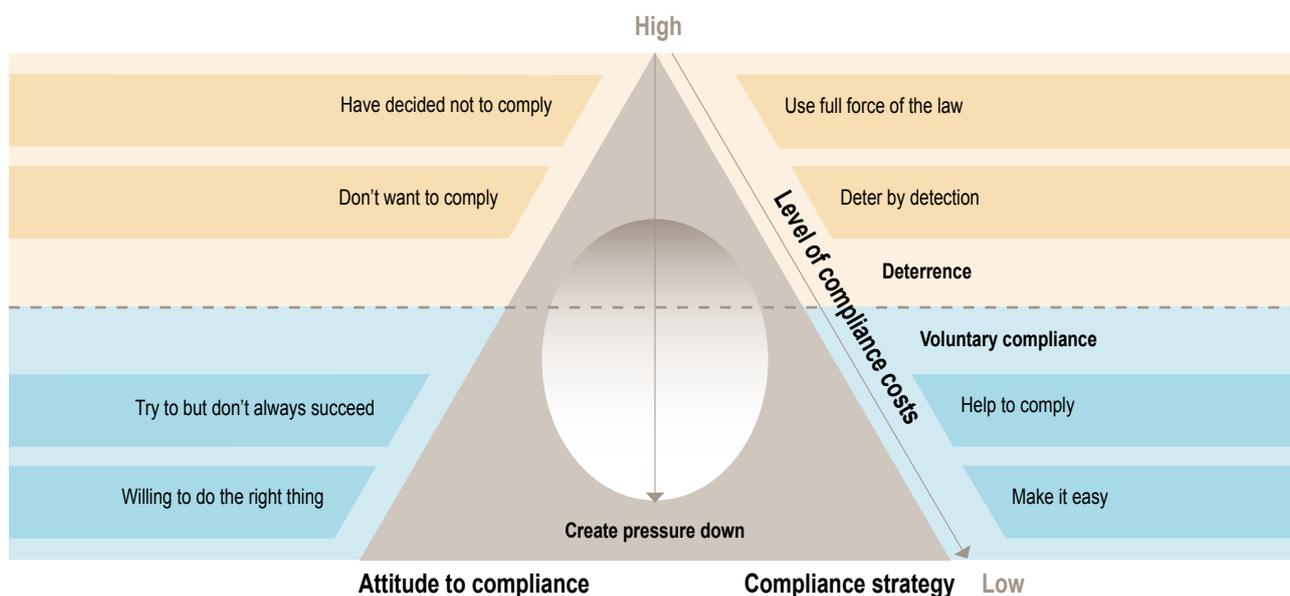


Figure 7.2 Compliance model pyramid

Source: Australian Fisheries Management Authority (2010)

Compliance approach

A range of measures will be available to MDBA to achieve compliance with the Basin Plan's provisions (the measures may also be known as the regulatory toolbox, pyramid or spectrum as shown in Figure 7.2). Measures will range from helping regulated parties to understand their obligations, to employing the full force of the Water Act to ensure compliance.

In the first instance, MDBA will help regulated parties to understand and voluntarily meet their obligations through a mix of:

- education and training — MDBA may choose to implement education and training programs with the regulated community, including the Commonwealth, Basin state water agencies, infrastructure operators and water rights holders
- engagement and negotiation — MDBA may engage with regulated entities to address compliance issues by discussion, negotiation and (non-statutory) written agreement
- incentives — MDBA (potentially in conjunction with other Commonwealth entities such as the Department of Sustainability, Environment, Water, Population and Communities) may choose to offer funding incentives to demonstrate best practice, help with adjustment to compliant or best-practice behaviour, or as tied conditional funding for Basin Plan implementation (e.g. the Water for the Future program buybacks, infrastructure and other investments)
- public affairs and communications — delivery of key messages through the media, stakeholder forums and publications has been shown to be successful as part of a regulatory strategy
- industry behaviour change — many other mechanisms can be applied to promote behaviour change in a community or industry
- audit — a key tool in a successful compliance strategy, allowing identification of non-compliance without necessarily leading to enforcement, providing the problem is addressed; both internal audit by the regulated entities and audit by the regulator (using powers if necessary) can be part of this strategy.

Where these methods do not produce compliance, MDBA will enforce it through the transparent, consistent and accountable use of enforcement powers available under the Water Act (ss. 136–170, 216–239), including:

- requiring information to be provided to MDBA
- entering property for monitoring purposes
- applying to a magistrate to enter property for compliance monitoring purposes and to gather evidence
- applying for a court injunction
- applying to a court for a declaration that a person is in contravention
- issuing enforcement notices
- entering into enforceable undertakings
- applying to a court for civil penalties for certain contraventions.

Before Basin Plan implementation, MDBA will develop a compliance and enforcement strategy. The Council of Australian Governments is developing a national framework for water legislation compliance and enforcement, including a proposal to agree and implement a common set of best practice principles.

MDBA will work with the Basin states to implement effective compliance through a compatible approach, aligned with Council of Australian Governments agreements.

Water resource plans

As stated, compliance and enforcement with water resource plan rules by water rights holders and infrastructure operators and operating authorities will be principally administered by Basin states through state and territory water legislation. MDBA will work cooperatively with Basin state compliance and enforcement agencies.

MDBA's principal focus for water resource plan compliance and enforcement will be on Basin state compliance with water resource plan rules. In particular, this is a key element of the diversion limit compliance method and framework. MDBA's compliance and enforcement effort will be targeted by the diversion limit compliance audit process and by other risk-based assessments.

Environmental Watering Plan

The Environmental Watering Plan will ensure that water 'outside' (i.e. not limited by) the long-term average sustainable diversion limits (SDLs) is used for the best Basin-scale environmental outcomes. It will provide new frameworks for the management and coordination of environmental watering. MDBA's role will be to coordinate planning and watering activities at the Basin scale. The Basin states' role in environmental watering will be ongoing, but will be required to be carried out consistently with the Environmental Watering Plan. MDBA will cooperate with Basin states, working in the context of clear roles, responsibilities and obligations.

The Basin Plan will require Basin states to consider the Environmental Watering Plan, including priorities and any schedules for environmental watering. While the approach will be founded on cooperation, MDBA will implement a robust compliance regime for planned and held environmental water, consistent with the approach for consumptive water.

Water Quality and Salinity Management Plan

Water resource plan rule accreditation will be a key component of water quality and salinity target implementation. Some water quality matters directly related to water management may operate directly through the Basin Plan. Section 22 of the Water Act prevents direct regulation by the Basin Plan of matters related to land use or planning and management of natural resources, or pollution control.



Landscape in Hattah–Kulkyne National Park, Victoria



*River Murray at Swan Reach,
South Australia*

Monitoring and Evaluation Program

The Monitoring and Evaluation Program's obligations are the reporting requirements. These will apply to Basin states and the Commonwealth. The requirements are set in such a way as to avoid embedding prescriptive technical detail in the Basin Plan, but are specific enough to ensure that critical data will be available to evaluate the plan's effectiveness.

MDBA will publish technical guidelines to help the Commonwealth and Basin states comply with the reporting requirements. MDBA will consult Commonwealth agencies and Basin states on the content of these guidelines.

Trading rules

The Basin Plan will specify trading rule obligations to be enforced by MDBA. The Australian Competition and Consumer Commission advises on Basin Plan trading rules, but will not enforce them as its enforcement role is limited to market and water charge rules.

MDBA proposes to undertake an awareness program before the water trading rules take effect, and to publicise the specific obligations that the trading rules impose. As the Basin Plan takes effect, MDBA will conduct auditing and training to highlight early non-compliance. It will also consider publicising instances of non-compliance to drive behavioural change before tougher enforcement options are pursued. MDBA envisages that it would seek negotiation with non-compliant entities in an attempt to reach a resolution before taking stronger action.

MDBA will audit trading rule compliance and identify information requirements necessary to detect potential contraventions.

7.2 Diversion limit compliance method and framework

The *Water Act 2007* (Cwlth)(s. 22(1) item 8) requires that the Basin Plan include a method to determine compliance with a long-term annual diversion limit (which is the sum of the long-term average sustainable diversion limit (SDL) and the temporary diversion provision for a particular SDL area). In addition, the *Water Act* (s. 71) obliges Basin states to report to the Murray–Darling Basin Authority (MDBA) within four months of the end of a water

accounting period on compliance with the limit in each SDL area, using the Basin Plan's method. The report must also include the quantity of water available, the quantity permitted to be taken, the quantity actually taken and various other relevant details. For most surface-water SDL areas, the quantity of water permitted to be taken will vary from year to year as climate and inflows vary.

The diversion limit compliance method will be written into the Basin Plan. It will also set out the contextual policy, regulatory and implementation arrangements that will give effect to the method, but is not required to be drafted in the Basin Plan. The compliance framework will provide particular details on how compliance with SDLs under the Basin Plan will be enforced. For the diversion limit compliance framework and method, the overall policy objectives are to:

- allow for climate variability, water resource availability, environmental requirements and entitlement water security
- provide objective rules by which water will be made available for diversion, which are clear to all regulated entities at the start of the water year and which provide certainty and security to water rights holders and the environment (within the reliability profiles of different entitlements)
- provide a clear, transparent, unambiguous and enforceable method to determine compliance
- ensure accountability for non-compliance with the diversion limit
- provide the ability to apply the limit from year one of the water resource plan
- focus effort on significant non-compliance by minimising the triggering of false non-compliance reports that are probably due to model error
- support transparent and thorough water accounting
- provide a clear policy signal to allocation authorities, the water market and the broader community, including a trigger to promptly manage any growth in diversions above the limit
- protect environmental water requirements.

The diversion limit compliance method proposed is similar to, but not the same as, that applied under the Murray–Darling Basin Cap. The method builds on the Cap's strengths and MDBA's experience with its implementation. The key differences of the diversion limit compliance method are that:

- its benchmark levels reflect environmentally sustainable levels of take, not 1993–94 diversions and rules
- governance arrangements and management decisions are administered by a regulatory authority to which the Basin states submit reports, rather than an independent auditing process and consensus decisions by partner governments
- groundwater is included
- there are legal consequences for non-compliance directly linked to water resource plan rule obligations and MDBA's civil enforcement powers, rather than reporting of non-compliance at the Ministerial Council.

Terminology used in this section:

- diversion limit compliance method — the method to determine compliance with a long-term annual diversion limit, required by the Water Act (s. 22(1) item 8) as mandatory content of the Basin Plan
- diversion limit compliance framework — MDBA's broader implementation framework for the method, not required by the Water Act to be included in the Basin Plan, but included in the *Guide to the proposed Basin Plan* for clarity and transparency
- permitted take — the maximum quantity of water permitted to be taken in a water accounting period in an SDL area, varying from year to year according to the interaction of climate, inflows and water resource plan rules (e.g. allocation rules, access rules)
- actual take — the total quantity of water actually extracted from the water resources of an SDL area during a water accounting period
- excess take — the quantity of water actually extracted from the water resources of an SDL area during a water accounting period that exceeds permitted take
- long-term average sustainable diversion limit (SDL) — the maximum long-term annual average quantity of water that can be taken on a sustainable basis from a particular water resource and reflects the environmentally sustainable level of take (Water Act s. 22(1) item 6 and s. 23)
- long-term annual diversion limit — the sum of the SDL and the temporary diversion provision for a particular water resource (Water Act s. 22(1) item 7).

Diversion limit compliance method

Water accounting period for diversion limit compliance

The primary water accounting period for diversion limit compliance reporting will be annual, over the period from 1 July to 30 June. However, there is provision for secondary tiers of the diversion limit compliance method to allow averaging over multiple years to reduce the risk of model error leading to false reporting of non-compliance, and to allow variability where appropriate.

Key variable for determining compliance — volumetric

The method for determining diversion limit compliance will be against a volumetric annual permitted take that varies according to climatic conditions and relevant triggers in water resource plan rules.

Central role of water resource plan rules

Under the Basin Plan, the annual determination of diversion limit compliance will depend on the combination of accredited water resource plan rules and climate and other triggers that occur in each water year.

Under the Basin Plan, the approach to diversion limit compliance will be:

- the Basin Plan identifies SDLs (Water Act s. 22(1) item 6)
- the Basin state then optimises the rules in the proposed water resource plan to achieve a diversion up to the SDL and other requirements, as specified in the water resource plan requirements (Water Act s. 22(1) item 11)
- the Basin state submits the water resource plan for accreditation and MDBA advises the Commonwealth Water Minister whether the water resource plan can be accredited as consistent with the Basin Plan
- once the water resource plan is made (under Basin state legislation) and accredited (under Commonwealth law), its rules are binding on the Basin state and other regulated entities
- determination of annual diversion limit compliance depends on the combination of accredited water resource plan rules and the climate and other triggers that occur each water year
- the diversion limit compliance method is outlined in the Basin Plan, but the actual volumetric limit in each year is not provided in the plan because this will vary with the climate and other triggers in the water resource plan rules
- diversion limit compliance will be enforced through the water resource plan, rather than directly through the Basin Plan (i.e. through the Water Act ss. 58–59, not through ss. 34–35)
- for this reason, Basin Plan requirements are specific on which water resource plan rules must be addressed in order to achieve accreditation.

If the actual take has exceeded the permitted take due to non-compliance with the water resource plan rules, MDBA can take action against the Basin state and/or other regulated entities (Water Act ss. 58, 59, 136–170). Depending on the circumstances, this may result in the use of a range of measures to ensure compliance with water resource plan rules.

The Basin Plan Monitoring and Evaluation Program will require Basin states to report annually to MDBA on compliance with water resource plan rules.



Hume Dam, on the River Murray in New South Wales and Victoria, at 3% capacity in May 2007

Long-term versus annual compliance assessment

The assessment of diversion limit compliance will take place on an annual basis, against a variable annual permitted take. While the SDL itself is a long-term average, it is essential that compliance is determined annually, so that unsustainable growth in diversions, or unauthorised take, can be addressed promptly. Permitted take will vary annually to reflect the climate-driven variability in:

- total available water
- environmental water needs
- allocations made to water rights holders.

This approach will help to protect environmental water requirements and underpin water rights through early detection of non-compliance.

To determine compliance with the long-term annual diversion limit at the end of any particular water accounting year, the Basin state will be required to determine that the actual take is less than or equal to the permitted take, using models and methods that meet the water resource plan requirements for accreditation.

If the actual take is greater than the permitted take for a water year, the Basin state will report non-compliance unless certain conditions apply (see the 'Use of models/methods (surface water)' and 'Credits and debits to address model uncertainty' sections of this chapter).

Definition of permitted take

A clear definition of permitted take is essential to underpin the diversion limit compliance method and to safeguard environmental water requirements and water rights.

Permitted take is defined as the maximum quantity of water permitted to be taken in a water accounting period in an SDL area, varying from year to year according to the interaction of climate, inflows and water resource plan rules (e.g. allocation rules, access rules). In most cases, for large, complex and regulated river systems, permitted take will be calculated at the end of every water year, using the same hydrologic model used to derive and accredit water resource plan rules.

For groundwater, permitted take is defined in the 'Groundwater diversion limit compliance method' section later in this chapter.

Forms of permitted take that cannot be modelled will be estimated using a method defined in the water resource plan, which satisfies accreditation requirements. See the 'Different forms of take' section later in this chapter.

The permitted take will exclude:

- the volume of water under the above categories that was identified as held environmental water before or at the time of water resource plan accreditation
- planned environmental water
- water rights traded out of the water resource plan area.

Permitted take is therefore not the same as the total volume of water rights or the total of allocations to water rights in a given year (see Figure 7.3).

The water resource plans will be required to detail how the method for determining compliance with the diversion limit will be applied, including how permitted take will be determined for each of the components of take



*Lock 4 on the River Murray at Berri,
South Australia*

listed above. The water resource plan requirements will specify how issues of rigour, accuracy, precision and consistency should be addressed to support the annual process of determining permitted take for that year. The long-term average of the permitted take for each water accounting period (over a model run of many years) will be required to be shown, at the time of water resource plan accreditation, to be equal to or less than the SDL (but with the addition of temporary diversion provisions where these apply in the transition period).

Definition of actual take

The actual take will indicate the performance of a Basin state in applying the water resource plan rules. It must be defined in a robust manner to ensure it will reflect the volume of water extracted and the volume made available to the environment.

The actual take is defined as the total quantity of water actually extracted from the water resources of an SDL area during a water accounting period. It will be determined according to the diversion limit method and the water resource plan.

To be consistent with the permitted take calculation, the actual take includes the same forms of take as those listed under 'Definition of permitted take'. These will be required to be measured or estimated using the best available method, as specified in water resource plan accreditation requirements (see Section 6.1, 'Water resource plans').

Use of models/methods (surface water)

In principle, the diversion limit compliance method is not a modelling exercise. The compliance method will compare annual actual take to annual permitted take.

In practice, hydrologic computer models will be needed to determine the permitted take volume. This will capture the effects of water resource plan rules (allocation, management and delivery of water) in relation to variability in available water, environmental watering requirements and the water security of different water entitlements. Permitted take will be determined using the models and methods provided to support water resource plan accreditation.

The use of hydrologic computer models raises various issues when applied to a compliance method.

Credits and debits to address model uncertainty

It is recognised that there are uncertainties involved in assessing the permitted take using computer simulation models, which will be the case for most of the water resource plan areas. Some of these issues are:

- carryover — the full complexity of carryover arrangements will need to be incorporated in the determination of permitted take
- behavioural changes — where people use water differently from the use assumed in the model, there will be cases where the water resource plan rules have been met but the permitted take is still exceeded
- extreme conditions — there will be greater uncertainty under extreme climatic conditions because of the limited data available against which to calibrate the models
- model error — there will be cases where the model does not accurately simulate system behaviour; this can be due to a range of causes such as the interaction between different attributes being poorly understood (e.g. surface-water and groundwater interactions) or there not being enough information available to sufficiently calibrate the model.

The diversion limit method will accommodate these issues and uncertainties by applying a debits and credits regime. This method builds on experience with the current Murray–Darling Basin Cap on surface-water diversions. Ongoing improvements to models will reduce these uncertainties over time.

To assess diversion limit compliance, the Basin state will be required to determine that actual take is less than or equal to permitted take for that water year.

If actual take is greater than permitted take, the Basin state will be required to report non-compliance unless the following conditions apply:

- the cumulative debit, within the period of effect of an accredited water resource plan, is less than 20% of the SDL (i.e. actual take does not exceed permitted take by more than 20% of the SDL)
- cumulative credits from previous water accounting periods are used to offset excess take, subject to:
 - cumulative credits can accumulate to a maximum of 30% of the SDL
 - cumulative credits used to offset excess take in any one water accounting period are limited to 10% of the SDL (i.e. to prevent adverse environmental outcomes, a cumulative credit of 30% cannot all be used in a single year to offset a debit).

This proposed credits and debits approach is intended to reduce false reports of non-compliance that are in fact due to model error and uncertainty. This will enable Basin states and MDBA to focus resources on those SDL areas where actual take is demonstrably growing beyond permitted take.

Full public disclosure of models, calculations, actual take and compliance assessment will be provided, subject to any lawful exceptions (*Privacy Act 1988* (Cwlth), evidentiary or enforcement matters).

When an accredited water resource plan is implemented, it is proposed there will be no importing of existing debits or credits from the current Cap on surface-water diversions because the basis of the limit, its governance and the regulatory legal context are substantively different. In addition, there are other mechanisms to help with transition, including Water for the Future investment, temporary diversion provisions and risk allocation (see Chapter 5 of this volume). However, MDBA will give further consideration to ensuring

the integrity of both the Cap and the SDL in the transition period to full implementation of the Basin Plan and water resource plans.

Different forms of take

The method for determining compliance will apply to all diversions in the water resource plan area, but some forms of take can be measured and their compliance determined with greater accuracy than others. It is important that the difficulties in accurately determining some forms of take (e.g. interception by farm dams) will not undermine provision of a clear limit for those forms of take for which compliance can be more accurately determined (e.g. metered water access entitlements).

The diversion limit for surface water will include components for the following forms of take:

- surface-water access entitlements — metered and included in hydrologic models
- surface-water access entitlements — estimated using an approved method
- harvesting floodplain surface water — included in hydrologic models
- harvesting floodplain surface water — estimated using an approved method
- take from watercourses under basic rights (stock and domestic rights, native title rights)
- interception by farm dams under basic rights (stock and domestic rights, native title rights and harvestable rights)
- interception by farm dams (irrigation and other purposes, excluding floodplain harvesting) — measured take
- interception by farm dams (irrigation and other purposes, excluding floodplain harvesting) — estimated using an approved method
- interception by forestry plantations (as it affects run-off).

The diversion limit for groundwater will include the following forms of take:

- groundwater access entitlements — measured take
- groundwater access entitlements — estimated using an approved method
- groundwater take under basic rights (stock and domestic, native title rights)
- take by forestry plantations (as it affects aquifers)
- interception by mining — measured take
- interception by mining — estimated using an approved model or method.

For more detail about the forms and components of take, see Tables 4.13 and 6.1.

Accounting for trade

Currently, trade in entitlements between water resource plan areas is generally accounted for in the water resource plan area of origin, because that is from where the characteristics of the entitlement are derived. However, this is not intuitive or transparent and does not reflect the physical location of extraction. It also conflicts with national water accounting standards and the method for accounting trade in the Cap.

Traded water will be accounted for in the calculation of both actual and permitted take. The volume traded will be kept on the water account in



The River Murray at Boundary Bend, Victoria

the water resource plan area where the water was extracted to be consistent with the national water account, reflect the physical reality and provide transparency. To ensure the traded water is not double-counted, the following adjustments need to be performed on the permitted and actual take:

- the permitted take in the origin water resource plan area must be reduced by the volume traded
- the permitted take in the destination water resource plan area must be increased by the volume traded
- the actual volume extracted must be included in the actual take of the destination water resource plan area.

These requirements have been put in place to ensure that trade is not restricted by the new diversion limit arrangements.

Trading rules are detailed in Section 6.4 'Water trading rules'. They include rules to ensure environmental outcomes are not affected by trade.

Accounting for held and planned environmental water

The use of water for the purpose of achieving environmental watering outcomes consistently with the Environmental Watering Plan is not limited by diversion limits. This means that take for such uses will not be counted as 'actual take' when permitted take and actual take are being compared to determine diversion limit compliance at the end of a water year.

Water available for environmental watering outcomes consistent with the Environmental Watering Plan may be water that has been made available under a water access entitlement or other water access right for achieving environmental outcomes (held environmental water). Alternatively, it may be planned environmental water that is set aside by a water resource plan for achieving environmental outcomes, for example through flow rules.

MDBA will account for the volumes of held environmental water used each year under the Water Act (s. 32). Basin states will be required to report to MDBA annually on volumes of planned environmental water and held environmental water used each year under the Basin Plan Monitoring and Evaluation Program.

Mechanisms to deal with change in purpose for which water rights are used — impacts on diversion limit compliance and water security

Both planned environmental water and held environmental water contribute to meeting environmental water requirements, and to ensuring that the SDL is not exceeded (see Figure 7.3). As shown in the figure, the total pool of water access rights is a different total from the SDL. The quantity of environmental water is to some extent determined by how much held environmental water is available.

The holders of water rights generally have the discretion to determine the purpose for which they will use their right from year to year — whether or not it is held environmental water. However, to assist Basin states in ensuring diversion limit compliance and providing third-party certainty, water resource plans will be required to identify water rights that Basin states understand will be used for environmental purposes. This will help Basin states to determine the water resource plan rules necessary to allocate water in a manner that supports compliance with the SDL.

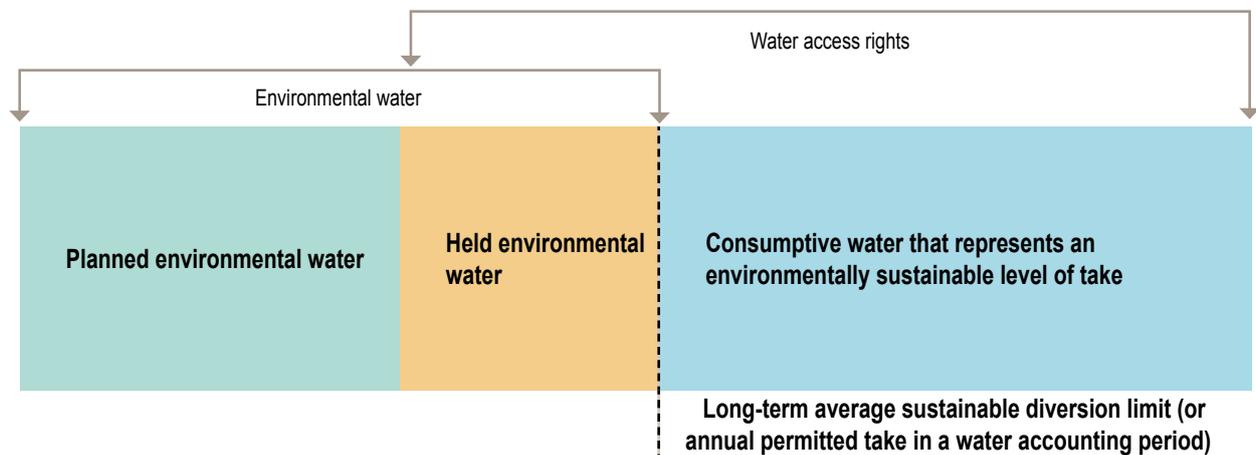


Figure 7.3 Hypothetical balance of planned and held environmental water contributions to meet environmental water requirements for a water resource plan area that ensures the SDL is not exceeded

Note: This figure is a conceptual representation of the long-term average water balance, as well as the balance for a water accounting period, which varies from year to year. The figure is not to scale and the proportions will vary between SDL areas and between water accounting periods.

In this diagram the terms planned environmental water, held environmental water and SDL have the same meaning as in the Environmental Watering Plan. Take of consumptive water is limited by the SDLs. An environmentally sustainable level of take reflects environmental water requirements.

The proposed Basin Plan will not prohibit the purpose of a water right being changed during the 10-year term of a water resource plan. Where the purpose of a water right changes from environmental purposes consistent with the Environmental Watering Plan to ‘take’ that is limited by the diversion limit, this presents a risk of exceeding the diversion limit. Where the purpose of a water right changes from ‘take’ limited by the diversion limit to purposes consistent with the Environmental Watering Plan, it is important that the overall allocations do not change, in order not to diminish the benefit of the new held environmental water.

The Basin Plan will require Basin states, when preparing water resource plans for accreditation, to provide mechanisms that ensure a change in purpose

for which water is used, does not diminish the environmental benefit of held environmental water and does not cause diversion limits to be exceeded. The Basin Plan will also require Basin states to consider the impacts of these mechanisms on water security for all uses of Basin water resources (including consumptive use). The mechanisms may, for example, involve the water resource plan requiring annual declarations about the intentions of holders of held environmental water and/or issuing entitlements with particular caveats (i.e. water is only to be used for a certain environmental purpose for a period of time).

This will mean that, if a consumptive entitlement is secured during the water resource plan accreditation period for environmental purposes, allocations will continue to be made to the entitlement as if its purpose had not changed. This will ensure that the purchase actually has a beneficial environmental effect. It will mean that the Basin state will not be able to increase allocations on the basis that there are fewer consumptive entitlement holders whose take is limited by the SDL.

The Basin Plan will require that each water resource plan includes rules to ensure there will be no reduction in planned environmental water protection over the life of the water resource plan. The Basin Plan will also require each water resource plan to document the contribution that environmental water makes towards meeting environmental water requirements in the water resource plan area to ensure that SDLs are not exceeded.

Groundwater diversion limit compliance method

Diversion limit compliance for groundwater requires slightly different arrangements to surface water because of the different nature of the resource (slower response time to rainfall and difficulty in measuring the volume of the resource in real time), and the different water management arrangements. However, the groundwater diversion limit compliance method will share the same fundamental construct of actual take assessed against permitted take.

For groundwater, SDLs will be set separately for different SDL areas. Diversion limit compliance will therefore be determined by SDL area. Actual diversions must be less than or equal to permitted diversions for the water accounting period (1 July to 30 June) for compliance to be reported, unless certain other conditions are satisfied.

The method for determining diversion limit compliance for groundwater systems will be against annual volumetric limits that reflect the assessed risk to the groundwater system from short-term extraction above the diversion limit.

MDBA has developed a method to determine the take temporarily permitted above the SDL for each SDL area, according to the assessed risk of compromising the environmentally sustainable level of take characteristics. The risk classification is based on the Recharge Risk Assessment Method.



Stock watering point between Booligal and Hay, New South Wales. Water is channelled in from the Lachlan River.

A Basin state can report diversion limit compliance where:

- the actual take for a water accounting period for each SDL area does not exceed the SDL by more than 5% for high-risk, 20% for medium-risk and 30% for low-risk SDL areas
- the average annual actual take over the past five water accounting periods is less than or equal to the SDL.

Diversion limit compliance framework

This section outlines MDBA's intended diversion limit compliance framework to provide context, clarity and transparency as to how MDBA intends to implement the diversion limit compliance method.

A detailed description of the framework is provided in Figure 7.4 and consists of these key elements:

- a method to determine compliance with the diversion limit (Water Act s. 22(1) item 8) by determining whether actual take in a water accounting period is less than or equal to the permitted take
- annual reporting obligations that require Basin states to determine their compliance with the diversion limit in accordance with the method and report this to MDBA
- MDBA verification to ensure that the compliance method is being accurately applied and to determine the causes of any non-compliance
- compliance assessment with water resource plan rules and obligations, and MDBA investigation where non-compliance is verified
- ensuring compliance, including by mechanisms such as a negotiated process or by MDBA enforcement.

This new compliance framework will come into effect once a water resource plan is accredited. The Cap arrangements will continue under the existing water planning arrangements and in accordance with the Murray–Darling Basin Agreement until this is the case, and include the period after the Basin Plan is in place but before a water resource plan has been accredited. However, it should be noted that the Cap is not enforceable under the Basin Plan.

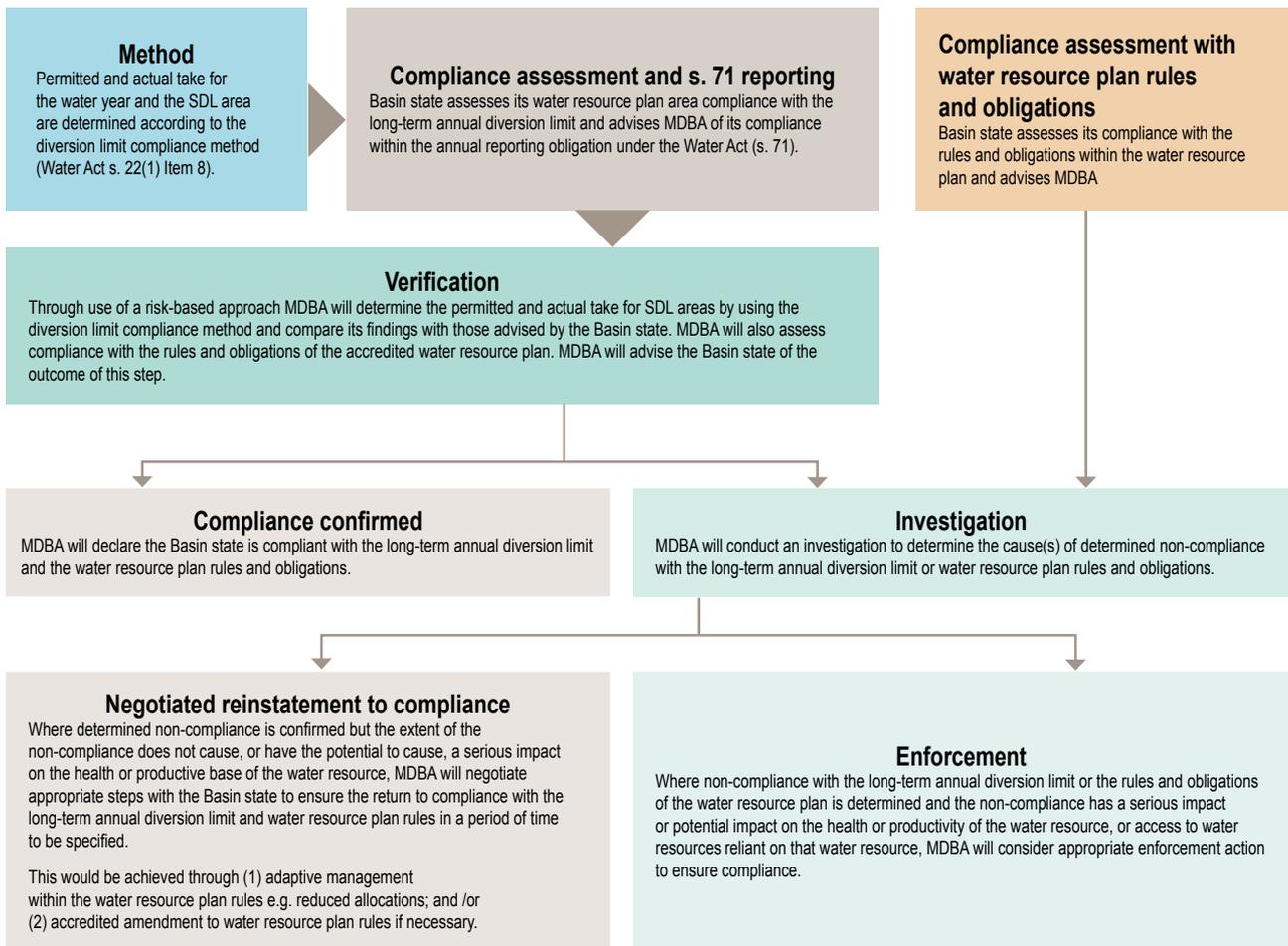


Figure 7.4 The diversion limit compliance framework

Reporting obligations and guidelines

Under the Water Act (s. 71), the reporting obligations provide the framework for annual reporting of compliance by the Basin states, against the diversion limit compliance method. MDBA may issue guidelines on how it interprets these reporting obligations and will consult the Basin states on the content of such guidelines.

Verification and investigation

Upon receipt of Basin state reports, MDBA will conduct verification procedures to assess whether the actual and permitted diversions have been determined correctly in accordance with the method and whether errors are present in the data or analysis.

Where the report and/or verification determines non-compliance (or where risks and drivers of future non-compliance are identified) MDBA will investigate to determine the cause of non-compliance. First, it will assess whether the water resource plan rules have been implemented and complied with and, if this is the case, whether the assumptions embedded in the model and water resource plan rules no longer apply.

Where non-compliance with the diversion limit or the water resource plan rules is identified, MDBA will conduct an investigation to determine the cause and the regulated entity at fault.

Ensuring compliance

Compliance will be achieved through the broader architecture of the Basin Plan and water resource plan requirements, as well as the overall Basin Plan compliance framework.

Ensuring compliance will rely on a number of mechanisms:

- water resource plans, including rules that allow allocations or other rules to be adjusted to bring diversions within permitted take, in response to non-compliance (or risk of non-compliance) with the diversion limit
- review of water resource plan rules
- where it is found that the water resource plan rules do not support diversion limit compliance, the Basin state must propose an amendment to the water resource plan for accreditation
- investigation where non-compliance with water resource plan rules is identified
- application of a range of measures by MDBA including enforcement mechanisms where required.

MDBA will publish guidelines or policy on its considerations for enforcement power decisions. This will ensure accountable decision-making and provide transparency for the regulated community.

Non-compliance with permitted take only

Where the permitted take has not been achieved, but the audit has found that water resource plan rules have been adhered to, the non-compliance will probably be due to a growth in diversions associated with changed behaviour by water rights holders or through other forms of take (e.g. from conservative to risky). Similarly, trade between water resource plan areas can lead to different behaviours by the seller and the buyer, in full compliance with water resource plan rules. Water resource plan access rules are mostly determined using a computer model that assumes a certain proportion of the allocated water is used. This is quite often based on historical behaviour. If this behaviour changes and a greater proportion of the allocation is being used, this may lead to non-compliance with the permitted take, even though there is compliance with the water resource plan access rules.

To remedy this, the model will be upgraded to better reflect the changed behaviour for each form of take. The upgraded model would need to be re-run to confirm that water resource plan rules support compliance with the diversion limit. Any proposed change to water resource plan rules, including use of the upgraded model to determine permitted take, would need to be submitted for accreditation as amendments to the water resource plan.

7.3 Monitoring and evaluation

The Basin Plan must set out a program to monitor and evaluate its effectiveness (*Water Act 2007* (Cwlth) (s. 22)). The Monitoring and Evaluation Program must include the principles to be applied and the framework to be used in evaluation, reporting requirements for the Commonwealth and Basin states, and five-yearly reviews of the Water Quality and Salinity Management Plan targets and the Environmental Watering Plan (*Water Act* s. 22). As well as being a legislative requirement, monitoring and evaluation will provide a rigorous process for adaptive management and continuous improvement of the Basin Plan using the best available science (biophysical, social and economic).



Inverell Public School students monitoring water pollution at Lake Inverell, New South Wales

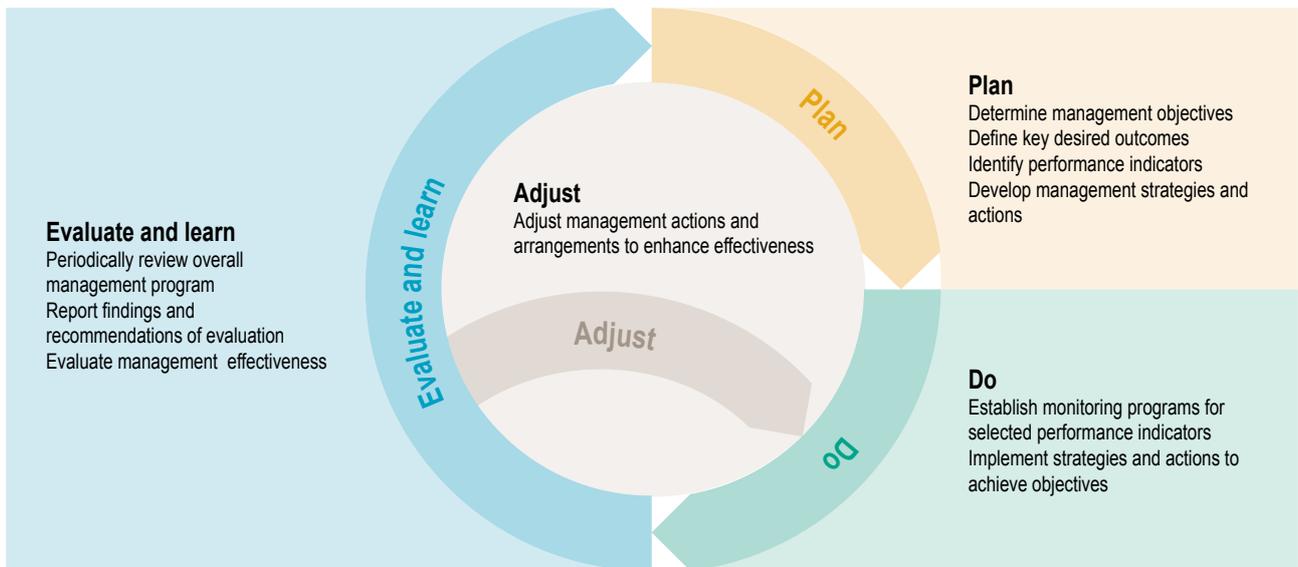


Figure 7.5 The planning cycle

Source: Jones (2005)

The monitoring and evaluation cycle (Figure 7.5) comprises four interrelated components:

- monitoring — the regular collection and analysis of information to assist timely decision-making, ensuring accountability and providing the basis for evaluation and learning
- evaluation — periodic assessment of impact, appropriateness, effectiveness and efficiency
- reporting — the publication of data and findings from the evaluation process
- reviewing and improving — the use of the evaluation findings to inform decision-making about whether and where adjustments might be made to ensure achievement of objectives and outcomes.

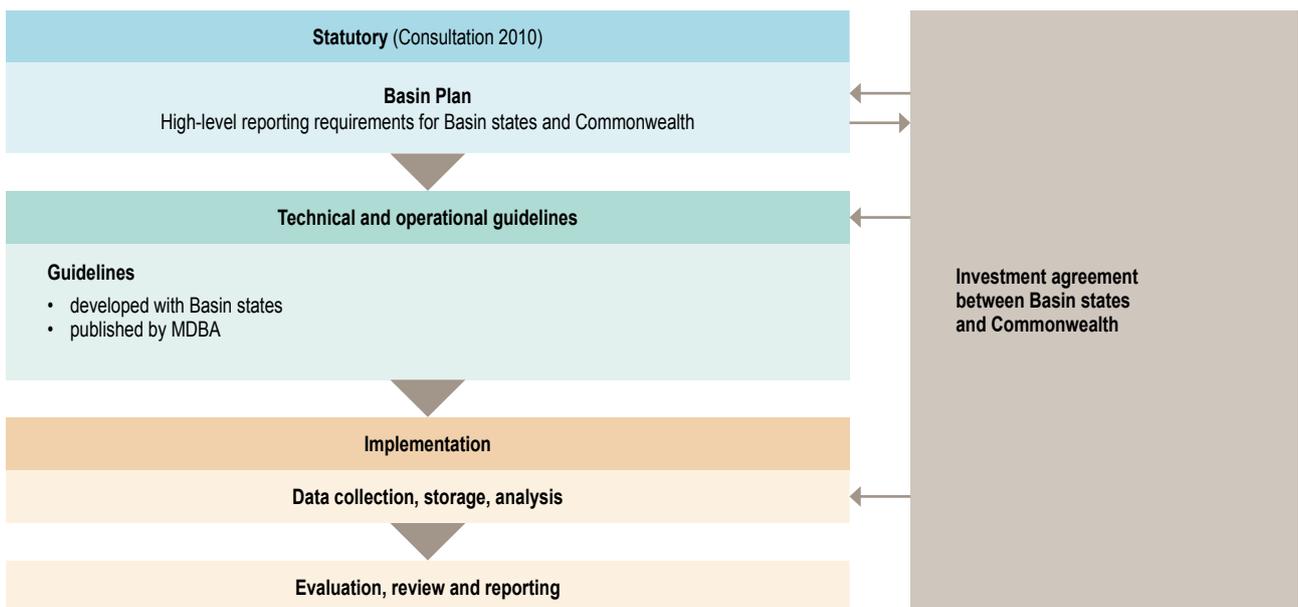


Figure 7.6 Relationship between the Monitoring and Evaluation Program, guidelines, implementation and investment

The structure for implementing the Monitoring and Evaluation Program is presented in Figure 7.6. The program will:

- provide the framework for collection and analysis of the critical information needed to determine whether and how the Basin Plan is meeting its purpose, objectives and targets
- guide and facilitate data and information provision for annual reporting, and 5-yearly and 10-yearly reviews of the Basin Plan
- ensure through reporting of outcomes that Basin Plan activities meet Australian Government requirements for accountability and transparency, to enable learning, improvement and accountability
- provide the principal mechanism to reinforce, review and refine activities as part of an ongoing adaptive management process.

Principles

Nine principles have been used in the development of the Monitoring and Evaluation Program and will guide its implementation:

- effective partnerships are established between the Australian Government and Basin states by defining clear responsibilities and obligations for Basin Plan monitoring and evaluation activities
- program logic is the key tool for evaluating Basin Plan performance by establishing causal links between program activities and outcomes; conceptual frameworks and models are the basis for establishing causal links and for testing underlying assumptions
- best available scientific knowledge (biophysical, social and economic), evidence and analysis are used in the Monitoring and Evaluation Program's application to ensure credibility, transparency and usefulness of evaluation findings
- multiple lines and levels of evidence, taking into account quantitative and qualitative data, are used in evaluating progress towards achievement of Basin Plan targets and objectives
- adaptive management through continuous learning is used to refine Basin Plan initiatives where required, and leads to adjustments in the plan programs, activities and targets
- cost-effectiveness of monitoring and evaluation activities is achieved by ensuring that benefits outweigh costs; existing monitoring programs and associated data are reviewed and used where appropriate to avoid duplication
- time and space scales are recognised and accounted for in evaluating Basin Plan performance
- consistent collection, collation and reporting systems are adopted by the Australian Government and Basin states
- stakeholder involvement in design and implementation of the program is encouraged.



Measuring water seepage at Burrinjuck Dam, New South Wales

What is the framework?

The monitoring and evaluation program will establish the information needed to evaluate effectiveness, by using the approach of the Australian Government's framework for natural resource monitoring, evaluating, reporting and improvement (MERI).

The purpose of this framework is to provide over-arching principles and guidance to the development of monitoring, evaluation and reporting processes within the natural resource management field. The MERI Framework incorporates four important concepts, which are relevant to this framework:

- an integrated approach to investment and program design, the planning process, evaluation and adaptive program management
- an asset-based approach to evaluation that promotes target setting for the key asset classes that contribute to sustainable natural resource management
- monitoring program performance in addition to the state of and change over time in the condition of assets
- reporting with an emphasis on outcomes and impacts, including at an intermediate outcome stage.

The MERI Framework has been adopted to frame the Basin Plan monitoring and evaluation program, with some customisation. The monitoring component of this framework will be addressed in the overall monitoring framework; the evaluation component will be addressed in the key evaluation questions; the reporting is addressed in the reporting requirements of the Basin states and Commonwealth; while the improvement component will be addressed in the adaptive management section.

Monitoring framework

Six key Basin Plan elements will be addressed in the Monitoring and Evaluation Program's monitoring framework:

- ecosystem outcomes from the implementation of long-term average sustainable diversion limits (SDLs) and the Environmental Watering Plan
- the Water Quality and Salinity Management Plan
- critical human water needs
- risks to the condition and availability of Basin water resources
- water trading and transfer rules
- socioeconomic impacts.

The conceptual framework for design of Monitoring and Evaluation Program elements is described in a program logic (Figures 7.7–7.16 and Table 7.1). The program logic identifies expected immediate, intermediate and longer-term program outcomes and impacts and provides a foundation for determining which strategies are effective. The Monitoring and Evaluation Program will operate at a range of scales and time frames:

- longer-term outcomes (11+ years)
 - the desired improvements across the Basin as a result of the Basin Plan; they may be measurable (although difficult and complex to measure at Basin scale) but may be difficult to attribute solely to the plan's water management inputs and activities
- intermediate outcomes (6–10 years)
 - the expected outcomes at the point where the Basin Plan's strategies have been applied
 - often protection or management outcomes
 - they are measurable (although with possible difficulty in measuring at the Basin scale) and significantly attributable to the Basin Plan's inputs and activities

- immediate outcomes (1–5 years)
 - the immediate consequences of each input and activity; these are generally easily identifiable and measurable
- foundational activities
 - the inputs and activities used to develop and implement the Basin Plan
 - inputs include the component parts of the Basin Plan such as the SDLs, the Environmental Watering Plan and the Water Quality and Salinity Management Plan.

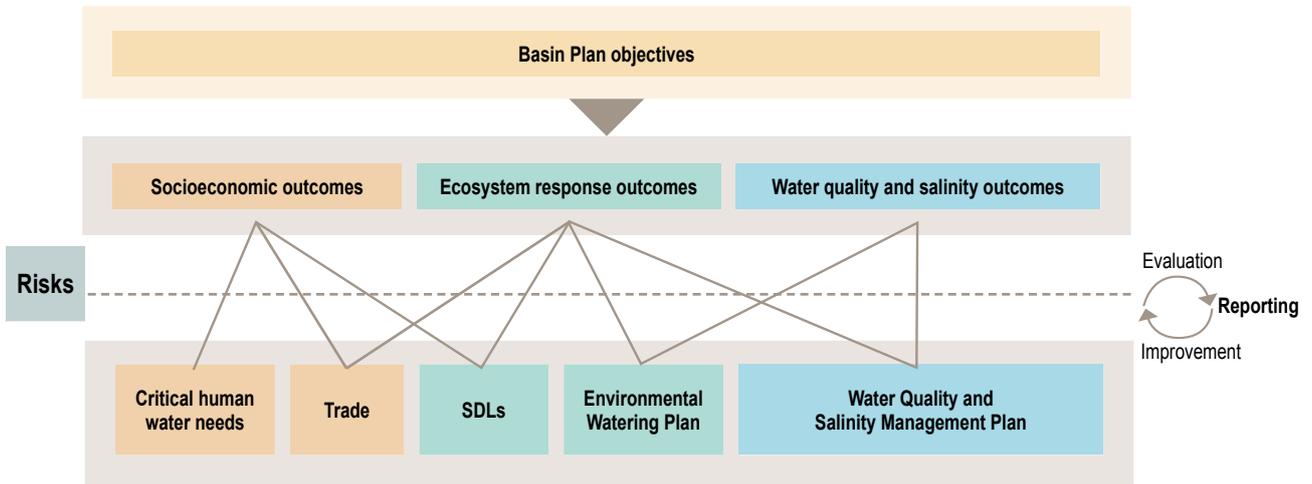


Figure 7.7 Program logic for the Monitoring and Evaluation Program

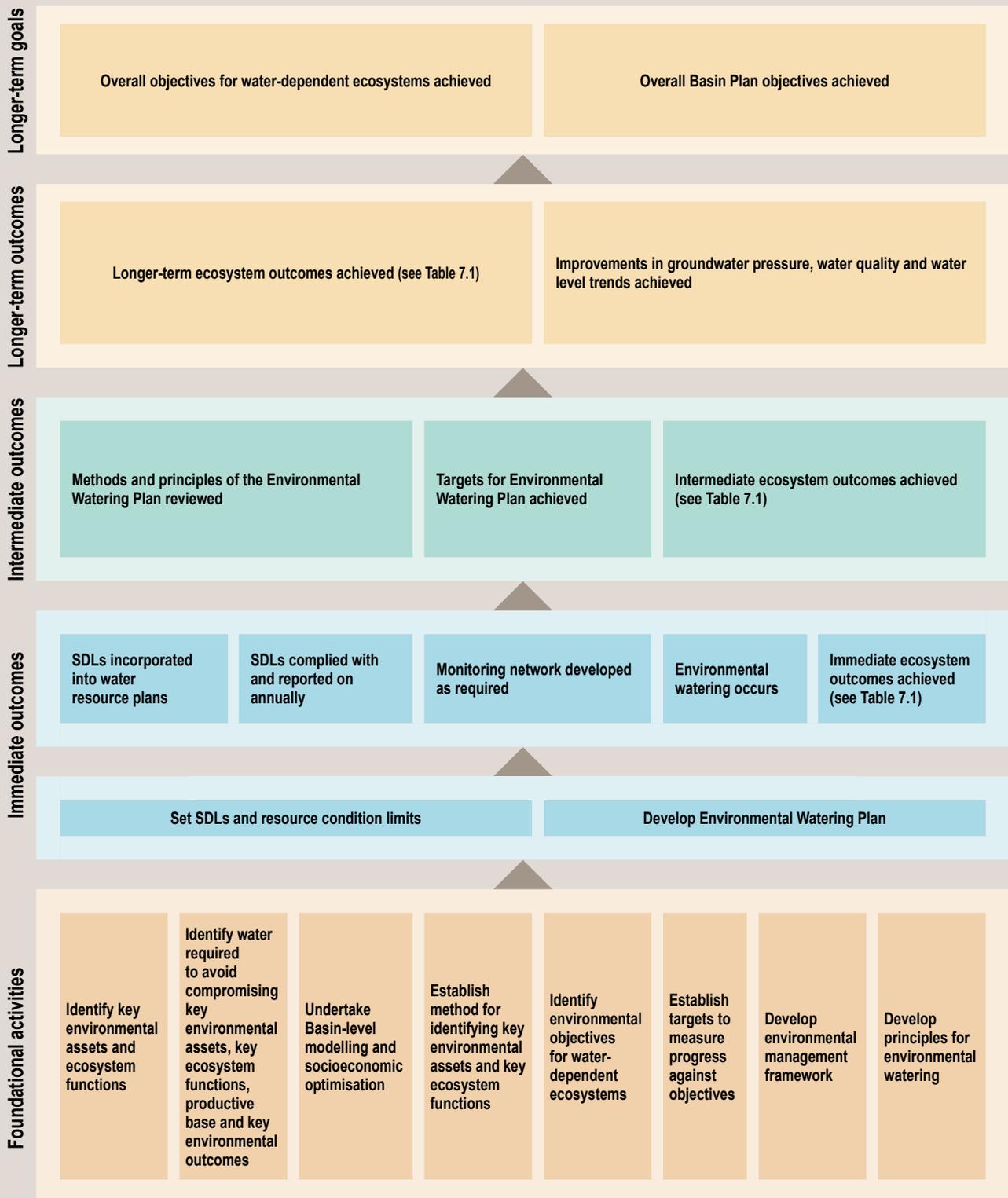
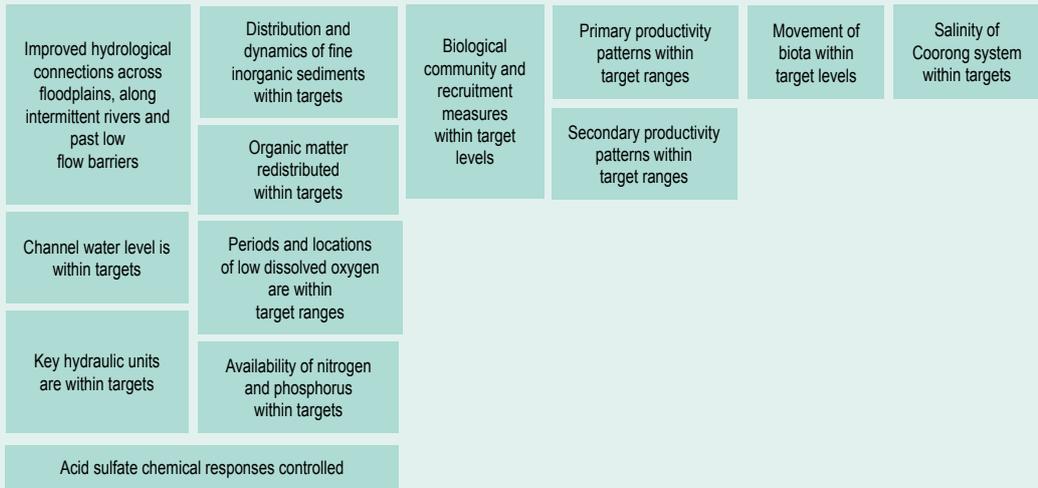


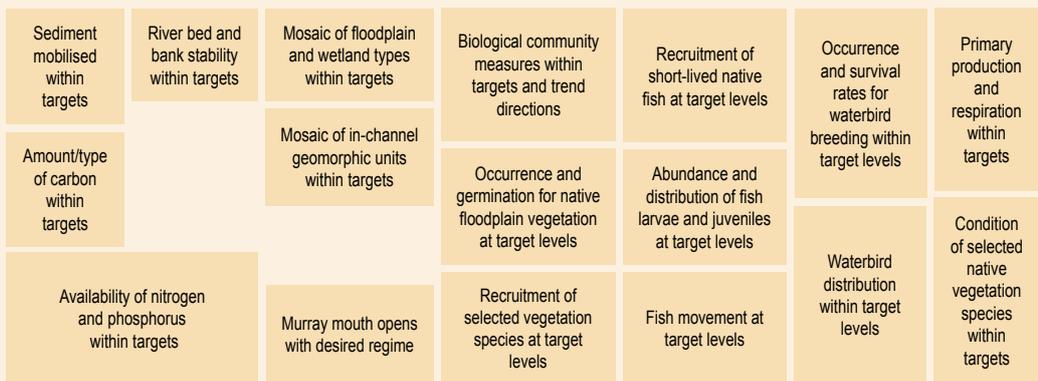
Figure 7.8 Program logic for the SDLs and Environmental Watering Plan

Actions under Basin Plan and water resource plans

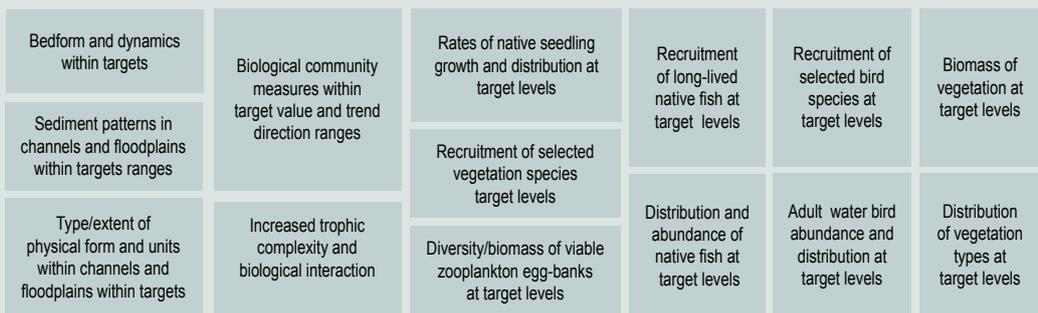
Ecosystem outcomes observed within 1 year



Ecosystem outcomes observed over 1 to 5 years



Ecosystem outcomes observed over 5 to 20 years



Ecosystem outcomes observed after 20 years

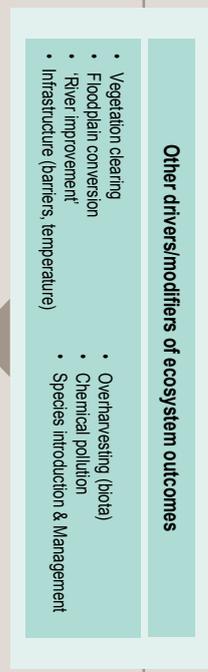


Figure 7.9 Ecosystem monitoring and evaluation conceptual framework: local scale

Source: Davies et al. (2008)

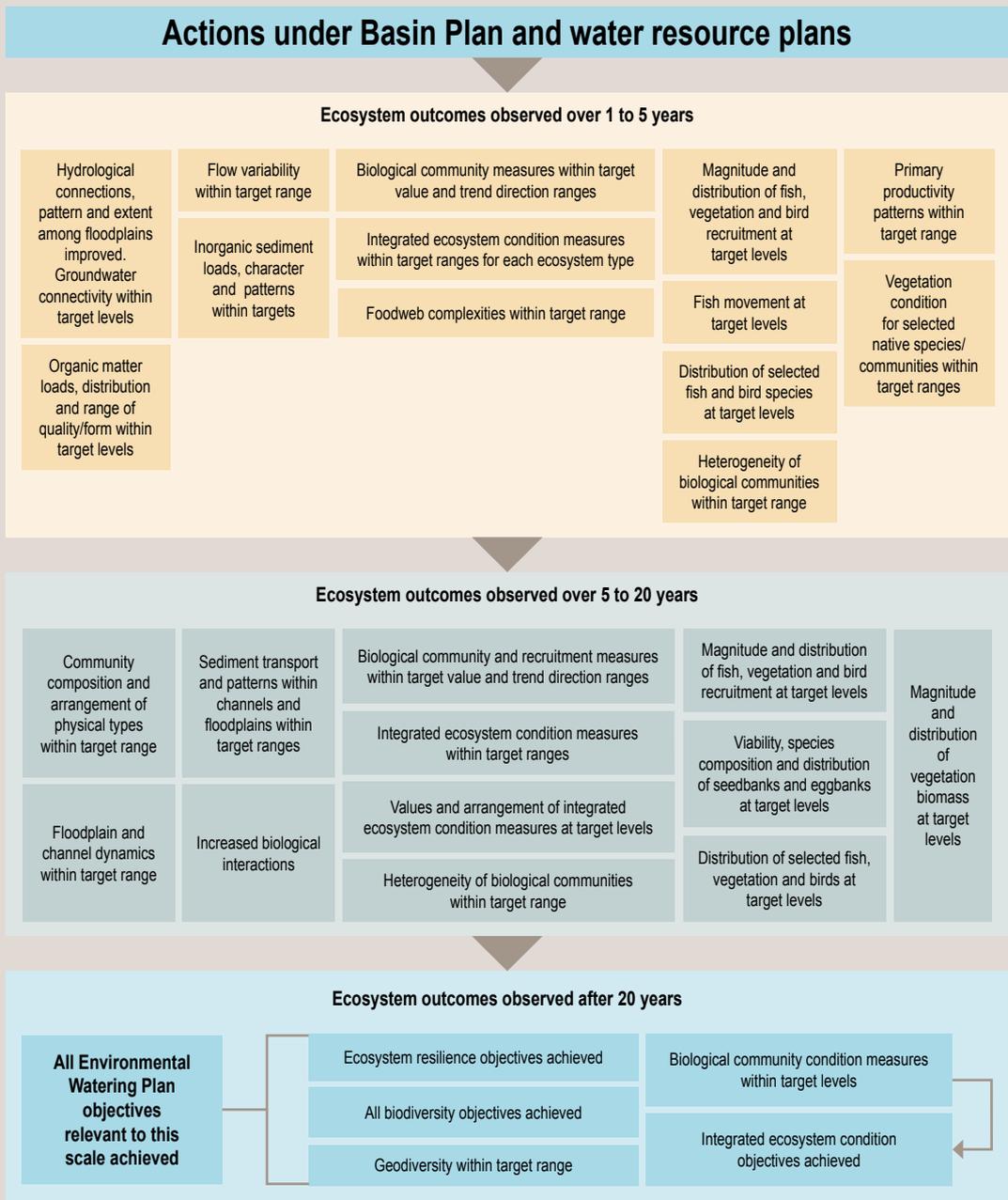


Figure 7.10 Ecosystem monitoring and evaluation conceptual framework: Basin scale

Source: Davies et al. (2008)

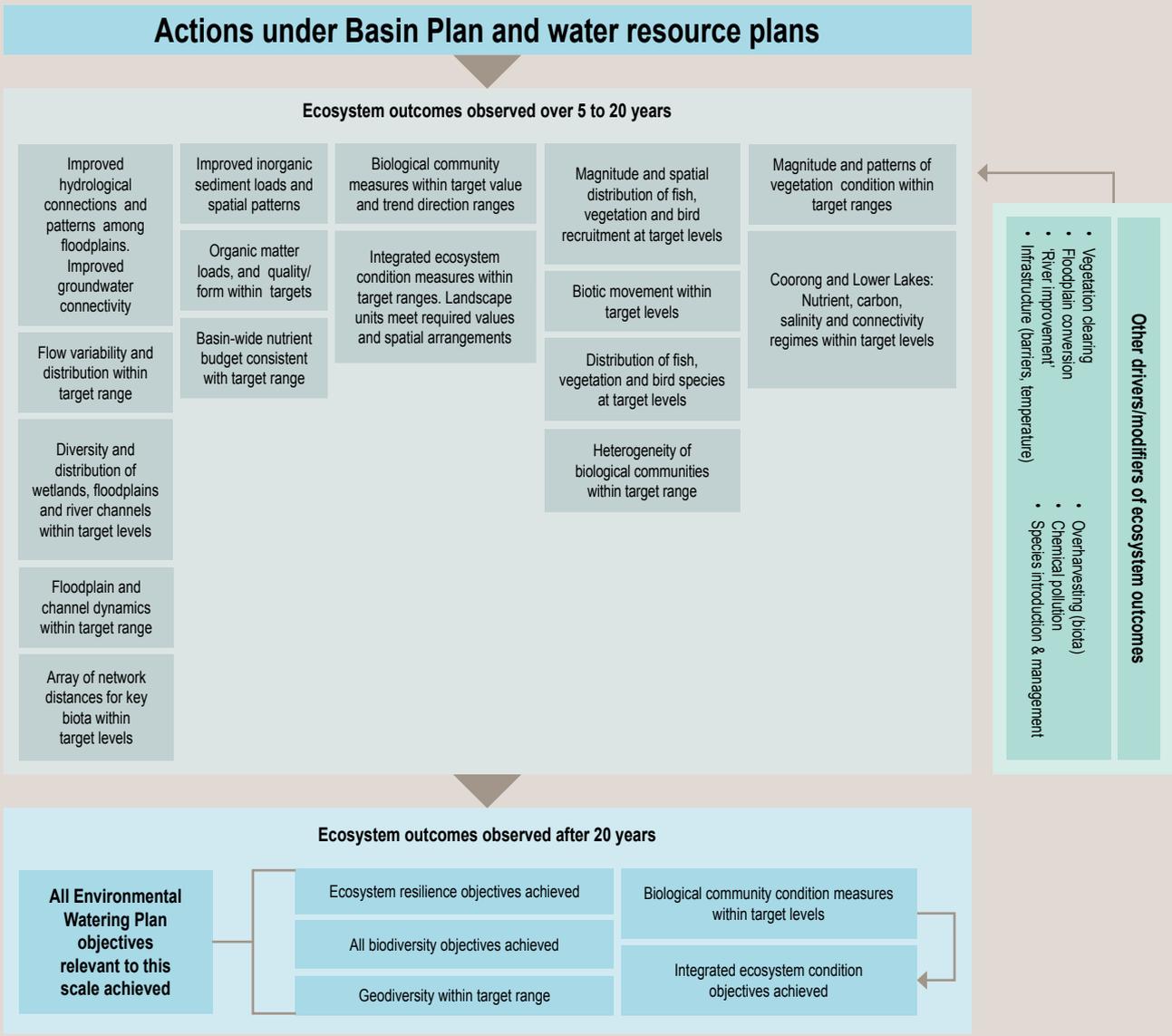


Figure 7.11 Ecosystem monitoring and evaluation conceptual framework: valley scale

Source: Davies et al. (2008)

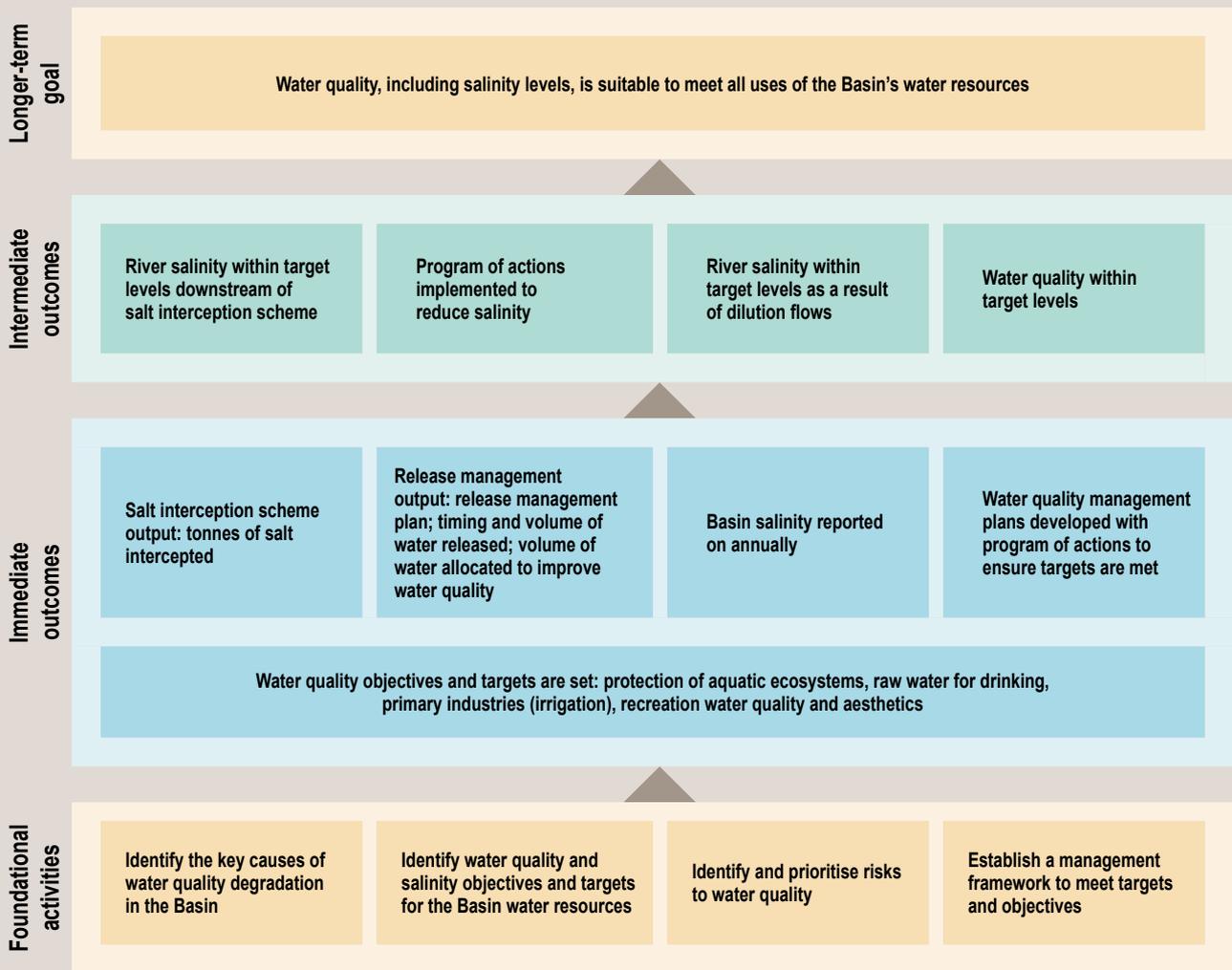


Figure 7.12 Program logic for the Water Quality and Salinity Management Plan

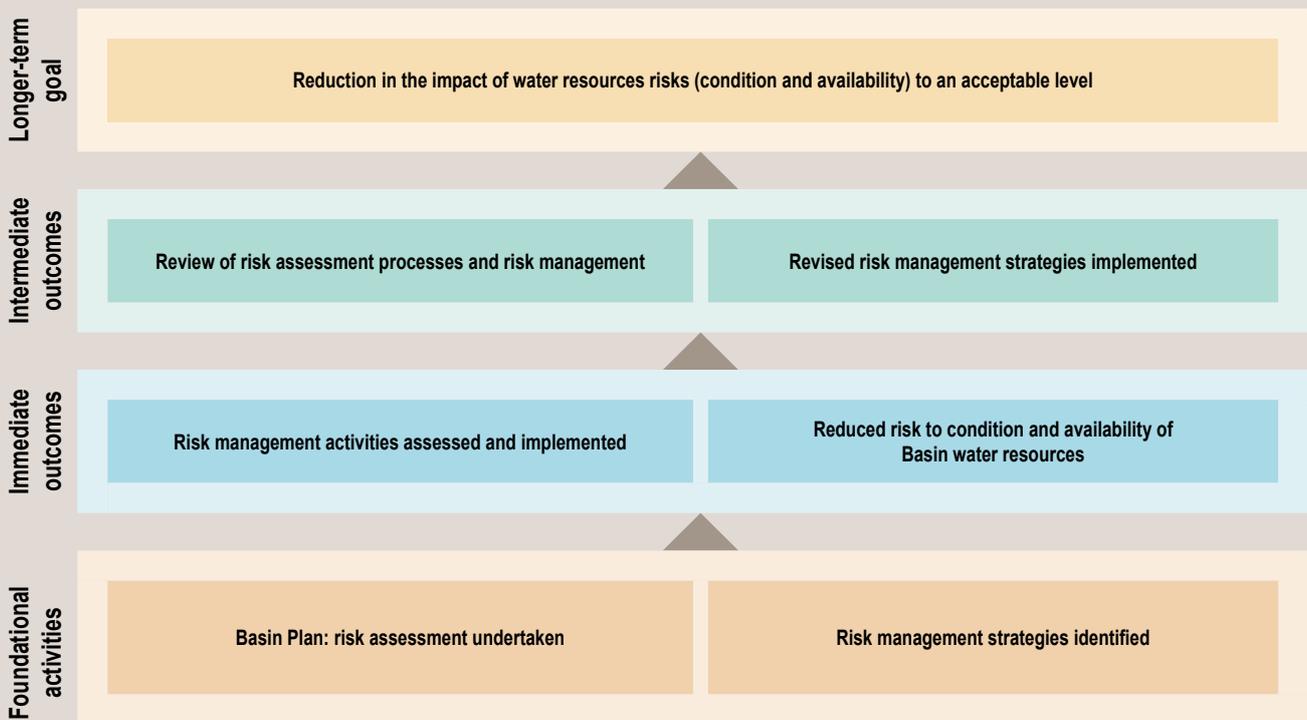


Figure 7.13 Program logic for risk assessment and risk management

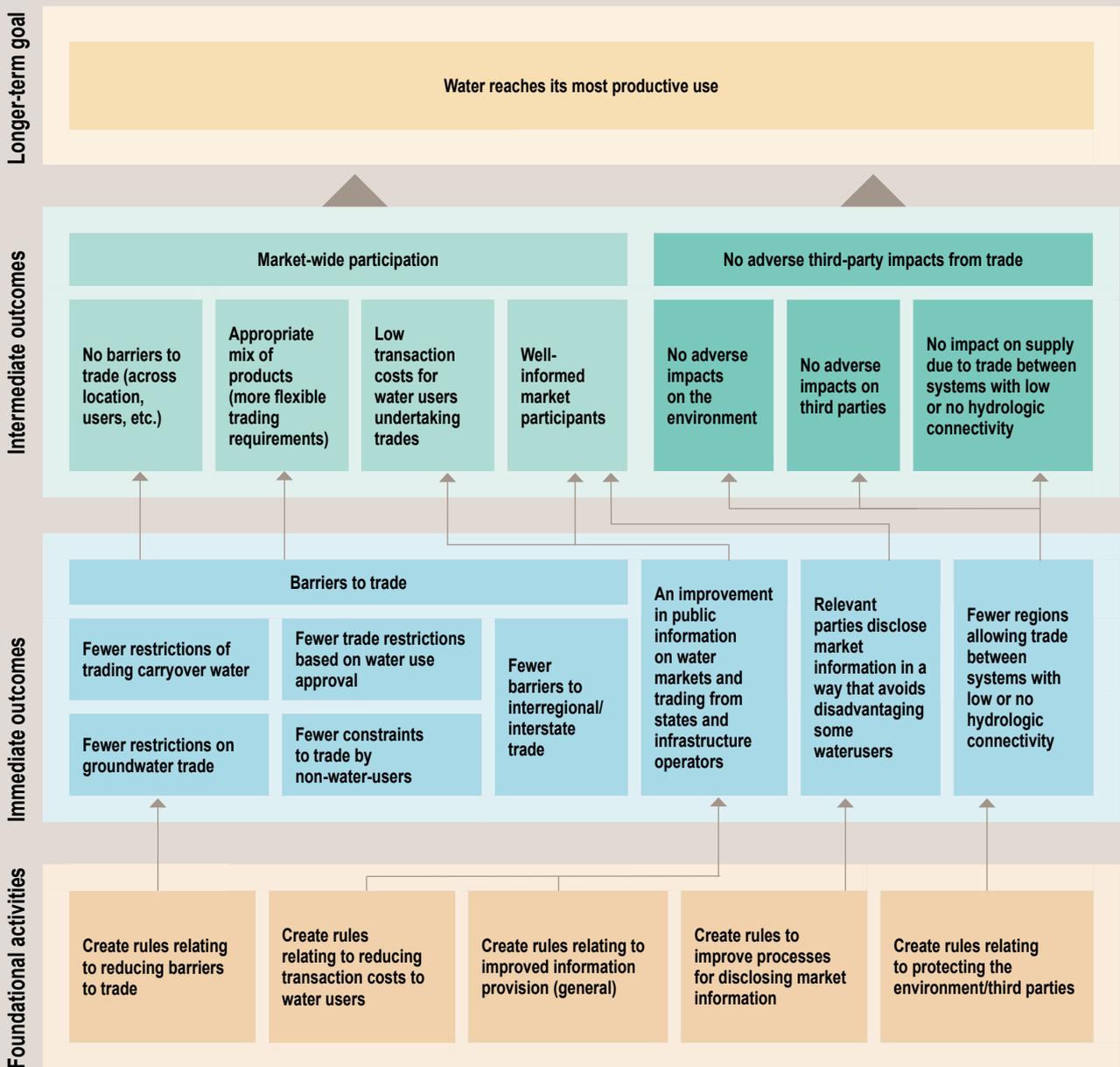


Figure 7.14 Program logic for water trade

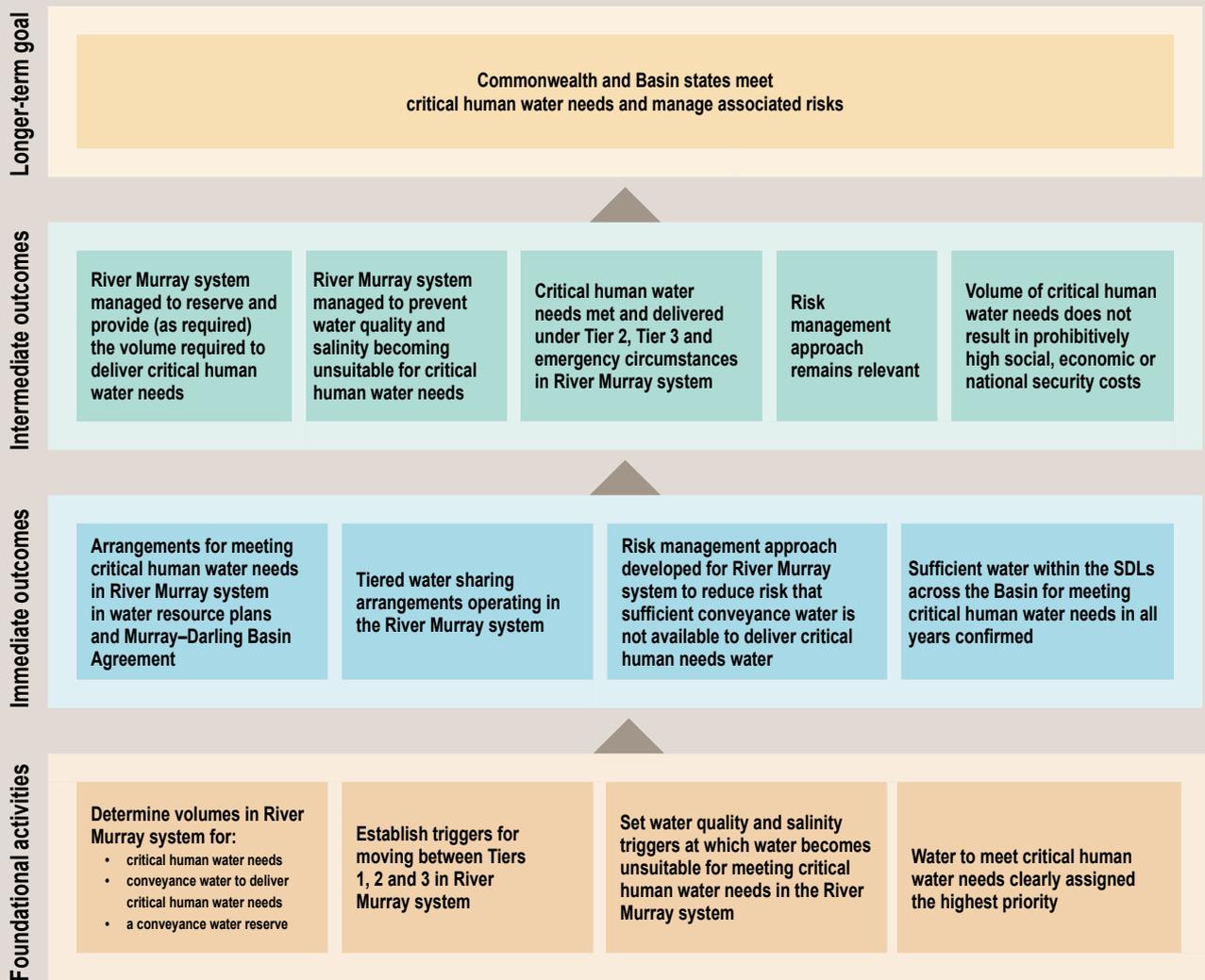


Figure 7.15 Program logic for critical human water needs

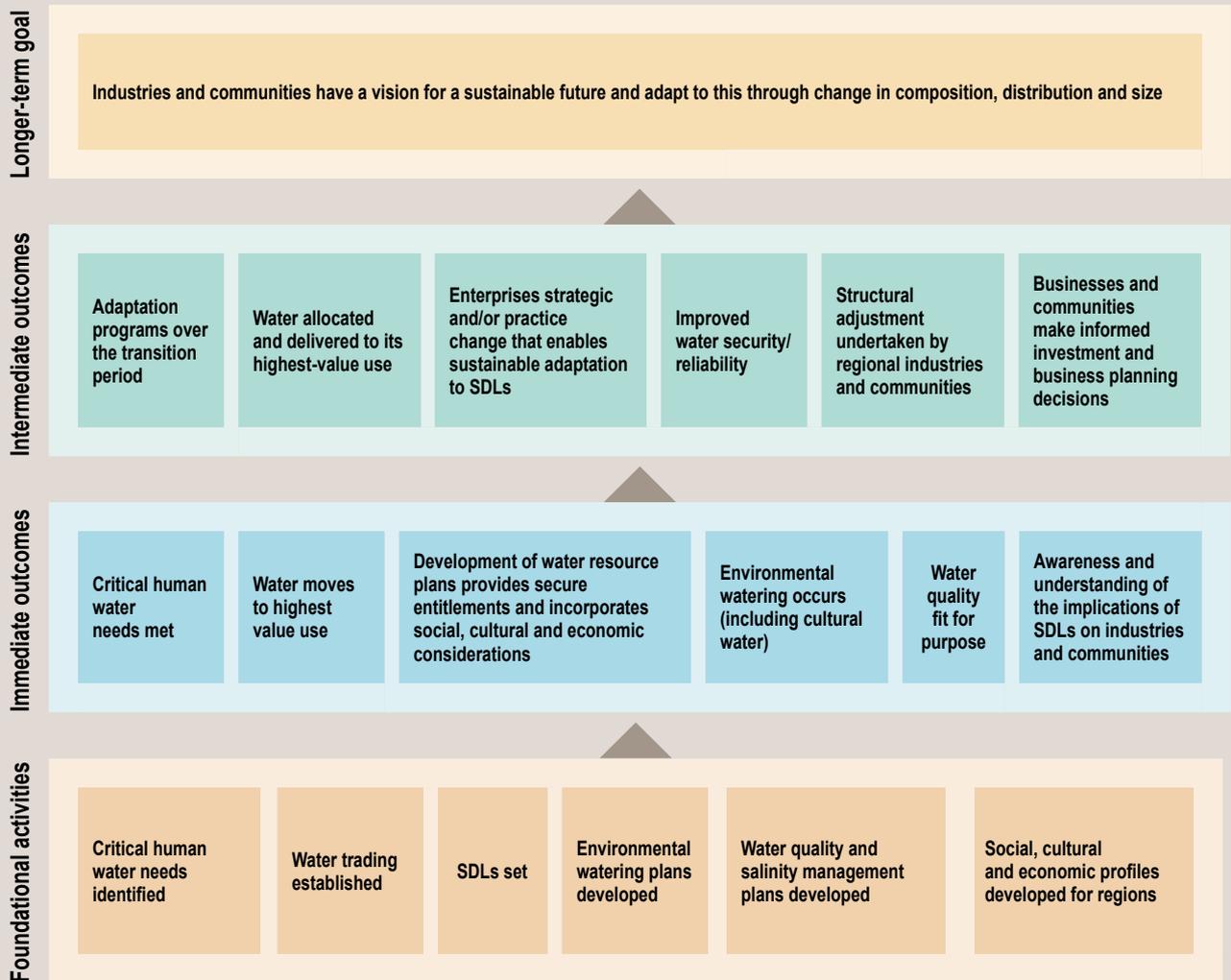


Figure 7.16 Program logic for social and economic outcomes

Table 7.1 The relationship between the Environmental Watering Plan’s overall objectives for water-dependent ecosystems and the ecosystem response outcomes^a

Overall environmental objectives for water-dependent ecosystems	Ecosystem response outcomes (and ecosystem reporting requirements)	Scale and timeframe of expected ecosystem response outcomes ^b	
<p>1. To protect and restore the water-dependent ecosystems that depend on Basin water resources</p> <p>Targets by which to measure progress towards this objective^c:</p> <ul style="list-style-type: none"> no loss or degradation of ecosystem response outcomes within 5 years of the Basin Plan commencing improvements in ecosystem response outcomes within 5–20 years of the Basin Plan commencing. 	Hydrologic outcomes		
	Hydrologic connectivity at local scale	Local, short term	
	Hydrologic connectivity at valley scale, hydrologic connectivity at Basin scale	Valley, short term Basin, long term	
	Physicochemical outcomes		
	Carbon dynamics	Valley, short term	
	Floodplain and wetland hydrological types	Local, short term	
	Riverine landscape units	Basin, long term	
	Biological outcomes		
	Vegetation physiological condition	Local, valley, Basin, short term	
	Biomass/standing crop of riverine vegetation	Local, long term	
	Recruitment of fish, riverine vegetation and birds	Valley, short term	
	Waterbird breeding	Local, short term	
	Recruitment of selected riverine vegetation	Local, long term	
	Array of network distances for riverine biota	Basin, long term	
	Riverine vegetation type, composition and pattern	Valley, short term, Basin, long term	
	Biological community metrics (including riverine vegetation, macroinvertebrates, fish and birds)	Valley, short term	
	<p>2. To protect and restore the ecosystem functions of water-dependent ecosystems that depend on Basin water resources</p> <p>Targets by which to measure progress towards this objective^c:</p> <ul style="list-style-type: none"> no loss or degradation of ecosystem response outcomes within 5 years of the Basin Plan commencing improvements in ecosystem response outcomes within 5–20 years of the Basin Plan commencing. 	Hydrologic outcomes	
		Flow regimes at valley scale	Valley, short term
		Flow regimes at Basin scale	Basin, long term
Hydrologic connectivity at local scale		Local, short term	
Hydrologic connectivity at valley scale, Hydrological connectivity at Basin scale		Valley, short term Basin, long term	
Physicochemical outcomes			
Carbon dynamics		Valley, short term	
Water quality		Local, short term	
Floodplain and wetland hydrological types		Local, short term	
Acid sulfate chemical response		Local, short term	
Condition of Coorong and Lower Lakes ecosystems and Murray Mouth opening regime		Local, short term	
Biological outcomes			
Vegetation physiological condition		Local, valley, Basin, short term	
Biomass/standing crop of riverine vegetation		Local, long term	
Recruitment of fish, riverine vegetation and birds		Valley, short term	
Waterbird breeding		Local, short term	
Recruitment of selected riverine vegetation		Local, long term	
Array of network distances for riverine biota		Basin, long term	
Riverine vegetation type, composition and pattern		Valley, short term Basin, long term	
Biological community metrics (including riverine vegetation, macroinvertebrates, fish and birds)	Valley, short term		

a Each ecosystem response outcome may relate to more than one objective.

b ‘Local’ scale will usually equate to environmental assets and ‘valley’ scale will usually equate to SDL area, but this may not always be the case.

c Under the Water Act, the Environmental Watering Plan is required to include targets to measure progress towards meeting the overall environmental objectives for the Murray–Darling Basin’s water-dependent ecosystems. The targets are only intended to measure progress towards meeting objectives. The Environmental Watering Plan will not oblige any party to reach these targets.

... continued

Table 7.1 The relationship between the Environmental Watering Plan’s overall objectives for water-dependent ecosystems and the ecosystem response outcomes^a (continued)

Overall environmental objectives for water-dependent ecosystems	Ecosystem response outcomes (and ecosystem reporting requirements)	Scale and timeframe of expected ecosystem response outcomes ^d
<p>3. To ensure that water-dependent ecosystems that depend on Basin water resources are resilient to risks and threats</p> <p>Targets by which to measure progress towards this objective^c:</p> <ul style="list-style-type: none"> no loss or degradation of ecosystem response outcomes within 5 years of the Basin Plan commencing improvements in ecosystem response outcomes within 5–20 years of the Basin Plan commencing. <p>Long-term indicators — ecosystem condition/health (applies to all the above objectives)</p>	Hydrologic outcomes	
	Flow regimes at valley scale	Valley, short term
	Flow regimes at Basin scale	Basin, long term
	Hydrologic connectivity at valley scale, hydrological connectivity at Basin scale	Valley, short term Basin, long term
	Physicochemical outcomes	
	Water quality	Local, short term
	Acid sulfate chemical response	Local, short term
	Integrated riverine ecosystem condition measures	Valley, long term Basin, long term

a Each ecosystem response outcome may relate to more than one objective.

b ‘Local’ scale will usually equate to environmental assets and ‘valley’ scale will usually equate to SDL area, but this may not always be the case.

c Under the Water Act, the Environmental Watering Plan is required to include targets to measure progress towards meeting the overall environmental objectives for the Murray–Darling Basin’s water-dependent ecosystems. The targets are only intended to measure progress towards meeting objectives. The Environmental Watering Plan will not oblige any party to reach these targets.



Beehives placed next to fields of rockmelons near St George, Queensland

Evaluation framework

The Water Act (s. 22) provides for the periodic assessment of the Basin Plan's effectiveness and promotes learning and adaptive management through a continuous cycle of monitoring, evaluation and review. The Monitoring and Evaluation Program's evaluation framework seeks to explain:

- why a particular outcome has occurred
- how well a program or activity was undertaken
- whether it was appropriate to undertake it
- what will be done in light of the evaluation findings in terms of Basin Plan refinement and implementation.

The evaluation framework addresses seven key elements of the Basin Plan:

- the Basin Plan itself
- ecosystem outcomes from the implementation of SDLs and the Environmental Watering Plan
- the Water Quality and Salinity Management Plan
- critical human water needs
- risks to the condition and availability of Basin water resources
- water trading and transfer rules
- socioeconomic impacts.

The evaluation framework is based on the key evaluation questions for each element of the Basin Plan described in Tables 7.2–7.8. MDBA will use the evaluation questions to inform its evaluation of the effectiveness of the Basin Plan in meeting the immediate outcomes, intermediate outcomes and long-term outcomes for each of the Basin Plan elements.

Table 7.2 Key evaluation questions for the Basin Plan

- What is the progress towards meeting the Basin Plan's purposes? (effectiveness)
- To what extent do the Basin Plan objectives and targets align with the Basin Plan's purpose? (appropriateness)
- To what extent have Basin Plan objectives, targets and outcomes been achieved? How do these results compare to what was intended or planned? (effectiveness)
- To what extent has the Basin Plan contributed (either directly or indirectly) to changes in condition? (impact)
- What, if any, unanticipated positive or negative outcomes have resulted from Basin Plan programs and activities? (impact)
- How could Basin Plan programs and activities be delivered more efficiently? (efficiency)
- What could be improved to maximise the impact of Basin Plan programs and activities? (efficiency)

Table 7.3 Key evaluation questions for SDLs and the Environmental Watering Plan

Immediate activities and outcomes
<ul style="list-style-type: none">• To what extent do the activities align with the Environmental Watering Plan and SDL targets and objectives? (appropriateness)• What results (immediate outcomes) have the activities delivered? How do these results compare to those intended? (effectiveness)• To what extent are the changes directly or indirectly a result of the activities? (impact)• How could activities have been delivered more productively and efficiently? (efficiency)
Intermediate outcomes
<ul style="list-style-type: none">• What is the progress towards targets? (effectiveness)• To what extent are the SDLs and resource condition limits methods based on best practice? (appropriateness)• To what extent are the following based on best practice? (appropriateness)<ul style="list-style-type: none">– the method to identify environmental assets that require environmental watering– the principles and methods for determining the priorities for applying environmental water• Have the SDLs and resource condition limits been effective in meeting the Basin Plan objectives? (effectiveness)• Have the SDLs been effective in meeting the environmental objectives for water-dependent ecosystems? (effectiveness)• What, if any, unanticipated outcomes have resulted from the Environmental Watering Plan, SDLs and resource condition limits? (impact)• What alternative or complementary (adaptive) actions could improve progress?
Longer-term outcomes
<ul style="list-style-type: none">• What is the progress towards targets? (effectiveness)• To what extent have the SDLs and Environmental Watering Plan contributed to this progress? (effectiveness)• What is the current status with respect to achieving Basin Plan targets? (impact)• What, if any, unanticipated outcomes have resulted from the Environmental Watering Plan? (impact)

Table 7.4 Key evaluation questions for the Water Quality and Salinity Management Plan

Immediate activities and outcomes
<ul style="list-style-type: none">• To what extent do the water quality and salinity management activities align with other Basin activities?• To what extent have the water quality and salinity management actions been implemented?
Intermediate outcomes
<ul style="list-style-type: none">• To what extent have the activities reduced threats to water quality?• What, if any, unanticipated changes or other outcomes (positive or negative) have resulted?• To what extent were the changes in water quality directly or indirectly produced by the program actions?
Longer-term outcomes
<ul style="list-style-type: none">• In what ways and to what extent has the Water Quality and Salinity Management Plan contributed to improving water quality, management practices and institutions?

Table 7.5 Key evaluation questions for the risks to Basin water resources

Immediate activities and outcomes
<ul style="list-style-type: none"> • To what extent is the risk management process based on best practice? • Are the proposed risk management strategies being implemented? • What results (immediate outcomes) have the projects/programs/activities delivered? How do these results compare to those intended? (effectiveness)
Intermediate outcomes
<ul style="list-style-type: none"> • Are risks decreasing to acceptable levels? • To what extent are changes in risk directly or indirectly a result of the projects/programs/activities? (impact)
Longer-term outcomes
<ul style="list-style-type: none"> • To what extent has the risks program ensured that the condition and availability of water resources is not significantly compromised by risks? • In what ways and to what extent has the risks strategy contributed to improvements in water resources? • In what ways and to what extent has the risks to water resources program contributed to changing management practices and institutions?

Table 7.6 Key evaluation questions for water trade

Immediate activities and outcomes
<ul style="list-style-type: none"> • What are the patterns of compliance across the Basin?
Intermediate outcomes
<ul style="list-style-type: none"> • Have the water trading rules had a discernible effect on water market functions? (i.e. no barriers to trade, low transaction costs, an appropriate mix of products, well-informed participants, and no adverse impacts on the environment or third parties) (effectiveness) • Is there evidence of water users using 'work-around' arrangements to reduce the cost of trade restrictions? • Are the key rules identified in each area (e.g. barriers to trade) still the most significant? Have some rules/issues become more important?
Longer-term outcomes
<ul style="list-style-type: none"> • In what ways and to what extent have water trading rules contributed to a more efficient water market? (effectiveness) • Are the water trading rules (and water market and trading objectives) aligned with improving overall market efficiency? (appropriateness) • Are there any trade-offs between the water market and trading objectives that could undermine overall efficiency?

Table 7.7 Key evaluation questions for critical human water needs

Immediate activities and outcomes
<ul style="list-style-type: none"> • Did the volumes supplied for critical human water needs avoid prohibitively high social, economic or national security costs? • Are sufficient volumes being reserved in the River Murray system to deliver critical human water needs? • Have the Basin states prepared water sharing arrangements that make critical human water needs the highest priority? • Are the tiered water sharing arrangement triggers and other emergency response processes appropriate to address water scarcity or breaches of water quality and salinity trigger points?
Intermediate outcomes
<ul style="list-style-type: none"> • Do communities reliant on the River Murray system have their critical human water needs met under all tiers of the tiered water sharing arrangements? • Was the River Murray managed to prevent water being unsuitable for critical human water needs? • What is the impact of meeting critical human water needs on other elements of the Basin Plan?
Longer-term outcomes
<ul style="list-style-type: none"> • How effective is the Basin Plan in ensuring that all communities dependent on the Basin water resources have critical human water needs met and how can it be improved?

Table 7.8 Key evaluation questions for socioeconomic outcomes

Immediate activities and outcomes
<ul style="list-style-type: none"> • What are the social, cultural and economic circumstances of the Basin communities? • What are the other external impacts on social, cultural and economic conditions?
Intermediate outcomes
<ul style="list-style-type: none"> • To what extent have industries and communities adapted to lower water availability as a result of the Basin Plan? • To what extent have enterprises adapted to lower water availability as a result of the Basin Plan?
Long-term outcomes
<ul style="list-style-type: none"> • How effective is the Basin Plan in meeting its social and economic objectives and outcomes? • What are the social, cultural and economic effects of meeting the Basin Plan environmental objectives?

Table 7.9 Reporting requirements for sustainable diversion limits and the Environmental Watering Plan

Immediate outcomes
(a) the environmental watering plan is implemented so as to facilitate the delivery of environmental water
(b) during each water accounting period: <ul style="list-style-type: none">(i) held environmental water and planned environmental water is used in accordance with the rules of the water resource plan area(ii) water released or otherwise made available to achieve environmental outcomes is assessed, including the volumes, timing (frequency and duration), location and flow rates of that water(iii) the hydrologic effects of the water that is released or otherwise made available is assessed, including whether the watering has met the watering requirements and flow regime requirements of the environmental assets and ecosystem functions.
(c) the degree to which the delivery of environmental water achieves the management outcomes relevant to the water accounting period as assessed
(d) long-term average sustainable diversion limits are incorporated into water resource plans
(e) compliance with the water resource plan rules give effect to the long-term average sustainable diversion limits and there is a reduction in unauthorised take
(f) for the first five water accounting periods after the commencement of the Basin Plan, there is no loss of, or degradation in, the following: <ul style="list-style-type: none">(i) flow regimes(ii) hydrologic connectivity(iii) nutrients(iv) carbon dynamics(v) acid sulfate chemical response.
(g) after the end of the 5th water accounting period there are improvement in the matters listed in (f) (i)–(v).
Intermediate outcomes
(h) the degree to which the delivery of environmental water achieves the site-specific ecological objectives and targets identified in the long-term watering plans as assessed
(i) five-yearly reviews of the environmental watering plan are undertaken
(j) for the first 10 water accounting periods after the commencement of the Basin Plan there is no loss of, or degradation in, the following: <ul style="list-style-type: none">(i) flow regimes(ii) hydrologic connectivity(iii) riverine landscape units(iv) condition of Coorong and Lower Lakes ecosystems and Murray Mouth opening regime(v) vegetation physiological condition(vi) riverine vegetation type, composition and pattern(vii) recruitment of riverine vegetation, fish and birds(viii) waterbird breeding(ix) biological community metrics (including riverine vegetation, macroinvertebrates, fish and birds).
(k) after the 10th water accounting period after the commencement of the Basin Plan there is improvement in the matters listed in (j) (i)–(ix).
Longer-term outcomes
(l) there are improvements in groundwater pressure, water quality and water levels
(m) there are improvements in the following: <ul style="list-style-type: none">(i) riverine landscape units<ul style="list-style-type: none">(ii) biomass and standing crop of riverine vegetation(iii) recruitment of selected riverine vegetation species(iv) array of network distances for riverine biota(v) integrated riverine ecosystem condition measures.

Table 7.10 Reporting requirements for the Water Quality and Salinity Management Plan

Immediate outcomes
(a) water quality and salinity objectives and targets are effectively met by salt interception schemes
(b) water resource plans incorporate water quality and salinity management plans with actions to ensure water quality and salinity targets are met
(c) water resource plans incorporate release management and flow manipulation rules that deal with the key causes of water quality degradation identified in the water quality and salinity management plan
Intermediate outcomes
(d) there are decreases in salinity levels in rivers downstream of salt interception schemes
(e) nutrients, turbidity, toxicants and algal blooms are within target levels
(f) dissolved oxygen is within target levels
(g) water temperatures is within target levels
(h) there are decreases in the levels of river salinity as a consequence of adequate dilution flows
(i) there are reductions in irrigation-induced river salinity levels
Note: Target levels are set out in the water quality and salinity management plan.
Longer-term outcomes
(j) water quality and salinity levels are suitable to meet all uses of Basin water resources identified in the water quality and salinity management plan
(k) water quality and salinity management plan objectives and targets are achieved.

Table 7.11 Reporting requirements for the risks to Basin water resources

Immediate outcomes
(a) risk management strategies are assessed at the water resource plan level and Basin level
(b) risk management strategies are implemented at the water resource plan level and Basin level
(c) there is a reduction in risk to the condition, and continued availability, of the Basin water resources
Intermediate outcomes
(d) risk assessment is reviewed and improved as required
(e) risks and implementation of risk management strategies in water resource plans are revised
Longer-term outcome
(f) the condition and availability of water resources are not significantly compromised by risks.

Table 7.12 Reporting requirements for water trade

Immediate outcomes
(a) there is a reduction in the number and severity of trade barriers in the Murray–Darling Basin
(b) there is an improvement in public information on water markets and trading
(c) relevant parties disclose market information in a way that ensures that water users do not suffer economic or social disadvantage
(d) fewer areas allowing trade between systems with low hydrologic connectivity
Intermediate outcomes
(e) there is an increase in water trade among water users and regions previously affected by trade restrictions
(f) there are more flexible trading arrangements
(g) there is a decrease in overall transactions costs from trading water
(h) there are well-informed market participants
(i) there are no adverse impacts on third parties who are not directly involved in the water trade transaction
(j) there are no adverse impacts on the environment due to trade
Longer-term outcome
(k) water markets allocate water to its most productive use.

Table 7.13 Reporting requirements for critical human water needs

Immediate outcomes
(a) arrangements for meeting critical human water needs in River Murray system in water resource plans and Murray–Darling Basin Agreement
(b) tiered water sharing arrangements operating in the River Murray system
(c) risk management approach developed for River Murray system to reduce risk that sufficient conveyance water is not available to deliver critical human needs water
(d) sufficient water within the SDLs across the Basin for meeting critical human water needs in all years confirmed
Intermediate outcomes
(e) river Murray system managed to reserve and provide (as required) the volume required to deliver critical human water needs
(f) river Murray system managed to prevent water quality and salinity becoming unsuitable for critical human water needs
(g) critical human water needs met and delivered under Tier 2, Tier 3 and emergency circumstances in River Murray system
(h) volume of critical human water needs does not result in prohibitively high social, economic or national security costs
(i) the risk management approach continues to be suitable
Longer-term outcome
(j) the Commonwealth and Basin states meet critical human water needs and manage associated risks.

Table 7.14 Reporting requirements for socioeconomic outcomes

Immediate outcomes
(a) water resource plans are developed having regard to social, cultural and economic profiles
(b) levels of awareness and understanding of the implication of the long-term average sustainable diversion limit on industries and communities have increased
Intermediate outcomes
(c) enterprise strategic or practice change occurs that enables sustainable adaptation to a water-reduced future, including technological and agronomic changes, business restructuring and lifestyle changes.
(d) structural adjustment occurs in regional industries and communities in response to any reductions in the long-term average sustainable diversion limits
(e) businesses and communities make informed investment and business planning decisions to produce the most productive outcomes
(f) there is improved water security/reliability
(g) water is allocated and delivered for its most productive use
(h) the uptake of adaptation programs addresses social, cultural and economic impacts
(i) cultural well-being of Indigenous communities relating to cultural flows is not adversely affected.
Longer-term outcomes
(j) Industries and communities have a vision for a sustainable future and adapt to this through change in composition, distribution and size.



Gwydir Wetlands, north-west of Moree, New South Wales

7.4 Reporting requirements

The reporting requirements are central to the implementation of the Monitoring and Evaluation Program (see Figure 7.6). The program must include reporting requirements for the Commonwealth and Basin states and five-yearly reviews of the Water Quality and Salinity Management Plan targets and the Environmental Watering Plan (*Water Act 2007* (Cwlth) (s. 22)). The Water Act (ss. 34, 35) requires the Murray–Darling Basin Authority (MDBA), Commonwealth and Basin state agencies to act consistently with the Basin Plan.

They are required to report on core activities and outcomes under the Monitoring and Evaluation Program as listed in tables 7.9–7.14. These reporting requirements have been derived from the element program logics in Figures 7.8–7.16 and from the ecosystem response outcomes listed in Table 7.1.

At the Commonwealth level:

- the Bureau of Meteorology is only required to report on core activities and outcomes that relate specifically to water information (this arrangement may change under any amendments to current regulations as a reflection of Basin Plan monitoring requirements)
- the Commonwealth Environmental Water Holder is only required to report on activities and outcomes that relate to aquatic ecosystems.

In addition to a written report, Commonwealth and Basin states will be required to provide raw data collected for each activity and outcome. This requirement will not apply where the data has been provided to the Bureau of Meteorology. MDBA will be responsible for ensuring that monitoring and evaluation is coordinated and consistent. The Monitoring and Evaluation Program's operating and technical guidelines will address issues of design, scale and implementation of the environmental monitoring program. Collection and analysis of data that underpins the reports will be required to be consistent with the Basin Plan Monitoring and Evaluation Program, and technical and operational guidelines published on the MDBA website.

MDBA must prepare an annual report, including an analysis of the Basin Plan's effectiveness (*Water Act* s. 214), and publish an account of environmental water in the Basin each financial year (*Water Act* s. 32). The Water Act (ss. 101–103) provides for the establishment of a

Murray–Darling Basin Water Rights Information Service by MDBA, which may hold some or all of the information included in the registers of water rights kept by a Basin state, an infrastructure operator or any other person prescribed by the regulations. It may also hold other information about water rights in these registers.

A range of parties specified in the Water Regulations 2008, including MDBA and Commonwealth and Basin state agencies, must provide the Bureau of Meteorology with water information (Water Act s. 126) and the Director of Meteorology must publish annual national water accounts (Water Act s. 122). The Commonwealth Environmental Water Holder is required to publish an annual report including achievements against the Environmental Watering Plan’s objectives (Water Act s. 114). Basin states are required to provide a written report, within four months of the end of a water accounting period, on the availability and management of water resources in each water resource plan area in the Basin state (Water Act s. 71). The Australian Competition and Consumer Commission must monitor transformation arrangements and compliance with the water market rules and give the Commonwealth Water Minister a report on the results of such monitoring (Water Act s. 99).

7.5 Water accounting

In recent years, water accounting has been shown to provide a transparent mechanism for identifying, measuring, recording and reporting water-related information to users and decision makers in a consistent and structured manner. The concept of water accounting also includes the more detailed management accounts that are required by water agencies to manage and report on water resources.

Under the *Water Act 2007* (Cwlth), the Bureau of Meteorology (among its other functions) has the responsibility for:

- collecting, holding, managing, interpreting and disseminating Australia’s water information
- compiling and maintaining water accounts for Australia, including a set of water accounts to be known as the National Water Account.

In implementing the various mandatory components of the Basin Plan, water accounting will be used as a central mechanism by which Basin water resources will be measured, recorded and reported to stakeholders in a consistent and transparent way. This use of water accounting in relation to Basin water resources will be implemented in a collaborative approach with the Bureau of Meteorology and other agencies.

Murray–Darling Basin water accounts

On an annual basis MDBA will prepare a set of Murray–Darling Basin accounts that will display the volumes of water available for environmental use, consumptive use or extraction within the various water resource systems of the Murray–Darling Basin. In general the type of information to be identified in Basin water accounts may include:

- water resource final allocation announcements
- carryover brought forward
- water resource system losses
- extraction/usage (consumptive and environmental).



Sprinkler irrigation on a farm near Moree, New South Wales

It is proposed that these annual Basin accounts will be publicly available and relate to the Bureau of Meteorology's National Water Account, which will be published annually. It is anticipated that both the Murray–Darling Basin water account and the Bureau of Meteorology's National Water Account will be based on the same water information, but each will provide a different level of detail in relation to Basin water resources. As part of the process of preparing the proposed Basin Plan, 19 regional water accounts across the Basin have been prepared. These water accounts are located at Appendix F in this volume. They cover the 2006–07 and 2007–08 water years. The Bureau of Meteorology's Pilot National Water Account is available on the Bureau of Meteorology's website (www.bom.gov.au/water/nwa).

Environmental water reporting

MDBA proposes to develop specific environmental water accounts for the Murray–Darling Basin that explain how water (both held environmental water and planned environmental water) has been made available for environmental benefit within the Basin. They will provide the volumes of water that were potentially available for environmental use, the volumes actually used and where possible the location of that use. These accounts may also display information including, but not limited to:

- trading of held environmental water (between different users)
- carryover and other management of environmental water
- recovery of water (e.g. water savings through infrastructure)
- associated administrative information.

The information contained within these specific accounts would complement the Basin-wide water accounts.

Accounts for planned environmental water and held environmental water will draw on both data provided through the reporting requirements in the Basin Plan Monitoring and Evaluation Program and the information acquired through water information systems outlined below.

Diversion limit reporting

Specific accounts will be developed that report the water that was permitted to be taken in accordance with the diversion limit within a given water year, and the water that was actually taken. These will complement the Basin-wide water accounts. Preparation of these accounts will consider the method to determine compliance with the diversion limit (see Section 7.2), including water trading, allocations made and other relevant matters. This specific account will draw on information from Basin states provided under the Water Act (s. 71), complemented by other water information where relevant.

Water information systems

Under the Water Act, MDBA may provide an information service that allows access to water rights information specific to the Murray–Darling Basin. This service would integrate with the National Water Market System and with water information systems established by the Bureau of Meteorology. The National Water Market System is being developed cooperatively with Basin states by the Department of Sustainability, Environment, Water, Population and Communities.

The data stored in these integrated information systems will contribute to the preparation of reports on the status of Basin water resources such as Murray–Darling Basin water accounts, environmental water accounts and diversion

limit accounts. It is also anticipated that by using these integrated systems to prepare reports on Murray–Darling Basin water resources, information across the Basin will become more consistent, transparent and standardised over time, which will empower users to make more informed decisions about the management of water-related assets either on a specific or general basis.

7.6 Review

The *Water Act 2007* (Cwlth) explicitly provides for the adaptive management of water resources in the Murray–Darling Basin through the review of the Basin Plan and legislation. The Commonwealth Water Minister must initiate a review of the Water Act’s operation before the end of 2014 (Water Act s. 253) and the Murray–Darling Basin Authority (MDBA) must report to the Murray–Darling Basin Ministerial Council on the impacts of the Basin Plan after five years (Water Act s. 49A). The Basin Plan must be reviewed in its tenth year or when the minister — or all Basin states — request MDBA to conduct a review. The Water Act also stipulates five-yearly reviews of the Environmental Watering Plan and the Water Quality and Salinity Management Plan targets.

MDBA will analyse the information provided by the Basin states and the Commonwealth and evaluate the Basin Plan’s effectiveness at appropriate intervals. These reviews will inform improvements to the Basin Plan or adjustments to its implementation. The evaluation and review process will consider:

- refinement of targets
- improvement of causal relationships to ensure strong ties between management actions and outcomes
- effective use of knowledge
- identification of the practical effectiveness and impact of Basin Plan provisions, including unanticipated and unintended outcomes, and provision of more meaningful progress reporting to the community to assist public awareness.

The reviews may result in minor refinements, such as changes to the combination or order of actions, or significant alterations such as to targets or in strategic direction.

A deliberative, cooperative and transparent review process will result in better decision-making for the Basin Plan and, while the Water Act provides the regulatory infrastructure, there is a need for interactive learning and feedback to all participants through the review process.