

Working paper

The role of natural capital accounting in enhancing climate resilience in Small Island Developing States

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Abstract

This working paper delves into the multifaceted issue of climate change and its impact on Small Island Developing States (SIDS), highlighting the role of natural capital accounting (NCA) in fostering climate resilience. Recognising the unique vulnerabilities of SIDS, this study emphasises the systematic quantification and valuation of ecological assets through NCA, and the importance of integrating this essential information into their economic and development planning. The research explores how NCA can guide SIDS in making informed decisions that balance environmental conservation, sustainable resource use, and economic growth. It also investigates the potential of blue carbon credit finance as a tool for environmental and financial sustainability. This paper presents case studies and a literature review to illustrate the practical application of NCA, aiming to provide actionable solutions that address the complex interplay of social, economic, and environmental aspects of climate change in SIDS. The goal is to offer insights that contribute to the resilience and sustainability of these regions, enhancing their capacity to navigate and adapt to the ongoing challenges posed by climate change.





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About this paper

This is one of 12 papers commissioned for the Small Island Developing States (SIDS) Future Forum, co-hosted by RESI and Island Innovation, alongside partners UN-OHRLLS, UNDESA, UKAid and AOSIS.

In each paper, a leading expert analyses one of five themes identified in the preparatory documents for the UN's Fourth International Conference on Small Island Developing States (SIDS4) in May 2024. The papers will contribute to SIDS4 as supporting material/annexes to the next 10-year roadmap for SIDS, the Antigua and Barbua Agenda for SIDS.

This paper was commissioned under the theme of 'Environmental Integrity: Transformative action for climate and resilience and environmental protection.'

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Acronyms/Glossary

CARICOM Caribbean Community

InVest Integrated Valuation of Ecosystem Services and Trade-offs

NCA natural capital accounting

SIDS Small Island Developing States

SEEA System of Environmental-Economic Accounting

SEEA-CF SEEA Central Framework

1 Introduction

Climate change presents profound challenges for Small Island Developing States (SIDS), uniquely impacting their ecosystems, economies, and communities (Metcalfe and Bennett, 2023). These challenges necessitate multifaceted strategies that foster resilience, especially in areas where climate impacts are most acute, such as environmental vulnerability and economic disruption.

Central to these strategies is natural capital accounting (NCA), which offers a systematic approach to quantifying and valuing ecological assets, thereby integrating essential environmental data into economic and development planning. By highlighting how NCA can be leveraged to understand the relationship between the environment and the economy, the paper proposes accounting for natural capital as a foundation for resilient and sustainable economic development in these vulnerable regions.

In addition, the study explores the financial dimensions of climate resilience, through the blue carbon credit finance mechanism. Conservation efforts can also offer an avenue for SIDS to generate economic resources through blue carbon credits as a financial instrument that also targets environmental objectives.

Overall, the paper aims to present a view of how NCA can be instrumental in guiding SIDS through the multifaceted nature of climate change. It seeks to contribute practical and achievable solutions that encompass environmental stewardship, economic stability, and innovative financial mechanisms, thus enhancing the resilience and sustainability of SIDS in the face of ongoing climatic changes.

2 Literature review

SIDS face formidable challenges from climate change, which critically impacts their environmental sustainability and the livelihoods of their communities. These islands are among the most vulnerable to climate change effects like rising sea levels, intensified tropical cyclones, and increasing water temperatures, all of which directly threaten their limited resources and infrastructural resilience (Nurse et al., 2014; Lewis, 2022). Addressing the complex interplay of social, economic, and environmental issues is crucial for enhancing resilience to these long-term impacts. Initiatives focused on improving risk knowledge and managing island resources effectively are essential in reducing vulnerability and enhancing the adaptive capacity of SIDS (Ninan and Inoue, 2017).

Effective policy responses to climate change require a comprehensive understanding of the interconnectedness between the environment and economy. The utility of natural capital data is instrumental in advancing environmental and climate objectives, as this data-driven approach enables the identification of critical ecological changes and economic influences, thereby facilitating targeted interventions that align conservation efforts with broader climate and economic goals (United Nations, 2020; World Bank, 2023). Furthermore, investments in natural capital, such as preserving and restoring ecosystems that act as carbon sinks, can bolster resilience against climate impacts, mitigating climate change effects and strengthening defences against climate-related disasters (Vardon et al., 2023).

The application of NCA provides valuable insights into its effective use in national policy and environmental management. For example, the WAVES partnership has been instrumental in implementing NCA in various countries, including the Philippines, where NCA data has significantly informed government strategies for managing natural resources amid diverse climate challenges. This ongoing environmental accounting effort is expected to play a crucial role in shaping national development plans, highlighting the tangible impact of NCA on policy and resource management (WAVES, n.d.).

3 Methodology

The research approach involved a literature review, encompassing academic journals, policy documents, and reports from international organisations. Key focus areas included natural capital accounting, its role in climate resilience strategies, and the specific challenges and opportunities faced by SIDS. The case studies used were chosen to illustrate the diverse ways in which NCA can be applied in the unique contexts of SIDS. This paper aims to bridge an existing knowledge gap by providing new perspectives on leveraging NCA for climate resilience in SIDS.

4 Climate change as a multifaceted issue

Climate change policy often suffers from the lack of an integrated approach, with different government sectors working in isolation and using disparate sets of data. According to the United Nations (2020), this disjointed approach often leads to policies that fail to capture the issue's complexity and overlook necessary trade-offs among various policy areas. Moreover, the World Bank (2012) reports that the contributions of natural resources like forests and wetlands are frequently underrepresented in national accounting systems. This segmentation in policy-making and accounting results in significant gaps. For example, while forestry activities might be recorded, the carbon sequestration benefits of forests often remain unaccounted for. Such omissions lead to a decline in ecosystems' visibility and value in national development strategies, especially in low-income countries where natural capital constitutes a major part of total wealth (World Bank, 2012). Given that natural capital is crucial, particularly in SIDS communities, there is a pressing need to integrate natural resource values into national policy frameworks.

As the international statistical standard for NCA, the System of Environmental-Economic Accounting (SEEA) provides a framework for measuring the environment and its relationship to the economy, offering relevant indicators for guiding climate change policy, and detailing the ways in which environmental factors are connected to economic activities and human well-being (United Nations, 2020). By revealing these critical linkages, the framework can equip SIDS with the necessary data to address climate change effectively. This data-driven approach enables a deeper understanding of how environmental changes impact economies and societies, facilitating the development of more resilient strategies. Utilising the insights provided by SEEA, policymakers in SIDS can move beyond isolated policy-making and better comprehend the complexities and trade-offs involved in climate change, leading to more integrated, effective, and sustainable solutions. However, it is essential to highlight the significance of not only relying on data but also interpreting it effectively for sound policy-making. Decision-makers must be able to make intelligible use of the data, coupled with their experience and judgement, to make informed decisions. This perspective is particularly pertinent in the context of climate change, where data-driven insights must be balanced with practical wisdom and an understanding of the unique circumstances of SIDS.

5 The role of NCA in enhancing climate resilience

5.1 Managing trade-offs: assessing how NCA can facilitate the balance between human activities, economic development, and environmental preservation

The SEEA offers two essential perspectives to aid policymakers in addressing climate change:

- SEEA Central Framework (SEEA-CF): This focuses on individual natural resources like energy and water. It examines how they are used in economic activities and the environmental impacts of their use, such as emissions and resource depletion. The SEEA-CF tracks both the quantities of these natural resources (stock accounts) and their usage and impacts in various economic sectors (flow accounts). This includes data on economic activities related to the environment and
 - helps in understanding the availability and sustainability of resource use (United Nations, 2020).
- 2. SEEA Experimental Ecosystem Accounting (SEEA-EEA): This complements the SEEA-CF by considering how different environmental assets interact within ecosystems. It includes accounts for:
 - the size and type of ecosystems (ecosystem extent)
 - the health and condition of these ecosystems
 - the benefits ecosystems provide to humans and the economy (ecosystem services)
 - the monetary value of these ecosystems (asset accounts).

Ecosystem services, such as flood control or soil retention, are crucial for mitigating climate change impacts. The condition and extent of ecosystems determine their capacity to provide these services. The SEEA-EEA also allows for spatial analysis, meaning it can show these ecosystem services on maps, helping to identify changes over time and space and supporting the mapping of carbon sequestration (United Nations, 2020).

Overall, the SEEA provides comprehensive data on how natural resources and ecosystems are used and their impact on the environment. This information can guide policymakers through different stages of the policy process, offering a detailed understanding of climate change impacts and potential solutions. For SIDS, this approach is especially important in addressing trade-offs and effectively balancing the often-competing demands of social interests, economic development, and environmental conservation, especially in the context of climate change. A notable example of this balancing act is the Coastal Marine Management Plan in Belize.

5.2 Belize's environmental challenge and NCA solution

Located on the Caribbean coast of northern Central America, with a coastline of 240 miles, Belize is home to a coral reef that is the largest in the Western hemisphere and the second largest in the world. Its coastal area contains a rich diversity of habitats and attractions including lagoons and mangrove forests. Over 40% of the Belizean population live and work on the coast, which supports thriving fisheries, aquaculture, and tourism industries (CZMAI, 2016).

Belize ranks as one of the world's most vulnerable and disaster-prone nations. Rising sea temperatures each year cause coral bleaching and a decline in fish populations, both of which are vital to the livelihoods of locals. The intensity and frequency of storms also cause significant disruptions to economic activities and profoundly affect the lives of community members (World Bank, 2021).

Recognising this urgent issue, Belize implemented the National Integrated Coastal Management project, developed in collaboration with the Natural Capital Project of Stanford University. The aim of the project is to guide sustainable use of coastal resources, harmonising conservation goals with the country's economic and social requirements, while preserving their integrity and ensuring ecosystem services. On 31 August 2016, the Belizean government officially endorsed the Integrated Coastal Management Plan (CZMAI, 2016).

In this project, NCA was used to scrutinise three distinct scenario sets, examining the potential conflicts between degradation trends and the utilisation and preservation of key habitats including coral reefs. Table 1 represents the findings from the InVest¹ habitat risk assessment of coral reefs and the corresponding scenarios results, namely, the Informed Management scenario,² the Conservation scenario,³ and the Development scenario.⁴

Integrated Valuation of Ecosystem Services and Trade-offs (InVest) is a decision support tool for mapping and valuing ecosystem services developed by the Natural Capital Project.

² A vision that blends strong conservation goals with current and future needs for coastal development and marine uses.

A vision of long-term ecosystem health through sustainable use and investment in conservation.

⁴ A vision that prioritises immediate development needs over long-term sustainable use and future benefits from nature.

Table 1 Habitat risk assessment on coral reefs

Findings Scenarios results Risk levels • Informed Management: results in a reduction of corals at high risk to about 90% of the area 81% of Belize's coral reefs were at medium risk currently at high risk. due to human activity. 1% of corals were at low risk, • Conservation scenario: results in dramatic while nearly 18% were under high threat from increases in the coral reef habitat. human activities. • **Development scenario:** results in corals at Regional threats high risk in more than five times the area at Over 90% of coral reefs in the Southern region face high risk in the current scenario. risk (medium and high potential threat), primarily due to fishing pressures and oil exploration. The South Northern Region was least threatened.

Source: Created by the author using data from CZMAI (2016)

The risk assessment revealed a majority (81%) of Belize's coral reefs to be at medium risk due to human activities, and a much smaller portion (only 1%) experiencing low risk. 18% of the coral reefs were revealed to be under high threat from human activities, indicating a critical need for management and conservation efforts in that area. The Southern region was indicated as facing the most significant risk to its coral reefs, with over 90% falling into medium – and high-risk categories. The primary threats in this area stem from fishing pressures and oil exploration activities, suggesting a need for targeted interventions and stricter regulations to mitigate these impacts. In contrast, the South Northern Region presents a less dire picture. This area was the least threatened, indicating either lower levels of harmful human activities or more effective management strategies in place to protect the coral reefs.

By implementing the Informed Management scenario, Belize reduced the area under the 'at high risk' category for its coral reef habitats by about 90%. This was achieved by imposing various regulations which managed the activities in this area, limiting coral exposure to the accumulated effects of various stressors such as fishing and oil exploration. Notably, the habitat assessment also revealed that significant increases in low-risk coral reef areas only occur under a Conservation scenario and, conversely, that high-risk areas for coral reefs could substantially increase under a Development scenario.

This assessment enables informed decisions that balance economic development with environmental conservation and emphasises that while economic development is crucial, it should not come at the cost of degrading vital ecosystems. This approach not only protects the environment, but also supports sustainable economic growth by preserving the natural resources that underpin key sectors like tourism and fisheries on which the communities of Belize rely. Incorporating these findings into the broader discourse on climate resilience, it becomes evident that the pathway chosen for development and resource management has profound implications for the health and sustainability of critical ecosystems.

The Belize case demonstrates the role NCA can have in proactive conservation and in developing informed management strategies to achieve enhanced climate resilience. By offering countries a structured approach to understanding and valuing the contribution of natural capital to their economies and societies, NCA enables informed decisions that balance economic development with social interests and environmental conservation. These insights into proactive conservation and informed management strategies are key to enhancing climate resilience in SIDS, where natural systems play a crucial role in the economy and buffering against climate change impacts.

5.3 Prioritising areas for protective measures and investments in resilience

SIDS are situated in some of the world's most disaster-prone regions, accounting for two-thirds of nations with the highest annual disaster-related losses. Since 2000, over 33,518 major natural disasters have struck SIDS, causing around \$22.7 billion in direct damages (OECD and World Bank, 2016). The damage costs from these disasters have risen from an average of \$8.7 billion from 2000–2007 to more than \$14 billion during 2008–2015 (ibid.). The World Bank (2013) reports that in the Caribbean, yearly damages to infrastructure from natural disasters range from \$500 million to \$1 billion. In the Pacific Islands, infrastructure and cash crops at risk amount to an estimated \$112 billion. This data underscores the devastating economic impact of these disasters on SIDS. The increase in damage costs over the years reflects the growing severity of these events. The threat is especially acute given that over 80% of inhabitants of small islands reside near coastlines, making them highly susceptible to sea-level rise and associated hazards such as storm surges (United Nations, 2021). The increasing frequency and intensity of disasters due to climate change make it essential for these states to focus on building resilience as a core component of sustainable development (OECD and World Bank, 2016).

The escalation of these disasters severely impedes the developmental growth of SIDS. Governments in these situations are often forced to reallocate limited resources from crucial development sectors to disaster response (ibid.). This diversion of resources underscores the precarious balance SIDS must maintain between development and disaster response. Therefore, effective risk management and enhanced preparedness for climate and disaster consequences are vital. By implementing NCA to improve the utilisation of data for strategic planning, SIDS can strengthen their resilience, ensuring a more secure future.

In this context, the case study of Anguilla exemplifies how NCA can be used to strengthen resilience by identifying vulnerable areas for enhanced resilient strategies.

5.4 Anguilla case study: strategic identification of areas for enhanced climate resilience

In 2016 the UK government funded the Natural Capital in the Caribbean and South Atlantic Overseas Territories project in Anguilla to build capacity in natural capital accounting. The aim of the project is to enable decision-makers to balance development goals with environmental preservation and consequently build resilience to natural disasters (Kuyer et al., 2019). The project spanned the entire island and utilised geographic information systems (GIS) to assess Anguilla's natural capital. The results of the analysis estimated the damage cost of storm surges in various areas seen in Figure 1.

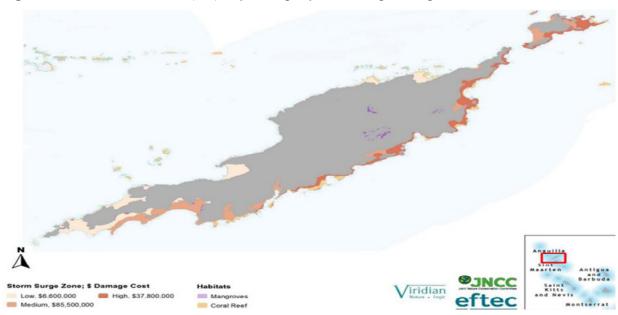


Figure 1 Total cost (in USD) of property damage by storm surge in Anguilla)

Source: Kuyer et al. (2019)

Based on the findings from Anguilla's application of NCA, it is evident that the island faces significant challenges due to climate change, particularly from storm surges. The assessment identified areas with low, medium, and high risk of storm surges and revealed that a significant portion of Anguilla's coastal area falls within the medium to high potential damage-cost categories. The NCA approach in Anguilla has been instrumental in quantifying the economic impact of storm surges. By classifying coastal zones based on their risk level and associating these with potential damage costs, the assessment provides a clearer picture of the financial implications of climate-induced coastal hazards.

This quantification is crucial for several reasons:

- **Risk management** it aids in prioritising areas for protective measures and investments in resilience.
- **Policy development** governments and planners can use this data to formulate policies aimed at minimising risks and damages from future storm surges.
- **Financial planning** the assessment informs budget allocations for disaster preparedness and recovery.
- **Conservation efforts** this information can be used to enhance conservation efforts for protective habitats like mangroves in areas prone to high-risk damage.

The Anguilla case study underscores the value of NCA in addressing the economic implications of climate change impacts. By identifying high-risk areas for storm surges, NCA equips decision-makers with vital insights that facilitate informed decisions for enhancing the climate resilience of vulnerable regions.

5.5 Blue carbon credit finance

The current climate and development finance architecture fails to meet the speed and scale of SIDS' needs (UN-OHRLLS, 2022). Despite being disproportionately affected by climate change and contributing only 1% to global carbon emissions, SIDS received a mere \$1.5 billion of the \$100 billion pledged in climate finance to developing countries in 2019 (UNCTAD, 2022). Additionally, barriers to funding eligibility, especially for non-Official Development Assistance countries and territories, exacerbates this challenge. Their vocal advocacy for finance to respond to climate change emphasises the urgent need for a more responsive and tailored financial support system that aligns with their specific circumstances and vulnerabilities.

The conservation and rehabilitation of coastal habitats like mangrove forests and seagrass beds are crucial natural strategies for addressing climate change. Termed 'blue carbon' ecosystems, these areas are recognised for their exceptional ability to capture and store carbon at high rates, exhibiting a negative global warming potential – a rare property in comparison to most land-based and freshwater ecosystems (IUCN, 2017). Their remarkable capacity to sequester carbon at rates up to five times higher than tropical forests positions blue carbon sinks as crucial for climate mitigation efforts, and indispensable for preserving the vital ecosystem services these habitats provide. Therefore, leveraging blue carbon credits can be a strategic approach for SIDS to access climate finance. By monetising the carbon sequestration capabilities of their coastal ecosystems, SIDS can generate resources to fund resilience-building initiatives while simultaneously contributing to global climate mitigation efforts.

Blue carbon is becoming a focal point for businesses aiming to offset their residual emissions after implementing decarbonisation and efficiency measures. With an increasing number of companies committing to net zero emissions, blue carbon's appeal as a natural climate solution is on the

rise, especially due to its compatibility with corporate social responsibility and its environmental benefits (Friess et al., 2022). The financial industry, recognising the role of natural climate solutions in achieving corporate net zero targets, anticipates the voluntary carbon market to grow to as much as \$50 billion by 2030. In this market, about 20% of the global mangrove area – roughly 2.6 million hectares – could qualify for avoided deforestation carbon credits, with the potential to generate around \$1.1 billion each year (ibid.). This situation points to a growing trend in the commercial sector, where blue carbon is increasingly seen as a viable investment opportunity. The considerable financial potential within the voluntary carbon market for blue carbon projects is a key factor driving this interest (ibid.). Consequently, there is a surge in investor activity to identify and finance blue carbon projects.

NCA plays a vital role in enhancing the development and integrity of carbon credit markets, particularly for blue carbon projects. NCA offers accurate data on the carbon sequestration potential of these projects, which is crucial for the effective sale of carbon credits. This aids in the generation of additional revenue streams for conservation efforts and ensures the reliability of the carbon credits traded. The standardised approach of NCA allows for the consistency and comparability of data across different regions. This uniformity is essential for fostering international collaboration in blue carbon initiatives, ensuring that data from one region can be effectively compared with data from another. For SIDS, which often depend on external support and cooperation for environmental projects, the role of NCA becomes even more significant. It enables these states to participate effectively in the global blue carbon market, enhancing their ability to contribute to and benefit from conservation and climate mitigation efforts. The Bahamas emerges as a case study for utilising blue carbon credits as a climate finance solution.

The Bahamas' blue carbon credits: an innovative climate finance solution

The Bahamas is set to become a global pioneer in trading blue carbon credits. With its surrounding waters acting as a significant natural carbon sink, the nation's commitment to leveraging these assets for climate finance is groundbreaking. The Bahamas plans to be the world's first country to engage in blue carbon credit trading, a move that aligns with the increasing corporate and financial sector interest in natural climate solutions and corporate social responsibility (Bastian, 2023).

The nation's vast seagrass meadows, which cover up to 92,000 km2 and are essential for storing billions of tons of greenhouse gases, are at the heart of this initiative. The Bahamas government, recognising the potential of these ecosystems, has implemented a regulatory framework through the Climate Change and Carbon Initiatives Act, 2022 and the Carbon Credit Trading Act, 2022 to enable the trading of blue carbon credits, with the majority of the proceeds benefiting the Bahamian government (Bastian, 2023).

The potential market value of blue carbon credits is estimated to be vast, with the initial offering of at least 2.5 million carbon credits as early as 2024, and the possibility of up to 10 million

credits by 2030. The value of these credits could reach around \$90 each by 2030, contributing substantially to the national economy. This venture aligns with the Bahamas' commitment to the Paris Agreement's National Determined Contributions, aiming for significant contributions to global climate mitigation efforts (Bastian, 2023).

The role of NCA in assisting SIDS with blue carbon credit financing for climate projects is significant. NCA provides a critical tool in this context, by offering robust data on the carbon sequestration potential of blue carbon projects. This provides an additional revenue stream to support conservation efforts and enhances the integrity and development of carbon credit markets. Blue carbon ecosystems offer a natural climate solution that aligns with corporate social responsibility and also presents additional environmental benefits. The financial industry's recognition of natural climate solutions for meeting corporate net zero targets, and the anticipated growth of the voluntary carbon market, positions blue carbon as a viable and lucrative option for SIDS.

The importance of scale cannot be overstated for SIDS when confronting the international financial framework. In addressing their limited capacity, SIDS can greatly benefit from an aggregated mechanism for blue carbon credits. This strategy involves pooling blue carbon resources across multiple SIDS to create a collective with significantly enhanced scale and market presence. Such an approach can increase their negotiating power in the global carbon market and maximise the value of their blue carbon assets.

A practical implementation of this aggregated model is the regional collaboration under entities like the Caribbean Community (CARICOM). By unifying Caribbean SIDS, this model leverages their shared ecological characteristics to achieve economies of scale, leading to more efficient blue carbon project development and management. This regional approach enhances negotiating strength, fosters the sharing of knowledge and best practices, and aligns projects with regional goals, thereby creating a cohesive strategy for climate change response.

6 Conclusion and recommendations

NCA's comprehensive approach to enabling the understanding of the economic value of natural resources facilitates informed decision-making that integrates environmental preservation with economic development. The case studies from Anguilla, Belize and the Bahamas are particularly illustrative in demonstrating how NCA can be strategically applied in risk management, policy development, financial planning, and conservation efforts. They serve as compelling models for other SIDS to adopt and adapt in accordance with their unique contexts and challenges. As climate change continues to pose an existential threat to SIDS, the application of NCA emerges as a useful tool to better combat its impacts. By identifying and valuing natural capital, SIDS can make more strategic choices in resource allocation, policy formulation, and international collaboration, all aimed at enhancing their resilience to climate change.

6.1 Recommendations

Integrate NCA into policy-making

SIDS governments should integrate NCA into their economic and environmental policy frameworks. This integration would enable a holistic view of the value of natural ecosystems and their contribution to climate resilience.

Build capacity and knowledge sharing

There is a need for capacity building in SIDS to effectively implement NCA. International organisations, NGOs, and academic institutions should collaborate to provide technical support and share best practices.

Promote international cooperation

Given the global nature of climate change, international cooperation is essential. Developed countries and international financial institutions should support SIDS in implementing NCA through funding, technology transfer, and collaborative research.

Create an integrated policy-making framework

Governments should consider establishing a centralised governing body, such as a dedicated task force or a 'Super Minister', empowered to unify various ministries and departments. This integrated framework would ensure cohesive and collaborative efforts across previously siloed sectors, enhancing the effectiveness of policies related to climate resilience, environmental conservation, and economic development.

Develop an aggregated mechanism for blue carbon credits

Considering the challenges SIDS face in meeting the scale required by global financial architectures, there is a need to establish an aggregated mechanism for blue carbon credits. This approach would allow SIDS to pool their blue carbon resources, creating a larger, more impactful offering in the global carbon credit market.

NCA stands as a transformative approach for SIDS to address the challenges posed by climate change. By valuing and managing their natural assets, SIDS can enhance their climate resilience and ensure development in harmony with their unique environmental contexts.

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