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2009

FINAL ASSESSMENT REPORT

RIVERINA BIOREGION REGIONAL FOREST ASSESSMENT RIVER RED GUMS AND WOODLAND FORESTS

natural
resources
commission



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Commissioner's foreword

The Riverina bioregion is a treasured part of Australia, with its winding rivers and floodplain forests, its rich agricultural land, and its cultural significance to Indigenous and non-Indigenous Australians. The region's floodplains, and the river red gum forests they have supported for thousands of years, are an integral part of the natural landscape and the social fabric of the region.

The large Central Murray river red gum forests were created by the Cadell fault that raises the land abruptly at Echuca, creating a natural dam and diverting the Murray River to the north and south. This 'choke' restricts the channel flow and frequently floods the otherwise flat landscape, creating the most extensive red gum stand in the world. These forests are thought to have supported the most densely populated Indigenous population in pre-European Australia. They continue to support a rich ecology, and significant economic and social values.



But the river red gum forests are in decline across the region. As we've built dams and weirs over the last 120 years and diverted river flows to irrigation, the natural flows and floods of the river have been progressively restricted. Without flooding, the red gum forests can't regenerate and support the ecology and forestry industries which depend on them. The impacts on communities, land use and the natural environment are predicted to get more severe under climate change.

To map a way forward, the NSW Government asked the Natural Resources Commission (NRC) to undertake this scientifically based assessment of the red gum and other woodland forests in the Riverina bioregion. This final assessment report provides the scientific platform to help everyone understand the forests, how they are changing, and what can be done to better manage them through the coming changes. Actively managing the forests through the changes is undoubtedly the best way to preserve what we all value about the forests.

The NRC has made its recommendations on future management of the forests in a separate, shorter recommendations report for ease of access. Reconciling the differing needs for the area has been a complicated yet inspiring task and we have sought to ensure that the requirements of the people who live and work in the area are thoroughly considered along with the views of those scientific experts and the broader community with whom we have engaged.

The assessment provides the scientific basis for Government to resolve the vexed issue of how the river red gum forests in the Riverina should be managed. Certainty on this crucial issue is fundamental so we can all work together to help the forests and the local communities that depend on them adapt to ongoing water scarcity and the potential impacts of climate change.

The timing of this assessment is also important. There is a unique opportunity for governments to use the pending Murray-Darling Basin Plan to rebalance the use of water resources across the Basin and create sustainable futures for the river red gum forests and the communities that love them. To survive, the forests need to be flooded and actively managed to help them transition to a drier future. Industries and local communities need the same degree of support to make a similarly challenging transition. This report provides the scientific and information base to guide a process of change, and the NRC's recommendations report proposes how this should begin.

I would like to thank all those who contributed so enthusiastically to the assessment, including the NRC's staff, technical panel members, stakeholder groups, consultants, government agencies, and members of the public who made submissions and attended public hearings.

Sincerely,

John Williams

Commissioner

Acknowledgements

The NRC acknowledges the contribution of many agencies, individuals and organisations in the provision of information, data and views for this report.

Forests NSW (Department of Industry and Investment) and the Department of Environment, Climate Change and Water provided invaluable assistance and support throughout the assessment, sharing data, local expertise and hosting our visits to the region. Without the hard work, diligence and professionalism of officers in these agencies, the NRC would not have been able to undertake this assessment in the timeframe.

The forest industry and local communities have been very generous with their time and resources, sharing with us not only a detailed understanding of the operation of their businesses, but also their knowledge and shared sense of identify with the red gum forests. The preparation of the socio-economic analysis could not have been possible without the cooperation of individuals and companies across the region, and we thank them for their willingness to be interviewed.

We are very grateful for all those people and organisations who took the time to prepare detailed and informative submissions for our review. In particular, the submissions and broader engagement with both the Forest Products Association and the National Parks Association were comprehensive and highly valuable to our assessment.

We are also indebted to Aboriginal Land Councils, Traditional Owners and the Indigenous communities within the region who shared with us their stories, wisdom, concerns and aspirations.

We are grateful for the expediency with which a variety of other NSW and Australian government departments, local governments and non-government organisations were able to provide information to us, including the Commonwealth Department of Environment, Water, Heritage and the Arts; Victorian Environment and Assessment Council; Catchment Management Authorities; Murray-Darling Basin Authority; CSIRO; and Land and Property Management Authority.

We are also very appreciative of the members of the Technical Review Panel who shared a wealth of scientific expertise, guided the design of our analysis and peer reviewed our assessment (see **Appendix 7** for further details).

Finally, the previous work undertaken by such companies as GHD and Water Technology provided valuable knowledge platforms for our assessment.

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Introduction and approach

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1.1 Overview

The NSW Government asked the Natural Resources Commission (NRC) to assess the river red gum and woodland forests in the Riverina bioregion in NSW so that Government can then make a forest agreement “to determine conservation outcomes and a sustainable future for the forests, the forestry industry and local communities”. The terms of reference are included in **Appendix 1**.

The NRC completed a preliminary assessment report on 30 September 2009 and called for submissions to the NRC on how Government can best promote conservation outcomes and a sustainable future for these forests, the forest industries and local communities in the region.

The NRC also consulted key stakeholders and experts and held public forums in October 2009 to seek input and gain a richer picture of the breadth and depth of values people place on the forests. This report takes the input from public submissions and consultation into consideration.

The purposes of this final assessment report are to:

- draw together the best available science and knowledge on the river red gum and woodland forests of the Riverina bioregion
- outline what we know about the values of the forests and their current management
- draw out the key issues to underpin recommendations to the Government on their future management.

This report does not make specific recommendations to Government on the future of the forests. These are covered in an accompanying recommendations report. Also available is an accompanying A3 Map Book.

1.2 Terms of reference

The NRC was required to report by 21 December 2009¹ on the river red gum and woodland forests in the Riverina bioregion in NSW, and separately on the south-western cypress forests by 30 April 2010. The terms of reference (**Appendix 1**) require the NRC to:

1. assess the environment and heritage values (including Indigenous heritage), economic and social values, ecologically sustainable forest management, timber resources, and otherwise meet the assessment requirements of the Environment Protection and *Biodiversity Conservation Act 1999* (Cth) as determined in discussion with DEWHA
2. recommend conservation, protection, economic and ecological sustainable use of public land in the bioregion
3. recommend water management and flooding requirements to sustain the forests and identified values and uses under the range of projected impacts of climate change.

This assessment report deals substantially with term of reference 1. The NRC will also undertake an assessment on the cypress forests in south-western NSW. It is anticipated that this report will be available in mid-2010.

An accompanying recommendations report addresses terms of reference 2 and 3. Together these documents report on the full terms of reference, and present recommendations to Government on the future management and uses of the river red gum and woodland forests in the Riverina bioregion.

¹The NSW Premier granted an extension to 21 December 2009 from the original date in the Terms of Reference which required the NRC to report by 30 November 2009.

1.3 What does this report indicate about the forests?

This assessment report presents the best available science and knowledge on the current health, uses and values of the forests, together with the predicted implications of climate variability and climate change, and the consequent impacts on changes in water availability and flooding regimes. The report also proposes goals and principles to guide river red gum floodplain ecosystem management in a water-scarce future.

The Riverina bioregion is characterised by rivers with extreme hydrological variability and extensive regulation. The construction of dams and weirs over the last 120 years and diversion of river flows for irrigation have resulted in highly modified ecosystems. In addition, there has been a dramatic decline in average inflows to the Murray system in the last 15 years compared to the long-term average.

River regulation, over-allocation of water resources and persistent drought are responsible for the observed decline in the red river gum forests and the industries and social systems they support.

The health of red river gum forest ecosystems is driven by river flows and flooding regimes. As such, many of the river red gum forests are under high stress, and in some cases are transitioning to alternative states. Their future health, and the industries and communities they support, will depend on whether the forests stands can be artificially flooded and how they are managed. However, even with ambitious water reforms there will not be enough water to restore all the red river gum forests to health.

Climate change is a significant threat to biodiversity, ecosystem function and ecosystem resilience in the bioregion. Climate change is likely to cause landscape-scale changes, markedly different hydrological regimes and the further transformation of ecosystems. The choice ahead is therefore whether to let this decline take its course, or act to manage the forests to create new, more sustainable ecological, economic and social futures.

Future management of these floodplain ecosystems needs to be attuned to meeting the diverse values of conservation, commercial production, cultural and social use in an increasingly dynamic water-scarce future. Accordingly, current tenure, models and management strategies need to be able to actively and adaptively manage the emerging challenges. There is a range of institutions, tenures and management models available to manage the red gum forests.

Future management of river red gum forests under all forms of tenure must also address the ecosystem as a whole. In many cases, we will need to rethink our current approach to forest management. Depending on the management objectives, targeted and active management interventions across all tenures can achieve outcomes with a greater degree of control and certainty than naturally occurring processes or passive approaches. Ecological thinning may provide a useful tool to enhance conservation and/or production outcomes.

The river red gum forests play a role in the regional economy and support a number of forest industries that are dependent on them for timber. Reduced quality of timber supply is already impacting upon local forest industries. Timber growth rates have declined significantly as a result of reduced flood

inundation and draughts. As a consequence, sustainable long-term timber yields are expected to be reduced by 70 per cent. Timber quality is dropping as tree health declines with drought stress. While the forestry industry on public land in the Riverina makes a relatively small contribution to the economy at a state or regional level, it is a significant employer and basis of social capital for a number of towns in the region.

The forests have important cultural significance particularly to their Traditional Owners. Indigenous communities value the forests for the ability to visit special places, and continue practices such as hunting, fishing, collecting foods and telling stories. Like environmental flows, cultural water flows are also highly valued by Indigenous communities. Improving the protection of special and sacred sites and improving compliance with provisions for protecting these sites is important to Indigenous communities.

Non-Indigenous people also have a strong cultural connection to the forests. This is particularly so for community members who work, and enjoy a variety of recreational activities, in the forests.

Several towns within the region have close ties to the timber industry through the employment and local expenditure it provides, and some are more sensitive to changes in the timber industry than others. All towns in the region are already being impacted by the effects of drought and water reforms. The capacity of the region's communities to reinvent themselves will however depend on maintaining economic and social diversity, and investing in human and physical capital. A sustainable future for the region will depend on regional development focused on less-water-dependent industries.

1.4 What is a regional forest assessment?

NSW forest agreements are formal agreements between the NSW Ministers for Environment and Primary Industries setting out how forests in particular regions will be managed by the Department of Environment, Climate Change and Water (DECCW) as part of the NSW reserve system or by Forests NSW as State Forests.

The NSW Ministers may only negotiate a forest agreement following a 'regional forest assessment' by the NRC, which must include an assessment of:

1. environment and heritage values (including Indigenous heritage)
2. economic and social values
3. ecologically sustainable forest management
4. timber resources.

NSW forest agreements must contain certain minimum provisions and are intended to frame an Integrated Forestry Operations Approval (IFOA) under which Forests NSW then carries out harvesting operations. An IFOA describes the forestry operations permitted in the area covered, and the conditions imposed² (*Forestry and National Parks Estate Act 1998* (NSW)). The agreements must also meet the assessment requirements of the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act).

² The approval may contain the terms of a licence under the *Protection of the Environment Operations Act 1997*, *Threatened Species Conservation Act 1995* and *Fisheries Management Act 1994*. Enforcement of the licences rests with DECCW or Department of Industry and Investment – Fisheries.



A stand of healthy River red gum forest – photo courtesy of DII

1.5 Analytical framework for this assessment

The NRC developed an analytical framework for undertaking this assessment and making its recommendations to Government. The NRC's broad approach was to:

- characterise the biophysical, historical and institutional context for the forests, and the current condition of these floodplain ecosystems
- characterise the cultural, heritage, environmental, social and economic values the forests currently support
- project how the forests and associated ecosystems and socio-economic systems, and hence values, may change under future climate-change projections, water management regimes, and possible forest management regimes
- draw out the implications for the NRC's recommendations on uses and management arrangements.

Figure 1.1 depicts the broad approach across six steps and a number of sub-steps.

Step 1 – Map forest locations and explain landscape context – Chapters 2 and 3

The river red gum and cypress forests coexist in some parts of the region and are distinct landscape types in others. The NRC defined which forests to assess first within the Riverina bioregion, and which to assess later as the South-Western Cypress State Forests.

Step 2 – Document historic management and current extent, condition and values – Chapters 2, 3, 4, 5 and 6

The river red gum forests have been managed and modified over a lengthy period. Documenting the baseline of how historic Indigenous and European management has shaped

forest extent and condition and resultant values satisfies term of reference 1(a) at a broad scale using existing information and expert opinion. Public consultation on the preliminary assessment report has generated finer-scale information on forest uses and values.

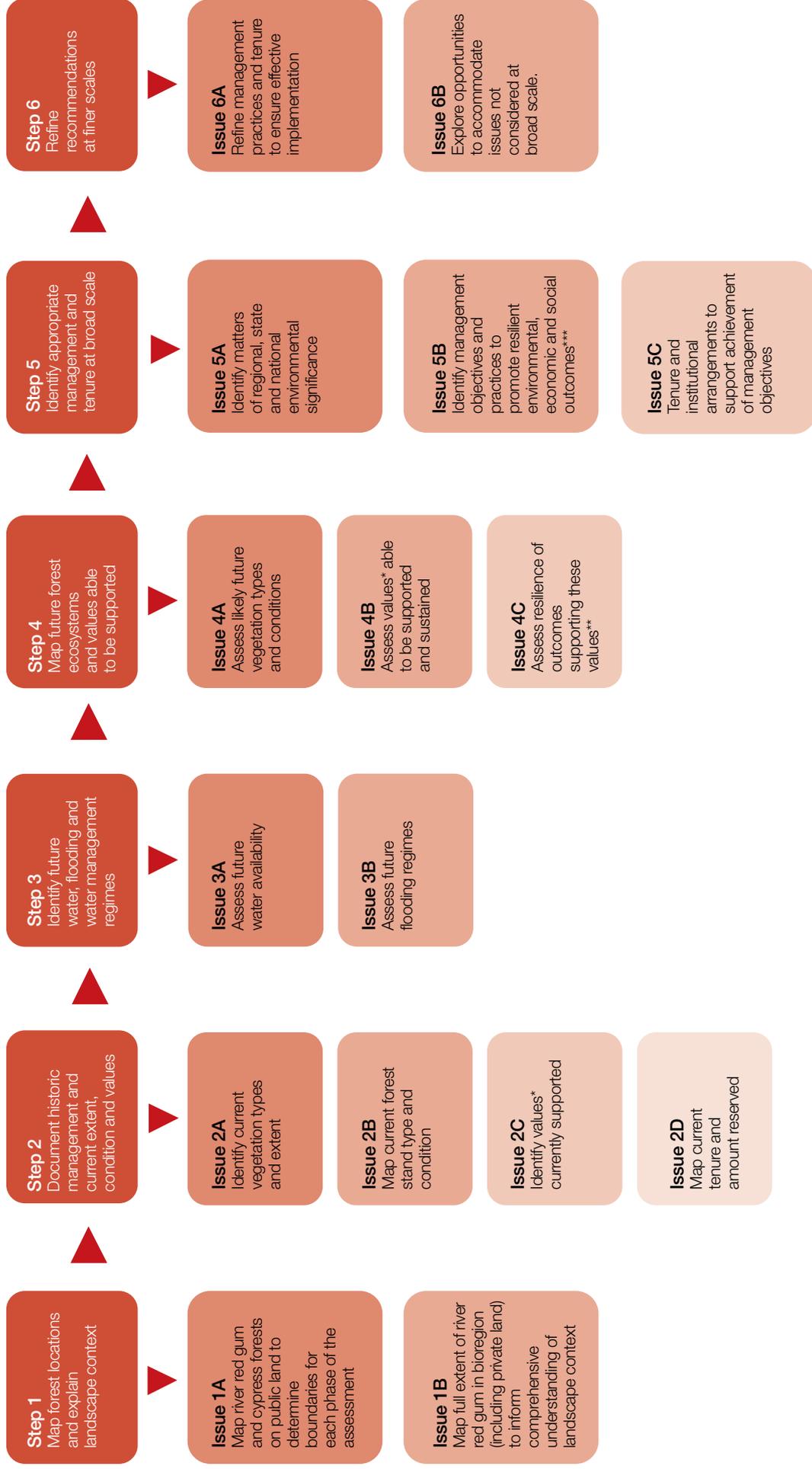
Step 3 – Identify likely future water, flooding and water management regimes – Chapters 7 and 8

Climate variability and climate change is projected to reduce rainfall, river flow and flooding. Basin-wide and local water management will differentially affect flooding timing, frequency and duration, and hence forest health. This step defined the 'future water scenarios' considered within the assessment and anticipated how this might affect flooding patterns in particular forest groups.

Step 4 – Map future forest ecosystems and values able to be supported – Chapters 9 and 10 and recommendations report

Based on likely future flooding patterns, possible changes to vegetation types and ecosystems were characterised and mapped, and changes to the values they are likely to support were described. Nationally agreed criteria for reserve systems plus more recent work on resilience of socio-ecological systems will be used to nominate parameters to describe and gauge the resilience of particular environmental, economic and social outcomes and values. The NRC attempted to identify likely tipping points beyond which further changes in a parameter (say flooding frequency) will cause a step change in the vegetation types (say from river red gum forest to open river red gum woodland or box woodland) and the values and uses that that vegetation type is able to support. The NRC's approach to resilience was informed by recent work which explores how this concept might be incorporated into land use and sustainability decision-making (for example, Cork, 2009; Fischer et al., 2009, Walker et al., 2009).

Figure 1.1: The NRC's analytical framework for assessment and recommendations for the river red gum forests of the NSW Riverina bioregion



* Environmental heritage (including indigenous heritage), economic and social values will be considered

** Regard will be given to nationally agreed criteria for a comprehensive, adequate and representative reserve system and to other complimentary methodologies for protection conservation values

*** Regard will be given to appropriate forest management practices to promote long term productivity and health and to international or governmental obligations, agreements or arrangements

Step 5 – Identify appropriate management and tenure at broad scale – Chapter 11 and recommendations report

This step determined the most appropriate mix of landscape management objectives, practices and tenure options to achieve conservation outcomes, protection of matters of national environmental significance and a sustainable future for the forests, forestry industry and local communities. High priority environmental values were identified and mapped at an appropriate scale, to address the *EPBC Act* requirements in term of reference 1(b). Potential synergies and trade-offs between environmental, economic and social outcomes and values were then identified and mapped at a coarse scale to identify preferred management regimes and principles to promote resilient outcomes. Preferred management regimes were used to recommend a relatively broad-scale mosaic of tenure and associated management arrangements.

Step 6 – Refine recommendations at finer scales – recommendations report

Through engagement, consultation, and finer-scale assessment (local/site scale), the NRC refined its recommendations, and refined management practices within different forest zones. Where existing knowledge allowed, the NRC recommended appropriate management priorities for the forests and tenures for many of the 83 individual State Forests containing river red gum forests.



Forest inspection by the NRC and stakeholders

1.6 Consultation during this assessment

As part of the analytical approach described above, the NRC undertook a variety of consultations with a diverse range of groups and individuals who have interests in the river red gum forests of the Riverina bioregion.

The NRC met with a cross-section of interested parties, took tours of the region, held public forums and received formal submissions.

The consultation activities helped the NRC see the forest from a diversity of perspectives and values, develop an appreciation of the specific issues of communities and industries, and better understand the local and regional context of the assessment.

Appendix 6 outlines the consultation process in greater detail.

1.6.1 NRC tours of the river red gum forests in the Riverina

To better understand the issues facing the river red gum forests in the Riverina and the communities which rely on them, the NRC visited the region nine times and visited 50 State Forests between August and November 2009.

The local Indigenous communities, forest industries, local government, state agencies and community representatives generously gave their time and expertise to help the NRC understand the issues concerning the river red gum forests. The NRC:

- observed silvicultural practices, and mill operations, including timber processing for high-value timber veneers
- met with Indigenous people, who shared their stories and history
- visited sites of environmental and cultural significance and observed the close connections between the forests and the communities that rely on them
- visited Yanga National Park and saw the contrast of healthy river red gum forests with non-flooded areas of drought-stressed trees
- visited interpretative centres on the history and heritage values of the rivers and their floodplain forests
- visited areas important for tourism and the recreation of locals.



1.7 Overview of submissions

The NRC received 5,534 submissions, of which 259 were unique. The remainder were form letters or emails. **Appendix 6** contains a list of organisations that provided submissions.

The NRC reviewed and considered every submission during the preparation of this assessment report and the recommendations report.

Individuals, interest groups and organisations representing a broad cross-section of the community made submissions to the assessment. Several submissions provided detailed information including technical reports to support opinions or proposals.

The submissions covered a broad range of views and recommendations in response to the main findings of the preliminary assessment report – that the river red gum forest ecosystems are experiencing, and will continue to face, unprecedented levels of long-term change associated with a water-scarce future.

Many submissions called for greater consideration of forest ecology, impacts of timber industry operations and impacts of water allocation on desired conservation outcomes. Others called for more attention to the social, economic and community interests of local people.

Most submissions acknowledged that the forests were under stress and recognised that changes were needed to protect them for the future. Overall, they agreed on the fundamental importance of environmental watering for the future of the forests, with most calling for greater water security and for efficient use of that water.

Many of the submissions provided detail on the values that the forests support and how these should be conserved or managed in the future. In particular, submissions detailed the biodiversity values of the forests and the cultural, social

and economic values of the forests for regional communities. All submissions demonstrated the high value of these forests to the region, the state and for all Australians.

The submissions varied in how forest values might be maintained into the future, with many focused on either conservation or production values. The submissions ranged from strong support for new national parks, perhaps jointly managed with the traditional owners, through to equally strong support for maintenance of the current situation – management by Forests NSW – and protection of forest industries and their communities. A few submissions argued for a balance across both conservation and forestry – national parks or reserves in high-value conservation areas and continued forest industries elsewhere.

Conserving forest ecosystems in national parks

A significant number of submissions called for approaches to prioritise the environmental values of the forests – requesting preservation of all, or at least the most ecologically significant, river red gum forests, in national parks. Some called for linking conservation reserves across the landscape and conserving high-value forests in national parks, providing environmental flows to these forests, controlling total grazing pressure and ending logging activities.

Advocates for this approach argued that the intrinsic ecological values of the river red gum forests outweighed the benefits from timber production. In particular, proponents wanted national parks for preservation of forest ecosystems currently under-represented in the national reserve system and for protection of habitat for threatened species.

The supporters of future national park management of the river red gum forests were focused on the precautionary principle – wanting protection of the forests in light of the implications for biodiversity of predicted climate change impacts. They argued that, as well as their inherent ecological values, the forests are important for carbon sequestration and as east-west conservation corridors for adaptation to climate change.

Most proponents for the conservation of the river red gum forests in national parks did not discuss the specifics of their management (including issues surrounding fire and pest management). The submissions focused on current management practices only with respect to cessation of production activities due to both known and potential impacts on biodiversity. Water management was not addressed in detail. Proponents did request more comprehensive landscape-scale conservation strategies for the region.

Support for continued forestry management

An equally substantial number of submissions strongly opposed a 'lock-up' style of forest conservation (in national parks) and argued for continued forestry management. Proponents argued that current timber industry practices are ecologically sound and the current health of the forests – excluding the impacts of the recent drought – are evidence of past sustainable management, balancing environmental and social values with timber production.

These submissions argued that, until the current drought, the health of the forests was maintained and thinning operations were able to sustain tree regeneration and growth rates. They further added that State Forests are well maintained, provide employment and control feral animals, minimise spread of weeds and actively manage fire risk. They cited examples of other national parks where they believe tourism, pests and fire risk are not managed in the best interests of local communities and they suggested that the success of a preservation approach should be demonstrated before 'locking-up' other forests.

Some submissions called for reform of forest management by Government and separation of the management of public land from commercial interests.

Long-term security for industry and communities

Submissions focused on the value the forests hold for local and regional communities and the interdependence of local towns on forest related industries – including forestry, service industries and recreation. They argued strongly for continued government support for these industries – both in allowing continued activity but also investment in research, development, training and infrastructure – to underpin the regional economy and the viability of local towns.

Many proponents argued for long-term security for the forest industries in the bioregion, even if a reduction in sustainable yield is agreed. They want support for high-quality forestry enterprises, to reduce reliance on lower-value or less well-managed activities and to encourage investment in their industries and towns, including forestry-related tourism. While firewood is considered a lower-value timber industry, some submissions discussed pragmatic and equity issues – firewood collection is an important source of income and a cheap fuel source for lower socio-economic groups.

Local business owners stressed that they invest heavily in the local community – they have invested in infrastructure for their future and will not be viable if their industry is cut back. Submissions from industry and local shires described the heavy reliance of businesses and communities on the income and future viability of the forest industries. Concerns were raised about the viability of community services such as schools, health services and clubs, should forestry decline.

Proponents discussed the need to support individuals, businesses and communities impacted by possible transfers to national park management. Most acknowledged the need to support local communities that are dependent on forestry-related income and with a strong social and cultural relationship to the forests – although views differed on how this might be done.

Consideration of Indigenous communities

A significant number of submissions argued for greater recognition of the importance of river red gum forests to Indigenous people and many argued for a much greater role for traditional owners in forest management. There were requests for transfer of ownership to, and/or joint management of the forests by, the traditional owners. Many viewed this as an important step in future sustainable management of the forests for a range of values.

Environmental water allocations

Many proponents stated their belief that water purchased by Government will support healthy river red gum forests and forestry in the region once the current drought is over. They requested secure environmental water allocations for the forests.

Additional science and adaptive management

Many submissions requested more information – both in the report and in future research – on the environmental values of the forests and on the impact of timber production activities on forest ecology.

Most submissions agreed that the future is uncertain and an adaptive approach will be important.

1.8 Structure of this report

This assessment report presents the available science and information on the current health, uses and values of the forests, and how climate variability and climate change is likely to affect them. This report underpins the NRC's separate recommendations report. The structure of the report is as follows:

Chapter 2 – Biophysical and historical context – describes an evolving landscape with a history of forest use and management. The distribution of river red gum forests and woodlands are considered in terms of eight water management units.

Chapter 3 – Institutional context – describes the institutional arrangements under which the forests are managed and governed, and discusses cross-jurisdictional and governance issues for future management.

Chapter 4 – Current forest extent, condition and environmental values – describes the environmental values and the current extent, health and functioning of red gum forest ecosystems.

Chapter 5 – Economic and social values – examines the socio-economic values and uses of the forests at a local and regional scale.

Chapter 6 – Cultural and heritage values – describes the Indigenous and non-Indigenous cultural and heritage values derived from the forests, and discusses possibilities for joint management.

Chapter 7 – Climate variability and predictions for future climate change – outlines the current understanding of climate variability and climate change in south-eastern Australia and the implications for planning under uncertainty.

Chapter 8 – River regulation and water reforms in a drying climate – describes the effects of river regulation in the Murray-Darling Basin, the water reforms required to save the river red gum forests, and predicts the impacts of changes in future water availability for forests in each water management unit.

Chapter 9 – Implications of water scarcity for environmental values – predicts the likely impacts, in the context of altered flooding regimes, on the environmental values of the forests.

Chapter 10 – Implications of water scarcity for economic and social values – predicts the likely social and economic impacts of a changing and variable climate on the bioregion, and discusses possible alternatives for the timber industry under a water-scarce future as well as approaches for building adaptive capacity in the region's communities.

Chapter 11 – Managing red gum floodplain ecosystems – proposes a set of principles for the future management of red gum floodplain ecosystems across a dynamic socio-ecological landscape.



Historic Murray River flood levels near Moama
