



The role of Natural Resource Management in improving the outlook for the State of the Environment

A response to Australia's State of the Environment Report 2021



NRM Regions Australia

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Executive summary

Australia's integrated Natural Resource Management (NRM) system is unique in the world. It has grown in sophistication since its inception in the 1990s and early 2000s, and is now a distinct social and organisational infrastructure delivering outcomes for the Australian Government, state and territory governments, local communities, industry, and land managers. It has the potential to do more. We can further help the Australian Government and all those with a stake in Australia's environment to turn around the declining trends in the state of our environment while supporting communities across Australia.

Australia's State of the Environment (SoE) Report 2021 provides a comprehensive overview of the state of Australia's land, water, air and seascapes, and the state of and impacts of climate change. For the first time, the report embedded co-authorship from Indigenous authors.

The report presents a stark picture. It is clear that the state and trajectory of Australia's environment and natural resources is poor and frequently declining across many indicators.

Australia's NRM sector is a critical piece of national infrastructure capable of helping turn this around. This report highlights where and how, touching on key findings from the SoE report, and how they articulate with the capabilities, capacity and potential of NRM to make future SoE findings a story of success.



Native vegetation at a travelling stock reserve helps support landscape health and biodiversity connectivity

Findings of the SoE report	NRM Contributes
Overview need for holistic environmental management priority to integrate disjointed systems	<ul style="list-style-type: none"> integrated delivery across needs and scales continent-wide coverage regional planning and prioritisation focus on partnerships benefits for health and social cohesion data and regional expertise
Climate land use key in emissions reduction and sequestration formidable challenges to adaptation need for more coordination, synergies in adaptation	<ul style="list-style-type: none"> support landholder and land manager emissions reduction and sequestration coordination of regional adaptation efforts resilience planning
Indigenous Indigenous knowledge and practice are key self-determination long-term timeframes and investment	<ul style="list-style-type: none"> partnerships with First Nations groups enabling co-stewardship Indigenous-led NRM
Extreme events increasing intensity and frequency other pressures exacerbate impacts growing priority for long-term resilience strategies	<ul style="list-style-type: none"> on-ground recovery coordination and prioritisation managing landscape pressures resilience planning and spatial capability
Biodiversity most biodiversity indicators declining many ecosystems facing collapse recent positive shift to landscape-scale conservation	<ul style="list-style-type: none"> species and ecosystem recovery integrated threat management including fire landscape-level approaches support for cultural fire and land management
Heritage climate change is impacting heritage need to manage pressures altogether unacceptable destruction of Indigenous heritage	<ul style="list-style-type: none"> managing habitat, invasive species supporting prioritisation, post-disaster recovery enhanced connectivity working with First Nations
Land ongoing declines in land-based natural capital soil health declining key issues: clearing, invasive species, climate change	<ul style="list-style-type: none"> management of soils, pests, weeds vegetation restoration integrated landscape-level management natural capital accounting
Inland Water more droughts, floods projected lower water quality and quantity significant impacts on freshwater biodiversity	<ul style="list-style-type: none"> improved water management on farms managing health of rivers, wetlands, floodplains delivering environmental water
Coasts coastal ecosystems offer physical protection management is fragmented pressures worse except nutrient run-off, flow regimes	<ul style="list-style-type: none"> coastal ecosystem restoration regional and national coordination adaptation for climate and weather extremes
Marine western and Indigenous assessments variable reefs and reef species poor and deteriorating key issues climate change, fishing, pollution, run-off	<ul style="list-style-type: none"> reduced sediment, waste and nutrient run-off sustainable fisheries and marine industries national and regional coordination
Urban need for climate-resilient urban environments managing heat islands, water and stormwater greenspace key for urban biodiversity and livability	<ul style="list-style-type: none"> urban revegetation and species recovery restoring wetlands, creeks and rivers connecting people and nature, cities and regions
Air quality warming climate will increase pressures dust a significant pollutant smoke from 2019-20 fires caused 400 excess deaths	<ul style="list-style-type: none"> reduced fire hazard through early season burning restoration of First Nations fire management retaining vegetation cover and soil moisture

Figure 1: Potential for NRM to support action to improve the state of the environment across domains

1. Overview

What does the SOE report say?

Holistic approaches to environmental management: *“Adequately resourced, innovative, responsive and collaborative management measures will foster investment and renewed action to turn things around. Australia currently lacks a framework that delivers holistic environmental management to integrate our disconnected legislative and institutional national, state and territory systems, and break down existing barriers to stimulate new models and partnerships for innovative environmental management and financing.”*

How does the NRM sector contribute?

The NRM sector provides interlinked, continent-wide coverage across Australia for delivering integrated programs at a regional level. There are 54 NRM regions spanning Australia. They enable planning, delivery, monitoring and evaluation of a wide range of initiatives to manage natural and cultural resources, and embed resilience in our landscapes, freshwater systems, and marine environments. Regional NRMs are diverse but interconnected across the country; they are place-based, responding to specific needs and priorities in their regions and jurisdictions. At the same time, they are woven together by common principles, shared approaches to planning, partnerships and innovation, and interlinked networks and communities of practice.

NRM organisations are firmly embedded within local communities, bringing strong regional and local capacity. Regions work through a partnerships model, which allows for both horizontal integration (across tenures, sectors and ecological zones) and vertical integration (between levels of government and using a nested approach that operates at different scales). They also take a systems approach, which is key to building resilience. This involves threading together the needs of diverse communities, organisations, sectors, industries, species, landscapes, waterways and built environments. NRM partners include Indigenous groups, landholders, all levels of government, industry, land management organisations and research. NRM work addresses a wide diversity of environmental values, reflecting this integrated approach. This includes improving the quality of water, soils, and vegetation, supporting sustainable production in agriculture, building community capacity to care for natural environments, mitigating the impacts of and responding to climate extremes and natural hazards, and protecting and restoring natural and cultural heritage areas, wetlands, threatened



Riparian planting on Giru cane farm, North Qld

ecological communities and threatened and migratory species populations. NRM organisations manage and streamline otherwise disjointed and stop-start investment, using strong financial systems and high standards of governance. Being community-based, NRM also delivers significant benefits for the health and social fabric of communities.

NRM organisations adopt a regional planning approach to identify priorities for action, underpinned by data and science and integrated across landscapes, stakeholders, and issues; across scales, from paddock to national; and between national, state/territory, regional and local goals. The value of these regional plans is increasingly recognised in policy, supporting investments through the Emissions Reduction Fund, and being explored as a basis for industry sustainability strategies.

What more could be achieved together?

The scale of investment does not yet match the problem. In fact, declining investment has undermined capacity in some areas in Australia. Further investment could leverage the national NRM infrastructure to strengthen holistic approaches to environmental management in Australia, including:

- Measures to strengthen delivery of integrated approaches on-ground, including delivering greater spatial connectivity, and bringing together organisations, networks and strategies at multiple levels
- Creating a nationally interlinked natural disaster resilience and recovery capability as an enduring core capability and network embedded in NRM
- Investing in NRM organisations to directly support integration and coordination of climate adaptation strategies and actions by diverse organisations, interlinking climate mitigation and adaptation, and helping mainstream climate resilience and adaptation thinking through wider systems and programs
- Measures to support regions to drive wider uptake of biodiverse and culturally beneficial emissions reduction schemes, recognising the urgency of reducing emissions and significance of the land sector
- Drawing on nationally connected, integrated and scalable data and information from NRM organisations to support national environmental information and reporting systems, environmental accounting and institutions such as the proposed Environmental Protection Agency
- Stronger connections of NRM regional planning and of insights and lessons from NRM to wider investments, policies and programs, including drawing on regional plans to underpin holistic design of programs and delivery of multiple benefits
- Developing innovative approaches in NRM that deliver benefits across sectors and build an evidence base and partnerships to stimulate new environmental approaches and sources of financing
- Extending NRM capacity to deliver critical knowledge, support and tailored advice to industry, from landholders to Research and Development Corporations (RDCs), to encourage sustainable practices that protect and restore natural resources
- Strengthening benefits of community-based NRM for the health and social fabric of communities



Natural resource management provides benefits across sectors and landscapes. These native bees on paper daisies in Corowa NSW are contributing pollinators for agricultural industries.

2. Climate

What does the report say?

Emissions reduction: *“A major factor in reducing Australian emissions has been the land use, land-use change and forestry sector [which] by 2015 had become a net sink in Australia... Regrowth of forest, much of it on previously cleared land, is a major contributor.”*

Climate change impacts and adaptation: *“Habitats, ecosystems and biodiversity; water systems and resources; industry, crops and agriculture; urban, rural and coastal communities; and Indigenous knowledge and culture will all be affected by rising temperatures and changing climate patterns... the challenges to effective adaptation are formidable...”*

Climate change impacts and adaptation: *“The growing understanding of the impacts of climate change has resulted in a substantial increase in resilience planning activities from all 3 levels of government, enormous community mobilisation and engagement, and innovative approaches from commerce and industry, but the need remains to coordinate and look for synergies between approaches”*

Climate change impacts and adaptation: *“Local governments have a major role in climate change adaptation and managing climate risk, because they are at the front line of many of the impacts of climate change... This may exceed the financial capacity of local government in the absence of additional sources of funding... Many local governments are also relatively small entities that have limited resources to develop their own climate risk management processes and adaptation plans”*

What do the lead authors say in their public briefings?

Emissions reduction: *“The rate of decrease [in land clearing emissions] slowed somewhat after 2010”*

Climate change impacts and adaptation: *“Not only is the change over the next couple of decades already largely locked in... in many cases we haven’t been exposed to the full range of climate extremes and climate risk ... possible under a 1.1°C climate. One illustration ... in most years ... we see somewhere in the world a summer heat wave where previous record high temperatures get broken by 3°C or more... we haven’t seen an event on that scale yet in Australia, and there’s no reason to assume that we can’t...”*

How does the NRM sector contribute?

NRM organisations play a vital role in emissions reduction, adaptation and responding to extreme events (see Chapter 4). NRM organisations support and coordinate nature-based climate adaptation strategies across Australia, including through working directly with partners such as Local Government Areas that bear significant responsibility for climate adaptation, and helping coordinate regional networks to link together strategies and identify priorities and risks at a regional level. The sector’s climate adaptation strategies are guided by principles of landscape-level resilience and underpinned by regional plans developed through partnerships and anchored in the most up-to-date data and information. This includes analyses to assess likely climate change impacts on industries, land, waterways, ecosystems, coastlines, and cultural values. The sector also supports and facilitates community processes to bring together landholders and regional communities to share experiences in responding to climate change.

Integrated management has helped deliver system-wide changes to our landscapes that have also contributed vitally to Australia's climate change mitigation action. These include:

- Direct support for uptake and management of stewardship practices and other activities
- Improved farming practices that deliver vegetation and soil carbon as co-benefits
- Industry partnerships to reduce agricultural emissions
- Working to understand and ensure co-benefits from carbon farming initiatives
- Providing a key point of contact for carbon farming programs and policies
- Understanding and sharing messages on benefits of retaining existing vegetation



Restoration plantings support carbon sequestration while delivering benefits for biodiversity, landscapes and communities

What more could be achieved together?

Given the urgency of reducing emissions, and the significance of the land sector, we suggest:

- Funding a network of carbon farming officers working throughout Australia in NRM organisations to support the adoption of carbon projects (e.g. under ERF and other schemes)
- National rollout of the Carbon+Biodiversity pilot including in places seeking to achieve greater co-benefits e.g. for threatened plant communities
- Exploring novel ways to invest in biodiversity plantings to promote conservation values in targeted areas where the carbon potential is also high
- Upgrading spatial data for all regions to identify carbon sequestration potential and relevant methods that could support this

NRM organisations are extremely well positioned to strengthen our climate adaptation efforts nationally. Priority actions could include:

- Investing in and cementing the role of NRM organisations in directly supporting climate adaptation efforts, data and knowledge-sharing, and regional coordination to support local government adaptation strategies, and strengthening integration with state/territory and national strategies
- Adopting NRM regional plans as a basis for higher level adaptation policies and priorities
- Expanding investments in climate adaptation priorities identified in regional plans
- Expanding existing investments to extend climate resilience and adaptation actions more widely throughout our landscapes, building on the evidence base from existing efforts
- Strengthening integration of climate resilience data, insights and actions held by NRM organisations through developing a national NRM data platform

3. Indigenous

What does the report say?

Importance of Indigenous knowledge and cultural practices: *“Indigenous knowledge and sustainable cultural practice are key to environmental management... Since the beginning of colonisation – a circumstance that continues today – Indigenous peoples have faced many challenges in exercising their stewardship of Country. While Indigenous stewardship is widely recognised in national and international laws ... practical application is still marginalised in mainstream environmental management. This ... has impacted all aspects of Country, the intergenerational transfer of knowledge and Indigenous people’s wellbeing. As a nation, Australia can benefit greatly from using Indigenous knowledge in environmental management practices, and from enabling Indigenous people to care for Country.”*

Strategies for supporting caring for Country: *“A comprehensive range of solutions to support effective caring for Country emerged across the consultations... self-determination; acknowledgement and use of traditional knowledge; realistic, long-term timeframes and long-term investment commitment; appropriate legal instruments; capacity building; initiatives to co-map economic and cultural values.”*

How does the NRM sector contribute?

NRM regions work with Indigenous organisations, ranger groups, businesses and communities in Indigenous land and sea management, helping support social, cultural, economic and environmental outcomes. This spans a wide range of activities, from working with Traditional Custodians on biodiversity surveys to supporting First Nations agricultural and business development. A key growing area is in supporting First Nations-led fire and cultural land management, particularly in the wake of the 2019-20 wildfires. NRM organisations also play a capacity building and supporting role with Traditional Owner groups as needed at the operational and governance level, particularly with new ranger programs or groups in early stages of development.

Alinytjara Wilurara Landscape Board in South Australia is led and managed by collaboration of Traditional Custodian groups. NRM organisations share knowledge nationally around opportunities for increasing Aboriginal engagement in NRM and develop ways of sharing information about approaches.



Anangu Pitjantjatjara Yankunytjatjara lands, South Australia

What more could be achieved together?

There is a need for significantly extended investment in First Nations-led stewardship. It is essential that increased support for First Nations stewardship be invested, first and foremost, in Indigenous organisations and led by Indigenous people.

The NRM sector is positioned and willing to support this work where appropriate, for example by aligning regional plans with Caring for Country and On Country Plans; enhancing our efforts to support First Nations groups to build relationships with other sectors; providing access to resources and training; extending awareness and opportunities for co-stewardship; and facilitating First Nations access to Country across tenures, and to programs such as carbon abatement and stewardship investments.

4. Extreme events

What does the report say?

Frequency, intensity and distribution of extreme events: *“Climate change is already having – and will continue to have for the foreseeable future – an impact on extreme events... By definition, extreme events are uncommon, but modelling ... suggests an increasing intensity and frequency of many extreme events, a potential expansion in their distribution, changes in their duration, and increasing complexity of linked impacts. Some events, such as tropical cyclones and east coast lows, are likely to become more intense but less frequent... Changes in the distribution of events means that existing policies and regulations that are regionally based may need to be revised...”*

Impacts of extreme events and compounding factors: *“Increasing intensity may overwhelm systems... leading to a more negative overall impact and negating the positive impacts of occasional disturbance, and the stimulus for colonisation, growth and reproduction that this may provide... Human modification of landscapes through habitat fragmentation, changed management practices, introduction of invasive species and other pressures exacerbates the impacts of extreme events and inhibits post-event recovery... Extreme events are continuing the incremental destruction of Indigenous places and cultural values...”*

From recovery to resilience: *“Management efforts are largely in response to extreme events, but there is emerging recognition that enhancing resilience requires long-term planning and investment. This is being addressed through increasing investment and research to prioritise and support work on impact prevention, preparedness, response and recovery.”*

How does the NRM sector contribute?

NRM organisations are a key element of our national infrastructure for securing our landscapes and waterways against the impacts of climate extremes and natural hazard disasters. They work across their regions to identify priority actions for mitigating risks from climate extremes and natural hazards, and embed ecological, landscape-level and community resilience. This includes actions to mitigate natural hazard risks, such as streamflow and wetland restoration to reduce flood risk, coastal vegetation to mitigate storm surge impacts, support for cultural land and fire management, and national adaptation infrastructure to protect productive land



Streambank works to prevent erosion following 2019-20 wildfires near Gilmore NSW

and ecosystems from cyclones and damaging winds.

NRM has an increasing role in working across and integrating state and national funding programs and priorities to deliver coordinated disaster recovery. This includes working with emergency agencies and in follow up to first responders. NRM organisations deliver a wide range of post-disaster actions, including rapid on-ground assessments, coordinating networks for action,

supporting prioritisation, managing direct on-ground work, and delivering restoration advice and grants to land managers and landholders.

Being embedded in local communities, NRM groups frequently help coordinate responses to protect and recover natural resources after extreme events, and remain involved throughout the natural hazard cycle, from preparedness to emergency response to restoration and recovery, through to long-term resilience planning and action.

What more could be achieved together?

NRM organisations are extremely well-positioned to strengthen our efforts to develop Australia's resilience to climate extremes and natural hazards nationally, and to prioritise and undertake recovery actions in response to emergencies. Further work could:

- Create a nationally interlinked natural disaster resilience and recovery capability as an enduring core capability and network embedded in NRM
- Formally recognise the role of NRM within disaster recovery policies and planning: in planning and delivery of actions for resilience and preparedness; in providing post-event recovery of natural resources, including coordinating networks, priorities and community engagement; and through programs to support delivery of rapid recovery responses to natural hazard disasters
- Provide short and medium-term investments through NRM for recovery of biodiversity and natural resources from all natural disasters to complement standing capability, with flexibility to meet a wide range of needs and respond to ground-up priorities
- Develop a green infrastructure maintenance fund that invests in returning to maintain areas rehabilitated from natural disasters
- Expanding investment in diverse actions that enhance ecosystem and landscape management, to create resilience to repeated, ongoing natural disasters and climate extremes



Bushfire recovery site at a Travelling Stock Reserve near Batlow, NSW. Nest boxes were installed to replace burnt out hollows for greater glider population

5. Biodiversity

What does the report say?

Plants and animals: *“Most indicators of the state and trend of plants and animals show decline... Conservation actions ... have not been sufficient to reverse declines overall... Many of the pressures on biodiversity in Australia have increased in intensity in the past 5 years. Habitat loss and degradation and invasive species result in persistent and sometimes irreversible impacts on biodiversity ...”*

Ecosystems: *“Many Australian ecosystems are experiencing cumulative and compounding pressures, leading to ecosystem collapse characterised by loss of key defining features and functions... Multiple pressures are interacting to amplify threats to biodiversity, and abrupt changes in ecological systems are occurring. In particular, climate change and associated extreme events, compounded by other pressures, have had a major impact on biodiversity over the past 5 years, with consequences likely to be evident for many years to come.”*

Landscape-scale approaches: *“Biodiversity conservation has rapidly shifted in recent decades to embrace landscape-scale conservation planning, which aims to support biodiversity alongside agricultural and other human land uses ...”*



Field day at Hells Gate pastoral station, North Queensland

How does the NRM sector contribute?

Working at integrated landscape scales is a fundamental principle of the regional approach, which has been central to transforming how we protect, recover and manage biodiversity in Australia. NRM organisations work at landscape scales to reduce the impacts of invasive pests, weeds and diseases on native biodiversity; coordinate strategies to build resilience in biodiverse systems to climate change, extremes and pervasive interactive threats; grow connectivity across landscapes and waterways; support First Nations fire and land management; and support protection and climate-resilient restoration of vegetation and habitat features across tenures. This provides a critical foundation for biodiversity to flourish.

Regions also deliver an array of specific actions to protect and recover threatened species and ecological communities in the landscape. This includes restoring key vegetation and habitat features, protecting refugia, recovering waterways, providing artificial habitat, and managing and testing appropriate fire regimes for ecosystems and species of concern. The sector also plays a key role in supporting the recovery response for biodiversity to extreme events, underpinned by assessments of priority needs (c.f. Chapter 4). Actions for biodiversity following the 2019-20 wildfire season included emergency rescue and translocation, installing supplementary habitat such as nest boxes, restoring or replanting critical habitat for nesting and foraging, preventing erosion, reinstalling fencing to prevent grazing and incursion, supporting First Nations recovery priorities, and managing invasive pests, weeds and diseases to prevent compounding impacts and create opportunities for recovery. Insights from this work have been integrated and shared through national networks and databases to ensure lessons are available for future events.



Monitoring of two Mountain Pygmy Possum groups connected by an under-road tunnel in Alpine Victoria shows restoration of gene flow between

NRM organisations also provide vital mechanisms to integrate policy, investment and action to protect, recover and manage biodiversity. Crucially, the sector provides a mechanism to ensure multiple streams of disjointed and stop-start funding are streamlined on the ground. Regions support and coordinate monitoring programs and recovery planning for threatened species and ecosystems, and hold knowledge and networks that are essential in coordinating rapid and prioritised responses to extreme events (Chapter 4), and in linking together climate adaptation for biodiversity, climate-ready restoration, and biodiverse emissions reduction (see Chapter 2). Insights from NRM also help inform and co-design industry standards and the delivery of new environmental markets with biodiversity benefits.

What more could be achieved together?

Actions to enhance biodiversity protection and recovery through NRM could include:

- Recognition of the benefits of regional planning to identify and implement landscape scale approaches for identifying biodiversity priorities and enhancing cross-tenure management
- Greater investment in priority biodiversity assets and areas, including in enhancing resilience through connectivity, protecting refugia and integrated management of compounding threats
- Resourcing NRM role in preventing new incursions and establishment of pests, weeds and diseases
- Investment in regional networks for managing biodiversity following extreme events, including longer-term recovery strategies
- Expanded monitoring of species and ecosystems across tenures, including on agricultural land, and curation and sharing of data on biodiversity and management effectiveness in central repositories
- Further investment for industry partnerships to co-develop industry sustainability frameworks for biodiversity reporting, including against the Task Force on Nature-Related Financial Disclosures

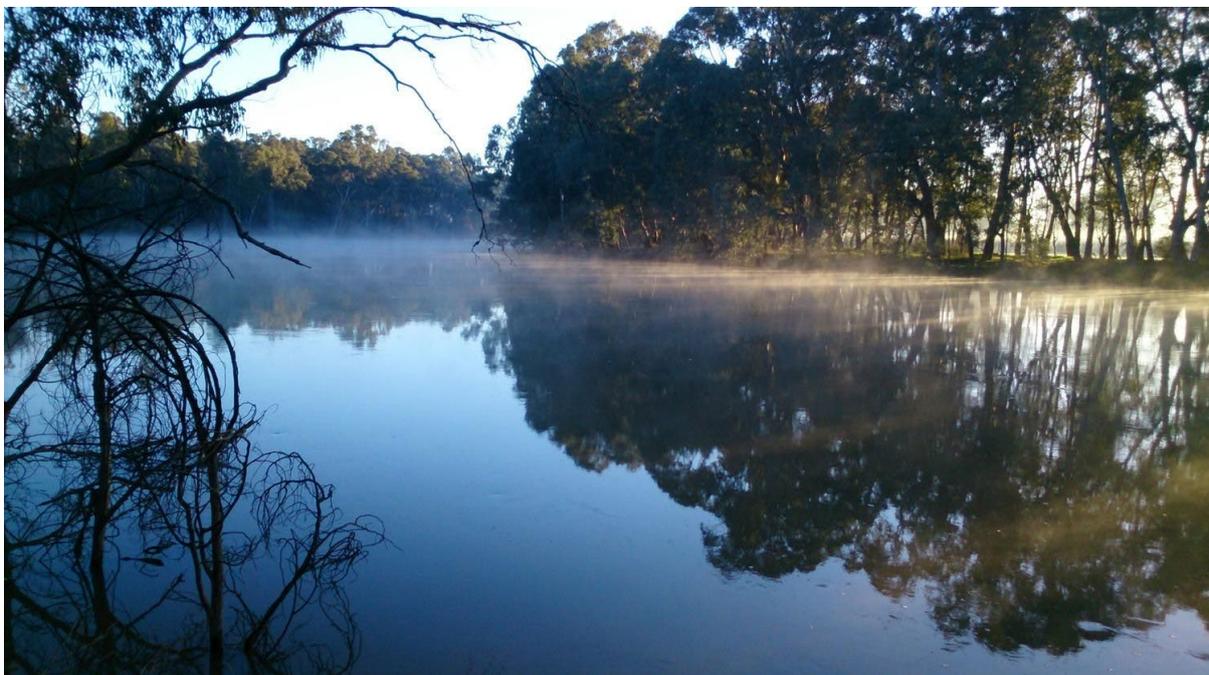
6. Heritage

What does the report say?

Natural heritage: “Climate change is significantly impacting [Australia’s natural] heritage, and urgent local and global action is required ... There is also a need for active management of the other key identified pressures – invasive species; land clearance and modification due to farming, extractive industries and other land-use changes; and increased recreational use.”

Cultural heritage: “Destruction of Indigenous heritage is occurring at an unacceptable rate and the reported experience of Indigenous Australians is that they are denied their right to speak for, make decisions about, protect, access and manage their heritage.”

Knowledge and protection gaps: “To ensure that Australian heritage is fully protected, resources to identify and research all types of heritage, encompassing all parts of our history, are needed ... Improved statutory recognition of the broad scope of heritage (i.e. intangible heritage, cultural landscapes and other landscapes, serial sites and objects) would provide more comprehensive heritage protection.”



Mist on the water at Gunbower forest wetland, protected under the international Ramsar convention

How does the NRM sector contribute?

The NRM sector is a key component in Australia’s infrastructure to protect and manage our world and national heritage areas, Ramsar wetlands, cultural heritage values and culturally significant species and values. NRM organisations are frequently involved in protecting and recovering natural values in World Heritage Areas (WHAs) and National Heritage Areas through restoring and enhancing terrestrial ecosystems, wetlands, and freshwater systems, managing pests, weeds and diseases in and around heritage areas, enhancing landscape and riverine connectivity to support movement of species across and between heritage places, and helping prioritise and manage specific threats to biodiversity. In some states, NRM

organisations are responsible for facilitating environmental watering of heritage wetlands and floodplains.

NRM organisations support coordination between groups involved in heritage area management. They are often involved in helping prioritise actions to protect natural and cultural heritage in response to emergencies, coordinating with other groups and building networks to support protection, recovery and resilience. The NRM sector frequently works with First Nations groups to support First Nations-led management of cultural heritage places; cultural land and fire management of natural heritage; and protection and restoration of culturally significant species and places.

What more could be achieved together?

Actions to enhance natural and cultural heritage protection through NRM could include:

- Policy recognition of the importance of NRM in helping protect and recover heritage areas after extreme events

Heritage protection would also benefit from greater investment in:



Spiny crayfish found in bushfire-affected Gondwana WHA



Local Land Services near Greater Blue Mountains WHA work with park managers to deliver cross-tenure pest animal control to reduce impacts on the WHA and surrounding

- Protecting and recovering priority heritage assets and areas, including long-term recovery from extreme events, management of ongoing threats, and enhancing resilience through connectivity, protecting refugia and First Nations fire and land management strategies.
- NRM participation in or coordination of heritage protection networks
- Engagement with and support for First Nations historical and living cultural heritage protection
- Networks and capabilities to strengthen integration of heritage protection and prioritisation with wider response and recovery efforts during emergencies
- Integrating local heritage monitoring data into wider reporting efforts

7. Land

What does the report say?

Natural capital decline: *“Overall, the state and trend of natural capital in the land environment of Australia is declining. A renewed focus on landscape recovery, especially in southern and eastern Australia, and learning from Indigenous land management practices provides the opportunity to reverse some of these declines to achieve a more ecologically sustainable future.”*

Key pressures: *“Native vegetation has been extensively cleared throughout intensive land-use zones of eastern and southern Australia... Growing profits from agriculture, forestry and mining are driving up clearing rates... Australia is burdened by tens of thousands of non-native species... Climate change is an immediate pressure on all land sectors that is intensifying the need to adapt.”*

Soils: *“Australia has had the third highest cumulative loss of soil organic carbon in the world ... Regenerative management practices are restoring soil function locally, but adoption is not yet widespread. Groundcover targets have not been met, and monitoring is identifying where improved protection from wind erosion is needed”*

Below-ground biodiversity: *“Below-ground organisms comprise a large fraction of global terrestrial diversity and are responsible for essential ecosystem functions and services, such as plant productivity, nutrient cycling, organic matter decomposition, pollutant degradation and pathogen control”*



Yellabina regional reserve, South Australia

How does the NRM sector contribute?

NRM contributes to a wide range of activities that mitigate land degradation, from restoring vegetation, to soil health, to control invasive weeds, pests and diseases. The sector provides crucial support for sustainable agriculture to benefit environmental values through innovation



Woody weeds field day, North Queensland

and extension networks, including through Regional Agricultural Landcare Facilitators (RALFs). Taking an integrated landscape-level approach to natural and cultural values means that NRM organisations can be key partners in addressing landscape recovery as a whole, across tenures and actions, as well as protecting, managing and recovering particular high-value places and assets across landscapes.

NRM regions have also been pioneers in natural capital accounting, and are actively involved in developing viable data, methods and approaches that can support assessments of the state and trend of natural capital in land, freshwater and marine environments.

NRM has helped transform approaches to managing our soils. Work by NRM organisations has pioneered management practices that have helped restore soil function, reverse degradation and protect landscapes from erosion in priority areas, delivering improvements in observed soil management and function in many of our landscapes. This work is underpinned by integrated approaches, knowledge of the importance of soil health and the practices needed to restore it, broadening understanding of the benefits of soil health for productivity and for ecosystems, and working with landholders to support adoption of agricultural practices to improve soil health.



What more could be achieved together?

Additional initiatives and investment could build on this strong foundation to:

- Extend the activities of NRM organisations to achieve wider coverage and a broader array of priority actions to improve landscape-level recovery, including connecting with and supporting Traditional Custodians and First Nations land management practices where appropriate
- Expand the crucial extension function of NRMs, including the successful RALF model
- Invest in NRM innovation and connect the work of Rural RDCs directly with landholders and producers to increase relevance, reach and adoption
- Expand efforts and capabilities in soil management to extend the benefits more widely across landscapes and bioregions, and reach wider networks of communities and landholders
- Improve recognition of NRM plans and initiatives that identify, plan and implement landscape restoration, and inclusion of these plans in government policy priorities
- Draw on the data, skills and expertise in natural capital across NRM networks to support national environmental accounting and natural capital assessments
- Use the extensive data held by NRM organisations to augment future SoE assessments, particularly at a regional scale, and engage with regions to identify potential new indicators relevant to them

8. Inland water

What does the report say?

Drought, floods and lower cool season rainfall: *“The outlook under a changing climate, in which severe droughts are projected to occur more frequently and last longer, extreme events to become more intense and cool-season rainfall to continue to decrease, will impact both the environment and the economy.”*

Lack of recovery time between most recent droughts: *“Australia has experienced its lowest 24-month rainfall period on record, which has significantly affected inland water environments, which had not recovered from the millennium drought. Both surface-water and groundwater ecosystems were affected, and several major fish deaths occurred.”*

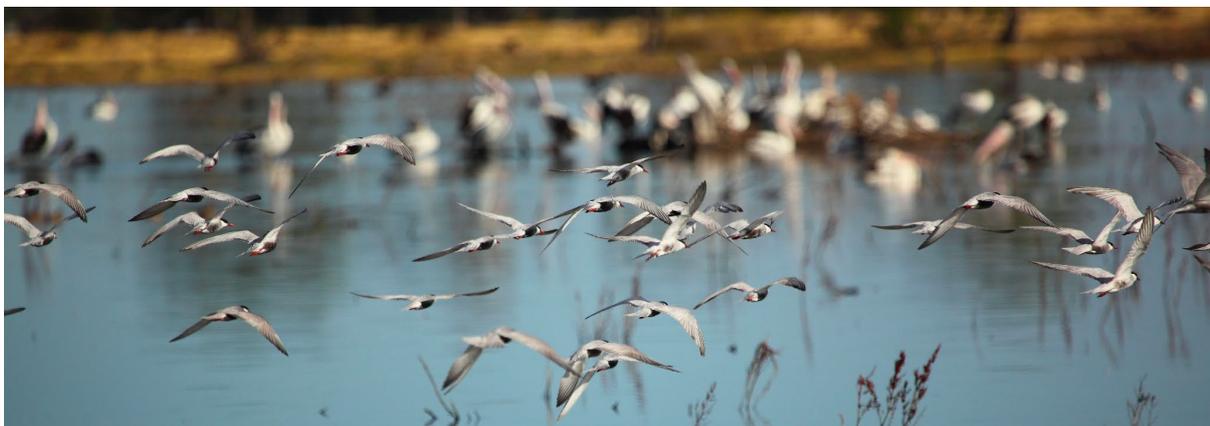
Impacts on freshwater ecosystems: *“Altered water quality and quantity, as a result of climate change and resource extraction, are having major detrimental effects on freshwater biodiversity... hot conditions, low flows and significant algal blooms during the 2018–20 major drought resulted in mass fish deaths... Future changes in the global climate system are likely to have an even more profound impact on hydrology.”*

Impacts on freshwater ecosystems: *“In the Murray–Darling Basin – home to 16 internationally significant Ramsar wetlands, 35 endangered species and 98 species of waterbirds – rivers and catchments are mostly in poor condition, and native fish populations have declined by more than 90% in the past 150 years: a trend that appears to be continuing today.”*

Impacts on freshwater ecosystems: *“2019–20 drought and bushfires reduced vegetation cover, and increased the levels of dry soils and ash... following rains could wash large amounts of sediments and nutrients such as phosphorus into waterways, triggering blooms [which] can produce toxins and reduce the oxygen content of water, affecting fish and other oxygen-dependent organisms.”*

How does the NRM sector contribute?

All regional NRM organisations deliver actions to improve the health of waterways, and most include water in their regional planning. In some states, NRM organisations develop the annual watering plans around climate scenarios, working with water corporations to deliver environmental water to priority sites, and undertaking long-term intervention monitoring programs. The NRM regional model also supports water management across state boundaries such as the tri-state alliance.



Whiskered tern, Lake Murphy, Victoria

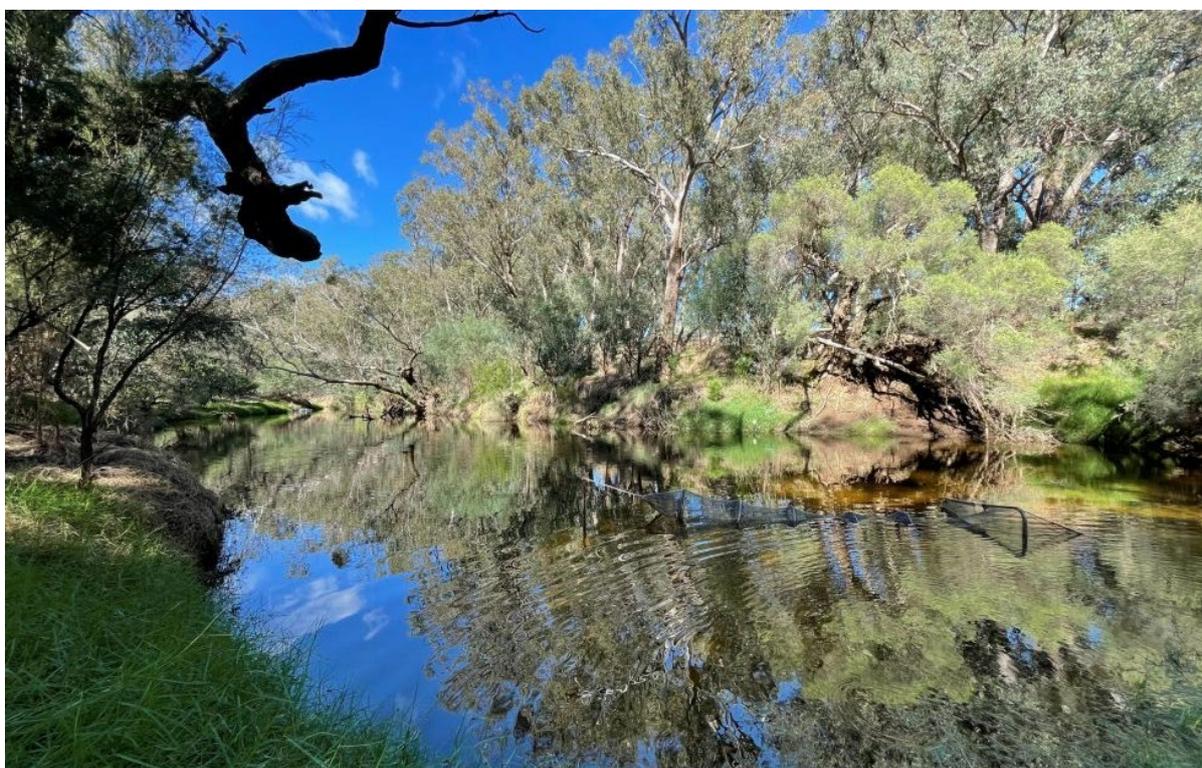
NRM actions to support freshwater management include:

- Working with farmers to manage water use, improve riparian vegetation, restore traditional channels, integrate sustainable irrigation, and reduce erosion, sediment and nutrient runoff
- Supporting local projects designed to improve the health of rivers, wetlands and floodplains
- Coordinating land and water management works to maximise environmental benefits and improve irrigation efficiency and drainage
- Working with Traditional Custodians to protect and restore culturally significant wetlands and river systems
- In some states, facilitating environmental watering, catchment and river health programs

What more could be achieved together?

Inland water management and climate planning could include:

- Increased investment in NRM to enable adoption of sustainable irrigation and water management in farms, agricultural sustainability frameworks, and regional, state and national-level planning
- Greater integration of regional NRM planning for water management and drought resilience
- Further investment in NRM to develop partnerships to manage river, wetland and floodplains health to benefit freshwater ecosystems and species, including monitoring, building the evidence base and working with Traditional Custodians to protect culturally significant species and places
- Support for NRM and partners to co-develop, trial and implement new teal carbon methodologies



River health assessments across sections of the Murray River in Western Australia will provide a snapshot of ecological condition against which future restoration activities can be measured.

9. Coasts

What does the report say?

Pressures on coastal systems: *“Impacts of many pressures on Australia’s coastal environment appear to be worsening, meaning that current management actions are insufficient ... invasive species are an ongoing and pervasive threat to coastal ecosystems... However, pressures associated with nutrient pollution and flow regimes appear to be lessening in response to management action”*

Adequacy of management: *“Management is currently fragmented across all levels of government... ... Coastal adaptation to climate change is in its infancy, far behind that needed ... “*

Importance of coastal restoration: *“Restoration and conservation of coastal ecosystems (e.g. mangroves, saltmarsh, and shellfish reefs) can offer physical protection from extreme weather events and erosion, with additional benefits of enhanced biodiversity, and ecosystem function and services.”*



Shorebird surveys Far West Coast SA

How does the NRM sector contribute?

NRM organisations in coastal areas have a significant focus on coastal management, including monitoring, restoration and conservation of coastal ecosystems and species, ensuring adaptation and resilience to climate change and weather extremes, and supporting sustainable coastal and estuarine industries. NRM organisations have supported the development of methodologies and uptake of blue carbon to invest in and implement coastal protection.

Many regional organisations are leading work on coastal protection and recovery. Torres Strait Regional Authority has pioneered coastal adaptation for storms and storm surge protection.

OceanWatch Australia provides a national overview of voluntary adoption measures and supports national knowledge-sharing on integrating marine, coastal and terrestrial planning.

What more could be achieved together?

NRM organisations can play a key role in expanding and better coordinating coastal protection and restoration, including through:

- Providing a vehicle to better coordinate and scale up cost-effective coastal climate adaptation
- Drawing on regional planning and applying research to prioritise management of coastal habitats and communities
- Co-developing blue carbon methodologies and rapidly scaling up uptake of coastal blue carbon initiatives, delivering outcomes for industry, First Nations values, biodiversity, coastal protection, mitigation and adaptation
- Supporting the expanding body of voluntary organisations caring for and incubating actions for coastal management across jurisdictional boundaries.



OceanWatch Australia mangrove forest recovery project to protect coastlines after bushfires

10. Marine

What does the report say?

Condition of marine environments: *“Australian marine habitats... are predominantly in good, stable condition overall. However, reefs ... and reef-associated species ... are in poor condition and deteriorating as a result of the effects of climate change and cumulative pressures... Traditional Owners assessed habitats and communities as in worse condition than reflected by the ‘western science’ assessments.”*

Pressures: *“The pressures with the highest impact on the Australian marine environment remain climate change, fishing, pollution (especially plastics; debris; and land-based inputs of sediments, excess nutrients and chemicals), oil and gas industries, and marine noise. ...”*

First Nations management: *“Investing in the growth of Indigenous and organisational capabilities will strengthen our readiness for collaboration by increasing confidence and capability for cross-cultural relationship building. Fragmentation in management will persist in Australia if there is no investment in giving our communities decision-making agency, and allowing them to participate in the management, adaptation and restoration of our marine environment.”*

How does the NRM sector contribute?

The NRM sector delivers cross-regional and cross-program integration for management of marine systems, delivering integrated outcomes from funding from multiple levels of government, industry and private sources.

Many NRM regions undertake work to maintain healthy estuaries and coastal waterways to prevent or reduce impacts on marine environments, working with partners including Traditional Owners, state/territory and local governments, industry and communities. NRM organisations also work with landholders and across tenures to reduce nutrient pollution, improve flow regimes, and reduce erosion and sedimentation that lead to downstream negative impacts on marine systems.

NRM regions also pioneer innovative mechanisms, for example the cutting-edge Reef Credits scheme for the Great Barrier Reef, developed in partnership with Greencollar and funded by the Queensland Government. This work has built collaborations with landholders, industry groups, Traditional Custodians, governments and researchers that have been vital in reducing nutrient pollution in Great Barrier Reef catchments.

What more could be achieved together?

Integrated and strategic investment in our catchments, coastlines and marine environments is essential to reduce compounding pressures, support sustainable industries and accelerate



Developing an assessment and approach to preventing litter accumulation on seabeds by reducing estuarine waste

climate change adaptation efforts. NRM organisations can play a key role in expanding and better coordinating these efforts, including through:

- Drawing on regional planning to prioritise and integrate management across catchments, coastlines and marine systems
- Supporting Traditional Owner-led marine activities
- Enhancing investment in actions to prevent pollution, sediment and waste runoff to build resilience in marine environments and to support extension of sustainable marine industries
- Increasing the coordinating role of OceanWatch Australia in marine and coastal NRM
- Enhancing targets and related investments in restoration of critical marine habitats.



Mulloway tagging at Yalata Beach, South Australia

11. Urban

What does the report say?

Climate-resilient urban areas: *"The economic roadmap out of the COVID-19 pandemic and other environmental shocks must dovetail with the shift towards zero carbon and climate-resilient urban environments so that our urban areas can bounce back smarter, greener, cleaner and more equitable."*

Managing heat islands: *"With the urban heat island effect, temperatures in our urban areas can be 1–7°C higher than in surrounding areas... The significant health, environment and social implications of urban heat have led to various measures to proactively reduce and manage the potential for impacts... this has required a collaborative approach by governments and communities to address this issue through physical improvements to our urban environment ... waterways such as fountains, ponds, lakes, wetlands, rivers and reservoirs can create 'urban cooling islands', resulting in a notable decrease in urban temperature... increasing tree and vegetation cover provides shade, increases rates of evapotranspiration, and regulates air movement and heat exchange"*

Urban water management: *"Effective water and stormwater management ... plays an important role in supporting the quality and flow of water within our urban waterways, along with the greening of our private and public gardens, parks, ovals and bushlands."*

Urban biodiversity: *"our urban areas play an important role in supporting a diverse range of flora and fauna, including providing critical habitat for endangered species."*

Livability: *"The livability of our urban environments is an important determinant of our wellbeing ... as our urban areas grow and expand, this standard will decline without a collective and concerted effort to build better, greener and more resilient urban environments."*

How does the NRM sector contribute?

NRM organisations are active in and around urban areas, including our most densely populated cities. NRM organisations form strong partnerships with city councils to support planning, projects, climate adaptation and coastal management, such as work to restore living waterways and wetlands to improve filtration and reduce urban flooding.

Urban natural resource management encompasses revegetation, restoration of urban rivers, creeks, wetlands and riparian areas, supporting urban and peri-urban biodiversity and waterways, and partnerships with Traditional Custodians to care for culture and Country. NRM organisations also work with managers of urban green spaces (such as golf clubs), to manage and restore habitat, reduce weeds, pests and disease, and improve the quality of water courses and wetlands.



Enhancing Our Dandenong Creek restoring nature corridors and waterways in southeast Melbourne



Backyard 'canopy bridges' allow safe passage for Western Ringtail Possums in south-west WA

Urban NRM has a strong focus on community engagement, liveability, and connection with biodiversity, waterways and natural and cultural heritage. NRM organisations work with schools, develop citizen science programs, provide community education for native habitats in gardens, courtyards and balconies, install habitat features for urban wildlife, and invest in biosecurity community surveillance, particularly in crucial peri-urban areas. NRM organisations work with communities and schools to increase recognition of the importance of biodiversity corridors and river systems and minimise impacts to urban and peri-urban waterways from recreational activities, boating and fishing.

Regions also help strengthen connections between urban, regional and rural areas through activities such as supporting participation in land care and catchment management activities and encouraging city residents to grow plants for revegetation of regional areas after wildfires.



Native garden workshop, Townsville

What more could be achieved together?

Further work could:

- Expand investment in urban carbon, climate adaptation, biodiversity, water and cultural heritage management
- Expand work with natural waterways, wetlands and floodplains both within urban areas and higher in catchments, to slow flows and reduce flooding into and through urban areas
- Strengthen integrated waterway management across agricultural, peri-urban and urban waterways to reduce pollution through nutrient runoff and improve filtration and water quality
- Expand NRM engagement capacity, including community engagement, schools, and citizen science programs, and invest in partnerships with city councils to support their capacity
- Integrate NRM organisations more fully into urban planning, climate adaptation and restoration decisions, including biodiversity-sensitive and water-sensitive urban design

12. Air quality

What does the report say?

Bushfires: *“A warming climate will increase pressures on air quality... The summer of 2019–20 produced one of the worst bushfire seasons on record ... Smoke blanketed towns and cities in Australia for many weeks, with concentrations of PM2.5 (particulate matter with a diameter of 2.5 µm or less) well above air quality limits ... about 80% of the Australian population was affected... The costs to health ... have been estimated at 417 excess deaths across Australia, 1,124 hospital admissions for related cardiovascular problems, 2,027 hospital admissions for respiratory problems and 1,305 asthma presentations at emergency departments.”*



Bushfire smoke haze over Canberra Jan 2020

Dust: *“Dust can be a significant air pollutant for remote and regional areas. Levels of dust and dust storms are higher in regions with low soil moisture and sparse vegetation coverage, and dust may become an increasing problem with climate change... High airborne dust concentrations are likely to have contributed to increased allergies, and ear and lung infections in Indigenous children living in 66 remote Western Australian communities... Dust suppression through vegetation programs would benefit the health of these communities.”*

How does the NRM sector contribute?

Bushfire hazard is dramatically increased by climate change. With land use change so central to Australia’s mitigation efforts, programs to create carbon sinks and reduce emissions are critical to moderating the rapidly increasing likelihood of extreme and catastrophic fire danger weather across the continent (see Chapter 2).

Other specific NRM activities can help reduce the dangers of smoke hazard from wildfires. Many NRM organisations support early season burning and First Nations fire management, which reduce the likelihood and incidence of catastrophic wildfires. Actions such as creating vegetation windbreaks, green firebreaks from fire-retardant vegetation, and restoring riparian areas can also in some cases reduce the risks of fast-spreading wildfires across landscapes. NRM has played a significant role in reducing land degradation across regional Australia that can lead to dust pollution. Regional NRM organisations work with industry to improve grazing land management, with direct benefits for both enterprise sustainability and groundcover. The NRM Spatial Hub groundcover layers give rangeland managers the capability to map, plan, analyse and monitor groundcover maintenance on their properties. NRM activities such as revegetation and water flow management also maintain ground cover and other vegetation, and help retain soil moisture, mitigating the effects of drought and weather extremes, and reduce tendencies to whole-of-landscape drying which can exacerbate dust pollution.



Revegetation, water retention and other NRM strategies can reduce risk of dust pollution in dry and drought conditions

What more could be achieved together?

Further work could:

- Expand on the role of NRM in improving and maintaining vegetation cover through restoration and management, and in management of stream flows and soils to improve moisture retention and mitigate the most extreme impacts of drought
- Investigate and invest in management of overly abundant and feral animals in areas prone to long dry periods to allow for maintenance of groundcover
- Increase uptake of sustainable agriculture practices such as grazing management and cropping systems
- Assess and quantify the benefits of NRM activities such as revegetation, herbivore management and streamflow restoration for reducing landscape drying and consequent dust pollution
- Support more awareness and extensive use of First Nations fire and land management practices across Australia
- Investigate the potential of NRM activities such as windbreaks, green fire breaks, and water retention for mitigating bushfire risk and smoke hazards under different conditions.