



Government  
of South Australia

# Managing the water resource impacts of plantation forests

A Statewide policy framework

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# Foreword

South Australia, and the nation, faces an unprecedented challenge to protect its precious water resources. More than ever, governments, industry and the community understand that water is a critical natural resource that must be managed within clearly defined and sustainable limits, both now and into the future.

The demands on water are many – flows must be secured for critical human needs, for sustainable industry development and for environmental assets. The continued severe drought and the effects of climate change are adversely impacting the availability and sustainable management of water resources in many areas across the State and Australia. Yet there is a pressing need to maintain regional communities and the industries that sustain them.

South Australia is tackling this critical challenge on many fronts. This framework for managing the water resource impacts of plantation forests addresses an important component of that broader challenge – ensuring the ongoing viability of surface and groundwater resources that sustain the environment, industries, communities and regional centres across the State.

A key aim of this policy framework is to provide guidance to government agencies, particularly regional Natural Resources Management Boards, to ensure that all water-affecting activities are identified and managed within sustainable limits, to promote the use of appropriate water management tools, and to effectively account for the environmental, social and economic impacts of water allocation decisions.

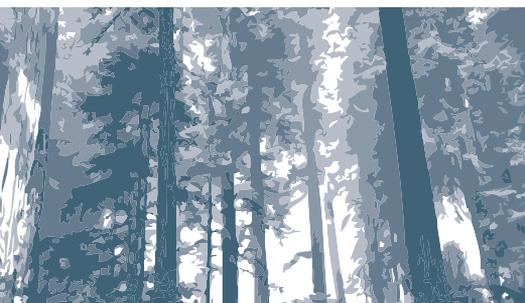
The State Government is pleased to present South Australia's first ever policy framework for managing the water resources impacts of plantation forests.



Hon Jay Weatherill MP  
Minister for Environment and Conservation



Hon Paul Caica MP  
Minister for Forests





# Contents

<b>Foreword</b> .....	<b>1</b>
<b>PART A: THE POLICY FRAMEWORK</b> .....	<b>4</b>
<b>1   Introduction</b> .....	<b>4</b>
Sustainable management of water resources .....	4
Purpose of this policy framework .....	5
Who is the framework for? .....	6
Structure of the framework .....	6
<b>2   Goal and principles</b> .....	<b>7</b>
Goal .....	7
Guiding principles .....	7
Policy context .....	10
<b>3   Science informing policy</b> .....	<b>13</b>
Importance of science .....	13
Use of best available science .....	13
Key scientific findings and positions .....	13
Scientific uncertainty .....	18
<b>4   Management options</b> .....	<b>20</b>
Legislative framework for water resources management .....	20
Recommended management options .....	23
Choosing an option .....	24
Adaptive management .....	26
<b>PART B: IMPLEMENTING THE FRAMEWORK</b> .....	<b>30</b>
<b>5   Implementation</b> .....	<b>30</b>
Partnerships and collaboration .....	30
Roles and responsibilities .....	31
Key issues for consideration when implementing this framework .....	32
Monitoring and review of this framework .....	33
<b>Glossary</b> .....	<b>35</b>
<b>Further reading and resources</b> .....	<b>38</b>

## PART A: THE POLICY FRAMEWORK

# 1 | Introduction

### **Sustainable management of water resources**

Current trends in the condition of South Australia's water resources show that they are declining in many areas due to a range of factors. Reflecting the importance of the need to use water resources sustainably, and the future uncertainty in water security linked to the impacts of climate change, *South Australia's Strategic Plan* contains a target to manage South Australia's water resources within sustainable limits by 2018.

#### *The National Water Initiative*

In 2004, the South Australian Government signed an agreement with the Australian Government and other states and territories known as the National Water Initiative (NWI). Among other things, the NWI requires governments to implement a series of measures to account for and manage the water interception effects of land use change by no later than 2011. In signing the NWI, governments recognised that where interception activities assessed as being significant are not subject to some form of planning and regulation, they pose a risk to the future sustainability of water resources, the integrity of water access entitlements and the achievement of environmental objectives for water systems. Examples of such activities include farm dams and bores, the interception and storage of overland flows, and large-scale plantation forestry. This policy framework focuses on the water resource impacts of plantation forestry.

A key objective of national water reform initiatives is to address the over-allocation of water resource areas and to return them to environmentally sustainable levels of extraction. In areas where water resources are either nearing or are already at full allocation, the NWI requires future expansion to be accounted for, and managed.

#### *Plantation forests in South Australia*

The plantation forest industry in South Australia is a dryland crop and is currently concentrated in three regions: the South East, Kangaroo Island and the Mount Lofty Ranges. This distribution reflects the higher rainfall areas of the State.

The plantation forest industry and forest products sector provides economic benefits to South Australia, including employment of nearly 13,000 people in over 630 businesses (Montreal Process Implementation Group for Australia, 2008). In 2006-07 the industry was worth at least \$2.8 billion to the South Australian economy (Australian Bureau of Statistics, 2008). This is expected to increase in the future with the construction and operation of a renewable energy mill in Mount Gambier, the Penola Pulp Mill and the export of hardwood plantation woodchips.

The total extent of plantation forest in South Australia is around 180,000 hectares, comprising around two thirds softwood plantations and one third hardwood plantations (Bureau of Rural Sciences, 2008). There has been an average of around 5,000 hectares planted annually since 2001 (Montreal Process Implementation Group for Australia, 2008). The extent of hardwood plantings is expected to decline in the future, due in part to a combination of regulatory constraints and the current economic environment. The extent of softwood plantations is expected to continue increasing gradually in the future, although future expansion will be restricted by competition for land. This includes a possible expansion of plantation forestry into lower rainfall areas (e.g. Eyre Peninsula) for the purposes of carbon sequestration.

The *National Forest Policy Statement*, signed by governments in 1995, recognises that the community values the commercial, environmental and aesthetic benefits of plantation forests. It sets a goal to expand the industry, while also acknowledging that this expansion must occur within environmentally sustainable limits.

#### *Water resource impacts of plantation forests*

It is widely accepted that land use change to large-scale plantation forestry has hydrological and hydrogeological implications because the water use is greater than the mostly dryland farming uses that it replaces. Depending on the concentration, extent and location of plantation forests, the sustainable yield of the water resources in a catchment or groundwater basin may be significantly reduced.

In South Australia, plantation forests are identified as an issue for sustainable water resources management in the higher rainfall areas (i.e. annual rainfall greater than 600mm) of the Lower South East, Kangaroo Island and the Western and, to a lesser extent, the Eastern Mount Lofty Ranges.

### **Water and plantation forests in South Australia: a snapshot of regions**

The scale and intensity of plantation forests varies across South Australia. Alongside this land use variability are regional differences in water resources management, with different levels of management according to the condition of water resources, and the use of the water resources.

Regions of South Australia where the water resource impacts of plantation forests are identified as an issue for sustainable water resources management include:

- **Kangaroo Island** – water resources are not prescribed but the regional Natural Resources Management plan under development includes policies for managing water-affecting activities.
- The **Western and Eastern Mt Lofty Ranges** – water resources are prescribed and water allocation plans are being developed that include policies for the allocation, use and trading of water.
- The **Lower South East** – water resources are prescribed and a water allocation plan is being developed that recommends the inclusion of a forest water licensing system in place of the permit system currently in operation.

### **Purpose of this policy framework**

This policy framework has been developed to articulate the South Australian Government position on the management of the water resource impacts of plantation forests. While acknowledging the statutory role of Natural Resources Management (NRM) Boards to prepare regional NRM plans and water allocation plans in consultation with their communities, the South Australian Government has identified the need for a Statewide policy framework to manage the water resource impacts of plantation forests.

This policy framework has been developed to work within the legislative framework established by the *Natural Resources Management Act 2004* (NRM Act) and the broad policy context provided by the *State Natural Resources Management Plan 2006* (State NRM Plan). The NRM Act is South Australia's principal legislation for managing natural resources. It sets the objectives and provides the legislative framework for managing our natural resources, fulfils obligations under several

Commonwealth/State agreements and provides direction for the development of State and regional NRM plans (including water allocation plans) and associated agency activities. It brings together the people and expertise needed to manage our natural resources, including the sustainable management of water resources.

This framework will help meet our obligations under NWI, and reflects NWI and other Government strategic targets and national and State policy drivers.

While the sustainable management of water resources is the key driver of this policy framework, recognition of the benefits of plantation forests to the State is fundamental to this body of work. The long-term sustainable development of plantation forests and the forest products sector in South Australia will be a key consideration when implementing this policy framework.

The scope of this policy framework is restricted to plantation forests that are grown for commercial reasons, including carbon sequestration. It is not intended to cover farm forestry, large-scale revegetation with permanent plantings to achieve biodiversity outcomes, or irrigated plantation forests. Although these activities fall outside the scope of this framework, they should nevertheless be included in regional water balances and in water allocation planning.

### **Who is the framework for?**

This framework has been developed to provide guidance to State government agencies, industry, regional decision-makers, such as local government and regional development boards, and regional NRM Boards when developing and implementing regional NRM Plans (including water allocation plans) under the NRM Act.

### **Structure of the framework**

This document is made up of two parts:

- **Part A** provides an introduction to water resources management and plantation forests in South Australia, outlines the strategic framework of the policy, including the goal and guiding principles, and details the science underpinning the framework and the management options available to manage the water resource impacts of plantation forests.
- **Part B** outlines a partnership approach to implementation of the framework, including identifying roles and responsibilities of key parties and detailing operating protocols, and provides policy direction on key implementation issues including addressing over-allocation and identifying and assigning risks and trade-offs.

## 2 | Goal and principles

### Goal

*South Australia will achieve ecologically sustainable development of plantation forests, while protecting and managing our water resources for all users now and in the future.*

This goal is consistent with the vision and goals of the State NRM Plan, reflecting the integration of this policy within the South Australian Government's NRM framework.

### Guiding principles

There are 12 policy principles underpinning this framework, outlining the approaches and values that will be used to guide and inform its implementation. The principles provide the Government's approach to managing the water resource impacts of plantation forests. They should be considered alongside the 14 guiding principles listed in the State NRM Plan, which help inform the implementation of this framework as a component of South Australia's NRM framework.

Proposals put forward by regional NRM Boards to manage the impacts of plantation forests on water resources must be developed in accordance with these principles.

#### 1. Sustainable management of water resources

South Australia's water resources must be managed within sustainable limits to provide for the needs of current and future generations.

Water resources will be managed within a consistent policy framework that ensures water for environmental needs and balances the competing consumptive uses of water.

Policy approaches and plans will contribute to sustainable water resource management including resolving water over-allocation in our water systems to help meet our NWI obligations and State targets.

Key policy links      SASP: T3.9  
National Water Initiative 2004  
NRM Act 2004  
State NRM Plan 2006

#### 2. Optimise net benefits to the community

Policy approaches and management decisions related to water resource impacts will attempt to optimise net benefits to the community as a whole from environmental, economic and social outcomes.

Key policy links      National Water Initiative 2004  
NRM Act 2004  
State NRM Plan 2006

### **3. Sustainable industry development**

Water resources will be managed to help achieve prosperous communities and industries, including economic development and growth in exports and employment opportunities, while using and managing natural resources within ecologically sustainable limits.

Key policy links        SASP: T1.1, T1.5, T1.10, T1.14, T3.1, T5.9  
                              NRM Act 2004  
                              State NRM Plan 2006  
                              National Forest Policy Statement  
                              Plantations 2020: The 2020 Vision

### **4. Consistent and transparent treatment of water users**

Water resources will be managed within a consistent framework that recognises existing user rights and identifies and accounts for all water use in a transparent manner.

Recognition of existing water use is important and will be considered in the development of policy approaches, with an aim of providing users with a reasonable degree of certainty regarding future access.

Any actions to address over-allocation should give priority to recognising historical rights to interception and water use.

Key policy links        SASP: T1.8, T3.9  
                              National Water Initiative 2004  
                              State NRM Plan 2006

### **5. Use markets and trading**

Policy approaches will facilitate the operation of markets and opportunities for water trading. These markets will be used to help achieve balance between water supply and demand, and will help distribute the use of water between competing consumptive uses.

Key policy links        National Water Initiative 2004  
                              NWI Water Pricing Principles  
                              Water Act 2007  
                              NRM Act 2004

### **6. Best practice regulatory approach**

Management of water resource impacts will be best practice and subject to continuous improvement, recognising the Government's requirement to avoid undue administrative and regulatory burdens.

Any regulatory changes that could potentially adversely impact on existing users will be preceded by careful consideration of options to address unreasonable harm, with action taken if and when appropriate.

Key policy links        SASP: T1.8, T3.9  
                              National Water Initiative 2004  
                              NRM Act 2004  
                              Red Tape Reduction target

### **7. Science-informed policy and planning**

Water resources management and accounting will be informed by the best available science and robust technical monitoring programs.

Key policy links        State NRM Plan 2006

## **8. Adaptive and precautionary approaches to managing water resources**

An adaptive management approach that evolves as new knowledge becomes available will be used, to ensure that management approaches are flexible and respond to future changes in water availability or other factors.

While acknowledging the need to use science and data to inform decisions, where there is a risk of serious or irreversible damage to natural resources, lack of full scientific certainty will not be used as a reason for postponing measures to prevent environmental degradation.

Notwithstanding this, there is also a need to identify and consider the impacts of management decisions on other parties, including industry. When making decisions under scientific uncertainty, a risk management approach will be used to identify and consider the range of potential environmental, economic and social benefits, costs and risks of each option, and to help prevent, minimise and mitigate adverse impacts to industry and communities.

Key policy links            National Water Initiative 2004  
                                      NRM Act 2004  
                                      State NRM Plan 2006  
                                      DWLBC Precautionary Principle Fact Sheet (endorsed by NRM agencies)

## **9. Clear open communication and participatory management**

Management of water resource impacts will be based around clear, open communication and transparent decision-making.

Agencies will work together in a coordinated whole of government approach to formulate and implement policy approaches for water resources management.

A partnership approach to stakeholder involvement will be adopted, to allow for industry, scientists and the community to comment on management options, resulting in inclusive and transparent management decisions informed by stakeholder input.

Key policy links            SASP: T1.8  
                                      NRM Act 2004  
                                      State NRM Plan 2006  
                                      Regional NRM Plans for the eight NRM regions of South Australia  
                                      Plantations 2020: The 2020 Vision

## **10. Accounting for regional settings**

Policy approaches for managing water resource impacts will deliver a consistent management approach across South Australia, yet will retain the flexibility to incorporate local and regional issues and settings, providing regional NRM Boards with the flexibility to develop and administer regionally-appropriate NRM (including water allocation) plans.

Key policy links            NRM Act 2004  
                                      State NRM Plan 2006  
                                      Regional NRM Plans for the eight NRM regions of South Australia

## **11. Recognition of State, National and International directions and obligations**

Policy approaches for managing water resources will recognise State, National and International directions and obligations, along with our intentions to achieve them all.

Key policy links            National Water Initiative  
                                      National Forest Policy Statement  
                                      Plantations 2020: The 2020 Vision

## 12. Consistent terminology

Consistent terminology will be defined and applied in policies and plans, to help establish a common understanding of definitions and processes.

Key policy links	National Water Initiative 2004 Water Act 2007 NRM Act 2004 State NRM Plan 2006 National Forest Policy Statement
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### Policy context

This framework to manage the water resource impacts of plantation forests forms a component of the broader NRM policy framework in South Australia. It should be read and considered alongside other NRM planning and policy documents including the State NRM Plan, and should be implemented in a manner consistent with the NRM Act and South Australia's obligations under other relevant State and Commonwealth legislation and agreements.

Important policy and legislative links to this document are detailed below.

#### *South Australia's Strategic Plan*

South Australia's Strategic Plan (SASP) is the overarching strategic plan for South Australia. It has six broad objectives: growing prosperity, improving wellbeing, attaining sustainability, fostering creativity and innovation, building communities, and expanding opportunity. This policy framework will help contribute to a number of the targets in SASP, most notably the target to use water resources within sustainable limits by 2018. SASP also acknowledges the importance of industry development to the South Australian economy by containing targets to exceed the national economic growth rate and to treble the value of export income by 2014. Specific SASP targets that relate to the guiding principles of this framework are listed earlier in this document.

#### *Natural Resources Management Act 2004*

The NRM Act is South Australia's principal NRM legislation. It sets the objectives and provides the legislative framework for the management and sustainable use of our natural resources, fulfils obligations under several Commonwealth/State agreements, and provides direction for the development of State and regional NRM plans (including water allocation plans) and associated agency activities.

#### *State Natural Resources Management Plan 2006*

The State NRM Plan is established under the NRM Act. The plan sets out principles and policies for achieving the objects of the NRM Act throughout the State. It has four key goals, which this policy framework will help to achieve:

- Landscape scale approaches to maintain and enhance the health of the whole system.
- Prosperous communities and industries using and managing natural resources within ecologically sustainable limits.
- Communities, governments and industries with the capability, commitment and connections to manage natural resources in an integrated way.
- Integrated management of biological threats to minimise risks to natural systems, communities and industry.

### *Regional NRM Plans developed under the NRM Act*

There are eight NRM regions in South Australia, all of which are required under the NRM Act to develop and implement a regional NRM plan. These plans give an overview of natural resources within each region, highlighting their social, economic and environmental significance and any risks posed to those natural resources. Regional NRM plans detail the strategies that regional NRM Boards will use to manage and use natural resources, along with detailing the means by which the relevant NRM Board will address any identified risks to natural resources. This includes the development of water allocation plans for prescribed water resources, to distribute water resources between users, including the environment.

### *Development Act 1993*

The *Development Act 1993* is the State's principal land use planning legislation. It provides for integration between the NRM system and the land use planning system, to ensure that future use and development of land and water is ecologically sustainable.

### *National Water Initiative Intergovernmental Agreement 2004*

The National Water Initiative (NWI) represents the shared commitment of the Australian Government and State and Territory governments to water reform. The overall objective of the NWI is to achieve a nationally compatible market, regulatory, and planning based system for managing surface and groundwater resources for rural and urban use, in a manner that optimises economic, social and environmental outcomes.

The NWI consists of a set of agreed actions to contribute to better water management in Australia. This includes an action to manage the water resource impacts of land use change activities that have the potential to intercept significant volumes of water. These activities, such as farm dams and bores, harvesting overland flows, and large-scale plantation forestry, can have impacts on the integrity of water access entitlements and the achievement of environmental objectives for water systems. Governments have a responsibility to ensure that water is allocated and used to achieve socially and economically beneficial outcomes in a manner that is environmentally sustainable. This requires recognising trade-offs between competing water users including the environment, along with recognising threats to water security and working towards the inclusion of these threats in water accounting and water management frameworks.

### *Groundwater (Border Agreement) Act 1985 (parallel legislation in South Australia and Victoria) and Border Groundwaters Agreement*

The *Groundwater (Border Agreement) Act 1985* established the *Border Groundwaters Agreement* (the Agreement). This Act and Agreement have parallel legislation in Victoria and any amendments or changes to the Agreement require approval of both State Parliaments. The Agreement applies to all lands and all groundwater within the Designated Area (20 kilometres either side of the border). It establishes a Permissible Annual Volume (PAV), the maximum amount of water permitted to be extracted from licensed wells specified for each zone, or aquifer within a zone, in the Designated Area. The total volume of water allocated and used from licensed wells in each zone, or aquifer within the zone, cannot exceed the PAV. The provisions of the NRM Act and regulations made under the NRM Act apply to the border Designated Area. A water allocation plan prepared under the NRM Act must be consistent with the Agreement in so far that it does not allocate water that would exceed the PAV in a zone, or an aquifer within a zone, in the border Designated Area.

### *No Species Loss: A nature conservation strategy for South Australia 2007-2017*

'No species loss' is a statement of aspiration included as a target within South Australia's Strategic Plan. *No Species Loss: A nature conservation strategy for South Australia 2007-2017* maps out the strategic direction that is needed to meet this aspirational target and maintain the biodiversity of

South Australia. The aim of *No Species Loss* is to halt and where possible reverse the decline in the State's terrestrial, aquatic and marine biodiversity.

#### *Environment Protection and Biodiversity Conservation Act 1999*

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* is Australia's central environmental legislation. It provides for the protection and management of nationally and internationally important flora, fauna, ecological communities and heritage places, and sets referral processes in place for developments that pose a risk to significant environmental matters. It requires Commonwealth approval for any action that may have a significant impact on a matter of national environmental significance (e.g. nationally listed threatened species or threatened ecological communities).

#### *National Forest Policy Statement*

The *National Forest Policy Statement* (NFPS), signed by all participating Australian Governments (except Tasmania) at the Council of Australian Governments (COAG) meeting in April 1995, provides a vision, objectives and policies for the ecologically sustainable management of Australia's private and public forests, including plantation forests. The vision of the NFPS includes an expansion in the area of plantation forests, while also acknowledging the need for this to happen within environmentally sustainable limits, and in an environmentally sensitive manner.

To achieve the NFPS vision and to ensure the community obtains a balanced return from all forest uses the Governments agreed to pursue 11 broad national goals. Two specific goals relate to water and plantations:

- To ensure the availability of reliable, high quality water supplies from forested land and to protect catchment values.
- To expand Australia's commercial plantations to provide an additional, economically reliable and high quality wood resource for industry as well as to rehabilitate cleared agricultural land, improve water quality and meet other environmental, economic and aesthetic objectives.

#### *Plantations 2020: The 2020 Vision*

*Plantations 2020* is a partnership between the Commonwealth, State and Territory governments and the plantation timber growing and processing industry. It was launched in 1997 with a vision to treble Australia's plantation industry to three million hectares by the year 2020 in an effort to improve regional wealth and international competitiveness.

#### *Climate Change and Greenhouse Emissions Reduction Act 2007*

The nation's first climate change legislation, sets out targets for South Australia to:

- Reduce greenhouse gas emissions by at least 60% of 1990 levels by the end of 2050.
- Increase the proportion of renewable electricity generated, and proportion of renewable energy consumed, so that they comprise at least 20% of electricity generated and consumed by the end of 2014.

In line with this legislation, South Australia's Greenhouse Strategy aims to contribute to the achievement of the Kyoto target by limiting the state's greenhouse gas emissions to 108% of 1990 levels during 2008-2012, as a first step towards reducing emissions by 60% by 2050.

## 3 | Science informing policy

### **Importance of science**

The development of this policy framework, and its implementation, is informed by the best available science. Scientific data and information is widely used to inform the management of water resources, as it helps us better understand our surface and groundwater systems and the risks that they face. Science is most valuable in a policy context when scientific knowledge can be used to help guide, support and inform management decisions. When combined with robust technical monitoring systems and an adaptive management framework, science allows for continuous improvement to management systems.

### **Use of best available science**

While science provides knowledge and data that helps us better understand natural systems, it is also true that scientists often have divergent views on how things operate, and that two different scientific methods applied to the same problem can provide different results. A variety of scientific methodologies have been applied to studying the water resource impacts of plantation forests in South Australia.

The CSIRO has conducted an independent assessment of the scientific methodologies used to account for the impacts of plantation forests in South Australia, with the aim of providing a consistent set of assessment methodologies for future use. Its key findings are addressed below against specific issues.

### **Key scientific findings and positions**

These methodologies can be used to approximate the water resource impacts of plantation forests in the absence of more detailed scientific knowledge or technical information. Notwithstanding this, the use of these methodologies does not replace the need for, and importance of, localised assessments and monitoring data, and where possible this technical information should be collected to provide greater certainty in water planning, and to ensure that the scientific methodologies used are appropriate for a particular situation. This information should be collected as a priority in areas that have both limited data and pressure on water resources. In these areas there is a need to reduce scientific uncertainty to confirm the sustainable use limits of water resources and to ensure that generalised rules and precautionary approaches do not unreasonably hold back industry development.

#### *Scale of application of sustainable use limits of surface water in South Australia*

In some situations, there may be limited knowledge of water resources. In these circumstances, it remains important to ensure that water use takes place at sustainable limits, while also acknowledging the importance of industry development to the economic prosperity of the State.

In the absence of further information (and outside of prescribed areas), 25% of the median annual adjusted catchment yield can be used as a guide to the sustainable use limit of a water resource (refer State NRM Plan, Appendix B). Resource development is able to proceed up to this point in the absence of detailed scientific knowledge, with little risk to water resources. Once water use reaches this point, further information on the condition of the water resource is required prior to approving any further use of water, to confirm that further use takes place within sustainable limits.

The 25% limit is not intended to be a prescriptive threshold on water use, nor an excuse for avoiding or postponing the collection of scientific or technical data. Instead, it provides flexibility at lower levels of water use, by providing a basis for development approval while technical monitoring programs are developed and implemented. It represents the point at which additional water use needs to be accompanied by assessments of the likely impacts of additional use on the resource and downstream users. This further information will help provide more certainty on the sustainable use limit of the water resource, and allow for further use of water where data suggests that the sustainable use limit lies above the 25% already allocated.

There has been some debate around the scale at which the 25% use limit is best applied. CSIRO has confirmed that the sustainable use limit applies at catchment, sub-catchment and property scales. However, the implications of applying the rule across the different scales will need to be considered. For example, applying the limit at the property scale can restrict development on individual properties. In contrast, applying it at the catchment or sub-catchment scale provides more flexibility for individual properties, but can result in a 'first in-best dressed' scenario. The decision on the best scale of application of the 25% use limit is therefore based more on policy considerations than hydrological factors.

This framework adopts the positions that:

- In non-prescribed areas, and in the absence of assessments of the condition of the water resource and the extent of use of the resource, 25% of the median annual adjusted yield can be used as an indicator of the sustainable use limit for a catchment or sub-catchment.
- In areas where the 25% use limit is used, technically robust monitoring programs should be developed and implemented to enable an assessment of the water resources, and to provide more certainty on the sustainable use limit to guide further water use decisions. Such monitoring should take place in a timely manner and monitoring results should be incorporated into management decisions within an adaptive management framework.

#### *Buffer widths for streams, wetlands and water-dependent ecosystems*

Buffers are used in water resources management to physically separate the location of water-affecting activities from streams, wetlands and water-dependent ecosystems, with an aim of preventing and minimising potential impacts on these systems and on downstream users. While most agree on the need for buffers to protect ecological systems, there has been some debate about the most appropriate width of buffers for specific situations.

In the absence of detailed scientific information, generalised buffer widths can be used for surface water systems as a guide to informing management decisions. For surface water systems, buffers of 20 metres width to the edge of streams and wetlands are justified on grounds of water quality, erosion control and ecology, along with providing hydrological benefits.

Wetlands and water-dependent ecosystems that have been assessed as matters of national environmental significance under the *Environment Protection and Biodiversity Conservation Act 1999* should be managed in a manner that maintains or enhances their ecological values. In some situations this may require the use of a wider buffer than the general rule stated above.

Restrictions on activities that disrupt the soil (e.g. cultivation) are required in drainage lines to prevent local erosion and associated water quality problems. Standards should meet the agreed industry guidelines.

The ecological complexity of groundwater systems means that the use of generalised buffer widths is not appropriate conceptually and may also be impractical. In these systems, management decisions should be informed by the water allocation plan, and in the absence of a water allocation plan, by detailed analysis to determine regionally-appropriate buffer widths.

The approach to determining buffer widths for groundwater systems will vary depending upon the extent of resource development in an area. In areas of low water use buffer widths can be calculated for regional situations based on simple models and pragmatic rules. In areas of higher levels of resource development and water use, both monitoring and field investigations are required to support the development of buffer widths. In very high levels of development, calibrated groundwater models may also be needed on top of monitoring and investigations.

This framework adopts the positions that:

- Buffer widths for streams, wetlands and water-dependent ecosystems will be:
  - 20 metres for surface water resources.
  - Informed by water allocation plans and/or detailed analysis for groundwater resources.
- Wetlands and water-dependent ecosystems assessed as matters of national environmental significance under the *Environment Protection and Biodiversity Conservation Act 1999* should be managed in a manner that maintains or enhances their ecological values, recognising that in some situations wider buffers may be required for biodiversity benefits.
- Restrictions on activities that disrupt the soil are required in drainage lines to prevent local erosion and associated water quality problems.
- Modelling, monitoring and field investigations should be completed to inform the development of regionally-appropriate buffer widths for groundwater systems.

#### *Environmental water requirements*

Water needed to support aquatic systems and water-dependent ecosystems, including maintenance of their biodiversity and ecological processes are deemed environmental water requirements. As specific environmental water requirements are often unknown or uncertain, approximate figures are often used to estimate their needs while additional information is collected. The exact figure that should be used for environmental water requirements has been subject to some debate.

An environmental water requirement of 10% will allow for some through-flow at a range of scales, and should be sufficient to avoid salinisation of groundwater resources. However, this figure is low for environmental assets and may not be sufficient to fully support natural systems. Default values of 20-30% have been used both nationally and internationally as a precautionary measure to account for uncertainty in environmental requirements, and to better reflect the risk to environmental assets.

A generalised rule cannot be applied for environmental water requirements in surface water systems. In these systems, detailed assessments of local environmental assets are required to estimate environmental water requirements. This is likely to be the area of greatest uncertainty in water resource assessments, and research to reduce the uncertainty of environmental water requirements is required.

This framework adopts the positions that:

- In the absence of detailed information, environmental water requirements for groundwater systems should be set at:
  - 10% to avoid salinisation of groundwater; or
  - 20% to support environmental assets.

- Increasing our knowledge of environmental water requirements is a key research priority for this policy framework.

#### *Impact of plantation forests on runoff reduction and groundwater extraction*

Plantation forests intercept rainfall and therefore reduce runoff. While this reduction in runoff is widely acknowledged, there has been some debate regarding the extent to which runoff is reduced due to plantation forests.

There is strong evidence that the runoff reduction (including groundwater recharge) due to plantation forests is in the order of 70-100%. This data comes from areas within the range of mean annual rainfall within which plantations are likely to be located in South Australia. The exact extent of runoff reduction will vary among specific situations. Lower rainfall catchments are likely to have greater reductions in runoff than higher rainfall catchments. Other factors, such as tree species type, soil fertility, disease, and net versus gross forest area are second order considerations and are encompassed within the range of local uncertainty. The value of 85% reduction runoff due to plantation forests is appropriate to use in South Australia, as it lies within the range of 70-100% and is based on the best available science.

The extent to which plantation forests directly extract water from groundwater systems has also been subject to debate. The relationship between tree water use and the depth to the groundwater table is complex, and is impacted by the root distribution of different tree species in different situations, the ability of the trees to access other water sources, and soil moisture conditions prior to the development of the plantation. The use of a 6 metre trigger to define the depth of the groundwater table at which plantation forests cease to directly extract groundwater reflects the best available information and is appropriate for use.

This framework adopts the position that:

- Plantation forests, regardless of species, can be assumed to reduce runoff (including groundwater recharge) by 85% and access groundwater through direct extraction when the depth to the groundwater table is less than 6 metres.

#### *Water use by plantation forests over the life cycle of the forest*

Water use by plantation forests increases as the trees move from seedlings to maturity and leaf area increases. Due to this variability in the amount of water that plantation forests use, there has been some debate about the best way to approximate water use over the life cycle of a forest, in particular whether average versus maximum water use should be used.

Using the average water use of a plantation forest over time to estimate the amount of water used over a life cycle would only be appropriate for large established plantations with a mix of stand ages. It would not be appropriate for new developments established within the period of a single rotation. Furthermore, water planning based on average conditions or planned times for harvesting provides no flexibility for changes in circumstances or extension of rotation lengths.

Use of the maximum water use of a plantation forest to estimate the water used over a life cycle is considered more appropriate. This is because tree growth is inevitable once the plantation is established and water resource planning is aimed at ensuring water security at times of maximum water use. Other uses of water, such as irrigation, farm dams and environmental requirements do not use their maximum entitlement every year, with some variability in use from one year to another, below the maximum allowed. Thus the situation that use in some years may be below the level of entitlement required is not unique to plantations. Consistent with the principles of water planning, maximum water use should be used as the most appropriate basis for policy and planning.

This framework adopts the position that:

- Maximum water use should be used to estimate the amount of water used by plantation forests over the life cycle of the forest.

*Areas available for plantation forest expansion where it may be beneficial for salinity management and will not adversely impact on water quantity*

Plantation forests have the potential to reduce salinity. However, alongside reductions to salinity are the impacts of plantation forests on water resources. Where the salinity benefits from plantation forests outweigh the impacts on water quantity, such areas may be considered for plantation forest expansion, subject to consideration within the broader water allocation framework.

In order to distinguish the trade-offs, it is important to understand the spatial context of each of these. Higher rainfall areas usually have good quality water at high availability, and in these areas plantation forestry productivity is high. In this situation, the salinity benefit provided by plantation forests is outweighed by their impacts on water resources. Areas of low rainfall are often associated with lower quality water and with low water availability, and these areas are also low productivity for plantation forests. In these low rainfall areas, the salinity benefits provided by plantation forests could outweigh the impacts on water resources, but these areas may be less attractive for forestry because of their lower productivity. Other factors, such as terrain and geology, will also impact on the relative salinity benefits, and require consideration.

Criteria for determining areas with potential salinity benefits need to be developed. In the absence of these criteria, application of rules embedded within salinity models may identify areas where the salinity benefits of plantation forests outweigh their impacts on water resources. Determination of the criteria for deciding when the relative salinity benefits justify plantation forest expansion is a policy decision depending on the values applied to a particular management area.

This framework adopts the position that:

- Criteria to assess areas available for plantation forestry expansion where it may be beneficial for salinity management without adversely impacting on water quantity should be developed.

*Changing water management zone boundaries from cadastral (hundreds) to hydrogeological areas for the South East*

In groundwater systems, management zones need to be defined for water resources management. In the South East these have historically been based on the administrative boundaries of hundreds, although there has been some debate about changing to a system that is more hydrologically meaningful, such as a change to boundaries based on hydrogeological areas.

Determining the most appropriate definition of groundwater management zone boundaries reflects finding a balance between administrative efficiency and biophysical causes. To avoid gradient reversals (e.g. changes to the natural movement and flows of groundwater), it will be necessary to define hotspots of water use and have groundwater management zones defined to best address these. Potentially, broad management rules could be consistent across the whole aquifer, but with water use thresholds and values defined for individual zones within this.

A groundwater model will need to be developed for the Lower South East in the near future and permissible annual volumes of extraction determined on the basis of outputs from such a model. Application of nested models to reflect hotspots within the broader groundwater flow system will address some of the issues above and give a better basis for application of different rules across the system.

This framework adopts the position that:

- A project should be initiated to change water management zone boundaries from cadastral (hundreds) to hydrogeological areas for the South East to address hotspots for sustainable water resources management.

### **Scientific uncertainty**

It is sensible to acknowledge that there will always be some degree of scientific uncertainty when making policy decisions. It is important to adopt a precautionary and adaptive management approach to manage this risk associated with scientific uncertainty.

When there is a lack of scientific information for a particular management area, the scientific methodologies listed above can be used to help make informed decisions, along with using the precautionary principle to help develop management decisions. Where there is more detailed knowledge and understanding of the condition of water resources and the demands on them, these generalised rules should be replaced with management informed by the results of local assessments.

#### **Policy**

- Plantation forest impacts are to be fully accounted within the water budget of a management area where forestry impacts are considered to be significant.
- Water accounting will be transparent and based on the best available science.
- Where possible, determination of water balance calculations that underpin estimation of water allocations will be done on relevant hydrological/hydrogeological catchments.
- Plantation forest impacts will be quantified in volumetric terms and should be specified in an annualised form for consistency and simplicity.
- The precautionary principle in the context of environmental protection will be used to manage scientific risk or uncertainty, with consideration also given to the potential impacts of management decisions on industry and communities.
- The best available science will be used to underpin policy and implementation strategies, along with the identification of critical knowledge gaps, and the support of research and investigations that address environmental, economic and social considerations and support research and investigations that address environmental, economic and social considerations.
- The scientific methodologies detailed in this framework are appropriate for use as approximations of the impacts of plantation forests on water resources in the absence of more detailed scientific information.

## Action

- Where there is a lack of detailed local information, decision-makers will apply the methodologies outlined in this policy framework when assessing the impacts of plantation forests on water resources.
- Agencies and NRM Boards will ensure that relevant new scientific and technical data is documented, peer-reviewed and made available to stakeholders in a transparent manner.
- Agencies and NRM Boards will identify priority research areas to address areas of scientific uncertainty. These will include, but are not limited to:
  - Clarification of environmental water requirements, including regionally-appropriate buffer widths and the amount, frequency, timing and quality of water needed to sustain environmental values.
  - Development of conceptual models of regional hydrology to model the key driving processes of surface and groundwater hydrology in each region.
  - Measuring and predicting hydrological processes to provide background measurements of hydrology.
  - Changing water management zone boundaries from cadastral (hundreds) to hydrogeological areas for the South East.
  - Development of criteria to assess areas available for plantation forestry expansion where it may be beneficial for salinity management and will not adversely impact on water quantity.

## 4 | Management options

### Legislative framework for water resources management

The legislative framework in South Australia provides a number of regulatory options for managing the use of water resources within sustainable limits, including controls under the NRM Act and the *Development Act 1993*. This variety of options provides flexibility for water resource management, allowing for the intensity of the management effort applied to water users to be tailored according to the level of risk or pressure on the water resources, or the specific water resource impacts of a given activity.

#### *NRM Act controls*

The NRM Act provides for control of activities that affect water resources by applying licensing or permitting systems to those activities. Both are authorisation systems that include applications, assessment of the activity, refusal or approval, attachment of conditions and provision for variations.

A key difference between the two controls is the way in which they manage water use:

- The **licensing system** manages water resources by allocating specified volumes or volume equivalents to water users.
- The **permit system** manages water-affecting activities by controlling their extent and nature.

More detailed information on permits and licences is shown on page 21 and 22 respectively.

#### *Licensing in prescribed water resource areas*

Water licensing can only be established through *prescription* of a water resource – the most intensive management tool for water resources available under the NRM Act. Prescribing a water resource allows activities that are defined as ‘taking water’ under the NRM Act to be closely managed by volume or volume equivalents through a system of licences, water allocations and water allocation plans. Prescription establishes a system for sharing a surface or groundwater resource and protects against the unregulated use of water. It aims to ensure the resource is used sustainably and shared appropriately between users, providing security for users and balancing social, economic and environmental needs. Expansion of activities that use water can continue up to designated sustainable limits, as identified in water allocation plans.

## **Water licences: managing water by allocating volumes**

Licences issued under section 146 of the NRM Act manage water resources within sustainable limits by allocating licence holders a volumetric allocation of water.

Licences have the following characteristics:

- Can be applied to existing and future activities.
- Provides a licence and water allocation that is the personal property of the holder.
- The water allocation is allocated in accordance with the water allocation plan which identifies the water available for allocation to licensees.
- Allocations can be varied over time, in accordance with water allocation plans and with respect to water resource information and sustainable levels of water allocation.
- Licences and allocations can be sold or transferred, subject to water allocation plan policies.
- The water licence and water allocation are not tied to, and may be sold separately from, land.
- Cannot be revoked or cancelled, unless the holder is in breach of the licence.
- Restrictions may be applied to licensees where a water resource is threatened by declining water availability or quality or where ecosystems dependent on the water are at threat.
- Allow conditions to be applied.
- Levies are payable on water allocations in prescribed water resource areas.
- Water use must be reported annually.
- Penalties can be imposed where water use exceeds water allocation, and licences can be cancelled or varied.

### *Water allocation plans and licensing*

Water allocations are provided through a licensing system implemented in accordance with water allocation plans, which must be prepared for every prescribed water resource. Regional NRM Boards are responsible for preparing water allocation plans, in consultation with the community. Water allocation plans set out how water can be allocated to users and how licences and allocations can be traded.

Once water licensing is introduced, on application 'existing water users' are entitled to be granted a licence and water allocation by the Minister responsible for the NRM Act (the Minister for Environment and Conservation). The initial water allocation that is granted is – subject to the capacity of the water resource to meet the needs of all existing users and the environment – that required for the user to continue their existing activities.

After initial licences and allocations are issued, further licences and allocations may be issued if there is further water available. Any further allocation of water is subject to the policies in the water allocation plan. All water allocations are subject to variation over time, as water allocation plans are reviewed and revised. Once allocations are issued, water may be traded permanently or temporarily by licence holders, subject to the provisions in the water allocation plan.

## **Permits: managing water by controlling the extent and nature of water-affecting activities**

Permits issued under section 135 of the NRM Act control the extent and nature of water affecting activities defined under section 127 of the NRM Act to achieve sustainable water resources management.

Permits have the following characteristics:

- Can only be applied to future activities (i.e. cannot be applied retrospectively to manage current water-affecting activities).
- Do not allocate a volume of water to permit holders (i.e. no water allocations are attached).
- Cannot be sold or transferred.
- Provides an authorisation that is binding on and operates to the benefit of the applicant and the owner of the land, and to all subsequent owners.
- Allows conditions to be attached to permits. Conditions can remain in force after the activity has been completed.
- Allows permits to be varied, revoked or suspended where the permit holder breaches conditions of the permit.
- Allows permits to be varied so that they remain consistent with an NRM plan and to be revoked where they cannot be varied to be consistent with an NRM plan.
- Where an activity that will take water is authorised by a permit, the amount of water that is 'taken' by that activity is accounted for by not including it in the amount of water that is made available for allocation to water licence holders.
- Does not provide for permanent or temporary transfers of water that the permitted activity may be taking, by permit holders. However, if an activity was to be removed from a landscape, then water available for allocation to water licences would increase when the water allocation plan was reviewed as water was returned to the available pool for allocation.

### *Water-affecting activity permits*

Plantation forests can be regulated under the NRM Act as a water-affecting activity requiring a permit. Currently in the South East, a permit is required to be obtained to undertake future plantation forest activity. Included within the permit approval process is an assessment of the water resource impacts of plantation forest proposals. Where water is available, a permit may be issued to allow expansion of plantation forests at ecologically sustainable limits. The permit system can be used to control the extent and location of plantation forest expansion, by ensuring that any expansion takes place at levels and in locations that are consistent with the sustainable management of water resources.

Water allocation plans set out policies for the management of water-affecting activities. In areas that aren't prescribed, regional NRM plans can detail these policies. The NRM Act sets out some water-affecting activities for which a landholder is required to get a permit to undertake, if required by a relevant plan. Other water-affecting activities can be prescribed by regulation or incorporated through the regional NRM plan, or water allocation plan, which sets out the criteria for assessing the water resource impacts of the proposed activity and the issuing of permits.

### *Development Act approvals*

In South Australia, new plantation forest proposals are subject to land use planning approval under the relevant Development Plan, in accordance with the *Development Act 1993*. This development approval does not of itself require an assessment of the water resource impacts of a plantation forest proposal, although in some cases, applications are voluntarily referred by the relevant authority (e.g. local council) to the Department of Water, Land and Biodiversity Conservation (DWLBC) for assessment of the water resource impacts of the proposal. In these cases, comments are provided by DWLBC to the relevant authority that makes the decision on whether to approve or refuse an application.

The NRM Act and the *Development Act 1993* have complementary roles in dealing with activities that are identified as both a 'development activity' that requires assessment under the Development Act and a 'water-affecting activity' that requires assessment under the NRM Act.

Schedule 8 of the *Development Regulations 2008* sets out referral arrangements where both development and NRM assessments are required, so that councils are required to refer development proposals to the relevant NRM authority for assessment. The NRM authority then has power of direction or regard over the relevant development authority. The referral process streamlines assessment and approval processes for applicants to ensure that the one application process provides for assessment against relevant development approval and NRM permit requirements.

As the Development Act does not assess or manage the water resource impacts of land use proposals, it cannot be relied upon to control the increased water use in catchments and groundwater basins that results from the expansion of plantation forests. Managing the expansion of plantation forestry solely through the Development Act may result in significant risks to water resources and water security.

### **Recommended management options**

This policy framework provides for the following management options to be used by agencies and regional NRM Boards to manage the water resource impacts of plantation forests:

- A water licence under the NRM Act.
- A water-affecting activity permit under the NRM Act.
- Codes of Practice and industry agreements.

These management options differ in their applicability to specific situations, and not all of the tools will apply to a given situation. The recommended use of management options in different situations is detailed later in this section.

#### *Water licences*

Plantation forests are managed by a system that requires them to hold a water licence in accordance with the NRM Act.

#### *Water-affecting activity permits*

Plantation forests are managed by regulating them as a water-affecting activity that requires a permit in accordance with the NRM Act.

### *Codes of Practice and industry agreements*

Codes of Practice and industry agreements can be developed in consultation with industry to reflect this policy framework and regionally-agreed outcomes.

In accordance with this policy framework, the development of Codes of Practice and industry agreements may be most appropriate for use as supporting management tools to accompany licences or permits under the NRM Act.

## **Choosing an option**

Based on the scientific evidence of the impacts of plantation forests on water resources, this policy framework acknowledges that both forest water licences and permits are appropriate tools to use to manage the water resource impacts of plantation forests, with their applicability to specific situations dependent upon the condition of, and pressure on, water resources and the current and future extent of plantation forests relative to other water users. For example, licences allow for volumetric water allocations to be allocated to existing plantation forests in prescribed areas, while permits provide an option to manage the expansion of plantation forests at levels that are sustainable for water resources across all areas, regardless of prescription. The recommended option for a given situation will depend upon a number of factors, as detailed below and shown in *Figure 4.1*.

Further information on the implementation of a chosen management option, including addressing over-allocation, is considered in *5 | Implementation*.

### *Whether a water resource is prescribed or not prescribed*

Prescription of water resources under the NRM Act provides for more intensive water resources management. These water resources are typically under stress or high levels of pressure from existing use. In prescribed areas, licensing will be the recommended option for plantation forests in many situations, particularly where the impacts of plantation forests on water resources are high or have the potential to be high.

### *The extent of pressure or stress on water resources*

The level of pressure or stress on water resources is a key factor in determining the intensity of management effort that needs to be applied to managing water users. In areas under higher pressure or stress, the prescription of a water resource to enable licensing may be justified. In areas of lower stress, regulating expansion at ecologically sustainable limits via the permit system may be sufficient to manage the water resource impacts of plantation forests. While in prescribed areas pressure will be likely to be high, in non-prescribed areas the pressure on resources will vary across the State depending upon the extent and type of existing water uses, predicted future use, and the current and future projected water availability. The pressure on water resources should be assigned as high, low or uncertain, using *Table 4.1* as an indicative guide to assessment. The data to be collated and considered in making this assessment should follow the information in the relevant DWLBC Technical Report (Mangelsdorf and Kawalec, 2008).

**Table 4.1:** Determining the extent of pressure on water resources

Data to be considered in determining pressure on water resources		
<ul style="list-style-type: none"> <li>• The extent and nature of existing water users, including the requirements of the environment and water-dependent ecosystems</li> <li>• Water availability and projected trends in future water security</li> <li>• Resource condition and resource condition trends/changes over time</li> </ul>		
LOW pressure	UNCERTAIN pressure	HIGH pressure
<p>Few existing users, existing use low</p> <p>Availability of water high relative to existing use</p> <p>Resource condition good, trends stable</p>	<p>Little data on water availability relative to use</p> <p>Data on water availability and use unclear or uncertain – unable to draw conclusions about extent of pressure on water resources</p>	<p>Lots of existing users, existing use high</p> <p>Availability of water low relative to existing use</p> <p>Water resources may be over-allocated or over-used or nearing over-allocation</p> <p>Water resources showing signs of stress, resource condition declining</p>
<p>————— Extent of pressure on water resources increasing —————&gt;</p>		

*The impact of plantation forests on water resources at broader scales*

Plantation forests have the potential to impact on water resources at the catchment or basin scale. Known high or potentially high impacts of plantation forests at these broader scales of management may justify more intensive management measures, such as licensing in prescribed areas or the use of permits to regulate future forest expansion in non-prescribed areas. The impact of plantation forests on water resources at the catchment or basin scale should be assessed as high or low, or uncertain where data is lacking or impacts are unclear. Where there is scientific uncertainty regarding impacts, a precautionary approach should be adopted. *Table 4.2* can be used as a guide to help make this assessment.

*The impact of plantation forests on water resources at localised scales*

Plantation forests can have localised impacts on water resources, regardless of the extent of their impacts at broader scales. For example, if plantation forests are restricted to a specific location in a management zone, there may be relatively low impacts at the broader scale of management (e.g. within the catchment), yet the impacts may be significant within the local area (e.g. within the sub-catchment). Localised impacts may also be present where forests are located immediately adjacent to sensitive water-dependent ecosystems. The impact of plantation forests on water resources at the sub-catchment or local scale should be assessed as high or low, or uncertain where data is lacking or impacts are unclear. A precautionary approach should be taken when impacts are uncertain. *Table 4.2* can be used as a guide to help make this assessment.

**Table 4.2:** Determining the extent of the impacts of plantation forests on water resources

<b>Data to be considered in determining impacts of plantation forests</b>			
<ul style="list-style-type: none"> <li>• The extent and location of plantation forests</li> <li>• Type and extent of other water users</li> <li>• Known or perceived impacts of plantation forests relative to those of other water users</li> <li>• Resource condition and resource condition trends/changes over time</li> </ul>			
↑ Scale increasing ↓	<b>LOW impacts</b>	<b>UNCERTAIN impacts</b>	<b>HIGH impacts</b>
	<b>Catchment scale</b> Extent of plantation forests low relative to other water users No impacts of plantation forests observed	Little data on impacts of plantation forests Impacts of plantation forests unclear or uncertain	Extent of plantation forests high relative to other water users – forests a main land use in catchment Impacts of plantation forests on water resources observed
	<b>Sub-catchment scale</b> No localised ‘hotspots’ of plantation forest activity No localised impacts of plantation forests observed	Little data on impacts of plantation forests Impacts of plantation forests unclear or uncertain	Localised ‘hotspots’ of plantation forest activity Sensitive water-dependent ecosystems located close to plantation forests Impacts of plantation forests on water resources or ecosystems observed
	← <b>Extent of impacts on water resources increasing</b> →		

### *The expected future expansion of plantation forests*

The potential impacts of plantation forests into the future should also be considered when determining the appropriate management response. Although plantation forests at current levels may be having negligible or low impacts, the extent of these impacts could increase in the future if an increase in the extent of the area of plantation forests is likely (e.g. areas targeted for industry growth or expansion, including expansion in low rainfall areas for carbon sequestration). In situations where the current impacts of plantation forests on water resources are low, but future expansion is likely or expected, use of the permit system may be justified to regulate the extent and location of plantation forests.

### **Adaptive management**

Adaptive management is the process of learning through doing – learning from the results and outcomes that arise through the implementation of management decisions.

The extent and availability of water resources, and the type and extent of water use, are not static over time. For example, climate change is likely to lead to reduced rainfall, which will impact on future water availability. Land use change may vary the type and extent of water users in a particular location, with consequential impacts on the amount of water that is available for allocation from a catchment or basin in the future.

Increased knowledge and scientific information can change our understanding of the sustainable extraction levels from a water resource or the water use of a particular activity, which can also vary the amount of water available for future allocation.

Reflecting this future variability and uncertainty, water resources management should take place within an adaptive management framework that reviews and adapts management decisions as information is gained and learnt.

In particular, the process of choosing the best management option to manage the water resource impacts of plantation forests should be reviewed regularly to ensure that the chosen management decision remains the most appropriate management option. At a minimum, decisions should be reviewed every time a water allocation plan or regional NRM plan is reviewed.

Agencies and regional bodies should also incorporate adaptive management frameworks into water allocation plans and regional NRM plans, allowing for management to be varied during the life of a plan as more information becomes available, and allowing for continuous improvement in management practices.

### **Climate Change**

Climate change poses a significant risk to water resources management as well as to water-dependent industries such as irrigation and plantation forestry. Climate change is predicted to have an impact on rainfall patterns (Suppiah *et al.*, 2006) and therefore on surface and groundwater resources. This in turn will impact on the availability of water for environmental requirements and the range of consumptive uses within a water resource area, including plantation forests.

Using and managing water resources in a precautionary way (i.e. within sustainable limits and ways that are compatible with natural climate variability and long-term changes in rainfall) will minimise the risks, and take advantage of any benefits, arising from the impacts of climate change on natural resource based industries and NRM programs.

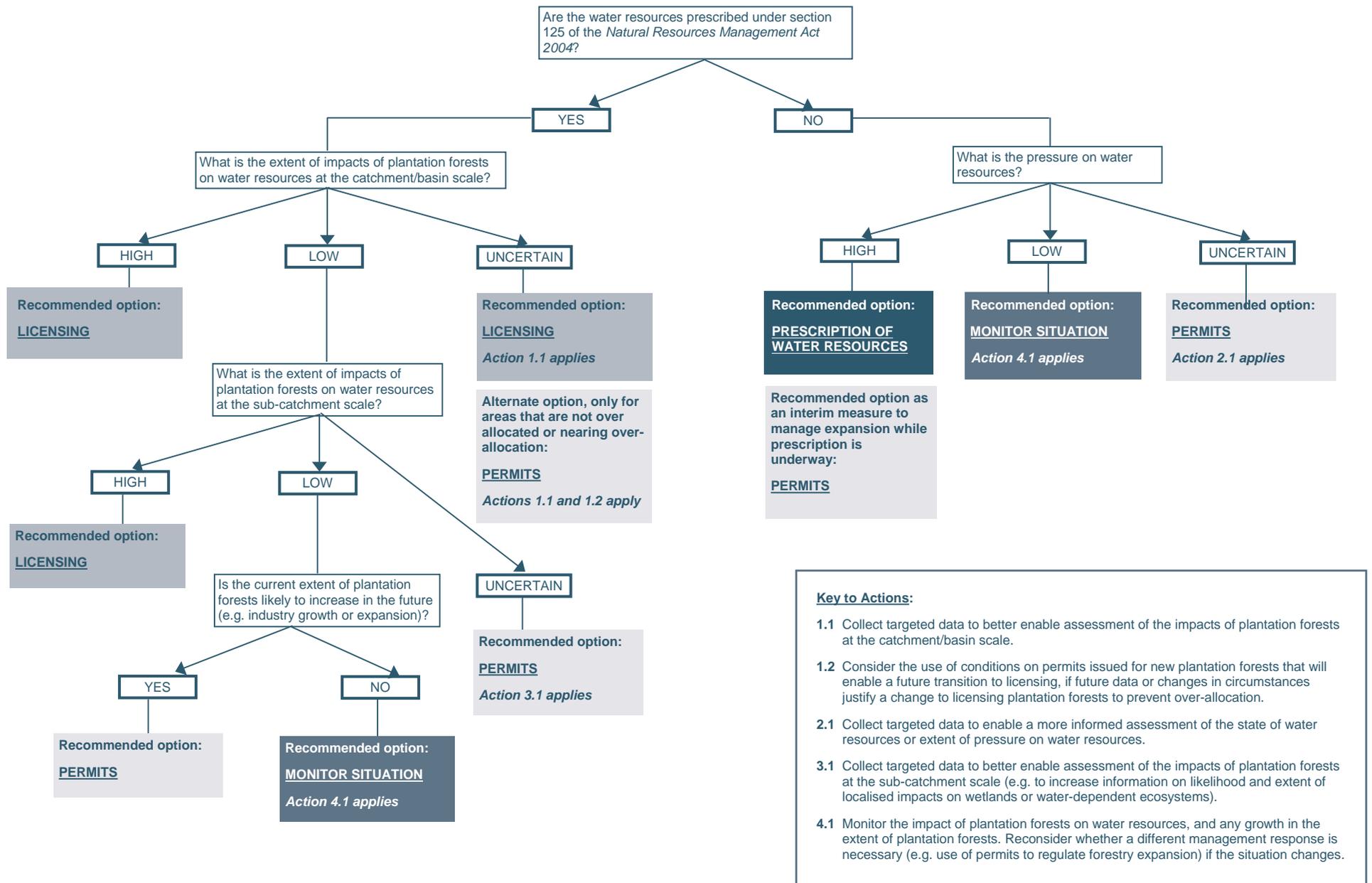
## **Policy**

- The impacts of plantation forests will be fully accounted for in water balances. Water accounting is to be transparent to ensure maximum confidence for all stakeholders.
- Plantation forests will be managed according to the level of risk to the sustainability of the water resource.
- In prescribed areas, plantation forests will be managed through a water allocation plan and should be licensed where they are having a high impact on water resources or where there is a risk that future expansion will affect the future availability of water from a resource that is at or near full allocation.
- A forest water licence will be a licence under the NRM Act that recognises the unique type of water use involved in the dryland landscape scale practice of forestry and the nature of the potential impacts on a water resource.
- Permits should be used to control new plantation forests, or expansion of existing plantation forests at ecologically sustainable limits, where water resources are under pressure or at risk of pressure.
- When scientific data is lacking or unclear, a precautionary approach should be taken to managing the water resource impacts of plantation forests, with decisions reviewed as more data is obtained.
- Current management options should not preclude the ability to address the future implications of climate change, recognising predictions of increased variability in weather and gradual drying.

## **Action**

- Agencies and NRM Boards will follow this policy framework when determining which management option(s) to use to manage the water resource impacts of plantation forests.
- Agencies and NRM Boards will develop a transparent process for managing reductions to water allocations in over-allocated areas where plantation forest impacts on water resources are significant.

**Figure 4.1:** Guide to assist choice of management option(s) to manage the water resource impacts of plantation forests.



## PART B: IMPLEMENTING THE FRAMEWORK

# 5 | Implementation

This framework will be implemented through regional NRM planning processes and associated partnership arrangements.

### **Partnerships and collaboration**

Government, industry and communities, and their willingness and ability to work together to achieve ecologically sustainable plantation forests and best practice water resource management, are critical to realising the vision of this framework.

State government agencies (principally the Department of Water, Land and Biodiversity Conservation, Primary Industries and Resources South Australia, Department for Environment and Heritage, Department of Planning and Local Government and the Environment Protection Authority) and regional NRM Boards will work collaboratively to enhance systems of governance and foster partnerships with all key interested groups, including:

- The Ministers responsible for water resources management and forests.
- Other relevant State and Commonwealth government agencies.
- The NRM Council.
- Industry and community groups, including NRM peak bodies such as the Conservation Council of South Australia and the South Australian Farmer's Federation.
- Local government.

### *Shared values*

State government agencies and regional NRM Boards share a commitment to:

- Assist in the achievement of ecologically sustainable development in South Australia through an integrated approach to the use and management of the State's water resources.
- Acknowledge their shared responsibility under the NRM Act to sustainably manage natural resources, while also acknowledging, recognising and respecting each others views, roles and responsibilities.
- Maintain openness and transparency in their dealings with each other and their communities.
- Work together to achieve consistent and compatible approaches and solutions to managing the impacts of plantation forests on water resources in South Australia.
- Use open communication and develop processes to identify and resolve differences where they occur.

## **Roles and responsibilities**

Clearly defined and agreed roles and responsibilities are essential to providing transparency and certainty for the sustainable management of water resources and plantation forests.

The implementation of this framework by State government agencies and regional NRM Boards will be built upon the following roles and responsibilities:

### *State Government agencies*

- Provide the policy and compliance framework.
- Oversee the process for Ministers.
- Be a custodian of data and information on a statewide basis.
- Have a strong engagement in development of State and regional NRM plans.
- Deliver services (e.g. water licensing functions and technical services).
- Provide and support a corporate governance framework for both agencies and regions.
- Manage consistent delivery of this framework across State agencies.

### *Regional NRM Boards*

- In consultation with communities, agencies and industry, develop regional NRM plans and water allocation plans that are consistent with this policy framework.
- Ensure implementation of regional NRM plans, including coordination with other delivery partners such as local government.
- Play the lead role in involving industry and communities in NRM and coordinating education and engagement processes.
- Ensure regional delivery of all NRM Board activities within agreed statewide frameworks.

The plantation forest industry and other water users will be involved in the implementation of this framework through the following roles and responsibilities:

### *Plantation forest industry and other water users*

- Represent their interests in NRM planning and water allocation planning processes established under the NRM Act.
- Recognise their responsibilities to contribute to ecologically sustainable development and best practice water resource management.
- Work with government agencies and regional NRM Boards in an open and transparent manner to identify practical solutions to implementation issues arising from this framework.

## Key issues for consideration when implementing this framework

### *Addressing over-allocation*

This policy framework acknowledges the need to address over-allocation in over-allocated and/or over-used water systems, in accordance with the NWI. This policy framework also acknowledges the need to prevent over-allocation in the future by implementing appropriate management options for water users, including management options for plantation forests in accordance with this framework.

The South Australian Government, through the NWI, has agreed that substantial progress will be made by 2010 towards adjusting all over-allocated and/or over-used water systems in accordance with the timelines indicated in their implementation plans.

Clauses 55-57 of the NWI set out the measures to be taken in relation to water interception activities. South Australia will implement these measures through the NRM Act and regional NRM planning (including water allocation planning) processes. Water allocation planning under the NRM Act is the mechanism by which governments and communities make water resources management and allocation decisions that consider productive, environmental and social objectives.

Water allocation plans prepared for prescribed areas will detail how any current or future over-allocation and/or over-use will be addressed, including identifying a hierarchy in which measures to reduce allocations will be taken, and will detail the management measures that will be taken to ensure that future over-allocation is prevented.

In over-allocated areas where plantation forests are considered to have a significant impact on the water resource, settling trade-offs between competing outcomes for water systems will involve judgements informed by the best available science, socio-economic analysis and community input. These judgements will be reflected in the policies detailed in water allocation plans.

### *Assigning risks for changes in water allocations*

The NWI seeks to establish clarity for water entitlement holders around the assignment of risk arising from future changes in the availability or reliability of water. Assigning risks for changes in allocation is covered in paragraphs 46-51 of the NWI. Paragraphs 48-50 outline a 'risk assignment' framework, detailing who bears the risk of reduction in water availability under certain circumstances. For example, paragraph 50 states in part:

*"Governments are to bear the risks of any reduction or less reliable water allocation that is not previously provided for, arising from changes in government policy."*

However, paragraph 51 provides that State governments can implement an alternative risk assignment framework if appropriate, which states that:

*"Alternatively, the Parties agree that where affected parties, including water access entitlement holders, environmental stakeholders and the relevant government agree, on a voluntary basis, to a different risk sharing formula to that proposed in paragraphs 48 to 50 above, that this will be an acceptable approach."*

The South Australia Government has adopted paragraph 51 in relation to this matter. The water allocation process under the NRM Act is the process used in South Australia to transparently develop and determine water allocations as part of a sustainable consumptive pool. The framework of the NRM Act is considered sufficient to encompass the outcomes of the NWI.

The NRM Act provides that the Minister responsible for the NRM Act may reduce allocations where necessary to protect the sustainability of the resource and/or water-dependent ecosystems. This includes taking account of climate change and periodic events that may impact on water resources. Compensation is not payable to the holders of water entitlements.

In summary, South Australia's approach to risk assignment for changes in allocations is encompassed by paragraph 51 of the NWI. It is considered that the water allocation planning process under the NRM Act is a sufficiently robust, transparent and consultative process to provide ample public and investor confidence that water access entitlements are sustainable both within the water planning cycle and in the longer term.

## **Monitoring and review of this framework**

DWLBC will monitor the implementation of this policy framework.

This document will be reviewed in five years time unless new knowledge warrants an earlier review.

### **Policy**

- South Australia will make substantial progress in adjusting water allocations in over-allocated areas by 2010-11, consistent with its NWI commitments. This will occur through NRM planning and water allocation planning processes established under the NRM Act.
- NRM and land use planners will be aware of the short and long-term consequences of their management decisions for water resources management and broader environmental outcomes. Inappropriate planning decisions that give a short-term economic gain may result in long-term environmental degradation with ongoing negative economic impacts for the wider community, including future generations.
- There will be fairness and equity between competing consumptive uses in the implementation of the water management options recommended in this framework.
- Existing rights of water users, including plantation forests, will be given appropriate consideration in areas where reductions are required to return over-allocated or over-used water resources to sustainable limits.
- In over-allocated areas, where plantation forests are required to meet reductions in water allocations, acknowledgement will be given to the longer timeframes of forest rotations and that there may be a need to meet reductions over longer timeframes (e.g. 20-30 years).
- When establishing management arrangements for water interception and extraction licences, an appropriate date should be established as a baseline for recognition of existing user rights.
- Actions to encourage the shift of water to the highest value of water use should be adopted.

## **Action**

- Implementation strategies for this policy framework will be addressed by State government agencies and regional NRM Boards.
- Measures to address and prevent over-allocation, including trade-offs and assignment of risks, methods for reducing allocations, and transition measures, will be clearly addressed in water allocation plans.
- Water allocation plan policies will encourage moves towards improving the efficiency of water use and delivery.
- Management decisions will be reviewed every time a water allocation plan or regional NRM plan is reviewed.
- State government agencies and regional NRM Boards will incorporate adaptive management frameworks into water allocation plans and regional NRM plans.

# Glossary

**Accounted, accounting or accountable** means the process of recording the impact of the plantation forest in the water budget for a management area, or catchment. It does not imply any assignment of responsibility.

**Adaptive management** is an approach, often used in natural resources management, where there is little information and/or a lot of complexity and there is a need to implement some management changes sooner rather than later. The approach is to use the best available information for the first actions, investigate and document the assumptions, implement the changes, monitor the outcomes, and regularly evaluate and review the actions required.

**Bio-sequestration** is the capture and storage of carbon in biological organisms.

**Catchment** is that area of land determined by topographic features within which rainfall will contribute to run-off at a particular point.

**Climate change** means a change in climate, which is attributed directly or indirectly to human activity, which alters the composition of the global atmosphere, and is in addition to natural climate variability observed over comparable time periods.

**Commercial forest** is the term used in development plans (under the *Development Act 1993*) for the commercial or industrial scale plantation forest land-use. Some in the plantation forest industry prefer the term 'industrial scale'. See Plantation forest.

**Consumptive uses of water** means all water intercepted or extracted from a water resource but excludes environmental water requirements.

**Ecologically sustainable development (ESD) or sustainable development** comprises the use, conservation, development and enhancement of natural resources in a way, and at a rate, that will enable people and their communities to provide for their economic, social and physical wellbeing while: sustaining the potential of natural resources to meet the reasonably foreseeable needs of future generations, safeguarding the life-supporting capacities of natural resources, avoiding, remedying or mitigating any adverse effects of activities on natural resources.

**Environmental water provisions** means those parts of environmental water requirements that can be met at any given time. This is what can be provided at that time with consideration of existing users' rights, social and economic impacts.

**Environmental water requirement** means the water regime needed to sustain the ecological values of aquatic systems, including their processes and biological diversity, at a low level of risk. Basically, this means what these ecosystems – including watercourses, riparian zones, wetlands, floodplains, estuaries, cave and aquifer ecosystems – need.

**Groundwater** is for the purposes of this framework water occurring naturally below ground level.

**Interception** is a term used in the Intergovernmental Agreement on a National Water Initiative, paragraphs 55-57. This is interpreted as meaning any interruption to the natural water cycle, resulting in a diversion of natural water movement, or a reduction in the consumptive pool by a particular activity. In this paper the use of the term interception refers to the impact of plantation forests in: - reducing surface water catchment yield, reducing groundwater recharge, and extraction of groundwater from shallow water tables.

**Land use planning system** refers to all arrangements under the *Development Act 1993* for managing land use and development.

**A licensing system** would record plantation forest impacts as allocation through the water licensing system. Under a licensing system a transferable property right is assigned to the plantation owner/manager/landowner for the deemed impact on the water resource.

**Natural resources** includes soil, water resources, geological features and landscapes, native vegetation, native animals and other native organisms and ecosystems.

**Net benefits to the community as a whole** are the benefits minus the costs accruing to the community.

**NRM region** means a natural resources management region established under Chapter 3 Part 3 Division 1 of the *Natural Resources Management Act 2004*.

**Over-allocation** refers to situations where, with full development of water access entitlements in a particular system, the total volume of water able to be extracted by entitlement holders at a given time exceeds the environmentally sustainable level of extraction for that system.

**Over-used** refers to situations where the total volume of water actually extracted for consumptive use in a particular system at a given time exceeds the environmentally sustainable level of extraction for that system. Over-use may arise in systems that are over-allocated, or it may arise in systems where the planned allocation is exceeded due to inadequate monitoring and accounting.

**A permit system** means a system that can be applied to control water-affecting activities listed in the *Natural Resources Management Act 2004* or prescribed by regulation, where a regional NRM plan or water allocation plan identifies that permits are required for that activity.

**Plantation forest** means for the purposes of this framework commercial plantation forest activity carried out at an industrial scale by companies, or private individuals, recognised as commercial forest operators. It excludes small-scale commercial forests integrated into a farming operation.

**Precautionary principle** means where there are threats of serious or irreversible environmental damage, a lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.

**Prescribed** means a water resource prescribed under section 125 of the *Natural Resources Management Act 2004*.

**Regional NRM plan** means a plan prepared by a regional NRM board under Chapter 4 Part 2 of the *Natural Resources Management Act 2004*. It includes a water allocation plan.

**Significant** (or significance) is a term used in the Intergovernmental Agreement on a National Water Initiative. When the aggregated impact of plantation forests represents a noteworthy portion of the total water budget in the relevant water allocation plan and has considerable impact, the impacts are considered significant.

**Surface water** means water flowing over land (except in a watercourse) after having fallen as rain or hail or having precipitated in any other manner, or after rising to the surface naturally from underground.

**Sustainable** see Ecologically sustainable development (ESD) above.

**Threshold area** is a term used in the National Water Initiative. It is the sum of the existing plantation forest estate plus any allowance for plantation expansion that has been accounted for within the water budget. In the case of the lower South East, threshold tables were developed by summing the forest estate, as at 2002, resulting in 59 000 ha of expansion potential. Within the threshold area, the impacts of the plantation forest on groundwater recharge are fully accounted for within the relevant groundwater management areas. However, no allowance has been made for the impacts of direct extraction of groundwater by plantation forest within the water budget of the threshold areas.

**Water allocation** means (a) in respect of a water licence, the water (taking) allocation or the water (holding) allocation endorsed on the licence; and (b) in respect of water taken pursuant to an authorisation under section 128 of the *Natural Resources Management Act 2004* the maximum quantity of water that can be taken and used pursuant to the authorisation.

**Water allocation plan** means a plan prepared by a regional NRM board under the *Natural Resources Management Act 2004*. Water allocation plans form part of respective regional NRM plans.

**Water licence** means a licence granted under Chapter 7 of the *Natural Resources Management Act 2004*.

**Water resource** means a watercourse or lake, surface water, underground water, stormwater (to the extent that it is not within a preceding item) and effluent. A reference to a water resource includes all aspects of a water resource, including the water, organisms and other components and ecosystems that contribute to the physical state and environmental, social and economic value of a water resource.

**Water trading** means the buying and selling of water access entitlements. Under the *Natural Resources Management Act 2004*, water access entitlements are separated from land titles. Water trading allows water access entitlements to move between users in an open market mechanism so that water allocated for consumptive use progressively moves to higher value uses. This not only results in greater production from the same (or less) volume of water but also can provide positive environmental benefits.

**Water use** includes water interception and extraction.

**Watercourse** means a river, creek or other natural watercourse (whether modified or not) in which water is contained or flows whether permanently or from time to time.

**Wetland** means an area that comprises land that is permanently or periodically inundated with water (whether through a natural or artificial process) where the water may be static or flowing and may range from fresh water to saline water and where the inundation with water influences the biota or ecological processes and includes any other area designated as a wetland by an NRM plan under the *Natural Resources Management Act 2004* or by a development plan under the *Development Act 1993*.

## Further reading and resources

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# Notes

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