



**Sustainable
Communities
and Waste**

National Environmental Science Program



**Nature-based Solutions
in Australia –
applications and
opportunities to deliver
real outcomes for
communities and nature**

**Sustainable People–Environment
Interactions theme**



Acknowledgements

Acknowledgement of Country

We acknowledge the Traditional Owners of Country throughout Australia and their continuing connection to land, sea and community. We pay our respects to them and their cultures and to their elders both past and present. We are committed to working respectfully with Aboriginal and Torres Strait Islander peoples and give particular acknowledgement to their use, knowledge and custodianship of Australia's native plants and animals over countless generations.

We support Aboriginal and Torres Strait Islander peoples and their aspirations to maintain, protect and manage their culture, language, land and sea Country and heritage.

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Executive Summary

Nature-based Solutions (NbS) are place-based interventions designed to overcome complex social and environmental challenges at the appropriate scale through the protection, management and restoration of nature. They are intended to support the achievement of society's development goals, while safeguarding human well-being through the protection, maintenance, and enhancement of ecosystem services in ways that benefit biodiversity and human wellbeing. The concept of NbS arose from ecosystem-based approaches to environmental planning and were formalised into a standard by IUCN in 2020. Following a period of deliberation over definitions and the use of the term, the UN General Assembly adopted a definition of NbS in 2022. The key features of NbS that differentiate it from other ecosystem-based approaches include: NbS can be implemented alone or in an integrated manner with other approaches; NbS can be applied at a landscape scale; NbS are integral to addressing societal challenges such as climate adaptation, environmental degradation, food security and human health and wellbeing; and NbS deliver outcomes for both biodiversity and human wellbeing. The IUCN Standard for NbS outlines eight criteria and associated indicators providing a rigorous framework for its application and verification.

Internationally, NbS are being used to inform global and national policy-making on a range of issues, notably climate change adaptation, climate related disaster reduction and biodiversity conservation. Considering its overarching goal to address global societal challenges, NbS have the potential to substantially contribute to the 2030 Agenda for Sustainable Development and the 2030 Global Biodiversity Framework (targets 8 and 11 in particular). The role of Indigenous People and Local Communities in co-design is an essential component for success of NbS projects.

In an Australian context, NbS provide a holistic approach to integrated conservation and development planning across agencies and sectors. Several Australian Government policies and programs have already adopted NbS, including Australia's Strategy for Nature 2019-2030, the Nature Positive Plan (and Nature Repair Market), National Landcare Program, National Reserve System, and the National Climate Resilience and Adaptation Strategy 2021 – 2025. There is further opportunity for incorporating NbS approaches in Powering Australia, Emission Reduction Incentive programs, various Transport strategies and policies and the National Preventive Health Strategy 2021–2030.

Several challenges to implementation of NbS have been identified in the literature and through consultation with practitioners. These are likely to also apply in Australia and include:

- Awareness and shared understanding of NbS – there have been competing definitions and there is no clear policy guidance
- Cross-sectoral expertise is critical to successful NbS and requires new collaborations
- Existing governance mechanisms across and between jurisdictions and across different sectors impact on delivering landscape-scale projects
- Access to long term sustainable funding is limited
- Greenwashing where use of NbS as offsets rather than taking direct action to reduce emissions or biodiversity loss is a risk and may lead to perverse outcomes

Australia's Nature Positive Plan (DCCEEW 2022) states that *“we must shift our thinking and amend our laws to promote climate and environment-friendly development and **nature-based solutions** to protect, restore and manage our most precious habitats, places and*

species". However, the NbS concept has largely been developed in a very different biodiversity context to Australia. Fundamental to reaping the benefits that will flow to Australian communities and our unique biodiversity from the effective use of NbS at scale is a need to take a place-based and integrative approach to the operation, governance and delivery of NbS programs. We propose three key strategies for the successful implementation of NbS at scale in Australia:

- **Measure what matters** – National success is often measured through Gross Domestic Profit which can result in perverse outcomes for nature and human wellbeing. Shifting focus to creating benefits for people and nature will lead to more sustainable outcomes and support greater investment in and uptake of NbS.
- **Connect to nature, particularly in urban areas** – Connecting with nature has benefits for human wellbeing and can support environmental behaviours. But Australia is one of the most urbanised countries in the world, and urban areas often leave little space for natural environments which can lead to disconnection with nature. NbS approaches in cities can simultaneously contribute to greening, connection, and biodiversity.
- **Take an integrative and collaborative approach** - governments at all levels and across sectors work in silos and as a result very rarely apply a systems-thinking lens to addressing societal, biodiversity and climate related challenges. NbS requires a whole of government approach and genuine collaboration across sectors. Australia's unique Aboriginal and Torres Strait Islander cultures provide an enduring foundation for nature-related policy and programs and must be front and centre in any NbS implementation and governance in Australia.

This report, prepared for the Department of Climate Change, Energy, the Environment and Water (DCCEEW) provides an analysis of the global context and the application of NbS in Australian Government environmental policy, investigated through the lens of Australia's Strategy for Nature 2019 – 2030. This strategy represents Australia's commitment under the Convention on Biological Diversity to sustainably manage nature to 2030 and is currently under revision to incorporate the new 2030 Global Biodiversity Framework targets. We look at each of the three goals of the strategy and consider how they relate to NbS, and how NbS can be used as an effective tool towards addressing the 2030 targets.

We suggest that the key role of the Australian Government in the application of NbS should be through providing holistic and integrated policy direction and thought leadership, promotion of research, and demonstration of the concept, particularly through the National Landcare Program, Powering Australia, the National Reserve System, and implementation of the Nature Positive Plan and the National Preventive Health Strategy 2021–2030.

It is recommended that a national policy statement and strategy be developed to frame NbS within an Australian context and to support integrated delivery at scale and a national research and knowledge hub be established to promote the application of NbS. In addition, we recommend that the Australian Government explicitly support the adoption of NbS for place-based interventions within their own remit, for example on Commonwealth land as demonstrations to encourage other jurisdictions and investors.

To maximise their real value to Australia, NbS should be incorporated into the Measuring what Matters process currently underway within Treasury to ensure the national wellbeing framework being developed recognises that a healthy environment underpins a healthy economy and society. This requires engagement with departments beyond DCCEEW and would benefit from leadership from the Prime Minister's office.



Infographic executive summary of Nature-based Solutions in Australia – applications and opportunities to deliver real outcomes for communities and nature report.

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Introduction

This report provides an overview of Nature-based Solutions (NbS) and their characteristics and how this is being applied in Australia, specifically through Australian government environment and climate policies and programs and where there are opportunities to strengthen or leverage improved outcomes. It has been undertaken by applying a brief analysis of how NbS has developed internationally and is currently included within Australia's Strategy for Nature 2019 – 2030. We then draw conclusions and make recommendations about the potential to engage more explicitly with NbS in Australian Government policies and beyond - acknowledging this is a rapidly changing landscape.

The origin, application and ongoing evolution of the NbS concept

Nature-based Solutions (NbS) are an approach to integrated conservation and development planning intended to support the achievement of society's development goals and safeguard and benefit human well-being and biodiversity through the protection, maintenance, and enhancement of ecosystem services (e.g., Cohen-Shacham et al., 2016, 2019). NbS provide opportunities to influence almost every aspect of activity in the environment, natural resource management, infrastructure development, extractive industries, transport and health sectors, as well as in many other areas of economic activity.

The Fifth Session of the United Nations Environment Assembly (UNEA-5) made a resolution to adopt a multilaterally agreed definition of NbS; recognising the important role this approach plays in the global response to climate change and its social, economic and environmental effects. The UNEA Resolution March 2022 is the first agreed definition of NbS within the United Nations (UN) Multilateral System and was adopted by the UN General Assembly in September 2022 (see Box 1).

Development of the NbS concept and Standard by IUCN continued in 2022, including work to refine the 8 Criteria for NbS, develop training and accreditation programs, and the exploration of certification systems for NbS projects. A major international conference on NbS was hosted by Oxford University in 2022 and a scientific journal dedicated to NbS ("Nature-based Solutions") was launched in late 2021.

Box 1. UNEA-5 Resolution on NbS adopted by the United Nations Environment Assembly on 2 March 2022¹

The UNEA -5 resolution notes that NbS are:

Are among the actions that play an essential role in the overall global effort to achieve the Sustainable Development Goals, including by effectively and efficiently addressing major social, economic and environmental challenges, such as biodiversity loss, climate change, land degradation, desertification, food security, disaster risks, urban development, water availability, poverty eradication, inequality and unemployment, as well as social development, sustainable economic development, human health and a broad range of ecosystem services.

The UNEA -5 resolution defined NbS as:

Nature-based solutions are actions to protect, conserve, restore, sustainably use and manage natural or modified terrestrial, freshwater, coastal and marine ecosystems which address social, economic and environmental challenges effectively and adaptively, while simultaneously providing human well-being, ecosystem services, resilience and biodiversity benefits.....

NbS are based on an ecosystem approach

NbS use an ecosystem approach and are intended to complement, supplement or replace purely technological and engineering approaches to overcoming societal challenges in a cost-effective way over the long-term. NbS can mediate the negative impacts of technological and engineering approaches. The ecosystem approach that underpins NbS means that they are different from, but often complementary to, Nature-derived (i.e., wind turbines and solar panels) or Nature-inspired Solutions (i.e., using concepts from nature in product design).

NbS has evolved from ongoing application and development of ecosystem-based approaches to sustainable development and conservation of nature, particularly the Ecosystem-based Approach to Climate Change Adaptation (EbA) (Cohen-Shacham et al., 2016). NbS is therefore best considered an umbrella concept that covers a range of different approaches rather than being qualitatively different to existing ecosystem-based approaches.

NbS generate biodiversity benefits

NbS are explicitly designed to generate a net gain for biodiversity as well as addressing specific societal challenges – recognising that human wellbeing and biodiversity gains can be achieved jointly. The need for biodiversity benefits is made clear both in the UNEA definition (see Box 1 above) and in the IUCN Standard for NbS (IUCN 2020a). The need for explicit recognition of biodiversity benefits in nature-based policy and programs is becoming more widely understood in response to large scale initiatives such as carbon tree planting

¹ Refer <https://wedocs.unep.org/bitstream/handle/20.500.11822/39864/NATURE-BASED%20SOLUTIONS%20FOR%20SUPPORTING%20SUSTAINABLE%20DEVELOPMENT.%20English.pdf?sequence=1&isAllowed=y>

that can be detrimental for biodiversity when monoculture and/or invasive species are used (The Declaration Drafting Committee, 2022).

Core principles and standard for NbS

In 2020, the International Union for the Conservation of Nature (IUCN) Council approved the Global Standard for Nature-based Solutions (IUCN 2020a&b) which contains eight criteria and 28 indicators of the criteria, to aid the successful design, application and verification of the NbS concept (Figure 1). The criteria for effective NbS are 1) NbS effectively address societal challenges, 2) Design of NbS is informed by scale, 3) NbS result in a net gain to biodiversity and ecosystem integrity, 4) NbS are economically viable, 5) NbS are based on inclusive, transparent and empowering governance processes, 6) NbS equitably balance trade-offs between achievement of their primary goal(s) and the continued provision of multiple benefits, 7) NbS are managed adaptively, based on evidence, and 8) NbS are sustainable and mainstreamed within an appropriate jurisdictional context.

Appendix 1 shows the eight criteria for the IUCN NbS. These criteria and their associated indicators are used to develop and evaluate the extent to which a particular intervention or action can be considered an NbS. A self-assessment tool is under development by IUCN to quantify this measurement.

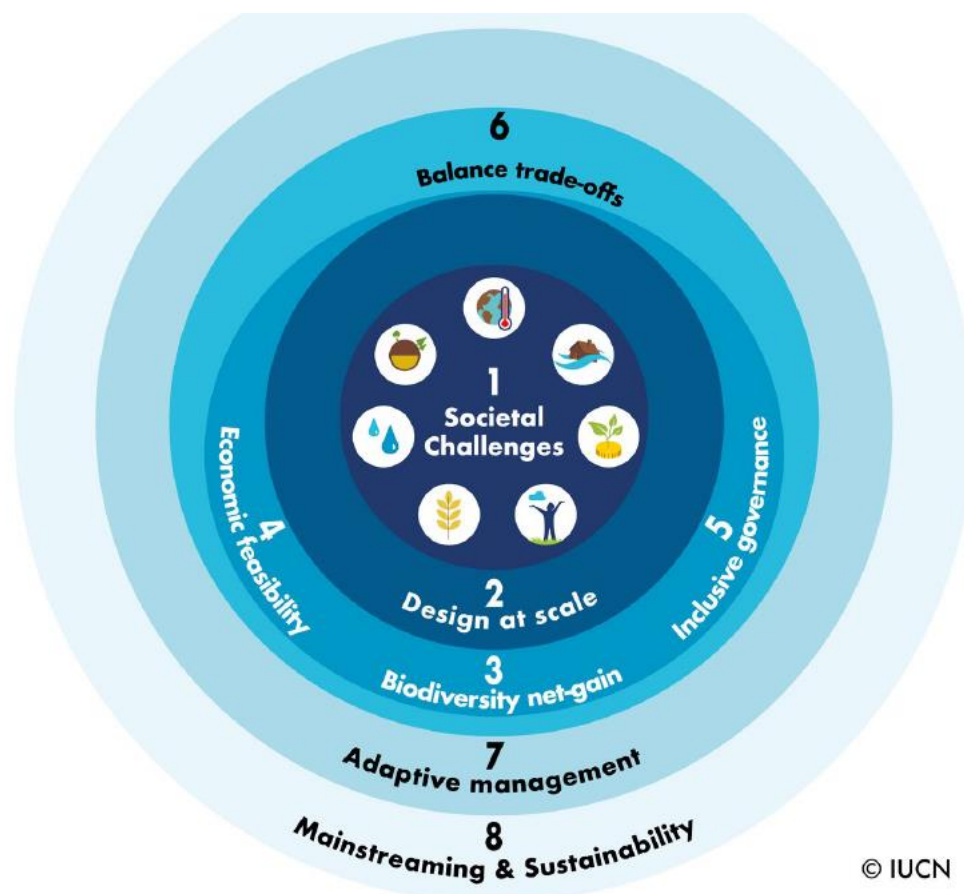


Figure 1. The IUCN NbS criteria and their inter-relationship. Source: Figure 2 IUCN Criteria and indicators provide a framework for designing high quality NbS, based on self-assessment (IUCN 2020b).

Relation to other terms and concepts

Several other terms (e.g., such as Green Infrastructure or Natural Infrastructure) can also fall within the framework of NbS and Seddon et al. (2021) provides a comprehensive assessment of different approaches that can be framed as NbS and Zhu et al. (2023) summarise the terms and approaches used in the Australian academic literature. It is important to note that not every environmental action is or needs to be considered as an NbS and other ecosystem-based approaches continue to be widely used. Cohen-Shacham et al., (2019) considered the development and characteristics of NbS in relation to other ecosystem-based approaches, providing five categories that nest under NbS (see conceptual representation in Figure 2):

- Restoration (Ecological restoration, Forest landscape restoration, Ecological engineering)
- Issue-specific (Ecosystem-based adaptation; Ecosystem-based mitigation; Ecosystem-based disaster risk reduction; Climate adaptation services)
- Infrastructure (Natural infrastructure; Green infrastructure)
- Management (Integrated coastal zone management; Integrated water resources management)
- Protection (Area-based conservation approaches, including protected area management and other effective area-based conservation measures).

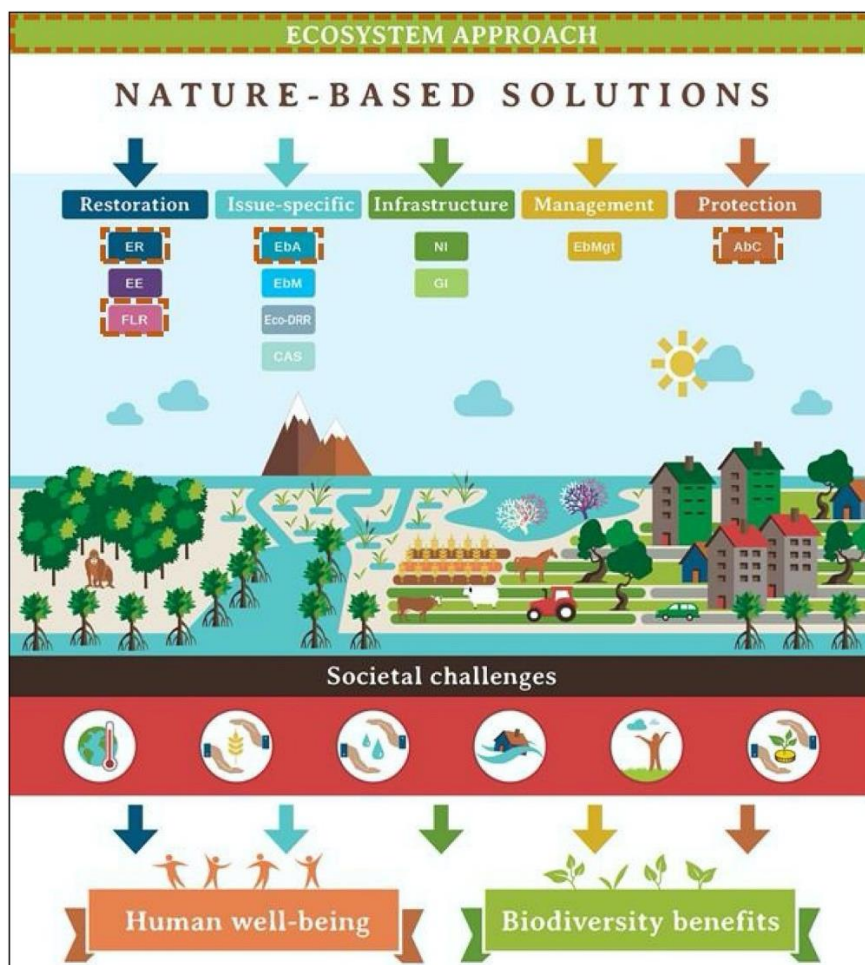


Figure 2. Conceptual representation of the NbS umbrella for five categories of ecosystem-based approaches (from Fig. 1 Cohen-Shacham et al., 2019). Acronyms used: Ecological Restoration (ER);

(continued) Ecological Engineering (EE); Forest Landscape Restoration (FLR); Ecosystem-based Adaptation (EbA); Ecosystem-based Mitigation (EbM); Climate Adaptation Services (CAS); Ecosystem-based Disaster Risk Reduction (Eco-DRR); Natural Infrastructure (NI); Green Infrastructure (GI); Ecosystem-based Management (EbMgt); Area-based Conservation (AbC). The lower circles represent the societal challenges they address: climate change, food security, water security, disaster risk, human health, and social and economic development.

Criticisms of and concerns about NbS

At the UN Biodiversity Conference - Conference of the Parties (COP) 15 in 2022, some countries and Non-government Organisations (NGOs) initially rejected the term NbS, primarily as it had been misused as a way of 'greenwashing' by some countries and fossil fuel companies. Of particular concern was the labelling of projects as NbS to describe large-scale afforestation programs, often using exotic tree monocultures, primarily for greenhouse gas mitigation or the generation of carbon credits (e.g., Veldman et al., 2015). Similar criticisms have been raised by Indigenous groups and First Nations people, as well as the Third World Network. Other concerns and emerging issues raised included resistance to change within established agencies, lack of capacity within governments and communities, inconsistency in application, and the idea of NbS as a short-lived trend. NbS has been a hotly debated concept as challenges and concerns over the failure to implement biodiversity and human rights safeguards, particularly for Indigenous communities, in some projects labelled as NbS.

The use of the term 'nature-based solutions' also proved contentious during the approval of the *Summary for Policymakers of the assessment report of the Intergovernmental Panel on Climate Change's (IPCC) Working Group 2 on Climate Change 2022: Impacts, Adaptation and Vulnerability*. The controversy centred around concerns that the lack of an agreed definition for NbS could lead to the misunderstanding that NbS can provide a global solution to climate change without emissions reductions. Engaging with these concerns will help NbS provide diverse and meaningful solutions that contribute to environmental integrity and Caring for Country approaches across Australia.

The UNEA definition (Box 1) identified that social and environmental safeguards are critical to NbS and this will help address concerns raised by some countries and non-government organisations. UNEP will also lead intergovernmental consultations on the definition, criteria, guidelines and financing to be completed by end of 2023, with an objective to reach global consensus.

Benefits and impacts of the NbS approach

While it is still too early to know the full impact of NbS interventions due to their long-term nature, the evidence base is rapidly expanding. The *Nature-based Solutions Initiative* at the University of Oxford² for example, provides a comprehensive on-line data base and resources on NbS, including analysis of the evidence for effectiveness of NbS based on a review of hundreds of published studies. This analysis shows that as financing and government ambition increase, there is an urgent need for greater co-ordination between practitioners, policy-makers, financiers and the private sector. This collaboration needs to occur across all sectors, particularly where government and community capacity is low, and engage deeply with local and Indigenous communities. For optimal outcomes, the focus of climate change investment needs to include quality, not only volume. In addition, valuing

² Refer <https://www.naturebasedsolutionsinitiative.org/>

ecosystem services and monitoring the socio-economic co-benefits of NbS activities encourages effective cross-government and sector collaboration at scale.

The broad range of benefits provided by NbS, even unintended benefits, make them particularly suited to solve problems in complex socio-ecological systems. An important consideration in these systems is the extent of community involvement and use of local and Traditional Knowledges. Some argue that high quality NbS planning must go beyond awareness and support to focus on true participation and codesign of activities and indicators. Indigenous People and Local Communities (IPLC) should not be seen as passive participants or stakeholders in NbS, but should be key collaborators and, ideally, leaders (Chausson et al., 2023). The importance of Indigenous-led projects in the effort to mitigate and adapt to climate change is widely emphasised throughout the NbS literature globally (e.g., Townsend 2020) and in Australia (e.g. Frantzeskaki et al 2022).

UNEP and IUCN (2021) have addressed the potential contribution of NbS to deliver emissions reductions and removals in the quest to achieve net zero CO₂ emissions by 2050. They conclude that NbS implemented across all ecosystems can deliver emission reductions and removals of at least 10 GtCO₂e per year and up to a maximum estimate of 18 GtCO₂e per year by 2050, a significant proportion of the total mitigation needed. This contribution will require adherence to strict social and environmental safeguards to avoid harm. These safeguards are reflected in tools such as the IUCN Global Standard for Nature-based Solutions, and in more ecosystem-specific instruments such as the Cancun safeguards for REDD+ (Reducing Emissions from Deforestation and forest Degradation, plus the sustainable management of forests, and the conservation and enhancement of forest carbon stocks).

As NbS have developed they have become more attractive for policy-makers, practitioners and financiers with benefits including: a clear standard and indicator framework, integrated co-benefits to communities, potential for landscape scale impact, empowering community-led action and breaking down silos between sectors and across governments and ministries.

The importance of scale

Criteria 2 of the IUCN Standard for NbS explicitly refers to the need to be informed by the scale of the social and environmental challenges being addressed. While it is easy to assume that 'scale' always means 'large', the criteria actually refers to the concept of an 'appropriate' scale. The scale of the NbS intervention must be at the level needed to effectively encompass the problem being tackled. Furthermore, the Standard states that *“Scale applies not only to the biophysical or geographic perspective but also to the influence of economic systems, policy frameworks and the importance of cultural perspectives.”* The physical scale at which a NbS should apply is the scale at which the challenges are being addressed and could encompass everything from a local water catchment restoration project to a large national park or an entire geographical region such as Cape York Peninsula. In policy terms, NbS can be applied at all levels of governance from local councils through to national and international policy instruments. It is particularly suited to regional planning approaches.

A powerful example of the need to consider scale is provided by the Great Barrier Reef Marine Park (GNR). While the GBR provides a robust framework for managing threats to the marine environment that arise from within the boundaries of the park, its ability to deal with exogenous threats such as pollutants and nutrient run-off from the adjacent mainland is more limited. An effective NbS approach to the problem of land-based marine pollution

therefore needs to explicitly incorporate State and Federal Government agencies, and a wide range of stakeholders, with responsibility for land management across the entire GBR catchment.

In general terms, the problem of scale will require solutions that involve:

- Capacity building and training for decision makers, and to enable codesign
- Integrating long-term systems thinking into policy and regulatory frameworks
- Formalised targets for biodiversity and ecosystem health
- Breaking down silos to enable a more whole of government approach across jurisdictions
- Cross-organisation and cross-sector collaboration to avoid duplication/confusion.

Australia is a vast continent, with a low population density over most of the country and a history of decisions that adversely affect the environment. As a result, there is an urgent and ongoing need in Australia to effectively understand and cost-effectively manage the environment at relevant scales. Several NGOs and government agencies are approaching this problem by working directly with Indigenous communities (e.g., see Box 2). There are a number of land/sea-scape approaches that seek to provide environmental and socio-economic outcomes for Indigenous Australians and local communities, including a number of Indigenous Protected Areas that engage Indigenous Australians in co-management.

Box 2: Implementing NbS at scale in remote Australia – Bush Heritage and the Wunambal Gaambera people³.

Bush Heritage and the Wunambal Gaambera people are collaborating in a holistic approach to manage around 2.5 million hectares of land and sea country in the northern Kimberley for environmental, social and economic outcomes over an extended period. The community established a vision for the region which provided the driver for their Healthy Country Plan 2010 – 2020. The Plan is a good example of a project that was not originally designed with NbS in mind but can be seen as a real example of how NbS can be operationalised at scale. The plan details how biodiversity, traditional foods sources, and cultural sites, are to be conserved through scientifically informed cultural practice, providing positive cultural and economic outcomes.



Photo 1: Mitchell Falls Lookout

Another key concept is that of ‘scaling up’ solutions (e.g. Cohen-Shacham et al., 2019). NbS are often implemented within jurisdictional boundaries while the problems they aim to seek are not constrained in the same way – thus NbS need to be extended, linked and merged to ‘scale up’ these solutions (Fastenrath et al 2020). A useful framework for undertaking NbS at large scales (>1 million hectares) is the Four Returns Framework⁴ that connects ecology, community values, spirit and culture, business and long-term economic sustainability at the landscape level. It allows government, business and communities to co-create and deliver a common vision for a resilient landscape. It is widely used internationally and is now being used across several locations in Australia (e.g. see Box 3).

³ Refer <https://www.bushheritage.org.au/places-we-protect/western-australia/wunambal-gaambera>

⁴ Refer <https://www.landscapefinancelab.org/wp-content/uploads/2021/07/4-RETURNS-Hi-Res.pdf>

Box 3: Implementing NbS at scale in Traprock and in the Burnett Mary, Queensland – RegenFarmersMutual⁵

Regen Farmers Mutual brings together many individual farmers and farmer organisations together across a landscape to coordinate interventions and share in joint outcomes, using the 4 Returns Framework. The mutual is solely focussed on creating value for members. Its services help farmers capture the value of environmental outcomes whether through productivity gains, food & fibre, or environmental markets. The Traprock Group is coordinating a biodiversity corridor that will provide habitat for the quoll, swift parrot and regent honey eater. This coordinated revegetation will enable shelter belts and provide other on-farm benefits. The key organisations include the Traprock Group, Granite Belt Sustainable Ag Network, Southern Queensland Landscape (NRM). Farmers along the Burnett Mary and Fitzroy Rivers are working on multiple conservation, carbon and biodiversity outcomes, but most importantly these reduce silt and chemical run-off into the lower Great Barrier Reef and Fraser Island. The key organisations include the Burnett Mary Region Group (NRM), Gympie Landcare, Food and Agribusiness Network and Accounting for Nature.

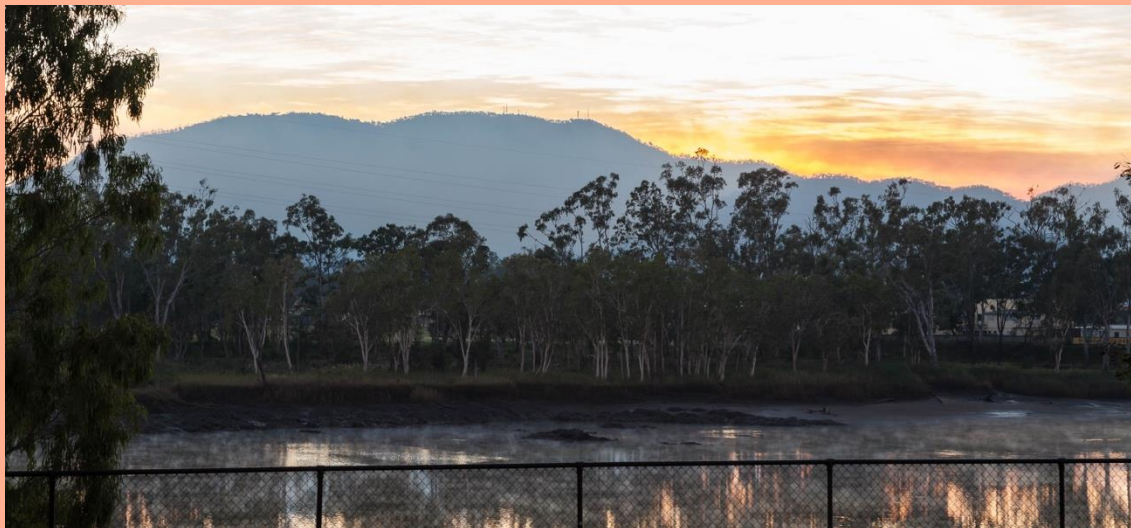


Photo 2: *Fitzroy River, Rockhampton*

NbS in environmental policy and programs

NbS is being used to inform global and national policy making on a range of issues, notably climate change adaptation, ecosystem-based adaptation, and climate related disaster reduction, including in Australia. NbS was highlighted in recent global assessment reports conducted by bodies such as the Intergovernmental Panel on Climate Change (IPCC) and the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES). One of the most significant incorporations of NbS approaches into national policy, particularly by developing countries, has been their inclusion as Nationally Determined

⁵ Refer <https://regenfarmersmutual.com/2023/07/08/traprock-landscape-impact-program-project-report/>

Contributions under The Paris Agreement, a legally binding international treaty on climate change (Seddon et al., 2019).

Considering its overarching goal to address global societal challenges, NbS has the potential to substantially contribute to the 2030 Agenda for Sustainable Development targets and to help achieve the full range of Sustainable Development Goals (SDGs). Specifically, NbS are directly relevant to SDG 2 (food security), 3 (health and well-being), 6 (clean water and sanitation), 11 (sustainable cities and communities), 13 (climate change), 14 (conservation and sustainable use of oceans, seas and marine resources), and 15 (protection, restoration and promotion of sustainable use of terrestrial ecosystems) (Cohen-Shacham et al., 2019). Box 4 provides an example of a large NbS program, funded by the Australian Government in Fiji that addressed multiple SDGs.

Box 4. Watershed management Fiji⁶

'Through a systems approach to watershed management, the Watershed Interventions for Systems Health in Fiji (WISH Fiji) project has provided access to cleaner quality water for over 5,000 residents and has helped reduce the risk of water-related disease in 29 communities across five watersheds in Fiji. Over the past four years, the WISH Fiji project has worked to transform environmental and public health action from reactive to preventative, while improving systems health of coastal watersheds to maintain the integrity and buffer against water-related disease and natural disasters. This has been done by identifying common drivers associated with water-related disease risk in coastal human populations and ill health in downstream ocean ecosystems, and then reducing those risks through integrated watershed management through targeted actions operating at different scales.

One hundred and fifty types of management interventions, principally related to improvements in water systems, integrated planning, land use management and waste management were implemented. In addition to reducing the risk of water-related disease, the project focused on enabling communities to realise their fundamental right to clean water, while strengthening peoples' connection to their lands and sea. To do this, many partners across multiple sectors worked together, including the Ministry of Health and Medical Services, Ministry of iTaukei Affairs, Ministry of Agriculture, Ministry of Fisheries and Forests, Ministry of Environment and Waterways, Ministry of Rural and Maritime Development, Ministry of Infrastructure and the Water Authority of Fiji.

WISH Fiji was implemented by University of Sydney, Edith Cowan University, Fiji National University and the Wildlife Conservation Society and was funded by the Australian Government's Indo-Pacific Centre for Health Security and Bloomberg Philanthropies' Vibrant Oceans Initiative.



Photo 3: *Viti Levu's Coral coast, Fiji.*

⁶ Refer <https://wishfiji.sydney.edu.au/>

The New Urban Agenda was adopted at the United Nations Conference on Housing and Sustainable Urban Development (Habitat III) and endorsed by United Nations General Assembly in 2016. It represents a shared vision for a better and more sustainable future. The New Urban Agenda highlights the role that NbS can play in sustainable urban development. NbS are now explicitly included in two Global Biodiversity Framework 2030 Targets (see Box 5), but it provides a useful approach and can have a role to play in addressing Targets 1-13.

Box 5. References to nature-based solutions in the Global Biodiversity Framework⁷

TARGET 8

Minimise the impact of climate change and ocean acidification on biodiversity and increase its resilience through mitigation, adaptation, and disaster risk reduction actions, including through nature-based solution and/or ecosystem-based approaches, while minimizing negative and fostering positive impacts of climate action on biodiversity.

TARGET 11

Restore, maintain and enhance nature's contributions to people, including ecosystem functions and services, such as the regulation of air, water and climate, soil health, pollination and reduction of disease risk, as well as protection from natural hazards and disasters, through nature-based solutions and/or ecosystem-based approaches for the benefit of all people and nature.

Signatories to the Convention on Biological Diversity (CBD) are encouraged to prepare a National Biodiversity Strategy and Action Plan. In Australia this plan is referred to as *Australia's Strategy for Nature 2019 – 2030* (Commonwealth of Australia 2019) and is currently undergoing revision to incorporate Australia's obligations to meet the 2030 Global Biodiversity Framework targets. Several Australian Government programs already include NbS approaches, including the National Landcare Program, the National Reserve System, and National Climate Resilience and Adaptation Strategy 2021 – 2025. The Australian Government's Climate Change Policy specifically mentions NbS as a major tool in climate change adaptation.⁸

Explicit references to NbS also occur in some Australian environmental research programs such as National Environmental Science Program (NESP). For example, through NESP, guidelines for the implementation of nature-based methods for coastal hazard risk reduction have been developed.⁹ NbS-type projects are also playing a role within local and state government programs, particularly in urban centres through greening strategies focused on

⁷ This is extracted from the project pages. Refer <https://www.cbd.int/gbf/targets/>

⁸ Refer <https://www.dcceew.gov.au/climate-change/policy/nature-based-solutions-for-climate>.

⁹ Refer <https://nespclimate.com.au/australian-guidelines-for-the-implementation-of-nature-based-methods-for-coastal-hazard-risk-reductio/>

improving liveability for communities. It is important to note however that in many cases these initiatives are not being called NbS. There is a clear opportunity to take the lessons learned from these programs that have been underway for some time in some cities, and use them to inform a national strategy for NbS that adheres to the three pillars¹⁰ and eight criteria described by the IUCN. These lessons can then inform NbS approaches and applications across the country, particularly in remote and regional communities that are increasingly suffering from heat and water stress. From a review of existing Australian Government programs it is clear there is already strong support and integration of NbS (see Table 1) though there is scope to make the NbS component more explicit or provide better guidance for effective NbS adoption.

Currently, the adoption of NbS in other policies and programs outside of environment is limited. Adoption of NbS-based policy and programs in other domains (health, infrastructure, transport, finance) in response to global policy drivers such as the New Urban Agenda, the Sustainable Development Goals, and business reporting requirements in the 2030 Global Biodiversity Framework, would have benefits for both society and biodiversity and would be consistent with the holistic approach needed for successful NbS implementation.

Table 1: Some examples of Nature-based Solutions in national environmental policies and programs.

Policy/Program	Level of NbS support	Type of NbS integration
Australia’s Strategy for Nature 2019 – 2030 (Commonwealth of Australia, 2019)	Strong	Explicit
Nature Positive Plan: better for the environment, better for business (DCCEEW, 2022)	Strong	Explicit
National Climate Resilience and Adaptation Strategy 2021 to 2025: Positioning Australia to better anticipate, manage and adapt to our changing climate (DAWE, 2021).	Strong	Explicit
Threatened Species Strategy Action Plan 2022 – 2032 (DCCEEW, 2022).	Medium	Implicit
National Environmental Science Program	Strong	Explicit

¹⁰ The term “three pillars” of NbS is not an official term but is sometimes used by practitioners to emphasise the key elements of NbS as: 1) protection, management and restoration of ecosystems, 2) ecosystem-based climate adaptation and 3) addressing societal challenges (e.g., food security, water, health etc).

Policy/Program	Level of NbS support	Type of NbS integration
National Landcare Program	Medium	Implicit
National Reserve System - Indigenous Protected Areas	Strong	Implicit

Barriers to implementation of NbS and steps to overcome them

An ongoing challenge of governments and NGOs globally and within Australia is how to address the challenges of nature loss and climate change at the scale and speed needed. NbS are being used to inform a range of policy debates in these areas as a way to overcome challenges to landscape and seascape scale restoration, natural resource management adaptation and food security. Several studies have investigated the sociocultural, institutional and economic barriers to implementation of NbS and how they can be overcome. For example, Seddon et al. (2020) specifically identifies challenges such as 1) measuring or predicting effectiveness relative to alternative approaches, 2) poor financial models and flawed approaches to economic appraisal that lead to under-investment, and 3) inflexible and highly sectoralised forms of governance that hinder uptake.

In a report published by WWF, Pérez-Cirera et al. (2021) also propose enabling mechanisms to overcome barriers organised around three overarching categories: inclusive governance, smart planning and progressive economic and financial regulation. The WWF report *“proposes a systemic enabling framework to effectively implement, scale up and mainstream nature-based solutions”*. The report focussed on three types of structural barriers to implementing effective ecosystem-based approaches – sociocultural, institutional, and economic (see Figure 3). They present a set of policy levers that are available to decision-makers to overcome these barriers, organised around the three overarching categories of systemic enablers (inclusive governance, smart planning, and progressive economic and financial regulation). WWF proposes that action in these three areas represents an important step towards an integrated whole-of-government approach to social and economic policy, which is *“the most effective way to power nature-based solutions.”* Each chapter addresses a specific issue relating to NbS, such as Indigenous People and Local Communities, financing, and the use of indicators. With the use of case studies from across the world, the report presents recommendations for overcoming barriers to the implementation of effective NbS.

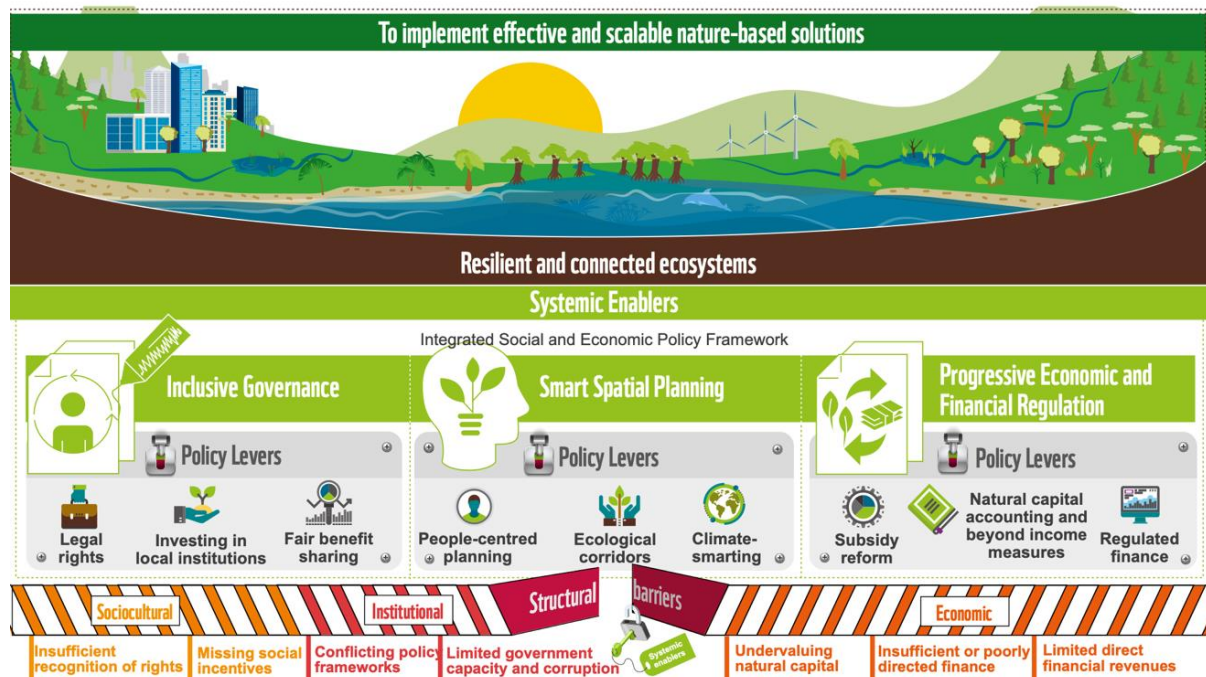


Figure 3 The structural barriers to nature-based solutions are surmountable with an integrated set of policy levers (Source Pérez-Cirera et al. 2021)

There has been much work undertaken by the European Union to disentangle the complexities associated with the integration of research and policy with regards to NbS implementation and mainstreaming through the NetworkNature. This is a project between a consortium of organisations funded to provide a bridge between the European policy landscape and the NbS community. It has an overarching objective of maximising the impact and spread of nature-based solutions. NatureNetwork recommended six policy actions to “to provide clear recommendations for policy-makers, taking into account the main challenges and barriers identified so far, to ensure a wider and successful uptake of NbS across different sectors, policy areas, and engaging multiple influential stakeholders” of relevance to Australia (NatureNetwork undated):

- Leveraging resources to develop tools to estimate impacts, benefits and cost-effectiveness of NbS in quantitative terms across ecosystems
- Dedicating research funding to increasing knowledge and monitoring systems of mitigation potential of NBS across ecosystem types
- Supporting targeted training and sharing of NbS best practices with key stakeholders
- Enabling financing resources for NbS interventions
- Establishing and testing standardisation for NbS
- Integrating concrete NbS provisions in policies at the national and local level

Barriers to implementation were also explored in a report by TierraMar for the Conservation Measures Partnership – an international body dedicated to improving and standardising global conservation practice (TierraMar 2021). Interviews with global practitioners using NbS approaches identified several common benefits to framing ecosystem-based conservation as NbS, as well as some common barriers (Figure 4).

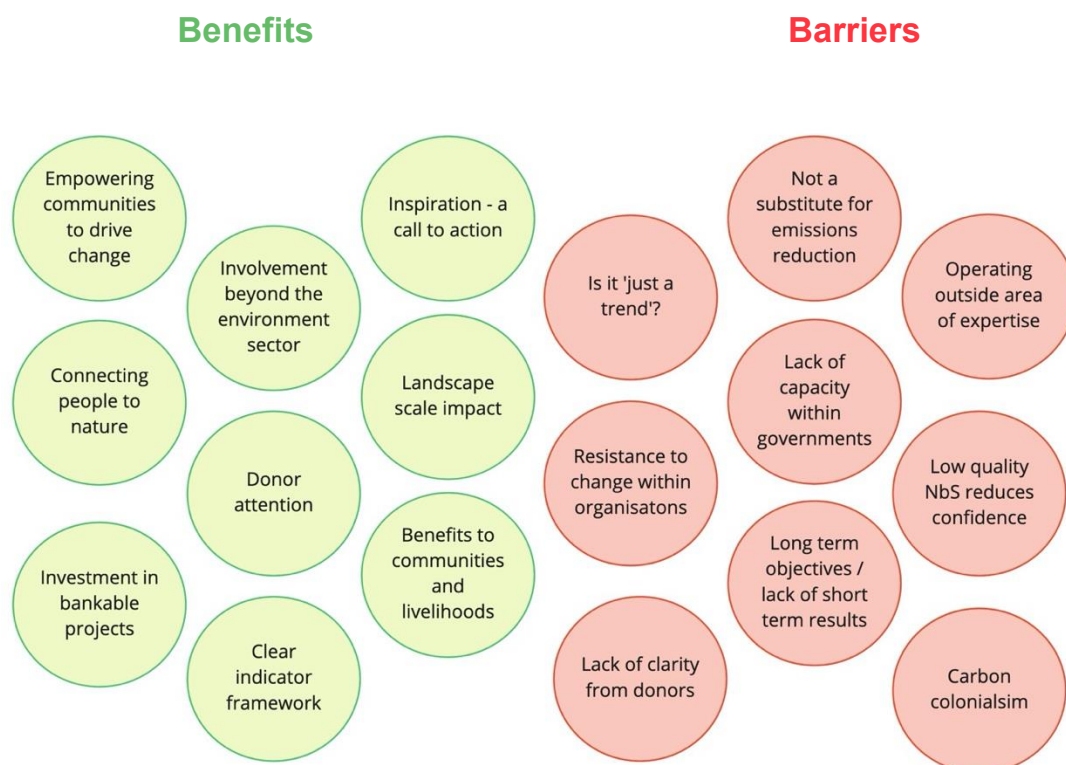


Figure 4. Lessons learned from interviewing NbS practitioners-- the benefits of using NbS framing and key barriers. (Source: TierraMar (2021))

Overcoming challenges to maximising the benefits of NbS in Australia

Considering the work undertaken in other jurisdictions and at the global level, it is reasonable to expect similar approaches to overcoming key challenges in Australia:

- **Use of multiple concepts - awareness and shared understanding of NbS**
Limited awareness and shared understanding of NbS can hamper the uptake of NbS and cause misrepresentation or confusion about their purpose and application, including for potential donors and investors. This is particularly the case given there is no clear definition adopted and limited policy guidance provided in Australia. Providing a clear definition and policy direction will go a long way towards addressing confusion and assist in creating an enabling environment for investment, particularly as the Nature Repair Market establishes.
- **Limited capacity and collaborations to access cross-sectoral expertise in important subjects that are critical to successful NbS**
Many NGOs and government agencies do not have the capacity necessary inhouse to design and implement an NbS such as economics, sustainable finance, local and national politics, cultural issues, gender, equity and social inclusion. New collaborations are required to maximise the value of the NbS approach. The IUCN Criteria for NbS give an indication of the range of expert input required to meet the criteria at a high standard.
- **Conflicting policy frameworks and existing governance mechanisms across and between jurisdictions and sectors impact on delivering landscape scale outcomes**
Nature-negative flows from public sources globally are reported to be 3 to 7 times larger than positive flows from investments into NbS - these need to be phased out, repurposed or reformed (UNEP 2022). It will be important to demonstrate the multidimensional benefits of NbS across agencies outside of DCCEEW to incentivise public sector investment in NbS and reduce perverse outcomes from conflicting policy frameworks in this regard.
Given the siloed mentality of government, policy frameworks often do not complement each other, and instead can create competition between nature, communities, and development. This is driven by fragmented, non-overlapping jurisdictions and agencies. It can be impractical for proponents to deal with all relevant multiple decision-makers across sectors (e.g., the environment, economy, agriculture, health, natural resources, development etc.), which then impacts on the success of any NbS interventions. There is a clear need to review how existing policies across agencies and jurisdictions are enabling NbS approaches and how NbS can contribute to achieving future policy goals, across different policy areas. This will be key to fostering further integration and mainstreaming of NbS to meet the 2030 Global Biodiversity Framework targets and deliver on key Australian Government commitments in the Nature Positive Plan.
- **Access to long term sustainable funding is limited**
Funders do not often have the capacity to fund projects with multiple equally important economic, social and environmental outcomes over long periods of time. Government funding programs at all levels, as well as that of donors typically prioritise one of these outcomes over the rest and operate within limited short-term grant cycles, expecting outcomes within 1-2 years. NbS projects generally are long-term interventions (4-10

years plus) depending on the scale and the type of nature interventions applied. This could be attractive for investors, yet governance structures can hinder accessing investor funding. Some funding programs internationally are beginning to address this issue, such as the Kiwa Initiative to which Australia is a contributor¹¹.

Delivering the *Nature Positive Plan: better for the environment, better for business* (December 2022) and creating a successful Nature Repair Market are dependent not only on the regulatory reforms proposed, but on having a strong business case for the private sector to invest in nature and incentivising them accordingly. With the work underway globally to internalise the value and costs associated with impacts and dependencies on nature for the private sector through the Taskforce for Financial-related Nature Disclosure and the soon to be global standards for climate related disclosures, it will be important to demonstrate how applying NbS approaches will assist companies to reduce financial risks identified in Australia. This will work towards strengthening the business and investment case for nature and increasing funds available for delivering onground outcomes.

- **Undervaluing natural capital – economics are being prioritised over natural and social capital, particularly in urban areas**

The *Australia State of the Environment Report (2021)* states that more than 96% of the Australian population (around 24.5 million) live in urban areas and 68% live within the greater metropolitan areas of Australia's eight capital cities.¹² Liveability in urban environments therefore significantly affects the lives of most Australians. In addition, the majority (79%) of Aboriginal and Torres Strait Islander people live in capital and regional cities. The fastest-growing Indigenous populations in Australia are in major cities according to the Institute for Urban Indigenous Health¹³. This population growth pressure in urban areas is leading to economics being prioritised over nature and community. This is primarily due to the ecosystem services provided by nature not being factored into planning decisions, effectively undervaluing the natural and social capital in these areas. More informed decision making is needed so economics is not competing with the need to protect natural landscape and the benefits that will flow to communities from these landscapes.

- **Insufficient recognition of rights - the NbS concept has largely been developed in a very different biodiversity and social context to Australia**

Given the NbS concept and standard have been developed, generally in a developing country or global north context, it is important to ensure projects developed in Australia are fit for purpose, and will lead to nature positive, net zero and human wellbeing outcomes. This is particularly the case for Indigenous Australians and minority groups. Australia's unique Aboriginal and Torres Strait Islander cultures provide an enduring foundation for nature-related policy and programs and must be front and centre in any NbS implemented in Australia (see e.g., Frantzeskaki et al, 2022).

¹¹ Refer <https://kiwainitiative.org/en/about-kiwa-initiative>

¹² Refer <https://soe.dcceew.gov.au/urban/environment/livability>

¹³ Refer <https://www.iuih.org.au/our-services/>

NbS and Australia's Strategy for Nature 2019 – 2030

In this section we provide an example of how NbS can be used to inform the future development of environmental policy in Australia using *Australia's Strategy for Nature 2019 – 2030* (Commonwealth of Australia 2019) as an example.

“Australia's Strategy for Nature brings together existing work across the country and will guide the development of new and innovative approaches. It focuses on overarching goals that support healthy and functioning biological systems by promoting a stronger connection between people and nature, improving the way we care for nature, and building and sharing knowledge. It is a shared roadmap to better understand, care for and sustainably manage nature to 2030.”

Goal 1: Connect all Australians with nature

This goal emphasises the need to connect people with nature, not only for the intrinsic wellbeing of individuals, but also to create a collective desire for better stewardship of the natural environment. The goal explicitly emphasises maintaining and reinforcing the existing (inter)connection to nature of Aboriginal and Torres Strait Island peoples.

This goal is foundational in Australia meeting all Global Biodiversity Framework 2030 targets, particularly target 12. A connection to nature provides an important enabling mechanism in gathering support for the use of NbS to address key challenges facing Australian communities, while supporting a nature positive, net zero future. Critical however to meeting this goal is a need to have clear national indicators for measuring the outcomes from an improved connection to nature and a recognition that the environment underpins a healthy economy and society.

The general disconnection of communities from nature, particularly in urban settings can lead to many of the challenges we face today caused by loss of ecosystem services, including declining physical and mental health, heat and water stress, and climate change adaptation. Our approach to infrastructure development, land clearing and urban expansion is often at the expense of nature, where economics are valued over maintaining or enhancing natural settings within these areas (Frantzeskaki et al 2022). Programs that enable improved connection with nature within affected communities while at the same time demonstrating other socioeconomic benefits, particularly when conducted at scale to address societal challenges (e.g., climate adaptation) can be effective NbS type projects.

Frantzeskaki et al (2022) suggest the need to steer urban planning, policy and governance in Australian urban areas, applying a NbS lens through:

- evidence-based planning for nature in cities and mainstreaming new planning tools that safeguard and foreground urban nature (eg water and biodiversity sensitive urban design)
- collaborative planning becoming standard practice and adoption of inclusive governance for nature in cities, prioritising Aboriginal and Torres Strait knowledge systems and practices as well as looking beyond what local governments can do
- empowering communities to innovate with nature to progress to nature-positive cities.

In Australia we are starting to see examples of where this can occur, such as in Indigenous Protected Area management, water security projects in agriculture and improving urban liveability (see Box 6).

Box 6: Melbourne Urban Forest Strategy¹⁴

The City of Melbourne is working to address the significant challenges of climate change, population growth and urban heating, which are impacting on the built fabric, services and people. A healthy urban forest has been identified by the Council as critical in maintaining the health and liveability of Melbourne and has developed an Urban Forest Strategy. Its aim is to manage the change and protect against future vulnerability by providing a robust strategic framework for the evolution and longevity of Melbourne's urban forest.

The strategy has several key objectives: adapt the city to climate change; mitigate the urban heat island effect by bringing inner-city temperatures down; create healthier ecosystems; become a water-sensitive city; and engage and involve the community.

The approach taken to deliver these aims includes: increasing canopy cover from 22 per cent to 40 per cent by 2040; increasing forest diversity with no more than five per cent of one tree species, no more than ten per cent of one genus and no more than 20 per cent of any one family; improving vegetation health; improving soil moisture and biodiversity; and informing and consulting with the community.



Photo 4: Melbourne, Australia

Goal 2: Care for nature in all its diversity

With its emphasis on ecosystem resilience, Goal 2 addresses a key element of NbS. The goal states that: *“Resilience can be improved by protecting a wide variety of land and seascapes in an ecologically viable habitat network, increasing biodiversity, reducing threats,*

¹⁴ Refer <https://www.melbourne.vic.gov.au/community/greening-the-city/urban-forest/Pages/urban-forest-strategy.aspx>

managing trade-offs in the use of natural resources and actively encouraging and connecting nature in urban environments.”

Goal 2 is aligned with several of the IUCN NbS Criteria especially NbS Criterion 3: NbS result in a net gain to biodiversity and ecosystem integrity. The language in this Goal reflects many of the essential elements of NbS. However, the extent to which Goal 2 is aligned with all eight criteria will depend on the specific program or project being considered.

As with Goal 1, a key role for the Australian Government is in establishing a clear definition and the principles of NbS in an Australian context, as well as promoting the development and sharing of knowledge about NbS, where they are best applied and how. Hou Jones et al., (2021) for example, considered 13 case studies from the aid and development sector from around the world to identify key success factors. These included:

- Landscape approaches that build on long-term multistakeholder partnerships
- Long-term engagements and planning that combine science with local and traditional knowledge
- Participatory approaches that ensure strong community ownership and engagement
- Combining short-term and long-term benefits, and securing them through sustainable finance strategies
- Developing policies that can remove barriers and drive systemic changes at large scales, and
- Action on gender equality and women’s rights

In addition, adopting a suitable framework for how we undertake integrated landscape and seascape scale restoration activities using an NbS lens will provide clarity to investors, particularly the private sector and work towards specifically achieving targets 8 and 11 of the 2030 Global Biodiversity Framework targets. It will also provide direction in addressing more broadly targets 1-13. A useful framework being used in Australia to achieve scaled-up outcomes is the *4 Returns Framework for integrated landscape restoration*.

“The 4 Returns Framework for landscape restoration is a practical tested system-change framework used by stakeholders to undertake a landscape approach. It seeks to balance competing stakeholder demands in a mosaic of different management approaches, to supply a full range of natural, social and economic returns.....The 4 Returns Framework connects ecology, community values, spirit and culture, business and long-term economic sustainability at landscape level. It allows government, business and communities to co-create and deliver a common vision for a resilient landscape.”¹⁵

There is opportunity for the Australian Government to take a leadership role in:

- ensuring the wellbeing budget being developed for Australia will create an enabling environment to support a nature positive, net zero future
- estimating the impacts, multiple benefits and cost-effectiveness of NbS in quantitative terms across ecosystems
- developing and promoting knowledge and monitoring
- training and sharing of best-practices and successes
- enabling finance for NbS, particularly from the private sector
- standardisation of NbS approaches.

¹⁵ Refer <https://www.landscapefinancelab.org/the-4-returns-framework-for-landscape-restoration/>

A good example of the application of NbS principles is provided by NESP *Project 1.6: A roadmap for coordinated landscape-scale coastal and marine ecosystem restoration* (see Box 7).

Box 7: A roadmap for coordinated landscape-scale coastal and marine ecosystem restoration. NESP Project 1.6¹⁶

The project specifically cites NbS as the “Solution” to the challenge of large-scale restoration in marine and coastal systems as follows:

“This project will develop a roadmap to guide research and investment into landscape-scale coastal and marine restoration. The project brings together interdisciplinary expertise in coastal engineering, decision theory, marine ecology, modelling and ecosystem services to examine decision support needs and opportunities to restore coastal marine ecosystems at scale. The research will focus on the ecosystem services of coastal protection and climate resilience with the recognition that this Nature-based Solution (NbS) approach provides co-benefits such as biodiversity, fisheries production, carbon sequestration, and nutrient cycling. The research will be accomplished through surveys and workshops/meetings with input from key end user groups in industry, NGO, Indigenous and Governmental organisations.”



Photo 5: 2016 Margaret River Australia.

The objective of the Australian Government *Blue Carbon Conservation, Restoration and Accounting Program* is to implement on-ground coastal blue carbon restoration and conservation projects in Australia and overseas, and measure and account for the diverse benefits to demonstrate how restoration and conservation activities lead to climate, biodiversity and livelihood outcomes. Box 8 provides an example of a coastal blue carbon project.

¹⁶ Refer to <https://www.nespmarinecoastal.edu.au/project-1-6/>

Box 8. South Australian Blue Carbon Ecosystem Restoration Project¹⁷

The Australian Government's Blue Carbon Ecosystem Restoration Grants provide funding over 4 years from 2021–22 to 2024–25 for implementing on-ground projects that restore degraded coastal wetland ecosystems in Australia. One such program is being undertaken within the Adelaide International Bird Sanctuary (AIBS) - an important site for coastal biodiversity, especially beach-nesting birds and migratory shorebirds, many of which are threatened.

In order to address the impacts of climate change, coastal restoration using both natural and engineering approaches* are being used to restore 12,400 ha of the AIBS National Park, nearby crown land and adjoining private properties. The project aims to restore natural tidal flows into stranded wetlands, improving both the ecological health and extent of these local ecosystems and improving habitat for birds and other native species.

The \$2.9m grant together with substantial additional private and corporate funding was developed and implemented by The Nature Conservancy and partners.

Partners include the local First Nations people (Kurna), the South Australian Department for Environment and Water, Adelaide Plains Council, Flinders University, The University of Adelaide, Birds SA, BirdLife Australia, and the Northern and Yorke Landscape Board.

*Such approaches are referred to as “hybrid” NbS in the literature



Photo 6: Eastern Great Egrets roosting at Adelaide International Bird Sanctuary National Park—*Winaityinaityi Pangkara* South Australia.

Goal 3: Share and build knowledge

The importance of developing knowledge for improved decision-making, evidence-based approaches and the sharing and use of such knowledge is a major theme of the NbS

¹⁷ Refer <https://www.dcceew.gov.au/climate-change/policy/ocean-sustainability/coastal-blue-carbon-ecosystems/conservation/restoration-grants>

literature (e.g., Turner et al., 2022). This Goal is therefore clearly aligned with the IUCN NbS Criterion 7: NbS are managed adaptively, based on evidence.

A key role for the Australian Government is in enabling access to information and knowledge relating to NbS for stakeholders wanting to undertake restoration activities. Coordinating NbS research, training, education and communication as well as being able to understand the cumulative impact and benefits from NbS projects delivered on-ground in Australia will therefore be important. One potential way of achieving this may be to create an NbS research and knowledge hub, supported by a NbS Community of Practice.

The Australian Government has made a major investment in this area through the National Environmental Science (NESP) Program. One of the NESP Programs *IP1: Sustainable people-environment interactions* have NbS as a major focus for research, particularly in relation to liveability in regional and remote settings. Preliminary research undertaken through the NESP program has demonstrated that NbS is not a term commonly used in Australia and that in many cases NbS projects are being undertaken, particularly at the state and local level using different terminology (see Box 9).

Box 9. A systematic review of NbS in Australia from NESP Sustainable people-environment interactions (IP1; led by Monash and UTas)¹⁸

IP1 is exploring how NbS is being adopted and used in Australia. A NbS approach encourages transdisciplinary methodologies for co-design and co-creation of research to address environmental, ecological and human health and wellbeing challenges. It fosters multiple benefits for people and place and promotes the resilience of social–ecological systems to environmental change.

A systematic review focussed on the context of NbS in Australia from the published literature showed that in Australia the term NbS is not broadly used (Zhu et al. 2023). Key findings are presented in **Figure 5**.

¹⁸ Refer National Environmental Science Program Sustainable Communities and Waste Hub research plan 2022. https://www.nespsustainable.edu.au/sites/default/files/documents/sCaWRresearch_plan_2022_webversion.pdf

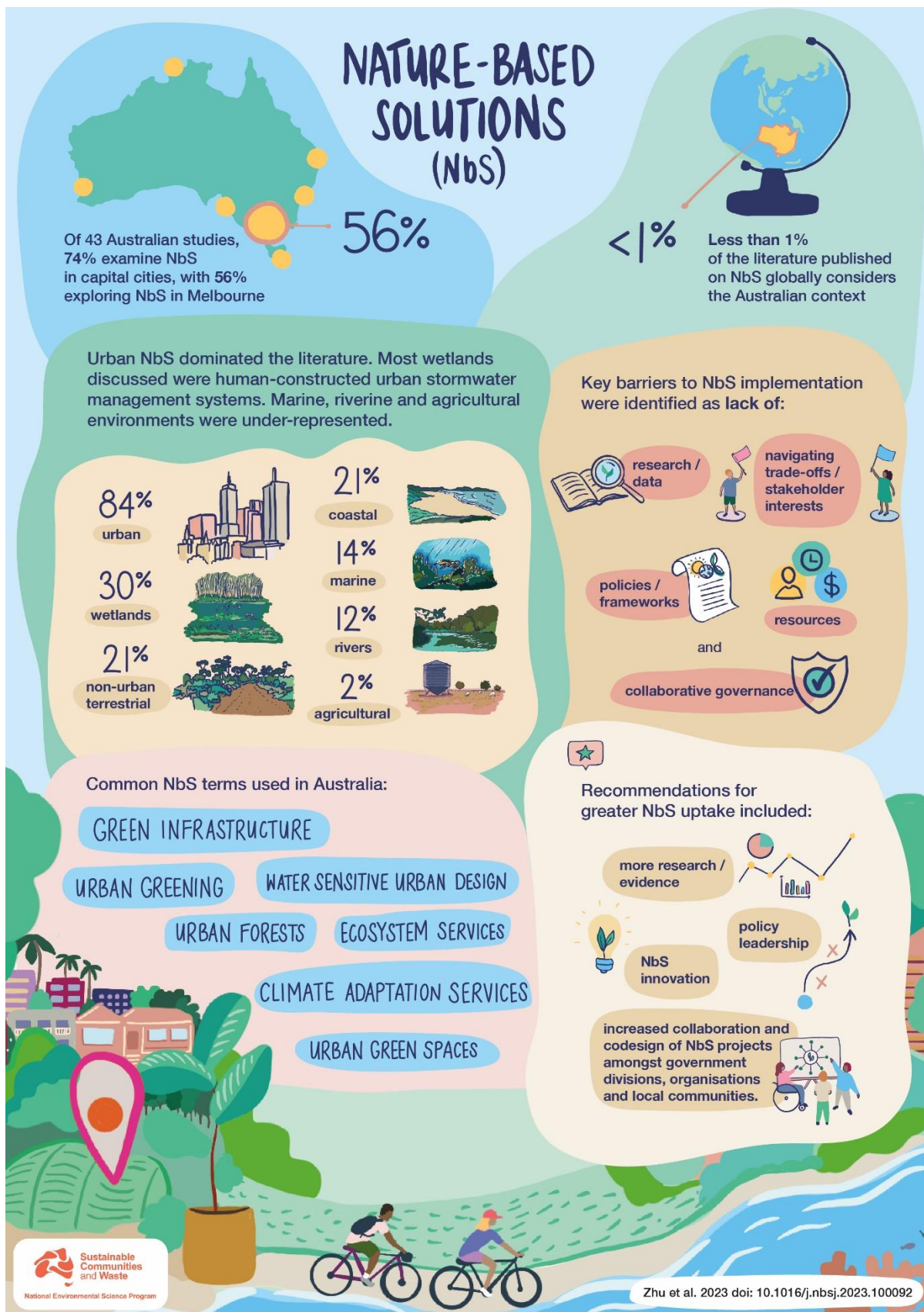


Figure 5. An infographic summary of the key findings from a recent systematic review of the Australian NbS (academic) literature (Zhu et al. 2023).

Conclusion and Recommendations

NbS provide an approach to integrated conservation and development planning intended to support the achievement of society's development goals, to safeguard human well-being through the protection, maintenance, and enhancement of ecosystem services, and to generate biodiversity benefits. Within the Australian Government environment portfolio NbS approaches are most widely used as place-based interventions designed to overcome complex social and environmental challenges (especially climate change adaptation) at the appropriate scale through the protection, management and restoration of nature. Development of general principles and key factors for success based on existing international frameworks would be a useful contribution to mainstreaming NbS in the Australian context.

Although there are many points at which NbS can be integrated into relevant policies at the national and state/territory and local levels, a key role for DCCEEW is to provide thought leadership and over-arching policy direction, as well as working with other agencies such as Treasury and Department of Health and Aged Care to embed an enabling environment that will support Australia being able to meet the 2030 Global Biodiversity Framework targets. As the *“overarching framework for all national, state and territory and local strategies, legislation, policies and actions that target nature”*, *Australia's Strategy for Nature 2019–2030* (or revised strategy following the adoption of the CBD 2030 Global Biodiversity Framework) is a potential vehicle for the Australian Government to signal national intentions towards incorporation of NbS into Australian environmental policy and practice. Similarly, the National Health and Climate Strategy¹⁹ currently under development, with its aim to *‘increase connections between climate policy and public health policy’*, is another potential opportunity for the Australian Government to signal support for NbS as a pathway for paired health and environmental outcomes. The *Measuring what Matters* process underway within the Treasury to *“lay out the government's proposed wellbeing measures...expected to draw on international frameworks established over the past half-century”* is therefore key²⁰.

There is a need for an overarching policy framework for NbS in Australia to create the enabling environment to ensure effective uptake. This approach would assist in overcoming some of the barriers to adoption and implementation identified. A number of recommendations are made:

Recommendation 1: A National Policy Statement and Strategy for NbS in Australia

The Australian Government, in collaboration with state and territory governments, should develop a Policy Statement and Strategy for mainstreaming the implementation of NbS in Australia. The development of such a policy should involve diverse and relevant stakeholders and include consideration of where the policy could be housed to support the necessary cross-sectoral impact. For example, the US Nature-based Solution Roadmap²¹ calls for an intra-agency task force to look into various aspects of NbS financing; a similar

¹⁹ Refer <https://www.health.gov.au/our-work/national-health-and-climate-strategy>

²⁰ Refer <https://treasury.gov.au/sites/default/files/2023-04/c2023-386696-measuring-what-matters.pdf>

²¹ Refer <https://www.whitehouse.gov/wp-content/uploads/2022/11/Nature-Based-Solutions-Roadmap.pdf>

inter-agency approach could stimulate NbS awareness, uptake, and appropriate financing of NbS in Australia.

Alternatively, an NbS Policy Statement and Strategy could be as a key part of the next revision of Australia's Strategy for Nature (or replacement) or the National Health and Climate Strategy currently under development. An NbS statement and strategy could learn from and build on existing international documents such as the US Nature-based Solution Roadmap and advance the Australia-California Memorandum of Understanding²² to driving action to combat the climate crisis. The Statement and Strategy could support the following:

1.1 Adopt a clear definition and principles for NbS in Australia - provide the context for why, where, and how NbS could be incorporated into whole of government programs. The Policy Statement could introduce a clear definition and the key principles of NbS and the IUCN Standard in an Australian context (e.g. unique flora and fauna, enduring Aboriginal and Torres Strait Islander culture). It could also adopt a framework for landscape/seascape scale NbS projects such as the 4 Returns Framework.

The use of a standard would assist in ensuring the trust, quality and coherence of NbS projects, not only for proponents, beneficiaries and investors but to garner the support of policy-makers outside of environmental agencies and to allow scaling up for reporting against national targets. A good starting point could be to undertake an analysis of how aligned existing NbS type projects in Australia are with the IUCN standard, similar to the work undertaken by Chales et al., (2023) who looked at how coastal NbS are currently included in the NDCs of Pacific small island developing states.

1.2 Integrate concrete NbS provisions in policies at national and sub-national level - A systems approach to understanding how NbS can contribute to achieving future policy goals, across different policy areas, is required to foster further integration and mainstreaming of NbS and to unlock additional public sector investment across agencies and jurisdictions. At the subnational (e.g. state, local) level, mainstreaming NbS in strategies and planning requires the support of decision-makers across departments and with the collaboration of local stakeholders. The Australian Government can play a crucial role in setting the right conditions, incentives and regulatory framework to support mainstreaming at the subnational level. Alignment between national and state/territory and local government policies in supporting NbS is required to ensure support for NbS mainstreaming on the ground.

Recommendation 2. A National Research and Knowledge Hub for NbS supporting a Community of Practice

Making NbS information, knowledge and research more easily accessible to stakeholders could be achieved through establishing a research and knowledge hub. The hub could offer tailored courses and training in application and accreditation of NbS, conduct research into NbS, and act as a knowledge broker. This could be complemented with establishing a Community of Practice for practioners, donors and investors working in the NbS space.

²² Refer <https://www.dfat.gov.au/news/media-release/joint-statement-new-australia-california-memorandum-understanding>

2.1 Consolidate and disseminate existing knowledge - There is a substantial and rapidly growing body of knowledge being generated through multiple research institutions (e.g. universities, CSIRO), government research initiatives (e.g. NESP, government departments and agencies) and private research (e.g. NGOs, think tanks and consulting firms). This information should be brought together in a usable way that allows for integration of future knowledge as it becomes available. Sharing knowledge is a key mechanism for overcoming barriers to the adoption of NbS that conform to IUCN standards.

This could be supported by the development of tools to estimate impacts, benefits and cost-effectiveness of NbS in quantitative terms across ecosystems. Mainstreaming NbS implementation across agencies and jurisdictions will need supporting tools for policymakers (e.g., handbooks, guidelines, and data tools) in different settings and when working across the range of ecosystems.

2.2 Support targeted training and sharing of NbS best practices with key stakeholders - Sharing success stories and practical experiences of NbS implementation in different circumstances can help increase the inclusion of NbS into jurisdictional plans, policies and strategies at all levels, as well as make NbS a viable option for land owners and managers, providing evidence on what types of NbS can work in specific contexts.

More effective approaches to cross-sectoral and interdisciplinary knowledge sharing, such as targeted training, should be supported by decision-makers and facilitated by relevant networks, sub-national authorities and associations (e.g., NRM Regions Australia and the Indigenous Land and Sea Corporation would appear to be ideal candidates to coordinate and deliver these outreach programs).

2.3 Have a rigorous monitoring framework and making monitoring data available - Learning about the value of NbS (and the drivers of value) will be possible if their impacts on society and on biodiversity are monitored and shared. Monitoring standards should be developed where needed and become a core part of NbS programs and projects. Data collected should be stored in a findable, accessible, interoperable, and reusable (FAIR) way, preferably in national collaborative research infrastructure.

Improved analysis and quantification of the impact of NbS interventions across all ecosystem types are needed to strengthen the evidence base in current and future policies and strategies and support policy implementation. Monitoring and evaluation are essential to improve practices and build the evidence base for NbS. A strong monitoring system allows for early detection and a rapid response to problems and unintended consequences, but also the ability to capture benefits early.

2.4 Support new research to address priority needs - As much NbS knowledge and practice has been generated and conducted in the northern hemisphere, new research is needed to better understand how NbS can be effective in the Australian context, particularly regarding its diverse bioregions and ecosystems and their response to challenges such as climate change and sustainable food production.

In addition, continued exploration of innovative financing models and regulatory interventions for NbS to deliver multiple benefits will be important. There is much work going on globally within academic institutions, NGOs and governments to look at this so it will be important to stay abreast of latest developments. Working with

organisations like UNSW Canberra School of Business, Trust for Nature, and other organisations who undertake related research will be key.

Recommendation 3. Implementing NbS approaches

As a demonstration of the multiple benefits from NbS, the Australian Government could explicitly support the adoption of NbS approaches for place-based interventions within their remit, for example on Commonwealth land and as bioregional planning is rolled out. This could also be promoted in partnership with Aboriginal and Torres Strait Islander people to incorporate NbS principles into Indigenous land and sea management programs, and with NRM organisations, the private sector and industry and community stakeholders into the National Landcare Program and climate change initiatives.

Other opportunities for integrating NbS should be explored in other sectors relating to health, transport, infrastructure towards ensuring more inclusive decision making leading to improved outcomes for people and nature from economic decisions made.

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Appendix 1

The IUCN NbS criteria and guidance on applying the NbS criteria (Source: IUCN (2020)).

Note that each criteria have multiple indicators and additional guidance however these are not included for brevity.

NbS Criteria	Guidance for users
<p>Criterion 1: NbS effectively address societal challenges</p>	<p>The purpose of this Criterion is to ensure that the NbS is designed as a response to a societal challenge(s) that has been identified as a priority by those who are or will be directly affected by the challenge(s).</p> <p>All stakeholders, especially rights holders and beneficiaries of the NbS, must be involved in the decision-making process used for identifying the priority challenge(s) (Criterion 5).</p>
<p>Criterion 2: Design of NbS is informed by scale</p>	<p>The purpose of this Criterion is to encourage NbS designs that recognise the complexity and uncertainty that occur in living dynamic land/seascapes. Scale applies not only to the biophysical or geographic perspective but also to the influence of economic systems, policy frameworks and the importance of cultural perspectives.</p> <p>NbS design will be informed by what stakeholders know about the interactions between different aspects of a land/seascape using a three-scale framework that considers the parts within the land/seascape; the land/seascape itself; and the wider environment around the land/seascape. One example would be households within villages within a local authority area.</p> <p>Understanding the interactions which affect attributes like cultural values, laws, soils, forests and water are important in this regard, as they are relevant to the assessment of the risk of undesirable change, or the probability of creating desirable change.</p> <p>NbS design seeks to maintain the productive capacity of ecosystems as well as the production of benefits necessary for human well-being.</p>
<p>Criterion 3: NbS result in a net gain to</p>	<p>NbS are derived as goods and services from ecosystems, therefore strongly depend on the health of an ecosystem.</p>

NbS Criteria	Guidance for users
biodiversity and ecosystem integrity	<p>Biodiversity loss and ecosystem change can have significant impacts on the functioning and integrity of the system. Therefore, NbS design and implementation must avoid undermining the integrity of the system and instead, proactively seek to enhance the functionality and connectivity of the ecosystem. Doing so can also ensure the long-term resilience and durability of the NbS.</p>
<p>Criterion 4:</p> <p>NbS are economically viable</p>	<p>The return on investment, the efficiency and effectiveness of the intervention, and equity in the distribution of benefits and costs are key determinants of success for an NbS. This Criterion requires that sufficient consideration is given to the economic viability of the intervention, both at the design stage and through monitoring the implementation.</p> <p>For NbS to be sustainable, there must be strong consideration of the economic aspects as, most likely, long-term gains must be balanced against short-term costs, with short-term actions developed within the context of long-term (over generations) goals and plans.</p> <p>If the economic feasibility is not adequately addressed, NbS run the risk of being short-term projects, where, after closing, the solution and benefits provided cease to exist, potentially leaving the landscape and communities worse off than before.</p> <p>Innovative and evidence-based tools for the valuation of nature, along with ideas for NbS contributions to markets and jobs, encourage creative (blended) financing of NbS, thereby increasing the likelihood of their long-term success.</p>
<p>Criterion 5:</p> <p>NbS are based on inclusive, transparent and empowering governance processes</p>	<p>This criterion requires that NbS acknowledge, involve, and respond to the concerns of a variety of stakeholders, especially rights holders. Good governance arrangements are proven to not only reduce an intervention's sustainability risks, but also to enhance its social 'license to operate'.</p> <p>Conversely inadequate governance provision for otherwise well-intended actions can adversely affect the legitimacy of benefit and cost sharing arrangements.</p> <p>At a minimum, NbS must adhere to and align with the prevailing legal and regulatory provisions, being clear on where legal responsibilities and liabilities lie. However, as often is the case with natural resources, basic compliance will need to be</p>

NbS Criteria	Guidance for users
	<p>complemented with ancillary mechanisms that actively engage and empower local communities and other affected stakeholders.</p>
<p>Criterion 6: NbS equitably balance trade-offs between achievement of their primary goal(s) and the continued provision of multiple benefits</p>	<p>Trade-offs in land and natural resource management is inevitable. Ecosystems provide a wealth of different benefits and not everyone values each of them in the same way. While trade-offs cannot be avoided, they can be effectively and equitably managed. This Criterion requires that NbS proponents acknowledge these trade-offs and follow a fair, transparent and inclusive process to balance and manage them over both time and geographic space.</p> <p>This involves a credible assessment, full disclosure and agreement among the most affected stakeholders on how the trade-offs should be addressed. Fair and transparent negotiation of trade-offs and compensation among potentially affected parties for any damages or trade-offs to local opportunities and livelihoods provides the basis for successful long-term NbS outcomes.</p> <p>Critically, it is important to recognise that trade-offs have social and ecological limits beyond which point certain values or benefits can be lost in perpetuity. This means that safeguards will be necessary to ensure, <i>inter alia</i>, that the integrity of ecosystems and the long-term stabilising properties of ecosystem services are not exceeded.</p>
<p>Criterion 7: NbS are managed adaptively, based on evidence</p>	<p>This Criterion requires that NbS implementation plans include provisions to enable adaptive management as a response to uncertainty and as an option to effectively harness ecosystem resilience.</p> <p>A degree of uncertainty is inherent when managing most ecosystems due to their complex, dynamic and self-organising nature. This also means that ecosystems have greater resilience which confers a wider range of options to respond to unanticipated social, economic or climate events.</p> <p>The foundation of adaptive management is the evidence-base provided by regular monitoring and evaluation, drawing on scientific understanding as well as Indigenous, traditional and local knowledge. By proactively adopting an adaptive management approach, the NbS can continue to be relevant</p>

NbS Criteria	Guidance for users
	through the lifecycle of the intervention and the risk of redundancy and stranded investments minimised.
<p>Criterion 8: NbS are sustainable and mainstreamed within an appropriate jurisdictional context</p>	<p>This Criterion requires that NbS interventions are designed and managed with a view to long-term sustainability and that they take account of, work with and align with sectoral, national and other policy frameworks.</p> <p>There are various approaches to mainstreaming NbS; however, all rely on strategic communications and outreach. Audiences to consider include individuals (e.g., the public, academics), institutions (e.g., national government, start-ups, businesses, and organisations) and global networks (e.g., Sustainable Development Goals, Paris Agreement).</p>