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FINAL REPORT

Project 3.7

Identifying and overcoming barriers to marine and coastal habitat restoration and nature-based solutions in Australia

Project summary

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Acknowledgement of Country

The Marine and Coastal Hub acknowledges Aboriginal and Torres Strait Islander people as the first peoples and Traditional Owners and custodians of the land and waterways on which we live and work. We honour and pay our respects to Elders past, present and emerging.

Aboriginal and Torres Strait Islander peoples represent the world's oldest living culture. We celebrate and respect this continuing culture and strive to empower Aboriginal and Torres Strait Islander peoples.

Executive summary

There is an increasing need for the restoration of marine and coastal ecosystems to help manage habitat and biodiversity loss, water quality degradation, coastal inundation and erosion, and blue carbon asset protection around Australia. These measures help meet international targets like the Kunming-Montreal Global Biodiversity Framework. At present, the projects being undertaken to upscale restoration are enacted by a range of actors, including Commonwealth, state and local government agencies, NGOs, universities and community groups. Their work is enacted across different habitat types and different scales.

Despite the recent restoration advances, the ability to undertake large-scale projects has been precluded by a number of barriers, which centre on: 1) Aboriginal and Torres Strait Islander inclusion and co-design; 2) policy and legislative barriers; and 3) engineering adoption of Nature-based Solutions (NbS). For Australia to achieve international protection and restoration targets through facilitating large-scale restoration, these barriers need to be understood and addressed.

In this project, we consulted widely with government, industry, Traditional Owners, community and NGOs to identify legal and policy barriers to restoration, barriers to Indigenous inclusion and co-design of restoration projects and greater adoption of NbS for coastal protection works. In this project, the campaign reports identify and outline how project proponents have found pathways through these barriers and complexity relating to approval. While restoration progress has been possible in many instances, there remains important opportunities to reform laws and policies to provide more explicit and streamlined pathways, reduce the costs and timeframes for projects, and increase access to available technical information and guidelines, which could reduce risk and uncertainty. It is also key to upscaling restoration, as our consultation showed a trend of proponents scaling down projects to make the processes easier to navigate, while also providing the governance and infrastructure for wider inclusion in restoration design and on-ground execution in Australia.

We also found that an important element of restoration is communication and inclusion of interest actors not only in project design, but also through the lifecycle of restoration projects. This has the advantage of fostering broader support, trust, social equity, and endorsement of project outcomes. There is also a clear need for more training and upskilling from engineers, construction workers, consulting services for monitoring and evaluation of projects, in

addition to a live and curated access point for information and learnings from works undertaken to be stored and publicly available.

For the journey ahead towards a more intact, functioning, productive and protected marine and coastal ecosystem network in Australia, there needs to be more focus, coordination and sharing access to data and information so that all stakeholders involved have access to the latest research and development. The three associated technical companion reports in this project highlight opportunities that will help to ensure that marine and coastal restoration projects occur more efficiently, effectively and accountably so they are more likely to: (a) reverse the degradation of coastal and marine environments, (b) be fundable by emerging nature financing markets that lead to benefits that are sustained through time; and (c) be widely supported and initiated by government, Traditional Owner groups, community and industry.

1. Introduction

Australia has a spectacular marine and coastal environment that provides many essential services such as coastal protection, clean water, food production, habitat for aquatic species, among others (Figure 1). This area is also where we live, recreate, and secure economic growth – activities that have resulted in extensive habitat loss and modification (Creighton et al. 2016). As a result, many marine and coastal ecosystems have been either lost entirely or are so heavily changed that they look very different to the past.

To deal with this legacy of loss and modification, managers, scientists, politicians, community groups, industry and government agencies are responding to the urgent call to do more to protect and repair the marine and coastal ecosystems – including in Australia. This call is not only in response to initiatives set out by the United Nations, but for the many cultural and social amenity values provided and that need protection. Efforts to restore marine and coastal ecosystems are underway in Australia (Costa et al. 2024; Eger et al. 2023; Heimhuber et al. 2024; McAfee et al. 2022; McLeod et al. 2022; Morris et al. 2024; Sinclair et al. 2021; Waltham et al. 2019), but consist largely of fragmented projects that are separated spatially and undertaken at different scales, making it difficult to see any meaningful positive impact across the land- and seascape more broadly. These programs must be sufficiently large-scale if they are to have any chance of achieving global targets (or if they are to reinstate lost ecosystem services), such as the 2030 targets in the Kunming-Montreal Global Biodiversity Framework (Obura et al. 2023), and the Bonn Challenge (Verdone and Seidl 2017), which have been set to deliver the UN's declaration of ecosystem restoration (Waltham et al. 2020).



Figure 1 Mangrove communities in northern Australia are inundated providing shelter and feeding areas for many marine species (Photo credit M. Curnock).

For Australia to effectively protect, conserve and repair its marine and coastal estate, it needs a coordinated plan (Saunders et al. 2022). This plan should not only map a pathway forward, but should be underpinned by a long-term commitment of funding for maintenance, a program of continued training and development of human capital to continue restoration and protection works, funding for new research to advance technology development, and funding for monitoring and evaluation. It also needs a co-design and inclusion architecture, so that local values (including traditional knowledge and values) and expectations of various stakeholder groups are heard and included early in the project development. As part of the first round of the National Environment Science Program Marine and Coastal Hub (NESP MAC), an exercise was completed that captured the views and status of marine and coastal restoration efforts around Australia (NESP MAC Project 1.6, *A Roadmap to Coordinated Landscape-Scale Coastal and Marine Ecosystem Restoration*) (Saunders et al. 2022). This discussion included input from government, Indigenous groups, community, Non-government Organisations (NGOs), and Industry, which lead to the generation of ten guiding principles to help coordinate and inform large-scale restoration projects in Australia (Saunders et al. 2022) (see Figure 2). The roadmap has been an important conversation starter, and together with the reinstatement of the Australian Coastal Restoration Network (<https://www.acrn.org.au/>), has stimulated a renewed focus on marine and coastal restoration (Bell-James et al. 2023; Hagger et al. 2022; Howie et al. 2024).

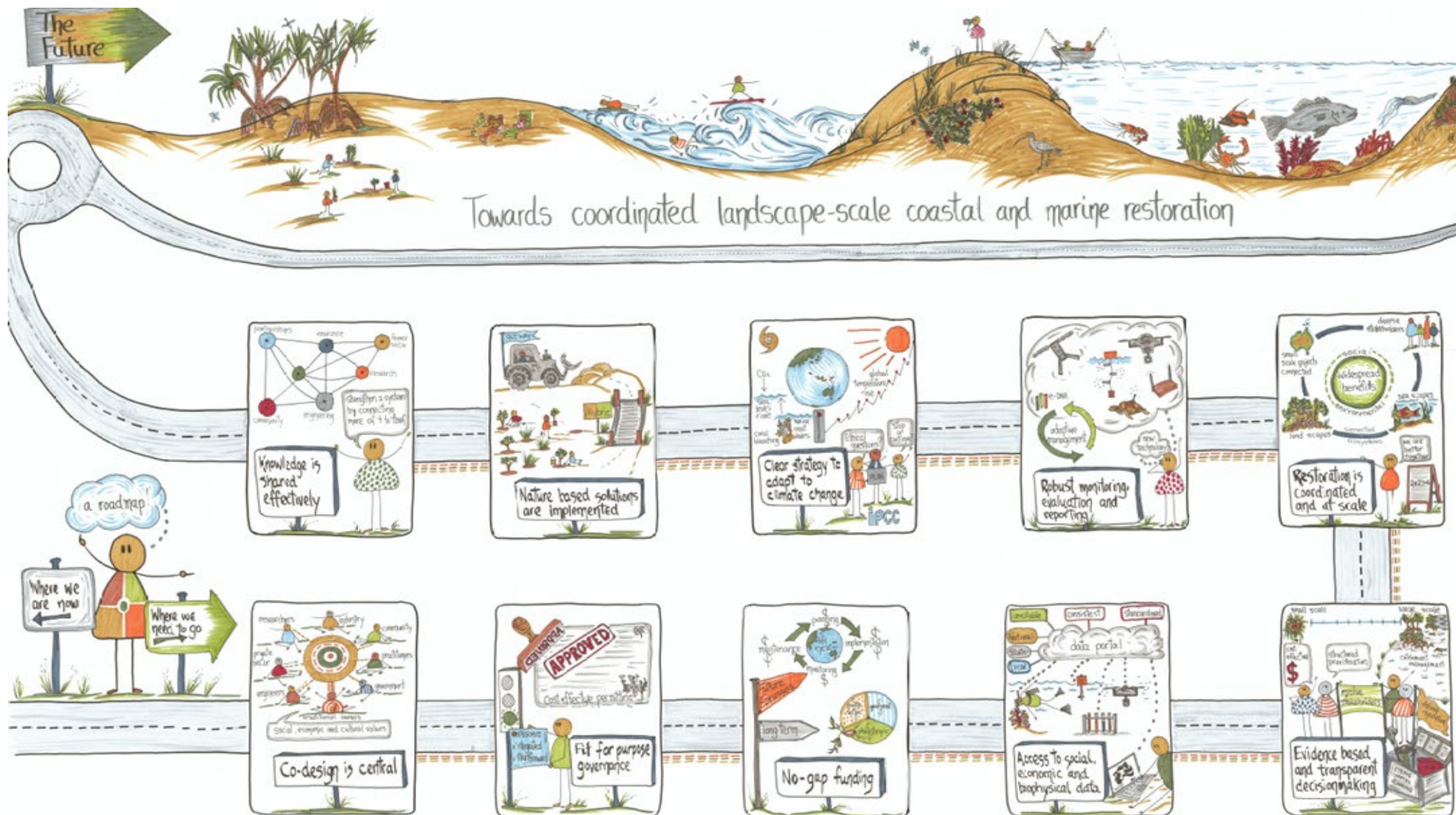


Figure 2 Road map (NESP 1.7) to coordinated and large-scale marine and coastal restoration (Saunders et al. 2022). Image: Fiona Malcolm, Purpose Partners.

Importantly, this project has sparked further conversation about opportunities amongst the restoration network in Australia and has raised the profile of the efforts already underway or completed in Australia. This in turn has assisted the federal government to work through possible strategies and opportunities to deliver international ecosystem and biodiversity protection targets.

However, Project 1.6 also identified further work to be done. An important conclusion of the road map was the clear need to further understand and examine the major roadblocks to coordination of resources and efforts in marine and coastal restoration. Of the ten guiding principles to coordinated landscape scale marine and coastal restoration identified in this report, several fundamental barriers prohibiting large-scale, coordinated, restoration in Australia were identified. These are: 1) acknowledgement and inclusion of Indigenous People in the development of restoration projects and plans; 2) legal system and governance challenges that delay, slow or inhibit restoration; and 3) acknowledgement and acceptance of Nature-based Solutions for coastal protection as an alternative to traditional engineering approaches for dealing with coastal erosion and asset protection. Examining, understanding and addressing these key principles is important if Australia is to deliver on international targets, and realise the government's vision for 'nature positive' through its Nature Repair Market.

In Australia, there is an increasing need for, and investment into, marine and coastal restoration to help manage habitat and biodiversity from further loss, water quality degradation, coastal inundation and erosion protection, and protection of the wide range of services that these ecosystems provide. Some of this investment will be driven by the carbon market: there has already been some development of environmental market methodologies, including for the reinstatement of tidal waterways over separated low-lying terrestrial lands (Lovelock et al. 2023). Importantly, there are more methods in the pipeline to assist with funding and upscaling restoration to help the government reach targets. For example, NESP M&C Project 3.8 is examining how to develop a methodology for carbon sequestration generated through control of feral ungulates (<https://www.nespmarinecoastal.edu.au/project/3-8/>). A Nature Repair Market, which will generate certificates for biodiversity accrued through nature repair, was announced in March 2023 and is expected to be operational by early 2025. Importantly, there is a great number of research institutes, Indigenous Ranger programs, community and industry groups actively involved in restoring ecosystems, with more joining and looking to be involved and part of the

solution. Sharing information, generating opportunities to access funding, providing for greater inclusion of all beneficiaries including First Nations people, and upskilling to a more experienced, technical, workforce will help deliver restoration at the scale needed.

The present project builds on the foundation that the roadmap project (Project 1.6) provided, and tackles the most critical barriers inhibiting large-scale, coordinated, restoration. This project was undertaken by three working groups, each focused on one of the three key principle challenges outlined above. To raise the profile of these investigations and to highlight the key messages, there are three companion reports in this NESP project which provide more specific details. The intention of this report has been to provide a synthetic review of the key messages and conclusions and present a pathway for Australia to continue developing a plan for large-scale restoration and its coordination. These companion reports are:

- Saunders MI, Fischer M, Vozzo M, Chewying K, Malcom F, Liddel B, Cooley R, Cassady J, Bugnot AB, Waltham NJ (2024) Identifying and overcoming barriers to marine and coastal habitat restoration and Nature-based Solutions in Australia: Pathways to Aboriginal and Torres Strait Islander inclusion and co-design. Report to the University of Tasmania, Hobart, Tasmania.
- Bell-James, J., McCormack, PC, Shumway, N., Wawryk, A. (2024) Identifying and overcoming barriers to marine and coastal habitat restoration and Nature-based Solutions in Australia: legislative permitting processes for restoration. Report to the University of Tasmania, Hobart, Tasmania.
- Morris RL, Pomeroy AWM, Boxshall A, Dack, D, Dunlop A, Townsend M, Swearer SE (2024) A blueprint for overcoming barriers to the use of nature-based coastal protection in Australia. Report to the University of Tasmania, Hobart, Tasmania.

2. Summary of the companion reports

The research team for this project consisted of experts from universities, government, industry, Indigenous and NGO organisations. The team was divided into major theme research groups, to undertake the project and provide important project oversight. The project team met several times during the project to discuss the emerging results and outcomes of the three sub-programs and the various workshops and interviews completed during this project. The sub-program groups met more regularly during the project, to compile the data generated and information into the companion reports. These companion

reports sit below this synthetic report herein, with each companion report providing more detail and information that interested individuals can pursue. This synthetic report provides an overview of the key messages and lessons from the companion reports, including the key recommendations and the journey ahead. A summary of the findings presented in the companion reports is provided below.

2.1 Indigenous co-design in marine and coastal restoration

A sub-group of the project team participated in investigating the barriers preventing Indigenous People from participating in coastal and marine restoration. Specifically, the study examined what enables successful participation, and what steps community groups could take to ensure more Indigenous participation in coastal restoration in future projects. Here interviews were completed with three Indigenous people from two different organisations that have successfully partnered with organisations to conduct marine and coastal restoration on sea

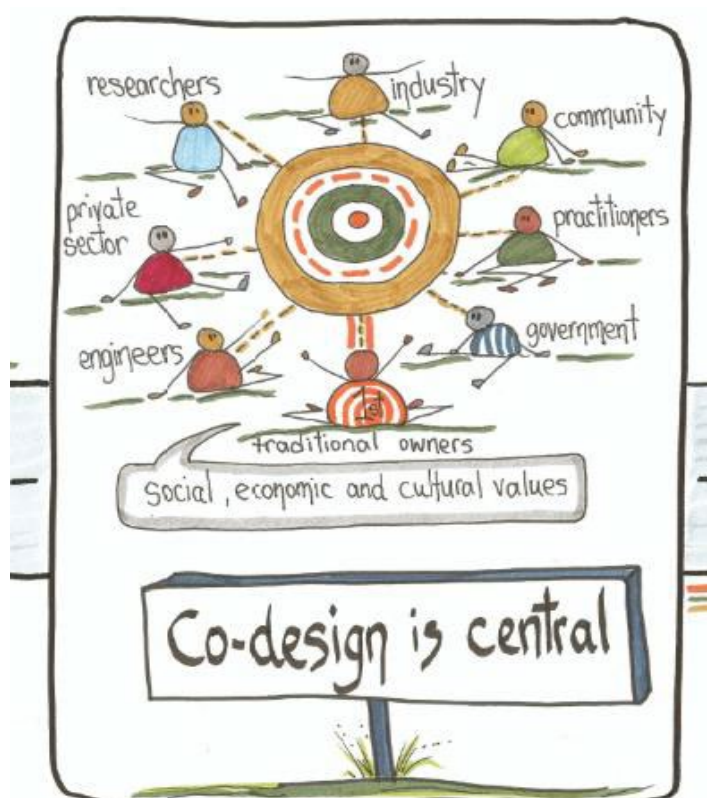


Image: Fiona Malcolm, Purpose Partners.

Country. An important caveat is that the individuals interviewed spoke on behalf of themselves rather than on behalf of their organisations, therefore the findings do not represent the voices of Indigenous groups or people more broadly. Through addressing the research questions, the team identified barriers as well as enabling conditions which allow for Indigenous participation in marine and coastal ecological restoration (for example, access to training and up-skilling to participate in restoration, or access to timeframes needed to secure Traditional Owner groups inclusion might be beyond funding round timeframes). This information underpinned a proposed pathway to help overcome barriers which includes steps that can be taken by western scientific groups, Indigenous groups and decision makers and

funders. These steps could lead towards achieving enabling conditions which support Indigenous participation in marine and coastal ecological restoration.

Following the pathway may result in benefits to Indigenous groups such as job opportunities and spiritual and cultural outcomes from caring for sea Country. Environmental benefits can flow from conducting successful ecological restoration over larger areas than would otherwise be feasible. For Australia, partnering with Indigenous groups will be necessary to achieving Target 2 of the Convention on Biological Diversity to restore 30% of lands and waters by 2030. While there is no firm data to allow interpretation about whether we are on track to achieve this target, the available information suggests that a step change is needed to do so for coastal and marine ecosystems. Decision makers and funders may also benefit from following the pathway, for instance, as it has potential help to achieve Closing the Gap targets which have been put forward to address United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP). Achieving marine and coastal ecological restoration over large scales may result in economic benefits from an expanded marine restoration economy which is 'nature positive' and supports ecosystem service delivery and climate change mitigation and adaptation.

2.2 Identifying and overcoming governance barriers

The governance barriers sub-group completed an extensive review of the legislation in each focus jurisdiction (Queensland, New South Wales, Tasmania and South Australia), in relation to two types of restoration project (restoration of tidal flow, and oyster reef restoration) that are increasing in these jurisdictions. This legislative review was supplemented by interviews and discussions with relevant personnel in government, industry, NGOs, Natural Resources Management groups and community groups undertaking restoration projects. The team sought to speak



Image: Fiona Malcolm, Purpose Partners.

to as many stakeholders as possible within the project timeframe. In addition to these analyses, the team also presented components of the research outcomes at the Australian Coastal Restoration Network Conference (May 2023, Townsville), Australian Marine Sciences Association Conference (July 2023, Gold Coast), NESP Marine and Coast Hub Stakeholder workshop (July 2023, Canberra) and The Nature Conservancy Blue Carbon workshop (August 2023, Sunshine Coast).

As anticipated, the legislative review showed that in each jurisdiction there exists a complex array of legislation and policy, which may trigger requirements for proponents to obtain permits. As is evident from the diagrams in the detailed report, most legislation requires a permit(s) to be obtained if a particular trigger or threshold is activated, meaning that proponents need to make a judgement call as to whether a particular permit will be needed based on the circumstances.

Although there were some differences across the jurisdictions surveyed, overall, each state had a broadly similar legislative framework, with permit requirements extant in planning legislation, fisheries legislation, cultural and natural heritage legislation, and other environmental legislation, as well as land access requirements, and biosecurity requirements (for oyster reefs). Currently, no state has a specific legal framework to facilitate any coastal or marine restoration activity, although we did find some small amendments had been made in some specific legislative instruments (e.g., in Queensland there have been some amendments to fisheries codes to streamline some restoration activities and allow them to proceed without a permit). Queensland has also established an inter-departmental working group to work through the governance processes for approving coastal restoration. The full results of the legislative reviews are contained in the companion report, with detailed analyses of the permits required in each jurisdiction for each type of restoration activity. This analysis is current as of November 2023 and may be a useful guide to proponents approaching the permitting process.

2.3 Overcoming barriers to Nature-based Solutions in Australia

This sub-group held a 1.5-day workshop at the University of Melbourne in mid-June 2023. Thirty-one participants attended the workshop. They were invited based on their professional roles, which included coastal management and/or climate adaption or implementing actions to mitigate the risk of coastal hazards. The aim was to have half of the participants representative of the different levels of government from across Australia, while the other half represented engineering consulting firms that engage in, and design coastal protection



Image: Fiona Malcolm, Purpose Partners.

works. A pre-workshop survey presented to participants assisted in shaping the workshop and the sessions addressed barriers, solutions, contextualised barriers and solutions, and a final open session on general discussion.

During this process, 19 barriers to nature-based coastal protection were defined. Primary barriers were a lack of education and awareness, community support, necessary expertise and technical guidelines, as well as uncertainty around the risk reduction that can be achieved, planning and regulatory processes and ownership of the structures after construction. As part of this workshop, short- and long-term solutions for enabling nature-based coastal protection in response to the primary barriers were identified. The most important take-home message was the need for a national technical guideline supported by scientific research and development. The next step for this work includes a review of the solutions proposed by the relevant organisations that can take responsibility for moving them forward. Only when Nature-based Solutions (NbS) are applied at large-scales and for a wide range of conditions will both evidence and methodologies be established to a level consistent with conventional coastal engineering approaches.

3. Common themes

A workshop was held in Canberra (July 2023) with project team members and representatives from federal and state government departments, industry partners, NGOs, and scientists and academics. The aim was to present the preliminary findings of this project, and to gather feedback, responses and information needed for the remainder of the project. Following the workshop, a project team meeting was held in addition to individual discussions and meetings to ensure the team collected all available information. During the workshop, and in preparing the final reports, a series of common themes emerged which cut across all the key barriers to large-scale restoration. These points are outlined below.

3.1 Risks to restoration

Despite the expanding network of marine and coastal restoration experts and highly skilled practitioners, there remains a risk that Australia will not achieve national targets or obligations, and overall protection of these important ecosystems. Indeed, ‘risk’ emerged broadly as a theme during the project, noting that risk can be perceived differently among restoration actors and stakeholders. For example, workshop participants highlighted the risk that nature-based coastal protection would not provide an equivalent solution, as a minimum, to traditional hard engineered solutions. This concern stems from anecdotal and data limited issues in restoration practice. However, the risk in this instance may be overcome by access to more data and demonstration that alternative solutions to traditional approaches is necessary. Removing risks could result in greater uptake of these alternative solutions (i.e., would weighing the risk of a particular restoration solution relative to the risk of doing nothing equate to ongoing ecological decline?).

Failing to include all key stakeholders in projects was outlined as another risk to the success of restoration projects (for example, not all interest actors were included in first defining the restoration goals, which can create challenges further in the project cycle when interest actors become involved). In this instance, the perceived risk could be overcome, or mitigated much as practicably possible, with greater time and funding to engage the main stakeholders in projects. This inclusion could be more clearly demonstrated particularly during funding applications that capture this evidence – possible joint submissions or a funding allocation to project partners to cover costs to be involved in project is another way to reduce this risk.

From a governance and legal perspective, risk is always a consideration in project activities, and requires careful consideration and mitigation. Given the complexity of the relevant legal and policy frameworks, a fundamental strategy for minimising legal risks is to engage a lawyer, along with other expert consultants or advisors, to ensure that all the necessary permits are obtained prior to commencing work. While legal liability for completed restoration activities may not be able to be resolved ‘up front’, the long-term implications of a restoration activity must also be considered by project proponents and government decision makers. For example, installation of shellfish reefs might pose a navigation hazard, which means a group or authority needs to take responsibility of the asset and any liability risks (e.g. government or group installing the restoration reef?). The management and liability of these new or restored natural assets was discussed during this project with project partners, with all agreeing that ownership of the asset is not consistently determined among states and restoration habitats. These responses are consistent with our analysis of the relevant legal frameworks, which are unclear and inconsistent on these longer-term considerations. Reef ownership and future liability risks require further investigation.

3.2 Hurry up – go slow

Despite the interest by groups (government, industry, community) and more projects and research underway funded through programs such as NESP MAC, feedback and discussions during this project indicated that progress and expansion should not be hindered. Indeed, progress should be encouraged, and it will require a fit for purpose governance with appropriate checks and balances in place. However, there was also a strong message that for co-design, inclusion, and acceptance to be meaningful and respectful, it takes time to develop trust and partnerships. Some discussions indicated it could take years to properly develop the necessary trust required to underpin a long-term and successful partnership. However traditional funding models require restoration to be undertaken in a fairly short period, which essentially means these partnerships must have already been developed.

3.3 Codesign and inclusion a must

The preparation of a restoration project or program must be completed in conjunction with all local actors. This includes not only landholders or government, but also local Indigenous groups and community more broadly - this was a strong message during the Indigenous co-design and NbS interviews and workshops during this project. This inclusion is essential and

has the major advantage that it creates a sense of inclusion and influence in a project outcome/s, and it ensures that the measure of success is agreed to by all actors, at the start, before any activities are undertaken or completed. It has another important advantage also, in that it can pre-empt and address any challenges to the project outcome prior to commencement, and result in a project outcome that empowers the local community and motivates more restoration to commence. Finally, inclusion is a must as it means that participants learn and develop new skills that can be taken forward to new sites, contributing to upscaling restoration. A major challenge in delivering large-scale restoration is the lack of enough skilled and experienced personnel, which could be addressed by including all local interest groups in projects early on during the design phase and contributing to their upskilling (these training programs are going to be critical to upskill the personnel who will be needed to reach national targets, for example, such as the 30x30 target). There is increasing recognition that inclusion is important, and a key ingredient in achieving national and international targets. During the various workshops and forums held during this project, the need and recognition of inclusion and co-design was consistently raised as a discussion point and has been genuinely embraced now with new and emerging restoration projects in Australia.

3.4 Funding

The cost of restoration needs to align to the long-term processes it takes for works approvals and the fact that it may take many years or decades for ecosystems to recover. Funding for research and development was raised during all workshops and discussions with research partners. Traditional funding sources are too ephemeral, and when announced there is a relatively short timeframe to prepare a fully considered and co-designed project proposal. Indeed, if a project has not already been in the pipeline well ahead of the funding announcement, an application may be impossible. There are also challenges with funding needed to get through the permitting (can take between 18-36mths) leaving less funding resources for monitoring and evaluation. It was apparent again during the workshops and discussions with project end users during each of the three sub-projects here, that funding for restoration projects needs to move beyond ad hoc and short-term arrangements. There are many examples where projects have needed multiple funding rounds to complete the work, often from different funding sources. Nationally, the amount of funding that is announced for restoration is very small relative to the level of impacts that need to be addressed, and the extremely high value that marine and coastal ecosystems provide through provision of ecosystem services. Participants in this project agreed that, in an ideal

scenario, marine and coastal restoration projects would be resourced with no funding gaps. This funding would extend to maintenance of project sites after completion, and also ensure that human capital remain in place long-term, as there is currently a risk that trained staff are lost when the funding ends. Environmental markets are emerging in Australia and continue to indicate a longer-term funding prospect for organisations working in restoration. However, the timing of these market mechanisms and notably delivery of the payments remains unclear. There is promise that environmental market mechanisms might be an important part of future funding of restoration in Australia.

3.5 Unknowns and knowns

Restoration of marine and coastal ecosystems has been described as a learning process. With each project more is learned, which can in turn be shared among interested networks. However, while this sharing of knowledge is important, there remains a challenge for groups and organisations to be able to consider and design for future unknowns. An example of this is future projected climate changes and how marine and coastal ecosystems will be able to respond, adjust and become more resilient to future conditions. For example, in the design and implementation of Nature-based coastal protection solutions, the ability for works to respond positively to future conditions was outlined during the workshop in this project. Responding to this future change will be challenging but needs to be included in planning and design/construction.

Other future unknowns might include new advancements in technology. This was a discussion point during the NbS workshop, where there is clearly a need to advance technology, and research and development in this domain. As more data becomes available following trials of new advancement in Nature-based engineering, preparation of guidelines and technical specifications will be possible. In the advent of these data and details, the confidence and understanding of these alternative approaches to coastal protection, and therefore the risks, can begin to be overcome.

3.6 Access to data and sharing

Feedback from government, industry, Indigenous groups, community and NGOs during the various workshops, stakeholder meetings, and the 2023 ACRN Symposium outlined a clear need to develop a framework for coordinated access to information with respect to marine and coastal restoration, including NbS. There was also discussion during these workshops etc relating to the need for a reporting system on restoration projects/outcomes, which would

assist Australia to report on the 30x30 targets. In addition, there is a need for a reporting, monitoring and evaluation platform which is live, updated, curated, funded and maintained, with the underpinning work to support its adoption and uptake (Cadier et al. 2024; Eger et al. 2022). This feedback is important and needs to be responded to, to achieve coordination and sharing of new learning in the field. While government agencies have information on websites that are regularly updated (e.g. Queensland Government – [WetlandInfo](#)), which are a major and important resource for local groups and community, access to this same information, that is specific to a region or state, is generally missing. Scientific data generated from research and consultancy projects needs to be widely available, especially for projects where important lessons have been learned.

The Australian Coastal Restoration Network presents an important opportunity to disseminate information, coordinate information sharing and connecting people across the business of restoration (Figure 3). At present the network has 455 members, is free to join, and has regular newsletters, social media posts and an annual symposium. The network has also been a successful investment opportunity by NESP MAC, in the short time since it was restarted in 2023.



Figure 3 Delegates at the second Australian Coastal Restoration Network meeting in Townsville, James Cook University Communication (photo May 2023).

Sharing and disseminating information can be challenging and it requires on-going commitment and funding, to ensure that the restoration community will have access to required information. With increasing interest in restoration and as the number of projects expand and continue, there is a real need to ensure that data and information is available and shared. The ACRN is one strategy to achieve this, however, funding to maintain the network beyond the current NESP 2 program is required. Further, funding to host more events and to maintain up-to-date websites is required.

In sharing information and lessons, the opportunity to increase training for engineers and construction industry in relation to adoption of NbS was identified as critical for those working in the industry to feel confident in this new approach to coastal protection. Strong messages along these lines were raised in the workshop undertaken during this project. While the [living seawall database](#) is available at present, it will also require on-going review and update as new projects and technology are developed. Tools such as the living seawall database are potentially very useful for the restoration and NbS communities, but require a long-term commitment, or they risk also becoming an overlooked or lost opportunity.

The issues of training and access to restoration and NbS information, including technical guidelines, was also raised during this project by stakeholders and partners. As new technology and approaches to restoration and NbS become available, new specialist skills in construction, design, engineering, environmental management, environmental auditing, and monitoring and evaluation. By way of example, delivery of shellfish reef restoration has increased in several states in Australia, which has required machinery operators to up-skill or develop new ways to construct and deploy the infrastructure. These skills will likely continue to be in demand as more government, NRM, industry, community and Indigenous groups implement this restoration strategy to restore shellfish reefs. It is possible that restoration and NbS could stimulate major job growth across a range of sectors, if designed and supported appropriately to enable this opportunity.

4. Looking forward

While significant on-ground restoration work has been completed around Australia, more effort is needed to ensure not only that our national and international targets are met, but that sensitive and culturally significant ecosystems are protected and remain resilient to future changes in climate. At the local scale, restoration is important for local groups and communities? that are strongly interested in their local area, but achieving large-scale

restoration targets will require linking these local projects or increasing their size, which requires support by greater funding. Developing a road map was an important foundation for coordinating large-scale restoration that recognises, and scale of the opportunities and interests at stake. Parts of the road map are now currently underway. For example, a strong network is already being built in Australia to share information and knowledge (Principle 10 in the roadmap to restoration, “knowledge is shared effectively” project 1.6) with NESP investment into the Australian Coastal Restoration Network. The ACRN has also become an important central point for information sharing, and networking opportunities, and an avenue for international groups to connect with Australian researchers and practitioners. Funding through NESP MAC for the continuation of this network, via a paid Secretariat, is in place until 2026.

In completing the road map, the current project has taken a deeper dive into several of the key restoration barriers, relating to governance, co-design and inclusion, and adoption and de-risking concerns relating to the application of nature-based coastal protection. This project has further advanced discussions among networks, identified and provided direction and on priority short- and long-term solutions to the challenges, and has identified a possible pathway forward for greater inclusion of diverse participants in the coastal and marine restoration community.

Looking forward, the Australian Government has initiated law and policy reforms to implement its Nature Positive Plan, which signals the need for urgent investment in nature repair, facilitated by coordinated planning. However, clear guidance and strong governance frameworks will be needed to clarify the risks and opportunities, and to make nature repair attractive to investors including government and non-profit actors, industry, landholders, community and Indigenous groups. The Australian Government’s new Nature Repair Market aims to enable nature-related investment by the private sector for landholders and communities to conduct nature repair activities, through the Australian Government Ecosystem Restoration Fund and the Blue Carbon Ecosystem Restoration grants, in addition to philanthropic funding that is possible through non-profit organisations. NESP has supported this much-needed next step of improving governance frameworks and incentives for nature repair by investing in NESP research with a new funded project (NESP Project 4.10 *De-risking nature repair activities in Australian coastal and marine ecosystems*). That project will build on the findings of previous NESP research and bring together leading research agencies and research users in a united approach to support and guide the key objective of scaling up nature repair of Australia’s marine and coastal ecosystems. This new

project will help to achieve improved governance and incentives for nature repair through the following activities:

- Updating databases of marine and coastal restoration and nature repair activities in Australia;
- Compiling an evidence base to reduce the (perceived) risk of nature repair projects for investors, managers and practitioners; and
- Drafting a national investment framework to guide and coordinate future investment into nature repair.

These activities will consolidate the evidence base and guide a more coordinated national approach to upscaling nature repair activities in Australia. This new project will also enable research users including the Australian and state governments, natural resource managers, non-profit agencies, researchers and community and Indigenous groups to be better equipped to understand the risks and benefits of nature repair, make more informed decisions which optimise investment in and evaluation of nature repair activities, manage and participate in nature repair and environmental markets, and identify and respond to research priorities. Working together as a community through the Australian Coastal Restoration Network will help the Australian Government to meet priorities such as the targets set under the Kunming-Montreal Global Biodiversity Framework and accelerate restoration outcomes through updates to the national Strategy for Nature, the National Biodiversity Strategy Action Plan and launch of information portals housed by the new Environmental Information Australia. This forward-looking project has been funded and will commence February 2024 with an anticipated completion date of December 2026.

5. Conclusions

A great deal of investment, effort and commitment has been demonstrated by project proponents into marine and coastal ecosystem restoration across Australia. These examples, and the interest that continues to emerge more recently with the development of Australia's first blue carbon methodology, means that Australia needs to be working and investing in the architecture required for large-scale project developments. To achieve this will involve considerably larger amounts of investments, which is potentially possible via environmental market schemes. Importantly, the steps necessary to be ready for the opportunity requires coordination (e.g. the road map – NESP 1.6), examination of the main

barriers to large-scale restoration (this NESP project), a way to facilitate information sharing and collaboration (e.g. the Australian Coastal Restoration Network and co-design), solutions that will support more Indigenous participation in restoration, and an investigation into the opportunities and requirements to derisk nature positive planning, data capture and articulation of project successes (NESP 4.10 commencing March 2024). The journey so far has been important and timely, and the opportunity here is to set up the architecture to support a multidecadal program and network of marine and coastal restoration practitioners in Australia. If coordinated, streamlined and supported, protection and restoration of Australia's marine and coastal environment and the myriad of services they provide is possible.

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