

2026 DISCUSSION PAPER

# Nature as infrastructure

Recommendations to strengthen landscapes for climate adaptation and disaster risk reduction in Australia

NRM REGIONS AUSTRALIA

# Rights and interests of First Nations people

## ACKNOWLEDGEMENT

The authors respect the enduring spiritual and physical connection of First Nations people as Custodians of Country. We value the importance and diversity of the knowledge and understanding of First Nations people, which is based on a history of adapting to shifting climatic conditions, and balancing nature and society. We respect and recognise them as the first natural resource managers of Australia who have practised nature-based solutions for more than 60,000 years and recognise their Elders, both past and present. We commit to working together to care for Country.

## LEADERSHIP

The governance systems of First Nations people and their responsibilities to care for Country endure over all the lands and waters of Australia. First Nations people should be given the opportunity to lead on decisions made for their Country that strengthen landscapes and waterways to address climate adaptation and disaster risk reduction. This can be supported by empowering First Nations leadership in all places and all spaces including policy, research and programs.

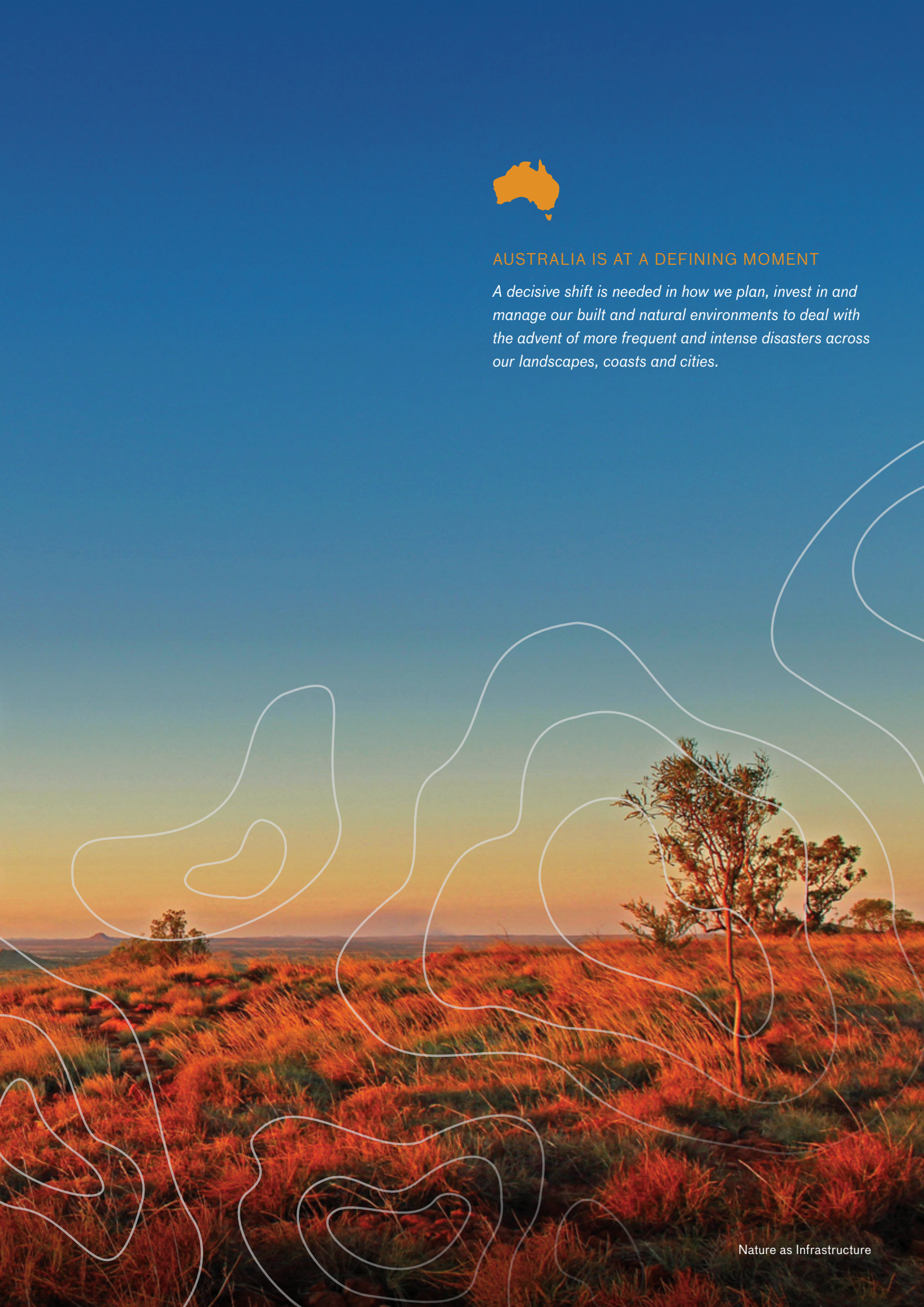
## LANGUAGE

This report uses the term 'First Nations people' to describe the first peoples of Australia and should be read to include 'Indigenous', 'Traditional Owners', 'Traditional Custodians', 'Aboriginal', 'Torres Strait Islander peoples', as appropriate, throughout the document. The authors acknowledge First Nations people's right to self-determination and respect their choice to describe their own cultural identities, which may include these or other terms. Throughout the report, 'Indigenous' is used to refer to the broader knowledge tradition, including phrases such as 'Indigenous knowledge systems' and 'Indigenous fire practitioners'; 'Traditional Custodians' is used when specifically referring to the people with cultural authority in a particular Country.



Cover image: Johnstone River Catchment, QLD. Image: Terrain NRM.
Channel country, QLD. Image: Desert Channels QLD – Ryan Francis.

NRM Regions Australia



## AUSTRALIA IS AT A DEFINING MOMENT

*A decisive shift is needed in how we plan, invest in and manage our built and natural environments to deal with the advent of more frequent and intense disasters across our landscapes, coasts and cities.*

# Who we are

NRM Regions Australia is the national voice for Australia's professional network of regional natural resource management (NRM) organisations spanning the entire continent. Grounded in regional communities for over 20 years, the NRM sector delivers lasting solutions to the complex environmental and climate challenges we face through people-driven, strategic and integrated landscape management. Our organisations are woven together by common principles and networks, with shared approaches to integrated NRM planning and partnerships.



Shepparton Irrigation Region. Image: Goulburn Broken Catchment Management Authority.

# Acknowledgements


## Authors: Sarah Hoyal and Dr Bek Christensen, NRM Regions Australia; Jen Barwick, Natural Solutions Consultancy; and, Dr Rachel Morgain and Ainslie Macdonald, University of Melbourne.



This report has been made possible through the support of the Minderoo Foundation.

The authors wish to thank the following people and organisations for their contributions and insights which were used to develop this document through direct engagement, group discussions and feedback on drafts. However we note that this engagement does not indicate endorsement by the individuals or the organisations they represent, of all of the recommendations provided in the report.

- Staff from regional NRM organisations across Australia
- Staff at Australian Government Department of Climate Change, Energy, the Environment and Water and the National Emergency Management Agency
- John Richardson, Australian Institute for Disaster Resilience
- Michael Cornish, Australian Land Conservation Alliance
- Dr Eleanor Robson, Australian Local Government Association
- Kristy Graham, Nicole Yazbek-Martin and Mauravi Jukar, Australian Sustainable Finance Institute
- Lis Ashby, Biodiversity Council
- Janet Hallows, Carbon Market Institute
- Sally MacAdams, Climate Emergency Australia
- Chris Lee, Climate-KIC
- Jo Sanson, Liam Walsh and Dr Rachelle Meyer, Climateworks Centre
- Dr Josie Carwardine and Dr Russ Wise, CSIRO
- Simon Koger, Engineers Australia
- Sam Kernaghan, Eleanor Ogston and Jeremy Mansfield, GreenCross Australia
- Eleanor Dewar, ICLEI Oceania
- Taegan Calnan, Indigenous Desert Alliance
- Duncan Paterson and Dr Kate Simmonds, Investor Group on Climate Change
- Oliver Costello and Dr Kristin den Exter, Jagun Alliance
- Elisabeth Mealey, Landscape Finance Lab
- Marnie Lassen, Dr Mat Hardy and Rachel Clarke, NRM Regions Australia
- Estelle Parker, Jess Rowe and Nayanisha Samarakoon, Responsible Investment Association of Australasia
- Michael O'Neill, The Nature Conservancy
- Dr Judy Bush, The University of Melbourne
- Rayne van den Berg, Value Australia
- James Pearson, World Benchmarking Alliance



The document should be cited as: 'Hoyal, S., Christensen, Dr B., Barwick, J., Morgain, Dr R. and Macdonald, A. (2026) *Nature as infrastructure – Recommendations to strengthen landscapes for climate adaptation and disaster risk reduction in Australia*, NRM Regions Australia' and is licensed under CC BY 4.0.

# Contents


1 Overview

5 Scope and purpose

6 Limited investment in natural infrastructure is exacerbating climate impacts

8 The case for investment in natural infrastructure

18 Navigating a path to scale natural infrastructure

31 Glossary of terms

33 Further reading

34 Appendix 1: Overview of natural infrastructure approaches

38 Appendix 2: Global momentum in natural infrastructure adoption




Nature-based solutions for flood resilience, WA. Image: NACC NRM.

# Overview

## AUSTRALIA IS AT A DEFINING MOMENT

Addressing the growing severity and frequency of climate hazards across Australian landscapes, coastlines, and urban centres demands a pivotal transformation in how we direct capital, formulate policy, and steward our natural environment.

Achieving long-term resilience requires moving away from reactive post-event recovery toward proactive risk mitigation and nature-based adaptation, while transitioning reliance from rigid 'grey' infrastructure to adaptable, cost-effective natural infrastructure.

By recognising and investing in nature as critical adaptation infrastructure, Australia can:

- reduce chronic climate risks whilst simultaneously mitigating further risks;
- catalyse adaptation and resilience responses and reduce adaptation and resilience costs;
- protect communities, infrastructure and local economies from increasing extreme acute climate events and reduce the costs of recovering from these events;
- support ecosystem recovery and meet international nature and climate commitments; and,
- unlock new economic opportunities.

## THE COSTS ARE ESCALATING

Total annual economic loss from extreme events in Australia in 2021 was an estimated $38 billion[1]. The National Climate Risk Assessment[2] identified around one million homes will be in 'very high risk' climate hazard zones by 2050 and effectively uninsurable – which will have huge ramifications for social cohesion and equity. In 2025 alone, disasters damaged 145,392 homes nationwide – almost as many as the 172,657 new homes completed that year.[3]

Escalating disasters also negatively impact the natural environment that provides $892b to our GDP[4]. Yet domestically, Australian Government investment mostly flows into disaster response and recovery. Investment in climate adaptation and disaster resilience, primarily through the Disaster Ready Fund and Future Drought Fund, remains marginal compared to the cost of disasters.[5]

Australia's current approach to climate and disaster risk is increasingly unsustainable. As climate hazards intensify, continuing to rely predominantly on post-event recovery will expose governments, communities, businesses and insurers to even higher escalating costs. A greater share of public and private capital must be directed towards reducing risk before disasters occur by investing in prevention, resilience and adaptation.

## PREVENTION IS BETTER THAN CURE

Just as targeted investment in preventative health care—such as better nutrition, fluoride in water supplies and immunisation programs—can significantly reduce the demand for acute care, investing in natural infrastructure such as functioning floodplains, coastal vegetation, urban tree canopy and fire-resilient landscapes, reduces the impacts of climate hazards and their associated costs. The lesson from health is that governments that invest in prevention and risk reduction at scale, with robust measurement and long-term funding, realise compounding returns.

1 Deloitte (2021) *Special Report: Update to the Economic Costs of Natural Disasters in Australia*.

2 Australian Government (2025) *National Climate Risk Assessment.*

3 Insurance Council of Australia (2026) *Catastrophe Resilience Report 2025-26.*

4 Australian Conservation Foundation (2022) *The nature-based economy: How Australia's prosperity depends on nature*. '$892b of our GDP has a moderate to high direct dependence on ecosystem services'.

5 Australian Government (2026) *Australian Government Investment Funds.*



Strategic back burn to protect Mt Lofty Ranges, SA. Image: SA Country Fire Service, Hills and Fleurieu Landscape Board.

*In 2025 alone, disasters damaged*

145,392 HOMES NATIONWIDE

*– almost as many as the 172,657 new homes completed that year.*

The same logic applies to climate and disaster resilience. Critically, natural infrastructure generates multiple co-benefits, including contributing to preventative health care – it increases biodiversity, improves community wellbeing, supports water security and sequesters carbon, while also reducing future disaster costs. London's urban forest prevented an estimated 153 heat-related deaths between 2015–2022[6] and Australian adults living in neighbourhoods with at least 30 per cent tree canopy have better mental and physical health than those in low-canopy areas.[7]

Investment in natural infrastructure also represents co-investment in programs that support many other government objectives, including enhanced community health and safety, and greater resilience of local economies, green jobs, cultural values, and infrastructure. These actions can reduce climate risks, advance climate resilience and adaptation, support nature recovery and net zero goals, and strengthen Australia's economy.

## THE EVIDENCE IS CLEAR

Natural infrastructure approaches are cost-effective, deliver multiple benefits for communities, economies and biodiversity, and are deployable now. A global review of more than 20,000 economic evaluations of natural infrastructure over a 20-year period found 95% consistently proved cost-effective in mitigating hazards and 91% of relevant studies found that natural infrastructure is at least as effective as engineered solutions.[8] The advent of hybrid natural and engineered infrastructure solutions provides even more scope (See Box 1).

**Australia has the capability and expertise** in natural resource management and caring for Country organisations, local governments, research and the private sector to support the adoption of natural infrastructure. What remains missing is the enabling policy, governance and investment architecture to unlock this potential at scale.

6 Taylor et al. (2024) Environ. Res. Lett. 19 054004.

7 Astell-Burt T, Feng X. (2019) *Association of Urban Green Space With Mental Health and General Health Among Adults in Australia*. JAMA Netw Open. 2019;2(7):e198209. doi:10.1001/jamanetworkopen.2019.8209.

8 Vicarelli, M. et al. (2024) *On the cost-effectiveness of Nature-based Solutions for reducing disaster risk.* Sci. Total Environ. 947, 174524.



Carbon workshop in paddock, SA. Image: Kangaroo Island Landscape Board.

BOX 1:

## WHAT DO WE MEAN BY NATURAL INFRASTRUCTURE?

In this paper, 'Natural infrastructure' refers to actions that protect, sustainably manage and restore natural or modified ecosystems, to address societal challenges effectively and adaptively. To achieve maximum benefits, natural infrastructure must be appropriate to place, and take a systemic, landscape-scale approach when addressing climate risks.[9] Examples of systemic approaches include restoring and protecting riverbanks in a whole catchment, rather than on a single property; and, considering the chronic and acute climate hazards that are predicted under a range of scenarios. Natural infrastructure can be equally effective, or more effective, than traditional 'grey' infrastructure[10] (such as concrete storm channels, levees, seawalls), and deliver significant benefits to local communities, ecosystems and economies. Natural infrastructure is generally more adaptable than grey infrastructure and can be up to 50% cheaper.[11] Natural infrastructure approaches are compatible with other land uses including agriculture, and can easily work alongside traditional grey infrastructure as hybrid solutions, like mangrove restoration with constructed breakwaters.[12]

Examples include:

- Protecting and restoring mangroves to prevent erosion and damage to built infrastructure from storm surges.
- Revegetating catchments and riverbanks, and reconnecting wetlands and floodplains, to reduce the energy and extent of flooding.
- Working with First Nations people to reintroduce cultural burning practices, which can reduce fire risks for communities.
- Growing fire-resistant plants to reduce fire risk.
- Growing street trees and urban forests to help cool cities.
- Climate-smart agricultural practices, such as cover cropping and soil conservation techniques, to reduce erosion from floods and droughts.

*See Boxed Case Studies and Appendix 1 for further examples of natural infrastructure.*

9 Asian Infrastructure Investment Bank (2023) *Nature as infrastructure*, Beijing, China: AIIB Headquarters.

10 Vicarelli, M. et al. (2024) *On the cost-effectiveness of Nature-based Solutions for reducing disaster risk*. Sci. Total Environ. 947, 174524.

11 Asian Infrastructure Investment Bank (2023) *Nature as infrastructure*, Beijing, China: AIIB Headquarters.

12 Conservation International (viewed August 2026) *Green-Gray Infrastructure Community of Practice* – https://www.conservation.org/projects/green-gray-infrastructure



## THIS DISCUSSION PAPER IS A CALL TO ACTION

*It recommends specific federal and state government actions that can accelerate natural and hybrid infrastructure approaches to climate adaptation and disaster resilience across Australia.*

Western swamp tortoise, Image: Spindrift Media, South West NRM.

This discussion paper is **a call to action.** It recommends specific federal and state government actions that can accelerate natural infrastructure approaches to climate adaptation and disaster resilience across Australia. These actions have been produced by a cross-sector collaboration which reflects the breadth of engagement required to drive change at the scale needed. Many of these recommendations will not require significant new investment but rather a change in investment allocations - such as shifting investments from traditional 'grey' infrastructure to natural infrastructure.

## THE RECOMMENDATIONS THAT FOLLOW SHOULD BE CONSIDERED AS A SEQUENCE OF CRITICAL STEPS

**Climate, nature and social risks and opportunities are interdependent, and none of them will shift at pace without a comprehensive picture across and within each. Sequencing matters as much as ambition. Government leadership sets the sequence; private capital and delivery follow with confidence once the measurement and policy signals are clear and consistent.**

Action to implement natural infrastructure approaches to adaptation and risk reduction is gaining momentum globally. Australian Federal, state and territory governments have a significant opportunity to strengthen Australia's landscapes, cities and communities through the adoption of natural infrastructure, so that they are resilient to the current and future impacts of a changing climate.

The key recommendations across these interconnected areas are:

**HEALTHY COUNTRY HEALTHY PEOPLE:** Increase investment in First Nations co-stewardship and leadership of natural resource management programs, and give a voice to Indigenous knowledge and leadership.

**VALUE NATURAL INFRASTRUCTURE:** Incorporate natural values into government financial decision making.

**CATALYSE PRIVATE SECTOR ACTION:** Structure government policy to catalyse private sector frameworks for valuing and investing in natural infrastructure.

**INCREASE SUPPLY:** Invest in Australia's established network of local, regional and cross-regional aggregators – including Indigenous land management organisations, local government, and natural resource management and landcare organisations – to accelerate the delivery of natural infrastructure.

**BUILD CAPACITY:** Invest in closing the knowledge and awareness gaps and strengthening the Australian evidence base to support scaling of natural infrastructure for disaster risk reduction.

# Scope and purpose

Australia faces escalating climate risks that demand a decisive shift in how we plan, invest in and manage our built and natural environments. This paper provides an overview of key reforms at the state and national level to embed climate and nature risks and opportunities across all government portfolios and create the enabling environment for greater public and private investment in natural infrastructure.

The adaptation window is narrow – climate resilient development becomes progressively more challenging with every increment of warming[13]. Decisions being made now about infrastructure, restoration and investment can either lock in resilience, or exacerbate vulnerability for decades to come.

The report seeks to identify the barriers and opportunities that stand between Australia's current trajectory and a future in which natural infrastructure is consistently considered, resourced and scaled alongside other disaster risk reduction and climate adaptation approaches.

The authors drew on global and Australian published and unpublished case studies and evidence, and sought advice and contributions from a range of sectors including: Indigenous land management organisations, all levels of government, industry, natural resource management, conservation, investors, researchers and practitioners to generate the recommendations contained in this report.

13 IPCC (2022) *Climate Change 2022: Impacts, Adaptation and Vulnerability*. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change.



Indigenous Ranger Gathering 2025, Kati Thanda-Lake Eyre, SA. Image: SA Arid Lands.

# Limited investment in natural infrastructure is exacerbating climate impacts

## Climate change is driving more frequent and more intense disasters across our landscapes, coasts and cities – and the costs are escalating.

Over 80% of Australians were exposed to natural hazards including bushfires, floods, drought, destructive storms, landslides and heat waves between 2019 and 2024.[14] The financial cost of insured extreme weather in the same period was about $22.5 billion, a 67 per cent jump from the previous five-year period.[15] There are multiple factors driving the escalating costs — increasing climate change, the severity and frequency of natural disasters, growing populations in harm's way, and infrastructure that was not built to withstand the impacts of a changing climate.

The Australian Government's release of the National Climate Risk Assessment, National Adaptation Plan, Net Zero Plan and associated sector plans in October 2025 are welcome additions to adaptation policy, but come with little funding for implementation. The plans highlight the importance of the natural environment as a protective mechanism for people, communities and the built environment, but also demonstrate the risks climate change already poses to nature.

Today only a small proportion of disaster funding is spent on risk reduction and even less on natural infrastructure for risk reduction.[16] The Colvin Review (2024) found that 87% of Commonwealth disaster expenditure between 2018-19 and 2022-23 was directed to recovery.[17] This is despite evidence that directing more resources to prevention, risk reduction and resilience has the potential to deliver significant social and economic returns on investment,[18] and natural infrastructure has been identified in national disaster risk reduction strategies as a key part of the solution.[19]

At the same time, low levels of investment in nature protection and regeneration more broadly, have led to significant degradation of natural infrastructure and declines in almost every ecosystem indicator, a situation being exacerbated by increasing climate hazard intensities and impacts in already changing climates. [20, 21]

14 Climate Council (2023) *Climate Trauma*.

15 Insurance Council of Australia (2025) Insurance *Catastrophe Resilience Report 2024–25*.

16 Productivity Commission (2014) *Natural Disaster Funding Arrangements*.

17 Colvin, A. (2024) *Final Report – Independent Review of Commonwealth Disaster Funding*, Deloitte Touche Tohmatsu.

18 CSIRO (2020) *Climate and Disaster Resilience: Technical Report*.

19 Such as the National Disaster Risk Reduction Framework (2019), and Second National Action Plan (2023).

20 Bergstrom, D.M. et al (2021) *Combating ecosystem collapse from the tropics to the Antarctic*, Glob. Change Biol., 27: 1692-1703, https://doi.org/10.1111/gcb.15539

21 Murphy H. & van Leeuwen, S. (2021) *Australia state of the environment 2021: biodiversity, independent report to the Australian Government Minister for the Environment, Commonwealth of Australia*, Canberra, DOI: 10.26194/ren9-3639.

BOX 2:

## DISASTER AND ADAPTATION FUNDING

In Australia, disaster funding refers to government expenditure that is meant to be directed at all phases of the disaster management cycle: preparedness, response, recovery and mitigation. It is delivered through a combination of Commonwealth and state and territory governments via mechanisms including the jointly-funded Disaster Recovery Funding Arrangements (DRFA), which reimburse states for eligible disaster costs, and the Disaster Ready Fund (DRF), which is directed toward risk reduction and resilience investments ahead of disasters occurring. These funding arrangements are currently being reviewed. The DRF along with the Future Drought Fund are also considered to be the key sources of funding for climate adaptation nationally.

The risks to the natural environment outlined in the National Climate Risk Assessment further threaten the critical protective infrastructure and multiple benefits that nature provides to our society – compromising future essential ecosystem services such as water quality and availability, soil fertility, pollination, and coastal protection. Damage to ecosystem services impacts community and individuals' health and wellbeing, education, regional resilience and productivity. It also has direct economic costs.

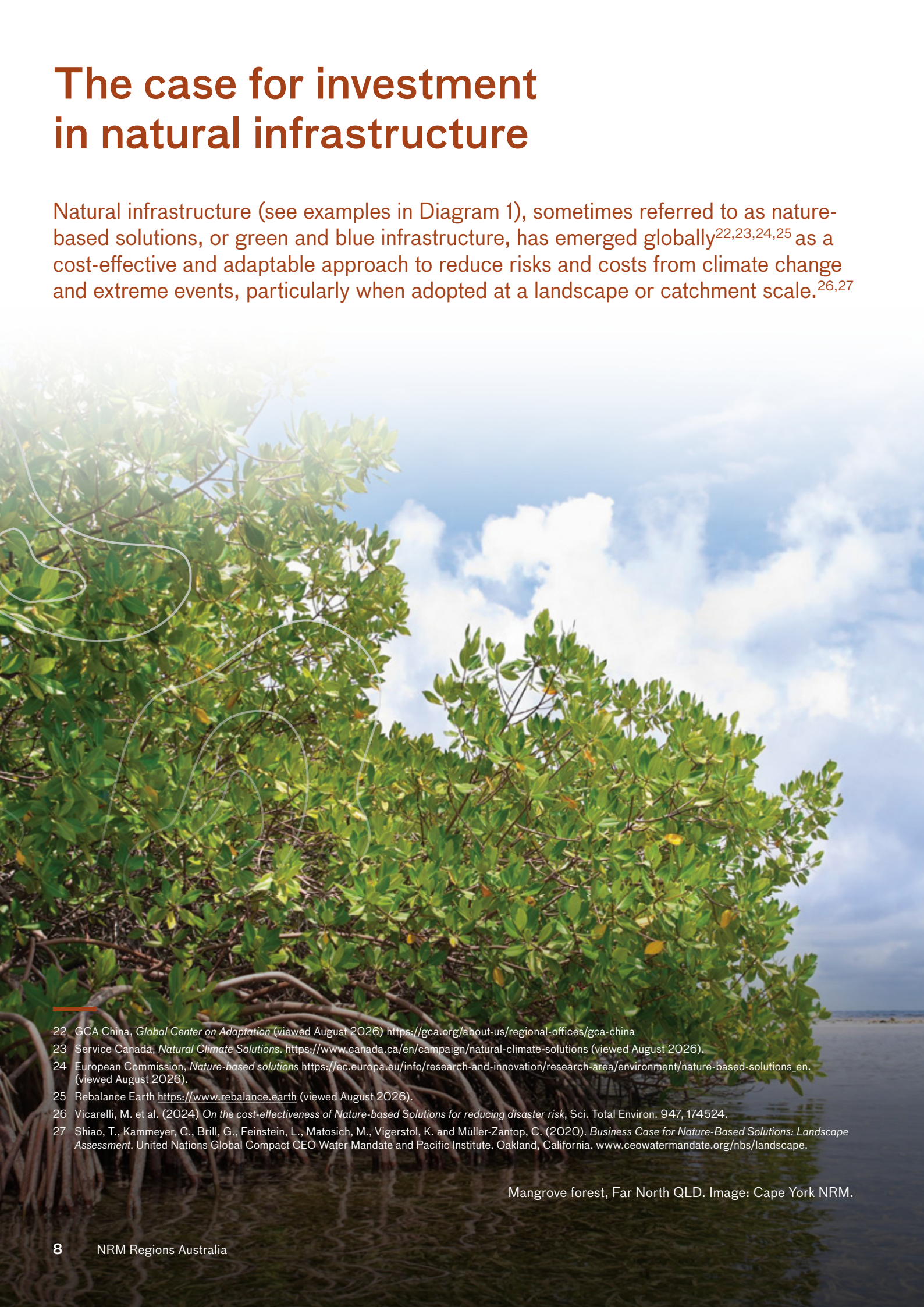
At present, little real value is put on natural infrastructure as part of the solution to climate adaptation or disaster risk reduction in Australia. However, the decisions made today about infrastructure, land use, urban development, natural resource management and disaster preparedness will influence Australia's exposure and resilience to climate risks for decades to come. Greater immediate investment and enabling policy settings are needed now.



Threatened species conservation of Swan galaxias, TAS. Image NRM South.

# The case for investment in natural infrastructure

Natural infrastructure (see examples in Diagram 1), sometimes referred to as nature-based solutions, or green and blue infrastructure, has emerged globally[22,23,24,25] as a cost-effective and adaptable approach to reduce risks and costs from climate change and extreme events, particularly when adopted at a landscape or catchment scale.[26,27]



22 GCA China, *Global Center on Adaptation* (viewed August 2026) https://gca.org/about-us/regional-offices/gca-china

23 Service Canada, *Natural Climate Solutions*. https://www.canada.ca/en/campaign/natural-climate-solutions (viewed August 2026).

24 European Commission, *Nature-based solutions* https://ec.europa.eu/info/research-and-innovation/research-area/environment/nature-based-solutions_en. (viewed August 2026).

25 Rebalance Earth https://www.rebalance.earth (viewed August 2026).

26 Vicarelli, M. et al. (2024) *On the cost-effectiveness of Nature-based Solutions for reducing disaster risk*, Sci. Total Environ. 947, 174524.

27 Shiao, T., Kammeyer, C., Brill, G., Feinstein, L., Matosich, M., Vigerstol, K. and Müller-Zantop, C. (2020). *Business Case for Nature-Based Solutions: Landscape Assessment*. United Nations Global Compact CEO Water Mandate and Pacific Institute. Oakland, California. www.ceowatermandate.org/nbs/landscape.

Mangrove forest, Far North QLD. Image: Cape York NRM.

A global review of more than 20,000 economic evaluations of natural infrastructure over a 20 year period (2001 to 2021), found that natural infrastructure was effective and cost-effective in mitigating hazards in 71% of cases studied, and cost-effective under certain conditions in 24% of studies. When comparing engineering-based solutions with natural infrastructure, 65% of studies found that natural infrastructure was always more effective at attenuating hazards, and it was partially more effective in 26% of studies in the review.[28]

Natural infrastructure can take longer to become fully effective than some engineered measures, particularly where benefits depend on vegetation establishment and tree growth, hence the most effective approach is to protect natural infrastructure already in place. Once established, well-designed and diverse natural infrastructure can provide flexible and long-term adaptation benefits under changing climatic conditions, while also delivering multiple benefits such as cooling, flood mitigation, erosion control, biodiversity conservation and carbon sequestration.[29] Natural infrastructure is most effective when it is place-based: designed and adaptively managed for a specific biogeographical context, and embedded in local social systems and values, including First Nations values.[30] Importantly, natural infrastructure can work alongside other land uses, including productive agriculture.

Governments around the world are shifting to implementing natural infrastructure commitments into operational frameworks. For example, three of the ten principles for adaptation action in New Zealand's National Adaptation Plan (2022 -2028)[31] are to work with nature, maximise co-benefits, and adopt local, place-based solutions to build risk reduction and increase climate resilience across all government strategies and policies.

The United Kingdom's Green Infrastructure Framework (2022)[32] provides standards which define what good green infrastructure looks like for local planners, developers, parks and greenspace managers and communities, and how to plan it strategically to deliver multiple benefits for people and nature. When used together, these standards help stakeholders to deliver the Green Infrastructure Framework's principles and enable everyone to benefit from good green infrastructure provision.

In the US state of California, the Natural and Working Lands Climate Smart Strategy (2022)[33] underscores the role of natural and working lands in achieving carbon neutrality and climate resilience. It identifies priority natural infrastructure to deliver climate benefits across all of California's diverse landscapes, guides State programs and includes more than $9billion of investments toward carbon sequestration, ecosystem restoration, and wildfire and flood risk reduction.

**Appendix 2** provides more details and examples of the global momentum in natural infrastructure for adaptation and disaster risk reduction.

In Australia, every $1 invested in natural capital brings at least $9 in benefits – with the highest returns occurring for the restoration of degraded agricultural land and ecosystems ($31.5 for every $1 invested).[34]

**Table 1** (pages 12-13) maps examples of evidence from multiple data sources of natural infrastructure benefits across all the key functional systems assessed under Australia's National Climate Risk Assessment.[35] This table provides further evidence that natural infrastructure is key to Australia's economic, social, cultural and environmental adaptation and resilience to a changing climate.

28 Vicarelli, M. et al. On the cost-effectiveness of Nature-based Solutions for reducing disaster risk. Sci. Total Environ. 947, 174524 (2024).

29 IPCC (2022) *Climate Change: Impacts, Adaptation and Vulnerability, Working Group II contribution to the Sixth Assessment Report, Summary for Policymakers.*

30 Turner, B., Devisscher, T., Chabaneix, N., Woroniecki, S. Messier, C. and Seddon, N. (2022) *The Role of Nature-Based Solutions in Supporting Social-Ecological Resilience for Climate Change Adaptation*, Annual Review of Environment and Resources 47 (2022): 123–48. https://doi.org/10.1146/annurev-environ-012220-010017; Cottrell, C. (2022) *Avoiding a New Era in Biopiracy: Including Indigenous and Local Knowledge in Nature-Based Solutions to Climate Change*, Environmental Science & Policy 135 (2022): 162–68. https://doi.org/10.1016/j.envsci.2022.05.003.

31 Ministry for the Environment (2022) *Aotearoa New Zealand's first national adaptation plan*, Wellington, Ministry for the Environment, New Zealand Government. https://environment.govt.nz/assets/publications/MFE-AoG-20664-GF-National-Adaptation-Plan-2022-WEB.pdf

32 Natural England (2026) *Green Infrastructure Framework*, online https://designatedsites.naturalengland.org.uk/GreenInfrastructure/StrategyStandard.aspx

33 State of California (2022) *Natural and Working Lands Climate Smart Strategy* https://resources.ca.gov/initiatives/expanding-nature-based-solutions

34 Vause, J., Grice, H., Cierna, A., Kaye, S., Muge, A. & Lancelin, J. (2024) *Closing the Gap: Investing in natural capital to meet the SDGs*. UN Environment Program.

35 Australian Climate Service (2025) *Australia's National Climate Risk Assessment Report*. Australian Government. 280pp.

DIAGRAM 1:

# NATURAL INFRASTRUCTURE APPROACHES FOR CLIMATE ADAPTATION AND DISASTER RISK REDUCTION IN AUSTRALIA

## Resilient native vegetation

### 1 Living firebreaks

When planted and managed in appropriate ways, vegetation slows or stops the spread of fire, protecting communities, infrastructure, and other assets. Appropriate vegetation includes shelterbelts, water retention approaches and fire-resistant vegetation.

### 2 Widespread vegetation

Locally appropriate native vegetation, across the right scale, position, and shape has the capacity to increase water filtration, reduce runoff and flood height, prevent erosion, reduce temperatures in surrounding areas, reduce evaporation to keep water in the environment, provide shelter and more.

### 3 Shelterbelts

Vegetation reduces temperatures in surrounding areas and reduces the evaporation of water to provide shelter for humans, stock, and infrastructure, with large trees and complex multistory vegetation providing the greatest benefit.

### 4 Vegetation along watercourses

Plantings, especially around watercourses e.g. riverbanks, lower flood heights, improve water quality, and reduce erosion, mitigating the impacts of floods and helping to speed recovery.

### 5 Urban greening

Green infrastructure in urban areas increases water infiltration and reduces evaporation to keep water in the environment, reducing the temperature of surrounding areas, providing shelter for humans and infrastructure.

## Resilient coastal ecosystems

### 6 Mangroves

Mangroves dissipate wave energy, providing a physical barrier between waves or seawater and communities and/or assets, preventing erosion, reducing sea level intrusion and minimising damage.

### 7 Locally appropriate dune vegetation

Dunes with vegetation dissipate wave energy, providing a physical barrier between waves or seawater and communities or assets, and stabilise sand and sediment to prevent erosion, reduce sea level intrusion and minimise damage.

### 8 Reefs and seagrass

Coastal restoration can create a physical barrier that provides protection to highly exposed areas, dissipating wave energy, stabilising sand and sediment to protect communities and/or assets.

## Cultural fire

### 9 Guided by local Traditional Knowledge

First Nations managed fire regimes reduce fuel loads and typically the mosaic vegetation structure contributes to a reduced risk of catastrophic wildfire.

## Connected and resilient floodplains and wetlands

### 10 Floodplains and wetlands

Floodplains and wetlands store and absorb excess water, this can lower flood heights, improve water quality, delay the onset of negative impacts of drought and aridity, and provide cooling and fire resilience benefits.



RIVERINE AND FLASH FLOODING



CHANGES IN TEMPERATURE, INCLUDING EXTREMES



DROUGHT AND CHANGES IN ARIDITY



BUSHFIRES, GRASSFIRES, AND AIR POLLUTION



COASTAL AND ESTUARINE FLOODING



COASTAL EROSION AND SHORELINE CHANGE

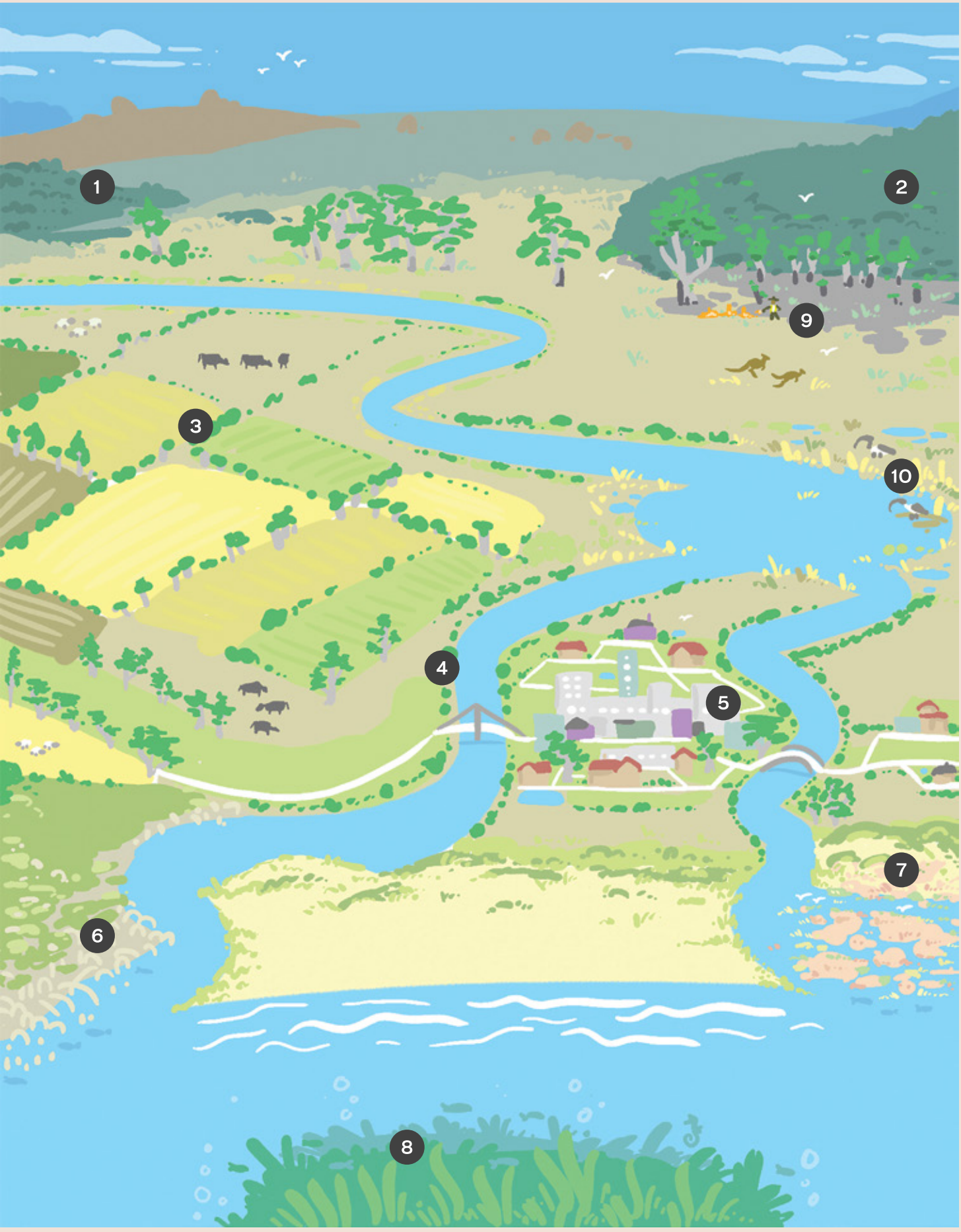

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**Table 1:** Mapped examples of natural infrastructure benefits against Australia's National Climate Risk Assessment seven identified key functional systems.

| National Climate Risk Assessment (NCRA) System | Current risk | 2050 predicted risk | Evidence of natural infrastructure's benefits to this system |
|---|---|---|---|
| **Communities – urban, regional and remote** | Moderate | Very High to Severe | • Improved social cohesion[36]<br>• Improved well being[37, 38]<br>• Strengthened First Nations cultural, social and economic outcomes[39] |
| **Defence and national security** | High | Very High to Severe | • Public infrastructure protection[40]<br>• Climate migration and social upheaval risk reduction through regional collaboration[41] |
| **Economy, trade and defence** | Moderate | Very High | • Nature-positive business opportunities A$298b/year by 2035[42]<br>• Gross Domestic Product of A$892b with moderate to high direct dependence on ecosystem services[43]<br>• A$137b revenue by 2050 from a biodiversity market in Australia[44]<br>• Agricultural resilience, and regional employment[45]<br>• Improved agricultural productivity, higher livestock margins and profit[46]<br>• 1.6 million direct jobs by 2035[47] |
| **Health and social support** | Moderate to High | Very Severe | • Reduction in premature deaths and fewer acute respiratory symptoms[48]<br>• Prevention of heat related deaths[49]<br>• Improved mental and physical health[50]<br>• Lower levels of depression and high blood pressure[51] |

36 Austrade (2024) https://www.austrade.gov.au/en/news-and-analysis/news/the-rise-of-nature-based-tourism-in-australia

37 Lin, B., Sollis, K., Flies, E.J., and Marsh, P. (2025) *Nature connection, wellbeing and pro-environmental behaviour across an urban gradient: Understanding the regional sweet spot*, 55(2):327–343. doi: 10.1007/s13280-025-02229-2.

38 Arthur Rylah Institute (accessed August 2026) *Nature-led Community Resilience Toolkit*, Victorian Government. https://www.ari.vic.gov.au/research/people-and-nature/nature-led-community-recovery

39 Such as cultural continuity, leadership and community governance, wellbeing, increased employment and training pathways, reductions in welfare dependence and alcohol-related harms, and lower incarceration rates. The Pew Charitable Trusts and Synergies Economic Consulting (2015) *Country Needs People*.

40 Cyan Ventures (2024) *Green Shoots Report: Understanding the nature-positive business opportunities for Australia.*

41 Cyan Ventures (2024) *Green Shoots Report: Understanding the nature-positive business opportunities for Australia.*

42 Cyan Ventures (2024) *Green Shoots Report: Understanding the nature-positive business opportunities for Australia.*

43 Australian Conservation Foundation (2022) *The nature-based economy: How Australia's prosperity depends on nature.*

44 Price Waterhouse Coopers (2024) *A nature-positive Australia: The value of an Australian biodiversity market.*

45 CSIRO (2023) *Enabling nature-based solutions in Australia.*

46 Heagney et al., (2026) *Natural capital enhances farm production, profitability and financial resilience: findings from a study on 230,000 ha of farmland in Australia*. Agricultural Systems (Vol. 231)

47 Cyan Ventures (2024) *Green Shoots Report: Understanding the nature-positive business opportunities for Australia.*

48 Better air quality – Trees removed 17.4 million tonnes of pollutants in 2010 (valued at US$6.8 billion), associated with >850 fewer premature deaths and ~670,000 fewer acute respiratory symptom cases (US). Nowak et al (2014) *Tree and forest effects on air quality and human health in the United States*, Environmental Pollution, V 193, 119-129, https://doi.org/10.1016/j.envpol.2014.05.028.

49 London's urban forest prevented 153 heat-related deaths between 2015–2022. Adding 10% canopy cover could reduce heat mortality by another 10%. Taylor et al. (2024) Environ. Res. Lett. 19 054004.

50 Australian adults living in neighbourhoods with at least 30% canopy were found to have lower odds of psychological distress and of fair/poor general health than those in low-canopy areas, whereas grass dominant greenspace showed little or adverse association. Astell-Burt T, Feng X. (2019) *Association of Urban Green Space With Mental Health and General Health Among Adults in Australia*. JAMA Netw Open. 2019;2(7):e198209. doi:10.1001/jamanetworkopen.2019.8209.

51 Visiting green space <30 minutes/week ~up to 7% lower population prevalence of depression & 9% lower prevalence of high blood pressure. Shanahan, D., Bush, R., Gaston, K. et al. (2016) *Health Benefits from Nature Experiences Depend on Dose*, Sci Rep 6, 28551. https://doi.org/10.1038/srep28551.

| National Climate Risk Assessment (NCRA) System | Current risk | 2050 predicted risk | Evidence of natural infrastructure's benefits to this system |
|---|---|---|---|
| **Infrastructure and the built environment** | Low to Moderate | High to Very High | • Storm and tidal surge protection[52]<br>• Storm damage mitigation from wetlands valued at A$469/ha/storm[53]<br>• Coastal property protection from mangroves, saltmarsh, and seagrasses approx A$2.6b in 2019[54] |
| **Natural environment** | High to Very High | Very Severe | • Ecosystem services[55]<br>• Carbon storage[56] |
| **Primary industries and food** | Moderate to High | High to Very High | • Coastal wetlands contribute A$35.5m/year to nearshore commercial fisheries in south-eastern Australia[57]<br>• 120.2 million tonnes of natural feed for sheep and cattle (2022-23)<br>• 10.8 million megalitres of surface water for drinking and use as a material at a value of $864 million (2022-23)<br>• 51.7 million megalitres of surface water was used as an energy source (2022-23)<br>• $463.0 million or 161,721 tonnes of fish from State-managed and Commonwealth-managed fisheries[58] |

52 Australian Bureau of Statistics (2022-23), National Ecosystem Accounts, experimental estimates, ABS Website, (accessed September 2026).

53 Mulder, O., Mulder,K., Kubiszewski, I., Anderson, S., Costanza, R., Sutton, P. (2020) *The value of coastal wetlands for storm protection in Australia*, Ecosystem Services, V46, 101205, https://doi.org/10.1016/j.ecoser.2020.101205.

54 Carnell, P.E, Reeves, S.E, Nicholson, E., Macreadie, P. Ierodiaconou, D., Young, M., Kelvin, J., Janes, H., Navarro, A., Fitzsimons, J., Gillies, C.L. (2019) *Mapping Ocean Wealth Australia: The value of coastal wetlands to people and nature*, The Nature Conservancy, Melbourne.

55 Reside, A., Welbergen, J., Phillips, B. et al. (2014) *Characteristics of Climate Change Refugia for Australian Biodiversity*, Austral Ecology 39, no. 8: 887–97, https://doi.org/10.1111/aec.12146; Tonkin, J., Siqueira, T., Merder, J. et al. (2026) *Extreme Events and River Biodiversity under Climate Change*, Nature Reviews Biodiversity 2, no. 3: 150–69, https://doi.org/10.1038/s44358-026-00131-7; Ward, M., Tulloch, A. Radford, J. et al. (2020) *Impact of 2019–2020 Mega-Fires on Australian Fauna Habitat*, Nature Ecology & Evolution 4, no. 10: 1321–26, https://doi.org/10.1038/s41559-020-1251-1; Bay, L..,Gilmour, J., Muir, B. and Hardisty, P. (2023) *Management Approaches to Conserve Australia's Marine Ecosystem under Climate Change*, Science 381, no. 6658: 631–36, https://doi.org/10.1126/science.adi3023.

56 In ecosystems of 34.6 million ktC or $59.5 billion in Grasslands, Native forests, Savannas and Mangroves; 43.2b (2021-22) Australian Bureau of Statistics (2022-23), National Ecosystem Accounts, experimental estimates, ABS Website, (accessed September 2026).

57 Carnell, P.E, Reeves, S.E, Nicholson, E., Macreadie, P. Ierodiaconou, D., Young, M., Kelvin, J., Janes, H., Navarro, A., Fitzsimons, J., Gillies, C.L. (2019) *Mapping Ocean Wealth Australia: The value of coastal wetlands to people and nature*, The Nature Conservancy, Melbourne.

58 Australian Bureau of Statistics (2022-23), National Ecosystem Accounts, experimental estimates, ABS Website, (accessed 9 September 2026).

There are hundreds of examples from across Australia which show that for modest costs, natural infrastructure can provide significant adaptation and disaster risk reduction benefits[59]. Below are four such examples.

**Case Study 1** highlights that a $4m investment by the Tasmanian state government in natural infrastructure to restore productive land and enhance flood risk reduction after a flood event in 2016, resulted in at least a $58m reduction in damage costs when a similar flooding event occurred in 2022.

CASE STUDY 1:

## GROWING FLOOD RESILIENCE ACROSS TASMANIA

**A $4m healthy waterways program saves $58m+ in flood damage**

Flooding across Tasmania in 2016 had a devastating impact - claiming 3 lives and resulting in ~$180million damage with $70m damage to the agricultural industry alone. With $4 million in funding from the Tasmanian government, Tasmania's three regional natural resource management (NRM) organisations – NRM North, NRM South, and Cradle Coast NRM – worked with agricultural landholders to co-design and deliver natural infrastructure to restore productive land and enhance risk reduction to future floods.

The primary natural infrastructure used were resilient riverbank vegetation and connected floodplains, which collectively restored the landscapes' natural capacity to resist erosion, and to manage heavy rainfall and flooding. The onground actions consisted of revegetation, weed control, floodplain restoration, wood piles and rock beaching for bank stabilisation, and fencing to keep stock away from revegetation areas.

The value of these works was validated when they were put to the test during new floods in 2022. With a similar flood footprint to 2016, damage costs to agricultural land from the 2022 floods totalled only $12.4 million, a fraction of that incurred during the 2016 floods.

There is strong community support for expanding this natural infrastructure to more areas in the catchment, with participants emphasising the need to restore whole systems to achieve the best disaster risk reduction outcomes. All participants indicated their support for the program, stating that it was cost effective and impactful for disaster risk reduction, biodiversity and agricultural production.



Flood resilience, revetment works, Inglis River, TAS. Image: NRM North.

59 See more case studies that include natural infrastructure here – The University of Melbourne, Monash University & University of Tasmania (2026), *Australian Adaptation Database* (2026), https://australianadaptationdatabase.unimelb.edu.au/

**Case Study 2** highlights how resilient riverbank vegetation along a degraded river system in south east Queensland has reduced downstream sediment loads by almost 20,000 tonnes during flood events[60] and helped reduce impacts on a $375m/year agricultural industry, the Port of Brisbane and significant ecotourism in Moreton Bay.



Laidley Creek restoration for flood resilience, Lockyer Valley region, QLD. Image: Healthy Land & Water.

CASE STUDY 2:

## RIVERBANK RESTORATION REDUCES FLOOD DAMAGE IN SOUTH EAST QUEENSLAND

**20,000 tonnes of sediment no longer entering river system, saving significant costs to local industry**

The Brisbane River is the primary water source for 3 million Australians, and flows into the Port of Brisbane and the ecologically important Quandamooka/Moreton Bay. The alluvial soils of the Brisbane River catchments generate $375 million a year in agricultural produce. However, millions of tonnes of valuable sediment have been lost during floods, discharged through the river into Moreton Bay. This negatively impacts agriculture, water quality for the greater Brisbane region, and the ecosystems of Moreton Bay and ecotourism dependent on them. To reduce further erosion and sediment discharge during floods, the regional NRM organisation Healthy Land and Water installed natural infrastructure between 2013 and 2026 along 3.8km of Laidley Creek in the Brisbane River Catchment.

This comprised resilient riverbank vegetation, implemented through revegetation, reshaping of river banks to reduce erosion, and wood piles to stabilise banks while vegetation regrows. Ongoing monitoring shows this approach has reduced flood risk of the landscape and downstream areas by reducing erosion during flood events, with an estimated annual reduction of almost 20,000t of sediment entering the catchment (Port of Brisbane). Healthy Land and Water works in partnership with the Laidley Creek community and landholders, urban utilities, the Port of Brisbane Corporation, local government, and the Queensland Government to deliver this natural infrastructure.

60 Port of Brisbane, 3 June 2026, *Catchment rehabilitation supporting healthier regional waterways*, media release, (accessed online 9 September 2026). https://www.portbris.com.au/w/catchment-rehabilitation-supporting-healthier-regional-waterways

**Case Study 3** shows how strengthening coastal dune systems in the wider Perth region will enhance coastal resilience and protect 2.4 million Australians from coastal hazards.

CASE STUDY 3:

## BUILDING COASTAL RESILIENCE IN PERTH

### Strengthening dune systems to protect 2.4 million Australians from coastal hazards

Over 80% of Western Australia's population lives within 10km of the coast and is dependent on coastal dunes for physical protection from rising sea levels, storms, surges, waves and wind.

Without dune ecosystems providing a physical barrier for coastal communities, residents risk losing access to recreational assets including beaches in the short term, and critical infrastructure including roads and utilities within 15 years.

Perth NRM is strengthening coastal dune systems as natural infrastructure that can protect communities from coastal threats.

This is done by planting native species to stabilise dunes and prevent erosion, installing matting and brushing to reduce wind erosion, sand-trap fencing to encourage sand accumulation, weed control to increase ecosystem function and resilience, dune nourishment, and conservation signage and fencing to reduce trampling. Citizen science project CoastSnap is helping to document the efficacy of the project, gathering quantitative data on dune condition and recovery following storm events.



Building coastal resilience, WA. Image: Perth NRM.

And, **Case Study 4** shows how Caring for Country through cultural burning and weed management, can reduce fire risk and enhance cultural, community and ecological resilience in regional NSW.



Assessing site for a cultural burn, NSW.
Image: NSW Local Land Services.

CASE STUDY 4:

## CARING FOR COUNTRY REDUCES BUSHFIRE RISK IN GRASSY WOODLANDS

**Reducing bushfire risk by working with Aboriginal communities to implement Cultural and Ecological Knowledge**

Without appropriate fire regimes, critically endangered White Box, Yellow Box, Blakely's Red Gum Grassy Woodlands (BGGW) accumulate high fuel loads, dominated by flammable invasive species, increasing the prevalence and severity of bushfires across landscapes. To maintain the condition of BGGW, reduce fuel loads and lower future bushfire risk, this project led by North West Local Land Services in NSW is partnering with First Nations Peoples through Local Aboriginal Land Councils to manage BGGW ecological communities with appropriate fire regimes.

The project combines cultural, community and ecological resilience, demonstrating how Caring for Country and managing ecosystems through cultural burning can reduce the threat of bushfires. It commenced in 2023, and to date has undertaken 330ha of weed management and 4ha of cultural burning, with further works scheduled in coming years.

Cultural burning and other 'cool burning' practices are known to prevent the build-up of fuel loads, and weed removal also reduces the dominance of highly flammable species. The project also delivers local and Indigenous employment, increased natural resource management skills in the community, and provides Indigenous people cultural connection and access to Country, bush tucker, fibre, medicines and tools.

The project is using ecological monitoring and cultural surveys to document the changes in vegetation and fuel load over time to understand the impact of cultural burning on reducing fuel loads, enhancing disaster risk reduction for bushfire hazards, and improving community wellbeing and resilience.

The work is funded by the Australian Government's Natural Heritage Trust.

With clear and mounting evidence on the effectiveness of natural infrastructure for climate adaptation and disaster risk reduction, the critical challenge now involves moving from evidence to policy change, investment and on-ground delivery at scale. Australia has a significant opportunity to integrate a natural infrastructure approach to strengthen Australia's landscapes, cities and communities so that they are resilient to the current and future impacts of a changing climate.

However, moving from evidence to delivery depends on sequencing as much as ambition. Nationally accepted measurement and valuation guidance, and the Australian evidence base beneath it, are the enabling actions that will allow the taxonomy, disclosure requirements, insurance pricing, cost-benefit analysis, disaster funding and nature markets to recognise natural infrastructure. An integrated, multi-disciplinary policy approach is critical.

# Navigating a path to scale natural infrastructure

## OVERVIEW

The adoption of natural infrastructure to protect people, nature and communities in Australia is hindered by barriers across planning, governance and regulation, finance and investment decision making, Indigenous stewardship, and information and adoption pathways. The following section identifies a policy and investment strategy across state and federal government in the short to medium term that could transform the role of natural infrastructure across Australian landscapes and address the adaptation gap. Many of these recommendations will not require significant new investment, but instead focus on supporting a change in how investment decisions are made.

All government portfolios are affected by climate and nature risks. Nature-based adaptation can therefore contribute to objectives across agriculture, fisheries and forestry; climate change, energy, environment and water; defence; employment and workplace relations; finance; social services; foreign affairs and trade; and health, disability and ageing. The recommendations proposed in this section are the product of the diverse expertise contributed by collaborators across multiple sectors including business, health, superannuation, insurance, construction, government, finance, investment, research, First Nations land managers, and natural resource managers. They are also informed by Australian and international research, government reviews including the Colvin and Glasson reviews and Australia's National Climate Risk Assessment, and practitioner knowledge built over decades of on-ground delivery.

## HEALTHY COUNTRY HEALTHY PEOPLE

### Where are we now?

Australia's First Nations people have practised natural resource management for more than 60,000 years, adapting to shifting climatic conditions and recognising that human flourishing stems from healthy, resilient Country. Traditional Custodians' governance and responsibilities to Country endure across all lands and waters.

Indigenous land management organisations are a significant landholder and manager across Australia, directly managing 20% of the continent, including 55% of Australia's reserve estate, and with rights and interests over 58% of the continent.[61] First Nations peoples' caring for Country, through the national Indigenous Protected Area estate, Ranger programs and wider land and sea management activities, are comparatively underfunded.[62]

Yet they have been shown to generate social, economic, cultural and environmental outcomes at 3 to 4 times the value of every dollar invested.[63]

The National Climate Risk Assessment identified seven nationally-significant climate risks to First Nations people. These cut across cultural, social, natural and economic domains, pointing to the importance of an integrated, systems-wide approach that centres Indigenous leadership, knowledge and stewardship.

61 Jacobsen R, Howell C, Read SM (2020) *Australia's Indigenous land and forest estate: separate reporting of Indigenous ownership, management and other special rights*, ABARES technical report, Canberra, doi.org/10.25814/bqr0-4m20

62 Legge, S. Murray, S. Lui, S. (2026) *How Indigenous Protected Areas Became a Vital Way to protect nature in Australia*, The Conversation, 7 September 2026. https://theconversation.com/how-indigenous-protected-areas-became-a-vital-way-to-protect-nature-in-australia-288394

63 Social Ventures Australia, (accessed online 9 Septemeber 2026), https://www.socialventures.org.au/our-impact/healthy-country-healthy-people/; and Feuerherdt, L., Peevor, S., Clinch, M., and Moore, T. (2018) *Social Return on Investment: Application for an Indigenous Rangelands Context*, The Rangeland Journal 41, no. 3: 177–83. https://doi.org/10.1071/RJ18017

### Where could we be?

Opportunities identified by First Nations people through the co-designed National Climate Risk Assessment process centred on:

- supporting First Nations leadership in managing climate adaptation and disaster risk reduction that directly impact them;
- facilitating Indigenous-led decision-making for environmental and on Country management, including Indigenous led investment and economic participation;
- combining Indigenous knowledge systems with scientific methods for holistic climate adaptation approaches for the shared benefit to the nation; and
- using integrated practices to improve ecological resilience in the face of climate change.

When First Nations co-stewardship and leadership is embedded in program design and natural resource management as the default rather than the exception, and when a voice is given to Indigenous knowledge and leadership, the largest single body of Australian natural infrastructure knowledge – caring for Country – moves from an under-funded service into the mainstream of national disaster and adaptation practice.

### How do we get there?

The actions below were co-developed with First Nations partners and informed by public policy positions developed by First Nations groups. However, as a non-Indigenous organisation, NRM Regions Australia acknowledges that policy recommendations in this area should be led by First Nations people.

| Key Actions | Resources and timeframe | Impact | Priority | Suggested lead agency/ies |
|---|---|---|---|---|
| **Increase direct operational support for Indigenous Rangers and Indigenous Protected Areas (IPAs)** that are fit-for-purpose so First Nations peoples and their organisations can meet rising costs, sustain on-Country delivery and deliver good land and sea management | $$$<br>Ongoing | ++++ | *** | Australian and State/Territory Governments |
| **Establish structured leadership opportunities at a national level** to provide a voice to protect, restore, manage and repair Country[64] | $<br>Establish and fund – 1-4 years | ++++ | **** | Australian Environment Dept and National Indigenous Australians Agency and State/ Territory agencies |
| **Embed First Nations leadership at all levels, including in policy, research priorities, disaster and climate adaptation frameworks[65]** | $<br>Ongoing – proactive, intentional action | +++++ | ** | Australian and State/Territory Governments |

KEY

*Resources:* $ (less than $2m) to $$$$$ ($1b+)
*Impact:* + (Indirect and insignificant) to +++++ (Significant, direct and systemic)
*Priority:* * (Low) to ***** (High)

64 Submission to the Australian Government (2025) https://www.commissionerforcountry.org.au/
65 CSIRO (2020) *Climate and Disaster Resilience: Technical Report.*



Rural landscape, TAS. Image: Cradle Coast NRM, Jess Bonde.

## REALISING COST-EFFECTIVE BENEFITS OF NATURAL INFRASTRUCTURE

### Where are we now?

Current government cost-benefit and accounting frameworks and climate risk economic forecasts do not fully account for long-term disaster risk, or for the benefits of natural infrastructure in supporting adaptation and mitigating disasters.

### Where could we be?

All levels of government have a role to play in providing core investment for natural infrastructure which generates public benefits. Incorporating natural infrastructure into cost-benefit analysis frameworks and embedding them within government programming and forecasting will ensure the full benefits of nature are captured in climate change risks and disaster-related costs.

Establishing national policy guidance which includes standardised indicators and methodologies applicable across project, catchment, regional, and national levels, Australia can better measure, value, and report on natural infrastructure.[66]

Guidance should be tiered so that small landholders and councils can apply a simple, minimum set of core indicators linked to material matters, while regulated entities, insurers and large public investments apply the full reporting suite linked to their portfolio's material matters.

Once a nationally accepted guidance exists for how good natural infrastructure can be measured at landscape, catchment and project scale, the Sustainable Finance Taxonomy can reference it, climate-risk disclosures can recognise it, insurers can price it, Cost-Benefit Analysis methodologies can value it, the Disaster Ready Fund can score for it and the Nature Repair Market can certify against it.

The Measuring What Matters wellbeing framework is Australia's first national wellbeing framework, and already includes a Sustainable theme and biological diversity, protected areas and air quality indicators. The framework seems a logical avenue to recognise the contribution of nature-based adaptation to national wellbeing, disaster risk reduction and climate adaptation outcomes.

66 These should build on the IUCN Global Standard for Nature-based Solutions, the System of Environmental-Economic Accounting (SEEA-EA), the Taskforce on Nature-related Financial Disclosure (TNFD) metrics architecture, and the National Adaptation Plan outcomes framework.

How do we get there?

| Key Actions | Resources and timeframe | Impact | Priority | Suggested lead agency/ies |
|---|---|---|---|---|
| **Publish national natural infrastructure policy guidance –** to drive and underpin decisions across public and private sectors | $<br>Develop and publish national guidance – 12 months | +++++ | ***** | Australian Treasury |
| **Cost Benefit Analysis (CBA) methodologies to include multi-capitals approach to financial decision making,** including embedding detailed guidance on the costs and benefits of natural infrastructure (including consequences of the loss or avoided loss), and ecosystem services | $$<br>Develop CBA framework – 6-12 months | +++++ | ***** | Australian and State/Territory Government Treasury Departments |
| **Explicitly consider natural and hybrid infrastructure in programs and procurement decisions –** government programs, agencies, infrastructure and new acquisitions could be required to demonstrate climate adaptation and disaster risk mitigation planning over the asset's full design life, including an assessment of the role of natural and hybrid infrastructure. The rule could cover both adapting existing assets and future-proofing new ones | $$<br>Update procurement guidelines – 6 months<br>Assessment across programs and assets on climate and disaster resilience, including natural infrastructure – Ongoing | ++++ | **** | Australian and State/Territory Government Finance Department |
| **Embed the role of natural infrastructure into the Measuring What Matters framework and climate economic forecasting** | $<br>Revise forecasting and framework – 1-3 years | ++++ | ***** | Australian Treasury |
| **Establish a cross-portfolio/ cross jurisdictional working group with the aim of reducing the costs of extreme events to the Australian economy –** and support the implementation of major climate adaptation and disaster risk reduction initiatives including natural infrastructure | $$<br>Charter, secretariat, reporting framework and funding developed – 6-12 months | +++ | *** | Australian Government Department of Prime Minister and Cabinet, State/Territory Governments |

## KEY

*Resources:* $ (less than $2m) to $$$$$ ($1b+)
*Impact:* + (Indirect and insignificant) to +++++ (Significant, direct and systemic)
*Priority:* * (Low) to ***** (High)

## CATALYSING PRIVATE SECTOR ACTION

### Where are we now?

Corporate climate risk disclosure frameworks do not provide a necessary vehicle to assess or evaluate the role and potential of natural infrastructure in risk reduction. Voluntary adoption of nature-related financial disclosures are nascent and uneven, the mediating role of natural infrastructure in addressing climate risk is not fully captured, and the focus on direct impacts and dependencies reduces attention to the distributed benefits of natural infrastructure across landscapes and over time.

### Where could we be?

Government policy has a role in catalysing private sector frameworks for valuing and investing in natural infrastructure, both as core business and in blended public-private action. This includes investing in frameworks and strategies that ensure financial entities and private companies (including land managers) can better recognise the opportunity and benefits of natural infrastructure protection and investment in their portfolios and business operations. Policy can also support investors, lenders, insurers, superannuation funds and private sector companies to have a consistent, comparable basis for assessing the protecting benefits of natural infrastructure, a more level playing field for acting to protect natural infrastructure, and avoiding perverse incentives that could lead to degradation of natural infrastructure.



Water quality sampling, Innisfail QLD.
Image: Terrain NRM.

How do we get there?

| Key Actions | Resources and timeframe | Impact | Priority | Suggested lead agency/ies |
|---|---|---|---|---|
| **Resource and accelerate the expansion of the Australian Sustainable Finance Taxonomy –** from mitigation to also include climate adaptation and disaster risk reduction, and embed natural infrastructure approaches | $<br>Build on the Adaptation and Resilience Taxonomy Scoping Project (running July 2026 to March 2027) | +++++ | **** | Australian Treasury |
| **Expand current Special Investment Vehicles (SIVs)[67] mandates** – to include climate adaptation and disaster risk reduction including natural and hybrid infrastructure.[68] Mandates should also value both financial performance, environmental and social benefit, and allow for a broad range of adaptation activities. SIVs could be better tasked to deliver investment into pre-commercial, adaptation technologies and materials and monitoring solutions; as well as large-scale system upgrades across water, energy, transmission, ports, and regional communities | $<br>Review and amend current SIVs mandates – 6-12 months | ++++ | **** | Australian and State/Territory Governments |
| **Develop a National Adaptation Finance Strategy[69]** – articulate the role of public, blended and private capital and explicitly embed natural infrastructure as a core class of investable adaptation activity | $<br>Co-developed by public and private sector, following taxonomy development – 6-12 months | ++++ | *** | Australian and State/Territory Governments |
| **Remove barriers to investors' capacity to address systemic risk and allow systemic investment –** facilitating investments that protect and grow natural infrastructure for climate resilience[70] | $$<br>Work with finance sector to review and amend policy settings that incentivise investment in short-term portfolio returns at the expense of long-term economic resilience and growth, including natural infrastructure – 1-3 years | +++++ | *** | Australian Treasury |

67 Such as the Clean Energy Finance Corporation, Regional Investment Corporation and the National Reconstruction Fund Corporation.

68 IGCC (2025) *Optimising Australia's Specialist Investment Vehicles for the Net Zero Journey*, Investor Group on Climate Change and Mandala.

69 Actuaries Institute, Meyricke, R., Pitt, F. & Wood, S. (2025) *Mobilising Investment For Climate Adaptation*, Actuaries Institute.

70 ClimateKIC Australia (2022) *A Pathway Towards Systemic Resilience Investment, Resilient Futures Investment Roundtable Concept Paper.*

| Key Actions | Resources and timeframe | Impact | Priority | Suggested lead agency/ies |
|---|---|---|---|---|
| **Establish mandatory nature-related financial disclosure and a national pathway for nature transition planning with resourcing for capacity-building**<br>• Define transition window with milestones<br>• Publish nature-transition-planning guidance mirroring climate standards<br>• Clarify interaction with expanded Australian Sustainable Finance Taxonomy adaptation and nature objectives<br>• Embed 'comply or explain' expectation for large entities ahead of any future mandate | $$<br>Map and publish the pathway by which Australia transitions from voluntary TNFD71-aligned reporting (the current state, with 900+ early adopter organisations globally and a growing Australian cohort) to a recognised national framework for nature-related financial disclosure – 1-3 years | +++ | *** | Australian Treasury |
| **Embed carbon and environmental markets into national adaptation policy –** the National Adaptation Plan, forthcoming adaptation investment frameworks and state adaptation planning should identify the role that carbon and environmental markets can play in catalysing and financing land-based adaptation and resilience and their role in helping mobilise private capital and adaptation | $<br>1-2 years | ++++ | *** | Australian and State/Territory Governments |
| **Develop a nationally aligned natural infrastructure co-benefit standard to support the above action including market mechanisms such as the Nature Repair Market and/or the Australian Carbon Credit Unit (ACCU) Scheme** and state and territory programs for carbon and nature investment - including developing the necessary policy and market settings that allow investment structures to fund compatible or stacked environmental outcomes, e.g resilience, adaptation, risk reduction | $<br>Develop co-benefit standard/s – 12 months | +++ | *** | Australian Government and State/ Territory Governments |

## KEY

*Resources:* $ (less than $2m) to $$$$$ ($1b+)
*Impact:* + (Indirect and insignificant) to +++++ (Significant, direct and systemic)
*Priority:* * (Low) to ***** (High)

71 Taskforce on Nature-related Financial Disclosure.



Winter burn 2025, Monash Grassland (urban natural temperate grassland remnant). Ngunnawal Conservation Trainee participants. Image: ACT NRM, Kristy Gould.

## INCREASING SUPPLY

### Where are we now?

Natural infrastructure is most effective at the landscape and catchment scale. The challenge of scale in Australia's landscape is made complex when approximately 60 per cent of Australia's land mass is privately managed, most of which is used for agriculture.[72] Suitable areas for natural infrastructure are distributed across thousands of landholders, hundreds of program touchpoints, and a wide variety of complex natural systems.

Australia has extensive capability in natural resource management, caring for Country, research and expertise in natural infrastructure. However, while aggregation at scale is needed to enable landscape and catchment-scale opportunities, the current minimal and fragmented implementation of natural infrastructure delivery in Australia means that governments, insurers and investors struggle to account for its full benefit, investment funds find it difficult to underwrite it, and natural infrastructure's full adaptation actions and disaster risk reduction potential is going unrealised.

Across Australia, planning, regulatory and governance barriers exist that hinder the scaling of natural infrastructure programs to support climate adaptation and disaster risk reduction objectives.

This includes departmental silos, incompatible funding cycles, wide-ranging metrics, plans, goals and commitments, and regulatory frameworks that drive perverse outcomes for nature.

### Where could we be?

Australia's natural aggregators already exist and can be mobilised to deliver natural infrastructure at the scales required through existing local, regional and cross-regional partnerships. Local governments provide land and coastal management across the nation, Indigenous land management organisations support the large network of Indigenous Protected Areas and ranger programs; and local and regional natural resource management and landcare organisations deliver programs across the entire continent, including coastal and marine areas.

There is huge potential to accelerate the delivery of natural infrastructure by investing in and strengthening this significant existing capability. This can be realised by providing appropriately resourced and integrated mandates with explicit disaster risk reduction and adaptation outcomes, and ensuring federal programs that are already engaging with private landholders embed natural infrastructure as a core deliverable.

72 https://www.dcceew.gov.au/environment/land/achieving-30-by-30; https://www.agriculture.gov.au/abares/products/insights/snapshot-of-australian-agriculture

How do we get there?

| Key Actions | Resources and timeframe | Impact | Priority | Suggested lead agency/ies |
|---|---|---|---|---|
| **Provide secure, enduring multi-year funding to key aggregating organisations Australia-wide –** for essential services to coordinate delivery of place-based, integrated, natural infrastructure projects | $$$<br>Build on current investment streams – Ongoing | +++++ | ***** | Australian and State/Territory Governments |
| **Reform the delivery of the Disaster Ready Fund and Disaster Recovery Funding Arrangements to support landscape-scale disaster risk reduction and climate adaptation** that deploys both traditional infrastructure and natural adaptation infrastructure as complementary classes — including hybrid solutions | $$<br>Include natural infrastructure expertise on DRF & DRFA decision making bodies<br>Include natural and cultural recovery domains in standardized assistance packages<br>Fund 'build back better' improvements in recovery, including natural infrastructure – 6-12 months | ++++ | ***** | National Emergency Management Agency |
| **Expand the scope of relevant government programs that involve natural infrastructure delivery to include disaster risk reduction and climate adaptation outcomes –** such as the Urban Rivers and Catchments Program, the Nature Repair Market, the Climate-Smart Agriculture Program, Future Drought Fund and the Regional Investment Corporation lending portfolio | $<br>Review relevant programs and embed natural infrastructure outcomes where possible – 1-5 years | +++ | **** | Australian Government Environment and Agriculture Departments<br>State/Territory Government Environment and Primary Industries Departments |
| **Develop mechanisms to strengthen the role of insurance and other risk-bearing capital in financing natural infrastructure –** including through improved risk data, recognition of risk reduction in insurance pricing (parametric) and investment in projects that reduce insured and uninsured losses | $<br>Review policy settings that relate to insurance and risk bearing capital and amend where possible – 1-2 years | ++++ | **** | Australian and State/Territory Governments |

| Key Actions | Resources and timeframe | Impact | Priority | Suggested lead agency/ies |
|---|---|---|---|---|
| **Revise perverse regulatory and permitting barriers that make it more difficult to expand natural infrastructure than grey infrastructure –** to increase policy and investment coherence related to land use and management across sectors, departments and government jurisdictions | $$<br>Cross-portfolio review of barriers – 1-2 years<br>Implementation of review recommendations – 3-5 years | +++ | *** | Australian and State/Territory Governments |
| **Protect natural infrastructure alongside life and property through disaster management arrangements** | $$<br>Embed natural values expertise in disaster management teams<br>Embed regional Emergency Preparedness and Response Plans[73] for key natural and agricultural assets in disaster management arrangements – 2-5 years | ++++ | *** | Australian and State/Territory Governments emergency services |

## KEY

*Resources:* $ (less than $2m) to $$$$$ ($1b+)
*Impact:* + (Indirect and insignificant) to +++++ (Significant, direct and systemic)
*Priority:* * (Low) to ***** (High)

73 These plans were prepared for every region in Australia in 2023-2024 and funded by the Australian Government. See https://nrmregionsaustralia.com.au/knowledge-hub/emergency-management/



Tree planting in the Daintree, QLD.
Image: Terrain NRM.

## BUILDING CAPACITY

### Where are we now?

Natural infrastructure approaches to adaptation and risk reduction currently have limited uptake in Australia partly due to critical knowledge and awareness gaps and lack of widely accepted national guidance. The Australian-informed evidence base is building but not yet cohesive, even though many examples exist of successful outcomes – see previous section. Currently most widely published performance evidence for natural infrastructure is from international contexts.

Awareness and understanding of natural infrastructure's value, design and delivery remains low, among the people who make investment, planning and risk-management decisions, such as councils, water authorities, landholders, infrastructure agencies, insurers, lenders, and agency staff.

The cumulative effect of these capacity and knowledge gaps, is that even where natural infrastructure is the most cost-effective option, the system cannot recognise, value or deliver it at the pace and scale climate change risks now require.[74]

### Where could we be?

Closing these knowledge and awareness gaps and strengthening the Australian evidence base will support scaling natural infrastructure. When practitioners and decision-makers can source technical resources and advice to help drive informed, values-based decision-making, on-ground delivery capability can be matched to the risk mitigation requirements of communities and economies across Australia. This will require a cross-sector cultural shift, particularly in those sectors that continue to invest in and rely heavily upon traditional grey infrastructure.

74 Kabisch, N. et al. (2016) *Nature-based solutions to climate change mitigation and adaptation in urban areas*, Ecol. Soc. 21; Anderson, C. C. & Renaud, F. G. (2021) *A review of public acceptance of nature-based solutions*, Ambio 50, 1552–1573; Johnson, B. A. et al. (2022) *Nature-based solutions for climate change adaptation*, Nat.-Based Solut. 2, 100042; Anderson, C. C. et al. (2021) *Public Acceptance of Nature-Based Solutions for Natural Hazard Risk Reduction*, Front. Environ. Sci. 9; Anderson, C. C. (2022) *Public acceptance of nature-based solutions,* University of Glasgow; Soini, K. et al. (2023) *Context matters: Co-creating nature-based solutions in rural living labs*, Land Use Policy 133, 106839; Apine, E. & Stojanovic, T. (2026) *Community acceptance of nature-based solutions for coastal flood risk management*, People Nat. 8, 21–36.

How do we get there?

| Key Actions | Resources and timeframe | Impact | Priority | Suggested lead agency/ies |
|---|---|---|---|---|
| **Invest in natural infrastructure peer-to-peer knowledge-exchange networks and technical advisory hubs** [75] **–** such as through local government, Engineers Australia, natural resource management organisations | $<br>Expand existing regional drought hubs or fund sector-led initiatives – 1-5 years | ++++ | ***** | National Emergency Management Agency, Future Drought Fund, Australian and State/Territory Governments |
| **Undertake nationally coordinated, climate adaptation investment planning at the local and regional scales –** centred on natural and hybrid infrastructure and identifying investment pathways for priority actions,[76] to bridge the gap between regional planning knowledge that is not yet systematically integrated into national land use modelling or decision making and investment pathways | $$$<br>Undertake planning through local and regional service providers – 2-5 years | ++++ | **** | Australian and State/Territory Governments |
| **Fund and widely promote long-term, Australian-context natural infrastructure demonstration, valuation, monitoring and learning programs –** to build confidence in their application[77] | $$-$$$<br>Grants program across Australia's principal landscape types and hazard contexts | +++ | **** | Australian and State/Territory Governments |
| **Embed natural infrastructure approaches into Australia's disaster risk reduction standards, guidance and risk tools –** such as the Australian Disaster Resilience Handbook Collection, Engineering Standards, National Climate Risk Assessment hazard methodology, and Geoscience Australia's national risk-mapping tool | $$<br>Revise national standards and resources – 1-3 years | ++++ | *** | National Emergency Management Agency, Australian Institute of Disaster Resilience, CSIRO and Geoscience Australia |

## KEY

*Resources:* $ (less than $2m) to $$$$$ ($1b+)
*Impact:* + (Indirect and insignificant) to +++++ (Significant, direct and systemic)
*Priority:* * (Low) to ***** (High)

75 The network should publish open access case-study libraries, technical notes, costed practice guides and decision-support tools – converting the long-term demonstration evidence into practitioner-ready material.

76 Asian Development Bank (2021) *Climate Adaptation Investment Planning: A Program to Bridge the Gap between Climate Adaptation Planning and Financing*.

77 The discussion paper Nature positive disaster risk reduction solutions (NPDRRS) prepared by Suncorp and Natural Hazards Research Australia in December 2024 includes an actionable idea to 'Undertake pilot studies to build confidence in, and efficacy of, NPDRRS" to provide learnings and facilitate public-private partnerships.'



Glossy black cockatoo chick, SA.
Image: Kangaroo Island Landscape Board.

## IN AUSTRALIA EVERY $1 INVESTED

*in natural capital brings at least $9.3 in benefits – with the highest returns occuring for the restoration of degraded agricultural land and ecosystems ($31.5 for every $1 invested).*

# Glossary of terms

### Carbon sequestration

A natural or artificial process by which carbon dioxide is removed from the atmosphere and held in solid or liquid form.

### Climate adaptation

The process of adjusting to current or anticipated climate change and its impacts. Adaptation seeks to moderate harm and exploit beneficial opportunities. It includes a wide range of actions, from infrastructure changes to landscape management, policy reform and behaviour change.

### Climate resilience

The capacity of social, economic and ecological systems to cope with a hazardous event, trend or disturbance, responding or reorganising in ways that maintain their essential functions while also supporting human wellbeing.

### Co-benefits

Secondary positive outcomes generated by an action whose primary purpose is different. In the context of NbS, co-benefits from disaster risk reduction investments may include biodiversity recovery, carbon sequestration, improved water quality, public health improvements, and economic and cultural benefits for communities.

### Disaster and adaptation funding

Government expenditure directed at all phases of the disaster management cycle: preparedness, response, recovery and mitigation. In Australia, disaster and adaptation funding is delivered through a combination of Commonwealth and state and territory governments via mechanisms including the jointly-funded Disaster Recovery Funding Arrangements (DRFA), which reimburse states/territories for eligible disaster costs, and the Disaster Ready Fund (DRF), which is directed toward risk reduction and resilience investments ahead of disasters occurring. These funding arrangements are currently being reviewed. The DRF along with the Future Drought Fund are also considered to be the key sources of funding for climate adaptation nationally.

### Disaster risk reduction

The policy objective and practice of preventing new disaster risk, reducing existing disaster risk and managing residual risk, in order to strengthen resilience and reduce disaster losses. It encompasses structural measures (e.g. flood levees, sea walls) and non-structural measures (e.g. land-use planning, early warning systems, and nature-based solutions).

### Ecosystem services

The benefits that people obtain from ecosystems. These include provisioning services (food, water, timber), regulating services (flood control, climate regulation, water purification), cultural services (recreation, spiritual values) and supporting services (soil formation, nutrient cycling).

### Ecological restoration

Ecological restoration is the process of assisting the recovery of an ecosystem that has been degraded, damaged or destroyed -restoring it to as close to the natural or native reference ecosystem. It often includes or requires science and evidence-based actions and outcomes of the restoration process.

### Natural or 'green' infrastructure

Actions that protect, sustainably manage and restore natural or modified ecosystems, to address societal challenges effectively and adaptively.[78]

### 'Grey' infrastructure

Conventional engineered infrastructure used to manage natural hazards or deliver essential services, such as concrete flood walls, stormwater pipes, sea walls, detention basins and drainage canals. Grey infrastructure typically addresses a single function, whereas green or hybrid infrastructure can deliver multiple benefits simultaneously.

78 Conservation International (viewed August 2026) *Green-Gray Infrastructure Community of Practice* – https://www.conservation.org/projects/green-gray-infrastructure

### Landscape scale / Catchment scale

Refers to nature-based adaptation interventions planned and delivered across an entire catchment, region or ecosystem, rather than at a single project or property scale. Landscape-scale approaches are generally more effective for disaster risk reduction because natural systems function at scale – a restored upstream floodplain reduces downstream flood peaks across an entire catchment.

### Nature-based adaptation

The application of nature-based solutions specifically to address climate adaptation and disaster risk reduction objectives. Nature-based adaptation interventions include riverbank and wetland restoration for flood protection, coastal revegetation to reduce storm inundation, fire-resistant native plantings in fire-prone landscapes, urban canopy for heat reduction, and cultural fire management. Used interchangeably in this paper with 'NbS for climate and disaster resilience'.

### Nature-based Solutions

Actions to protect, sustainably manage and restore natural or modified ecosystems, which address societal challenges (e.g. climate change, food and water security or natural disasters) effectively and adaptively, while simultaneously providing human well-being and biodiversity benefits.

### Nature repair

Similar to ecological restoration. Actions that assist the recovery of degraded, damaged or destroyed ecosystems. Restoration supports the risk reduction of ecosystems and the communities that depend on them, and is a key mechanism for delivering nature-based adaptation at scale.

### Procurement

Procurement encompasses the whole process of buying goods and services. It begins when a need is identified, and a decision is made to buy to meet this need. Procurement often includes a processes of risk assessment, seeking and evaluating alternative solutions, and the awarding of a contract.

### Special Investment Vehicles (SIVs)

A dedicated financing mechanism, typically established by THE government, to mobilise public and private capital toward defined investment objectives. Examples in Australia include the Clean Energy Finance Corporation (CEFC) and the National Reconstruction Fund. SIVs can de-risk investments through concessional finance, co-investment, guarantees or equity participation.

### Sustainable Finance Taxonomy

A classification system that defines which economic activities can be considered environmentally sustainable. Australia's Sustainable Finance Taxonomy[79] is intended to help investors, lenders and companies identify and disclose sustainable investment activities, including climate mitigation and – when expanded -climate adaptation and nature-based solutions.

79 https://www.asfi.org.au/australian-taxonomy

# Further reading


- Agile Initiative (2023) *Scaling up nature-based solutions in England's National Climate Change Adaptation Programme.*
- The Aotearoa Circle (2026) *Natural Infrastructure Plan: Embedding, maintaining and enhancing natural infrastructure to achieve economic prosperity for Aotearoa New Zealand.*
- The Aotearoa Circle (2026) *Natural Infrastructure Plan – Policy Map.*
- Climate Change Authority (2025) *Home safe: National leadership in adapting to a changing climate*, Commonwealth of Australia.
- Actuaries Institute, Meyricke, R., Pitt, F. & Wood, S. (2025) *Mobilising Investment For Climate Adaptation*, Actuaries Institute.
- Insurance Council of Australia (2023) *Valuing Nature for a Resilient Future.*
- Bowles, D., Smith, W., Gaukroger, C. and Sollis, K. (2025) *Avoidable Costs Better Outcomes and Better Value for Public Money*, Centre for Policy Development.
- Committee for Sydney (2025) *Nature's resilience dividend: How nature can strengthen Sydney's flood and coastal hazard resilience.*
- NESP Climate Systems Hub (2024) *Workshop Report: 2024 National First Peoples Gathering on Climate Change.*
- *Wentworth Group of Scientists (2024) Blueprint to Repair Australia's Landscapes.*
- *Wentworth Group of Scientists (2025) Addendum to the Blueprint to Repair Australia's Landscapes.*




Desert channels, QLD. A view from Deons Lookout, Birdsville. Image: Lorraine Kath.

APPENDIX 1:

# Overview of natural infrastructure approaches

^Hazards are taken from the ten priority climate hazards identified in Australia's National Climate Risk Assessment (2025)



RIVERINE AND FLASH FLOODING



CHANGES IN TEMPERATURE, INCLUDING EXTREMES



DROUGHT AND CHANGES IN ARIDITY



BUSHFIRES, GRASSFIRES, AND AIR POLLUTION



COASTAL AND ESTUARINE FLOODING



COASTAL EROSION AND SHORELINE CHANGE

Coastal revegetation, Bennion Beach, Perth WA. Image: Perth NRM.

| Natural Infrastructure | Actions used to deliver natural infrastructure | Hazards^ addressed | Disaster risk reduction benefits (direct and indirect) | Implementation |
|---|---|---|---|---|
| **Resilient native vegetation**<br><br>Locally appropriate native vegetation, across the right scale, position, and shape to address a particular disaster risk reduction goal.<br><br>This can include:<br>• Widespread vegetation in a catchment<br>• Vegetation along watercourses<br>• Urban greening<br>• Shelterbelts<br>• Living firebreaks | • Protect existing vegetation<br>• Plant vegetation<br>• Manage weeds<br>• Exclude stock<br>• Manage with appropriate fire<br>• Natural regeneration |  | • Increases water infiltration to reduce runoff, lower flood heights and prevent erosion<br>• Improves water quality<br>• Less erosion reduces flood impact and helps faster recovery | • Around watercourses, e.g. riverbank plantings<br>• Some benefits from whole-of catchment vegetation |
| | |  | • Reduces temperature in surrounding areas<br>• Reduces evaporation of water<br>• Provides shelter for humans, stock, and infrastructure | • Especially beneficial as large trees and/ or complex multistorey vegetation |
| | |  | • Increases water infiltration and reduces evaporation to keep water in the environment<br>• Reduces temperature in surrounding areas and provides shelter for humans, stock, and infrastructure | • Groundcover vegetation, large trees and/ or complex multistory vegetation |
| | |  | • When planted and managed in appropriate ways, slows or stops the spread of fire to protect communities, infrastructure, and other assets | • Tailored fire-wise design to suit landscape, range of conditions and assets to be protected; may include combination of shelterbelts, water retention approaches and fire-resistant vegetation |

| Natural Infrastructure | Actions used to deliver natural infrastructure | Hazards^ addressed | Disaster risk reduction benefits (direct and indirect) | Implementation |
|---|---|---|---|---|
| **Connected and resilient floodplains and wetlands**<br><br>Floodplains and wetlands that are connected to the broader system of waterways.<br><br>This can include floodplains (FP) and wetlands (WL) on both riverine and coastal systems. | • Protect existing FP & WL<br>• Reconnect FP & WL by removing barriers to water movement<br>• In-stream works to add structural complexity<br>• Plant vegetation<br>• Exclude stock<br>• Weed removal<br>• Natural regeneration | <br> | • Stores and absorbs excess water, and helps to filter water that passes through. This can contribute to lower flood heights and improved water quality, which reduces overall impacts and helps in faster recovery | • Connect floodplains and wetlands, introduce structural complexity to slow and manage streamflow |
| | |  | • Increases water infiltration to keep water in the environment. This may delay the onset of negative impacts of drought and aridity, and also help faster recovery | • Maintain or restore porous areas; manage vegetation to support infiltration |
| | |  | • Can provide cooling and fire risk reduction benefits | • Especially as wetlands in urban and peri-urban stream management, and/or as permanent wet areas in regional landscapes |

| Natural Infrastructure | Actions used to deliver natural infrastructure | Hazards^ addressed | Disaster risk reduction benefits (direct and indirect) | Implementation |
|---|---|---|---|---|
| **Resilient coastal ecosystems**<br><br>Locally appropriate dune vegetation, mangroves, seagrass, saltmarsh, and reefs. | • Protect existing ecosystems<br>• Plant vegetation<br>• Manage weeds<br>• Restore reefs<br>• Manage invasive species |  | • Dissipates wave energy<br>• Can provide a physical barrier between waves or seawater and communities or assets<br>• Stabilises sand and sediment. This prevents erosion and reduces sea level intrusion, which minimises direct damage to infrastructure and communities, and can help to speed up recovery efforts | • Design in highly exposed areas benefits from modelled analysis and design according to local conditions, e.g. tidal and wave dynamics. |
| **Cultural Fire**<br><br>Fire regimes guided by local Traditional Knowledge. | First Nations people manage fire regimes in the area for healthy Country and other values |  | • Reduced fuel load appropriate to that Country and typically mosaic vegetation structure contributes to a reduced risk of catastrophic wildfire | • Led by Traditional Custodians under appropriate cultural authority |
| **Ecological fire**<br><br>Fire regimes informed by needs and requirements of local biodiversity. | Fire is applied to the landscape in a way that is beneficial for local biodiversity. |  | • Reduced fuel load and managed vegetation structure appropriate to ecosystems contributes to a reduced risk of catastrophic wildfire | • Can occur at various scales from property to region, and may be led by landholders, non-government organisations, fire services, and others |

APPENDIX 2:

# Global momentum in natural infrastructure policy and frameworks

The following table is a snapshot of how natural infrastructure for adaptation is being deployed internationally.[80]

| Jurisdiction | Policy / Plan (Year) | Type | Focus | Brief Description |
|---|---|---|---|---|
| **New Zealand (NZ)** | National Adaptation Plan[81] | National Plan | Climate adaptation | NZ's first climate adaptation plan includes two key natural infrastructure principles: (9) work with nature and (10) adopt local place-based solutions. Objectives include to work with nature to build risk reduction and adopt climate resilience across all government strategies and policies. Measures include ecosystem-based adaptation such as wetland restoration and using natural infrastructure for flood management. |
| **United Kingdom (UK)** | Environmental Improvement Plan (2025)[82] | National Strategy (Statutory Plan) | Biodiversity, water, climate resilience | A 25-year environment plan that reframes nature recovery as essential to economic security, climate resilience, cleaner water and public health. It sets targets for restoring peatlands and woodlands and commits £10.5 billion in flood defences, including natural infrastructure like woodland planting and wetland restoration that can restore habitats, improve water quality, and store carbon. |
| **United Kingdom (UK)** | Green Infrastructure Framework (2022)[83] | National Standard | Climate adaptation and risk reduction | The Green Infrastructure Framework's standards define what good natural infrastructure 'looks like' for local planners, developers, parks and greenspace managers and communities, and how to plan it strategically to deliver multiple benefits for people and nature. When used together, these standards help stakeholders to deliver the Green Infrastructure Framework's principles and enable multiple benefits from good green infrastructure provision. |

80 Nature4Climate NbS Policy Tracker – https://nature4climate.org/nbs-policy-tracker-series/

81 Ministry for the Environment (2022) *Aotearoa New Zealand's first national adaptation plan*, Wellington, Ministry for the Environment, New Zealand Government. https://environment.govt.nz/assets/publications/MFE-AoG-20664-GF-National-Adaptation-Plan-2022-WEB.pdf

82 Department for Environment, Food and Rural Affairs (2025) *Environment Improvement Plan*, United Kingdom Government. www.gov.uk/government/publications/environmental-improvement-plan-2025/environmental-improvement-plan-eip-2025#structure-of-the-environmental-improvement-plan

83 Natural Englnd (2026) *Green Infrastructure Framework*, online https://designatedsites.naturalengland.org.uk/GreenInfrastructure/StrategyStandard.aspx

| Jurisdiction | Policy / Plan (Year) | Type | Focus | Brief Description |
|---|---|---|---|---|
| **Scotland, United Kingdom (UK)** | National Planning Framework 4 (NFP4) (2023)[84] | Planning Framework (Regulation) | Land-use, climate mitigation & adaptation, biodiversity | Scotland's statutory spatial plan integrates climate and nature objectives. It states: planning must invest in nature-based solutions to mitigate climate change while addressing biodiversity loss. NPF4 requires local plans to create nature networks and promote green infrastructure (e.g. woodlands, peatland restoration) for carbon sequestration, flood control and health co-benefits. |
| **European Union (EU)** | European Union Nature Restoration Law (2023)[85] | Legislation (Regulation) | Ecosystem restoration (mitigation & disaster risk reduction) | EU-wide law setting legally binding targets to restore degraded ecosystems. It requires Member States to restore at least 20% of EU land and sea by 2030 (ultimately all ecosystems in need by 2050). The law sets binding targets to restore degraded ecosystems *"in particular those with the most potential to capture and store carbon and to prevent and reduce the impact of natural disasters."* |
| **European Union (EU)** | European Union Adaptation Strategy (2021)[86] | Policy Strategy | Climate adaptation & disaster risk reduction | The EU's climate adaptation strategy encourages large-scale use of green infrastructure (restoring wetlands, rivers, urban greening, etc.) as cost-effective measures that provide co-benefits for climate adaptation, flood control and biodiversity. |

84 Scottish Government (2023) *National Planning Framework 4*. www.gov.scot/publications/national-planning-framework-4/

85 Regulation (EU) 2024/1991 of the European Parliament and of the Council of 24 June 2024 on nature restoration and amending Regulation (EU) 2022/869, https://environment.ec.europa.eu/topics/nature-and-biodiversity/nature-restoration-regulation_en

86 Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee for the Regions (2021) *Forging a climate-resilient Europe – the new EU Strategy on Adaptation to Climate Change*, COM/2021/82 final. https://climate-adapt.eea.europa.eu/en/eu-adaptation-policy/strategy

| Jurisdiction | Policy / Plan (Year) | Type | Focus | Brief Description |
|---|---|---|---|---|
| **Canada** | National Adaptation Strategy (2022)[87] | National Strategy | Climate adaptation | Canada's first national adaptation plan – ''Building Resilient Communities and a Strong Economy' – highlights scaling up nature-based solutions. It sets an outcome that *"the use of nature-based solutions is accelerated to increase resilience and maximise co-benefits – reducing stress on grey infrastructure, providing social benefits, and aiding climate change mitigation"*. |
| **Canada** | Natural Climate Solutions Fund (2021)[88] | Investment Program | Climate mitigation (with co-benefits) | A 10-year, $5 billion federal initiative (2021–2031) to combat climate change and biodiversity loss. It includes the Nature Smart Climate Solutions Fund, aiming to protect, restore and better manage forests, wetlands, grasslands and peatlands. |
| **California (USA)** | Natural and Working Lands Climate Smart Strategy (2022)[89] | Sub-national strategy<br><br>(Legislated) | Climate mitigation & adaptation | California's first comprehensive nature-based climate strategy for land use. Launched under Executive Order N-82-20, which also set a 30x30 conservation target. It underscores the role of natural and working lands in achieving carbon neutrality and climate resilience. It identifies priority nature-based solutions to deliver climate benefits across all of California's diverse landscapes and guides State programs and $9+ billion of investments toward carbon sequestration, ecosystem restoration and wildfire and flood risk reduction. |

87 Government of Canada (2022) *Canada's National Adaptation Strategy Building Resilient Communities and a Strong Economy*, His Majesty the King in Right of Canada, represented by the Minister of Environment and Climate Change. www.canada.ca/en/services/environment/weather/climatechange/climate-plan/national-adaptation-strategy/full-strategy.html

88 Government of Canada (2021) *Nature Smart Climate Solutions Fund*, sourced online August 2026 www.canada.ca/en/environment-climate-change/services/environmental-funding/programs/nature-smart-climate-solutions-fund.html

89 State of California (2022) *Natural and Working Lands Climate Smart Strategy* https://resources.ca.gov/initiatives/expanding-nature-based-solutions

| Jurisdiction | Policy / Plan (Year) | Type | Focus | Brief Description |
|---|---|---|---|---|
| **California (USA)** | California's nature-based solutions climate targets (2022)[90] | ASSEMBLY BILL 1757<br>Legislation | Climate risk, biodiversity loss, mitigation | These targets establish quantitative goals for the most effective evidenced-based nature-based solutions that increase resilience on lands and support durable and sustainable carbon stocks. The targets include wildfire risk reductions, urban greening, and grassland restoration. |
| **California (USA)** | California and Australia signed a Memorandum of Understanding (MOU)[91] | MOU | Climate risk, mitigation, adaptation | California has signed multiple MOU. The statement with Australia acknowledges both signatories recognise the importance of nature-based solutions and Climate-Smart land management in climate mitigation and resilience and commit to promote the development of climate and disaster resilience through addressing common challenges in climate change adaptation and mitigation. |
| **North Carolina (USA)** | Natural and Working Lands plan[92] | Policy/ Framework | Climate risk reduction, resilience and mitigation | North Carolina's Natural and Working Lands Action Plan is *"Building North Carolina's Green Infrastructure"*. Developed in 2020, as an appendix of North Carolina's resilience plan, it provides data and mapping, as well as a collaborative framework for action, for managing natural and working lands to enhance community resilience, reduce and avoid greenhouse gas emissions, promote carbon storage, and provide other ecological benefits. Covers six primary sectors: Agriculture, Coastal Habitats, Floodplains and Wetlands, Forestry, Pocosins, and Urban Lands. |

90 State of California (2022) *Nature-based solutions climate targets* https://resources.ca.gov/-/media/CNRA-Website/Files/Initiatives/Expanding-Nature-Based-Solutions/Californias-NBS-Climate-Targets-2024.pdf

91 Australia and California MoU: https://www.gov.ca.gov/2023/08/15/governor-newsom-announces-new-climate-partnership-with-australia/

92 State of North Carolina (2020) *Natural and Working Lands plan.* https://www.dncr.nc.gov/explore/nature-science/natural-and-working-lands



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