

Blueprint to Repair Australia's Landscapes

National case for a 30-year investment in a
healthy, productive & resilient Australia

Part I: Synthesis Report | July 2024

WENTWORTH GROUP OF CONCERNED SCIENTISTS

Wentworth Group of Concerned Scientists

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ABORIGINAL AND TORRES STRAIT ISLANDER PEOPLES AND THE NATION'S ENVIRONMENT

The Wentworth Group of Concerned Scientists acknowledges and celebrates Aboriginal and Torres Strait Islander peoples, the Traditional Custodians of the lands and waters of Australia. We pay our respects to their elders past and present.

Aboriginal and Torres Strait Islander peoples have been stewards of Country for over 60,000 years and have continuing cultural connections to lands and waters. Indigenous ownership was never ceded.

From 1788 to today, the connections and role in stewardship of Country all changed for Aboriginal and Torres Strait Islander peoples following dispossession from their lands.

Leading Indigenous experts have documented major issues affecting Australia's environment.¹ The current state of Country is far from healthy.

Aboriginal and Torres Strait Islander peoples now need to have leading roles in repairing and managing healthy landscapes, including to support social, economic, cultural, and spiritual values. "Healthy Country means healthy people."¹

Together, in repairing Country with Aboriginal people and Torres Strait Islanders, Australians can advance reconciliation and improve the health of our nation's lands and waters for the benefit of all peoples.

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Overview

“The biosphere, upon which humanity as a whole depends, is being altered to an unparalleled degree across all spatial scales. Biodiversity – the diversity within species, between species and of ecosystems – is declining faster than at any time in human history.”

- CONVENTION ON BIOLOGICAL DIVERSITY COP 15, MONTREAL, 2022

Australians undertake actions to improve the health of our landscape every day. Many actions have long-lasting and measurable benefits.

Yet despite these actions, and millions of dollars invested annually by government, private and philanthropic sectors, successive Commonwealth State of the Environment reports show that many parts of our environment are in a poor and declining condition.

Australia has national ambitions to reach net zero emissions by 2050, become nature positive, protect and restore 30% of land and water areas by 2030, deliver more sustainable, productive and resilient food systems, close the gap on Indigenous disadvantage, and grow towards and beyond a \$100 billion agricultural sector.

We now need to match these aspirations with programs and resources for achieving and sustaining them.

If we are to realise these ambitions and meet growing demands on our landscapes in a warmer and more unpredictable world, it is essential that we have a healthy and resilient natural resource base.

The Wentworth Group, together with experts from academia, government and business, has described a suite of practical actions and investments to repair Australia’s degraded landscapes, and in doing so, prepare for the unprecedented climatic pressures ahead. These actions expand on current successful efforts and set us on the path to achieve our national goals on a scale and scope never done before.

The objective of this blueprint is to articulate a practical vision for Australia’s landscapes, to put forward the national case for repairing degraded landscapes, and to identify a suite of practical actions that would enable them to take place effectively and at a continental scale.

Actions and investments are described in Part II: *Actions & investment for a healthy, productive and resilient Australia in the next 30 years.*

This is the most comprehensive assessment of its kind in Australia. With best available science and expert advice, we identified 24 actions worth \$7.3 billion per annum (in 2022\$) over 30 years, or 0.3% of GDP, which could repair much of the past two centuries of degradation.

We focus on actions which would improve the condition of landscapes, so they have the capacity to provide a range of goods and services now and in a rapidly changing future, including nature-based solutions.

Native vegetation actions identified could remove one billion tonnes of CO₂, offsetting about 18% of Australia’s net emissions over the next 30 years using high integrity carbon methods, contributing to mitigation needed to meet obligations under the Paris Climate Agreement.

At an average price of \$35 to \$75 per tonne of carbon dioxide equivalent, rising at 2% per annum plus inflation from 2024, native vegetation actions on private land could generate \$0.5 to \$1.1 billion per annum in carbon market revenue within 30 years, reducing the annual investment needed to between \$6.2 and \$6.8 billion (2022\$).

Further substantial opportunities exist to sequester biodiverse carbon and generate revenue through actions to restore river corridors, as well as savanna burning and blue carbon methods, and in coming years, through the Commonwealth's nature repair market and state trusts.

This assessment focuses on five of the natural assets identified as degraded in successive State of the Environment reports: soils, inland water, native vegetation, threatened species and coastal environments.

We do not propose to return these assets to a past state. Rather we identify opportunities to invest in renewing the health of degraded landscapes to support a broad range of objectives, and from which further enhancement is possible.

We show that actions can be undertaken in a way that increases agricultural productivity on prime farmland, supports jobs and increases resilience to extreme events and climate change.

In the UN Decade on Ecosystem Restoration (2021-2030), the actions would help Australia become nature positive,^{2,3} and contribute to the Sustainable Development Goals, the Leaders' Pledge for Nature and the Convention on Biological Diversity's Global Biodiversity Framework. The actions will help business de-risk nature and report under the Taskforce on Nature-related Financial Disclosures framework.

Actions will be more effective if we apply them at the regional scale – a scale large enough for the integrated management of actions, investments, cumulative impacts and pressures, yet small enough for participation and local knowledge to tailor place-based solutions.

We recognise the important role of Indigenous people as stewards of Country, and the need to draw upon Indigenous leadership and knowledge to guide the repair effort.

Targeted, long-term financial investments in the actions identified would unlock new and significant returns for forward-thinking businesses who choose to build their strategies on a healthy environment. We put forward measures that make these investments feasible and fiscally responsible.

While we cannot accurately measure the true cost of degradation, it far outweighs the modest cost to substantially repair nature.

This assessment reflects our best understanding of the national-scale actions and indicative investment needed. But this kind of program is never definitive, and these actions will not fix everything.

However, if done together, at scale, and built into broader public policy reforms which prevent future degradation, they will leave our environment healthier and more resilient to current and future pressures, including climate change.

This work seeks to empower individuals and organisations with the knowledge and confidence to undertake actions to repair degraded landscapes and invest in Australia's long-term future. We offer an open invitation to engage in a collective effort to accelerate, expand and refine the actions needed across Australia.

This blueprint is also aimed at challenging the notion that landscape repair is too big and expensive a task for us to tackle. By breaking down the work into pragmatic, tangible actions, and giving time for them to take place, we show the effort required, while substantial and urgent, will generate benefits and income over decades to come.

Australians do not have to choose between a healthy environment and a productive economy. Repairing Australia's landscapes is essential, urgent, achievable, affordable, and in the national interest.

Key findings

1. We identified 24 practical actions which aim to: (1) repair the productive base of agricultural soils; (2) fix overallocated and fragmented river systems and rehabilitate degraded water catchments; (3) restore healthy native ecosystems to a minimum 30% of their pre-1750 extent (4) mitigate imminent extinction risk and ensure survival of Commonwealth-listed threatened species; and (5) maintain and improve the health of estuaries (see Table 1).
2. It is possible to restore nearly all of Australia's degraded terrestrial ecosystems to 30% of their pre-1750s extent in healthy condition and maintain and even increase current agricultural production if we address environmental degradation and rebuild and prioritise productivity in agricultural landscapes.
3. The transition towards net zero emissions is an opportunity for Australia to repair degraded landscapes at scale. Restoring native vegetation across 13 million ha would abate almost one billion tonnes of carbon dioxide equivalent, equivalent to offsetting 18% of Australia's net emissions over the next 30 years,⁴ helping to meet Australia's obligations under the UN Paris Climate Agreement while financing landholders to repair and conserve habitat.
4. We estimate a capital investment of \$7 billion is needed annually over 30 years to deliver the actions, and a further expenditure of about \$250 million per year to maintain outcomes (in 2022\$). Carbon market revenue from regenerating native vegetation on private land could generate 7% to 15% of the investment needed, leaving a finance gap of \$6.2 to \$6.8 billion (2022\$) or 0.26% of GDP.
5. The investment will support employment and jobs in the short- and long-term across urban, regional and rural areas. Increased employment will promote a strong circular flow of income, generating government revenue in the form of income tax, GST receipts and associated revenues.
6. A range of financing mechanisms is needed. As a starting point, we suggest increased public investment for stewardship programs, Indigenous land managers and threatened species recovery; revenue-neutral changes to the tax system to incentivise conservation (e.g., removal of subsidies that degrade the environment); public investment in the Australian Government Green Bond Framework; the use of markets and other innovative solutions emerging in the private sector to incentivise conservation on private land; and philanthropy. This investment will improve Australia's global environmental, social and governance (ESG) position.
7. A national effort will only be successful if it is supported at the regional scale – a scale which gives prominence to local and regional communities, including Aboriginal and Torres Strait Islander people, with connections to the land, and enables an integrated approach to planning and implementation, underpinned by an understanding of how landscapes function.
8. Actions and recommendations in this blueprint are interdependent – they need to be undertaken together, at scale, with strategic and coordinated implementation across all sectors to ensure outcomes materialise and persist in the long term.
9. Policy, law and governance reforms are needed to ensure the repair effort is not undermined by further, preventable degradation of Australia's landscapes.

What we can achieve by 2055

"Nature can be conserved, restored and used sustainably while other global societal goals are simultaneously met through urgent and concerted efforts fostering transformative change." - CONVENTION ON BIOLOGICAL DIVERSITY COP 15, 2022

We demonstrate that Australia can substantially repair past degradation of our landscapes within 30 years. We can:

- 1. Repair the productive base of agricultural soils:** We can restore the productive base of our degraded and vulnerable soils by removing intractable constraints which limit agricultural productivity. This will build sustained resilience to climate change and allow soil carbon to rebuild. In addition, we can revitalise extension services to help landholders to optimise outcomes for people and nature across agricultural landscapes.
- 2. Fix overallocated and fragmented river systems and rehabilitate degraded water catchments:** We can restore ailing river basins by recovering surface and groundwater in overallocated systems, reconnecting floodplain wetlands to ensure the persistence of habitat, and removing impediments to fish migration. We can restore native vegetation in gullies and along riparian corridors of rivers, lakes and wetlands through regeneration and fencing to provide habitat, reduce soil erosion and improve water quality. We can revegetate our landscapes so our catchments will be more resilient to floods, droughts and other extreme events.
- 3. Restore healthy native ecosystems to a minimum 30% of their pre-1750 extent:** We can restore nearly all (99.8%) of Australia's degraded terrestrial ecosystem types to 30% of their pre-1750 extent in a healthy condition while maintaining and even increasing

productivity on prime agricultural land. Restoring native vegetation across 13 million ha would also abate almost one billion tonnes of carbon dioxide equivalent and produce AU\$16 to \$34 billion (2022\$) carbon market revenue to landholders within 30 years. We can expand the use of Indigenous fire management practices to support native vegetation health and reduce carbon emissions.

- 4. Avoid most extinctions and recover almost all threatened species:** We can mitigate imminent extinction risk and ensure medium-term survival of most nationally-listed threatened species by restoring habitat, addressing threats and undertaking interventions such as translocation and breeding programs.
- 5. Maintain or improve the condition of estuaries:** We can improve the health of estuaries through integrated catchment management, reconnecting freshwater and tidal flows to protect and restore salt marshes and re-establishing seagrass meadows and shellfish reefs.

We illustrate the opportunities to restore soils, inland waterways, native vegetation, threatened species and coastal environments within mosaic landscapes in Figure 1. We describe the specific objectives and actions for repairing Australia's landscapes in Table 1.

Our assessment focused on regional landscape repair actions, other important components such as air quality, urban settlements and marine environments beyond the scope of this assessment are also essential in a national repair effort.

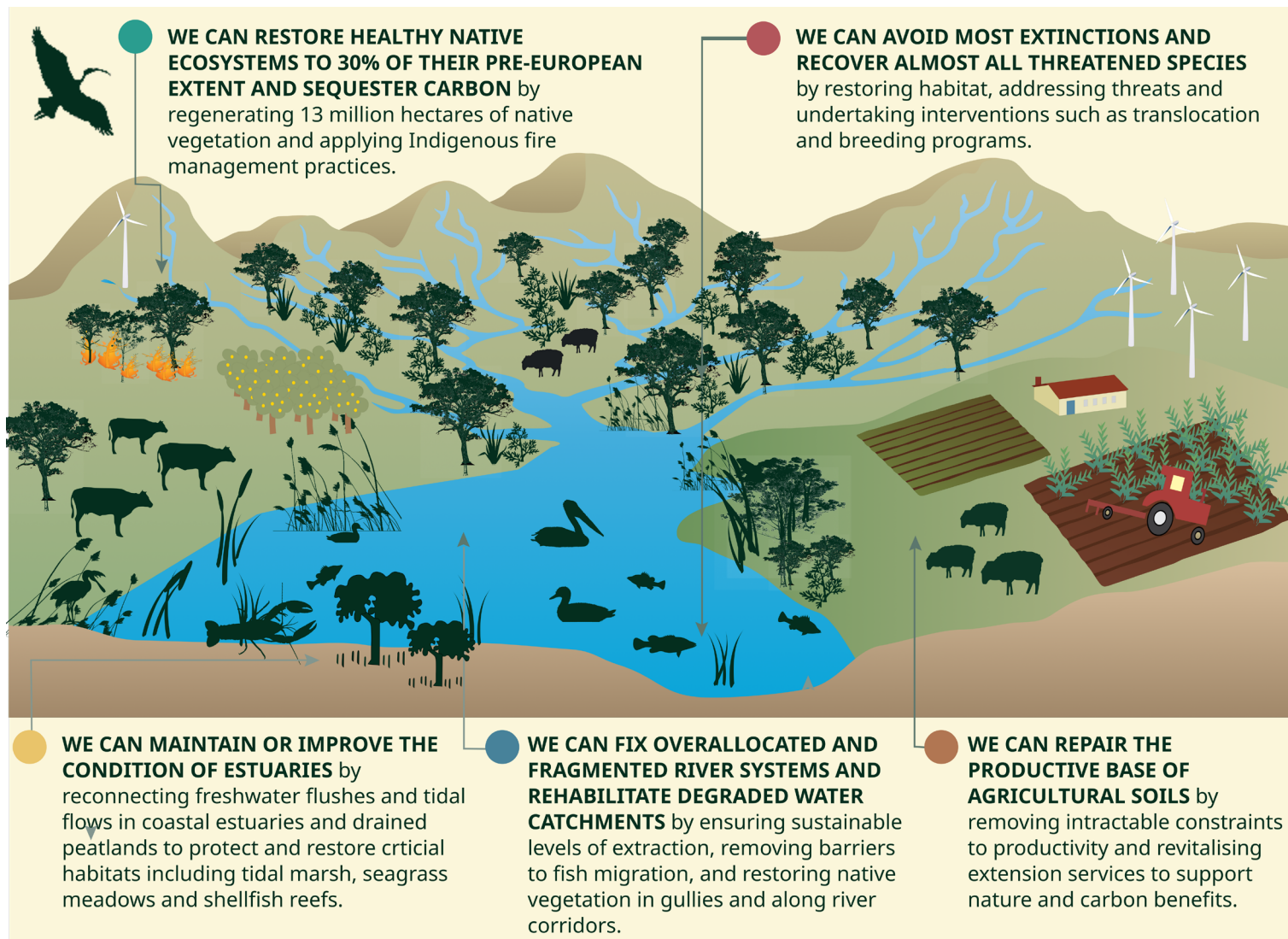


Figure 1. Schematic showing the opportunities for repairing ecosystems within a catchment, based on the actions identified in this blueprint. Central to the repair effort is a coordinated, integrated approach within a mosaic of ecosystems, where multiple outcomes are optimised to generate whole-of-catchment outcomes, in a way that recognises the regional context and involves local communities including Aboriginal and Torres Strait Islander peoples in the repair effort.

Other important components such as air quality, urban settlements and marine environments are also essential in a national repair effort.

Table 1. National-scale objectives and practical actions needed to substantially repair Australia's degraded landscapes. For details and rationale, see Part II Technical review, 'Blueprint to Repair Australia's landscapes: Actions & investment for a healthy, productive and resilient Australia in the next 30 years.'

Soils	Objective S1. Improve physical and chemical condition and productivity of agricultural soils that need remediation due to long term degradation and where that remediation is not likely to occur without direct investment.
	1. Apply lime to address soil acidification on agricultural soils where damage is significant, not affected by acid sulfate, and not amenable to current management.
	2. Apply gypsum to address soil structure decline on agricultural soils with excess sodicity where amendment is likely to produce substantial improvement.
	3. Plant salt-tolerant vegetation (e.g., saltbush) on salt-affected lands to maintain soil stability and some level of production.
	Objective S2. Repair gully erosion hot spots across Australia to improve water quality in rivers and expand the availability of healthy land for agriculture and wildlife.
	4. Undertake remediation works of revegetation, fencing, stick traps, and rock chutes for high-risk gullies.
Inland water	5. Undertake remediation works of stick traps, rock chutes, fencing for low-to-medium risk gullies.
	Objective S3. Connect agricultural land management practices with broader national ambitions for biodiversity, climate change and agricultural productivity.
	6. Revitalise advisory, support and extension services to provide landholders with the knowledge and capacity to better optimise outcomes including maintaining economic productivity, improving catchment health, sequestering carbon and improving biodiversity.
	Objective R1. Establish and restore riparian buffer zones on all of Australia's rivers and streams to protect productive land from erosion, support biodiversity, improve water quality and enhance the productivity of fisheries and health of freshwater and marine ecosystems.
	7. Restore, conserve, and manage strips of healthy native riparian vegetation
	8. Incentivise landholders to retire their farmland along the banks of Australia's major rivers, smaller rivers and streams, and major natural lakes and wetlands
Inland water	Objective R2. Restore overallocated river systems to sustainable levels of take.
	9. Return overallocated river systems of the Murray-Darling Basin to environmentally sustainable levels of surface water extraction through the strategic purchase of water licences from willing sellers, on-farm investment, and other measures.
	Objective R3. Restore lateral and longitudinal connectivity of rivers, floodplains and their wetlands.
	10. Allow water to reach and pass safely across floodplains and wetlands in the Murray-Darling Basin by modifying infrastructure (e.g., bridges and roads), removing high-risk or unauthorised flood works, or purchasing voluntary easements on private land.
	11. Restore fish passage by removing or modifying high priority physical barriers.

	<p>Objective R3. (cont...) Restore lateral and longitudinal connectivity of rivers, floodplains and their wetlands</p> <p>12. Install cold-water pollution control devices on priority large dams.</p> <p>13. Install fish diversion screening on all licensed irrigation pumps.</p> <p>Objective R4. Improve the efficient use and sustainability of groundwater resources</p> <p>14. Cap remaining open artesian bores and convert remaining open bore-drains to pipes and trough systems in the Great Artesian Basin.</p> <p>15. Return groundwater extractions to sustainable levels in the Murray-Darling Basin through the strategic purchase of water licences from willing sellers.</p>
Native vegetation	<p>Objective V1. Restore native vegetation cover to at least 30% of pre-1750 extent in a healthy ecological condition for each of Australia's terrestrial ecosystems</p> <p>16. Restore 1.3 million hectares of degraded native vegetation to a healthy ecological condition within the protected area estate</p> <p>17. Restore 11.6 million hectares of degraded native vegetation to a healthy ecological condition on non-prime agricultural land</p> <p>18. Incentivise landholders to retire their non-prime agricultural land for the native vegetation conservation areas</p> <p>Objective V2. Reduce the frequency and intensity of fires impacting Australia's tropical savannas</p> <p>19. Use Indigenous fire management practices to undertake controlled low intensity fires early in the dry season in Australia's tropical savanna lands.</p>
Threatened species	<p>Objective T1. Mitigate imminent extinction risk and ensure medium term survival of Commonwealth-listed threatened species.</p> <p>20. Restore habitat, address threats (including some localised impacts of invasive species) and undertake population interventions such as translocation and breeding programs for species listed as Critically Endangered, Endangered and Vulnerable under Commonwealth legislation.</p>
Coastal environments	<p>Objective C1. Support coastal biodiversity, and improve coastal fisheries productivity</p> <p>21. Maintain or improve the condition of degraded salt marsh ecosystems.</p> <p>22. Incentivise a change in management practice for salt marsh ecosystems.</p> <p>23. Re-establish locally degraded seagrass communities in priority areas.</p> <p>24. Re-establish shellfish reefs in priority locations.</p>
All assets	<p>▶ Ongoing maintenance gully control measures ▶ Management and monitoring of new riparian plantings along rivers, lakes and streams</p> <p>▶ Monitoring, operating, licensing and maintenance of fishways, cold-water pollution devices and diversion screening devices ▶ Bore system monitoring, operating, licensing and maintenance ▶ Monitoring and management of restored areas (fire, weeds, feral animals) ▶ Monitoring and management of savannas burning areas (weed monitoring and removal) ▶ Monitoring of existing and new seagrass areas</p> <p>▶ Monitoring and management of existing and new shellfish reefs.</p>

The national case for repairing Australia's landscapes

"Australians are undergoing a radical reassessment of their relationship with the land [...] inventing their own, distinctively Australian futures in a bid to create sustainability in this land". – TIM FLANNERY, 2002

The Australian landscape in context

Australia has enjoyed strong economic prosperity and, until the COVID pandemic in 2020, the longest period of growth without a recession for a developed country since World War II.⁵ Achievements in the land sector have included sustained productivity growth, increased crop yields and animal production, growing food availability and lowering food costs.^{6,7} Yet many of these achievements have come at a cost to the natural environment (Box 1).

All Commonwealth State of the Environment reports since 1996 document the degradation and declining health of our environment.⁸ About half of Australia's land surface has been significantly modified since European settlement, and some ecosystems have almost disappeared.^{9,10} At least nineteen ecosystems are undergoing collapse from climate change and other pressures.¹¹

For most of the last two centuries, we have extensively modified our landscapes, ignoring the complexity of these unique Australian ecosystems and the true costs of our actions.

There is a growing body of evidence that many past practices have left our landscapes highly compromised. They impact ecosystem health and limit our ability to take advantage of economic opportunities.¹² Public policies have further entrenched many practices causing degradation. If this trajectory continues, our economy, wellbeing and the unique and remarkable features of our natural landscape will suffer.

Redefining our relationship with the land

There are clear signs that some things are changing for the better. Australians are recognising the inherent vulnerability of our landscapes to the challenges of agricultural production, urban sprawl, population growth and climate change, and the cost of optimising only one or two features of the landscape.

There are many success stories where we have adapted our practices: for example, zero or minimum tillage now occurs across 78% of Australia's cultivated lands;¹³ Australian cotton growers have implemented world-leading integrated pest management solutions to reduce chemical insecticides;¹⁴ the Australian Landcare movement arose out of concerned farmers;¹⁵ and integrated Natural Resource Management (NRM) has been implemented nationally since the 2000s. These actions have led to long-lasting, measurable improvements in the landscape, and continue to be led by farmers, Landcare groups, NRM groups and regional communities.

Australians are also seeking to better understand the relationship between Indigenous peoples and the landscape and learn from Indigenous practices.¹⁶⁻¹⁸ Indigenous priorities, voices and knowledge are increasingly being incorporated into land management, with new models of joint management, ranger programs and expanded adoption of practices such as firestick burning. Many programs to date have achieved large-scale conservation outcomes, provided employment opportunities for Indigenous rangers and helped overcome barriers to Indigenous disadvantage.¹⁹⁻²¹

New and emerging influences on our landscapes

Australia's population is projected to grow to 37 million by 2052-3,²² and globally the population will reach 10 billion,²³ largely in cities as part of the global trend towards urbanization. While living standards will improve for many, global food production will need to expand by between 30% to 62% by 2050 from 2010 levels accounting for climate change,²⁴ and competition over land use is expected to intensify.²⁵

Australia has warmed almost 1.5 degrees since national records began in 1910.²⁶ Every decade since 1950 has been warmer than preceding decades.²⁶ Australia's weather patterns have changed, with observed shifts in patterns of rainfall, evaporation, soil moisture, streamflow, droughts, bushfire and flooding in many parts of the country. Extreme events due to climate change are predicted to continue to become more frequent and severe.

Agricultural landscapes have significantly declined in their capacity for maintaining agricultural productivity,²⁷ for supporting native systems, and as a base for the growth of repaired vegetation communities.^{28,29}

Climate change, population growth, the rise of Asia, economic trends, national and international priorities and other drivers will continue to have profound implications for Australia - for cities, coastal and inland regions, agriculture and the health of our environment and people.

Landscape degradation imposes significant costs because ecosystem services provided by our soils, vegetation communities, water systems and faunal communities will be impaired. Invasive species are exerting considerable pressure on our landscapes, with new threats continuing to emerge. We are only beginning to understand and quantify the full costs.

In the face of these defining influences, Australia can have a healthy, prosperous, and resilient future – if we choose to.

Box 1. The systemic decline of Australia's landscapes

- In the past 20 years alone, 8 million hectares of habitat, likely to have supported listed threatened species and ecological communities, was cleared.³⁰ In 2021, Australia was still one of the leading deforesters in the world. The vast majority of land clearing occurs in regional areas, affecting catchment health. Tree removal is also prevalent in urban areas (e.g. 22% tree cover in Sydney; 15% in Melbourne), exacerbating heat health risks.^{31,32}
- About half of Australia's agriculturally productive soils are affected by acidification.¹² Soil function is threatened by unsustainable rates of erosion, loss of soil organic carbon and nutrient imbalances.¹²
- Seventeen wetlands of international importance across Australia were reported to the Ramsar Convention Secretariat from 2006 to 2021 because of human-induced changes in their ecological character.³³ In the Murray-Darling Basin, 6 of the 11 lowest flow years recorded over the last 120 years have occurred since 1997.³⁴
- South-western Western Australia and Victoria have historically experienced widespread dryland salinity, and large areas of New South Wales along the Great Dividing Range and in the Murray-Darling Basin have been identified as having a high or very high salinity hazard, as well as the North Coast, Hunter Valley, Central West and Greater Sydney regions.³⁵
- The Great Barrier Reef has experienced six mass bleaching events from 2000 to 2023,³⁶ never previously recorded since its formation 12,000 years ago, and a seventh event is underway. Most sediment runoff to the reef originates from erosion of stream banks and gullies, exacerbated by degradation of riparian areas from land clearing, cropping and livestock grazing.³⁷

A whole-of-landscape, regionally-based mosaic approach

Repairing landscapes is about improving the integrity of the system as a whole. To achieve this, the actions described need to be undertaken together, at a regional scale and in a way that accounts for interdependencies, dynamics and uncertainty.

We recognise it is not possible to achieve everything everywhere, so the way we undertake the repair effort is important. It requires an understanding of the drivers of success, and a regional, mosaic approach, looking across the whole of our landscape to see where each component is likely to be most successful and how actions can be undertaken together across the landscape to optimise multiple outcomes. This involves:

- (1) Better matching land use with the characteristics of the landscape (for example, by preserving the best agricultural land for growing food and fibre, and by prioritising the protection of high-value native vegetation where it already exists);
- (2) Understanding the areas in a landscape where actions can achieve multiple outcomes together (e.g., areas of high biodiversity and carbon potential, with opportunities to reduce sediment flows into waterways), and creating economic incentives which help to optimise those outcomes within the landscape;
- (3) Boosting agriculture productivity on the land best suited for that purpose, to enable us to feed and clothe more people on more appropriate, smaller areas of land with lowered constraints to agricultural productivity;

- (4) Maintaining participation and connection between people and the land in the repair effort, including Aboriginal and Torres Strait Islander peoples who have an important role in stewardship of nature; and
- (5) Working regionally using a whole-of-catchment approach where possible, drawing on and supporting the knowledge and commitment of people in regional communities, and understanding land managers and their willingness and barriers to participation.

There are important benefits of taking this approach:

- (1) Undertaking actions together at the regional scale unlocks many complementarities including cost-savings and co-benefits for people and nature (e.g., restoring river corridors also improves water quality, improving soil health also increases agricultural productivity).
- (2) Improving the health of one asset usually depends on the restoration of other assets within a region (e.g., improving prospects for threatened species often requires regeneration and repair of habitat, while improving health of estuaries requires management of upstream impacts).
- (3) Mismanagement or inaction can have broader impacts and undermine overall improvement (e.g., unsustainable land management practices contributing to poor river, groundwater, and estuary health), or poor policies and regulations which exacerbate degradation (e.g., laws that permit broadscale clearing of native forests and woodlands).

The important role of Indigenous nations in repairing Country

Aboriginal and Torres Strait Islander peoples have been stewards of Country for over 60,000 years and have continuing cultural connections to land and waters. Aboriginal and Torres Strait Islander people need to have leading roles in managing and repairing landscapes, including to support traditional and ongoing social, economic, cultural, and spiritual values.

European settlement in Australia has led to drastic changes in the management, value and respect for lands and waters since 1788. For Aboriginal and Torres Strait Islander peoples, colonisation and lack of authority to speak for Country has created barriers to fulfilling their customary responsibilities for caring for Country, leading to poor or misinformed land and water management decisions and consequent environmental degradation. Through Indigenous eyes, the current state of Country is far from healthy.

Actions in this blueprint can unlock the potential for Aboriginal and Torres Strait Islander people to take leading roles in the national landscape repair agenda. Aboriginal and Torres Strait Islander people must be resourced and supported to generate meaningful and commercially sustainable employment and businesses on Country. Long-term funding for Aboriginal and Torres Strait Islander people to repair and manage Country has many benefits in terms of getting people back onto Country, sustaining culture, and reducing socio-economic disadvantage to help Close the Gap.

We propose four key measures to unlock the potential for Aboriginal and Torres Strait Islander people to take leading roles in the landscape repair agenda proposed in this blueprint.

1. Increase Indigenous ownership and management of land and water

Currently, Indigenous rights and interests in land are formally recognised over approximately 40% of Australia's land mass, mostly in the centre and the north.³⁸ Indigenous nations hold very few water entitlements, including only 0.2% of those issued in the Murray-Darling Basin.³⁹ As Aboriginal and Torres Strait Islander people benefit so little from their Country, the national Closing the Gap strategy targets a 15% increase in Australia's landmass and seas subject to Aboriginal and Torres Strait Islander people's legal rights and interests by 2030.⁴⁰ Returning more land and water ownership to Indigenous communities will sustain culture and generate socio-economic benefits, enabling a higher standard of management in the broader national interest.

2. Recognise the value of traditional knowledge to repair and manage Country

Aboriginal and Torres Strait Islander peoples hold generations of traditional ecological knowledge, connection, and observations for better management of natural resources and the achievement of sustainable development.⁴¹ We need to draw upon this knowledge for better management of natural resources and the achievement of sustainable development.⁴¹ This knowledge goes well beyond current mainstream knowledge, for example, in the management of species⁴² and use of fire to maintain the health of Country.⁴³

Applying traditional ecological knowledge to enhance natural resources management, enabling mutual learning between scientific and traditional knowledge holders and drawing on the expertise and skills of local people living on and near Country as the workforce for this national mission is critical for the national repair effort.^{41,44} Accessing traditional knowledge for better environmental management needs to occur in respectful and culturally appropriate ways, including the employment of Indigenous knowledge holders to apply their expertise along with the protection of their intellectual property.

3. Establish and expand programs to employ Aboriginal and Torres Strait Islander people to repair and manage Country

There is an urgent need to expand programs that permanently employ Aboriginal and Torres Strait Islander people to repair and manage Country. The Federal Government has made welcome commitments to expand the Indigenous-led Indigenous protected area and Indigenous land and sea ranger programs.

There is an opportunity and need to support Indigenous nations to establish, especially in southern and eastern Australia, and expand Indigenous land, river, and sea ranger programs with long-term funding. Indigenous organisations should be resourced to operate parallel to, and in coordination with, the 54 multi-stakeholder regional NRM organisations nationally. Much of the expenditure needed to implement the repair proposed in this blueprint could be provided to Indigenous-led initiatives including ranger programs.

4. Unlock broader socio-economic benefit from the repair and stewardship of Country

Aboriginal and Torres Strait Islander people must be resourced and supported to generate meaningful and commercially sustainable employment and businesses on Country. The Indigenous land and sea ranger programs are one critical opportunity. We also point to the need to employ elders to draw on, protect and pass on their traditional knowledge. It is vital that other socio-economic opportunities are also fostered through, for example, the range of support businesses (e.g., nurseries, aquaculture experts, fencing contractors) that will be needed to support repair activities.

The repaired landscape should be a resource base for other industries such as high value Indigenous agricultural products. There will be opportunities for an expanded tourism industry, for example, based on restored river systems and fish populations. The national Closing the Gap strategy targets an increase in the proportion of Aboriginal and Torres Strait Islander people aged 25-64 who are employed from 51% in 2016 to 62% in 2030.⁴⁰ Repairing landscapes should prioritise directly employing Indigenous peoples, prioritise procurement from businesses owned by or employing Aboriginal and Torres Strait Islander people, and support the establishment of Indigenous-owned businesses.

Together, in repairing Country with Aboriginal people and Torres Strait Islanders, Australia can advance reconciliation, Close the Gap and improve the health of our nation's lands and waters for the benefits of all peoples.

Financing the repair effort

Investment needed

The Wentworth Group has derived indicative estimates of the new investment needed over 30 years (Figure 2). The annual investment (in 2022\$) from 2025 to 2054 includes approximately:

- \$580 million to repair the productive base of agricultural soils;
- \$2.9 billion to fix overallocated, fragmented, degraded river systems (including \$2.6 billion to establish and repair riparian buffer zones);
- \$1.7 billion to restore ecosystems to >30% of their pre-1750 extent;
- \$1.2 billion to mitigate imminent extinction risk and ensure medium-term survival of Commonwealth-listed threatened species;
- \$35 million to maintain and improve estuary health;
- \$640 million in transaction costs (e.g., legal costs, data, compliance); and
- \$250 million in operational expenditure (e.g., monitoring, pest, weed & fire management).

While the blueprint requires a total investment of \$7.3 billion per annum over 30 years in 2022\$, we acknowledge that actions have different start dates and tenures. This blueprint's investment requirement over 30 years aggregates to upfront funding of \$218.8 billion (2022\$). If funded on an annualised future basis, accounting for inflation and time value of money, the total investment required would be considerably greater - between \$11.8 billion to \$19.4 billion per annum with an average of \$14.8 billion per annum.

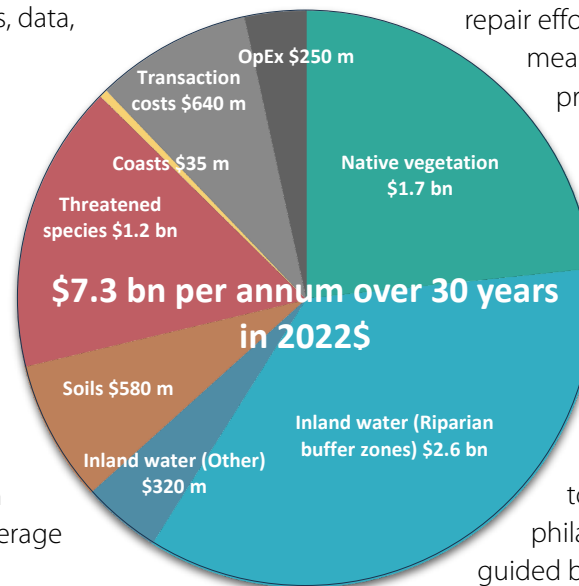


Figure 2. Annual investment required to repair key landscape components over 30 years in 2022\$.

Failure to repair past damage poses major risks to Australia's prosperity. Global studies estimate that the cost of inaction on environmental change equates to a loss of US\$479 billion per year.⁴⁵ While we cannot measure the true cost of degradation, evidence suggests the cost to people, nature and the economy far outweighs the cost to repair nature.

Financing opportunities

Globally, several reviews of international and domestic finance approaches have been undertaken, spanning government financing, private sector investment and philanthropic donations,⁴⁶⁻⁴⁸ providing a useful basis to inform appropriate financing options.

There are multiple stakeholders who have a role to play in funding the repair effort. Well-targeted public investment is an important means of funding the actions critical to the health and prosperity of our nation. Public investment allows for broad public benefits, such as regional employment and economic development.⁴⁹ Government investment can also be made without significant call on the budget, for example, by reorienting environmentally-degrading public spending and eliminating perverse subsidies.⁵⁰

Governments currently provide the dominant source of conservation financing.⁴⁷ Increased long-term public funding (across all levels of Government) needs to be complemented by an increase in private and philanthropic investment, coordinated across sectors and guided by strategic investment plans to drive efficiency at scale.

International agreements to which Australia is a party, and other global initiatives (e.g., Kunming-Montreal Global Biodiversity Framework, the Paris Agreement, the Natural Capital Protocol and the Taskforce on Nature Related Financial Disclosure), have spurred private sector interest in impact investing where social and environmental outcomes are generated alongside market returns. Interest is enhanced with Australia's reputation as a global supplier of healthy, and sustainably grown food and fibre, and of nature-based tourism.

There are opportunities to use government funding to leverage private sector investment as part of a blended-finance approach, particularly where there are environmental benefits from impact investment in sustainable agricultural and forested land, or urban green infrastructure.

Governments also have an important role to play in mobilising private-sector investment. In 2023, the Australian Government established the legal framework for a national, voluntary nature repair market to attract private finance to repair and protect nature. Government-led enabling factors will be essential to mobilise this investment (e.g., integrity standards, assurance frameworks, investment incentives).

The Australian Government sovereign green bond program launched in 2023 is designed to attract private sector investment for decarbonising the economy and supporting outcomes for nature.⁵¹ The Australian Office of Financial Management has commenced a global roadshow, with the first issuance in 2024. Investment in landscape repair could be incorporated into this framework and promoted in future roadshows.

Finally, one quarter of all Australians volunteer their time, creating monetary benefits to both nature, organisations, and the economy of an estimated \$288 billion annually.^{52,53} Although not factored into this analysis, the significant in-kind contribution that delivers environmental benefits has the effect of reducing the total investment required.

The substantial contribution of carbon markets

Australia can harness the potential of landscapes to remove carbon from the atmosphere, and in doing so, open up an important pathway to fund landscape repair actions, enhance agricultural productivity and contribute to Australia's national and international climate and biodiversity commitments.⁵⁴ This will require initiatives which encourage investment in carbon projects that also achieve outcomes for nature.

Under conservative assumptions, an estimated 919 million tonnes of carbon dioxide equivalent (tCO₂e) emissions could be reduced and/or avoided across the continent between 2025 and 2055 by undertaking actions to restore native vegetation described in this blueprint. This is equivalent to offsetting 18% of Australia's net emissions under current national greenhouse gas projections for the next 30 years.⁴

At a carbon price of \$35 to \$75 per tonne of carbon dioxide equivalent, rising at 2% plus 2.5% interest per annum from 2024, this would generate an estimated \$16 to \$34 billion for farmers, landholders, and Aboriginal people to repair degraded vegetation using high integrity methods within 30 years. This would provide \$0.5 billion to \$1.1 billion annually (2022\$), or 7% to 15% of the total investment required.

Better managed soils, savanna grasslands and woodland systems (e.g. through fire management) are also eligible for payments under the Australian carbon credits scheme.⁵⁵ Likewise, there are opportunities for riparian vegetation restoration and blue carbon payments for the restoration of coastal ecosystems. High-integrity methodologies and cost-effective measurement and monitoring are fundamental for the success of these schemes.

Recommendations

If the actions are to be effective in repairing degradation and assist in preparing landscapes for the unprecedented climatic stresses over the next century, eight measures are also needed:

- 1. A long-term nation-wide strategic plan to repair Australia's landscapes, linked to regional natural resource management plans,** setting out the objectives, targets, actions, roles and responsibilities, investment needed and benefits of landscape repair, to be developed by governments, businesses, communities, NRM regions and Aboriginal and Torres Strait Islander people.
- 2. A national body (e.g., a National Council) of experts and/or representatives responsible for overseeing the initiative, delivering the strategic plan and enabling policy, law and governance reforms.** This body would report to National Cabinet with an agreed framework, clear principles and accountability. It would be tasked with overseeing major components of the reform, including the strategic plan and the necessary policy, law and governance reforms (see Recommendation 7).
- 3. Use a regional approach to planning and delivery** by strengthening the role and influence of integrated NRM planning to ensure actions are integrated, appropriate and strategic at the regional scale, enable coordination across sectors, address underlying drivers, and importantly, facilitate ownership and participation by regional communities, building on the successes and advances of strategic natural resource management planning over many decades.
- 4. Ongoing, sustainable source of finance for the repair effort** by increasing public funding in landscape repair, incentivising complementary private investment and encouraging investment in carbon projects that also achieve outcomes for nature.
- 5. Unlock the potential for Aboriginal and Torres Strait Islander people to take leading roles in the landscape repair agenda,** including by increasing Indigenous land and water ownership, expanding programs and creating permanent roles to employ Aboriginal and Torres Strait Islander people to repair and manage Country, and through better recognition of the value of traditional knowledge to repair Country.
- 6. Support communities and businesses to drive the repair effort** to build long term capacity and knowledge, to address trade-offs, to achieve an overall increase in productivity and to promote sharing of successful management practices.
- 7. Policy, law and governance reforms** to prevent current and future degradation of Australia's landscapes, to provide appropriate pathways for restoration actions within the planning system, to ensure integrity and transparency of repair efforts and expenditure, and enable integrated regional planning and coordination across jurisdictions.
- 8. A system of environmental accounts at national, regional and property scales** to inform decisions, measure progress and real verifiable benefits, provide transparency and accountability, and enable continual improvement.

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