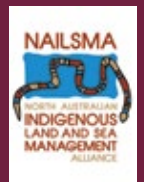




Northern Territory Blue Carbon Research Strategy

2024-2026

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Contents

Preamble	2
Background	3
Blue Carbon policy and legislative framework	6
Research strategy	15
A partnership approach	16
NT Blue Carbon Research Priorities (2024-2026)	17
NT Blue Carbon Market Opportunities Enabling Priorities (2024-2026)	19
References	22

Preamble

The Northern Territory (NT) Blue Carbon Research Strategy is an initiative to guide research for developing blue carbon market opportunities in the NT.

Blue carbon is the term used to describe the carbon captured and stored by marine and coastal ecosystems. Blue carbon ecosystems include seagrass, mangroves, saltmarshes, and supratidal wetlands. In the NT, blue carbon ecosystems are a component of the mosaic of vegetation in vast, interconnected floodplain wetlands. Thus, the research strategy includes research on wetlands and floodplains and, more broadly, climate science and integrated landscape management, reflecting the principles of sound landscape management.

In Australia, projects that restore blue carbon ecosystems through the reintroduction of tidal flows, deliver emissions reductions and elevated carbon storage in the restored landscape that enables carbon credits to be earned through the Australian carbon market. In addition to carbon abatement, blue carbon ecosystems provide a range of co-benefits to landholders, businesses and the community through improved water quality, coastal protection, breeding habitat for commercial and recreational fishes, tourism, and Aboriginal cultural benefits.

Recognising the numerous benefits that blue carbon ecosystems provide, the NT community, including the government, researchers, Aboriginal Land Councils, Non-government organisations and industry, are taking action to support the delivery of blue carbon projects and ensure the effective conservation of existing blue carbon ecosystems.

This document was developed by researchers from Charles Darwin University (CDU) in consultation with the NT Government, Northern Land Council, and the Indigenous Carbon Industry Network (ICIN). It follows a literature review on blue carbon in the NT (Groom et al., 2022). The Research Strategy outlines the status of research in the NT. It aims to guide sustainable blue carbon projects and increase participation in emerging market opportunities whilst improving biodiversity and cultural outcomes.

Background

Australia is a signatory to the Paris Agreement, a legally binding international treaty regarding action on climate change.

The central goal of the Agreement is to support the global response to climate-related threats by maintaining the global temperature increase this century to below 2°C above pre-industrial levels and to support activities that limit the temperature increase even further to 1.5°C.

The Australian Government has committed to a 2030 target to reduce greenhouse gas emissions by 43% below 2005 and net zero emissions by 2050 (www.dcceew.gov.au). Similarly, the NT Government has a policy to achieve net zero emissions by 2050 (Northern Territory Government, 2020). Ambitious collective action from governments, research institutions, non-government organisations, and global finance is necessary to find effective pathways to mitigate and adapt to an uncertain climatic future.

The NT is rich in blue carbon ecosystems and those connected on vast floodplains. The deposits of carbon stored within these systems are stored above- and below-ground biomass and in their anoxic but carbon-rich organic soils at significantly higher levels per unit area than terrestrial forests. The significant carbon storage within these ecosystems is released into the atmosphere if these ecosystems are damaged or destroyed (Lovelock et al., 2017). In addition to emissions mitigation, these ecosystems provide many other services that are important to meeting Australia's international and national commitments such as fishery nursery areas, commercial opportunities, improving water quality, coastal stabilisation, cultural and subsistence use for Indigenous communities, recreational value, and high biodiversity for many species (Macreadie et al., 2021; Vierros, 2017).



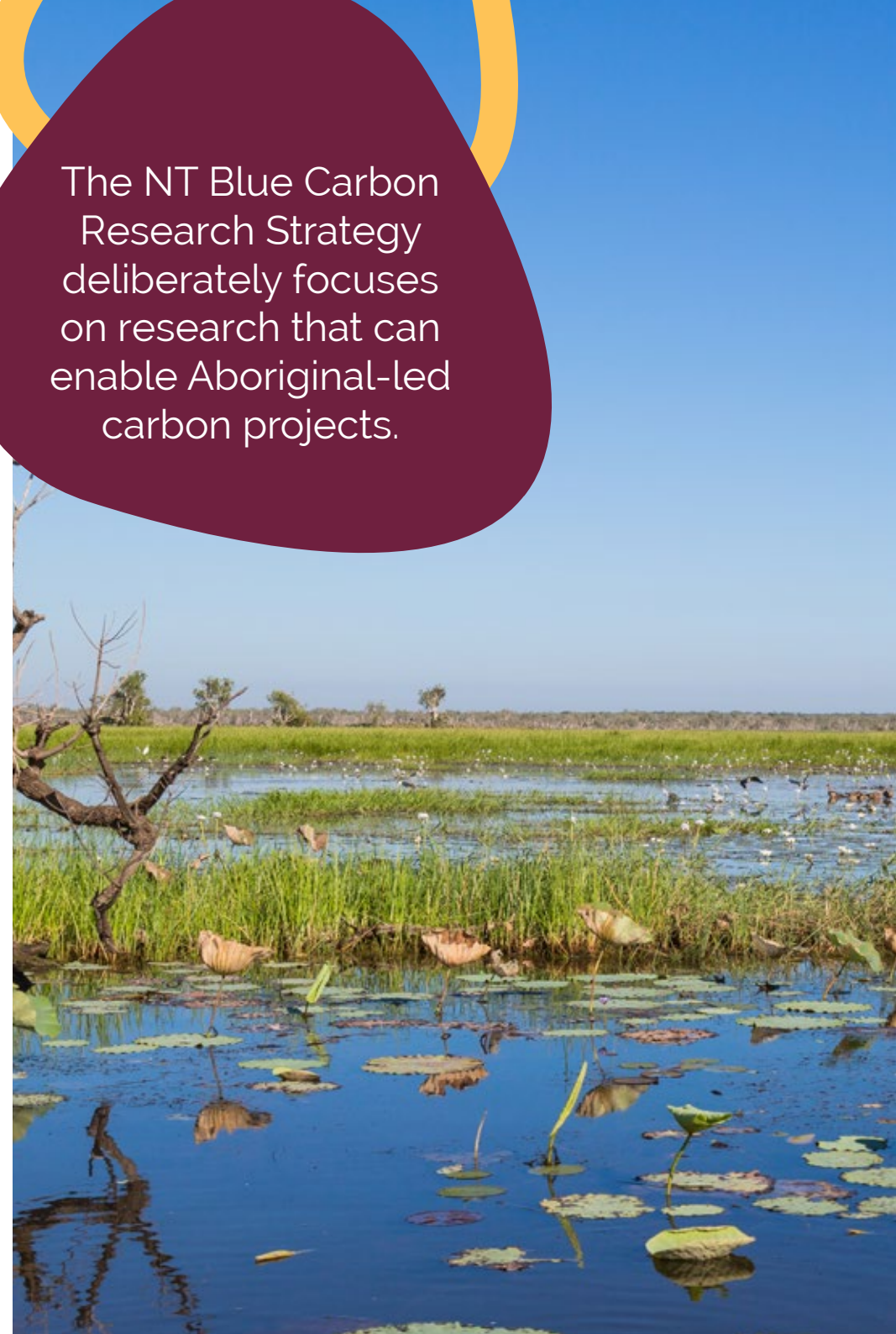
Australia holds
5-11% of global
blue carbon
stocks

Globally, recognition of coastal and marine ecosystem values and their capacity to provide a broad range of ecosystem-based mitigation and adaptation and resilience benefits for communities has increased. The role of blue carbon in sequestering and storing carbon from the atmosphere is increasingly recognised by governments in Nationally Determined Contributions (NDCs, as per the Paris Agreement) and National Greenhouse Gas Inventories. Research and non-government organisations are expanding efforts to improve our ability to track and manage emissions and conserve and restore these ecosystems.

The recent introduction of the *Australian Blue Carbon Method for Tidal Restoration (2022)* under the ACCU Scheme (administered by the Commonwealth Clean Energy Regulator) has highlighted the potential to expand the ACCU Scheme to other blue carbon ecosystems and methods. Blue carbon is a small component of the global voluntary carbon market (Macreadie et al., 2022). Its finance has the potential to grow overall investment in coastal and ocean nature-based solutions and build coastal resilience. This may occur through high-quality carbon credit projects that catalyse the achievement of climate targets while protecting people, respecting and accounting for local knowledge and tenure rights, and securing biodiversity benefits.

Australia holds 5-11% of global blue carbon stocks (Serrano et al., 2019). The NT has ~40% of Australia's mangrove forests and saltmarshes; therefore, protecting and managing these ecosystems is critical for carbon abatement and coastal stability, fisheries habitats, and potentially reducing greenhouse gas emissions by protecting of blue carbon ecosystems and restoring degraded sites. Most of these ecosystems along the NT's coastline occur on inalienable Aboriginal freehold land, which presents an opportunity for environmental, socio-economic, and cultural benefits to Aboriginal coastal communities. However, the approved Australian government ACCU Scheme method for blue carbon, the tidal restoration method, has limited scope for blue carbon restoration on Aboriginal Land or any areas where Aboriginal peoples have significant rights and interests in the NT. Under the current methodology, greenhouse gas emissions reduction can only be achieved by restoring anthropogenically degraded (not climate-driven or other 'natural' processes) blue carbon ecosystems where tidal influences have been removed or restricted (e.g.

The NT Blue Carbon Research Strategy deliberately focuses on research that can enable Aboriginal-led carbon projects.





with tidal gates or levees). The NT blue carbon literature review (Groom et al., 2022) identified pastoral properties in the Mary River region and Legune Station as having potential for a blue carbon project under the approved tidal restoration method; the development of these projects is the responsibility of the landowners.

Northern Australia is of interest to the development of blue carbon within the carbon market due to the extensive blue carbon ecosystems, most of which are on Aboriginal-owned land. The intactness of much of the coastline diminishes the opportunity for projects that deliver additional carbon benefits (above business as usual) under the current ACCU Scheme blue carbon method. However, some areas are significantly degraded, presenting an opportunity for restoration and blue carbon projects, potentially under new methods. Additionally, non-market-based opportunities may be available for developing long-term projects to monitor coastal wetlands and their change with climate change.

The NT Blue Carbon Research Strategy deliberately focuses on research that can enable Aboriginal-led carbon projects. Collaborative research focussing on developing new methods for the Australian carbon market is underway in the NT and other regions of Australia; these include research into abatement from seagrass restoration, integrated farmland management, and removing feral herbivores from wetlands on coastal floodplains.

Blue carbon research in the NT will adaptively respond to the aspirations of Aboriginal landowners, identify opportunities for market leadership and implement the principles of free, prior and informed consent (FPIC). Evaluating and mitigating carbon project risks in a place-based context will be necessary to support the prioritisation of activities needed to establish Aboriginal-led projects within the carbon and other environmental markets.

Scope

The NT Blue Carbon Research Strategy aligns with the Territory's values, is responsive to the local environment and supports Aboriginal people's leadership and engagement.

The NT Blue Carbon Research Strategy aims to:

- Recognise the stewardship, rights, interests and needs of coastal Aboriginal communities and support their leadership in developing blue carbon projects.
- Recognise the relevant roles of the NT Government and NT Aboriginal Land Councils when developing blue carbon research and engage with them accordingly.
- Focus on place-based assessment measures; partner with landowners and communities to co-design, building stewardship and accountability for the outputs and impacts.
- Guide research and partnerships to ensure that site-specific research projects are informed by advancements in blue carbon methods nationally and internationally.

Blue Carbon policy and legislative framework

Overview

Research is designed to work collaboratively with government agencies and Land Councils to ensure the required transformational change for the long-term benefit of the NT coast and communities. The research aims to inform policy that can generate investment in credible programs, leading to projects that improve livelihoods and ecosystem function while sustaining a traditional lifestyle and well-being.

Creating new ACCU Scheme methods and, more broadly, environmental accounting will accelerate the integration of policy and action with multi-layered benefits for the environment, economy, and society. Spatially explicit estimates of carbon stocks and sequestration in blue carbon ecosystems are needed to inform conservation and strategies as well as the National Inventories and climate mitigation policies.

The Paris Agreement requests each country to outline and communicate their post-2020 climate actions, referred to as their Nationally Determined Contributions (NDCs), to reduce national emissions and adapt to the impacts of climate change. International, national, and Territory legislation, conventions, and agreements are relevant to the growing blue carbon activity within the carbon market. They are a necessary framework to develop, amend, and review research priorities (Table 1). Research into the Territory's blue carbon market opportunities will align with these to guide ground-up decision-making, providing certainty, agency, and empowerment for coastal communities and improving marine and coastal management for the Northern Territory.

Table 1 Policy and legal instruments relevant to the blue carbon market in the Northern Territory

International						
United Nations Framework Convention on Climate Change	United Nations Convention on Biological Diversity	United Nations Sustainable Development Goals	Ramsar Convention on Wetlands of International Importance	United Nations Paris Agreement	United Nations Declaration on the Rights of Indigenous Peoples	
Commonwealth						
<i>Environment Protection and Biodiversity Conservation Act 1999</i>	<i>Carbon Credits (Carbon Farming Initiative) Act 2011 (Cth)</i>	<i>Native Title Act 1993</i>	<i>Aboriginal Land Rights (Northern Territory) Act 1976</i>	<i>Emissions Reduction Fund (ACCU SCHEME, 2014)</i>	<i>Draft Nature Repair Market Bill 2023</i>	
Northern Territory						
	<i>Territory Parks and Wildlife Conservation Act 1976</i>		<i>NT Fisheries Act 1988</i>		<i>Pastoral Land Act 1992</i>	
Other NT Statutory Documents	NT Parks Masterplan 2023-2053	Limmen Bight Marine Park Plan of Management	The Coastal and Marine Management Strategy 2019-2029	Aboriginal Land and Sea Action Plan, NT	Aboriginal Carbon Industry Strategy 2017	Greenhouse Gas Emissions Offsets Policy and Technical Guidelines



Guiding Principles for blue carbon research in the Northern Territory

The following Guiding Principles provide an approach for blue carbon research priorities in the NT that reflect the Territory's unique values and the opportunity to prioritise Aboriginal leadership. They are action-oriented expressions of core Territory values and should be incorporated into research practice.

The Guiding Principles take account of relevant cross-jurisdictional policy and seek to engage through inclusive dialogue and practice across multiple sectors, including Aboriginal landowners, research, government, non-government organisations, and industry. Of the NT's extensive coastline, ~85% is owned by Aboriginal Traditional Owner groups, with much of the remaining coast determined exclusive and non-exclusive native title land. Empowering Aboriginal people to monitor, maintain and increase blue carbon storage through ecosystem-based management will provide biodiversity protection in coastal and marine regions. It is a nature-based, multiple-benefit approach to climate mitigation and adaptation that deserves more attention and action in the Northern Territory.

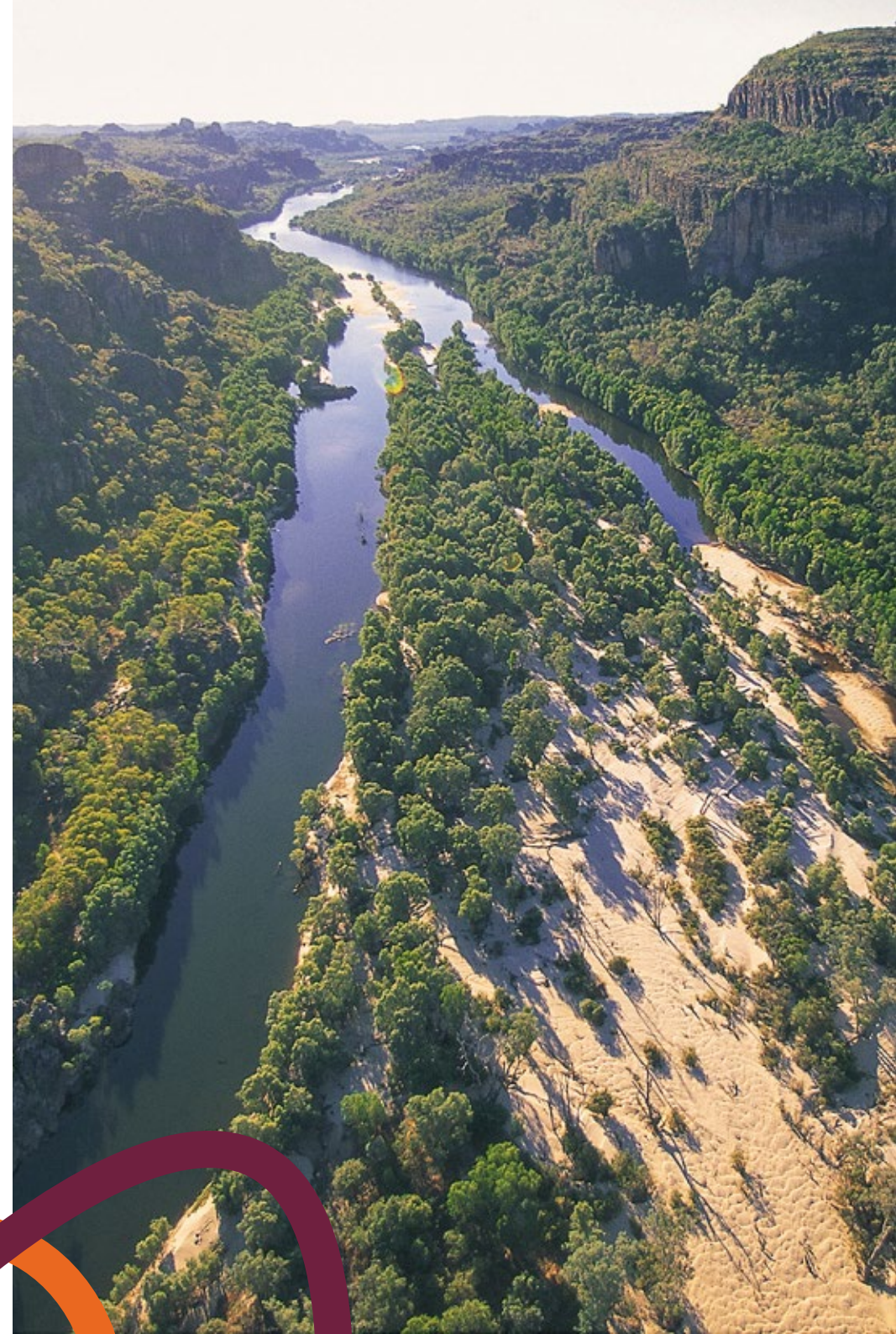


Table 2 Core values and guiding principles for NT blue carbon research

Core NT Values	Guiding Principles
<p>Aboriginal Lands, Seas, and People</p>	<p>Aboriginal leadership: Recognising, protecting and prioritising the rights, stewardship, cultures, knowledge, and histories of Aboriginal peoples is a fundamental recognition of Aboriginal peoples' inherent rights to self-determination, land, and resources. Recognising land and sea as integral to the lives of Aboriginal Territorians', and the legal and cultural rights of Aboriginal people in decisions regarding their land and sea.</p> <p>Collaboration and partnership: Engagement processes should be collaborative, involving Aboriginal communities as equal partners. Aboriginal peoples should engage in the decision-making processes that affect their lives, lands, and resources.</p> <p>Free, prior, and informed consent (FPIC): Aboriginal peoples have the right to give or withhold their free, prior, and informed consent in matters that affect them, including resource development, land use, and cultural heritage.</p> <p>Cultural competence: Engagement processes will be culturally sensitive, collaborative, and respectful, recognising and accommodating cultural practices, protocols, and values of Aboriginal peoples.</p> <p>Long-term relationships: Building and maintaining long-term relationships will be based on trust, reciprocity, and mutual understanding. This is essential for effective engagement with Aboriginal communities.</p> <p>Capacity building: Build capacity within Aboriginal communities to ensure future capability and leadership, as well as meaningful engagement, including providing access to information, resources, and training.</p> <p>Sustainable development: Engagement processes will aim to achieve sustainable outcomes that balance social, economic, and environmental factors, considering the long-term well-being of Aboriginal communities and their lands and seas. Incorporate cultural saliency into market operator actions to ensure equity.</p> <p>Reconciliation and healing: Engagement processes should contribute to reconciliation efforts, addressing historical injustices, promoting healing, and fostering positive relationships between Aboriginal peoples and other stakeholders. Identify opportunities for connection and healing.</p>

Core NT Values	Guiding Principles
<p>Empowering Communities</p>	<p>Participation and engagement: Actively involve community members in decision-making processes that affect their lives. Create platforms for open dialogue, encourage diverse perspectives, and ensure that community members have a voice in shaping their future.</p> <p>Capacity building: Provide opportunities for community members to develop skills, knowledge, and resources that enable them to take charge of their development. Offer training programs, educational initiatives, and access to tools and resources that enhance their abilities and self-reliance.</p> <p>Collaboration and partnerships: Foster collaboration between community members, local organisations, government agencies, and other stakeholders. Encourage partnerships that leverage the strengths and resources of various actors to address community challenges and create sustainable solutions.</p> <p>Respect for local knowledge and culture: Recognise and value the community's knowledge, traditions, and cultural practices. Understand that communities possess unique insights and understandings of their circumstances. Incorporate this local wisdom into decision-making processes and development initiatives.</p> <p>Equity and inclusion: Promote equity by ensuring all community members have equal access to resources, opportunities, and benefits. Embrace inclusivity by actively engaging marginalised groups, such as women, youth, indigenous peoples, and other vulnerable populations, and addressing their needs and concerns.</p> <p>Ownership and sustainability: Encourage community ownership and long-term sustainability of development initiatives. Support initiatives driven by the community, as they are more likely to succeed and endure over time: Foster self-reliance, local entrepreneurship, and the establishment of mechanisms for ongoing support and maintenance.</p> <p>Empowering leadership: Identify and support local leaders who can mobilise and inspire the community. Encourage leadership that is accountable, transparent, and representative. Foster leadership that empowers others, delegates responsibilities and builds the capacity of future leaders.</p> <p>Holistic approach: Take a holistic approach to community empowerment, addressing multiple dimensions of well-being. Consider social, economic, environmental, and cultural factors in the design and implementation of initiatives. Recognise that empowerment is not solely about improving material conditions but also about enhancing dignity, agency, and overall quality of life.</p> <p>Continuous learning and adaptation: Embrace a culture of learning, feedback, and adaptation. Regularly evaluate the impact and effectiveness of interventions and use this knowledge to inform future decision-making. Emphasise a flexible and iterative approach that allows for course corrections and adjustments based on community feedback.</p> <p>Long-term commitment: Empowering communities requires long-term commitment and sustained efforts. It is essential to recognise that change takes time and requires ongoing support. Foster enduring relationships with the community and commit to being a reliable partner in their development journey.</p>

Core NT Values

Nature Positive

'Nature-positive' outcomes entail protecting and restoring natural processes, ecosystems, and species.

Guiding Principles

Science and knowledge-based approach: Privilege local Aboriginal knowledge and incorporate sound scientific research and understanding of coastal ecosystems, carbon sequestration, and biodiversity. Ensure that culturally appropriate intellectual property agreements are in place to protect and respectfully report on and store Aboriginal knowledge (see: [CARE principles](#)). This will inform decision-making, target the most effective conservation and restoration actions, and monitoring activities. Apply the precautionary principle when considering the future effects of interventions on ecosystems.

Conservation and restoration: Focus on both the conservation of existing coastal ecosystems and the restoration of degraded or lost ecosystems. Protecting intact ecosystems prevents further carbon emissions while restoring degraded areas can re-establish their carbon sequestration and storage capacity. Support the ongoing regulated protection of blue carbon ecosystems in collaboration with Aboriginal landowners and custodians.

Stakeholder engagement: Involve local communities, Aboriginal peoples, and relevant stakeholders in decision-making processes. Traditional knowledge and participation are essential for successful implementation, as well as for the sustainable management of resources and ensuring social equity.

Ecosystem-based approach: Consider the interconnectedness and interdependencies of coastal ecosystems. Recognise the role of other habitats, such as coral reefs or tidal flats, in supporting the health and functioning of blue carbon ecosystems. Avoid isolated approaches that might negatively impact adjacent habitats.

Multiple co-benefits: Acknowledge and promote the benefits of blue carbon initiatives beyond carbon sequestration. These benefits may include coastal protection, improved water quality, enhanced fisheries, ecotourism opportunities, and livelihood support for local communities. It is essential to consider these co-benefits in project design and planning.

Adaptive management: Embrace adaptive management principles for flexibility and learning overtime. Management should consider adaptation to extreme events and sea level rise - management of landward movement of coastal ecosystems with sea-level rise. Monitor and evaluate the outcomes of conservation and restoration efforts, adjust strategies as needed and share lessons learned to enhance the effectiveness of future projects.

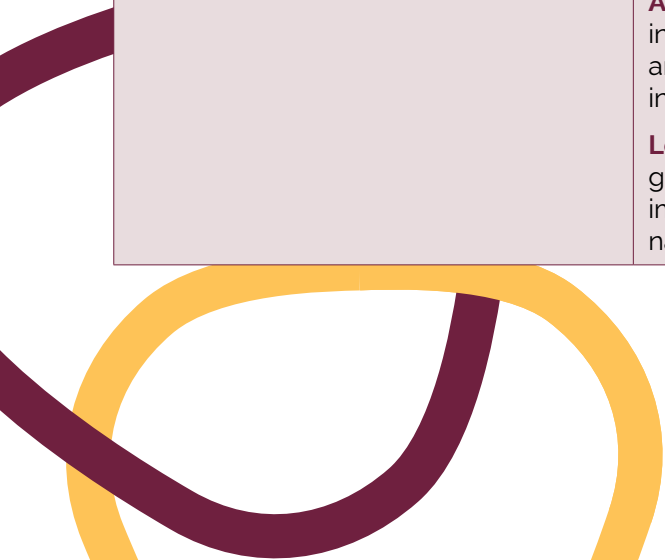
Policy and finance support: Support supportive policies and secure adequate financing for blue carbon initiatives. Collaborate with policymakers and financial institutions to create enabling environments that incentivise conservation and restoration, promote sustainable practices, and mobilise resources for implementation.

Collaboration and partnerships: Foster collaboration among various stakeholders, including government agencies, NGOs, research institutions, private sector entities, and international organisations. Form partnerships to leverage expertise, share resources, and scale efforts for maximum impact.

Long-term commitment: Recognise that achieving nature-positive blue carbon outcomes requires a long-term commitment. Develop ongoing monitoring, maintenance, and adaptive management strategies even after initial restoration or conservation efforts are completed.

Knowledge sharing and capacity building: Promote knowledge sharing and capacity building to enhance understanding and implementation of nature-positive blue carbon initiatives. Encourage the dissemination of research findings, best practices, and success stories to inspire and inform others engaged in similar endeavours.

Core NT Values	Guiding Principles
<p>Innovation, Knowledge, and Science</p>	<p>Best available knowledges: Apply the best available knowledge systems, including Aboriginal knowledge, local knowledge, and scientific knowledge. The science must be robust, and credible methods must be applied.</p> <p>Openness and collaboration: Foster an environment that encourages open sharing of information, ideas, and research findings.</p> <p>Ethical conduct: Uphold high ethical standards in all scientific research and innovation endeavours. This includes integrity, transparency, accountability, and respect for human rights. Ethical considerations should be integrated into the design, implementation, and dissemination of scientific and innovative projects.</p> <p>Evidence-based approach: Base decisions and actions on reliable and rigorous evidence. Scientific inquiry should be driven by systematic and objective investigation, experimentation, and analysis. Relying on evidence helps ensure that innovations and knowledge are founded on sound principles and can be trusted. Additionality should be demonstrated using clear evidence and reasoning.</p> <p>Continuous learning and adaptation: Embrace a culture of learning and continuous improvement. Be willing to adapt and revise approaches considering new information. Aligning public, private, and nongovernment sector entities, including in the establishment and implementation of spatial planning approaches</p> <p>Interdisciplinary integration: Promote interdisciplinary collaboration and integration of different fields of knowledge and expertise. Many complex challenges require diverse perspectives and approaches to find innovative solutions.</p> <p>Responsible innovation: Consider the societal, environmental, and ethical implications of innovations and knowledge creation. Strive for innovations that contribute to the betterment of humanity, preserve the environment, and address societal needs and challenges. Responsible innovation includes assessing and managing potential risks and unintended consequences.</p> <p>Accessibility and inclusivity: Ensure that innovations, knowledge, and scientific advancements are accessible to all individuals and communities. Promote inclusivity by addressing barriers such as gender, race, socio-economic status, and geographic location. Foster equal opportunities for participation and representation in scientific research and innovation.</p> <p>Long-term sustainability: Consider the long-term consequences and sustainability of innovations and knowledge generation. Strive for environmentally sustainable, economically viable, and socially beneficial solutions. Consider the impacts of climate change when aiming to address the needs of present and future generations while preserving natural resources and ecological balance.</p>



Core NT Values	Guiding Principles
<p>Building Capacity</p>	<p>Science-based approach: Blue carbon projects should be grounded in robust scientific research and understanding. This includes accurate assessment and monitoring of coastal and marine ecosystems, carbon sequestration potential, and the impacts of various activities on these ecosystems.</p> <p>Ecosystem-based approach: Capacity-building efforts should emphasise the conservation and restoration of coastal and marine ecosystems, such as mangroves, seagrasses, and salt marshes, which are vital for carbon sequestration and provide multiple ecosystem services.</p> <p>Collaboration and partnerships: Effective capacity building requires collaboration among stakeholders, including governments, local communities, NGOs, researchers, and private sector actors. Collaboration fosters knowledge sharing, resource pooling, and coordinated efforts toward common goals.</p> <p>Local community engagement: Engaging and empowering local communities in capacity-building initiatives is crucial. Their traditional knowledge, expertise, and involvement can contribute to successful project implementation, sustainable livelihoods, and long-term conservation efforts.</p> <p>Social equity and inclusivity: The capacity building should prioritise social equity, ensuring that benefits and opportunities are distributed equitably among stakeholders. It should address social and economic disparities and prioritise including marginalised and vulnerable groups.</p> <p>Knowledge transfer and education: Capacity building should focus on knowledge transfer and education to build local expertise and skills. This includes providing training, workshops, and educational programs to enhance understanding of blue carbon ecosystems, their value, and sustainable management practices.</p> <p>Sustainable financing: Building capacity requires adequate and sustainable financing mechanisms. Identifying and mobilising financial resources from public and private sectors, including international climate funds, grants, and innovative financing mechanisms, is essential for long-term success.</p> <p>Policy and governance support: Effective capacity building necessitates supportive policy frameworks and good governance. Capacity-building initiatives should promote policy reforms, institutional strengthening, and governance structures that incentivise blue carbon conservation and restoration.</p> <p>Monitoring, reporting, and verification: Robust monitoring, reporting, and verification mechanisms should be in place to track the progress, effectiveness, and carbon sequestration impacts of blue carbon projects. This ensures transparency, accountability, and credibility.</p> <p>Adaptive management: Capacity-building efforts should adopt an adaptive management approach, allowing for flexibility and with changing climate. Regular evaluations and adaptive strategies enable improvements based on new knowledge, changing circumstances, and stakeholder feedback.</p>

Core NT Values	Guiding Principles
<p>Equity, Finance, and Funding</p>	<p>Equity and social justice: Blue carbon initiatives should prioritise equity and social justice by considering the needs and rights of local communities, especially indigenous peoples and traditional resource users who depend on coastal and marine ecosystems for their livelihoods. Their involvement and participation should be actively sought and respected throughout the decision-making process.</p> <p>Benefit sharing: Blue carbon projects should aim to distribute benefits fairly and ensure that local communities receive a just share of the economic, social, and environmental benefits generated. This can be achieved through revenue-sharing arrangements, capacity-building programs, and sustainable livelihood opportunities.</p> <p>Sustainable Financing: Developing sustainable financing mechanisms is crucial for effectively managing and conserving blue carbon ecosystems. This may involve a combination of public and private funding sources, including government budgets, international funds, philanthropic contributions, and innovative financial instruments such as blue bonds or payments for ecosystem services.</p> <p>Long-term funding commitments: Blue carbon initiatives require long-term investments to support conservation, restoration, and monitoring efforts. It is essential to secure funding commitments that extend beyond short-term project cycles to ensure the continuity and effectiveness of conservation measures.</p> <p>Coordinated funding and collaboration: Coordination among various stakeholders, including governments, non-government organisations (NGOs), research institutions, and private sector entities, is essential to optimise funding and avoid duplication of efforts. Collaborative approaches can leverage diverse expertise and resources to address the complex challenges of blue carbon management.</p> <p>Science and monitoring: Robust scientific research and monitoring programs are fundamental for understanding blue carbon ecosystems, quantifying carbon stocks and fluxes, and evaluating the effectiveness of conservation and restoration interventions. Funding should support ongoing research, monitoring, and adaptive management practices.</p> <p>Knowledge exchange and capacity building: Promoting knowledge exchange and capacity building at local, regional, and international levels can enhance understanding and implementation of blue carbon initiatives. Funding should be allocated to support training programs, and workshops, among Indigenous communities to build the capacity of local communities, practitioners, and decision-makers.</p> <p>Transparency and accountability: Effective governance frameworks should ensure transparency, accountability, and the involvement of relevant stakeholders in decision-making processes. Funding mechanisms should have clear accountability mechanisms in place to track the allocation and utilisation of funds and to monitor the achievement of conservation and climate mitigation goals.</p>



Research strategy

As signatories to the Paris Agreement, Australia must undertake domestic mitigation efforts, reflecting their pledged Nationally Determined Contributions (NDCs).

Carbon sequestration in terrestrial vegetation has become a major focus in international and domestic climate policy, and progress on including coastal wetlands has lagged. A significant barrier has been the absence of appropriate methods for accounting for carbon abatement in coastal wetlands.

The NT has the major blue carbon ecosystems, but carbon storage estimates are highly uncertain due to the limited NT-specific field data and research programs. Also unknown is the extent of degraded blue carbon ecosystems in the NT. Although the coastline is mainly intact, coastal regions are severely impacted by feral ungulates, e.g., buffalo and pigs (that can be managed) and extreme climate events.

Credible methods are integral to reaching zero net carbon emissions and ensuring that targets are not overestimated. Research is integral to facilitating the development of additional credible methods suited to the management of Aboriginal-held coastal land in the Australian Government's Emissions Reduction Fund, the focus of the Australian Government's policy suite to reduce emissions. A robust research program is essential to achieve this.

For research to have its intended impact, it will engage constructively with the independent statutory authority, Clean Energy Regulator (CER), Carbon Abatement Integrity Committee (CAIC), and other relevant government

agencies to ensure advances in carbon market opportunities for Aboriginal people. The research must engage with landowners and stakeholders to scope locally relevant benefits as they are often context-specific. Projects should be pursued where ideas are co-designed and come from the ground up, reflecting community and Country needs and generating momentum across diverse land tenures, industry, and regulatory bodies.

Demonstration or pilot blue carbon projects are needed to establish proof of concept and show the financial, environmental, and socio-cultural benefits that can be generated. These projects will also provide the site-specific metrics to develop the Territory's blue carbon market opportunities. Communicating the process, risk, science and trade-offs in a way accessible to Aboriginal communities, government, and other agencies involved in blue carbon projects is critical to the success of this research and market opportunity development.

Blue carbon research can identify the current extent of specific coastal ecosystems, risks to their persistence including monitoring impacts of climate change, opportunities to improve conditions and confirm the historical extent and factors contributing to losses. This information could be relevant to other aspects of coastal ecosystem management aimed at protecting or enhancing overall ecosystem health as well as the health of species.

Two research themes reflect the core values identified for the NT; these are detailed following:

- Aboriginal lands and sea
- Innovation, knowledges and science

A partnership approach

Partnerships with Aboriginal Ranger groups, landowners, communities, government, Aboriginal Land Councils, research institutions, and industry looking to engage in the carbon market are fundamental to building knowledge around blue carbon in the environmental, cultural, social, and economic realms.

Targeted research will provide the evidence base to build the integrity of blue carbon credits and improve our understanding of the benefits and value of blue carbon ecosystem services. Blue carbon research, with its relatively broad spatial and temporal scope, may also help direct scientific thinking toward appreciating and learning from the refined land and water management by Indigenous peoples, founded on precise observations, a deep understanding of ecosystem relationships, and long timeframes.

Blue carbon research in the NT is in the early stages of development. It includes the collection of site-specific carbon metrics along some areas of the NT coast, spatial analysis of blue carbon ecosystems, blue carbon market feasibility studies based on hydrological modelling and investigation of the development of new methods important to Aboriginal land managers within wetlands on the broader floodplain.

There are multiple blue carbon research projects underway in the NT that are being conducted collaboratively by researchers from Charles Darwin University (CDU), Northern Australian Land and Sea Management Alliance (NAILSMA),

University of Queensland (UQ), Indigenous Carbon Industry Network (ICIN) and Macquarie University with Traditional Owners, Aboriginal communities, and ranger groups. These include:

Establishing Indigenous-led feral-ungulate control in northern Australia (National Environmental Science Program (NESP marine and coastal hub))

Feral-ungulate control to reduce greenhouse gas emissions from wetlands (NESP marine and coastal hub)

A National approach to Indigenous engagement in Australia's blue carbon and other environmental markets (NESP marine and coastal hub)

- Ferals and floodplains Macquarie ARC linkage grant: Partnership between Gurrumuru wāṅa waanju (Traditional Owners), Yirralka Rangers and Macquarie University

North-East Arnhem floodplain case study: Wetland mapping, LiDAR surveys, feral ungulate aerial survey method development and trade-off analysis for landowner decision-making

To date, funding has been provided through the Commonwealth NESP marine and coastal hub, INPEX, on behalf of the Ichthys Joint Venture and the NT Government.



NT Blue Carbon Research Priorities (2024-2026)

Research theme	Research activity	Estimated cost and timing
<p>1. Aboriginal lands and sea</p> <p><i>"the rights of Indigenous peoples and local communities in the context of climate action. Parties have agreed to develop a knowledge platform with local communities and Indigenous peoples." (The Paris Agreement)</i></p> <p><i>Aboriginal people's knowledge should be central to ecosystem solutions and incorporated as appropriate. Research should enhance and ensure the full and effective participation of local communities and Aboriginal peoples, including linking with knowledge holders and cultural authorities. FPIC will underpin all blue carbon partnerships.</i></p>	1. All research activities must support Aboriginal people's rights and leadership.	Ongoing
	2. <i>Consider emerging blue carbon methods for the ACCU Scheme: Quantify areas of degraded land and sea (suitable for restoration) at an ecological and culturally relevant scale. Determine the source of degradation and propose a co-designed management response—for example, an aerial survey of degraded floodplains and an abundance estimate of pigs and buffalo.</i>	~\$600K - FUNDED (2024-2025)
	3. Co-develop assessment, monitoring and restoration methods and tools with Traditional Owners for blue carbon ecosystems and associated biodiversity and cultural values to utilise in emerging markets.	~\$280K - FUNDED (2024-2025)
	4. Develop a trade-off analysis framework for any blue carbon activity that has the potential to impact community values. Respond to the information needs of landowners to enable informed decisions about their country and community opportunities.	~\$175K - FUNDED (2024-2025)



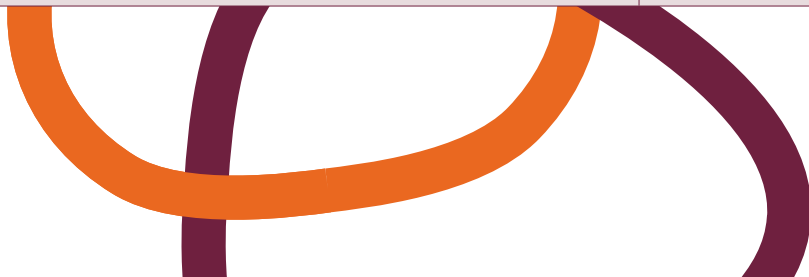
Research theme	Research activity	Estimated cost and timing
<p>2. Innovation, knowledges, and science</p> <p><i>Site-specific carbon metrics must be developed over several years to capture the variability in climatic and local environmental cycles. Prioritisation of areas for blue carbon restoration and protection is needed.</i></p> <p><i>The research will need to identify knowledge gaps and factors limiting the potential for the NT blue carbon market. Accurate baseline values will enable the planning and implementation of blue carbon projects.</i></p>	<p>1. Develop baseline data of degraded coastal areas and mapping that can support adaptive management decisions, site selection, and deployment of restoration and resilience interventions for blue carbon.</p>	<p>Ongoing</p>
	<p>2. Quantify the value of blue carbon co-benefits to diversify investment in blue carbon</p>	<p>\$100K (2024-2026)</p>
	<p>3. Investigate management actions that best maintain and promote carbon sequestration in blue carbon ecosystems.</p>	<p>~\$100K (2024-2026)</p>



NT Blue Carbon Market Opportunities Enabling Priorities (2024-2026)

Enabling theme	Enabling activity	Sector and timing
<p>1. Community engagement and empowerment</p> <p><i>The socioeconomic value of blue carbon ecosystems varies across the NT. Investigations of opportunities to package emissions reduction activities with other environment and land management services will achieve broader outcomes.</i></p> <p><i>To optimise the skills and resources of the broader community, effective consultation and engagement with landowners, producers, and stakeholders is necessary to ensure community buy-in and engagement.</i></p>	1. Facilitate publication of relevant research or information that can accelerate the adoption of and investment in blue carbon activities.	NTG, NGO, Research, Land Councils (2024)
	2. Clarify tenure arrangements over blue carbon ecosystem areas and provide accessible information to landowners and managers, e.g., seamapaustralia.org	NTG, Aboriginal Land Councils, Traditional Owners, Research (2024-2026)
	3. Provide clear and consistent advice, guidance, and support to landowners and primary producers to inform their decision-making.	NTG, NGO, Research, Land Councils (2024-2026)
	4. Identify barriers to new blue carbon projects and engage with relevant agencies and organisations.	NTG, NGO, Research, Land Councils (2024-2026)
	5. Establish or build on an existing network of landowners/managers, communicate with those interested, and establish processes where ideas for methodologies and restoration activities can come from the community via producer and stakeholder groups.	NTG, NGO, Research, Land Councils (2024-2026)
	6. Improve valuation of co-benefits for inclusion in blue carbon project assessment.	NTG, NGO, Research, Land Councils (2024-2026)
	7. Pursue a rights-based approach to developing carbon projects. Prioritise the establishment of Aboriginal-led carbon and environmental market projects through dedicated funding and policy development.	NTG, NGO, Research, Land Councils (2024-2026)

Enabling theme	Enabling activity	Sector and timing
<p>2. Finance and market equity</p> <p><i>The carbon market is a mechanism to facilitate the exchange of goods and services from producers with those who need to purchase them for emissions reduction.</i></p> <p><i>A legitimate and equitable system that safeguards landowner rights will be fundamental to avoid the high transaction costs and power imbalances that have characterised some carbon projects, e.g., carbon revenues disproportionately go to outside middle people.</i></p>	1. Link with Commonwealth knowledge transfer hubs to facilitate information exchange and capacity building.	NTG, NGO, Research (ongoing)
	2. Quantify and value ecosystem services and co-benefits to drive investment in blue carbon and co-benefits.	NTG, NGO, Research, Land Councils (2024-2026)
	3. Develop new metrics to quantify co-benefits and incorporate the value of co-benefits into financial frameworks.	NTG, NGO, Research, Land Councils (2024-2026)
	4. Engage with stakeholders to investigate blue carbon financing models and pathways.	NTG, NGO, Research, Land Councils, Commonwealth (2024-2026)
	5. Investigate potential barriers to blue carbon projects, including landholder hesitancy and financial outlay. Assess factors likely to influence permanence over 25- and 100-year periods in the NT and identify pathways to support project development.	NTG, NGO, Research, Land Councils (2024-2026)
	6. Build financial literacy within remote communities; a lack of access to information on managing natural resources puts communities at risk of exploitation.	NTG, NGO, Research, Land Councils (2024-2026)
	7. Create a framework for a feasibility analysis of the blue carbon site and project development.	NTG, NGO, Land Councils (2024-2026)
	8. Examine the application of and pathways to finance blue carbon, including developing projects to scale, private sector partnership models, and blended finance mechanisms.	NTG, NGO, Land Councils (2024-2026)



Enabling theme	Enabling activity	Sector and timing
<p>3. Policy and legislation</p> <p><i>A responsive and effective legal and policy framework is fundamental to mobilising a robust and equitable blue carbon market and increased protection of blue carbon ecosystems.</i></p>	1. Streamline environmental approval processes for blue carbon coastal restoration activities.	NTG, Land Councils (2024-2026)
	2. Establish strategic Sea Country management opportunities that facilitate the uptake of blue carbon projects and conservation.	NTG, NGO, Research, Land Councils (2024-2026)
	3. Determine the effectiveness of blue carbon ecosystem legislative protection, conservation, and climate change adaptation mechanisms.	NTG, NGO, Research, Land Councils (2024-2026)
	4. Support private and public land covenanting arrangements and other funding options to manage and conserve blue carbon ecosystems.	NTG, Land Councils (2024-2026)
	5. Identify ways Aboriginal communities can integrate blue carbon values and projects into Sea Country management.	NTG, NGO, Research, Land Councils (2024-2026)
	6. Identify an existing framework or develop an integrated governance framework for decision-making and regulation about coastal ecosystems and land tenure.	NTG, NGO, Research, Land Councils (2024-2026)
	7. Develop opportunities that provide a pathway for Aboriginal landowners to lead in developing carbon and environmental market projects.	NTG, NGO, Research, Land Councils (2024-2026)
	8. Identify existing or established Codes of Practice for proponents wanting to support Aboriginal-led projects. Proponents working in partnership with Aboriginal groups should demonstrate a social and cultural license to operate on Aboriginal land and sea and engage with Aboriginal people.	NTG, NGO, Research, Land Councils (2024-2026)

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