



CLIMATE
ADAPTATION



BIODIVERSITY



PEOPLE

POLICY BRIEF

NATURE-BASED SOLUTIONS
IN SMALL ISLAND DEVELOPING
STATES CAN GENERATE
“TRIPLE WINS” FOR CLIMATE
ADAPTATION, BIODIVERSITY,
AND PEOPLE

Zoe Brown



EXECUTIVE SUMMARY



Small Island Developing States (SIDS) are among the countries most vulnerable to climate change, facing escalating risks from sea-level rise, storms, coastal erosion, ecosystem degradation, and threats to food and water security.

Nature-based solutions (NbS) are increasingly recognised as a key approach for climate adaptation because they can simultaneously reduce climate risks, support biodiversity, and strengthen livelihoods and local economies.

This positions NbS as a strategic approach for enabling synergistic progress across multiple international policy agendas, including the Paris Agreement, the Kunming-Montreal Global Biodiversity Framework, the Sustainable

Development Goals, and the Antigua and Barbuda Agenda for SIDS (ABAS).

This policy brief synthesises evidence from a systematic review of 49 studies reporting 53 NbS interventions across 26 SIDS (Figure 1). The underlying research draws on evidence from UN-defined SIDS, comprising 39 UN Member States and 18 Associate Members across the Caribbean, Pacific, Atlantic, Indian Ocean, and South China Sea regions. Most of these States are members of the Organisation of African, Caribbean and Pacific States (OACPS). As such, the findings presented in this brief are broadly applicable to OACPS SIDS while also drawing on lessons and experiences from the wider SIDS community.

KEY FINDINGS

- The majority of NbS interventions reported positive climate adaptation outcomes. However, many studies lacked robust evidence frameworks.
- NbS were reported to deliver “triple wins” for climate, biodiversity, and people, supporting livelihoods, food security, and local economies.
- Evidence is heavily concentrated in terrestrial systems, while coastal and marine NbS remain underrepresented despite growing coastal climate risks in SIDS.
- Formal economic appraisals and private sector involvement in NbS implementation were rare.
- Equity considerations, local ownership, and distributional impacts were often poorly reported.
- More than half of SIDS were absent from the peer-reviewed evidence base.

POLICY IMPLICATIONS

- NbS offer a core implementation strategy for the ABAS framework by advancing climate adaptation, biodiversity conservation, and sustainable development objectives simultaneously in SIDS.
- Strengthening the evidence base through baselines, counterfactuals, and long-term monitoring is critical for informed adaptation planning and investment decisions.
- Coastal and marine NbS should be prioritized within research, monitoring, and assessment efforts given the high exposure of SIDS to coastal climate risks.
- Robust economic evaluation and appropriate private sector engagement are necessary for greater adaptation investment and implementation
- Equity, justice, and local leadership should be treated as core components of effective NbS implementation.
- Greater support for SIDS-led research and knowledge-sharing is needed to strengthen the representativeness, accessibility, and relevance of the NbS evidence base.



WHY DO NATURE-BASED SOLUTIONS MATTER FOR SIDS?

SIDS contribute minimally to global greenhouse gas emissions but experience disproportionately severe climate impacts. Annual climate-related losses across SIDS are estimated at approximately 0.8% of collective GDP, while extreme weather events cause substantially higher mortality rates than in non-SIDS countries (Panwar et al., 2025).

Climate change threatens food systems, freshwater supplies, coastal infrastructure, fisheries, tourism, livelihoods, biodiversity, and cultural heritage across SIDS. At the same time, SIDS possess globally significant ecosystems, including coral reefs, mangroves, seagrasses, tropical forests, and agroecological systems that can help buffer climate impacts while supporting local economies and biodiversity.

This makes NbS particularly suitable to SIDS contexts as they provide an opportunity to address climate adaptation, biodiversity conservation, and sustainable development simultaneously. Nature-based solutions (NbS) are actions that protect, conserve, restore, or sustainably manage ecosystems to address societal challenges while simultaneously benefiting biodiversity and human wellbeing. When designed and implemented effectively, NbS can generate “triple wins” for climate adaptation, biodiversity, and people.

Examples include:

- Mangrove restoration for coastal protection
- Coral reef restoration and marine protected areas
- Sustainable fisheries management
- Urban wetlands and green infrastructure for flood management

BOX 1

DEFINITION OF NATURE-BASED SOLUTIONS

The United Nations Environment Assembly (UNEA) defines Nature-based Solutions as “actions to protect, conserve, restore, sustainably use and manage natural or modified terrestrial, freshwater, coastal and marine ecosystems which address social, economic and environmental challenges effectively and adaptively, while simultaneously providing human well-being, ecosystem services, resilience and biodiversity benefits” (UNEP, 2022)

BOX 2

WHY NBS ARE PARTICULARLY IMPORTANT FOR SIDS UNDER ABAS

Nature-based solutions (NbS) fit very closely and strategically into the Antigua and Barbuda Agenda for SIDS (ABAS) 2024–2034 (United Nations General Assembly, 2024). They underpin many of its priorities by directly addressing the climate, environmental, and socio-economic vulnerabilities of Small Island Developing States.

Nature-based solutions can be leveraged to operationalize the ABAS vision by translating it into practical, ecosystem-centered actions tailored to the unique vulnerabilities of SIDS.

KEY FEATURES OF NATURE-BASED SOLUTIONS

- Actions to protect, restore, or sustainably manage ecosystems
- Deliver multiple benefits simultaneously for biodiversity, livelihoods, and resilience Address climate, disaster risk, and development challenge.
- Cut across sectors: climate, economy, environment, society
- Offer integrated solutions, rather than siloed interventions
- Use existing natural assets
- Are cost-effective alternatives to grey infrastructure
- Should be locally led/community-driven

KEY FINDINGS



1. NBS GENERALLY PRODUCED POSITIVE CLIMATE ADAPTATION OUTCOMES

Nearly three-quarters of reviewed interventions reported positive outcomes for reducing climate risks. Reported benefits included reduced economic vulnerability, reduced flooding risks, reduced erosion, and reduced coastal storm impacts (Figure 2).

EXAMPLES:

In Jamaica, restored mangroves were found to reduce wind speed by 11%–80% and reduce wave heights by 13%–68% (Lee et al., 2022)

In the Solomon Islands, the area surrounding an established marine protected area reported an increase in small business entrepreneurship, such as eco-tourism (O Ha'apio et al., 2014).

However, many studies lacked robust evidence frameworks. Less than half used baselines, counterfactuals, or thresholds to assess effectiveness. This limits decision-certainty around NbS.

2. NBS CAN GENERATE “TRIPLE WINS” FOR CLIMATE, BIODIVERSITY, AND PEOPLE

Studies frequently reported social, ecological, and economic outcomes and found them to be mostly positive (Figure 3).

Reported social benefits included increased household income, diversified livelihoods, access to information and education, stronger community networks, and women's empowerment.

EXAMPLES:

In Fiji, a mangrove restoration project created new livelihood opportunities for women, such as shoreline fishing at high tide, which was not possible prior to the intervention (Medina Hidalgo et al., 2021).

Reported ecological benefits included increased species diversity, improved habitat connectivity, and reduction of local environmental threats (e.g. pollution).

Mangrove restoration **in Cuba** contributed to the recovery of fish and bird populations, including the Zapata rail and Cuban crocodile (*Crocodylus acutus*), a species of conservation concern (Miller et al., 2018).

3. LACK OF PEER-REVIEWED EVIDENCE ON COASTAL AND MARINE NBS

Coastal and marine ecosystems were underrepresented despite the major climate risks facing coastal communities in SIDS. This lack of representation is concerning given that coastal flooding and erosion are projected to intensify

significantly in coming decades and many SIDS populations, economies, and infrastructure are concentrated along coastlines.

Coral reefs, mangroves, and seagrasses are known to provide critical protection and livelihood benefits. Expanding evidence generation, monitoring, and investment in coastal and ocean-related NbS should therefore be a priority.

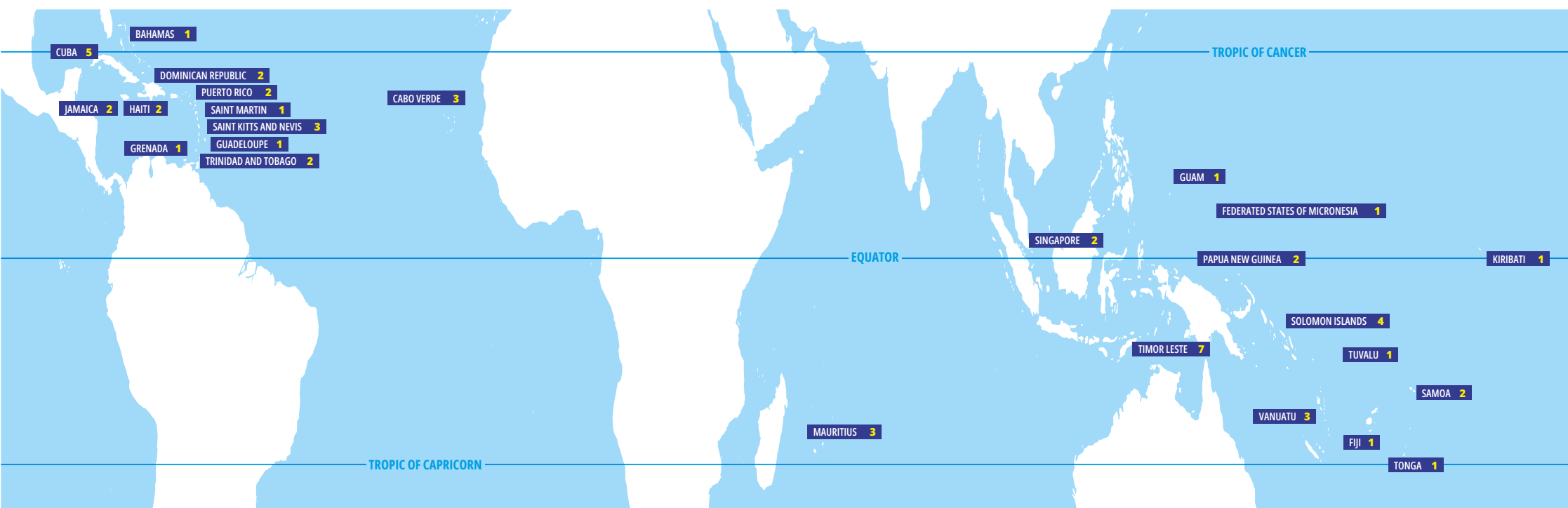


Figure 1
Global Distribution of NbS in SIDS

Map highlighting the quantity and distribution of reviewed studies of NbS interventions for climate adaptation in SIDS across the globe. (Redrawn from Brown, Z. et al., 2026). <https://BioRender.com/8iwmi74>

Figure 2
Reported climate adaptation outcomes in SIDS.

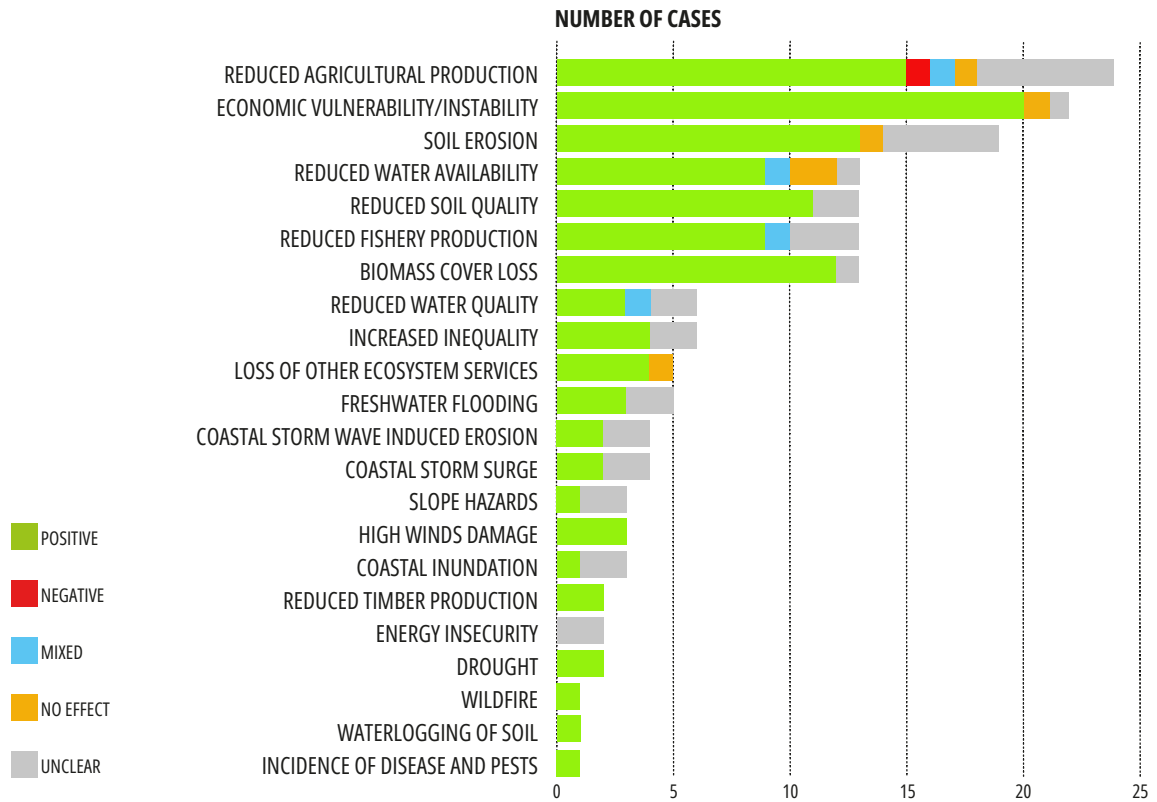
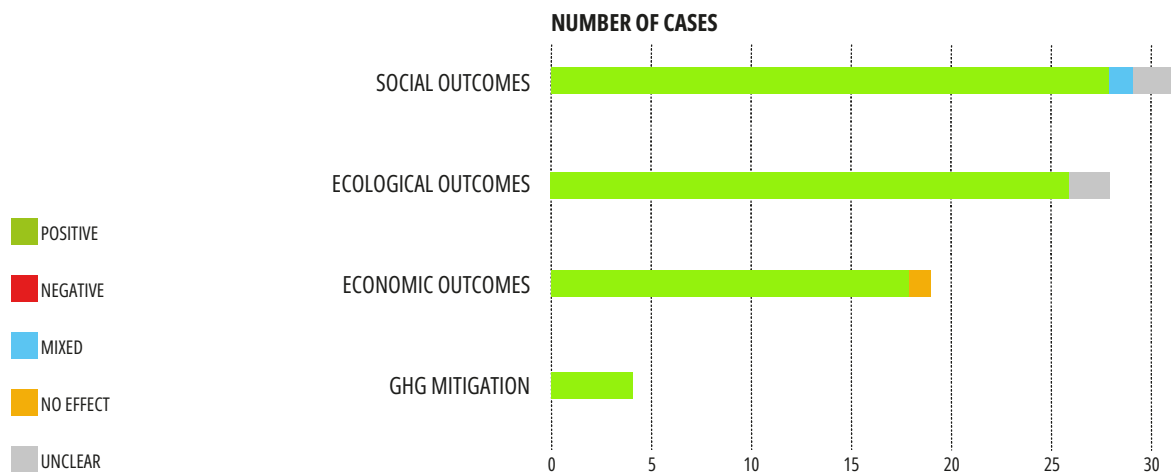


Figure 3
Reported social, ecological, economic & mitigation outcomes of NbS in SIDS.



4. ECONOMIC EVIDENCE & PRIVATE SECTOR INVOLVEMENT REMAINS LIMITED

Although many studies reported positive economic outcomes, formal economic appraisal was rare. Only a small proportion of studies conducted cost-benefit analyses, compared NbS to non-NbS alternatives or quantified long-term economic returns. This creates barriers for decision-makers and finance institutions seeking evidence on the economic viability of NbS investments.

At the same time, the review found evidence that NbS can increase employment opportunities, diversify incomes, and reduce disaster-related costs. Broader valuation approaches are needed to capture the full range of social, cultural, ecological, and long-term economic benefits generated by NbS.

Furthermore, private sector involvement was limited despite the resource constraints faced by many SIDS governments. The private sector therefore remains an underdeveloped opportunity for supporting NbS implementation in SIDS.

5. EQUITY AND JUSTICE ARE NOT PRIORITIZED

Most studies did not adequately assess equity and justice considerations such as rights and ownership, the inclusion of marginalized groups and knowledge pluralism. Furthermore, only around one-quarter of interventions explicitly

targeted poor or disadvantaged communities. This matters because NbS that fail to account for equity can reinforce existing inequalities or shift burdens onto vulnerable groups.

High-integrity NbS in SIDS should therefore seek to be locally led and context-specific, integrate and value Indigenous and local knowledge, ensure meaningful participation in decision-making, and equitably distribute benefits and risks.

6. MAJOR GEOGRAPHIC AND EVIDENCE GAPS PERSIST

More than half of SIDS had no representation in the peer-reviewed literature on NbS. Research was concentrated in a relatively small number of islands, particularly Timor-Leste, Cuba, and Solomon Islands.

This does not mean that other SIDS are not implementing NbS. Rather, many local adaptation

practices and interventions are likely undocumented or inaccessible through peer-reviewed literature, limiting opportunities for learning and knowledge sharing across SIDS regions.

In addition, most published studies were led by institutions from outside SIDS. Strengthening locally led research, regional collaboration, and inclusion of grey literature and Indigenous knowledge systems will be essential for building a more representative evidence base.

POLICY IMPLICATIONS



1. POSITION NBS AS A KEY PATHWAY FOR DELIVERING CLIMATE ADAPTATION, BIODIVERSITY, AND DEVELOPMENT OBJECTIVES IN SIDS

The evidence suggests that NbS can simultaneously address climate adaptation, biodiversity conservation, and socioeconomic resilience. This creates opportunities to align adaptation, biodiversity, and sustainable development agendas within SIDS policy frameworks.

2. INVEST IN THE EVIDENCE BASE NEEDED TO SUPPORT ADAPTATION PLANNING AND INVESTMENT DECISIONS

The lack of baselines, counterfactuals, and long-term monitoring limits the ability to assess the effectiveness, scalability, and reliability of NbS across different SIDS contexts. Strengthening evidence standards is therefore critical for informed adaptation decision-making.

3. PRIORITIZE COASTAL AND MARINE NBS WITHIN SIDS ADAPTATION RESEARCH AND ASSESSMENT AGENDAS

Despite the high exposure of SIDS to coastal climate risks, relatively few studies focused on coastal and marine NbS. This highlights the need for greater research, monitoring, and assessment of ocean and coastal NbS.

4. STRENGTHEN ECONOMIC EVALUATION OF NBS AND LEVERAGE PRIVATE SECTOR INVOLVEMENT

Limited economic assessment and private sector involvement may constrain adaptation investment and implementation of NbS in SIDS. Strengthening economic evaluation and exploring could support more informed adaptation decision-making, and appropriate private sector engagement can help to scale implementation.

5. PLACE EQUITY, JUSTICE, AND LOCAL LEADERSHIP AT THE CENTER OF NBS DESIGN AND IMPLEMENTATION

Limited reporting on equity, rights, and inclusion makes it difficult to assess who benefits from NbS interventions and whether vulnerabilities are reduced equitably. More inclusive and locally grounded approaches are needed to support socially just adaptation.

6. EMPOWER SIDS-LED RESEARCH AND KNOWLEDGE-SHARING

NbS initiatives and local adaptation practices in SIDS often remain undocumented or inaccessible through peer-reviewed literature. In addition, the concentration of research in a small number of islands and the dominance of externally led studies limits the representativeness of the evidence base. Developing knowledge-sharing platforms that support the inclusion of grey literature and documentation of local NbS initiatives could strengthen evidence generation and shared learning across SIDS contexts.

CONCLUSION

Nature-based solutions represent a significant opportunity for SIDS to address escalating climate risks while supporting biodiversity, livelihoods, and long-term resilience. The evidence reviewed suggests that NbS can effectively reduce climate vulnerabilities and deliver broad co-benefits across social, ecological, and economic systems. However, major evidence gaps remain, particularly around coastal and marine NbS, equity, economic appraisal, and long-term monitoring. Scaling high-integrity NbS in SIDS will require stronger evidence systems, sustained financing, inclusive governance, and greater support for locally led adaptation. In doing so, NbS can support the integrated delivery of key international and regional commitments, including adaptation goals under the Paris Agreement, biodiversity targets under the Kunming-Montreal Global Biodiversity Framework, and sustainable development priorities and the Sustainable Development Goals.

Nature-based solutions provide a core implementation strategy for the Antigua and Barbuda Agenda for SIDS (ABAS) 2024–2034, by translating its resilience, sustainability, and development goals into practical, ecosystem-centered actions tailored to the unique vulnerabilities of SIDS.

REFERENCES



Lee, S., Hall, G., & Trench, C. (2022).

The role of Nature-based Solutions in disaster resilience in coastal Jamaica: current and potential applications for ‘building back better.’

Disasters, 46(S1), S78–S100.

<https://doi.org/10.1111/DISA.12539>

Medina Hidalgo, D., Nunn, P. D., Beazley, H., Sovinasalevu, J. S., & Veitayaki, J. (2021).

Climate change adaptation planning in remote contexts: insights from community-based natural resource management and rural development initiatives in the Pacific Islands.

Climate and Development, 13(10), 909–921.

<https://doi.org/10.1080/17565529.2020.1867046>

Miller, V., Mirabal-Patterson, A., García-Rodríguez, E., Karr, K., & Whittle, D. (2018).

The SOS Pesca Project: A Multinational and Intersectoral Collaboration for Sustainable Fisheries, Marine Conservation and Improved Quality of Life in Coastal Communities.

MEDICC Review, 20(2), 65–70.

<https://doi.org/10.37757/MR2018.V20.N2.13>

O Haapio, M., Filho, W. L., Gonzalez, R., Holland, E., & Wairiu, M. (2014).

Mapping the economic costs and benefits of Coral Triangle Initiative (CTI) and Mangrove Rehabilitation Projects (MRP) in Solomon Islands: a study of two MPAs and one MRP.

International Journal of Sustainable Development & World Ecology, 21(5), 414–421.

<https://doi.org/10.1080/13504509.2014.957254>

Panwar, V., Noy, I., & Wilkinson, E. (2025).

Calculating loss and damage from extreme weather events in Small Island Developing States.

Regional Environmental Change, 25(2), 1–16.

<https://doi.org/10.1007/S10113-025-02408-7/TABLES/3>

United Nations General Assembly (2024).

The Antigua and Barbuda Agenda for Small Island Developing States: A renewed declaration for resilient prosperity.

Resolution A/RES/78/317, adopted 23 July 2024.

New York: United Nations.

<https://digitallibrary.un.org/record/4055364?v=pdf>

UNEP (2022).

Nature-based Solutions: Opportunities and Challenges for Scaling Up.

ABOUT THIS BRIEF

The policy brief has been co-published by the Nature-based Solutions Initiative, University of Oxford (UK) and the OACPS-EC Intra-ACP Support programme for SIDS.

THE NATURE-BASED SOLUTIONS INITIATIVE, UNIVERSITY OF OXFORD (UK)



Nature-based solutions Initiative
Department of Biology

11^a Mansfield Rd,
Oxford, OX1 3SZ, United Kingdom

This policy brief was developed by Brown, Z., and is based on the systematic review:



Brown, Z., Kendall, K., O'Donnell, E., Tavasi, L., & Seddon, N. (2026). Nature-based solutions for climate adaptation in small island developing states: a systematic review. *Frontiers in Environmental Science*.

<https://doi.org/10.3389/fenvs.2025.1706713>

For further information contact Zoe Brown,
zoe.brown@jesus.ox.ac.uk

DOWNLOAD THE POLICY BRIEF HERE



https://drive.google.com/file/d/12G9YGrxhkTEk5_6NXiGPtpfKg-JJ70cL/view?usp



<https://sidsforum.oacps.org/>

COORDINATION AND SUPPORT



ORGANISATION OF AFRICAN, CARIBBEAN AND PACIFIC STATES (OACPS)

www.oacps.org

Susan BRANKER-GREENE, *Assistant Secretary-General,
Policies and Programmes*



Funded by
the European Union

EUROPEAN COMMISSION | INTERNATIONAL PARTNERSHIPS

Aymeric ROUSSEL, *Team Leader,
Biodiversity and Ecosystems Services*

Nadia DECKERT, *International Cooperation
and Policy Officer, Biodiversity and Ocean*



TECHNICAL ASSISTANCE

Agriconsulting Europe SA – CECCODA – STANTEC

PRODUCTION TEAM

Ottavio NOVELLI, *Programme Director*

Alessio SATTA, *Team Leader*

Erinç EBINC, *Programme Manager*

Bori BRETUS, *Programme Manager*

Graphic Design & Layout: Mauro SANTELLA

Concept & Editor: GH MATTRAVERS MESSANA

For further information contact

Alessio Satta, a.satta@aesa-sids.eu



DISCLAIMER

The information and views set out in this publication are those of the authors and do not necessarily reflect the official opinion of the European Union. Neither the European Union institutions and bodies nor any person acting on their behalf may be held responsible for the use which may be made of the information contained therein.

© Nature-based Solutions Initiative, University of Oxford & the European Union, 2026.