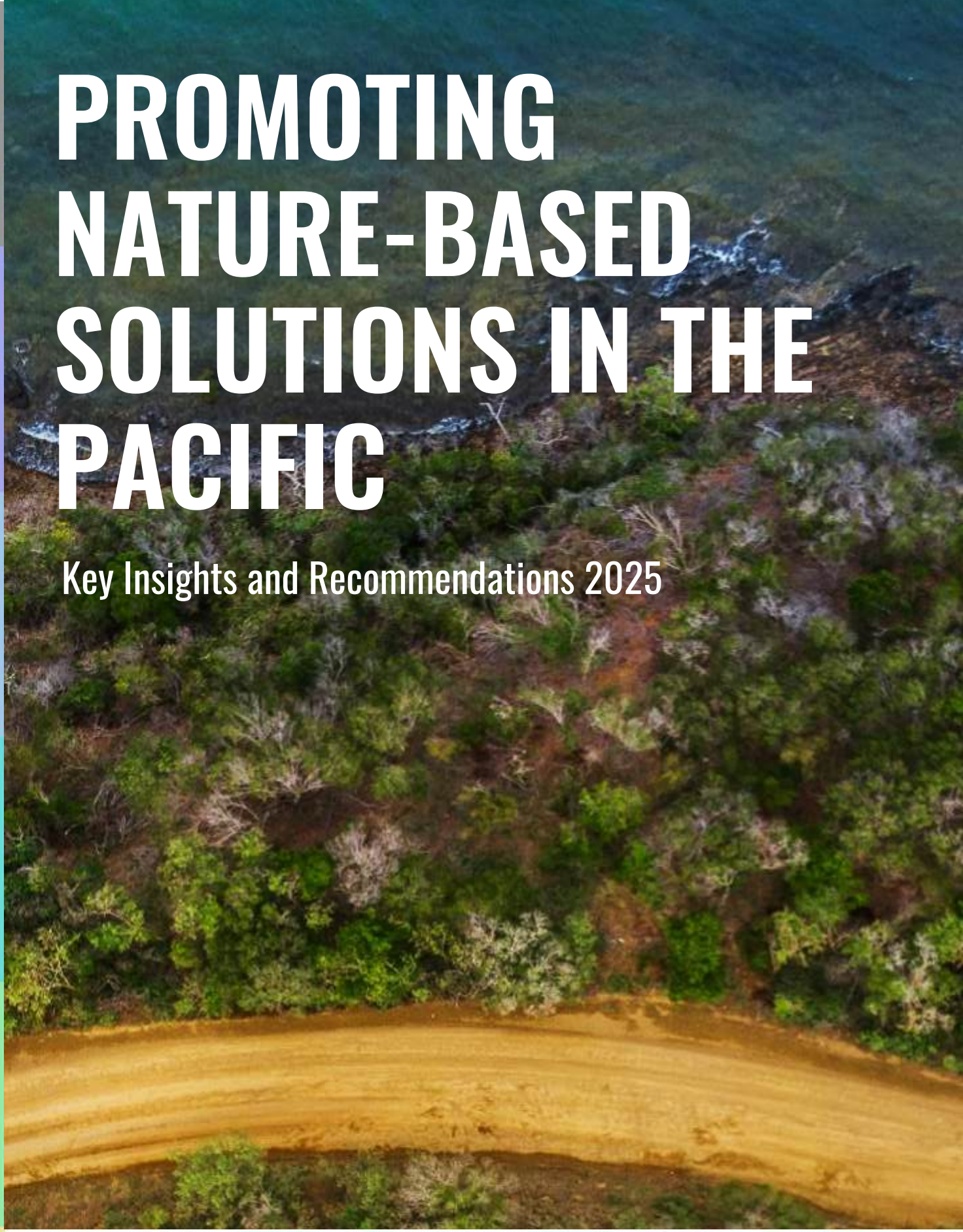
# PROMOTING NATURE-BASED SOLUTIONS IN THE PACIFIC

## Key Insights and Recommendations 2025



Pacific Islands Roundtable for Nature Conservation

Pacific Community
Communauté du Pacifique

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**Promoting Nature-based Solutions in the Pacific:**
Key Insights and Recommendations 2025

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Roundtable
Pacific Islands Roundtable for Nature Conservation

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# EXECUTIVE SUMMARY

The Pacific Islands, a tapestry of vibrant cultures and unparalleled biodiversity, face profound environmental and societal challenges, intensified by the escalating impacts of climate change. From towering volcanic islands to fragile low-lying atolls, this vast expanse is intrinsically linked to the health of its ecosystems – marine, coastal, terrestrial, and freshwater. The economies and livelihoods of Pacific Island Countries and Territories (PICTs) are deeply intertwined with these natural treasures, from vital tourism revenues to sustainable resource use. This intrinsic connection underscores an urgent truth: protecting and enhancing nature is not merely an environmental goal, but a fundamental necessity for resilience, survival, and sustainable development in the Pacific.

In this critical moment, Nature-based Solutions (NbS) emerge as a powerful, transformative approach. While the term "NbS" may be relatively new, its core concept – utilizing natural systems and processes to address biodiversity, social, and climate challenges – is deeply rooted in the traditional practices and ecological knowledge of Pacific communities. This report, Promoting Nature-based Solutions in the Pacific 2025, commissioned by SPC as Co-Chair of the Pacific Islands RoundTable for Nature Conservation (PIRT) NbS Working Group and a member of the PIRT, provides a vital assessment of the current state of NbS across the region, celebrating achievements, illuminating challenges, and charting a bold course for the future. Through analysis of two years of projects implemented in the region, stakeholder dialogue, and the latest research, the report unveils the critical role of NbS in building climate resilience, conserving biodiversity, and driving socio-economic prosperity.

The key findings, aligned with the chapters in this report and reflecting Pacific insights and recommendations, are provided below.

## NATURE-BASED SOLUTION?

NbS offer an integrated approach to the challenges faced by PICs and as a concept has long been practiced by Indigenous communities in the Pacific. However, there are diverse interpretations of the NbS concept, leading to theoretical challenges in monitoring efforts. This makes the measurement of NbS effectiveness problematic, which is further complicated by the application of global NbS frameworks in the Pacific that tend to overlook indigenous knowledge systems.

The analysis, drawing on a review of projects started between 2022-2024, comprehensive desk research, and invaluable stakeholder interviews, reveals a region actively embracing NbS with growing momentum. A significant USD 93 million was mobilized for NbS projects in the Pacific during this period, supporting diverse initiatives across critical landscapes, including agricultural, marine, coastal, urban, and water resource sectors.

NbS is defined by IUCN as **"actions to protect, sustainably manage, and restore natural and modified ecosystems". These actions "address societal challenges effectively and adaptively, to provide both human well-being and biodiversity benefits".** Consequently, defining "effectiveness" for NbS should combine ecological, social, and economic aspects for a comprehensive evaluation. These

pillars are the key difference to a more general Ecosystem-based approach, which represents a subset of NbS , specifically focused on using ecosystem services for climate adaptation. However, there is a grey area between the two concepts that the IUCN gold standard seeks to define more clearly.

Therefore, there is a need for flexibility in global NbS frameworks to address local challenges and integrate traditional and Indigenous knowledge. Ethnographic methods can assist in addressing this need as they are valuable for documenting community engagement processes that are essential for successful NbS implementation. Additionally, context-specific adaptations of global guidelines are crucial for respecting the "Pacific Way" and Indigenous knowledge systems while maintaining core NbS principles.

## KEY RECOMMENDATIONS

- ⇒ The design, implementation and ***M&E of NbS in the Pacific requires approaches reflective of the region's ecological, cultural, and social characteristics*** while maintaining the core principles / aspects that define NbS globally.
- ⇒ More specifically, guidelines and assessment frameworks should ***preserve core NbS criteria but allow for flexibility that respects the "Pacific Way" and Indigenous knowledge systems***. For this reason, context-specific adaptations are particularly important.
- ⇒ Promoting ***transparent and equitable interaction between scientific and Indigenous knowledge systems*** can enhance the ecological effectiveness of NbS while contributing to local ownership and knowledge exchange. This integration, currently underexplored, can strengthen NbS design and implementation in the region, ultimately contributing to their success.
- ⇒ Additionally, the potential spectrum of NbS approaches in the Pacific requires ***greater recognition and clarity around the integration of "grey" components,*** which can guide practitioners in the design and implementation of appropriate solutions.
- ⇒ ***Supporting regional knowledge-sharing mechanisms is essential*** to refine NbS standards without precluding local adaptability. These efforts can inform the development of Pacific-specific guidelines that better conform to regional realities while maintaining alignment with global frameworks. Integrating NbS into strategic plans can enhance NbS-related policy coherence and clarify how NbS can contribute to multiple objectives.

## LATEST RESEARCH OUTCOMES

The "Latest Research Outcomes" chapter paints a dynamic picture of growing attention and critical areas for accelerated action in this vital region. This assessment, rooted in a comprehensive desk-based literature review conducted in November 2024 , building upon previous work like the 2022 WWF review, evaluated 131 relevant publications from 2022-2024. The Pacific Islands are increasingly at the forefront of research addressing profound challenges like ecosystem degradation, biodiversity loss, climate change impacts, food insecurity, and threats to indigenous and cultural identity. Research on NbS in the Pacific is gaining significant traction, actively exploring diverse issues including the resilience of urban areas and informal settlements, food security, livelihoods, human health, indigenous knowledge, and community-led adaptation.

Nevertheless, research specifically focused on the Pacific Islands is still limited and geographically uneven, highlighting the need for further research in underrepresented countries. An area of surging interest is the immense potential for carbon sequestration in coastal ecosystems like mangroves, salt marshes, and seagrass. Small Island States hold significant blue carbon stocks, with mangroves alone potentially offsetting over 10% of land use emissions for numerous states. Integrating NbS into policy landscapes at national and subnational levels, conducting research on economic analysis and cost effectiveness of NbS, MEL for NbS, and impact evaluation, are also a key research outcomes. Despite the progress, the research highlights limited publications focusing on water resource management, forest restoration, agriculture, disaster risk reduction, and the link between Indigenous ecological knowledge

and scientific knowledge. There is also a gap in the literature concerning gendered dimensions of NbS planning and implementation which crucially needs to be addressed.

## KEY RECOMMENDATIONS

- ⇒ ***More research*** is needed in countries and territories currently underrepresented.
- ⇒ ***Several issues are currently emerging*** that require research to support evidence-based decision making. These include:
  - The role of ecosystems in carbon capture and sequestration;
  - The identification and quantification of economic and non-economic losses and damages associated with ecosystems and their functions and services;
  - The role of NbS in reducing and adapting to climate and natural hazard risks.
  - Economic analysis and cost effectiveness of NbS, MEL for NbS, and impact evaluation.
- ⇒ There is need to ***investigate the use of values-based assessment*** as an effective approach to assess loss and damage, as it is arguably more meaningful than economic metrics.
- ⇒ There is need ***to apply technology and innovation*** such as remote sensing, geographic information systems (GIS), multi criteria evaluation (MCE), and artificial intelligence (AI).
- ⇒ Relevant stakeholders must find ways to ***integrate scientific and indigenous knowledge*** and practice to ***promote community-led action***.
- ⇒ Researchers and practitioners should place more emphasis on the ***gendered dimensions of NbS*** planning and implementation and the role of women in community resilience to climate change.
- ⇒ There should be ***increased collaborations amongst scientists and researchers based in the region*** as well as international universities and research organisations to integrate traditional and local ecological knowledge alongside scientific knowledge
- ⇒ Establish platforms for peer-to-peer learning, regional knowledge-sharing, and multi-stakeholder collaboration to build collective capacity and **strengthen collaborative networks**

## UNLEASHING NATURE'S POTENTIAL ACROSS SECTORS

Categorising types of NbS across sectors is a thesis of work in itself. This report approaches NbS as nature based interventions designed with social, economic and cultural benefits central, i.e. it is not just the ecology. However, the ecologically / natural approach nested within the social, economic and cultural benefiting structures can be broadly be separated into: protection, restoration, creation and management. Often multiple types of practice are needed within one project. Likewise, defining distinct sectors in Pacific Island nations is challenging due to the inherent interconnectedness of land, ocean, water resources, urban settlements, and agriculture, rooted in custom & tradition. However, for analysis, the report divides NbS sectors into Marine and Coastal, Forestry and Land Use, Agriculture, Urban, and Water Resources, recognising people, ecosystems and water cannot be put into a box in real life. The following table highlights of the types of NbS found within the sectors of practice, showing cross cutting practices, challenged, opportunities and benefits. The sectoral chapters highlight the trends in implementation of methods used within the period 2022-2025.

*Table 1: Types of NbS within a sectoral classification*

| Sector | Description | Types of NbS | Challenges & opportunities | Benefits |
|---|---|---|---|---|
| **Marine & Coastal** | NbS that primarily targets the marine and coastal environment; addressing socio-economic issues of livelihood and food security, and cultural-environmental aspects of seascape ecological preservation. | **Community led:**<br>• Mangrove restoration & conservation<br>• Coral reef restoration & protection & climate resilient species<br>• Seagrass bed restoration & conservation<br>• MPAs<br>• LMMAs and Sustainable Fisheries Management<br>• Hybrid coastal protection<br>**Cross sector**<br>• Invasive species management<br>• Integrated Coastal Zone Management (ICZM)<br>• Wetlands restoration & management<br>• Ridge to Reef | Inclusion of customary marine governance<br>Capacity building and technical understanding for ecological restoration, and on-going management.<br>Securing long term investment for ecological restorative activities that take time.<br>Carbon market access<br>Data and monitoring<br>Land tenure and governance<br>Communities need to be driving initiatives<br>Involvement of women and youth | Multiple co-benefits for island nations, and cross sectional linkages between:<br>- Coastal climate resilience & protection<br>- Community engagement<br>- Biodiversity conservation<br>- Cost effectiveness<br>- Cultural heritage protection<br>- Food and livelihood security<br>-Carbon sinks |
| **Forestry & Land Use** | NbS that primarily targets the land area of an island nation, recognising that not all final successional states are forests and can be scrublands. Thes solutions address terrestrial challenges such as deforestation, soil erosion and water quality and access, and include Sustainable Land Management. | **Community led:**<br>• Sustainable forestry conservation management<br>• Sustainable land management<br>• Reforestation and afforestation<br>• Protection of indigenous forests<br>**Cross sector**<br>• Invasive species<br>• Integrated watershed management (IWM)<br>• Riparian restoration<br>• Ridge to Reef | Integration with traditional land management practices and tenure<br>Limited technical capacity and financing for scaling community-led forest restoration projects.<br>Free, Prior and Informed Consent<br>Technical knowledge on species and impact<br>Balancing short-term livelihood needs (e.g., agriculture expansion) with long-term restoration goals.<br>Data and monitoring | -Improved soil health & fertility<br>- Enhanced water security<br>- Reduced soil erosion<br>- Flood regulation<br>- Cultural practice preservation<br>- Biodiversity conservation<br>- Carbon sinks<br>- long-term income opportunities (such as carbon credits, sustainable harvesting, and ecotourism) |
| **Agriculture** | NbS that works with the production of crops and livestock for food & livelihood security or economic trade, central to the intervention. | **Community led:**<br>• Agroecological approached<br>• Agroforestry<br>• Conservation agriculture<br>• Sustainable grazing & crop-livestock integration<br>• Water efficient farming<br>• Home gardens & polyculture<br>**Cross sector**<br>• Invasive species<br>• Integrated watershed management (IWM)<br>• Riparian restoration<br>• Ridge to Reef | Cultural relevance of traditional farming practices with NBS<br>Blending traditional knowledge with modern technologies<br>Policy instruments that mainstream Agriculture NbS<br>Initial investment costs<br>Knowledge and capacity building- opportunity for extension services<br>Limited technical capacity in agroforestry practices and the lack of networks for knowledge exchange – opportunity to foster social | - Enhanced soil health and fertility<br>- Increased water efficiency<br>- Reduced reliance and synthetic inputs<br>- Biodiversity conservation<br>- Increased climate resilience<br>- Improved food security and nutrition |

| | | | | |
|---|---|---|---|---|
| | | | organization through agroecological farming cooperatives,<br>Research needs – opportunities for partnerships between projects and universities<br>Involvement of women | -Socioeconomic resilience |
| **Water Resources** | NbS that focuses primarily on water security and addresses freshwater availability for human use and for ecosystems. Such interventions may also address pollution from agriculture and sanitation, and other drivers of ecosystem degradation. | **Community led:**<br>• Managed aquifer recharge (geology dependent)<br>**Cross sector**<br>• Watershed protection and management<br>• Wetland conservation and restoration<br>• Riparian buffer zones<br>• Sustainable Land Management practices<br>• Rainwater harvesting<br>• Nature-based sanitation systems<br>• Ridge to reef | Community ownership is essential<br>Capacity building on water resources<br>Payment for ecosystem services is a demonstratable model<br>Technical knowledge relating to the hydrology and geology<br>Technical understanding of tree species impact on water resources<br>Data scarcity on water resources<br>Land ownership and governance – opportunity for integration with customary land ownership systems<br>Essential to synergise with existing water infrastructure | - Water security<br>- Water quality<br>- Cost effectiveness<br>- Reduced soil erosion and sedimentation<br>- Climate change adaptation<br>- Community empowerment |
| **Urban** | NbS centred around habitation of humans on the land of PICTs. These interventions include the mitigation of climate disasters such as floods, storms, coastal flooding and heatwaves to human infrastructure, and can also include waste management, food, water and energy provision. Key to urban NbS is the improvement in human wellbeing through healthy and safe living. | **Community led:**<br>• Urban green spaces, forestry and tree planting<br>• Ecological building design<br>• Sustainable Urban drainage systems including swales and rain gardens<br>• Blue infrastructure such as urban ponds<br>**Cross sector**<br>• Coastal protection through mangrove / wetland / beach / dune restoration<br>• Urban agriculture<br>• Constructed wetlands for water treatment<br>• Rainwater harvesting<br>• Ridge to reef | Limited space<br>Land ownership and governance<br>Financing of upfront costs<br>Technical capacity for some of the more engineered approaches, and intervention<br>Synthesis is needed with existing infrastructure.<br>Community led initiatives to identify, design and implement interventions<br>Inclusion of Indigenous Knowledge | Reduced impacts to coastal infrastructure and homes<br>Improved wellbeing<br>Improved air quality<br>Improved habitation<br>Improved water management |

## KEY RECOMMENDATIONS

- ⇒ ***Remember just because it has Nature in it, doesn't make it an NbS*:** NbS interventions across sectors must have a social, economic and cultural benefit, and be aware of any unintended negative consequence of the natural intervention.
- ⇒ ***Use participatory approaches to creating local specific NbS:*** Natural solutions can address a myriad of environmental, social, economic and cultural challenges, however going in with a defined solution misses the wider opportunity from NbS.
- ⇒ ***NbS is not always the best short-term solution but is often the best long-term solution:*** Sometimes NbS is not the solution. Recognising when to involve NbS and when not to requires pragmatic a clear identification of the challenge, and the timeframe within which the solution needs to be effective. Long term planning beyond political and financing cycles is critical for sustained implementation.
- ⇒ ***There is never one solution:*** All options, NbS, grey or hybrid, have pros and cons, and depending on perspective and interests of beneficiary group/ species. During the design phase of any intervention, **trade-offs need** to be identified and balanced through informed participatory process.
- ⇒ ***Ecosystems cannot be separated:*** The interconnectedness of ecosystems from ridge to reef in nutrient cycling, water flows, micro and macro climatic effects and protection, cannot fully be addressed in single projects focused on single ecosystems. Holistic approaches including the human activities of food production (on land and sea), water use, settlement and infrastructure in a programmatic or coordinated synergetic project NbS approach.

## CAPACITY BUILDING

The "Capacity Building" chapter – a vital engine for unlocking the transformative potential of Nature-Based Solutions (NbS) in the Pacific - underscores that empowering individuals, communities, and institutions is not just an option, but a fundamental necessity for addressing socio-environmental challenges and driving long-term change in the region. Capacity building for NbS in the Pacific is a multifaceted process aimed at enhancing skills for effective planning, implementation, management, and sustainability of NbS initiatives. It requires the integration of practices and knowledge, as well as a thoughtful and inclusive approach tailored to local needs. At the core is the urgent need to equip local communities with the knowledge and skills to lead, implement, and manage NbS initiatives themselves.

Knowledge exchange and collaborative governance among diverse stakeholders – donors, governments, NGOs, businesses, and local communities – are essential for successful NbS implementation and scaling. Empowering communities begins by acknowledging and building upon their existing abilities and know-how. Capacity-building initiatives are prioritizing training local communities with workshops on restoration techniques, agroforestry, and natural regeneration, often conducted with participatory approaches that value and integrate traditional knowledge. Training focuses on developing specific activities to meet project demands, as well as financial management, monitoring, evaluation, local governance, and GEDSI approaches.

The path isn't without its challenges. Key hurdles include limited resources (financial and human), short-term funding cycles that hinder long-term expertise retention, difficulties connecting global demands to local needs, a lack of collaboration, and the issue of 'brain drain' where skilled individuals leave the region. Sustaining capacity building beyond project lifecycles is a major concern. However, these challenges illuminate clear opportunities. Ultimately, capacity building for NbS in the Pacific must be tailored, inclusive, adaptable, and multidisciplinary. By strategically addressing capacity gaps, embracing

diverse knowledge, investing in people and institutions, and fostering collaboration, the Pacific can significantly enhance the effectiveness, inclusivity, and sustainability of NbS, forging a more resilient future.

For instance, the Kiwa Initiative has excelled in developing and promoting a regional NbS micro-qualifications framework, empowering local communities and leveraging collective actions. The interviews taught that capacity-building needs to be tailor-made, and platforms for sharing knowledge and lessons learned are fundamental tools. To achieve sustainable capacity building, it's crucial to synergise demand-driven non-formal pedagogical approaches with formal structures that ensure long-term institutional backing for developing human and social capital. Strengthening collaborative networks, integrating traditional and local ecological knowledge (LEK) into capacity building, and driving policy and institutional reforms that strengthen these networks are critical measures to unlock the full potential of NbS in the Pacific.

## KEY RECOMMENDATIONS

⇒ ***Integrating Traditional and Local Ecological Knowledge (LEK) into Capacity-Building*** Recognising and embedding LEK alongside scientific knowledge enhances NbS design and implementation, fostering locally relevant solutions.

⇒ ***Expanding Inclusive Training and Skill Development:*** Develop targeted training programmes that address technical skills, project management, and governance while ensuring accessibility.

⇒ ***Strengthening Collaborative Networks for Knowledge Exchange:*** Establish platforms for peer-to-peer learning, regional knowledge-sharing, and multi-stakeholder collaboration to build collective capacity.

⇒ ***Enhancing Policy Integration and Institutional Capacity:*** Strengthen governance structures to mainstream NbS into development plans, climate adaptation strategies, and biodiversity policies.

⇒ ***Ensuring Sustainable Funding Mechanisms:*** Develop financial strategies that include long-term investments, blended finance, and community-managed funds.

⇒ **Investing in Formal Education and Curricula Development:** Collaborate with regional universities, vocational institutions, and technical colleges to develop accredited courses and curricula on NbS.

⇒ **Scaling Up Training of Trainers (ToT) Programmes:** Establish robust Training of Trainers programmes to build a cadre of local NbS champions and resource persons. Equip trainers with participatory and context-specific methodologies to cascade practical skills, mentor peers, and sustain long-term capacity across communities, government, and civil society.

## POLICY INTEGRATION

"Policy Mainstreaming" chapter details how NbS are woven into the very fabric of governance and planning across the Pacific Islands. This section is a rallying cry, highlighting that shifting NbS from admirable projects to fundamental practice requires deliberate, strategic integration into regional and national policies. While there's growing recognition, the sources reveal the urgent need to accelerate this transition to unlock the full potential of NbS for climate resilience, biodiversity, and social outcomes.

NbS are increasingly recognised in regional frameworks as important for addressing climate change and biodiversity conservation. While the role of NbS for Climate Change Adaptation (CCA) and Disaster Risk Reduction (DRR) is increasingly recognized in PICTs, on-the-ground implementation lags behind ambitions. Efforts to integrate NbS into regional frameworks like the 2050 Strategy for the Blue Pacific Continent, the Pacific Coral Reef Action Plan 2021-2030, the Framework for Nature Conservation and Protected Areas in the Pacific Islands Region 2021-2025, are underway.

However, translating this regional recognition into tangible national policy with clear implementation pathways remains a significant challenge. While national documents like National Adaptation Plans (NAPs), National Biodiversity Strategy and Action Plans (NBSAPs), and Climate Change policies include ecosystem or nature-based elements, they often lack direct reference to NbS terminology and concrete implementation details or quantitative targets. A major hurdle is that relevant national policies and plans, like NDCs and NAPs, are not well understood at sub-national levels.

To move from recognition to transformative action, the sources issue powerful calls for policymakers, practitioners, and stakeholders. Recommendations for NbS mainstreaming include strengthening national policy instruments by aligning with global biodiversity targets, adopting a national holistic approach with a coordinating body, improving awareness and buy-in through advocacy, enhancing coordination and collaboration across government sectors, and learning from existing initiatives. Building capacity within governments to understand the interconnectedness of NbS and simplifying the language of NbS projects are also important.

Mainstreaming NbS into policy is a long-term endeavour requiring a holistic, coordinated, and evidence-based approach. By focusing on these actionable recommendations, the Pacific can solidify the foundations for resilient development powered by nature.

### KEY RECOMMENDATIONS

- ⇒ Take a ***long-term holistic approach to NbS requiring a whole-of-governance*** and cross-sectoral approach to enhance coordination and collaboration *amongst* government agencies and *between* government agencies, international donors and funders, and implementing organisations.
- ⇒ ***Evidenced-based decision making and the need to set clear and realistic targets***, and to identify the benefits as well as potential trade-offs in designing and implementing NbS projects.
- ⇒ ***Localisation, local level planning, and locally led development*** to ensure that projects are aligned with Indigenous perspectives and consistent with Indigenous knowledges and practices.
- ⇒ ***Measuring success and learning from good practice through demonstration projects***, as well as improving compliance and enforcement were also seen as critical to the success of NbS efforts in the PICTs.

## FINANCIAL MECHANISMS

The "Finance for NbS" chapter, focuses on the dynamic flow of resources and the urgent actions needed to power Nature-Based Solutions in the Pacific. This section lays bare the stark reality: globally, finance for nature falls far short of what's required to hit crucial climate and biodiversity targets, especially when contrasted with the massive flows still harming nature. For the Pacific Islands, this is more than statistics; it's a daily challenge to secure the investment needed to protect vulnerable ecosystems and build resilience. While recent years have seen an increase in committed funds, access remains a formidable barrier.

Existing financial mechanisms are diverse and range from grants and philanthropy to equity, nature-linked bonds and loans, and outcome-based financing like Payments for Ecosystem Services. Traditional grants and philanthropy remain important, but there's growing interest in leveraging market-based approaches and innovative finance. While private finance and innovative mechanisms are gaining traction, Official Development Assistance (ODA) remains the predominant, indeed often the *main*, source of funding for Nature-based Solutions in the Pacific Island context today. ODA also serves a vital catalytic role. By funding pilot projects, demonstrating the effectiveness of NbS, and de-risking investments, ODA can pave the way for future private sector engagement and blended finance solutions. Initiatives like the

KIWA Initiative, while multi-donor, are built upon ODA contributions, demonstrating the power of pooled public funds for dedicated NbS support.

Voluntary Carbon Markets (VCMs) offer a pathway for private investment, particularly in forest and mangrove conservation for carbon credits. However, the Pacific has largely untapped this potential due to low institutional capacity, complex land tenure arrangements, and the small volume of credits from limited land areas. Ethical practices and ensuring benefits reach Indigenous Peoples and customary landowners are crucial. Biodiversity Credits are seen as a promising, verifiable, and tradeable mechanism to reward positive nature outcomes, but the market is currently immature with low demand.

Blue bonds and blue carbon initiatives are emerging, recognizing the significant mitigation potential of coastal ecosystems like mangroves and seagrass. Despite this potential, few Small Island States have incorporated blue carbon into national inventories or set quantitative targets. Fiji's sovereign blue bond is highlighted as a regional example. Debt-for-Nature Swaps are being explored with interest, although they haven't been implemented in the Pacific yet.

Recommendations to mobilize NbS financing include building capacity for proposal writing, demonstrating the investment potential of NbS by valuing multiple benefits, defining "integrity" in nature markets, and developing a pipeline of bankable NbS projects. Financing NbS effectively requires more than just increasing the overall pot of money; it demands systemic change to improve access, ensure long-term sustainability, build local capacity, navigate complex governance, and leverage diverse financial mechanisms transparently and equitably. All of this needs to be embedded in longer funding timeframes.

## KEY RECOMMENDATIONS

- ⇒ **Develop Innovative and Blended Finance Mechanisms.** Promote the development and scaling-up of innovative finance models—such as blended finance (combining public, private, and philanthropic capital), green bonds, impact investing, and payments for ecosystem services—to diversify and increase funding sources for NbS.
- ⇒ **Ensure Longer Funding Timeframes.** Longer funding cycles allows NbS to reach full maturity, deliver intend benefits and support their ongoing monitoring and maintenance. It also allows their long-term efficacy and cost-effectiveness to be demonstrated for further investment and wider application.
- ⇒ Building **in-house capacity within Pacific Island nations for finance and proposal writing** is vital to improve access to global funds.
- ⇒ **Build Local Capacity for Market Readiness and Project Development.** Invest in capacity building for governments, local communities, and project developers on carbon/biodiversity standards (e.g., VCS, Gold Standard, Plan Vivo), MRV (Monitoring, Reporting, Verification), project registration, and credit issuance. Provide training on how to navigate market procedures, contracts, and risk assessment.
- ⇒ **Addressing complex land tenure arrangements and ensuring equitable benefit sharing** with Indigenous Peoples and local communities are crucial for successful and sustainable NbS projects, particularly in the context of carbon markets.
- ⇒ Demonstrating the **investment potential of individual NbS projects** by valuing their multiple benefits ("stacking") and showing a clear route to market with balanced investor returns and community benefits is essential for attracting large-scale investment.
- ⇒ **Strengthen Data, Baselines, and Monitoring Systems**. Develop and maintain robust data and monitoring systems for carbon stocks, biodiversity values, and ecosystem health. Use participatory approaches and remote sensing to ensure reliable baselines, project transparency, and long-term credibility.

## MONITORING AND EVALUATION

Monitoring and evaluation (M&E) isn't just about ticking boxes; it's the critical process that proves NbS are working, reveals what needs fixing, and ensures every investment yields the maximum benefit for nature and people across these vulnerable islands. The sources make it clear: effective M&E is essential, but navigating this space in the Pacific presents unique, multi-faceted challenges due to their multiple objectives and complex dimensions. Monitoring and evaluating NbS projects in the Pacific is a formidable task, wrestling with conceptual ambiguity and practical constraints.

NbS aim to tackle societal and ecological challenges simultaneously, while also striving for economic viability. This inherent complexity, coupled with the intricate interactions between environmental, social, and economic dimensions, makes measurement challenging. Ambiguity around defining "effectiveness" can lead to numerous evaluation criteria and indicators, which can complicate and pose obstacles to effective M&E. For effective M&E it is crucial to determine whose perspective is prioritized in the evaluation process. The lack of clarity on "effectiveness" has led to a confusing proliferation of evaluation criteria and indicators.

Determining whose definition of "success" is prioritised is a key challenge. Participatory approaches are essential for developing locally relevant M&E frameworks while community-led monitoring can increase local ownership and ensure culturally appropriate evaluation metrics. Several participants in this study emphasised how monitoring timeframes should align with critical socio-ecological processes to ensure effective M&E. Integrated MEL frameworks that balance environmental, social, and economic dimensions and capture effectiveness over different scales are needed, as well as balancing scientific data with traditional ecological knowledge to create more robust frameworks. Effective data management systems and cross-sectoral coordination mechanisms are essential, requiring dedicated capacity building and resources. Participatory development of theories of change that accommodate diverse knowledge systems can build shared understanding of "effectiveness". Technologies like drones and satellite imagery can help overcome geographical monitoring challenges. Regional knowledge-sharing platforms can accelerate learning.

Effective M&E is the backbone of accountability and learning for NbS in the Pacific. By addressing these challenges head-on with targeted investment, participatory design, and long-term vision, we can ensure that Nature-Based Solutions deliver their full transformative potential for the resilience and well-being of Pacific island communities and ecosystems.

### KEY RECOMMENDATIONS

- ⇒ Integrated frameworks should balance standardisation with flexibility, connecting NbS actions to outcomes through clear causal pathways.
- ⇒ Participatory development of theories of change that accommodate diverse knowledge systems can build shared understanding of “effectiveness”.
- ⇒ Regional knowledge-sharing platforms can accelerate learning across the Pacific, supporting standardisation where appropriate.
- ⇒ Technologies, such as drones or satellite imagery, can overcome geographical challenges of monitoring across dispersed Pacific islands.

## THE HEART OF NbS: COMMUNITY AND COLLABORATION

At the centre of every successful NbS initiative in the Pacific are steward communities supported by a collaborative network of partners. This has been evident in the region, with projects celebrating the voices of women, young and disabled people, championing the integration of Indigenous knowledge, and striving to build local research capacity. This is not just about implementing projects; it's about fostering a movement, a collective vision for a sustainable future.

## NAVIGATING CHALLENGES, SEIZING OPPORTUNITIES

While the path forward is clear, challenges persist. The region must overcome complexities with standards and frameworks, secure long-term funding, strengthen policy frameworks, and build capacity for collective action. Yet, within these challenges lie immense opportunities:

- ⇒ **Tailor NbS to the Pacific's unique ecological and cultural landscapes**, ensuring global principles are locally applied.
- ⇒ **Embed NbS within national policies**, leveraging global frameworks like the Global Biodiversity Framework and NDCs.
- ⇒ **Amplify awareness and buy-in**, fostering collaborative networks across all levels from government to local stakeholders.
- ⇒ **Upscaling and diversifying funding for NbS**, exploring mechanisms like blue bonds, biodiversity credits, and voluntary carbon markets, while ensuring equitable benefit sharing with local communities.
- ⇒ **Develop robust, participatory monitoring and evaluation frameworks**, weaving together scientific data and traditional ecological knowledge, and balancing standardization with flexibility.
- ⇒ **Invest in systemic capacity building**, creating regional hubs for knowledge exchange and expertise retention.

## A LEGACY OF RESILIENCE

Nature-based Solutions are not just a strategy; they are an investment in the very fabric of the Pacific Islands. Their communities are not just beneficiaries of NbS; they are innovators and leaders, drawing on centuries of traditional wisdom and adapting it to meet contemporary challenges. The inherent interconnectedness of ecosystems in the Pacific demands a holistic, integrated approach that transcends rigid sectoral boundaries. By embracing collaboration, innovation, and a deep respect for nature's wisdom and local people, the region can forge a legacy of resilience, ensuring that these island nations thrive for generations to come. This report is a call to action, an invitation to join the Pacific in harnessing the power of nature – a living shield against the challenges of our time.

# CONTENTS

# ACRONYMS

| | |
|---|---|
| ADB | Asian Development Bank |
| AFD | Agence Française de Développement |
| C4C | Corals for Conservation |
| CAPA | Climate Adaptation and Protected Areas |
| CBFM | Community-based fisheries management |
| CCA | Climate Change Adaptation |
| CePaCT | Centre for Pacific Crops and Trees |
| CI | Conservation International |
| CRxN | Climate Resilient by Nature |
| CSA | Climate-Smart Agriculture |
| CSOs | Civil Society Organizations |
| DFAT | Department of Foreign Affairs and Trade |
| DRR | Disaster Risk Reduction |
| EbA | Ecosystem-based Adaptation |
| EEZ | Exclusive Economic Zones |
| EIAs | Environmental impact assessments |
| EMPOWER | Engaging Mobilisation for Positive Outcome in Water, Ecosystem, and Resilience |
| EU | European Union |
| FAO | Food and Agriculture Organization |
| FAPE | Free Appropriate Public Education |
| FCPF | Forest Carbon Partnership Facility |
| FPIC | Free, Prior and Informed Consent |
| FRDP | Framework for Resilient Development in the Pacific |
| FSM | Federated States of Micronesia |
| GAC | Global Affairs Canada |
| GAPS | Global Animal Production and Health System |
| GBF | Global Biodiversity Framework |
| GCF | Green Climate Fund |
| GDF | Green Development Fund |
| GDP | Gross Domestic Product |
| GEDSI | Gender Equity, Disability and Social Inclusion |
| GEF | Global Environment Facility |
| GGGI | Global Green Growth Institute |
| GIS | Geographic Information Systems |
| GIZ | Deutsche Gesellschaft für Internationale Zusammenarbeit |
| HSBC | The Hongkong and Shanghai Banking Corporation Limited |
| ICZM | Integrated Coastal Zone Management |
| IDRC | International Development Research Centre |
| IFAD | International Fund for Agricultural Development |
| IISD | International Institute for Sustainable Development |
| INSPIRE | Invasive Species Management for Resilient Ecosystems |
| IPBES | Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services |
| IPs | Indigenous People |
| IWM | Integrated watershed management |
| IWRM | Integrated Water Resources Management |
| JNAP | Joint National Adaptation Plans |
| LEK | local ecological knowledge |
| LITK | local, Indigenous, and traditional knowledge |
| LLD | locally led development |
| LLEE | Live & Learn Environmental Education |
| LMMAs | Locally Managed Marine Areas |
| MEL | Monitoring Evaluation and Learning |
| MFAT | Ministry of Foreign Affairs and Trade |
| MiCOAST | Micronesia Community-based Fisheries Management as a NbS for Coastal Resilience |
| MOU | Memorandums of understanding |
| MPAs | Marine Protected Areas |
| MRV | measurement, reporting, and verification |
| MWLR | Manaaki Whenua - Landcare Research |
| NAP | National Adaptation Plans |
| NBEZ | Navakavu Blue Economic Zone |
| NbS | Nature-based Solutions |
| NBSAP | National Biodiversity Strategy and Action Plans |
| NbSWG | Nature-based Solutions Working Group |
| NCS | Natural Climate Solutions |

| | |
|---|---|
| NDCs | Nationally Determined Contributions |
| NELD | non-economic loss and damage |
| NENS | Natural Enemies / Natural Solutions |
| NGOs | Non-Governmental Organizations |
| NOAA | National Oceanic and Atmospheric Administration |
| NRDF | Natural Resources Development Foundation |
| NUWAO | Nature-based Urban design for Wellbeing and Adaptation in Oceania |
| NZDOC | New Zealand Department of Conservation |
| ODA | Official Development Assistance |
| OECD | Organisation for Economic Co-operation and Development |
| PEBACC | Pacific Ecosystem-Based Adaptation to Climate Change |
| PERENNE | Protection and Restoration of Riparian Zones of the Nera |
| PES | payments for ecosystem services |
| PICs | Pacific Island Countries |
| PICTs | Pacific Island Countries and Territories |
| PIFS | Pacific Islands Forum Secretariat |
| PII | Pacific Invasives Initiative |
| PM | Particulate matter |
| PNG | Papua New Guinea |
| POLFN | Pacific Organic Learning Farms Network |
| PPPP | Philanthropic-Public-Private Partnerships |
| PRISMSS | Pacific Regional Invasive Species Management Support Service |
| PROTEGE | Pacific Territories Regional Project for Sustainable Ecosystem Management |
| PRS | Pacific Resilience Standards |
| R2R | Ridge to Reef |
| RCP | Representative Concentration Pathway |
| REDD | Reducing Emissions from Deforestation and Forest Degradation |
| RMI | Republic of the Marshall Islands |
| RMIT | Royal Melbourne Institute of Technology |
| RS | Remote Sensing |
| SABLs | Special Agriculture and Business Leases |
| SIDS | Small Island Developing States |
| SIWA | Solomon Islands Water Authority |
| SLR | Sea Level Rise |
| SMART | specific, measurable, achievable, relevant, and time-bound |
| SMEs | Small and Medium-sized Enterprises |
| SPC | Pacific Community |
| SPREP | Secretariat of the Pacific Regional Environment Programme |
| TC | Tropical cyclones |
| TLK | Traditional and local knowledge |
| TNC | The Nature Conservancy |
| UNCCD | United Nations Convention to Combat Desertification |
| UNDP | United Nations Development Programme |
| UNEA | United Nations Environment Assembly |
| UNFCCC | United Nations Framework Convention on Climate Change |
| VCM | Voluntary Carbon Markets |
| VCP | Vaisigano Catchment Project |
| WB | World Bank |
| WCS | Wildlife Conservation Society |
| WISH | Watershed Interventions for Systems Health Plus |
| WWF | World Wide Fund for Nature |

# INTRODUCTION

This report, commissioned by SPC co-chair of the Nature-based Solutions Working Group (NbSWG) of the Pacific Islands Roundtable for Nature Conservation (PIRT), presents a 2025 assessment of the current state of Nature-based Solutions (NbS) across Pacific Island Countries and Territories in Oceania. It draws on multiple data sources, including comprehensive desk-based research on emerging trends and the development of a dedicated NbS project screening tool. As part of this process, a database of 124 interventions—sourced from the SPC Climate Change project inventory, WWF databases, Kiwa initiative database and consultations with regional and national stakeholders.

Building on the United Nations Environment Assembly (UNEA) resolution 5 definition of NbS—which incorporates biodiversity, social, and climate dimensions - an assessment framework was developed to evaluate projects from 2022 to 2025. Using this screening tool, each project's potential to become an NbS was assessed by examining its capacity to address both biodiversity/climate problems and societal challenges. Additionally, 30 stakeholder interviews were conducted with international regional and national actors involved in NbS implementation in Pacific, including academic institutions, project partners, and donors. This integrated approach aimed to provide a **comprehensive overview** of:

⇒ Pacific Island Countries and Territories NbS projects

⇒ Effective NbS implementation strategies

⇒ Identify common challenges

⇒ Uncover key opportunities

⇒ Actionable insights and recommendations for practitioners, decision-makers, and researchers working to advance NbS in the Pacific

**OVERALL METHODOLOGY SUMMARY**

1. **Literature review**
   a. Latest research trends
   b. Recent and past projects
   c. Knowledge sharing portals
2. **Interviews**
   a. Project implementing partners (regional and country level)
   b. Donors
   c. Researchers & academics
   d. Governmental representatives
3. **Sectoral case studies**
   a. Marine & coastal
   b. Forestry & land use
   c. Agriculture
   d. Urban
   e. Water resources
4. **Cross cutting themes**
   a. GEDSI
   b. Capacity building
   c. Traditional knowledge
   d. Monitoring, evaluation & learning
   e. Financing
   f. Policy and governance

# OVERARCHING THEMES

**This report analyses nature-based solutions across six areas: Research Trends, Implementation Updates, Capacity Building, Policy Mainstreaming, Finance, Monitoring Evaluation, and Learning. The report also examines overarching themes and important factors discovered through interviews with experts and a summary of the findings, which are discussed in the following sections.**

## 1. COMMUNITY, CUSTOM & 'PLACE' FIRST

### *1.1 Local ownership & leadership drives sustainability*

For Pacific Island States to sustainably integrate Nature-Based Solutions (NbS), local ownership and leadership are paramount. Local ownership is comprised of two key aspects. Firstly, communities themselves should define their needs, given their deep understanding of their unique ecosystems and social contexts. Secondly, secure land ownership is crucial as it empowers communities to manage their resources effectively and ensures long-term commitment to NbS projects. Concerning local leadership, this report identified three key elements that NbS projects should consider. Firstly, it is necessary that the youth are involved in NBS projects in order to foster intergenerational knowledge transfer and build future stewardship capacity. Secondly, strong local governance structures provide the framework for participatory decision-making and equitable benefit-sharing. Finally, it is important that customary tenure is integrated into NbS projects as it reflects watershed connections and indigenous ancestral ties. Furthermore, this integration grounds NBS initiatives into traditional ecological knowledge and cultural values, promoting long-term sustainability and resilience.

### *1.2 Traditional knowledge and customs of Oceania holds an innate Nature based wisdom*

Indigenous traditions and cultures across Pacific Island States tend to be philosophically based on living systems. Consequently, they often emphasise the interconnectedness between nature, people and culture. While the term for the elements of nature differs between the different cultures of the Pacific Islands, there is a common understanding that people are connected to land, air and water. Most traditional practices are built around the natural ecology and are fundamentally different from industrial resource extraction and polluted systems. Consequently, engagement with these traditional practices is beneficial when implementing NbS.

### *1.3 Synthesis of traditional and modern approaches is key*

Though indigenous traditions and culture are rooted in ecological harmony, colonial legacies have caused interruptions to these practices. Nevertheless, while efforts to ensure preservation of traditional knowledge are crucial it is also necessary that due consideration is given to contemporary and modern knowledge-based systems concerning NbS. Due to climate change, many natural processes have changed and ecological timings are different. Such differences need synthesis with traditional approaches to provide a more holistic understanding of the ecology of a community. Furthermore, it is important to acknowledge that some traditional practices may be based on

cultural and/or personal belief without any evidence-based or scientific validation.

## 2. 'NATURE-BASED' IN THE RIGHT 'PLACE'

### *2.1 Just because it is 'Natural' doesn't mean it is appropriate*

The environmental impact of introducing animal and plant species needs to be considered before a project commences. There are many examples of NbS using non-native plants or animals as a solution, with unexpected negative consequences. Even native plant species, if planted or introduced in the wrong environment, can have unexpected effects on local ecology and natural water sources. For example, Mangroves planted in the wrong location can dramatically affect the hydro-dynamics of a coastline, leading to stagnant or putrid waters. In addition, pure conservation efforts can lead to unexpected negative consequences due to, at best not realising the potential of changemaking with local communities, and at worst, ignoring the needs and land ownership systems of local communities.

### *2.2 NbS is not always the solution*

NbS, particularly the creation of new ecosystems and the restoration of heavily degraded ones, takes time. Where there is a short time frame to address an imminent threat, the establishment grey or grey-green- blue infrastructure should be considered. The idea of NbS as a golden panacea, would only have been possible with action yesterday. Taking appropriate action does the reputation of NbS a greater service, than selecting NbS for everything.

## 3. CAPACITY BUILDING SYSTEMICALLY FROM LOCAL COMMUNITIES UP

### *3.1 Recognise the power of women*

Women are crucial to any community and their contribution to NbS initiatives should extend beyond tick-box involvement. There is power in the 'feminine' aspect itself to build capacity, which is observable in the role they play in the family and community structures. Women often provide nourishment and support to the wider community. Therefore, building relationships with women in the community and helping them understand relevant NbS initiatives can assist in securing long-term capacity building and sustaining relevant initiatives.

### *3.2 Build capacity with local researchers and share knowledge with country level stakeholders*

Colonial history is present in the research and academic world. Although the tide is changing, further emphasis and support is needed to build capacity with local researchers who already hold an intrinsic understanding of the culture, people and place, where the studies are taking place. Extractive research should be discouraged through the emphasis on the relationship building through the research and ownership of the information. At the very least, summaries of research findings should be provided to country governments and stakeholders operating in the conservation and NbS landscape. At best, country owned and managed platforms to compile research data and findings could support national ownership and support decision-making.

### *3.3 Collaborative networks of stakeholders support and sustain capacity within countries and organisations*

The network of stakeholders across Oceania and the PICs is rich and diverse. From grassroots organisations such as NGOs, CSOs and even SMEs, up through regional organisation to international NGOs and donor organisations or Global Funds. Capacity can only be sustained regionally with effective connection, collaboration, knowledge sharing and support between the whole network of stakeholders. Such networks mitigate for personnel turnover, and immigration of nationals abroad. This is because these strengthened systems and structures assist in retaining knowledge by providing training.

### *3.4 Capacity building for financial institutions.*

Although capacity-building often targets local communities, it is equally urgent to equip financiers with a deeper understanding of the unique ecological, cultural, and socio-economic contexts of the Pacific. Strengthening their capacity to value ecosystem services more holistically and recognise the diverse benefits of NbS interventions will enable more informed investment decisions and help mobilise more financial resources for high-impact projects appropriate to local needs conditions.

## 4. NBS NEEDS LONG TERM FINANCIAL SECURITY

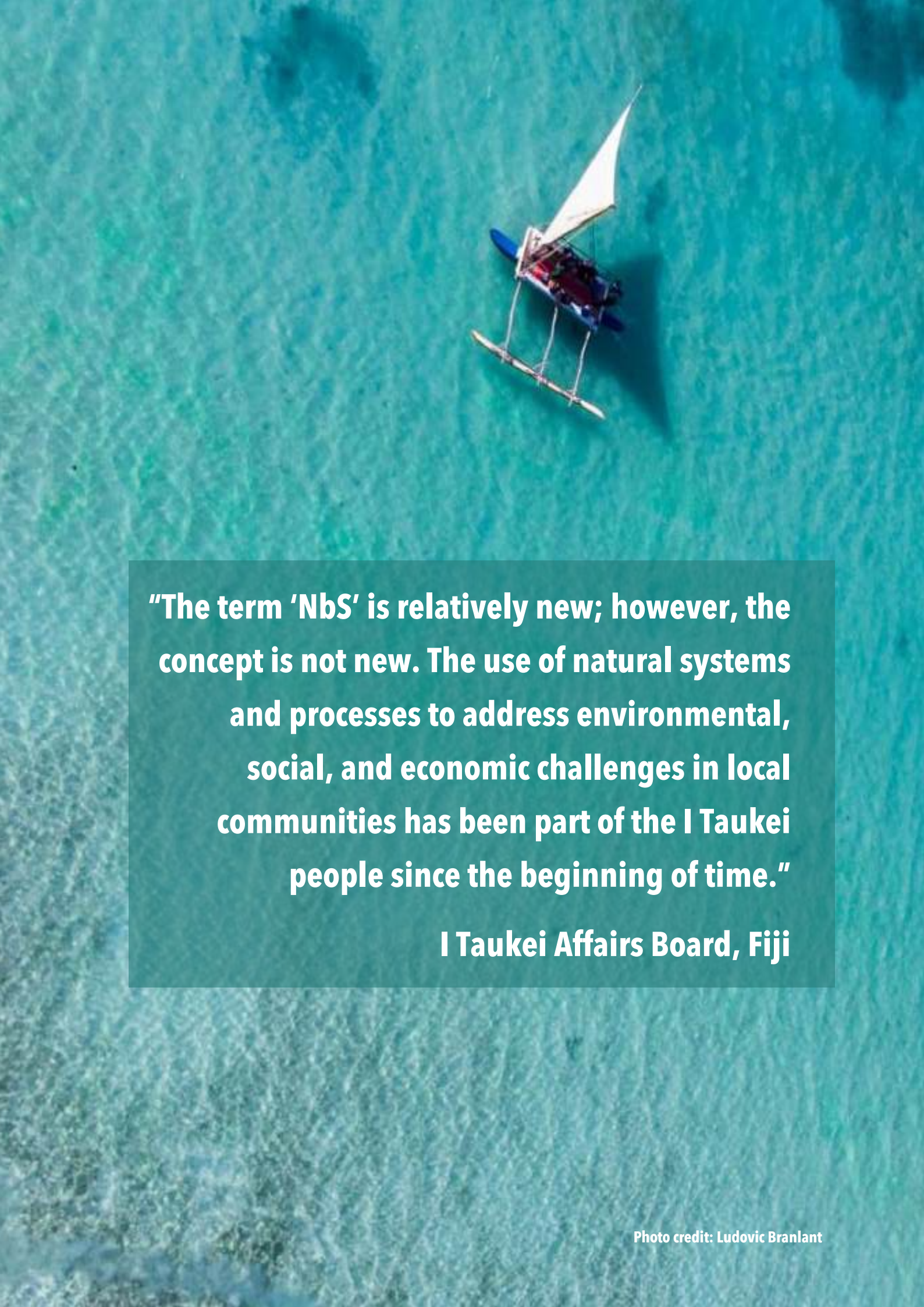
### *4.1 Short term financing cycles need to be replaced with long term sustainability models*

Nature takes time; it does not understand a funding deadline, or a project management sheet. Donor, financiers and project developers need to take this long-term perspective into account. Some reforestation work can take decades to be effective. Impact takes time. It is not always financing that is needed to ensure restoration efforts are managed well, but sometimes it is: Will replanting be needed where the initial planting did not establish? Will additional equipment be needed to replace original tools or seeds after 5 years? The long-term approach to management of restored ecosystems is essential to define, implement and adaptively manage.

### *4.2 Locally-appropriate, locally-owned monitoring, evaluation and learning processes*

Collecting data for donors to communicate impact is not the only reason for monitoring. Building capacity at the national and local level to understand, develop, collect and use data to inform action is essential, not only for PIC NbS projects but any project anywhere in the world. From the application of the NbS standard through to the ongoing monitoring of success for adaptive management, it is important to ensure empowered local ownership of the information that is being collected. It is also important to that local actors understand its use as this supports the long-term sustainability of data collection. This, in turn, supports the collection of impact data sets as NbS can require decades of recording

Pacific Islands Roundtable for Nature Conservation



**"The term 'NbS' is relatively new; however, the concept is not new. The use of natural systems and processes to address environmental, social, and economic challenges in local communities has been part of the I Taukei people since the beginning of time."**

**I Taukei Affairs Board, Fiji**

Photo credit: Ludovic Branlant

# REGIONAL CONTEXT

**The Pacific Islands represent a vast and geographically diverse region in the central and western Pacific Ocean, encompassing different geologic categorisations such as high volcanic, reef islands (atolls) and archipelagos.** These islands vary significantly in size and landscape, ranging from large, mountainous islands such as Fiji, to small, low-lying atolls such Tuvalu and Kiribati. They are popularly known for their pristine beaches, lush rainforests, and some of the clearest waters on the planet. These natural treasures make the region a global magnet for tourism, a critical driver of many Pacific economies.

**PICs have a combined population of about 13.2 million people, spread over an area equivalent to 15% of the earth's surface [1].** While some islands are densely populated and urbanised, others are sparsely inhabited, reflecting their unique cultural, environmental, and developmental contexts. There is great diversity across the Pacific Islands concerning population size. Fiji, holds the largest population in the group at over 900,000, while Tuvalu and Nauru, with estimated populations of approximately 12,000 each, are the World Bank Group's smallest members by population.

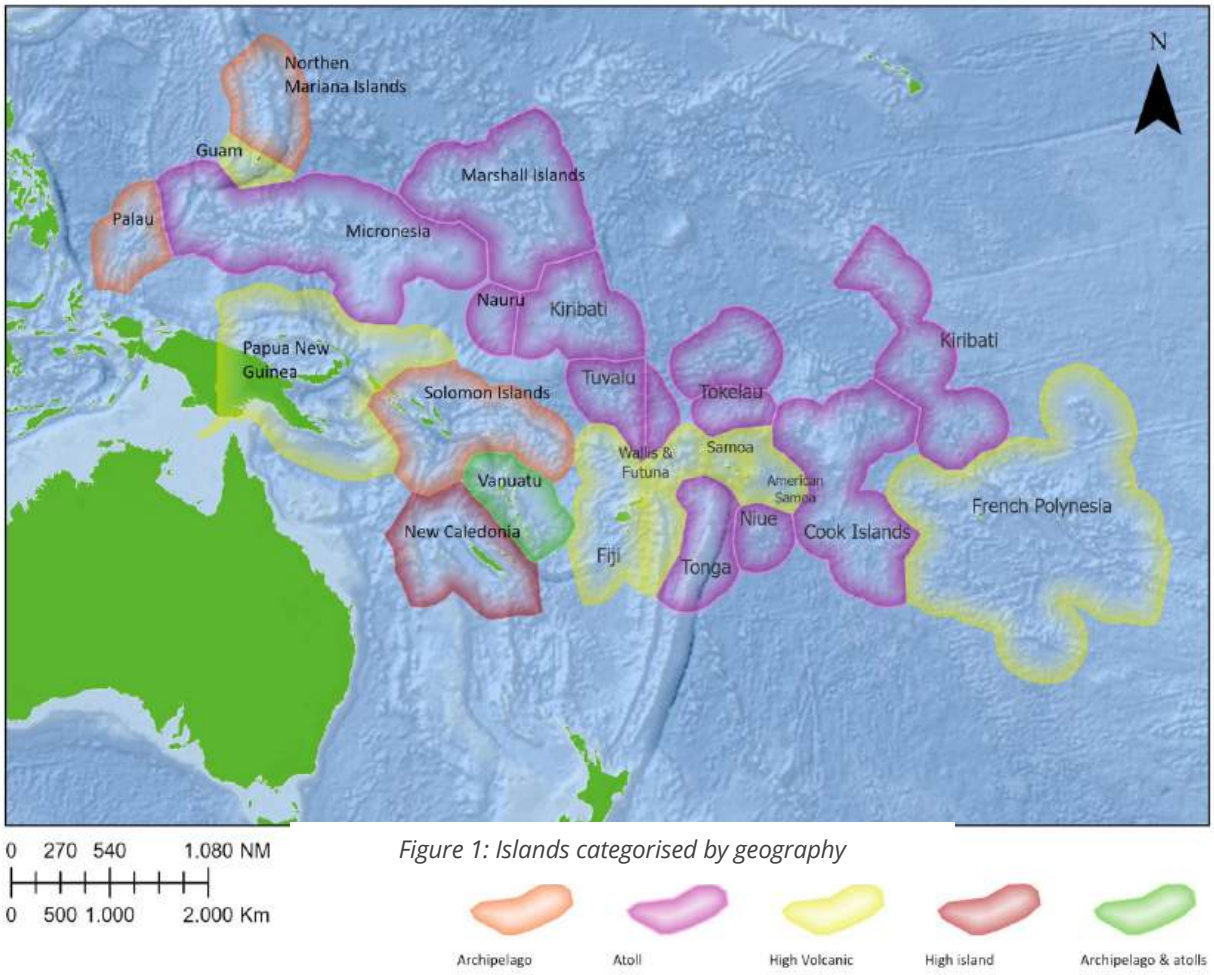



*Figure 1: Islands categorised by geography*

1 World Bank. (2024) Pacific Islands overview. Retrieved November 25, 2024, from https://www.worldbank.org/en/country/pacificislands/overview

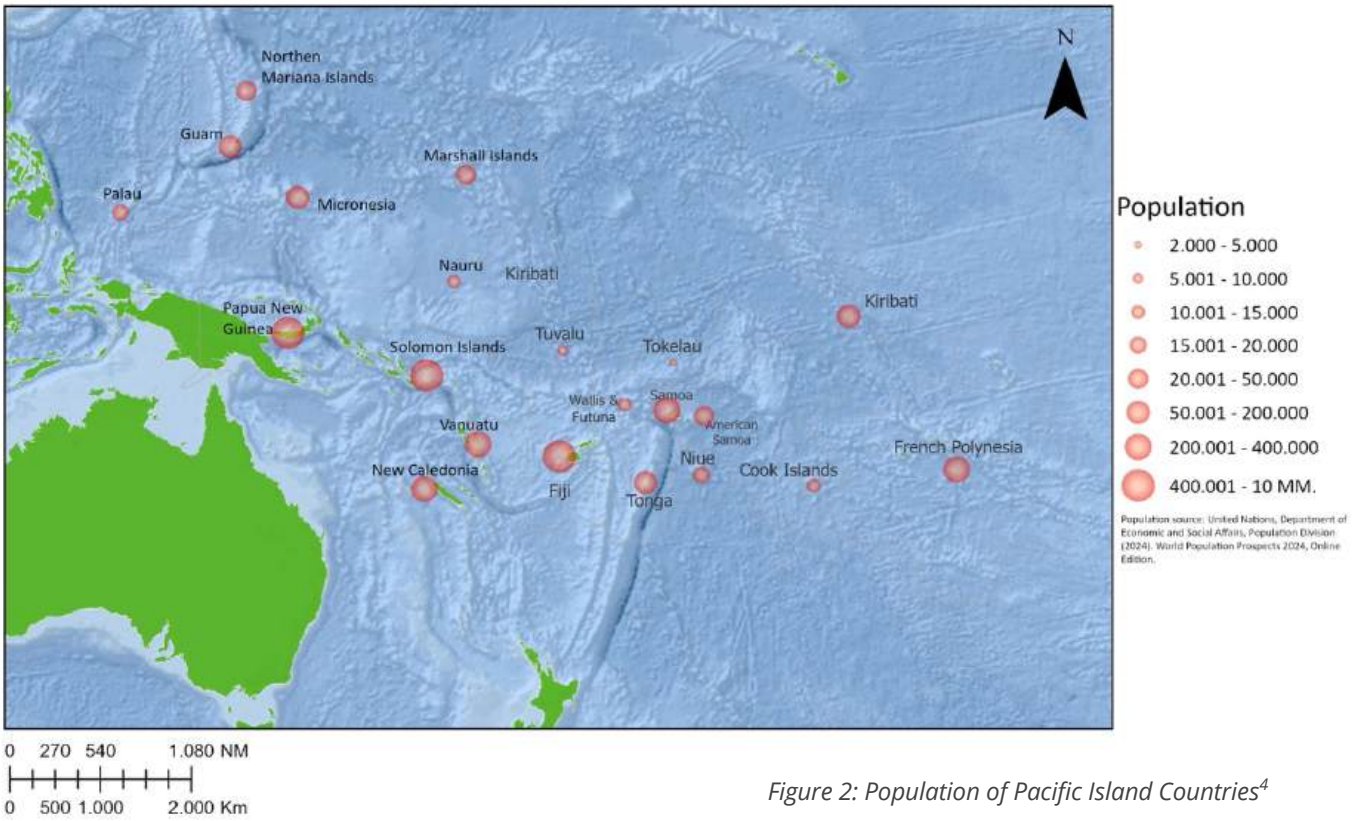



*Figure 2: Population of Pacific Island Countries*[4]

**The population of PICs has seen a steady increase over the years and is projected to grow significantly in the coming decades.** Countries such as Vanuatu, and the Solomon Islands demonstrate relatively higher growth rates over the years, reflecting economic expansion driven by various sectors. In contrast, nations like Northern Marianna islands, Palau and the Federated States of Micronesia exhibit lower or negative growth rates at certain years. This population expansion is likely to increase the relevance of NbS within the Pacific Islands.

Urbanisation in the Pacific Islands reflects a complex interplay of population distribution, growth trends. Most countries, including smaller island nations like Kiribati, Tonga, and Vanuatu, have urban populations predominantly under 0.3 million, indicating a prevalence of small, dispersed settlements rather than large urban centres.

**PICs face significant socio-economic challenges, compounded by poverty, malnutrition, and food insecurity** [2] **.** Approximately 12% of the population lives below the international poverty line, with a broader 25% below national poverty thresholds. Recent data on poverty rates highlight concerning trends in the Pacific, with rates recorded at 24.1% in Fiji, 7.9% in the Marshall Islands, and 15.9% in Vanuatu. Findings from 2019–2020 indicate a marginal increase in poverty levels in Vanuatu, reflecting broader regional socio-economic challenges[3].

**Tourism revenues are a major contributor to regional economic growth, with countries such as Fiji and Samoa surpassing pre-pandemic tourism levels, providing supplementary economic support to Pacific Island nations.**

2 UNICEF. (2023). Pacific Island Countries: Multi-Country Programme Document (MCPD) 2023–2027. Retrieved from https://www.unicef.org/executiveboard/media/14847/file/2023-PL1-Pacific_Island_countries_MCPD-EN-ODS.pdf

3 UNICEF. (2023). Pacific Island Countries: Multi-Country Programme Document (MCPD) 2023–2027. Retrieved from https://www.unicef.org/executiveboard/media/14847/file/2023-PL1-Pacific_Island_countries_MCPD-EN-ODS.pdf

# ENVIRONMENTAL AND CLIMATE CHALLENGES IN THE PACIFIC REGION

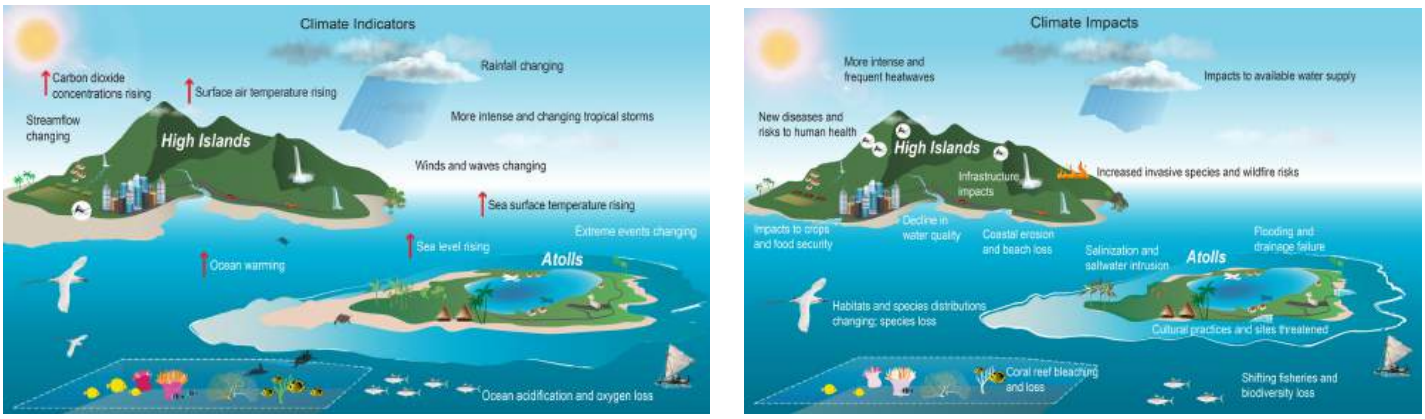
**The Pacific region faces significant climate risks, including rising temperatures, intensifying tropical cyclones, and sea level rise, which exacerbate vulnerabilities for ecosystems and communities.** Additionally, PICs are exposed to many types of natural hazards, the majority of which are climate related and projected to either increase in frequency of occurrence and/or intensity because of climate change. These climatic shifts pose significant risks to economic growth, inflation and the environment. The climatic and environmental issues interlink and intensify impacts *Figure 3*[4].

**Temperatures in the Pacific are increasing faster than the global average for small islands,** with projections reaching up to 1.0–2.0°C rise under RCP 4.5 and 2.0°C - 4.0°C by 2100 under RCP 8.5 scenario. This will ultimately lead to biodiversity loss as more species begin to decline or become extinct. [5] As a result of the rising water temperatures the frequency of coral bleaching events in the Pacific has increased significantly. Currently, the median return time between two severe bleaching incidents has reduced to just six years. A projected 50% decline in fish catch potential by 2100 further undermines marine biodiversity and food security [6]. Food security remains a challenge, with 25% of the population experiencing moderate to severe levels. These compounding risks highlight the region's urgent need for climate adaptation and resilience measures.

**Intensifying Category 4 and 5 tropical cyclones (TC) have caused widespread destruction within the Pacific Islands.** In 2016, TC Winston caused considerable damage to the Fiji Islands, estimated at approximately $500 million. Additionally, TC Pam in 2015 devastated Vanuatu's agricultural sector, with losses totalling 64.1% of its GDP.

*Key Insight: A projected rise in sea levels by 5-10cm by 2030-2050, threatens low-lying islands and atolls through coastal flooding, erosion and saltwater intrusion*

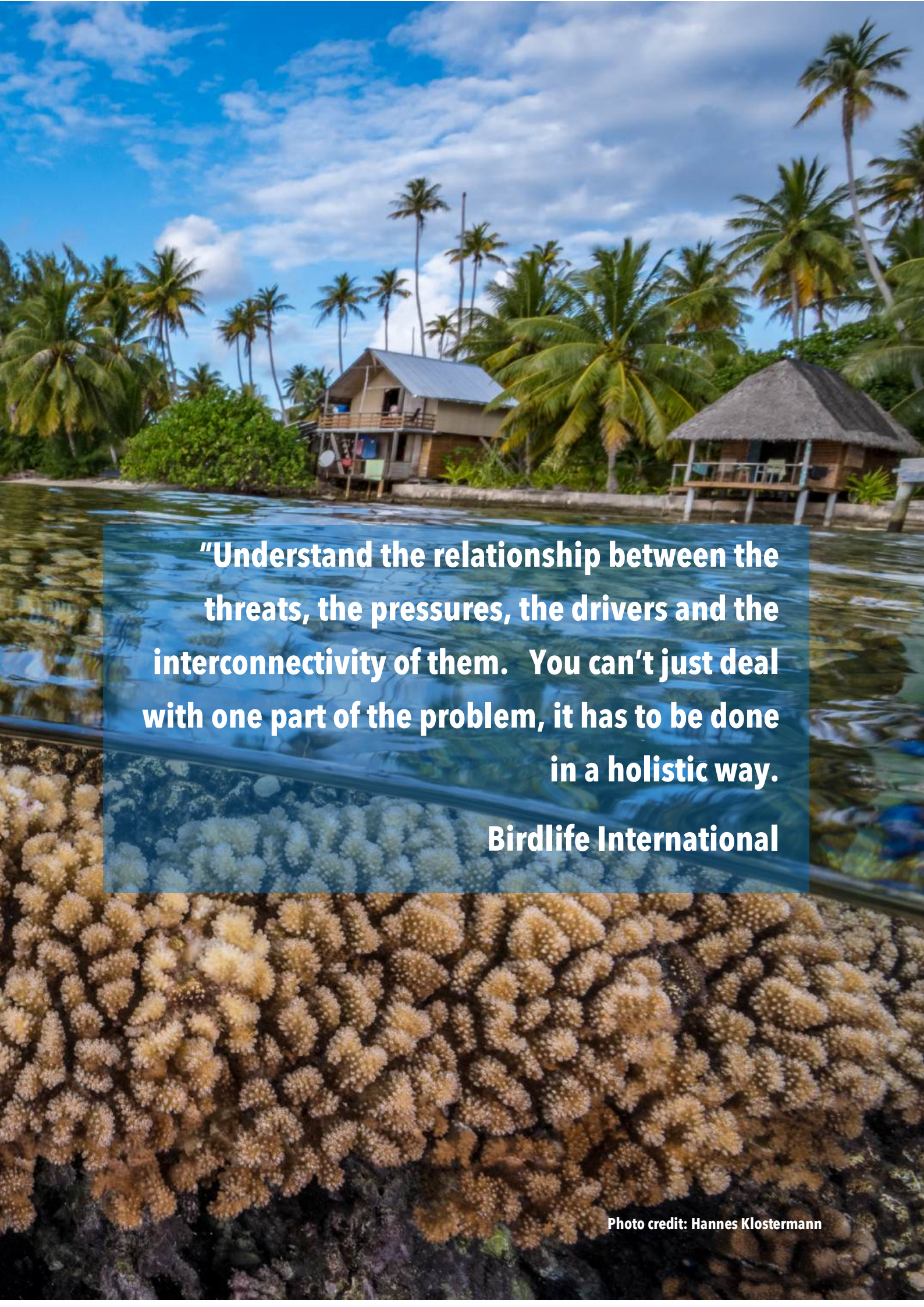
*Figure 3: Climate change indicators and impacts in the Pacific Islands (Frazier et al., 2023)*




[4] Frazier, A.G., M.-V.V. Johnson, L. Berio Fortini, C.P. Giardina, Z.N. Grecni, H.H. Kane, V.W. Keener, R. King, R.A. MacKenzie, M. Nobrega-Olivera, K.L.L. Oleson, C.K. Shuler, A.K. Singeo, C.D. Storlazzi, R.J. Wallsgrove, and P.A. Woodworth-Jefcoats, 2023: Ch. 30. Hawai'i and US-Affiliated Pacific Islands. In: Fifth National Climate Assessment. Crimmins, A.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, B.C. Stewart, and T.K. Maycock, Eds. U.S. Global Change Research Program, Washington, DC, USA. https://doi.org/10.7930/NCA5.2023.CH30

5 Lough, J.M., et al., (2016): Observed and projected changes in surface climate of tropical Pacific Islands. In: Vulnerability of Pacific Island agriculture and forestry to climate change[Taylor, M., A. McGregor and B. Dawson(eds.)]. Pacific Community, Noumea, New Caledonia, pp. 47–101.

6 Intergovernmental Panel on Climate Change (IPCC). (2022). *Chapter 15: Small islands*. In H.-O. Pörtner, D. C. Roberts, M. Tignor, et al. (Eds.), *Climate change 2022: Impacts, adaptation, and vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge University Press. https://www.ipcc.ch/report/ar6/wg2/chapter/chapter-15/



"Understand the relationship between the threats, the pressures, the drivers and the interconnectivity of them. You can't just deal with one part of the problem, it has to be done in a holistic way.

Birdlife International

Photo credit: Hannes Klostermann

# NATURE-BASED SOLUTION?

## THE ROLE OF NBS IN PACIFIC ISLANDS

**Nature-based Solutions (NbS) are increasingly acknowledged for their potential to mitigate climate change impacts while supporting biodiversity, ecosystem services and socio-economic development, all of which are crucial for human well-being.** This interconnected relationship between nature and society has been identified as critical in addressing global crises. This is because a single NbS intervention can contribute to addressing multiple developmental goals at a time, proving highly valuable as the current confluence of global crises is threatening the existence of society.

## WHAT TO LOOK FOR IN AN NBS?

### *What defines an NbS?*

With the emergence of the concept of Nature-based Solutions (NbS) came attempts to define it. The IUCN (2016) first defined NbS as "**actions to protect, sustainably manage, and restore natural and modified ecosystems in ways that address societal challenges effectively and adaptively, to provide both human well-being and biodiversity benefits"**. This definition was reinforced by the IUCN Global Standard for NbS (2020) which introduced benchmarks that would guide the design and implementation of NbS projects, thereby ensuring ecosystem services delivery while addressing biodiversity and societal challenges.

Further attempts to standardise the definition led to the United Nations Environment Assembly (UNEA) resolution 5 of 2022, which describes NbS as ***"actions aimed at protecting, conserving, restoring, and sustainably managing 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".***

*Figure 4: Nature based Solutions as depicted by IUCN, 2016*


**Despite these efforts, different interpretations and ambiguities persist, leading to different approaches to NbS design, implementation, and evaluation.** This is further complicated by conceptual unclarity brought about by related concepts, such as Ecosystem-based Adaptation (EbA), which represents a subset of NbS, specifically focused on using ecosystem services for climate adaptation. Nevertheless, most definitions share emphasis on addressing environmental, social, and economic goals, by reducing trade-offs or maximising co-benefits.

While closely related and often mutually supportive, conservation and nature-based solutions (NbS) differ in their primary focus. **Conservation** broadly refers to the protection, preservation, management, and restoration of natural environments and their biodiversity, often driven by the intrinsic value of nature itself. Its goals are fundamentally about safeguarding ecosystems, species, and genetic diversity to ensure their long-term survival. **Nature-based solutions**, on the other hand, are specifically defined as actions to protect, sustainably manage,

and restore natural or modified ecosystems that *address societal challenges* effectively and adaptively, while simultaneously benefiting both people and nature. This means NbS start with a human need, such as flood risk management, climate change adaptation, or food security, and then leverage natural processes and healthy ecosystems to provide solutions, intentionally linking environmental health with human well-being.

Stakeholder interviews further reveal a broad consensus that NbS should provide environmental and socio-economic benefits while addressing wider societal challenges, including climate-related pressures, to classify as such.

***Key insight:*** *Definitions of NbS emphasise multi-dimensional benefits across ecological, social, and economic domains. While standardised definitions provide important benchmarks, their application requires flexibility to adapt to diverse contexts.*

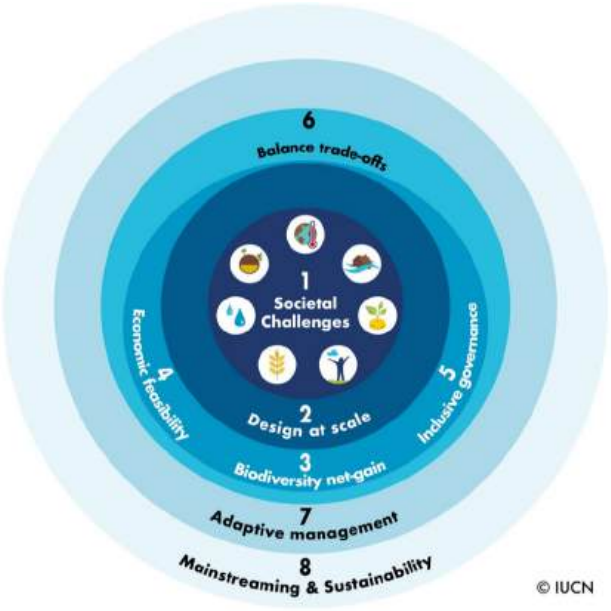



*Figure 5: IUCN Gold Standard for NbS 8 criteria*

## *From theory to practice - Challenges in applying NbS definitions*

Translating NbS definitions into practice presents several challenges. While global definitions and frameworks provide broad guidance for practitioners, they often fail to align with local or regional realities. This misalignment is particularly evident where Indigenous and traditional knowledge systems are integral to natural resource management, such as the Pacific, where the "Pacific Way" of community engagement emphasises collective decision-making and relationship-building processes.

Stakeholder interviews reveal that existing standards or approaches to NbS design and implementation, primarily informed by scientific research, often do not fully integrate these knowledge systems[7]. At the same time, some interviewers highlighted how the (equitable and transparent) interaction and integration of Indigenous and scientific knowledge can enhance the ecological effectiveness of NbS, while contributing to ownership, and knowledge exchange among different stakeholders. Yet, this is infrequent with scientific approaches often dominating NbS design and implementation. Ethnographic methods have proven valuable for recording and reflecting on community engagement processes that are essential for successful NbS implementation but may not be adequately captured in standardised evaluation approaches.

Another challenge is the variety of forms NbS can take, which is oftentimes sector specific. NbS can be sited along a spectrum ranging from interventions primarily relying on functioning ecosystems to those combining natural and "grey" elements. However, the extent to which grey components can be integrated into a project without compromising the "naturalness" of an NbS is still debated. This complicates their identification

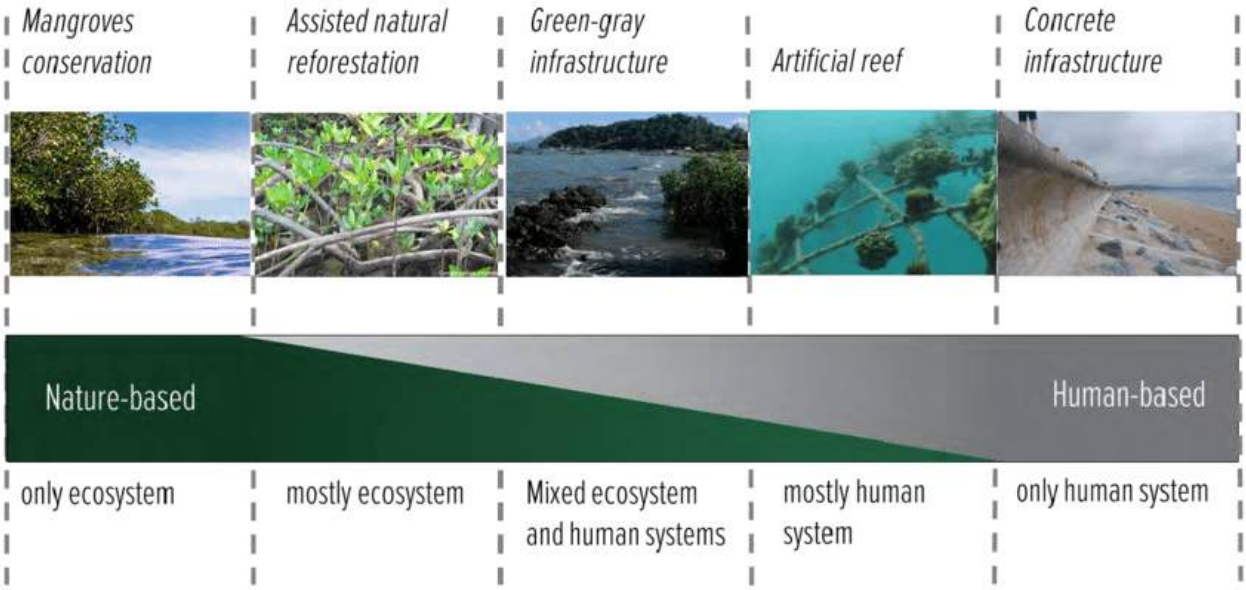
[7] Sowińska-Świerkosz, B., & García, J. (2022). What are Nature-Based Solutions (NBS)? Setting core ideas for concept clarification. *Nature-Based Solutions, 2*, 100009. https://doi.org/10.1016/j.NbSj.2022.100009

or implementation using standardised frameworks [8].

Diverse interpretations of the NbS concept have also resulted in theoretical challenges in monitoring efforts. As a result, measuring NbS effectiveness, and tracking progress towards "NbS targets" remain problematic[9].

***Key insight:*** *Application of global NbS frameworks in the Pacific reveals gaps, particularly in integrating Indigenous knowledge systems. Ethnographic methods have proven valuable for documenting community engagement processes (the "Pacific Way") that are essential for successful NbS implementation but may not be fully captured in standardised evaluation frameworks / guidelines.*


*Figure 6: NbS from purely "nature-based" to hybrid interventions. Source: Fedele et al. (2019)[10].*




[8] Châles, F., Le Gouvello, R., Leport, G., Parker, R., & Renaud, F. G. (2023). Using standards for coastal nature-based solutions in climate commitments: Applying the IUCN Global Standard to the case of Pacific Small Island Developing States. *Nature-Based Solutions, 3*, 100034. https://doi.org/10.1016/j.NbSj.2022.100034; Raphaëla Le Gouvello et al., 'The IUCN Global Standard for Nature-Based Solutions™ as a Tool for Enhancing the Sustainable Development of Marine Aquaculture', *Frontiers in Marine Science* 10 (27 April 2023), https://doi.org/10.3389/fmars.2023.1146637.

[9] **Châles, F., Le Gouvello, R., Leport, G., Parker, R., & Renaud, F. G.** (2023). Using standards for coastal nature-based solutions in climate commitments: Applying the IUCN Global Standard to the case of Pacific Small Island Developing States. *Nature-Based Solutions, 3*, 100034. https://doi.org/10.1016/j.NbSj.2022.100034

[10] **Fedele, G.** (2019, September 24). *Nature-based transformative adaptation: A practical handbook*. Zenodo. https://doi.org/10.5281/zenodo.3386441

## Major Pacific NbS programmes

**Climate Resilient by Nature:** (Budget - $21.2m) The Australian Government and WWF-Australia partnered to create Climate Resilient by Nature (CRxN), an initiative promoting equitable nature-based solutions to climate change in the Indo-Pacific region. CRxN projects collaborate with communities to restore and protect vital ecosystems, build sustainable livelihoods, and enhance resilience to climate change impacts. Launched in 2021, CRxN is funded by the Department of Foreign Affairs and Trade (DFAT) with additional funding provided by the Mekong Australia Partnership - Energy, Water and Climate (MAP-WEC).

**Kiwa Initiative:** (Budget - $85.72m) The Kiwa Initiative is a multi-donor program that aims to build resilience to climate change through Nature-based Solutions (NbS). Kiwa initiative supports projects at both regional and local scale and is operating in 18 Pacific Island countries. It is based on simplified access to climate change adaptation and NbS financing for local and national authorities, civil society and regional organizations. As of July 2024, the Kiwa Initiative is endowed with EUR 77 million. It is funded by the European Union (EU), Agence Francaise de Development (AFD), Global Affairs Canada (GAC), Australian Government Department for Foreign Affairs and Trade (DFAT), and the New Zealand Ministry of Foreign Affairs and Trade (MFAT).

**Promoting Pacific Island Nature-based Solutions (PPIN):** (Budget - $2.64 m) PPIN's overarching goal is that people and ecosystems in the Pacific benefit from NbS to address environmental and societal challenges. The project is working in three pilot countries: Vanuatu, Fiji and Tonga and envisages building NbS awareness and capacity into regional and national policies and regulatory frameworks for key sectors within the Pilot countries.The project is being implemented by IUCN Oceania, Pacific Community (SPC), the Secretariat of the Pacific Regional Environment Programme (SPREP) and GGGI Pacific. It is a regional project funded by the New Zealand Ministry for Foreign Affairs and Trade

**Climate Resilient Islands Programme - Live and Learn:** Working with 65 rural communities in Fiji, Papua New Guinea, Solomon Islands, Tonga, Tuvalu and Vanuatu to strengthen community resilience to climate change through nature-based approaches. Climate Resilient Islands is a New Zealand Ministry of Foreign Affairs and Trade initiative, implemented by Live & Learn with funding from the New Zealand Government.

# STATUS OF PACIFIC NBS PROJECTS

### *Methodology*

As part of this study, an NbS verification tool was developed building on UNEA-5's definition, to identify NbS projects in the region. The tool evaluated a series of climate- and biodiversity-focused interventions that have been actively implemented in the Pacific since 2022- 2024

The tool was designed with practical constraints in mind, including variable data availability and the recognition that many of the interventions assessed were intended to inform or lay the groundwork for potential NbS, rather than constituting fully developed examples. As such, the analysis focused on identifying projects that contribute to or are likely to lead to NbS implementation, even if they did not meet all UNEA-5 criteria.

An initial database of 124 interventions—sourced from the SPC Climate Change project inventory, WWF databases, and consultations with local stakeholders—was screened. For each intervention, the following aspects were systematically mapped:

**Biodiversity orientation:** including conservation, restoration, and/or sustainable use.

**Climate change orientation:** including adaptation, mitigation, and/or loss and damage.

**Social dimensions:** including community engagement, inclusivity, and co-benefits.

The analysis also considered whether interventions represented indirect or enabling measures, such as policy development, capacity building, or knowledge generation, aimed at creating conditions for future NbS implementation.

These three pillars formed the foundation for the classification process. A combination of

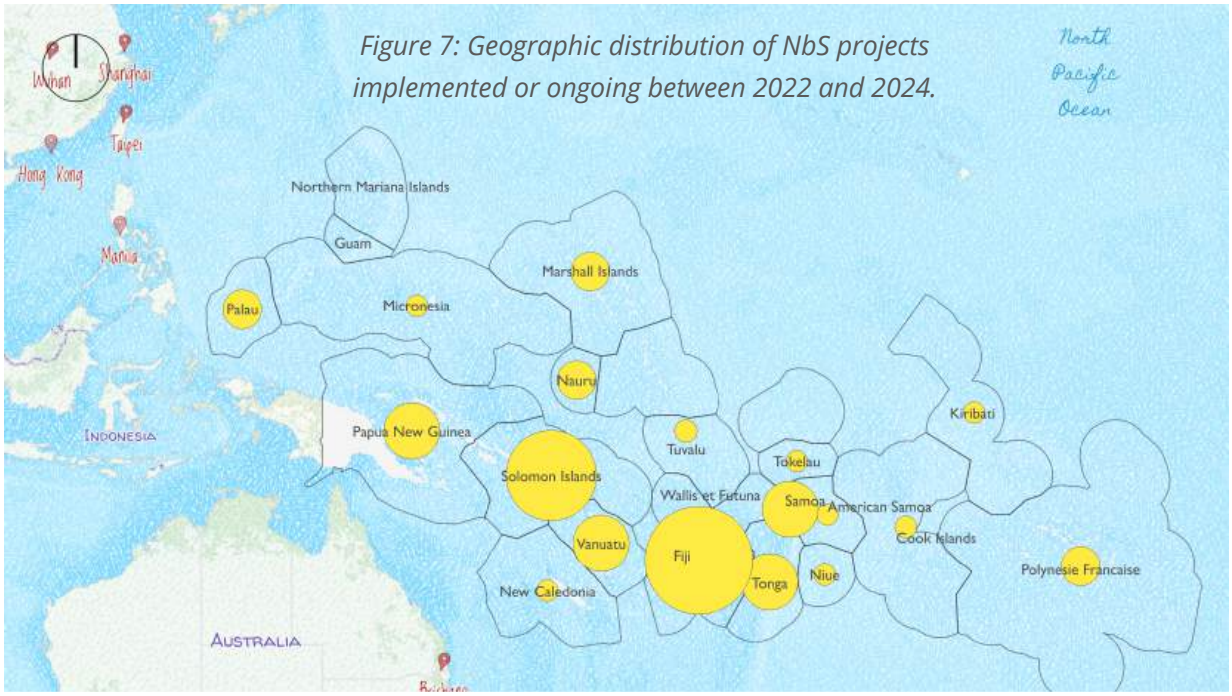



*Figure 7: Geographic distribution of NbS projects implemented or ongoing between 2022 and 2024.*

biodiversity or climate orientation with social dimensions was essential for classifying an intervention as contributing to an NbS. While these aspects alone are not sufficient to classify an intervention as NbS as per UNEA-5 definition, they also represent the core components of an NbS.

### *Limitations*

While this review offers valuable insights into the potential of NbS in the Pacific, several limitations must be acknowledged. The analysis was based on data sourced from the Kiwa Initiative database, SPC Climate Change project inventory, WWF databases, and consultations with local stakeholders. However, this is not an exhaustive list, and it is likely that additional relevant projects or databases were not captured. Some interventions also lacked comprehensive documentation—particularly on social outcomes and long-term effectiveness—which limited the depth of assessment.

## NBS PROGRAMMES IN THE PACIFIC

**The distribution of NbS projects across Pacific Island nations varies significantly.** Fiji (19), Solomon Islands (14), and Vanuatu (10) had the highest number of projects, reflecting a stronger engagement in NbS implementation. In contrast, countries like American Samoa, Pitcairn Islands, and Tokelau (0) show no recorded activity. Moderate levels of implementation are seen in Papua New Guinea (9), Samoa (7), and Tonga (7), while smaller island nations such as Niue (2), Kiribati (2), and Tuvalu (2) have fewer projects. This points to an uneven distribution of projects across the region, often linked to disparities in funding access and national capacity[11].

***Key insight:*** *The application of IUCN Global Standards or similar global frameworks in the Pacific benefits from adaptations, currently under development. These adaptations can also benefit from knowledge sharing in the region and conceptual clarity of what constitutes NbS and associated concepts.*

## SECTORAL APPLICATION

**In the Pacific, there is evidence of a predominance of NbS applied to coastal, marine and forestry sectoral projects.** This outcome is expected, as these landscapes are generally the centres of economic activity in the PICs, particularly due to the region's heavy interdependency on coastal and marine resources. Freshwater and urban ecosystems report the least number of projects assessed. This is consistent with the findings from the 2022, WWF Review of Nature-Based Solutions in the Pacific Region.

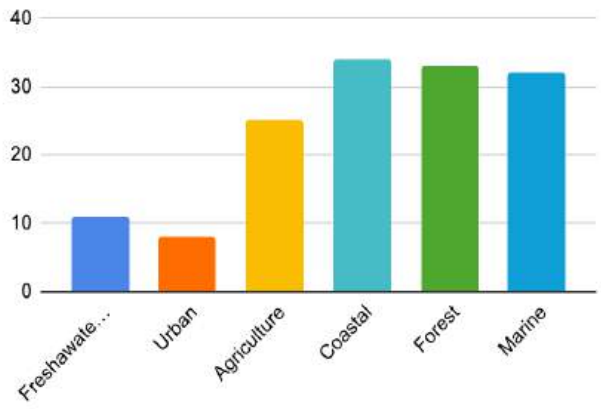



*Figure 8 NbS sectors*

A **total of USD $93 million was mobilized for NbS projects in the Pacific region during the 2022–2025 period.** Most active projects during this period received funding primarily between 2021 and 2022, highlighting a recent surge in investment for NbS initiatives. [12] It should be noted that a significant number of projects that incorporate NbS elements may not be explicitly identified or labelled as NbS, potentially leading to an underestimation of the true scale of investment.Across the identified **NbS projects in the Pacific, climate adaptation** is the primary focus, with **52% of projects** addressing adaptation needs, reflecting the high vulnerability of the region to multifaceted climate risks. In comparison, 20% of projects focus on mitigation**,** and another 20% serve as supporting measures**,** reinforcing broader resilience-building efforts.

# SCOPE OF NBS PROJECTS

## *Focus of Biodiversity Action*

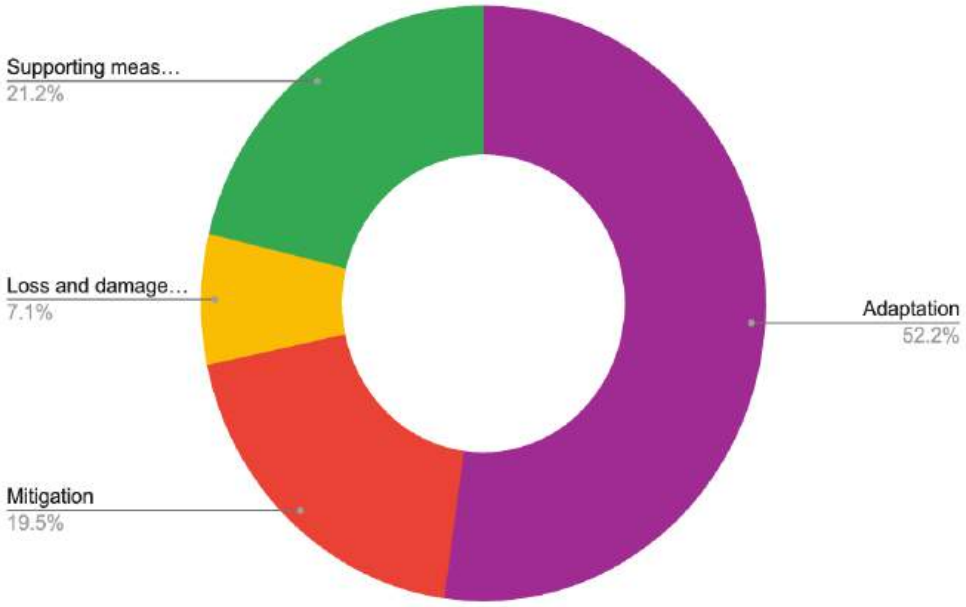
**Sustainable management emerged as the most prevalent biodiversity-related goal, closely followed by restoration and conservation.** This pattern aligns with the primary landscapes targeted for NbS adoption, which require addressing multiple challenges while balancing trade-offs and promoting sustainable resource use.

**Restoration closely follows sustainable management in prominence**, plausibly due to the widespread environmental degradation observed in both coastal and terrestrial ecosystems across the region. Restoration provides a valuable opportunity to rehabilitate degraded ecosystems and return them to a more functional or resilient state. This a critical need in PICTs which have experienced ecological stress that cannot be addressed through management alone. However, it is important to note that habitat recreation was only marginally represented.

# CROSS-CUTTING THEMES

**A significant number of projects had a strong community orientation**. This reflects a tendency towards participatory approaches, as well as the

*Figure 9: Focus of Climate Action*



fact that many of the projects assessed focused on supporting the sustainable management of natural resources through locally led or community-based initiatives.

Closely following this, 33.8% of projects focused on marginalised groups, such as women, youth, and Indigenous communities. It reflects a shift toward more integrated and people-centred approaches, where environmental restoration and protection are pursued in tandem with strengthening community resilience and agency.

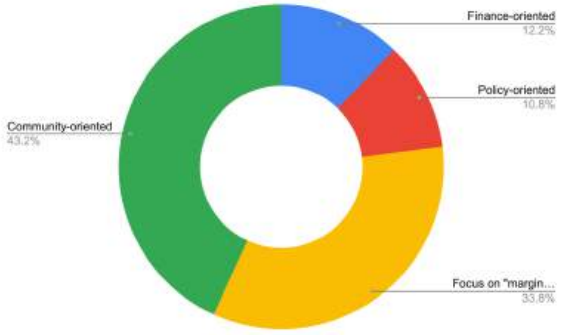



Figure 10 *Cross cutting themes*

## INTERVENTION TYPOLOGY

**Regarding the types of solutions being promoted, the majority built on existing ecosystems**, either managed or with limited anthropogenic presence, followed by supporting measures. Only a small fraction of projects considered hybrid solutions. Several interviews suggested that this may be due to a general tendency to avoid classifying interventions that include engineered elements as NbS. This stems from uncertainty in defining the boundary between NbS and engineered solutions, as well as a prevailing association of NbS with ecological processes. However, through the stakeholder survey, some stakeholders acknowledged that hybrid solutions could, in certain contexts, deliver greater benefits and expressed a preference for a more flexible approach to classification.

**In terms of scale most of the projects identified were country-specific, with only a few operating at a regional level, involving clusters of Pacific countries and territories working together**. While these regional projects included activities spanning multiple countries, they largely functioned as stand-alone, locally tailored interventions, with project components customised to national and community contexts, while also promoting regional capacity building and shared learning.

**Most of the interventions screened out had a strong orientation towards biodiversity conservation or restoration, with social outcomes possibly being a by-product rather than primary objectives.** Similarly, some focused on promoting sustainable agricultural practices, which, while contributing to ecosystem health, were primarily intended to enhance adaptation to climate change or identify technological solutions (e.g., climate-resilient crops) that did not rely on ecosystem processes, an element central to NbS.

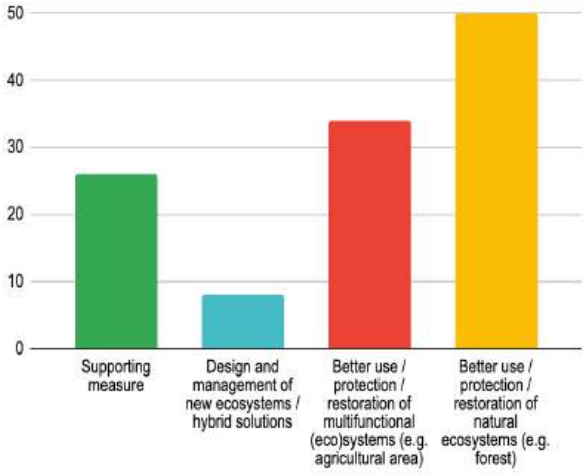



*Figure 11: Intervention Typology*

## EXPANDING THE SCOPE OF NBS – EMERGING OPPORTUNITIES

Stakeholder interviews reveal that while practitioners frequently reference the IUCN definition and guidelines, many adapted them during the implementation phase or built on them to develop context-specific "standards". ***This shows the need for flexibility in NbS frameworks to address local challenges.*** In doing so, there are opportunities to integrate traditional and Indigenous knowledge, which can enhance the effectiveness of NbS.

Though better distinguishing NbS from related sub-concepts such as EbA is essential to prevent

conceptual unclarities from hindering resource mobilisation and policy support, among others; excessive standardisation may compromise the adaptability needed for effective implementation across different ecological and socio-economic contexts, It is therefore necessary to find a balance between maintaining such flexibility and enabling a certain degree of "standardisation".

To navigate this balance, strengthening regional collaboration and knowledge-sharing mechanisms is also essential. Establishing platforms for data exchange and capacity building (see chapter below) can help refine standards while preserving the ability of common definitions / frameworks to accommodate local adaptations. Such efforts can also inform the development of Pacific-specific guidelines, which, at the time of writing, was under development with the guidance of the IUCN, as part of the *Promoting Pacific Island Nature-based Solutions (PPIN)*,

## KEY RECOMMENDATIONS

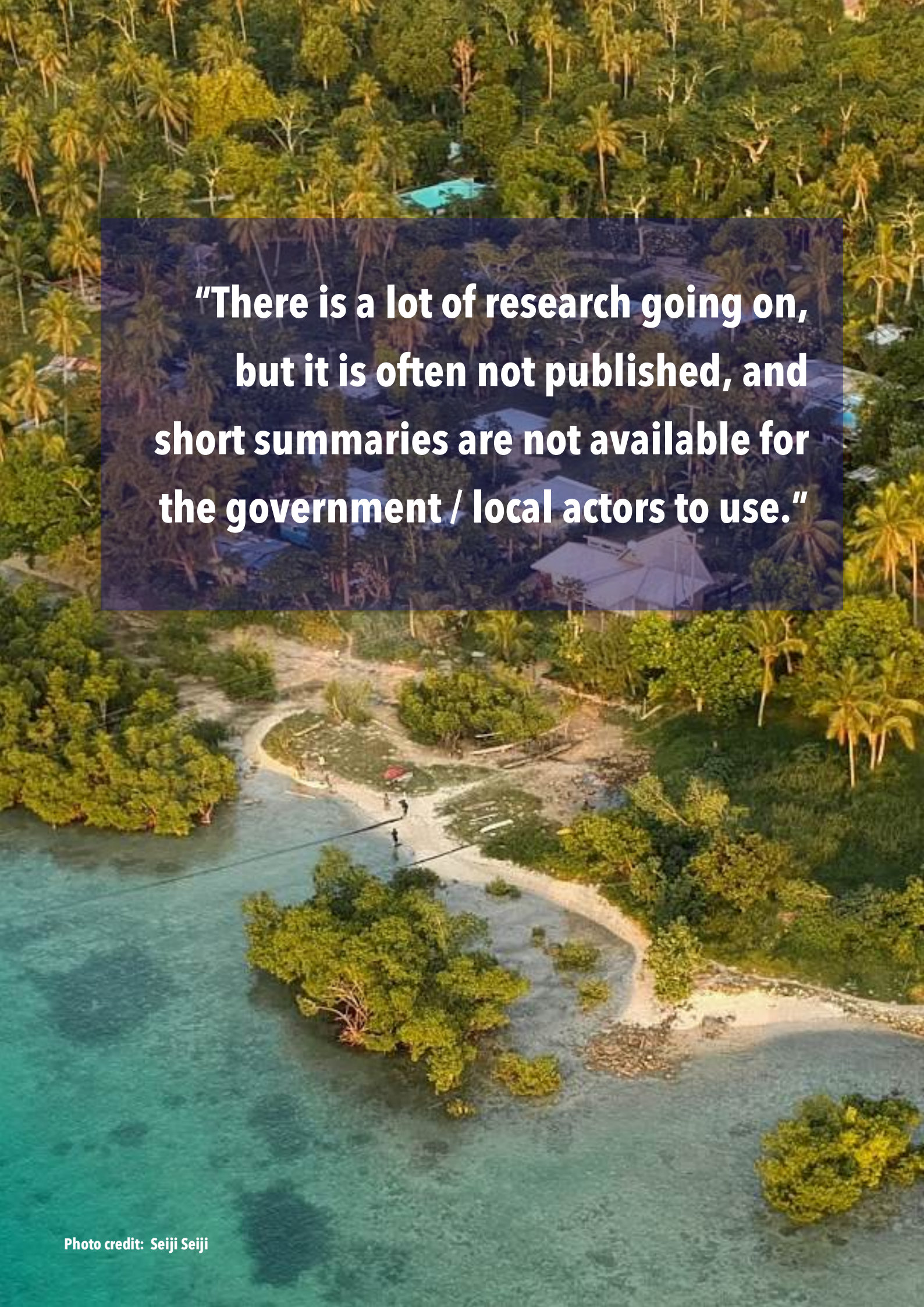
⇒ The design, implementation and ***M&E of NbS in the Pacific requires approaches reflective of the region's ecological, cultural, and social characteristics*** while maintaining the core principles / aspects that define NbS globally.

⇒ More specifically, guidelines and assessment frameworks should ***preserve core NbS criteria but allow for flexibility that respects the "Pacific Way" and Indigenous knowledge systems***. For this reason, context-specific adaptations are particularly important.

⇒ Promoting ***transparent and equitable interaction between scientific and Indigenous knowledge systems*** can enhance the ecological effectiveness of NbS while contributing to local ownership and knowledge exchange. This integration, currently underexplored, can strengthen NbS design and implementation in the region, ultimately contributing to their success.

⇒ Additionally, the potential spectrum of NbS approaches in the Pacific requires ***greater recognition and clarity around the integration of "grey" components,*** which can guide practitioners in the design and implementation of appropriate solutions.

⇒ ***Supporting regional knowledge-sharing mechanisms is essential*** to refine NbS standards without precluding local adaptability. These efforts can inform the development of Pacific-specific guidelines that better conform to regional realities while maintaining alignment with global frameworks. Integrating NbS into strategic plans can enhance NbS-related policy coherence and clarify how NbS can contribute to multiple objectives.



"There is a lot of research going on, but it is often not published, and short summaries are not available for the government / local actors to use."

Photo credit: Seiji Seiji

# LATEST RESEARCH

## STATUS OF SCIENTIFIC RESEARCH ACROSS THE REGION

**A desk-based literature review was conducted in November 2024 to assess the status, achievements, and challenges of Nature-based Solutions (NbS) in the Pacific Islands region.** This project builds on a previous review of NbS in the Pacific Region conducted by the World Wildlife Fund for Nature Australia [13] which identified several themes around the unique features of NbS in the Pacific, including high vulnerability to climate change, dependence on and connection with marine environments (large ocean states), strong community governance, traditional knowledge and community-based approaches, unique customary land tenure and resource rights, remoteness and challenges of geography, and limited capacity of governments.

**This review found a strong focus on marine conservation and coastal protection, climate resilience including both climate change adaptation and mitigation, and community-based conservation.** It is apparent that publications on NbS cover a diverse range of issues across the ten thematic areas of NbS, shared by the IUCN. Additionally, publications tend to cut across a variety of other issues as well, including resilience of urban areas and informal settlements; food security and livelihoods; human health and wellbeing; indigenous knowledge and community-led adaptation; and loss and damage.

**Many publications on NbS don't have a specific geographical focus. The search identified several regional studies with a broad focus on the Pacific Islands or the Asia Pacific Region.** 38 publications related specifically to the Pacific Islands Region, though, very few focused on a particular country. Out of the 38 publications, nine focused in Fiji, five on the Solomon Islands, four on Samoa, three on Tuvalu, three on Vanuatu, two on New Zealand and Papua New Guinea, and one each on the Cook Islands, Kiribati, the Marshall Islands, Guam, Hawaii and on the Northern Mariana Islands. This highlights the need for further research in other countries in the region.

***Key insight:*** *Breakdown of publication focus:*

- ⇒ *25 - climate change adaptation*
- ⇒ *17 - coastal and marine ecosystems*
- ⇒ *10 - carbon sequestration, blue carbon, and the carbon market*
- ⇒ *14 - Indigenous and traditional knowledge*
- ⇒ *5 - community-led adaptation and locally led development approaches*
- ⇒ *3 - cultural ecosystem services*
- ⇒ *4 - loss and damage*

## EMERGING THEMES

**The review demonstrates that NbS are gaining attention and are increasingly being applied in the Pacific Islands to address a range of contemporary and future challenges faced by the nations in this region.** The most significant issues being ecosystem degradation and loss of biodiversity, which increase the need for restoration; however also including climate change; natural hazard impacts; food insecurity; loss of livelihoods, human health and well-being;

[13] WWF (2022) *Review of Nature-based Solutions in the Pacific Region: Focus and Opportunities*. World Wildlife Fund. Available at: https://assets.wwf.org.au/image/upload/f_pdf/2022_MCC_WWF_Review_of_NbS_in_the_Pacific?_a=ATO2Ba20 (Accessed: 17 November 2024).

indigenous and cultural identity crises; as well self-determination, and local activism. [14] The review identified several emerging areas of interest which will be examined below.

## *Growing Significance of Coastal Ecosystems*

**An issue that has gained momentum more recently is the potential for carbon sequestration and storage in the world's ocean and coastal ecosystems such as mangroves, salt marshes and seagrass[15].** Many initiatives are now working to protect and restore coastal ecosystems as they play a pivotal role in reducing the impacts of global climate change. Coastal ecosystems support countries' efforts to reduce greenhouse gas emissions, thereby helping them to achieve their climate change goals included in their Nationally Determined Contributions (NDCs) under the Paris Agreement on Climate Change.

Friess calculated that Small Island States hold 1806–2892 Tg of blue carbon, and mangroves alone offset > 10% of land use emissions for 11-16 Small Island States, highlighting their potential contribution to national climate change mitigation if they are protected and restored. [16] However, Friess also found, that despite the vast potential of coastal ecosystems to mitigate climate change, less than 10% of Small Island States have incorporated blue carbon into their National Greenhouse Gas Inventories or Forest Reference Emissions Levels. [17] Moreover, only 23% have quantitative and measurable blue carbon targets, and 36% have no mention of blue carbon at all. There is therefore immense scope to implement robust blue carbon targets and actions in many Small Island States.[18]

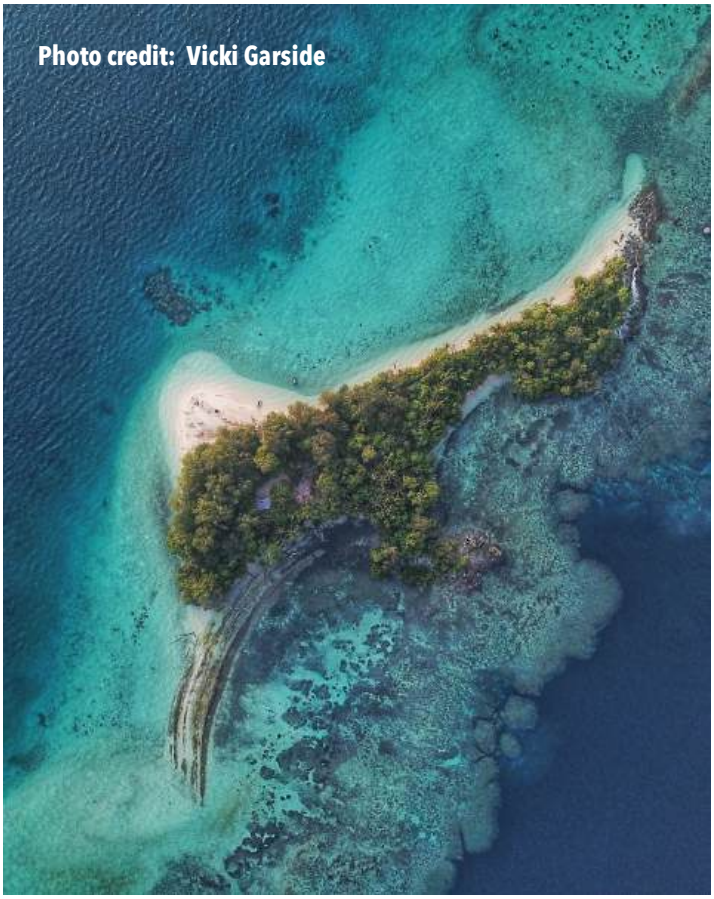


Photo credit: Vicki Garside

[14] Cohen-Shacham, E. *et al.* (eds) (2016) *Nature-based solutions to address global societal challenges*. IUCN International Union for Conservation of Nature. Available at: https://doi.org/10.2305/IUCN.CH.2016.13.en; Dunlop, T. *et al.* (2024) 'The evolution and future of research on Nature-based Solutions to address societal challenges', *Communications Earth & Environment*, 5(1), p. 132. Available at: https://doi.org/10.1038/s43247-024-01308-8; Hilmi, N. *et al.* (2025) 'Resilience of Small Islands: Unveiling Nature-Based Solutions for Sustainable Futures', in A. Arora, F. Belaïd, and S. Lechtenberg-Kasten (eds) *Climate-Resilient Cities*. Cham: Springer Nature Switzerland (Contributions to Economics), pp. 257–280. Available at: https://doi.org/10.1007/978-3-031-73090-0_13; IUCN (2019) *Nature-based Solutions for Climate Change Adaptation & Disaster Risk Reduction*. Available at: https://climate-adapt.eea.europa.eu/en/metadata/publications/nature-based-solutions-for-climate-change-adaptation-disaster-risk-reduction (Accessed: 20 January 2025); Seddon, N. *et al.* (2020) 'Understanding the value and limits of nature-based solutions to climate change and other global challenges', *Philosophical Transactions of the Royal Society B: Biological Sciences*, 375(1794), p. 20190120. Available at: https://doi.org/10.1098/rstb.2019.0120.

[15] Sharma, S. *et al.* (2022) 'Preface: Blue carbon studies in Asia-Pacific regions: Current status, gaps, and future perspectives', *Ecological Research*, 37(1), pp. 5–8. Available at: https://doi.org/10.1111/1440-1703.12290; Sun, Y. *et al.* (2024) 'Exploring the international research landscape of blue carbon: Based on scientometrics analysis', *Ocean & Coastal Management*, 252, p. 107106. Available at: https://doi.org/10.1016/j.ocecoaman.2024.107106.

[16] Friess, D.A. (2023) 'The potential for mangrove and seagrass blue carbon in Small Island States', *Current Opinion in Environmental Sustainability*, 64, p. 101324. Available at: https://doi.org/10.1016/j.cosust.2023.101324.

[17] ibid

[18] ibid

**In addition to their role in carbon sequestration, coastal ecosystems such as mangroves and coral reefs also feature strongly in protecting low-lying islands and atolls from erosion and flooding. This is because they enhance resilience to the impacts to climate change, inducing sea-level rise and natural hazards.** Coastal resilience assessments have been conducted for American Samoa [19], Guam [20] Palau [21], New Caledonia [22] and the Commonwealth of the Northern Mariana Island[23].

Many organisations support the restoration of coastal ecosystems and promote ecosystem-based adaptation and disaster risk reduction[24].

## *Lack of Robust Policy Guidelines on NbS*

**Another important issue is the application of the IUCN Global Standards for NbS in climate solutions in PICS. National climate plans, such as the NDCs, include NbS as a practical and effective action to help countries achieve their climate and biodiversity targets.** However, Châles et al. argue that the absence of a standardised NDC structure and the lack of guidance about how NbS should be included in NDCs can hinder access to external funding for developing countries and prevent transparent reporting on progress at the international level.[25] They found that alignment with the eight criteria of the IUCN Global Standard is currently insufficient.[26] Standardisation of the description of coastal NbS in NDCs is therefore needed to monitor the effectiveness of implementation and progress towards long-term goals. More research on economic analysis and cost effectiveness of NbS are also needed to help guide planning and application of NbS.

> ***Key Insight:*** *Practical support is needed for PICTs to integrate NbS in a standardised way into NDCs*

## *Climatic Impact of NbS: Preventing Non-Economic Loss and Damage*

**Another issue is the role of NbS in reducing loss and damage from climate change. Drawing on the perspectives of Pacific Islander stakeholders, Westoby et al. explore the complexity and interconnectedness of non-economic loss and damage (NELD).** [27] The authors argue that loss and damage is not always absolute, and that there are NELD that are arguably reparable.[28]

McNamara *et al.* highlight the importance of understanding and responding to climate-driven

[19] Dobson, J.G. *et al.* (2021) *American Samoa Coastal Resilience Assessment*. Asheville, NC, USA: UNC Asheville National Environmental Modeling and Analysis Center. Available at: https://www.nfwf.org/sites/default/files/2021-12/American-Samoa-Coastal-Resilience-Assessment.pdf (Accessed: 8 January 2024).

[20] Dobson, J.G. *et al.* (2021) *Guam Coastal Resilience Assessment*. Asheville, NC, USA: UNC Asheville National Environmental Modeling and Analysis Center. Available at: https://www.nfwf.org/sites/default/files/2021-10/Guam-Coastal-Resilience-Assessment-Oct-2021_0.pdf (Accessed: 8 January 2024).

[21] Great Barrier Reef Foundation (2024) A Resilience Strategy for the Koror Rock Islands southern lagoon World Heritage Site. UNESCO, The Nature Conservancy's Reef Resilience Network, Columbia University's Center for Resilient Cities and Landscapes, and AECOM 49 pp. Available at: https://www.barrierreef.org/uploads/Resilience-Strategy-for-the-Koror-Rock-Islands-Southern-Lagoon-051023.pdf

[22] Great Barrier Reef Foundation (2024) Strategic guidance document for the resilience of New Caledonia's coral reefs and associated ecosystems. UNESCO, The Nature Conservancy's Reef Resilience Network, Columbia University's Center for Resilient Cities and Landscapes, and AECOM. 80 pp. Available at: https://www.barrierreef.org/uploads/NewCaledonia-ResilienceStrategy.pdf

[23] Dobson, J.G. *et al.* (2020) *Commonwealth of the Northern Mariana Islands Coastal Resilience Assessment*. Asheville, NC, USA: UNC Asheville National Environmental Modeling and Analysis Center. Available at: https://www.nfwf.org/sites/default/files/2020-08/northern-mariana-islands-coastal-resilience-assessment.pdf (Accessed: 8 January 2024).

[24] SPREP (2024) *Adapting coastal cities and territories to sea level rise in the pacific – Challenges and Leading Practices*. Secretariat of the Pacific Regional Environment Programme. Available at: https://weadapt.org/wp-content/uploads/2024/09/Seaties-Regional-Report-Pacific.pdf (Accessed: 26 November 2024).

[25] Châles, F. (2023) *Coastal nature-based solutions for climate adaptation and mitigation in the national policies of Pacific Small Island Developing States*. Economics and Finance. Université de Bretagne occidentale - Brest.

[26] ibid

[27] Westoby, R. *et al.* (2022) 'Cascading loss and loss risk multipliers amid a changing climate in the Pacific Islands', *Ambio*, 51(5), pp. 1239–1246. Available at: https://doi.org/10.1007/s13280-021-01640-9.

[28] ibid

non-economic loss and damage.[29] Their views align with Van Schie et al who draw on studies conducted in Bangladesh and Fiji, **to emphasise the benefits of a values-based assessment approach that provides a context-sensitive understanding of people's lived experiences of loss and damage.**[30]

For example, intolerable impacts in Fiji include the loss of burial grounds and foundation stones, which provide a connection to ancestors and loved ones.[31] The authors show how a values-based approach unifies often dichotomised economic and non-economic loss and damage, providing a holistic overview of climate-related impacts so that decisionmakers can more mindfully engage with people's everyday lives.[32]

***Key Insight:*** *Values based assessment can be an effective approach to assess loss and damage, that is more meaningful than economic metrics.*

# GAPS IN LITERATURE

**The literature review also revealed several gaps pertaining to NbS which shall be examined within this section.**

## *Unaddressed Thematic Areas*

As earlier stated, there is a gap in literature focused on geographical case studies of NbS implementation. However, there are also limited number of publications focusing on the following thematic areas:

- Water resource management
- Forest restoration
- Agriculture
- Disaster risk reduction
- Cross-cutting issues

***Key insight:*** *Future research would benefit from more work in the geographical areas currently underrepresented, such as smaller islands and atolls.*

## *Link Between Indigenous and Ecological Knowledge and Scientific Knowledge*

**Another important area warranting further research is the link between Indigenous ecological knowledge and scientific knowledge.**

The success and sustainability of NbS projects could be enhanced by streamlining the integration of global scientific knowledge with traditional and local knowledge (TLK), while also fostering community engagement and support.[33] Similarly, an inclusive co-production of knowledge approach, with the project team engaging closely with community members and local stakeholders throughout the planning, design and implementation stages, is advocated.[34]

Mihaere et al. show that there is great potential for nature-based urban adaptation agendas to be more effective if they are linked closely to Indigenous ecological knowledge and understandings of wellbeing.[35]

## *Gendered Dimensions of NbS Planning and Implementation*

**More work is also needed to understand the gendered dimensions of NbS planning and implementation and the role of women in**

[29] McNamara, K.E. *et al.* (2021) 'Understanding and responding to climate-driven non-economic loss and damage in the Pacific Islands', *Climate Risk Management*, 33, p. 100336. Available at: https://doi.org/10.1016/j.crm.2021.100336.

[30] Van Schie, D. *et al.* (2024) 'Valuing a values-based approach for assessing loss and damage', *Climate and Development*, 16(8), pp. 722–729. Available at: https://doi.org/10.1080/17565529.2023.2289533.

[31] ibid

[32] ibid

[33] Harris, M. (2024) 'Opportunities for ecosystem-based adaptation to climate change in coastal Pacific Island communities: Case studies of mangrove reforestation on Vanua Levu Island, Fiji'. Available at: https://doi.org/10.25907/00859.

[34] McEvoy, D. *et al.* (2024) 'Localized nature-based solutions for enhanced climate resilience and community wellbeing in urban informal settlements', *Climate and Development*, 16(7), pp. 600–612. Available at: https://doi.org/10.1080/17565529.2023.2277248.

[35] Mihaere, S. *et al.* (2024) 'Centering localised indigenous concepts of wellbeing in urban nature-based solutions for climate change adaptation: case-studies from Aotearoa New Zealand and the Cook Islands', *Frontiers in Environmental Science*, 12, p. 1278235. Available at: https://doi.org/10.3389/fenvs.2024.1278235.

**community resilience to climate change.**[36] The KIWA Initiative aims to address this by integrating Gender Equity, Disability and Social Inclusion (GEDSI) into NbS for climate adaptation.[37] SPREP (2025) provides an overview of the types of investment and modes of delivery used to promote knowledge and strengthen capacity on integrating GEDSI and broader human rights and right-based approaches in NbS for climate adaptation in PICs.[38]

### *Interdisciplinary discussions of NbS and Innovation*

**In terms of innovation, some authors point to the need to enhance research collaboration, to conduct more interdisciplinary research on NbS. This will enable co-production of knowledge with local researchers, thereby strengthening the combination of scientific and Indigenous ecological knowledge discussed earlier.**[39] Others have identified a need to develop combined approaches incorporating both NbS and grey infrastructure to maximise the effectiveness of interventions. [40] There have also been considerable advances in technological innovation such as Remote Sensing (RS) and Geographic Information Systems (GIS), amongst others. For example, Dutta Roy *et al.* used RS coupled with modelling to efficiently and accurately estimate mangrove blue carbon stocks at larger spatiotemporal extent. [41]

***Key Insight:*** *Further research is needed to support synthesis between scientific and indigenous knowledge. Increased collaborations in research by national scientists and researchers will strengthen capacity & increase knowledge held within the region.*


[36] Singh, P., Tabe, T. and Martin, T. (2022) 'The role of women in community resilience to climate change: A case study of an Indigenous Fijian community', *Women's Studies International Forum*, 90, p. 102550. Available at: https://doi.org/10.1016/j.wsif.2021.102550

[37] SPREP (2025) *Integrating Gender Equity, Disability and Social Inclusion in Nature-based Solutions for Climate Adaptation: Principles, Case Studies and Lessons Learned*. Apia, Samoa: Secretariat of the Pacific Regional Environment Programme. Available

[38] ibid

[39] McEvoy, D. *et al.* (2024) 'Localized nature-based solutions for enhanced climate resilience and community wellbeing in urban informal settlements', *Climate and Development*, 16(7), pp. 600–612. Available at: https://doi.org/10.1080/17565529.2023.2277248

[40] Anderson, C.C. *et al.* (2022) 'Green, hybrid, or grey disaster risk reduction measures: What shapes public preferences for nature-based solutions?', *Journal of Environmental Management*, 310, p. 114727. Available at: https://doi.org/10.1016/j.jenvman.2022.114727; Molnar-Tanaka, K. and Surminski, S. (2024) *Nature-based solutions for flood management in Asia and the Pacific*. OECD Development Centre Working Papers 351. Available at: https://doi.org/10.1787/f4c7bcbe-en.

[41] Dutta Roy, A. *et al.* (2024) 'Remote sensing-based mangrove blue carbon assessment in the Asia-Pacific: A systematic review', *Science of The Total Environment*, 938, p. 173270. Available at: https://doi.org/10.1016/j.scitotenv.2024.173270.

## *KEY RECOMMENDATIONS*

⇒ ***More research*** is needed in countries and territories currently underrepresented.

⇒ ***Several issues are currently emerging*** that require research to support evidence-based decision making. These include:

- The role of ecosystems in carbon capture and sequestration;
- The identification and quantification of economic and non-economic losses and damages associated with ecosystems and their functions and services;
- The role of NbS in reducing and adapting to climate and natural hazard risks.

⇒ There is ***need to investigate the use of values-based*** assessment as an effective approach to assess loss and damage, as it is arguably more meaningful than economic metrics.

⇒ There ***is need to apply technology and innovation*** such as remote sensing, geographic information systems (GIS), multi criteria evaluation (MCE), and artificial intelligence (AI).

⇒ ***Relevant stakeholders must find ways to integrate scientific and indigenous knowledge*** and practice in order to promote community-led action.

⇒ Researchers and practitioners should place more emphasis on the ***gendered dimensions of NbS planning*** and implementation and the role of women in community resilience to climate change.

⇒ There should be increased ***collaborations amongst scientists and researchers based in the region*** as well as international universities and research organisations. This will strengthen capacity & increase knowledge held within the region.


“We don’t have land; we are the land. We don’t have ocean; we are the ocean. We don’t have relationship; we are the relationship. Rooted, connected. Fixed, yet fluid.”
- Upolu Lumā Vaai
Photo credit: Braden Jarvis

# NBS IMPLEMENTATION

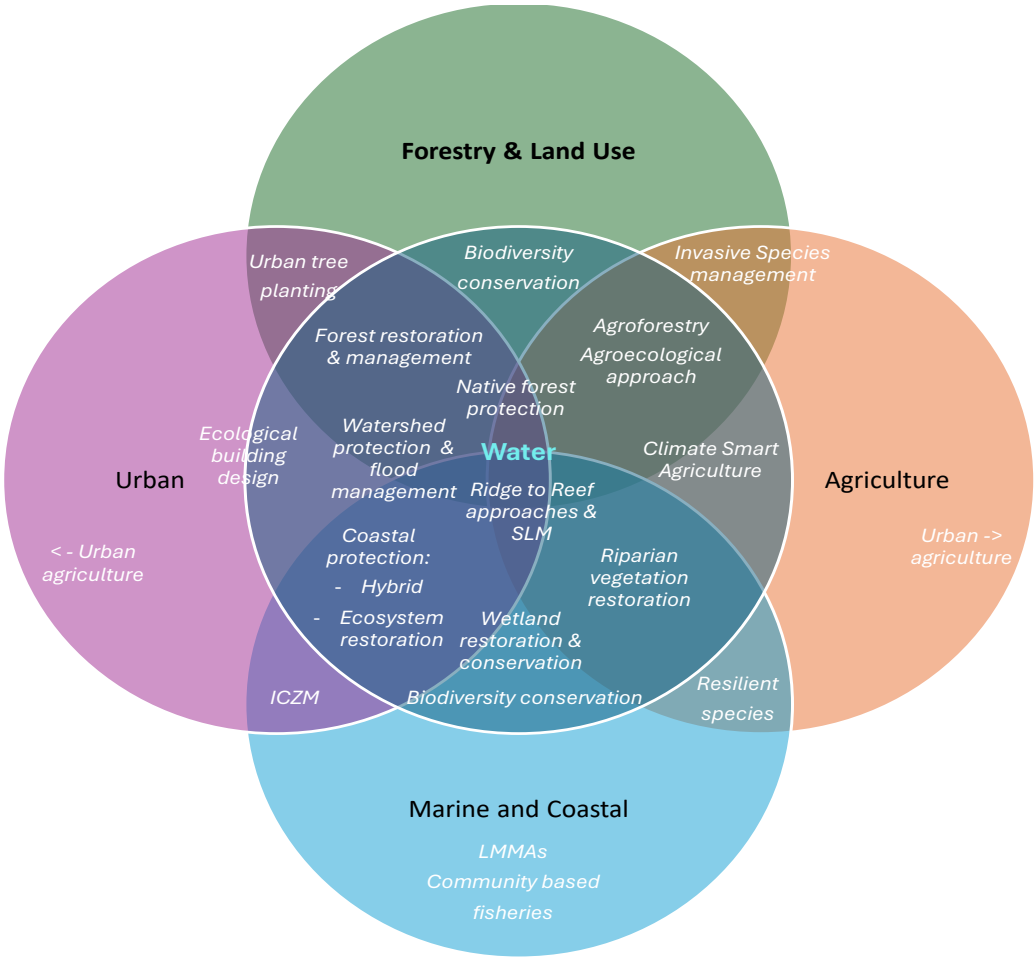
## DEFINING SECTORS

The delineation of distinct sectors within Pacific Island nations presents a significant challenge. Traditional Western frameworks, which often rely on compartmentalized definitions, struggle to capture the inherent interconnectedness of land, ocean, water resources, urban settlements, and agricultural practices. This interconnectedness, rooted in traditional Pacific Island livelihoods and resource management, renders rigid sectoral boundaries artificial and inadequate. The fluidity between these domains, where, for example, coastal agriculture directly influences and is influenced by marine ecosystems, necessitates a holistic, integrated approach. Failing to recognize this interconnectedness can lead to policy misalignments, thereby hindering sustainable development efforts that are sensitive to the unique socio-ecological realities of Pacific Island communities. However, for the purpose of this analysis this report divides the NbS sectors in PICTs into:

- Marine and Coastal
- Forestry and Land Use
- Agriculture
- Urban
- Water resources

Within this framework this report recognises that marine and coastal takes the ecosystems from ocean to shore; forestry and land use takes the ecosystems from shore to peak; agriculture considers the food production of the land; urban includes habitation and infrastructure and water resources is the whole freshwater system which connects all these ecosystems. A ridge to reef approach connects across all sectors as no island / watershed ecosystem can be considered in isolation. The following diagram illustrates the connection between the sectors and the NbS practices considered within each.

*Figure 12: Cross cutting aspects of Nature based Solution types*



Categorising NbS is challenged further when considering the driving motivation for their application. *Figure 13* below illustrates the alignment of NbS with key societal and environmental challenges identified in the PICs. Among these, climate change and disaster risk emerge as the most pressing and cross-cutting concern. The figure highlights how a diverse range of NbS interventions—such as mangrove restoration, coral reef protection, and watershed restoration—can offer impactful, context-specific responses to these urgent issues; while also addressing interconnected challenges like food insecurity, environmental degradation, and urbanisation issues persisting in the region.

*Figure 13 A subset of Societal & Environmental Challenges in PICTs and potential NbS Responses*[42]

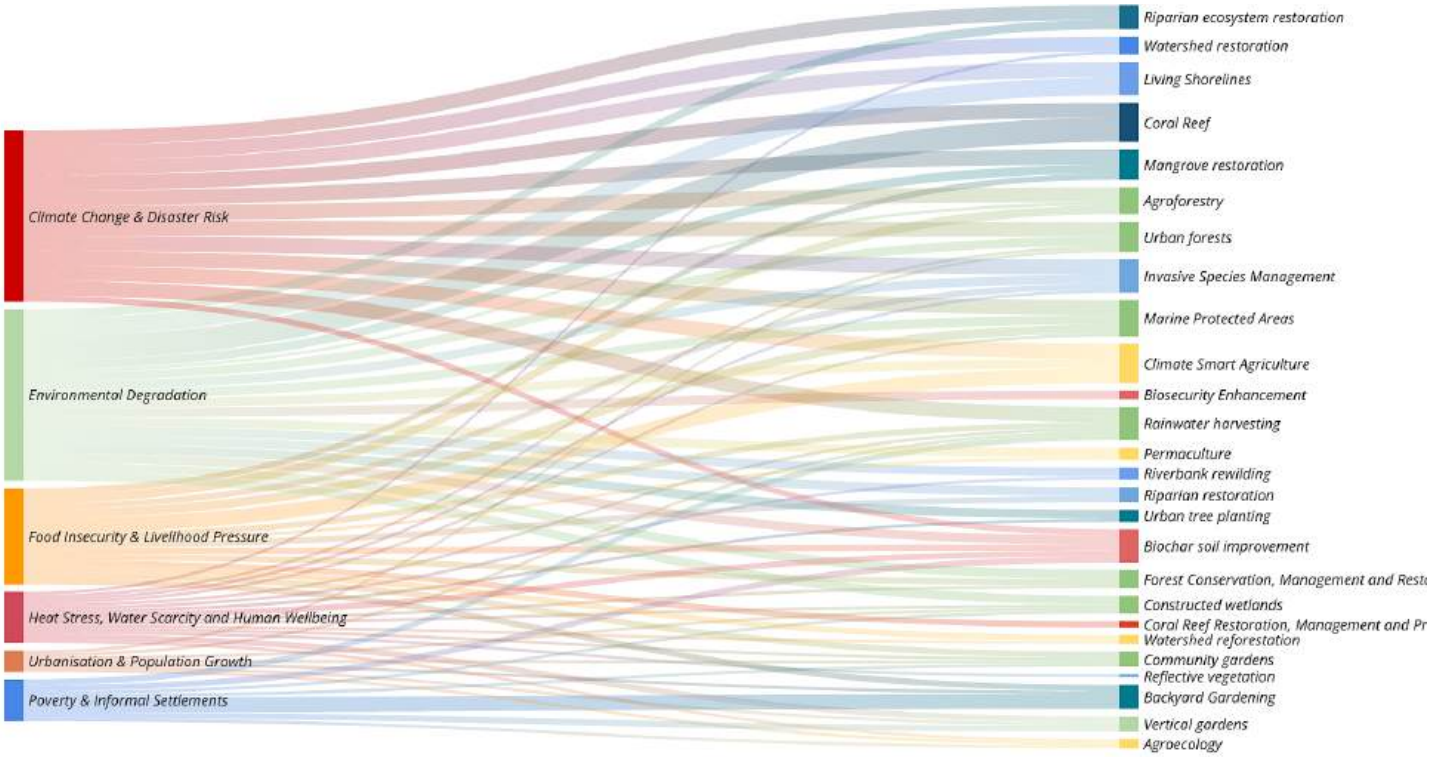
## HOW TO USE THIS SECTION

⇒ *Each of the five sectors provides a **background** for the Pacific Island Countries and Territories, then focuses in on the **present implementation** of NbS projects, key learnings and opportunities, as well as gaps, and highlights case studies of interest, and makes **recommendations for future action at the end.***

⇒ *A **summary table** of projects is provided in each section of NbS sectoral implementation. This is non-exhaustive, and a full list of projects is provided in the annex for reference.*

⇒ *The purpose of these sectors is to highlight the present status, whilst offering readers the option to **connect to specific projects** through the links provides.*

⇒ ***Key recommendations** are summarised at the end of the sub chapters*




[42] Prepared by the author based on contextual issues identified in the chapter. This is not an exhaustive list of Nature-based Solutions (NbS) applicable to the Pacific, nor a comprehensive account of all socio-economic and environmental challenges in the region.

## Case Study: WISH+ - Integrated Watershed Management as a holistic NbS approach

WISH+ is a project exemplifying the importance of addressing the interconnection of sectors, and use of multiple 'NbS types'. Watersheds, which include the ridge to reef drainage network of water from highest point to the sea, epitomise the importance of looking at the interconnections between all sectors. Through any watershed, water uses are utilising fresh water sources, agriculture and forestry may be present, and urban areas develop, as well as the natural ecologies throughout the watershed.

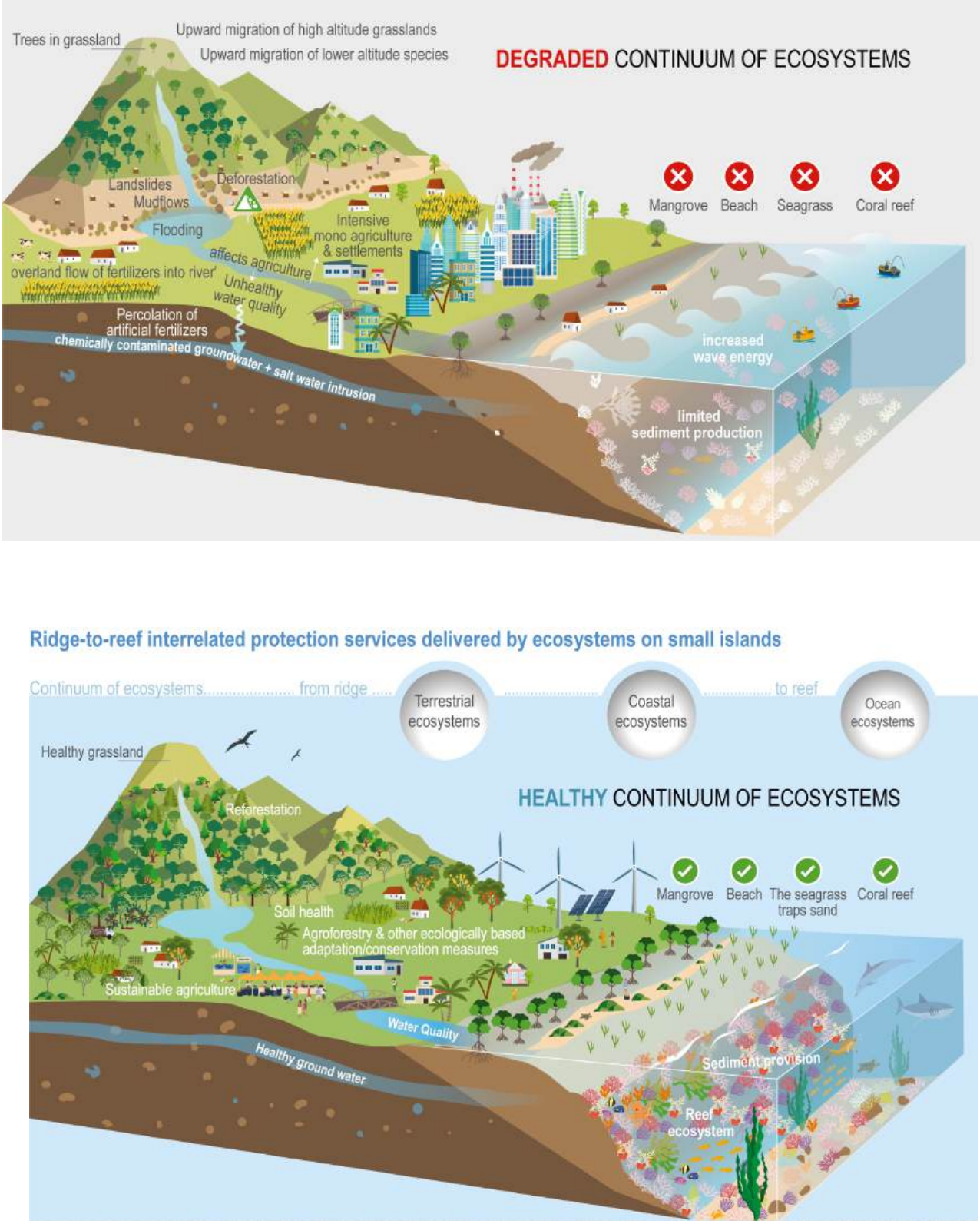
Coordinated by WCS, funded by the KIWA initiative, the EUR 4.8million WISH+ project seeks to address the **climate change impacts** of rising sea levels, increased frequency and intensity of extreme weather events (cyclones, droughts, floods) altered rainfall patterns, and ocean acidification directly impact freshwater availability, coastal ecosystems, and agricultural productivity; **Biodiversity loss** through habitat degradation, invasive species, and unsustainable resource use are leading to a decline in native flora and fauna, undermining ecosystem services crucial for resilience. **Human health risks** from contaminated water sources, vector-borne diseases exacerbated by climate change, and food insecurity pose significant threats to public health; whilst addressing **fragmented management.** Often, environmental, water resource, and health management are addressed in silos, hindering holistic and effective solutions. Recognizing these interconnected challenges, the WISH+ project was conceived to promote an integrated approach to watershed management, acknowledging the intricate links between healthy ecosystems, climate resilience, and human well-being.

The overarching goal of WISH+ is to enhance the resilience of Pacific communities by implementing integrated watershed management practices that deliver co-benefits for biodiversity, climate change adaptation, and human health. The project employs a holistic multi-faceted approach, which is essential not only for the access to water for humans, but also ecosystems throughout the watershed and out to the coast.

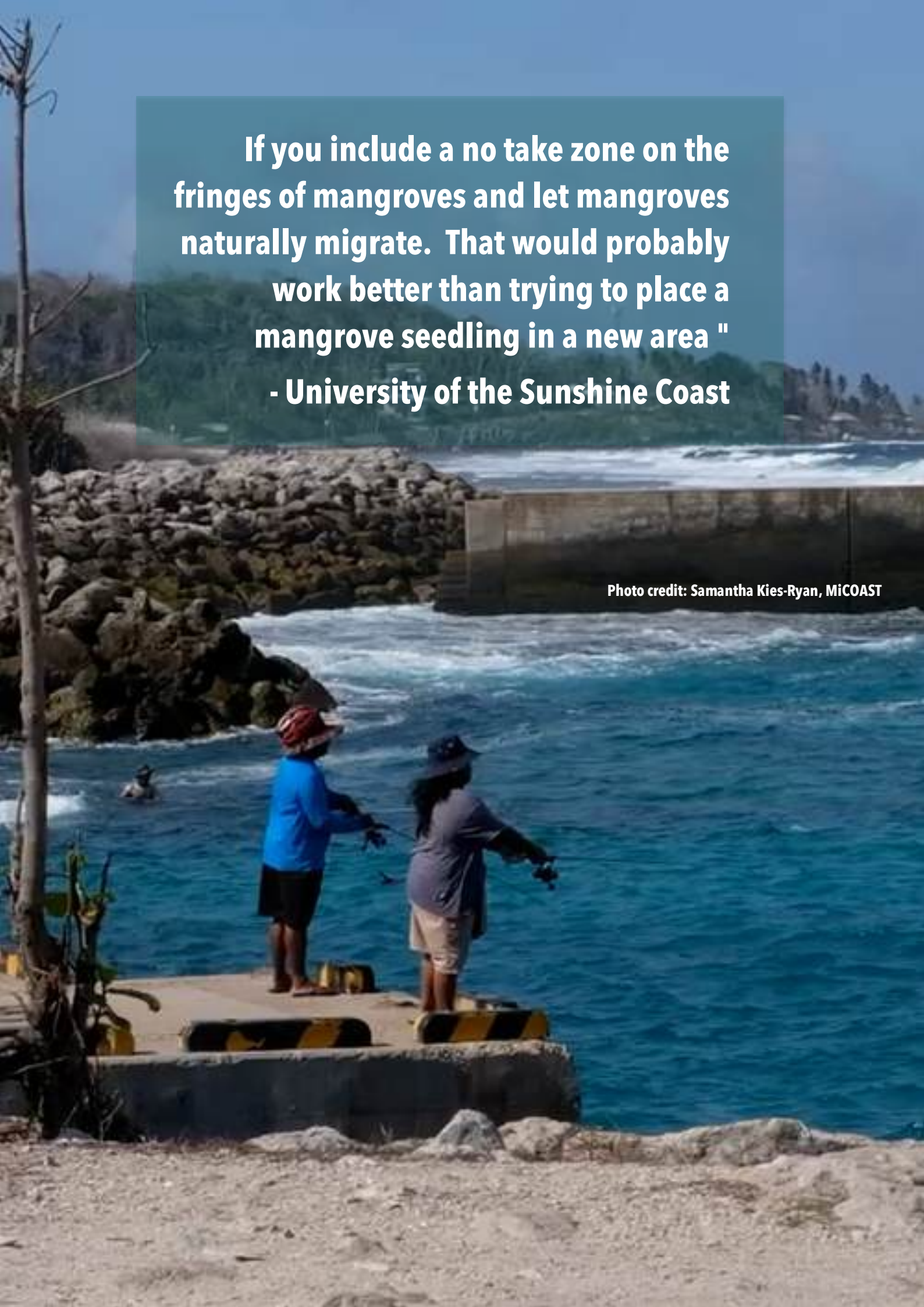
## Key aspects of the project

- **Participatory Planning:** Engaging local communities, traditional leaders, government agencies, and other stakeholders in the identification of priorities, planning, and implementation of watershed management strategies. This ensures local ownership and the integration of traditional ecological knowledge.
- **Ecosystem-Based Adaptation (EbA):** Implementing nature-based solutions within watersheds to enhance resilience. This could include:
    - **Riparian Zone Restoration:** Planting native vegetation along rivers and streams to stabilize banks, filter pollutants, and provide habitat.
    - **Forest Conservation and Reforestation:** Protecting and restoring forests to regulate water flow, prevent soil erosion, and sequester carbon.
    - **Wetland Management:** Conserving and restoring wetlands for their role in flood regulation, water purification, and biodiversity support.
    - **Coastal Ecosystem Restoration:** Protecting and restoring mangroves, seagrass beds, and coral reefs for coastal protection, fisheries habitat, and carbon sequestration.
- **Improved Water Resource Management:** Implementing sustainable water harvesting, storage, and distribution systems to ensure reliable access to clean water, particularly during periods of drought.
- **Sanitation and Hygiene Improvements:** Integrating improved sanitation facilities and promoting hygiene practices to reduce waterborne diseases and protect water quality.
- **Capacity Building:** Providing training and resources to local communities and government agencies to build technical expertise in integrated watershed management, monitoring, and evaluation.
- **Awareness Raising and Education:** Conducting public awareness campaigns to highlight the importance of healthy watersheds and promote sustainable practices.
- **Policy and Governance Support:** Working with national and local governments to integrate integrated watershed management principles into relevant policies and regulations.
- **Monitoring and Evaluation:** Establishing robust monitoring frameworks to track the effectiveness of implemented interventions in achieving biodiversity, climate resilience, and human health outcomes.

*Figure 14 Ridge to Reef nature-based solutions[43] showing interconnectedness of each sector*




[43] Figure 15.4 in Mycoo, M., M. Wairiu, D. Campbell, V. Duvat, Y. Golbuu, S. Maharaj, J. Nalau, P. Nunn, J. Pinnegar, and O. arrick, 2022: Small Islands. In: Climate Change 2022: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [H.-O. Pörtner, D.C. Roberts, M. Tignor, E.S. Poloczanska, K. Mi ntenbeck, A. Alegría, M. Craig, S. Langsdorf, S. Löschke, V. Möller, A. Okem, B. Rama (eds.)]. Cambridge University Press, Cambridge, UK and New York, NY, USA, pp. 2043–2121, doi:10.1017/9781009325844.017.



**If you include a no take zone on the fringes of mangroves and let mangroves naturally migrate. That would probably work better than trying to place a mangrove seedling in a new area "**

**- University of the Sunshine Coast**

Photo credit: Samantha Kies-Ryan, MiCOAST

# MARINE & COASTAL

## BACKGROUND

**With 540,658km$^2$ of land area and 28 millionkm$^2$ of Exclusive Economic Zones (EEZ)[44]; the marine and coastal sector is particularly important to the PICTs, as the intersection between the ocean and the land is of great importance, not only due to the 'ecosystem services' that they provide, but the socio-cultural connection.** Of the 13.2 million inhabitants [45], 97% (excluding Papua New Guinea) of the population are living within 10km of the sea [46]. This proximity intertwines Pacific islander's physical, emotional, mental and spiritual needs. The health and ecosystem functioning of the coastal and marine environments is essential for food, livelihoods, economic development and government revenue, but also for socio-cultural and personal wellbeing.

**The marine and coastal zone extends from the intertidal areas out to the open ocean, including mangroves, seagrass, lagoons, reef, littoral, beaches, offshore waters and the deep sea. Within these there is a huge richness of biodiversity supporting the livelihood, food and wellbeing security of millions.** The Pacific houses around 27% of the world's coral reefs (69,424 km$^2$) [47] and 4.52% of the mangrove forests (623,755km$^2$) [48]. Subsistence in coastal and lagoonal waters is significant, with many Pacific Islanders consuming two to four times more fish than in other nations[49]. Export markets include some small-scale coastal fisheries but are dominated by the black pearls in French Polynesia and shrimps in New Caledonia. Small-scale coastal fisheries are important for local communities as they provide subsistence (>100 000 tonnes), supports rural economies and the regions food security and nutrition, while some catches are sold in domestic market or exported (46 288 tonnes).

***Key insight:*** *Coastal and marine biodiversity, ecosystem functioning and the coastal fishery resources that they provide is of vital importance to PICTs, as the region's nutrition, welfare, culture, employment and recreation depend on it.*

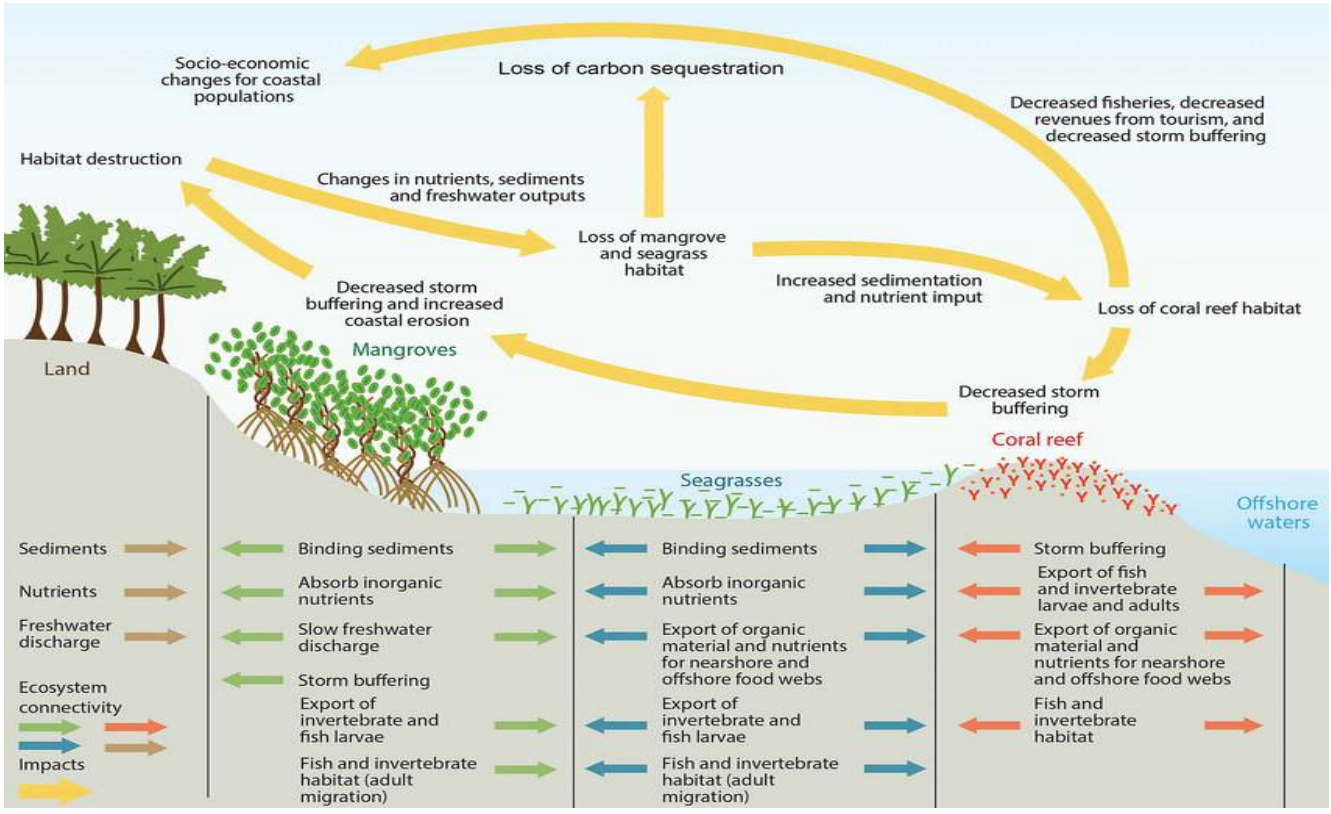
**Offshore fisheries are of a great importance in the region; the western and central Pacific Ocean is home to some of the largest fisheries, accounting for over 50% of the global tuna catch[50].** As of 2018, 1,100 vessels operate in the EEZs mainly using purse-seine and longline gear[51]. The licence fees paid to PICTs by foreign-based vessels are significant and a major source of governmental revenue. In 2014, within the PICT region, American Samoa, PNG, and French Polynesia accounted for about 76% of the total fishery exports (USD 820 million). Moreover, PNG's fisheries exports (dominated by tuna) represent 41% of export of the total in the region and valued

[44] Pacific Data Hub. (2022). *Pacific Data Hub*. Retrieved May 2, 2025, from https://stats.pacificdata.org/
[45] Pacific Data Hub. (2022). *Pacific Data Hub*. Retrieved May 2, 2025, from https://stats.pacificdata.org/
[46] Andrew, et al. (2019) Coastal proximity of populations in 22 Pacific Island countries and territories PLoS One, 14, Article e0223249
[47] Global Coral Reef Monitoring Network (GCRMN), International Coral Reef Initiative (ICRI), Australian Government, & Australian Institute of Marine Science. (2020). *Status and trends of coral reefs of the Pacific region* (Chapter 9). In *Status of coral reefs of the world: 2020*. https://gcrmn.net/wp-content/uploads/2023/01/Chapter-9.-Status-and-trends-of-coral-reefs-of-the-Pacific-region.pdf
[48] Bhattarai & Giri. (2011) Assessment of mangrove forests in the Pacific region using Landsat imagery.
[49] Conservation International. (n.d.). Sustaining Pacific Island fisheries. Retrieved May 2, 2025, from https://www.conservation.org/projects/sustaining-pacific-island-fisheries
[50] Global Fishing Watch. (n.d.). Transparency program: Pacific. Retrieved May 2, 2025, from https://globalfishingwatch.org/transparency-program-pacific/
[51] Gillett, R., & Tauati, M. I. (2018). Fisheries in the Pacific. Regional and national information FAO Fisheries and Aquaculture Technical Paper No. 625. Apia, FAO.

in USD 134.6 million (2014). In the Solomon Islands offshore fisheries were valued in USD 136.8 million[52]. While in Fiji, fisheries contributed to 1.8% (USD 65.7 million) to the Gross Domestic Product and exports were valued in USD 58 million.

**Marine ecosystems such as coral reefs, seagrass, mangroves, saltmarsh, and oyster reefs are being lost and degraded worldwide at concerning rates mainly due to climate change and human activities[53].** To hinder ecosystem degradation and promote conservation, ecosystem restoration and protection is highlighted as a priority[54]. Furthermore, several international organizations are stepping up, for instance, the UN has declared "UN Decade on Ecological Restoration" (2021–2030), and the goal 14 of the UN Sustainable Development Goals call for restoration of marine coastal ecosystems. The Convention on Biological Diversity is also taking actions towards restoration by building capacity to implement Target 2 of the Kunming-Montreal Global Biodiversity Framework[55], in which the member states have agreed to restore 30% of degraded ecosystems worldwide to enhance social resilience and drive progress towards a sustainable future. The principles and practices of ecological restoration described in Gann et al. (2019) strongly align with the core idea of utilizing natural processes to address environmental degradation and enhance ecosystem health and resilience and are considered a specific well-defined approach within the broader spectrum of NbS.

*Figure 15: Interconnection between marine and coastal habitats and impacts from degradation. Source: Pittman et al. (2021). Seascape ecology: Identifying research priorities for an emerging ocean sustainability science. MEPS 663: 1-29*




[52] Gillett, R. (2016). Fisheries in the economies of Pacific Island countries and territories. Pacific Community, Forum Fisheries Agency, and Australian Aid. Noumea, New Caledonia. 684 pp.

[53] Orth, et al. (2000). A review of issues in seagrass seed dormancy and germination: Implications for conservation and restoration. Mar. Ecol. Prog. Ser. 200: 277–288.

Duke, et al. (2007). A world without mangroves? Science 317:41.

Pandolfi, et al. (2003). Global trajectories of the long-term decline of coral reef ecosystems. Science 301: 955–958.

[54] Possingham, et al. (2015). Optimal conservation outcomes require both restoration and protection. PLoS. Biol. 13:e1002052.

[55] CBD (2022). Kunming-Montreal Global Biodiversity Framework CBD/COP/DEC/15/4. Convention on Biological Diversity, Montreal, Canada https://www.cbd.int/doc/decisions/cop-15/cop-15-dec-04-en.pdf (accessed 2 April 2025)

## THREATS

Across the Pacific, threats to the ecology of coastal and marine areas are diverse and context specific:

***Climate change:*** Ocean warming and acidification are causing coral bleaching, reef degradation, and changes in ecological balances, such as fecundity of species and distribution. Extreme weather events including cyclones destroy and damage intertidal habitats such as mangroves, lagoonal habitats through increased sedimentation or deposition and reef environments through wave action.

***Overfishing:*** Unsustainable fishing practices, including overfishing of both coastal and pelagic fish stocks, and the use of destructive methods like dynamite fishing, damage habitats.

***Pollution:*** Plastic debris, sewage, wastewater and agricultural runoff, and in some places, industrial pollution, all degrades and reduces the resilience of marine and coastal ecosystem. In some cases, where pollution is significant it can destroy habitats.

***Habitat degradation and loss:***

***Invasive species:*** The introduction of non-native species can outcompete native organisms, disrupt food webs, alter habitats, and introduce diseases, leading to a decline in biodiversity and ecosystem function.

***Coastal erosion and sedimentation:*** Human activities, such as deforestation, construction of coastal infrastructure, or planting of mangroves in the wrong place can alter natural hydrodynamic processes and result in turbid and unproductive waters.

***Unsustainable tourism practices:*** Pre COVID tourism contributed to nearly 8% of the GDF and directly employed over 90,000 people across the Pacific [56] ; however, many nations are now becoming very conscious of the negative impact to not only the ecology but the societies themselves, and a movement towards sustainable tourism is countering a past rhetoric that 'all tourism is good'.

***Loss/Degradation of Traditional Management Systems:*** Breakdown of customary marine tenure and traditional management practices (e.g., tabus, seasonal closures) can reduce resilience, stewardship, and local enforcement capacity.

***Unsustainable Coastal Infrastructure:*** Poorly planned ports, sea walls, reclamation, tourist resorts, aquaculture farms and sand mining further destabilize coastlines and threaten habitats and promotes habitat loss and degradation.

## OPPORTUNITIES

Despite these threats across the Pacific, there are many opportunities in addressing the challenges through a nature-based approach:

***Biodiversity preservation*:** Ecosystem approaches support the protection of biodiversity. In the Pacific, coral species and reef habitat contribute to the building of atoll islands but they are at the forefront of the effects of increasing sea water temperatures, and as such, they need holistic and global support.

***Food security & nutrition:*** Sustainable fisheries provide both food security and important nutrition to communities.

***Local economies and livelihoods:*** Sustainable fisheries and tourism support household income and local economies.

***Climate change adaptation:*** Strong, healthy ecosystems provide long term climate adaptation solutions from storm surges and Sea Level Rise.

***Carbon stores:*** Coastal ecologies are effective carbon sinks. Mangroves are estimated to hold 937 tonnes of carbon per $km^2$ [57] and seagrass meadows 83,000 tonnes of carbon per $km^2$ [58].

[56] Harrison D. & Prasad B. (2013) The contribution of tourism to the development of Fiji and other pacific island countries. Handbook of Tourism Economics. 741-761 doi.org/10.1142/9789814327084_0032

[57] Donato et al. (2011) *Nature Geoscience.* Mangroves among the most carbon-rich forests in the troPICs.

[58] Fourqurean et al. (2012) Seagrass ecosystems as a globally significant carbon stock. *Nature Geoscience*, 5(7), 505-509.

# IMPLEMENTATION OF MARINE & COASTAL NBS

**NbS in coastal and marine environments involve protecting, restoring and sustainably managing coastal and marine ecosystems, while also delivering key sociocultural and economic benefits**. The specific way NbS manifests in marine and coastal environments can be difficult to distinguish. The ocean and the coast are dynamic, interconnected ecosystems. What happens in a mangrove forest directly impacts the health of a nearby coral reef and the stability of the shoreline. So, while we can try to categorize specific interventions, they often overlap and work together in harmony. It is impossible to draw lines as boundaries between land, lagoon, reef and sea, nor explicitly between a 'restoration' NbS and a 'management' NbS. In fact, through our analysis of the active projects across the Pacific, it is rare that a project utilises only one approach or applies to only one sector. As most of the population of PICTs live close to the coast, we cannot fully exclude urban, land use or agriculture from 'coastal' considerations. Despite this overlap, we can broadly categorise NbS projects into those that; **'protect', 'restore', 'create' or 'manage'** an ecosystem and its intrinsic value; and/or its ecosystem functioning and /or the carbon sink.

***Key insight:*** *the design and implementation of effective marine and coastal NbS can yield broader socioeconomic (create jobs for local populations, and support tourism) benefits, environmental gains; and strengthen the quality of life and climate resilience for local communities.*

**Our analysis identified 64 ongoing NbS coastal and marine projects, along with recently completed initiatives from the past two years, implemented since 2022.** A common type of marine and coastal project utilizes a "ridge to reef" or ecosystem-based approach. This method considers the entire environmental system, including upstream water flows and their resulting sedimentation and runoff, to effectively guide the restoration and management of these ecosystems. However, there are also several mangrove, seagrass, and coral reef restoration projects. In addition, some projects have explored protection of ecosystems, and community-based fisheries management, and invasive species. The table (2) below presents a subset of NbS projects identified, showcasing the diverse range of marine and coastal resources focused on management, restoration, protection and conservation, while also delivering socio-economic benefits.

***Key insight:*** *marine and coastal NbS categories, must include social and economic sustainably and can include:*

***Protection****: Coastal / marine protected areas; blue carbon (carbon sequestration).*

***Restorative:*** *Mangrove, seagrass, coral community restoration efforts.*

***Creation:*** *Beach / shoreline vegetation; grey-green-blue seawalls.*

***Management:*** *Community based Fisheries; LMMAs.*

*Table 2: Subset of Marine and Coastal NbS projects identified in the screening tool*

| Project name and Source | Ecosystem/ Species /interventi on | Sub NbS type | Societal – socio cultural benefits | Key Ecological benefits |
|---|---|---|---|---|
| Biodiversity management and conservation - Tonga | Marine, coastal, forest, freshwater | Conservation Restoration Management | Empower youth and wider local communities (training, participation in biodiversity restoration; sustainable livelihoods). | Conservation of endangered species, restore ecosystems.<br>Clearing of invasive plant species and replanting primary vegetative species in the area and installing temporary natural measurement for cleaning of stagnant water. Rehabilitation coral reef and sea kelps and other marine |

| | | | | |
|---|---|---|---|---|
| | | | | species. Reforestation of mangrove and other coastal plant. |
| Coastal protection / Nature-based seawalls | Marine and coastal | Restoration | Enhance livelihoods of coastal communities and potential future issues of food security and focus on community involvement. | Address coastal erosion through nature-based seawalls. Hinder environmental degradation and biodiversity loss. |
| Reforestation and coral reef restoration | Marine and Forest | Conservation Restoration Management | Strengthening local communities, including women and youth. | By 2030, 80% of South Malekula biodiversity ecosystem services are restored, protected, conserved and the sustainable use of natural & marine resources. |
| Kyeema Foundation - Community-led Coral Reef Restoration: Community, Corals and Chickens | Marine | Coral Conservation Restoration | Supports young indigenous scientists and community leaders to promote locally-led adaptation to climate change. | Restoration of coral reefs as a nature-based solution to climate change. |
| Promoting Pacific Islands NbS (PPIN) Project - SPREP Component | Marine, coastal, forest, agriculture, urban | Policy | Build community resilience. | Build NbS awareness and capacity into regional and national policies and regulatory frameworks. |
| Micronesia Community-based Fisheries Management as a NbS for Coastal Resilience (MiCOAST) | Marine and coastal | Conservation Restoration Management | Community-based fisheries management, enhance climate adaptation and resilience, improve food security. gender equity and inclusion of vulnerable groups were integrated. | Maintain ecosystem services and biodiversity. |
| Fa'atura te Tahatai - Restoration and enhancement of coastal ecosystems in the Society Islands | Marine and coastal | Restoration | Community involvement and gender. | Restore native coastal vegetation heavily impacted sites. |
| Watershed Interventions for Systems Health Plus (WISH+) | Marine and coastal, freshwater | Restoration Management | Improve public health, enhanced community empowerment, built national capacity, increase representation of women, enhance environmental stewardship and maintain cultural practices. | Improved water quality by reducing risks to downstream environmental health. Reduce soil erosion and sediment runoff and, thus protects freshwater and marine ecosystems. Protection and restoration of natural vegetation within the watersheds. Sustainable use of land and natural resources within the watersheds. |
| Mainstreaming Adaptation Planning at the Local Level Fiji - GGGI | Marine, coastal, forest, agriculture, urban | Management | Improve coastal community resilience. Improve water quality, economic benefit to private sector. Capacity building on climate financing literacy and risk assessment, and adaptation planning (50% women). | Protection of coastal fish stock by fisheries management. |
| AQUA-Pearl: Scaling up community-led nature-based oyster aquaculture for climate resilience in Fiji | Marine and coastal, freshwater | Conservation | Enhance community resilience to climate change; knowledge sharing and capacity building among stakeholders from Fiji and other Pacific Island states. Reduce poverty and enhance livelihoods and food security. | Enhance ecosystem resilience to climate change. Biodiversity conservation. Enhanced water quality through restoration of riparian vegetation and by bivalve filtration). |

| | | | | |
|---|---|---|---|---|
| Reefs of Hope | Marine and coastal | Conservation | Alternative livelihoods, new job such as small-scale poultry farming, seaweed farming, coconut products, and soap making coral gardeners support eco-tourism. community-based management, participatory community decision making and youth leadership. | Coral restoration. Less pressure on fishing resources. Creates climate change resistant reef, marine biodiversity is improved and protected (no take zone). |
| Climate Adaptation and Protected Areas (CAPA) | Marine, mangrove forests and forests | Conservation, Restoration Management | Adaptive capacity and resilience of communities. Capacity building of local communities, also women and underrepresented groups. Improves water quality and food security. Development of economic. | Community conservation areas to promote healthy ecosystems and protect biodiversity. No take areas, enhance fish stocks. Improves biodiversity via pollination and soil health for agriculture. Habitat and coral reef recovery. |
| MACBLUE (Management and Conservation of Blue Carbon Ecosystems) | Seagrass meadows and mangrove forests | Conservation Management Rehabilitation | Source of food for ecologically and economically important species improve water quality, safeguard food security, and increase protection to coastal communities from storm-generated waves, sea level rise and erosion. Institutional and individual capacity building. | Preserve biodiversity and ecosystem services of important coastal ecosystems. |

# MARINE & COASTAL NBS APPROACHES IN PICTS

## PROTECTION

### *1. Protection of Marine Areas as NbS*

**Whilst accessing the carbon markets can be challenging, one of the significant opportunities in the Pacific for protecting coastal and marine ecosystems is through financing mechanisms, such as blue carbon credits, whilst also meeting international targets of protecting 30% of marine areas by 2030.** Marine ecosystems such as mangroves and seagrass meadow, sequester carbon at rates higher than terrestrial forests, store more carbon per hectare, and provide a habitat for ecologically and economically important marine species. They also improve water quality, safeguard food security, and protect the shoreline from impacts. NbS oceanic / coastal carbon credits projects in the region include Pacific Regional Blue Carbon Initiative and the MACBLUE (Management and Conservation of Blue Carbon Ecosystems) project. MACBLUE is carried out in Fiji, Papua New Guinea, Solomon Islands and Vanuatu. See finance section for more on this project. The Pacific Regional Blue Carbon Initiative is funded by the Australian government and implemented by Conservation International in Fiji. The project is based on two pillars: (i) grow the knowledge base (increase the knowledge about voluntary carbon markets) and (ii) stimulate the private sector and international financing to invest in blue carbon in the Pacific. The investment in blue carbon will focus on improving biodiversity, climate change mitigation (carbon sequestration) and adaptation (protect coastal communities) by the restoration of mangroves, potentially seagrass meadow and other marine ecosystems. In addition, by improving the health of mangrove ecosystems, the livelihood of coastal communities will be enhanced through food security. GEDSI approach and indigenous people engagement are part of the Pacific Regional Blue Carbon Initiative as well integration of traditional knowledge. This initiative could have great implications as a source of funding to small islands in the Pacific and at the

***Key insight:*** *Blue carbon and the carbon markets provide a huge financing opportunity within the coastal and marine sectors in the PICTS. For instance, estimates of the total organic carbon stored in mangroves has been estimated in metric tonnes of $CO_2e$ for Vanuatu, in Soloman Islands, Palau, Micronesia and Fiji.*

same mitigate and adapt to climate change impacts.

## RESTORATION

### 2. *Restoration for resilient coral ecosystems*

**Of key importance in the Pacific is the restoration, management and protection of coral reefs.** Due to increases in sea temperatures and the occurrences of marine heatwaves, the preservation of high temperature tolerant coral species is essential to the survival of reef builders.[59] Coral for conservation[60], the WINREEF Stress Adapted Corals[61] and the Climate-Smart Adaptive Management Framework for Palauan coral reefs project[62] (part of the Resilient Reefs Initiative[63] funded by Great Barrier Reef Foundation[64]); and the Reefs of Hope[65] is one example of such a practice in the region, working with local community groups and CSOs in Fiji, Palau, New Caledonia, Tuvalu and Kiribati. One Reef International in Palau is developing restoration frameworks and funding in-water projects. SPREP is also playing a supportive role through learning events and regional projects. Alignment of such projects with the NbS framework are needed to categorize and are an opportunity for long term ownership, governance and financing.

#### Key consideration for coral restoration

Successful coral restoration initiatives need to consider the project objectives, site assessment, selection of appropriate techniques and coral species with attention to genetic diversity, realistic understanding of costs and feasibility, and science-based and systematic long-term monitoring.

⇒ **Objectives are crucial:** they are often missing in coral restoration projects. They should aim to re-establish a self-sustaining breeding population and enhance natural larval production. At early stages, the purpose of the restoration needs to be clear, such as whether it's for scientific research, accelerating recovery post-disturbance, or re-establishing a functioning reef ecosystem.

⇒ **Site selection and environmental conditions**: selecting an inadequate place has been highlighted as a factor in determining the success of coral reef restoration, and this is associated with low survival of coral due to high sedimentation rates, strong currents, and/or unsuitable substrate.

⇒ **Restoration techniques and species coral selection:** The techniques to be applied significantly influence restoration success. Some methods include direct transplantation, coral gardening (nursery and transplantation phases), micro-fragmentation, genetic diversity in asexual propagation**,** larval enhancement, and artificial reefs. The most successful coral restorations were those that involved coral gardening, transplantation of coral from donor colonies, and the culturing of juvenile corals for out-planting onto reefs (technique known as "seeding")[66]. The selection of coral species, with fast-growing branching corals but also considering the genetic diversity, is crucial for building resilience for future stressors such as increase in water

[59] Caruso C, Hughes K and Dury C (2021) Selecting Heat Tolerant Corals for Proactive Reef Restoration. Front Mar. Sci. 8:632027. Doi:10.3389/ fmars.2021.632027 and Klepac C. N. and Barshis D. J. 2020 Reduced thermal tolerance of massive coral species in a highly variable environment. Proc. R. Soc. B. 287: 20201379 http://doi.org/10.1098/rspb.2020.1379

[60] Corals for Conservation. (n.d.). *Corals for Conservation*. Retrieved May 2, 2025, from https://www.corals4conservation.org/

[61] **Great Barrier Reef Foundation.** (2022). *Strategic guidance document for the resilience of New Caledonia's coral reefs*. https://www.barrierreef.org/uploads/NewCaledonia-ResilienceStrategy.pdf

[62] Palau International Coral Reef Center. (2024, December 20). *Coral reefs and climate change: Learn about the project driving climate smart reef management in Palau*. https://picrc.org/coral-reefs-and-climate-change-learn-about-the-project-driving-climate-smart-reef-management-in-palau/

[63] Great Barrier Reef Foundation. (n.d.). *Resilient Reefs Initiative*. Retrieved May 2, 2025, from https://www.barrierreef.org/what-we-do/projects/resilient-reefs

[64] Great Barrier Reef Foundation. (n.d.). *Great Barrier Reef Foundation*. Retrieved May 2, 2025, from https://www.barrierreef.org/

[65] Corals for Conservation. (2024, February 8). *Reefs of Hope: Coral-focused climate adaptation*.

[66] Bayraktarov et al. (2016) The cost and feasibility of marine coastal restoration. Ecol Appl, 26: 1055-1074. doi.org/10.1890/15-1077

temperature induced by climate change. **Cost and feasibility** are key factors in determining successful restoration, as the cost is generally high, with coral reefs and seagrass being among the most expensive to restore. Community- or volunteer-based projects can lower the operational cost.

⇒ **Long term monitoring and evaluation** is essential for assessing the success of restoration efforts. It involves monitoring key ecological outcomes, such as the re-establishment of healthy coral breeding populations, to determine if the project's initial aims and objectives have been met. This is particularly important in slow-growing organisms like corals. Current monitoring of coral restoration often focuses narrowly on the survival and growth of individual fragments rather than on broader ecological outcomes. Therefore, standardized monitoring and reporting are needed to assess the overall success of restoration efforts.

***Key insight:*** *Protecting heat-tolerant corals through restoration and community-led initiatives is crucial for the future of Pacific reefs, and aligning these efforts with NbS frameworks can secure long-term success.*

### Practical approaches for coral restoration

Coral reef restoration encompasses a range of methods aimed to recover degraded coral reef ecosystems and involves active interventions to reintroduce or enhance coral populations. Methods for coral reef restoration includes direct transplantation, coral gardening, artificial reefs, substrate manipulation, and larval propagation.

**Direct transplantation:** involves transplanting coral colonies or fragments of coral to a restoration site, this has proven to have a 64% survival rate[67].

**Coral gardening:** involves two phases: an intermediate nursery phase where coral colonies or fragments are grown during vulnerable early stages in the ocean or aquaria nurseries. When the coral reaches a suitable size, they are transplanted (2nd phase)[68]. Another method widely used is **artificial reefs** involve adding artificial structures for coral reef restoration, which act as a substrate for coral recruitment, coral planting, and/or fish habitat. **Substrate manipulation:** involves manipulating reef substrates to facilitate the coral recovery and growth processes with up to 80% coral survival. This means removing algal and unconsolidated rubble and has shown to be quite successful. Finally, **larval propagation** aims to increase coral fertilization rates, larval survival, and recruitment and involves releasing coral larvae directly at a restoration site[69].

***Key insight***: *Coral restoration is recognized as a crucial NbS for coastal resilience and protecting biodiversity. Its successful implementation requires careful consideration of ecological context, community involvement, and learning from past experiences, as restoration efforts can be complex and prone to failure if not planned and managed properly.*

## 3. Ecosystem restoration for coastal resilience

**Mangroves are the 'poster child' for NbS that enhance coastal resilience. When implemented effectively, mangrove restoration projects can provide numerous environment, social and economic benefits. However, success is not guaranteed, as outcomes depend on proper planning and execution.** There are diverse perspectives in mangrove restoration, with Live and Learn emphasizing the high failure rates and the importance of indigenous knowledge, while GGGI and Birdlife International caution against indiscriminate planting. SPC's research in Fiji

[67] Bowden-Kerby, A. (2001). Low-tech coral reef restoration methods modeled after natural fragmentation processes. Bulletin of Marine Science 69:915–931. Gleason et al. (2001). Can self-fertilizing coral species be used to enhance restoration of Caribbean reefs? Bulletin of Marine Science 69:933–943.

[68] Pioch, et al. (2020) A guide to coral restoration methods. United Nations Environment Programme (UNEP).

[69] Omori, M. (2019) Coral restoration research and technical developments: what we have learned so far. Mar. Biol. Research, *15*(7), 377–409. doi.org/10.1080/17451000.2019.1662050

reveals the complexities of mangrove restoration, including a lack of traditional planting culture in some areas. Nevertheless, there are broader efforts towards coastal resilience through NbS supported by GGGI and SPC. From our analysis, we identified significant challenges and considerations in marine restoration (see side box [70] ). The low success rates of mangrove restoration is a challenge, because of planting the wrong species in the wrong place and a lack of understanding of site-specific conditions. Additionally, while integrating traditional knowledge can be valuable in NbS initiatives, it's not always applicable, as seen in the case of mangrove planting in Fiji. This highlights the importance of capacity building and careful consideration of potential negative impacts of restoration projects, as essential for effective and sustainable outcomes. Community engagement is consistently highlighted as crucial for long-term success of restoration projects, alongside addressing socioeconomic benefits and enhancing community resilience to climate change impacts.

***Key insight:*** *Successful marine restoration, particularly mangroves, demands careful consideration of ecological context, local knowledge (where applicable), science data collection, monitoring and robust community engagement to overcome high failure rates and ensure lasting coastal resilience.*

## Key consideration for mangrove restoration

Mangrove restoration projects are multifaceted and span over ecological, social, economic, and governance aspects; and can achieve long-term ecological and socioeconomic benefits if key aspects are considered.

Mangrove restoration initiatives should be started by defining specific, measurable, achievable, relevant, and time-bound (SMART) ecological and social goals and objectives. These objectives should be agreed upon by all stakeholders. A feasibility assessment should be carried out to attend factors such as land tenure, communities and stakeholders' engagement, land use, and drivers of mangrove loss/degradation, evaluate the basic biophysical conditions of the site needed for mangroves to thrive. For a successful restoration project, the project design should include ecological, social, and economic factors. The ecological factor involves correcting hydrological, hydrodynamic, sedimentation, and propagule availability issues and replicating natural reference sites. Social design means community and stakeholder engagement in the design and implementation of the project. Finally, the economic design implies developing alternative livelihoods for local communities and blue carbon finance. Implement long-term monitoring and evaluation of ecological and social outcomes to assess progress and to identify issues that can be tackled with adaptive management actions. Funding to support long-term restoration is crucial; sources of funding could include blue carbon and the private sector. The drivers of mangrove degradation should be understood and addressed as they can lead to unsuccessful restoration.

## Practical approaches for mangrove restoration

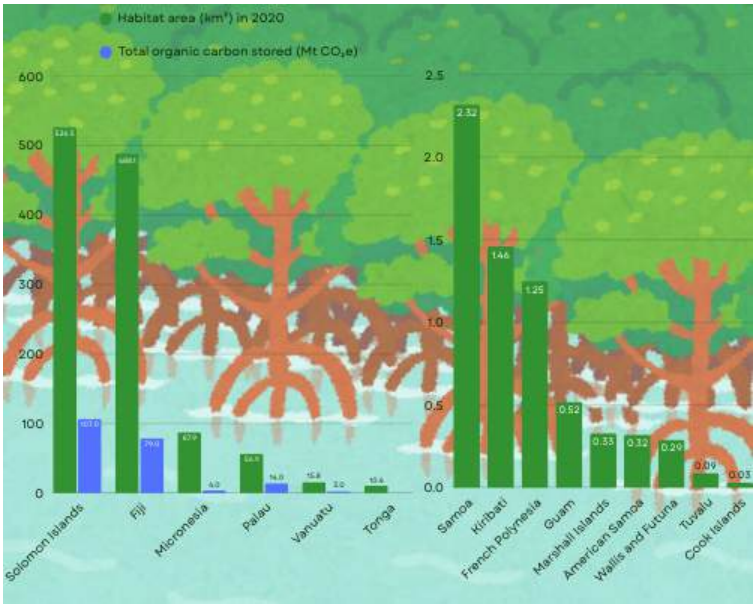
Mangrove restoration projects are not just simple tree or seedlings planting, but the creation of resilient and beneficial coastal ecosystems. Practical approaches may include site conditions, addressing the causes of degradation, engaging local communities, and implementing appropriate

[70] SPS interview (2025).
Harris, M. (2024). Opportunities for ecosystem-based adaptation to climate change in coastal Pacific Island communities: Case studies of mangrove reforestation on Vanua Levu Island, Fiji. University of the Sunshine Coast, Queensland. https://doi.org/10.25907/00859

restoration methods. Hereby, we list the most crucial approaches for mangrove restoration.

Assess restoration site conditions by investigating the basic biophysical conditions (hydrology, elevation relative to sea level) needed for mangroves to grow, whether natural mangroves were present, and reasons of mangrove loss and why they are not growing anymore. Apply the Community-Based Ecological Mangrove Restoration method that consists of mimicking natural processes that restore the mangrove habitat to its original state. Planting may be useful to accelerate recovery or where new mangroves are not growing naturally. The planting of seeds, seedlings, and propagules has had high survival rates. Selecting the right species for the location is also crucial. The Mangrove Restoration Tracker Tool was developed to quantify how specific conservation actions lead to outcomes for biodiversity, mangrove resilience, management effectiveness, communities, and governance. The goal of the tool is to improve mangrove conservation and engage the community in more effective mangrove restoration projects.

*Figure 16: Area (km2) of mangroves habitat and estimated of blue carbon expressed as total organic carbon stored in mangroves (Mt $CO_2e$) in PICTs for 2020. Source: Bunting et al. (2018)*[71].




## Challenges for mangrove restoration

- ⇒ Mangroves may not grow where they have not historically grown.
- ⇒ Mangroves species are site specific; seedlings may not grow in some areas.
- ⇒ Lack of training on planting techniques and how to grow mangroves.
- ⇒ Poor understanding of the ecosystem linkages between mangroves and reefs or upstream areas.
- ⇒ Absence of formal planning, monitoring, and evaluation processes for the mangrove planting projects.
- ⇒ Conflict between land use, such as boat anchorage, vs. mangrove restoration areas.
- ⇒ Lack of long-term support for monitoring and management.
- ⇒ Seawall (grey solutions) were prioritized, and existing or newly planted mangroves were removed.
- ⇒ Small-scale initiatives i.e. small restoration area may not be enough to deliver significant ecosystem services or biodiversity benefits.
- ⇒ Poor local engagement and local conflict may hinder project success.
- ⇒ Conflict between traditional resource management techniques like "no take" zone and government regulations, could significantly impact community ownership and enforcement of conservation efforts in restoration areas.

## Key recommendations

- ⇒ Improved planning, community engagement, scientific guidance, and long-term support and management is crucial for NbS initiatives.
- ⇒ Scientific knowledge (sediment surveys, trace metal levels, pH levels, salinity, etc) are needed to complement traditional practices
- ⇒ Utilize existing guidance for mangrove restoration practice such as the Global Mangrove Alliance which include social and economic aspects to suitability not only ecological ones.
- ⇒ Site suitability, planting techniques, community knowledge and involvement, and external support for planning, monitoring, and evaluation.
- ⇒ Capacity building is essential; communities possess the capacity to carry out this initiative; however, they benefit from guidance and training to improve the effectiveness, success and long-term sustainability.

[71] Bunting, P., Rosenqvist, A., Lucas, R. M., Rebelo, L.-M., Hilarides, L., Thomas, N., Hardy, A., Itoh, T., Shimada, M., & Finlayson, C. M. (2018). The Global Mangrove Watch—A New 2010 Global Baseline of Mangrove Extent. *Remote Sensing*, *10*(10), 1669. https://doi.org/10.3390/rs10101669

## Case Studies: Mangrove restoration in Fiji

***Vanua Levu Island Summary***

Mangroves restoration initiatives in Vanua Levu Island, Fiji, are quite diverse, with varying levels of implementation, funding sources, motivation, success, and community engagement. Key funding bodies and supporting bodies for mangrove restoration projects included NGO C3 Fiji (supported by Kiwa Initiative and Agence Française de Développement), Partners in Community Development Fiji, the Cakaudrove Provincial Office, the Ministry of Fisheries, the Ministry of Forestry, the Minister of Youth (in Navunievu village). However, in Vusasivo village, community-led initiatives without external funding were also carried out. Communities in Fiji have been involved in mangrove restoration efforts due to the impacts of sea-level rise and mangroves project initiated outside their communities. These initial efforts were not successful, as villagers had never planted mangroves, and there was lack of training and knowledge in mangrove planting. In addition, the importance of sediment, salinity levels, to match the mangrove species suitable for their local environment was limited. With the support of University of the South Pacific and the Pacific Community SPC these information caveats were overcome.

***Korolevu, Cakaudrove Province, Natewa Bay***

The mangrove planting project in Korolevu was initiated on 2021 by NGO Partners in Community Development Fiji and Cakaudrove Provincial Office had in collaboration and strong engagement local community. The project received support and advice from the Ministry of Fisheries and the Ministry of Forestry. The goal was to connecting ecosystem (new mangroves with natural existing mangrove forest); and to increase fish breeding habitats (e.g. mullet, Mugil cephalus). Furthermore, they also started a reforestation project on nearby hills to improve water quality in the river and coastal ecosystems.

***Raviravi, Macuata Province***

Planting was initiated at Raviravi in 2018 following a recommendation from the Worldwide Fund for Nature (WWF). The project has continued with the support of local NGO C3 Fiji, and staff from the Provincial Office and receive considerable funding from Kiwa Initiative (Agence Française de Développement) and has receive ongoing support from multiple donors and in-kind contributions. The project incorporated several novel approaches, such as a mangrove nursery, the use of a bamboo barrier to protect young saplings from wave impact, and traditional and local knowledge including planting multiple propagules together to improve survival. The community, both women and men, also received more formal training on the ecological importance of mangroves. Monitoring of new mangrove seedlings and tree height is carried out by community members and C3 Fiji staff . The project has shown to be successful due to community engagement, scale of the project, long term support and funding, and capacity building and the use of traditional knowledge.

## MANAGEMENT

### *4. Community Based Management & livelihood NbS Approaches*

**Pacific Islanders have managed and protected their marine and coastal ecosystems and fish resources for several centuries. However, under current ocean critical status, PICTs governments and NGOs are encouraging communities to be more engaged in management responsibilities within the framework of Community-based fisheries management (CBFM) projects.** The Pacific Framework for Action on Scaling up Community-based Fisheries Management (2021–2025) [72] defines CBFM as "fisheries management approaches that are community-driven and encompass an ecosystem approach that will sustain livelihoods and ensure resilient island communities". Defined CBFM as to a management system under which communities take a leading role in managing fisheries and adjacent coastal areas in partnership with, or with support from, a promoting agency. A new concept has been introduced to formalize a process under which the community owned fisheries management plans include actions to protect fish stocks and the ecosystems on which they depend.

**This Framework for Action is the first regional policy focusing on CBFM in the coastal areas of PICTs. One of the major challenges is the increasing threat to coastal resources from overfishing, which is further exacerbated by climate change and the COVID-19 pandemic. This urgency underscores the need to scale up effective coastal fisheries management incorporating CBFM approaches.** The "scaling-up challenge" in coastal fisheries management is the process of expanding effective local management to a much larger, more meaningful scale. This expansion requires significant national and regional support to be successful. At the national level, PICTs face significant challenges in coastal fisheries management, particularly for CBFM. Fisheries agencies often have inadequate budgets and staffing, a resource gap that is disproportionate to the critical importance of sustaining coastal fisheries. Strengthening these efforts and providing direct support to communities is essential to overcome logistical difficulties and distances, ensuring that assistance is more accessible and targeted. Implementing and scaling up CBFM in the Pacific region is logistically challenging. This is primarily due to the geographic isolation of thousands of communities and their great diversity in terms of ecology, environmental circumstances, and social needs. A few PICTs have a significant proportion of coastal communities engaged in CBFM (see MICOAST study case box); however, their challenges lie in securing long-term adequate funding, maintaining momentum, and monitoring progress. For most PICTs, achieving sustained scaling up requires significantly more investments in CBFM and a more strategic use of those investments to maximize impact. A good example of community led management is the Sea Grape project in which the initiative aims to enhance the management of sea grape ecosystems and while improving the livelihoods of local women (see Case Study box).


Photo credit: Tom Vierus

[72] Pacific Community (2021). Pacific Framework for Action on Scaling up Community-based Fisheries Management: 2021-2025. Noumea, New Caledonia: Pacific Community. https://www.spc.int/digitallibrary/get/yr5yv

### CASE STUDY: Sea Grapes as Nature-Positive Business Solution

The project is implemented in communities in Western Province in the Solomon Islands and is supported the Climate Resilient by Nature (Australian Dept. of Foreign Affairs and Trade) and in partnership with WWF-Australia.

**Overview**

The project strengthens climate resilience in Pacific Island communities by supporting women-led sea grape businesses. It reduces pressure on natural resources, aids ecosystem protection, and promotes climate adaptation. By centring women in managing and harvesting sea grapes—a traditional role—the initiative boosts livelihoods and stands as a successful NbS in the region.

**Lessons learned**

**Scientific data and traditional knowledge:** The initiative demonstrates that scientific data and traditional practices can be mutually beneficial. Through community-led participatory monitoring, youth rangers and a WWF-Solomon Islands team to conduct systematic surveys to assess sea grapes production. The data gathered directly inform local decision-making and ongoing management. In a collaborative effort, WWF has worked with the women and girls who harvest sea grapes to produce a manual and videos. These materials document traditional knowledge to guide sustainable practices in management, harvesting, processing, and sales.

**Community sustainable management**: The project develops sustainable management plans for local coral reefs, sea grapes, and mangrove ecosystems. To foster community sustainable management practices, the data collected in the field is reviewed by the community to decide whether to open or close the harvest of sea grapes. The application of sustainable management practices has led to several evident improvements, including healthier sea grapes, increased coverage across all project sites, higher household incomes for harvesters, and a more sustainable supply chain.

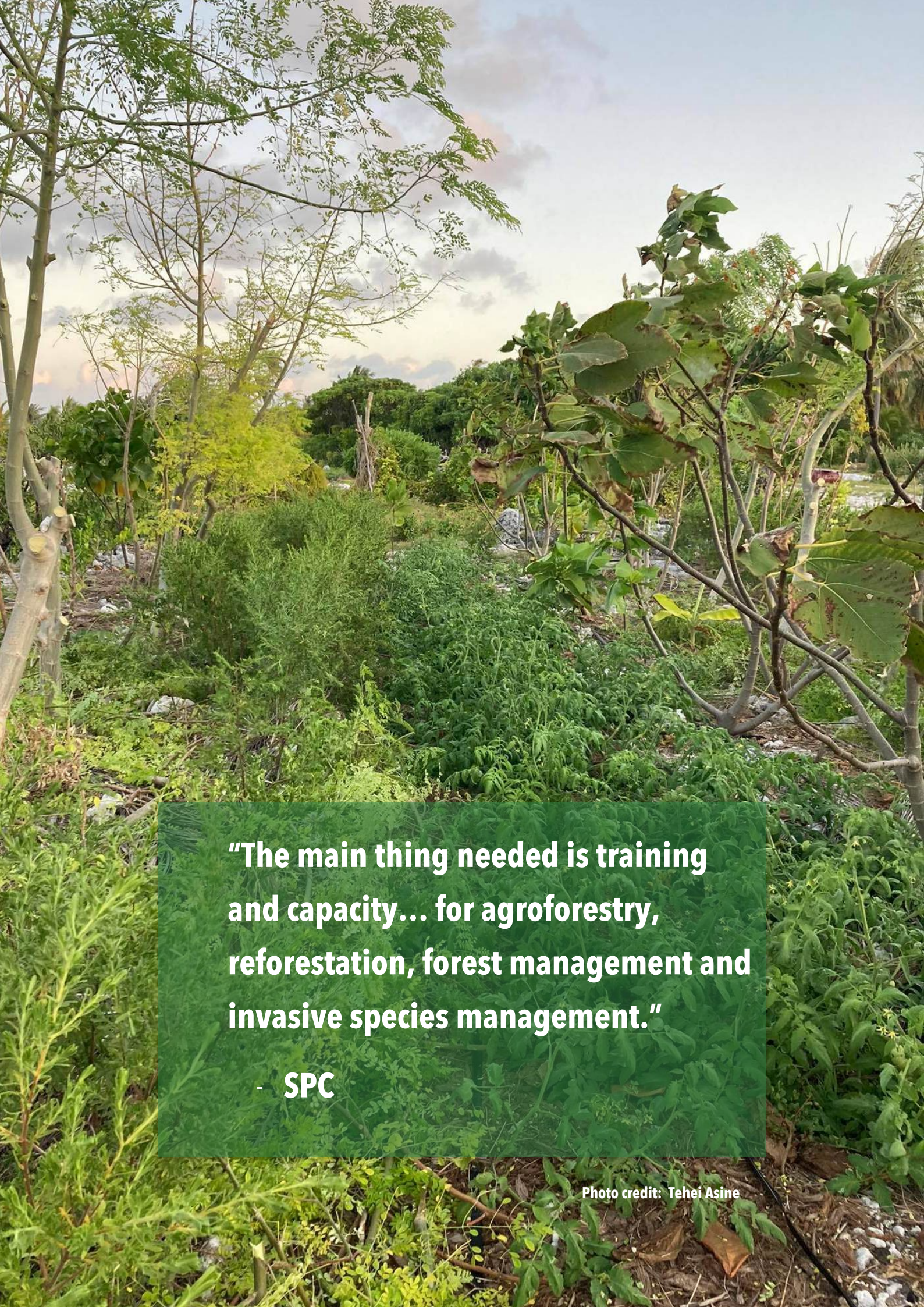
**Community-based business:** Through product added value and business development capacity building, community members have transformed sea grapes into soap, lotion, syrup, chips, and noodles and have market their product via digital marketing branding and packaging.

**More information: www.climateresilientbynature.com/news/when-the-sea-gives-you-grapes.**

### CASE STUDY: MiCOAST - Micronesian Community-based Fisheries Management (CBFM) as Nature-based Solutions to address food security, climate adaptation, and biodiversity maintenance

The MiCOAST project is a regional initiative funded by the KIWA Initiative, receiving €4,900,000 from September 2023 to September 2026. The primary beneficiary and signing entity for the financing is OneReef Worldwide Stewardship. The project aims to address the increasing threats to coastal fisheries in Micronesia, such as declining fish stocks, habitat degradation, pollution, and climate change. These fisheries are crucial for the livelihoods, food security, cultural values, and wellbeing of local communities. MiCOAST is set to benefit 70,500 direct and 1,287,500 indirect beneficiaries across the Marshall Islands, Micronesia, Nauru, and Palau. The MiCOAST empowers a wide range of stakeholders—including coastal fishers, communities, non-state actors, traditional and local government authorities to collaboratively identify and shape climate-resilient measures and improve CBFM. The project broadly uses the IUCN Global Standards for Nature-based Solutions (NbS) criteria as a design framework. Key partners in the region includes the Marshall Islands Conservation Soc., the Conservation Soc. of Pohnpei, the Kosrae Conservation and Safety Org., the Nauru Fisheries & Marine Resources Authority, the Marine Environmental Research Inst. of Pohnpei, OneReef Micronesia (Palau and Yap), RARE and cChange. The project has three specific objectives. First it aims to **strengthen the implementation of CBFM**-related NbS actions at 12 sites in four Micronesian countries through activities such as revising CBFM plans, **supporting good fisheries practices**, introducing climate-smart measures, and **strengthening marine protected areas**. Second, the project will **increase regional capacity to assess the results** of these activities by providing training on the. IUCN Global Standard for NbS and supporting partner use of community monitoring tools. Third, it will promote and scale-up the adoption of CBFM and NbS by **sharing results and documentation**. Activities include establishing regional workshops, producing communication materials, and promoting the integration of CBFM/NbS within relevant policies. The MiCOAST actively **promotes GEDSI** by integrating these principles into activities, ensuring inclusion in decision-making processes, and conducting awareness sessions. Project management, monitoring, and evaluation are handled by a Regional Project Management Unit responsible for overall management, reporting, and technical assistance.

**More information: https://cbfm.spc.int/projets/micoast**



**"The main thing needed is training and capacity… for agroforestry, reforestation, forest management and invasive species management."**

**- SPC**

Photo credit: Tehei Asine

# FORESTRY & LANDUSE

## BACKGROUND

**PICs are among the world's most forested countries.** At the time of this study, the percentage of land area covered by forests varied between different islands, ranging from 20 to 80%. Nauru, Tonga and Kiribati were outliers to this range as their forest area was only less than 8% of the total land area. Nevertheless, the average forest area per capita among the PICTs is approximately 3.56 ha, which is nearly seven times the global average[73].

Consequently, Pacific forests play a critical role in environmental sustainability, climate resilience, and community well-being. Forests are integral components of PICTs, supporting livelihoods, food security, and cultural traditions, while also serving as vital carbon sinks that can enhance carbon mitigation when managed sustainably.

However, deforestation, land degradation, shifting climate patterns, land use changes, urbanisation and a lack of management of invasive species, have emerged as growing challenges that are threatening PICT's forests. If these challenges are not curbed or remedied, they will considerably hinder the ability of PICT forestry to provide essential ecosystem services and mitigate extreme weather impacts[74]. Consequently, it is important that the preservations of these forests are prioritised

**Despite the high regional per capita forest cover, forest distribution varies significantly within Pacific Islands,** with only 156 islands exceeding 1,000 hectares [75] . Additionally, the challenges faced by these forests vary due to differences in land area, geography, environmental pressures, and nature of the land tenure. The difference in the PICTs influences the nature-based forestry and land-use solutions applied through NbS projects. This report shall now go on to discuss the implementation of NbS projects in PICT's forestry and land use in greater detail.

*Table 3 (below): Forest cover variations and land use challenges faced by the Pacific Island Territories Based on Pacific Forest Sector Outlook Study*

| Countries (Grouping) | Challenges in the sector | Scale and Nature of the Forestry Sector |
|---|---|---|
| **I –Papua New Guinea, Solomon Islands** | Higher deforestation rates (3.3% - 5.9%)<br>The land-use mosaic is changing rapidly due to commercial logging, forest degradation. Land use change rate. | The largest forested countries in the region where forest cover range between. (35,800,000 - 2,500,000 ha).<br>Almost all land uses and forest types in the Pacific subregion occur. Contains a large area of primary forests that require conservation, as well as extensive areas of secondary forests that require restoration. |
| **II – Fiji,<br>Vanuatu,<br>New Caledonia, Samoa,** | The depletion of resources has led to the scaling down of logging in natural forests.<br>Commercial logging leading to forest degradation (deforestation rate 2.5 – 0.25%), plantation forestry issues, | All have significant areas of forest (150,000 - 1,000,000 ha) and most have relative stability in land use in comparison.<br>Substantial efforts have been made to develop planted forests.<br>Several community-managed conservation areas are present. |

[73] Nair, C. T. S., Matta, R., Kumar, R., Lee, S., & Thomson, L. (2023). *Pacific forest sector outlook study 2023*. Food and Agriculture Organization of the United Nations (FAO). https://doi.org/10.4060/cc6201en

[74] Jupiter, S., Mangubhai, S., & Kingsford, R. (2014). Conservation of biodiversity in the Pacific Islands of Oceania: Challenges and opportunities. *Pacific Conservation Biology, 20*(3), 206–220. https://doi.org/10.1071/PC140206

[75] Nair, C. T. S., Matta, R., Kumar, R., Lee, S., & Thomson, L. (2023). *Pacific forest sector outlook study 2023*. Food and Agriculture Organization of the United Nations (FAO). https://doi.org/10.4060/cc6201en

| | | |
|---|---|---|
| | sustainable management challenges, urban expansion, and invasive species are major problems in these countries. | |
| **III - Cook Islands, French Polynesia Federated States of Micronesia, Marshall Islands, Tonga, Kiribati, Tuvalu, Nauru, Palau, Guam, Niue, American Samoa** | Lower deforestation rate (0.2 – 0%) however agricultural land clearing, invasive species, urbanization pressures exist. Forest cover is usually dry. Nauru has lost all forest cover to phosphate mining, though some vegetation remains. | Many are low elevation atolls and relatively more urbanized; in view of the small forest area (155,000 - 1,000 ha), the scope for conventional forestry is limited.<br>Although the proportion of land under forests is generally very high, the forest area is small, with fragmented distribution.<br>Forests and forestry provide locally important ecosystem services, especially the protection of watersheds and coastal areas. |

## THREATS

Across the Pacific, threats to forest ecology and land use are diverse and highly context specific.

***Climate Change*:** As a far-reaching force that impacts all sectors, climate change is expected to have significant direct and indirect effects on forestry. It will likely lead to an increase in extreme weather events—particularly tropical cyclones, storm surges, and droughts—which in turn will cause more frequent wildfires, flooding, and windthrow. These events can directly damage natural forests, and plantations. Indirectly, climate change can disrupt other parts of the economy, further weakening the ability to manage forest resources sustainably.

***Invasive species:*** Invasive species negatively impact indigenous vegetation by outcompeting, suppressing, and sometimes eliminating local species due to their ability to adapt quickly to changing environmental conditions. They tend to grow rapidly, reproduce efficiently, and disperse easily via wind and water, allowing them to spread swiftly—especially in disturbed areas, degraded agricultural lands, and stressed forests. Climate change is expected to further facilitate their spread across the Pacific by creating more favourable conditions.

***Urbanization***: As more people in Pacific Small Island Developing States (SIDS) move to urban areas, a major challenge arises city dwellers continue to rely heavily on nearby forests and land for essential resources like food, firewood, and traditional medicines. This ongoing dependence puts growing pressure on the forests surrounding urban centres.

***Expansion of oil-palm cultivation and logging practices:*** While subsistence farming historically contributed to deforestation, the significant recent forest loss, particularly in PNG and Solomon Islands, has been driven by the expansion of commercial crops like oil palm, rubber, cocoa, and coffee.

***Customary Land Tenure:*** The boundaries and rights under customary tenure can be complex, fluid, and often unwritten, making it difficult to align with the clear-cut definitions and regulations of formal forestry laws (e.g., permits, licenses, concessions). This can lead to confusion, disputes, and challenges in enforcing formal regulations. As seen with SABLs [76] in Papua New Guinea, customary tenure has, at times, been exploited to bypass formal forestry regulations or log export bans, often under the guise of agricultural development.

***Limited Technical Capacity and Financing for Scaling Community-Led Forest Restoration Projects.*** The expansion of community-led forest restoration efforts is severely constrained by limited technical expertise and inadequate financial resources. Without sufficient support, communities struggle to implement, manage, and scale restoration initiatives effectively. This lack of capacity and funding threatens the long-term success and sustainability of restoration projects,

[76] Special Agricultural Business Licenses

undermining efforts to restore degraded landscapes, enhance biodiversity, and build resilience to climate change.

## OPPORTUNITIES

Despite these challenges across the Pacific, there are many opportunities in addressing the challenges through a nature-based approach:

***Technical Knowledge on Species and Impact:***
There's an ongoing opportunity to enhance and apply technical knowledge regarding native tree species, their ecological roles, and the impacts of different forestry interventions. This includes understanding the specific requirements for successful restoration of degraded forest ecosystems, identifying climate-resilient species, and assessing the long-term environmental and social consequences of logging or agricultural expansion. Integrating traditional ecological knowledge with scientific research can lead to more effective and culturally appropriate forest management strategies.

***Balancing Short-Term Livelihood Needs (e.g., Agriculture Expansion) with Long-Term Restoration Goals:***
A critical opportunity lies in finding pathways to balance immediate livelihood needs, such as agricultural expansion, with the imperative of long-term forest restoration. This requires developing integrated land-use planning that promotes sustainable agriculture alongside forestry, perhaps through agroforestry systems or incentives for forest-friendly farming practices. Providing alternative income generation opportunities that are not reliant on forest conversion and demonstrating the long-term benefits of healthy forest ecosystems (e.g., water security, disaster risk reduction), can help bridge the gap between immediate necessities and future sustainability.

***Free, Prior and Informed Consent (FPIC).***
Significant opportunities lie in integrating modern forestry approaches with existing customary land management practices and tenure systems. Rather than viewing customary tenure as an impediment, it can be a foundation for sustainable forestry. This involves recognizing the deep cultural and ecological knowledge embedded within traditional practices, fostering true partnerships with landowning communities through meaningful FPIC processes, and developing flexible legal and institutional frameworks that honour both customary and formal land rights. This integration can lead to more effective and equitable forest governance, fostering local ownership and long-term sustainability.

***Emerging Carbon Markets Through Careful Planning*** Emerging carbon markets that support payments for ecosystem services (PES) offer a major opportunity for Pacific Island countries to protect forests while creating sustainable income streams for local communities. These mechanisms reward forest conservation and restoration efforts by allowing communities to earn income through the sale of carbon credits, linking environmental protection directly to economic benefits. However, to fully realize this opportunity, these initiatives must be carefully planned. Strong governance, clear land rights, transparent benefit-sharing mechanisms, and robust safeguards are essential to ensure community trust, ecological integrity, and lasting impact.

## EMERGING FOREST AND LAND MANAGEMENT NbS IN PICTs

**The current landscape in the Pacific presents significant opportunities to transform the potential of NbS into practical action**. A key enabler is access to funding, with targeted initiatives such as the Kiwa Initiative, which provides dedicated support for NbS projects, particularly in the context of climate change adaptation. Beyond the Kiwa Initiative, major climate finance funds, including the Green Climate Fund (GCF) and the Global Environment Facility (GEF) Small Grants Programme, have played a role in funding NbS-related forestry projects. These financial resources have enabled diverse organizations to come together in partnerships for project design and implementation. Notable organizations driving forest and land management

NbS development in the Pacific include the Wildlife Conservation Society, BirdLife International, Live & Learn Environmental Education, WCS [77] WWF Pacific, SPC, SPREP, IUCN, Conservation International, FAO[78], and PIC governments[79], all of which actively contribute to implementing NbS at scale[80].

**As a result of the technical and financial support highlighted above, various Forest related NbS programmes have been implemented in PICTs,** these include the Nakau Program which is a community-led forest conservation initiative; CRxN [81] , an ecosystem restoration initiative; Ridge to Reef (R2R) [82] a project that aims to bridge land-coastal management; BESTLIFE2[83], an initiative focussed on biodiversity conservation and restoration related projects; AIM4Forests which focuses on sustainable forestry[84]; and FCPF[8586], which is a carbon finance mechanism for conservation by WB, with presence mainly in Fiji. These programs represent some of the most recent and ongoing initiatives driving forest and land management projects across the Pacific.

Most land management initiatives across the PICs are increasingly aligned with global priorities set by the United Nations Convention to Combat Desertification (UNCCD). Many PICs are actively developing or refining their Land Degradation Neutrality (LDN) Targets, where ecosystem restoration, including forest restoration, is a central strategy.

***Key Insight:*** *NbS is a relatively new concept in the Pacific, therefore limited community awareness and understanding of its connection to climate resilience should be anticipated. Effective implementation requires early investment in community training and capacity building to ensure informed participation and long-term support.*

**Our analysis identified 33 ongoing NbS forestry projects that are actively being implemented since 2022. Moreover, some initiatives were completed in the past two years.** These projects focus on community-based conservation, restoration, and management activities, while also delivering social benefits. However, their scale, scope, and implementation approaches vary significantly, depending on the local context in which they are carried out.

The below table presents a subset of relevant NbS projects identified that showcases the diverse range of forest and land use initiatives, focused on management, restoration, and conservation, while also delivering socio economic benefit.

[77] the Wildlife Conservation Society
[78] Food and Agriculture Organization of the United Nations
[79] Pacific Islands
[80] Lee, W. K. (2023). *Forest carbon management strategies and policies in the Asia-Pacific region*. United Nations Economic and Social Commission for Asia and the Pacific. Retrieved from https://www.unescap.org/sites/default/d8files/event-documents/1-2.4.WK%20LEE%20Forest%20Carbon%20Management%20Strategies%20and%20Policies%20i.pdf
[81] Climate Resilient by Nature
[82] WWF Pacific Ridge to Reef
[83] Biodiversity and Ecosystem Services in Territories of European Overseas
[84] Accelerating Innovative Monitoring for Forests
[85] World Bank's Forest Carbon Partnership Facility
[86] Mackenzie E and Allen M (2023) The state of voluntary carbon markets in the Pacific. Report to WWF, Sustineo.

*Table 4: Subset of Forest and Land use management NbS projects identified in the screening tool*

| Project name and Source | Ecosystem | Sub NbS type | Societal – socio cultural benefits | Key Ecological benefits | Climate change benefits |
|---|---|---|---|---|---|
| **The Babatana Rainforest Conservation Project** | Lowland tropical rainforest and tropical hillside rainforest | Conservation, and Management | The Babatana Rainforest Conservation Project promotes sustainable financing through carbon credits. It also strengthens community governance and participation | This project facilitates ecosystem conservation, providing protection to over 806 hectares of tropical primary rainforest, as well as conserving 156 plant species, 58 bird species, and 50 fish species in the rainforest. | Climate Mitigation & Adaptation |
| **Improving Livelihoods through Biodiversity Conservation and Sustainable Climate Systems** | Conservation of threatened species - Nothofagus species | Forest management , reforestation and biodiversity conservation | This project prioritises socio-economic and financial resilience for communities<br>It also empowers targeted communities with livelihood support as well as trains locals in capacity building and awareness on species threat. The project also distributes tree seedlings and promotes human health. | This project facilitates biodiversity conservation as it protects 20 hectares of Nothofagus and plants 2 hectares of Nothofagus. | Climate Change Adaptation & Mitigation |
| **Forest Value Enhancement Project** | Lowland rainforest conservation | Conservation, Management | This project offers sustainable financing through carbon credits. It also emphasises socio-economic resilience and provides capacity building for men and women (16 rangers) | This project facilitates ecosystem conservation as it protects 600+ hectares of lowland rainforest and promotes watershed management. | Climate Mitigation & Adaptation |
| **Management and restoration of O Le Pupu Pue National Park** | Removal of Merremia peltate vine and replanting native trees | Conservation, Management | This initiative promotes increased capacity and participation from communities by securing economic benefits from park management. The project has also demonstrated sustainable financing models for protected area management. | This project facilitates ecosystem and biodiversity restoration and improves the conservation status of OLPP National Park, through forest restoration and species protection. | Climate Mitigation & Adaptation |
| **Ua Huka** | Black rat eradication & replanting native and endemic plant species | Biodiversity conservation, Management | This project promotes livelihood resilience as it aims to safeguard the copra crop, the island's main economic resource. It also facilitates increased public awareness on the importance of preventing invasive species. | This project facilitates ecosystem and biodiversity restoration and conservation as it prevents invasive alien species. It also protects native ecosystems and contributes to the restoration and preservation of natural forests. | |
| **INSPIRE** | Various Invasive Species in project countries (Rodents/ Miconia plant | Ecosystem Restoration & Management | This project provides strengthened local stakeholder engagement, knowledge-sharing and training for invasive species management. Moreover, it promotes Livelihood | This project promotes biodiversity restoration as it improves island ecosystem resilience and uses mainstream invasive species control. | Climate Change Adaptation |

| | | | | | |
|---|---|---|---|---|---|
| | and African Tulips) and native tree planting | | resilience through safeguarding agricultural crops of vines. | | |
| **Hùn môô'm Kahok** | Reduce the population of Pinus caribaea | Ecosystem Restoration & Management | This initiative promotes increased public awareness of fire impacts and invasive species. It also provides capacity building for local communities | The project promotes biodiversity conservation as it restores forest ecosystems through selective pine removal. It also emphasises fire prevention. | Climate Change Adaptation |


Photo credit: DAG (agroforestry plot Fakarava)

# DIFFERENT METHODS OF FORESTRY AND LAND MANAGEMENT NbS

## *1. Forest Protection*

**Protecting natural forests from logging ("proforestation") is widely recognized as a high-impact NbS for carbon removal and climate mitigation**[8788]. Global research estimates that protection of ecosystems could mitigate up to 3.9 gigatonnes (Gt) of $CO^2$ equivalent annually, with forests offering the highest sequestration potential [89]. Studies also show that protection-based NbS provide greater per-hectare carbon sequestration at a lower cost than technological alternatives, while also delivering co-benefits such as biodiversity conservation, water regulation, and economic support for local communities[90].

While conservation and nature-based solutions (NbS) are closely related, they are not interchangeable. Conservation traditionally focuses on protecting natural ecosystems and biodiversity for their intrinsic value and ecological importance. In contrast, NbS are specifically designed to address societal challenges—such as climate change, disaster risk, and food security—by harnessing the benefits of healthy ecosystems. While conservation is often a component of NbS, the key distinction lies in the intentional design of NbS to deliver measurable outcomes for both people and nature.

In the Pacific, forest conservation initiatives often integrate both climate mitigation and adaptation, with carbon sequestration projects playing a key role in ensuring Indigenous landowners and communities receive direct benefits for protecting their forests. This approach enhances carbon mitigation and promotes sustainable livelihoods. For example, the Nakau Program – a small-scale forest conservation and restoration initiative in the Pacific has facilitated this by community participation in Voluntary Carbon Markets (VCM). This is a new and innovative financing mechanism that provides economic benefits through forest protection.

Similarly, the Babatana Rainforest Conservation Project in Choiseul, Solomon Islands, has safeguarded 6,863 hectares of primary tropical rainforest, generating 17,423 carbon credits annually. This initiative has supported 6,000+ community members, enabling them to protect forests and develop alternative livelihoods through sustainable financing models. [91]. Within Group I countries, a higher number of conservation projects are being implemented, ranging from large-scale initiatives like REDD+[92] to smaller-scale programs such as the Nakau Program, which serves as an example of community-based conservation efforts in the sector[93].

***Key Insight:*** *Forest NbS initiatives offer significant long term strategic advantages beyond immediate environmental gains. By conserving and sustainably managing forests, communities and governments can unlock long term income opportunities (Carbon credits, sustainable harvesting and ecotourism), while simultaneously enhancing climate change mitigation and strengthening adaptation capacity by reducing disaster risks and safeguarding ecosystems.*

[87] Houghton, R.A., Byers, B. and Nassikas, A.A. (2015). A role for tropical forests in stabilizing atmospheric CO2. Nature Climate Change, 5, 1022–1023.

[88] Mackey, B., Kormos, C.F., Keith, H., Moomaw, W.R., Houghton, R.A., Mittermeier, R.A., Hole, D. and Hugh, S. (2020). Understanding the importance of primary tropical forest protection as a mitigation strategy. Mitigation and Adaptation Strategies for Global Change, 25, 763-787.

[89] Nature4Climate. (2023). *Nature as a critical climate solution: Busting the myths surrounding nature-based solutions*. https://nature4climate.org/wp-content/uploads/2023/09/N4C-myth-busting-paper-FINAL-1.pdf

[90] Nature4Climate. (2023). *Nature as a critical climate solution: Busting the myths surrounding nature-based solutions*. https://nature4climate.org/wp-content/uploads/2023/09/N4C-myth-busting-paper-FINAL-1.pdf

[91] Nakau Programme. (2024.). *Babatana | Solomon Islands*. Retrieved from https://nakau.org/projects/babatana-solomon-islands

[92] A framework that aims to reduce deforestation and forest degradation in developing countries

[93] Interview with Nakau Program, 2025

**The customary land tenure system in the Pacific presents both challenges and opportunities for forest protection and carbon initiatives**. In Fiji, where 83% of land is under customary ownership, most forests are on native land held by different clans[94], making community coordination essential for carbon projects. To gain community approval, the Free, Prior, Informed Consent (FPIC) process is required.

However, due to complex land ownership structures, this process can take three to four years and up to 25 meetings for a small-scale project, as seen in Nakau's programmes experience. While FPIC is crucial for ensuring fair participation, it is also resource-intensive and time-consuming, which some investors may view as a barrier to scaling forest carbon projects.

Additionally, the customary land tenure can pose challenges to the sustainability of projects. Unclear and fragmented land tenure, characterized by the lack of formal titling, overlapping customary rights, and complex webs of ownership, poses major challenges for forest restoration and carbon projects. Forests often span multiple clan or family lands, with nested rights (e.g., land, trees, harvest) creating unclear decision-making authority. Without clear mechanisms, these complexities can lead to internal disputes over land claims, benefits, and governance[95].

***Key Insight:*** *Sustainable forestry on customary land requires genuine community ownership. Donors and governments must adopt participatory, culturally sensitive approaches that respect traditional tenure systems, and promote harmony through adaptation, not imposition (Mohammed & Clark, 1986).*

### *REDD+*

REDD+ [96] represents a key international mechanism under the UNFCCC to support forest conservation and climate mitigation in developing countries. Fiji, Papua New Guinea, Solomon Islands, and Vanuatu are actively pursuing REDD+ initiatives with support from bilateral and multilateral donors, including: the Forest Carbon Partnership Facility (FCPF), the Global Environment Facility (GEF), and UNDP[97].

**As a carbon-focused approach, REDD+ can serve as a high-impact NbS for the forest sector—particularly when projects are inclusive, biodiversity-friendly, and aligned with local development priorities**. However, conflicts can emerge when REDD+ strategies narrowly prioritize carbon accounting at the expense of social and ecological outcomes. For example, large-scale monoculture plantations may meet carbon targets but undermine biodiversity and fail to reflect community preferences for diverse, multifunctional forest ecosystems [98] . Opportunities and barriers for Carbon markets are discussed further in the finance chapter.

Moreover, many stakeholders mentioned the issue of early experiences with "carbon cowboys"—actors who entered communities with limited transparency or benefit-sharing—have contributed to scepticism around REDD+ in some Pacific contexts. These challenges highlight the importance of robust safeguards, community participation, and integrated planning to ensure REDD+ functions as a truly sustainable and equitable form of NbS.

**Although new innovative forest conservation mechanisms through carbon markets offer significant opportunities, their feasibility across the Pacific varies due to differences in forest availability and land tenure systems.** Papua New Guinea (PNG) and the Solomon Islands, with extensive forest cover (35,856,000 ha - 2,523,000 ha), act as major carbon sinks, while Fiji, Vanuatu, and Samoa (Group I and II countries) contribute to regional carbon sequestration

[94] Mangubhai Sangeeta, Lumelume Ruci (2019) Achieving forest conservation in Fiji through payment for ecosystem services schemes. Pacific Conservation Biology 25, 386-393.

[95] Mohamed, N., & Clark, K. (1 996). Forestry on Customary-Owned Land: Some Experiences from the South Pacific. ODI Rural Development Forestry Network Paper 19a. Overseas Development Institute.

[96] Reducing Emissions from Deforestation and Forest Degradation, plus conservation, sustainable management of forests, and enhancement of forest carbon stocks

[97] Nair, C.T.S., Matta, R., Kumar, R., Lee, S., Thomson, L. 2023. Paci c Forest Sector Outlook Study 2023. Apia, FAO.. https://doi.org/10.4060/cc6201en

[98] Interview with NZ-MFAT, 2025

through carbon mitigation projects. In contrast, smaller island nations face distinct challenges in conservation efforts due to their limited and fragmented forest coverage, geographic scale, nature of the forest cover and level of land use threats to the forest ecosystems[99].

## 2. Biodiversity Conservation

**Another NbS approach to protecting existing forest cover is biodiversity conservation for promoting climate adaptation**. According to the IUCN Global Standard, NbS initiatives must support or enhance biodiversity at all levels, from genetic diversity to entire ecosystems[100]. In the Pacific, such unique biodiversity conservation projects also exist on protecting threatened plant species that face extinction due to environmental threats such as deforestation and induced land degradation, both driven by human and environmental factors. One example of such a project is *The Improving Livelihoods through Biodiversity Conservation and Sustainable Climate Systems in PNG* [101]. This initiative focuses on conserving the *Nothofagus plant* species, which has suffered significant deforestation due to high demand for its strength and durability. This has led to significant rates of forest cover reduction, prompting urgent action to prevent further decline. The effort aimed to protect Nothofagus forests while promoting ecosystem restoration through replanting and enhancing the livelihoods of over 1,500 people via climate-smart agriculture. This approach underscores the importance of integrating conservation with sustainable socio-economic practices, a key theme in stakeholder discussions. **By aligning conservation projects with complementary socio-economic goals, NbS becomes more holistic and impactful,** as illustrated by one stakeholder.

## 3. Forest Restoration

Forest restoration in the Pacific Islands presents a vital opportunity to address widespread land degradation caused by logging, cyclones, agricultural expansion, invasive species, and climate change. It focuses on rehabilitating degraded landscapes to restore biodiversity, enhance water conservation, improve soil stability, and strengthen ecosystem services critical to both environmental and community resilience[102].

Across the PICs, restoration is increasingly being integrated as a land use-based NbS. In practice, forest restoration projects generally fall into two main categories: reforestation (the direct replanting of forests and trees) and forest management initiatives (such as invasive species control and sustainable land use practices). These approaches are often implemented sequentially, with reforestation laying the groundwork for long-term forest management to ensure ecosystem resilience and sustainability[103].

Unlike conservation, which primarily aims to protect existing forests, **Forest restoration is particularly relevant to PICs, where many small island nations (Group III countries) lack extensive primary forest cover** and instead have fragmented, degraded forests that are increasingly threatened by agriculture, illegal logging practices and invasive species and climate change. In such contexts, restoration is essential for rebuilding ecosystem functions and strengthening climate resilience before conservation efforts can be fully effective. For countries like Nauru, which has been 100% deforested due to phosphate mining, restoration is a critical first step in revitalizing

[99] Mackenzie E and Allen M (2023) The state of voluntary carbon markets in the Pacific. Report to WWF, Sustineo.

[100] IUCN (2020). Global Standard for Nature-based Solutions. A user-friendly framework for the verification, design and scaling up of NbS. First edition. Gland, Switzerland: IUCN.

[101] Kiwa Initiative. (n.d.). Improving livelihoods through biodiversity conservation and sustainable climate systems. Retrieved from https://kiwainitiative.org/en/projects/filters/cobenefits/biodiversity-conservation/improving-livelihoods-through-biodiversity-conservation-and-sustainable-climate-systems

[102] Barbara, G., Chu Shing-Galuvao, E., Moverley, D., & Davetanivalu, J. (2018). Land degradation and forest restoration in the Pacific Islands. In *A Better World* (Vol. 4, p. 77). Tudor Rose. ISBN 978-0-9956487-5-3.

[103] Samoa Conservation Society interviews, 2025

degraded landscapes and creating a foundation for long-term conservation[104].

There is a growing trend of reforestation projects being implemented as NbS across the Pacific, ranging from large-scale initiatives to community-driven restoration efforts. NbS projects incorporate reforestation in different scales within projects at project level or activity level to enhance ecosystem restoration while securing financial support through innovative restoration mechanisms.

**However, forest restoration must be carefully planned, prioritizing ecological restoration over commercial forestry[105].** A focus on restoring ecosystems rather than timber production ensures long-term environmental benefits, including biodiversity conservation, habitat recovery, and ecosystem resilience. To this end, large scale reforestation may not always be beneficial. This is also evidenced in Fiji's 2020 Bonn Challenge initiative to plant one million trees and mangroves. [106][107] This large-scale commitment demonstrated strong national engagement in restoration, including a variety of exotic, native, fruit, and coastal species. [108][109] However, despite being widely promoted as successful, based on planting numbers such efforts often face significant implementation and long-term sustainability challenges.[110][111]

Similar perspectives were shared through stakeholders who have observed that many restoration initiatives fail due to a lack of scientific understanding of ecosystem restoration and a lack of trained staff with essential qualifications in the region. This aligns with global research on forest restoration, which identifies two critical factors that must be carefully considered in restoration: (1) where to plant trees; and (2) which species to plant.

The customary land tenure system in the Pacific presents both challenges and opportunities for forest conservation and carbon initiatives. In Fiji, where 83% of land is under customary ownership, most forests are on native land held by different clans, making community coordination essential for carbon projects. To gain community approval, the Free, Prior, Informed Consent (FPIC) process is required. However, due to complex land ownership structures, this process can take three to four years and up to 25 meetings for a small-scale project, as seen in Nakau's programmes experience. While FPIC is crucial for ensuring fair participation, it is also resource-intensive and time-consuming, which some investors may view as a barrier to scaling forest carbon projects.

Additionally, the customary land tenure can pose challenges to the sustainability of projects. Unclear and fragmented land tenure, characterized by the lack of formal titling, overlapping customary rights, and complex webs of ownership, poses major challenges for forest restoration and carbon projects. Forests often span multiple clan or family lands, with nested rights (e.g., land, trees, harvest) creating unclear decision-making authority. Without clear mechanisms, these complexities can

[104] Nair, C.T.S., Matta, R., Kumar, R., Lee, S., Thomson, L. 2023. Paci c Forest Sector Outlook Study 2023. Apia, FAO. https://doi.org/10.4060/cc6201en

[105] Samoa conservation society interviews, 2025

[106] Chazdon, R. L. (2017). *Landscape restoration, natural regeneration, and the forests of the future*. Annals of the Missouri Botanical Garden, 102(2), 251-257.

[107] Holl, K. D., & Brancalion, P. H. (2020). *Tree planting is not a simple solution*. Science, 368(6491), 580-581.

[108] Chazdon, R. L. (2017). *Landscape restoration, natural regeneration, and the forests of the future*. Annals of the Missouri Botanical Garden, 102(2), 251-257.

[109] Holl, K. D., & Brancalion, P. H. (2020). *Tree planting is not a simple solution*. Science, 368(6491), 580-581.

[110] Chazdon, R. L. (2017). *Landscape restoration, natural regeneration, and the forests of the future*. Annals of the Missouri Botanical Garden, 102(2), 251-257.

[111] Holl, K. D., & Brancalion, P. H. (2020). *Tree planting is not a simple solution*. Science, 368(6491), 580-581.

lead to internal disputes over land claims, benefits, and governance[112].

### *Strategic Land Use for Effective Restoration*

Both stakeholders and global best practices stress that site selection is the first critical step in restoration. There is little value in restoring areas that may later be cleared for development, as this undermines long-term conservation efforts. Ensuring the protection of restored sites is essential to securing long-term ecosystem benefits.

According to literature, effective forest restoration requires a careful balance between conservation efforts and agricultural productivity. It emphasises that restoration should avoid high-quality agricultural land, as this reduces food production capacity and increases reliance on food imports.

As food imports are often linked to tropical deforestation in exporting countries, contributing to global CO2 emissions  Given the growing dependence on imported food in PICs, poorly planned restoration could exacerbate environmental and economic vulnerabilities. However, both stakeholders and research suggest strategic alternatives that allow for tree planting without compromising food production. Such strategic alternatives include establishing tree groves on steep, inaccessible, or low-productivity areas within agricultural landscapes; integrating trees into agroforestry systems, which enhance biodiversity while supporting food and income generation; and utilising hedgerows, field margins, and riparian zones to restore ecosystem functions without reducing arable land. Such diversified NbS project integrations can be seen in agroforestry and freshwater related NbS projects which will be discussed further in those respective chapters.

#### The ISLAND Project: Integrating Carbon Offsets and Forest Restoration in Samoa

The ISLAND Project (Improving and Strengthening Leadership for Nature-based Development) is a community-led conservation initiative addressing deforestation and land degradation in O le Pupu Pu'e National Park (OLPP NP)—Samoa's and the South Pacific's first national park, established in 1978. Funded by the U.S. Forest Service through NatureFiji-MareqetiViti and implemented in partnership with the Samoa Conservation Society (SCS), the project brings together ecological restoration and climate action in a uniquely inclusive way.

#### Grassroots Carbon Offsets with Climate Responsibility

At the core of the ISLAND Project is an innovative grassroots carbon offset initiative that connects reforestation with personal climate responsibility. The Samoa Conservation Society (SCS) encourages seasonal workers and university students to offset their travel-related emissions through tree planting, raising awareness about the environmental impact of air travel while promoting local, tangible action. Unlike conventional offset programs confined to specific sites, the ISLAND Project promotes flexible participation, inspiring a broader behavioural shift and engaging individuals and businesses alike.

Since 2016, the project has led to the planting of over 35,000 native trees, in doing so, it also creates employment opportunities for local youth, demonstrating how environmental restoration can be effectively paired with livelihood support—a core principle of sustainable Nature-based Solutions. This innovative model not only mobilizes funding for restoration in OLPP National Park but also fosters public awareness and active participation in local climate solutions.

[112] Mohamed, N., & Clark, K. (1 996). Forestry on Customary-Owned Land: Some Experiences from the South Pacific. ODI Rural Development Forestry Network Paper 19a. Overseas Development Institute.

***Key Insights**: Restoration efforts are most effective when locally led, with communities actively involved in site selection and long-term maintenance, ideally for at least 10 years. Research shows that community led restoration strengthens local ownership and significantly improves long term ecological outcomes. Effective forest restoration balances conservation with agricultural productivity, avoiding high-quality farmland to protect food security*

Stakeholder consultations further highlight the need for community engagement and long-term stewardship. Restoration efforts should be locally led, with communities actively involved in selecting and maintaining sites for at least 10 years to ensure sustainability. Literature supports this approach, emphasizing that community-led restoration fosters stronger local commitment and long-term ecological success. Additionally, the Pacific's customary land tenure system could facilitate community-led restoration in small-scale projects, providing an opportunity for communities with shared interests to collaborate effectively.

### *3.1 Plant the right tree at the right time in the right place*

Stakeholders emphasized the importance of a science-based approach to restoration, advocating for the principle: "Plant the right tree at the right time in the right place." This perspective highlights the need for projects to prioritize native species suited to the local environment. In Samoa, local NGOs such as the Samoa Conservation Society have developed guidelines and publications on appropriate species for the local environment. This serves as a best practice that can be replicated in other contexts to provide knowledge on which species should be prioritized in local-scale restoration efforts. Additionally, it presents an opportunity to integrate traditional knowledge with modern restoration practices.

***Key Insight**: Successful restoration hinges on planting the right tree, in the right place, at the right time. It is crucial to prioritise native species that are well-suited to the local environment.*

Several other key considerations were highlighted as good practices for forest restoration through Samoa conservation Society basic guide to restoration. These included, selecting species based on availability in forestry division nurseries or local transplanting, and matching tree species and density to site conditions. As an example, they emphasised planting light-demanding species (e.g., Tava) for open areas and shade-tolerant species (e.g., Asi) for shaded areas. The guidance also highlights using "framework species" like Tava and Malili to support ecosystem development, while avoiding monoculture plantations, rather opting for mixed species planting to better mimic natural ecosystems.

**In summary, restoration is a highly technical process that requires clear guidelines and best practices in a both technical and academic capacity.** Its success depends on integrating scientific expertise with traditional ecological knowledge. Stakeholder interviews highlighted the need for more research and demonstration projects that connect science, pilot implementation, local knowledge, and community engagement. A major gap remains in training as most staff and local communities lack skills in propagation, nursery establishment, and basic plantation techniques. This underscores the need for targeted capacity building to support effective and sustainable restoration efforts.

## *4. Invasive Species Management*

According to the IUCN, invasive species are the leading cause of species extinctions on islands and pose a major threat to biodiversity in the Pacific Islands region. To date, 1,531 species have been identified as threatened by invasive species, emphasizing the urgent need for effective management. While eradication and control efforts are underway in nearly all PICs and territories, the overall status of invasive species management remains poor to fair. This highlights the need for carefully planned restoration efforts to ensure that native species are prioritized, avoiding the unintentional introduction or

promotion of invasive species that could further disrupt fragile ecosystems.

As shown in Table 2, many restoration projects across the Pacific focus on eradicating invasive tree and animal species as a primary objective, integrating forest restoration and invasive species management practices simultaneously.

Several invasive species management initiatives in the Pacific aim to enhance climate resilience through land-use interventions, such as the Pacific Regional Invasive Species Management Support Service (PRISMSS). However, NbS-based land management emphasises community partnerships, delivering a range of co-benefits alongside invasive species control.

A good example is the INSPIRE (Invasive Species Management for Resilient Ecosystems) Project, a NbS-focused land-use management initiative currently being implemented across five key sites across 4 Pacific islands. This project also highlights the challenges of implementing NbS from a grassroot level perspective, while demonstrating successful strategies for integrating invasive species management with broader ecosystem benefits to the communities.

## CASE STUDY - INSPIRE: Invasive Species Management for Resilient Ecosystems

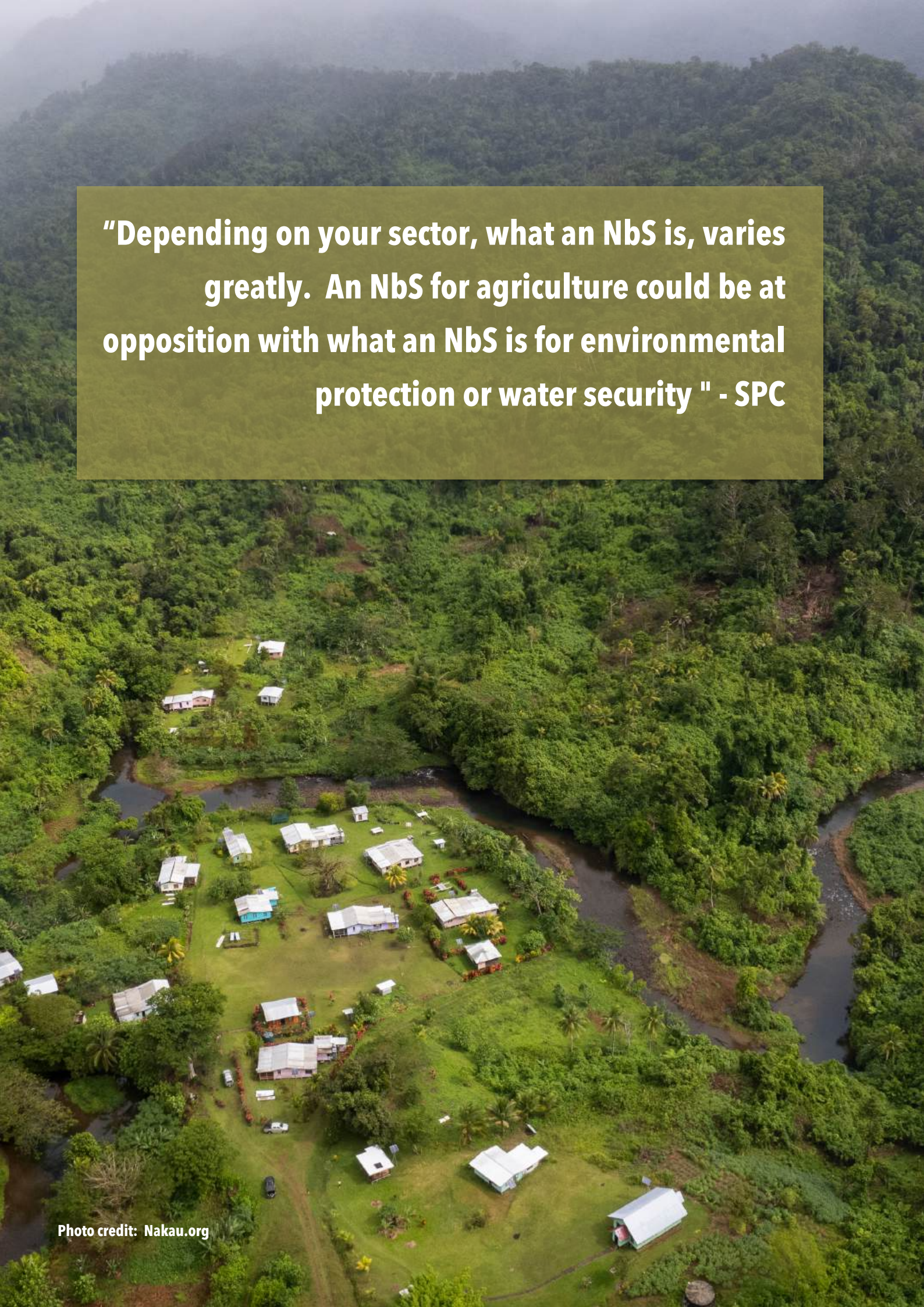
*The INSPIRE Project (2023–2026), funded by the Kiwa Initiative and led by BirdLife International with partners across Samoa, Fiji, French Polynesia, and Palau, focuses on eradicating invasive species and strengthening biosecurity to enhance ecosystem resilience in Pacific islands.*

*Invasive species, especially non-native predators and plants like rats and Miconia, pose major threats to fragile island ecosystems. The project emphasises early intervention, the use of indicators (e.g., boat inspections, rat tracking, GIS mapping), and biosecurity as essential tools for effective management.*

*The INSPIRE Project faced several implementation challenges that can be common to NbS initiatives in the Pacific:*

- ⇒ *Limited community awareness of invasive species and their connection to climate resilience—particularly in French Polynesia—delayed project uptake and required extensive time (often over six months) to build trust and secure meaningful participation.*
- ⇒ *Diverse site conditions, including varying ecosystems, land tenure, and NbS readiness, added complexity, while unclear governance structures and administrative barriers created further delays.*
- ⇒ *Capacity gaps among local teams, particularly in NbS policy, monitoring, and reporting, led to increased reliance on external support and higher operational costs.*
- ⇒ *Additionally, donor requirements often exceeded local capacities, and gender imbalance in environmental projects highlighted the need for more inclusive approaches to planning and implementation.*

*These types of challenges are not unique to INSPIRE and can be expected when implementing NbS across the Pacific, and underscores the need for early planning, adaptive approaches, and sustained capacity-building efforts.*



**“Depending on your sector, what an NbS is, varies greatly. An NbS for agriculture could be at opposition with what an NbS is for environmental protection or water security " - SPC**

Photo credit: Nakau.org

# AGRICULTURE

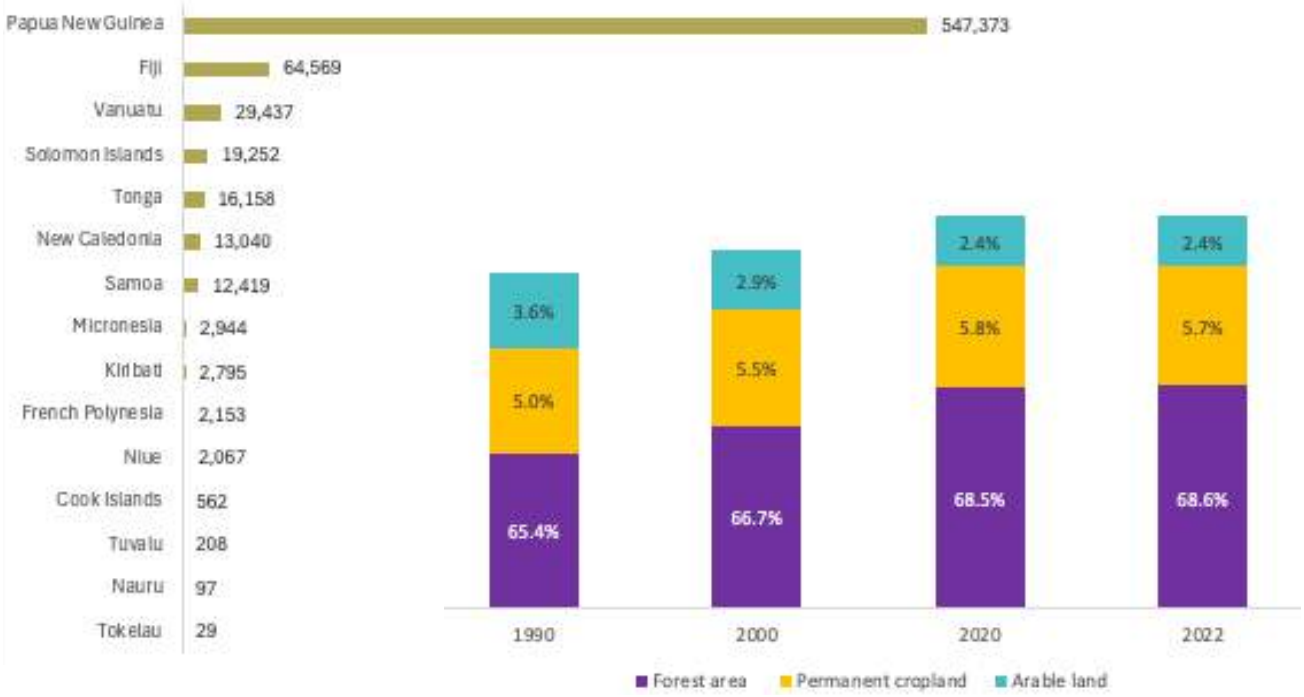
## BACKGROUND

The global food system represents a $10 trillion economy supporting 7.5 billion consumers and depends on over a billion producers, including farmers, pastoralists, herders and fishermen. With almost half of the world's habitable land dedicated to agriculture[113], food production has a profound impact on the planet. From deforestation and biodiversity loss to greenhouse gas emissions and soil degradation, the sector plays a central role in some of our time's most pressing environmental challenges.

As global food demand is projected to rise by 50%—and protein demand by 70%—by 2050[114], the way food is produced must evolve to support climate resilience, ecosystem conservation, and human well-being. Nature-based Solutions (NbS) offer a path forward by integrating ecological processes into agricultural practices, reducing environmental harm, and, in some cases, enhancing productivity.

With over 60% of the population living in rural areas, agriculture plays a vital role in the local livelihood and economy of the PICs, contributing 17.1% to the region's GDP in 2022 (World Bank[115]). Papua New Guinea has the largest agricultural area, followed by Fiji and Vanuatu, while Tokelau and Nauru have the smallest area.

*Figure 17 (left): Agricultural area by country in hectares in 2023[116] Figure 18 (right): Land use percentage PICs, 2023 FAOSTAT.*




[113] Ritchie, H. 2019. Half of the world's habitable land is used for agriculture. In: Our World in Data [online]. https://ourworldindata.org/global-land-for-agriculture#article-citation

[114] OECD & FAO. 2018. OECD-FAO agricultural outlook 2018-2027. Rome, italy, FAO and OECD. (Available at www.oecd.org/en/publications/oecd-fao-agricultural-outlook-2018-2027_agr_outlook-2018-en.html ).

[115] Word Band dataset = https://databank.worldbank.org/reports.aspx?source=2&country=PSS#

[116] FAOSTAT = https://www.fao.org/faostat/en/#data/QCL

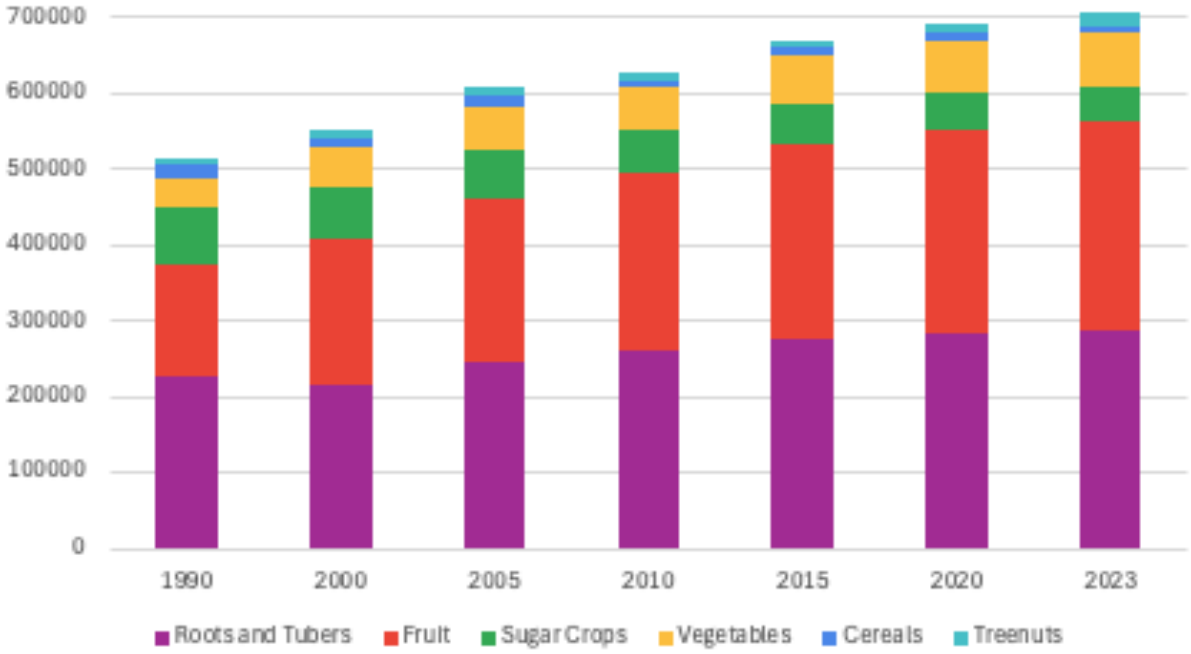



*Figure 19: History of the main farming cultures in the PICs in hectares (FAOSTAT[2]).*

***Key Insight**: Agriculture Nature-based Solutions (Agriculture NbS) refer to approaches that leverage natural processes to enhance the resilience and productivity of agricultural systems while also addressing environmental challenges such as climate change and biodiversity loss. These solutions can provide private benefits to individual farmers, such as increased productivity, and public benefits, including climate mitigation, biodiversity conservation, and improved water quality.*

Geographical and climatic constraints limit agricultural expansion in the PICs. Over the last 30 years, the farm area has remained around 8% of the islands' total area (Figure 1).

Therefore, agricultural production in the PICs is primarily small-scale and subsistence-based, relying on traditional and agroforestry practices. Root and tuber crops like taro and yams and fruits such as coconuts and bananas form the backbone of local diets and economies.

The limitation of agricultural expansion of PICs is further compounded by soil degradation, extreme weather events and rising sea levels that threaten these production systems. Climatic driven weather events such as cyclones, prolonged droughts, floods and saltwater intrusion intensify these challenges even further, jeopardising food security and sustainable livelihoods.

This has led PICS to seek innovative solutions to adapt their production systems, enhance food security, and strengthen agricultural resilience. These efforts include developing climate-resilient crops, adopting sustainable agroecological practices, and implementing integrated land-use systems.

## Agriculture NbS and Climate Adaptation

**Agriculture NbS are essential for enhancing climate resilience, helping societies adapt to a rapidly changing climate marked by rising temperatures, intensifying storms, and prolonged droughts**. By harnessing natural processes, Agriculture NbS provide a sustainable pathway for adaptation across multiple dimensions. Techniques such as improved rainwater harvesting and soil conservation help reduce water scarcity and the socio-economic consequences of extreme weather. Furthermore, they also enhance resilience by maintaining soil health, preventing erosion, and improving water

***Key Insights**: Agriculture NbS enhances resilience against climate change by improving soil health, water retention, and biodiversity, reducing vulnerability.*

retention which ensures food security even amid climate instability[117].

**Sustainable biodiversity management is the cornerstone of Agriculture NbS, guaranteeing the resilience and long-term functionality of agricultural systems**. By maintaining diverse species and genetic resources, Agriculture NbS enhances key ecological processes such as pollination, pest control and nutrient cycling, which are essential for maintaining productivity[118]. Agro-socio-biodiversity, especially local and indigenous crops, play a key role in climate adaptation, offering a wider range of traits that improve resistance to extreme weather conditions and pests.

***Key Insights**: Maintaining agrobiodiversity strengthens ecological functions like pollination, pest control and nutrient cycling, that ultimately support long term-benefits. It is therefore necessary to integrate biodiversity conservation within farming systems and as this ensures food security and ecosystem resilience*

## Agriculture NbS and Policy

Agriculture NbS is a subset of Ecosystem-based Adaptation)[119], both emphasizing biodiversity and ecosystem services to enhance resilience in PICTs. These two approaches also emphasise traditional knowledge systems in PIC as they contribute to the sustainable management of biodiversity by integrating locally adapted practices that promote food security and ecological stability[120]. According to our interviewees, EbA is increasingly embedded in national Climate Change Adaptation (CCA), Disaster Risk Reduction (DRR), and biodiversity conservation strategies. While the term "NbS" is not always explicitly used, its principles underpin key policies and programs, reinforcing long-term adaptation efforts and stability [121] . Recognising this, Ecosystem-Based EbA are being integrated into national plans for climate change adaptation (CCA), disaster risk reduction (DRR) and biodiversity conservation in the Pacific. Although the term Agriculture NbS' is not always used explicitly, the concepts are present.

***Key Insight:** EbA aligns with Agriculture NbS by leveraging biodiversity and ecosystem services for adaptation. Many PIC national policies, particularly in the Pacific, incorporate EbA principles into climate adaptation and disaster risk reduction strategies. Similarly, it is important to ensure that Agriculture NbS principles are also embedded in national climate policies, particularly relating to Climate Change Adaptation and Disaster Risk Reduction Frameworks.*

## Agriculture NbS and Local Communities

The involvement of local communities is crucial for the success of Agriculture NbS. It is therefore necessary to blend scientific research with indigenous knowledge as this strengthens adaptation strategies and fosters long-term sustainability. It is therefore necessary to create platforms for knowledge-sharing between indigenous communities, famers and scientists to integrate traditional practices into modern agricultural strategies. Furthermore, projects should aim to go one step-further and recognise and support community-led initiatives through participatory decision-making process and financial incentives and investment mechanisms that support farmers implementing NbS.

***Key Insight:** Safeguarding traditional knowledge while incorporating modern techniques is key to ensuring the future of agriculture in PICs.*

[117] Pierce, C. A. E. (2022). The Effectiveness of Formal and Traditional Learning about Climate and Disaster Resilience in Vanuatu. Bishop Grosseteste University.

[118] Thaman, R. (2014). Agrodeforestation and the loss of agrobiodiversity in the Pacific Islands: A call for conservation. Pacific Conservation Biology, 20(2), 180. https://doi.org/10.1071/PC140180

[119] UNEP (2022). Nature-based Solutions: Opportunities and Challenges for Scaling Up. https://wedocs.unep.org/20.500.11822/40783.

[120] Youngs, K., Johnson, J., & Basel, B. (2022). Review of nature-based solutions in the Pacific region: Focus and opportunities (p. 41). WWF. https://assets.wwf.org.au/image/upload/f_pdf/2022_MCC_WWF_Review_of_NbS_in_the_Pacific?_a=ATO2Bcc0

[121] Youngs, K., Johnson, J., & Basel, B. (2022). Review of nature-based solutions in the Pacific region: Focus and opportunities (p. 41). WWF. https://assets.wwf.org.au/image/upload/f_pdf/2022_MCC_WWF_Review_of_NbS_in_the_Pacific?_a=ATO2Bcc0

## THREATS

***Environmental and Climatic Vulnerabilities:*** PICs rank among the most climate-vulnerable worldwide. Cyclones, floods, droughts, and rising sea levels threaten ecosystems and communities, leading to saltwater intrusion, reduced freshwater supply, and degradation of scarce arable land. With only about 8% of land suitable for agriculture, large-scale NbS implementation is particularly challenging. Soil degradation undermines productivity and weakens agroecological approaches.

***Socioeconomic and Infrastructure Challenges:*** Agriculture in PICs relies on subsistence farming with smallholder systems and limited market integration. Poor infrastructure (e.g. irrigation, roads, and storage) hinders the adoption of NbS practices. Financial constraints also pose challenges, as most farmers lack the capital or credit access needed to transition to sustainable methods.

***Policy and Institutional Gaps:*** Many Pacific countries are informally adopting Climate-Smart Agriculture (CSA) and NbS, but these methods are not embedded in national policies. Weak land tenure creates insecurity and deters long-term ecosystem-based farming investment. Additionally, institutional fragmentation and overlapping mandates among ministries cause inefficiencies and hinder integrated planning.

***Knowledge and Capacity Barriers:*** The region faces gaps in technical knowledge, research, and capacity building regarding NbS. A disconnect between scientific knowledge and community practices limits intervention effectiveness and relevance. Poorly designed agroforestry or ecosystem restoration projects may inadvertently introduce invasive species, while the loss of traditional ecological knowledge among younger generations further reduces adaptive capacity.

## OPPORTUNITIES

***Strong Foundation in Traditional Knowledge and Agroecology:*** Many NbS are integrated into traditional Pacific practices such as polyculture, agroforestry, and organic farming. These approaches offer a culturally relevant basis for formal NbS strategies. Initiatives driven by communities that blend Indigenous knowledge with scientific insights show strong promise in delivering sustainable results.

***Resilience and Co-benefits:*** Agricultural NbS provide multiple benefits in PICs, helping communities adapt to climate change, enhancing food security, restoring biodiversity, and improving soil and water health. Initiatives promoting resilient crops, enhancing soil fertility, and managing water resources significantly boost the region's capacity to withstand climate shocks. These interventions also aid in carbon sequestration and disaster risk management reduction.

***Policy Momentum and Regional Alignment:*** Growing policy interest across the Pacific seeks to integrate Ecosystem-based Adaptation (EbA), Climate Change Adaptation (CCA), Disaster Risk Reduction (DRR), and biodiversity conservation into agricultural planning. Despite remaining challenges, this alignment offers a strategic opportunity to mainstream NbS into national development agendas. Regional platforms and adaptation plans can harmonize actions and attract funding.

***Food security driving Agriculture NbS:*** High dependence on food imports makes PICs vulnerable to supply shocks and price swings. Agriculture NbS, like agroecology and climate-resilient crops, can enhance local production and access to nutritious food. Urgency in food security can drive supportive policies for this type of NbS, including subsidies, climate finance, ecosystem service payments, and land-use reforms.

# IMPLEMENTATION OF AGRICULTURE NbS IN PICs

**Of the 60 NbS projects identified in the PICs focusing on climate, biodiversity and community-orientated social outcomes, 45% are related to agriculture**. Most of these projects (74 %) are linked to the forestry sector and strongly emphasise climate adaptation through sustainable biodiversity management (92%). These projects are largely community-led (90%) and aim to enhance and restore the landscape eco-system multifunctionality (70%). Most of them are concentrated in Fiji, Solomon Islands and Vanuatu.

## COMMON NBS AGRICULTURE IMPLEMENTATION APPROACHES

### *1. Climate Smart Agriculture*

**Climate Smart Agriculture (CSA) is an NbS approach designed to help agriculture adapt to the realities of climate change.** It integrates sustainable practices in crops, livestock, forestry and fisheries to address the challenges of food security and climate. By focusing on increasing productivity, improving resilience and reducing greenhouse gas emissions, CSA promotes farming methods adapted to local environments qhich ultimately fosters a more sustainable agricultural future.

Moving away from monoculture, CSA encourages diversified farming systems that are more resilient to climate shocks, improving adaptability and long-term stability. This shift enhances food security and provides financial incentives for farmers to adopt practices that protect the environment. For example, recognising CSA as beneficial allows for incentives and political support, enabling farmers to transition from harmful practices, such as slash-and-burn agriculture, to more sustainable alternatives.

Incorporating CSA into an NbS structure emphasises harmony with nature - improving soil health, conserving water and preserving biodiversity in agricultural landscapes. Adopting these practices is fundamental to community resilience, as they offer several benefits, including greater food security, diversified sources of income and better management of natural resources. Using appropriate financial mechanisms is fundamental for sustainable agriculture to become achievable, supporting the long-term viability of local ecosystems and livelihoods.

### *2. Agroforestry*

**The connection between Agricultural NbS and forestry is significant, mainly through agroforestry, which integrates trees into agricultural systems for biodiversity and food security**[122]. This practice improves landscapes, supports wild food diversity and provides habitats for pollinators. Furthermore, it enhances soil health, controls erosion, and improves crop resilience, while supporting food security by producing fruit, tubers, timber, and medicinal plants. Also included in this practice is the improvement of plantations through longer harvesting rotations.

Several organisations, including environmental NGOs, CSOs, and governments, work on NbS projects connecting agriculture and forestry in the Pacific. Initiatives such as WWF's Climate Resilient by Nature (CRxN) programme focus on supporting communities in harnessing nature to meet the challenges of climate change.

Agroforestry boosts a number of benefits. It promotes agroecological practices for food security and the conservation of indigenous agricultural crops.

**Agroforestry also promotes reforestation**, which converts degraded areas into forests. With agroforestry, reforestation can be facilitated through certifications and agricultural regulations that increase forest cover and biodiversity. It is an

[122] Miralles-Wilhelm, F. 2021. Nature-based solutions in agriculture – Sustainable management and conservation of land, water, and biodiversity. Virginia. FAO and The Nature Conservancy. doi.org/10.4060/cb3140en

effective strategy for rehabilitating land, reducing erosion and protecting riparian zone [123]. This evidences the key role that Agroforestry plays in disaster risk management[124].

**While, Agroforestry provides a number of benefits, it is important to ensure that forests are not converted to agriculture.** This can be achieved through protected areas, sustainable land use, improved land tenure, zero deforestation commitments and sustainable subsistence agriculture. **Sustainable forest management** helps mitigate the climate, while watershed vegetation management reduces the risks of landslides and floods, benefiting agriculture.

A major strength of agroforestry in the Pacific is its foundation in diverse, tree-based farming systems deeply embedded in long traditional agricultural practices. Integrating this local knowledge with modern scientific innovations ensures more adaptive and sustainable solutions. However, success depends on strong community engagement and aligning agroforestry initiatives with environmental goals and local livelihoods.

Activities such as awareness-raising, capacity-building and networking to empower stakeholders with knowledge about agroforestry, ecological diversity and income generation were highlighted by our interviewees as essential to ensuring adequate knowledge transfer of agroforestry systems.

While there are many benefits of Agroforestry, balancing conservation and production remains a challenge. Some projects emphasise native species for ecological restoration, while others focus on non-native trees for economic benefits. Poorly planned efforts can introduce invasive species, disrupting ecosystems. Careful selection of species and long-term monitoring are essential to avoid such risks.

### *3. Resilient Gene Pools*

The development of Resilient Gene Pools is another supporting NbS measure, strengthening agriculture in the Pacific Islands. By identifying and cultivating naturally adapted crop varieties, farmers can increase food security without relying on genetic modifications.

Research and traditional breeding methods help select plant characteristics that resist temperature and water availability changes. This approach goes beyond native species. This is evident in subsistence and agroforestry practices that introduce non-native trees to improve soil and landscape resilience. Such processes prioritise the selection of more productive and resistant species.

Integrating traditional knowledge with scientific research further refines the selection of climate-resilient crops. This synergy supports sustainable agricultural systems that are more resistant to extreme environmental events, guaranteeing long-term food security.

The following Table 1 explores a subset of the NbS projects identified, showing the diverse range of NbS related to the agricultural sector.

[123] Niijima, K. & Yamane, A. 1991. Effects of reforestation on soil fauna in the Philippines. Philippine Journal of Science (Philippines).

[124] Van Noordwijk M, Hairiah K, Tata HL, Lasco L. 2019. How can agroforestry be part of disaster risk management? In: van Noordwijk M, ed. Sustainable development through trees on farms: agroforestry in its fifth decade. Bogor, Indonesia: World Agroforestry (ICRAF) Southeast Asia Regional Program. pp 251–267.

*Table 5: Subset of Forest and Land use management NbS projects identified in the screening tool*[125]

| Project name and Source | Countries | Socio-cultural benefits | Key Ecological benefits | Climate change benefits |
|---|---|---|---|---|
| Climate Smart Agriculture (CSA) | | | | |
| **Pacific Organic Learning Farms Network (POLFN)** | Fiji \| Nauru \| Solomon Islands \| Tonga | POLFN enhances community cohesion through learning farms that share knowledge and promote traditional agricultural practices essential to Pacific cultures. It boosts food security and empowers local farmers, particularly youth and women, with skills for better livelihoods. POLFN also fosters cultural exchange and intergenerational learning, ensuring agricultural knowledge is passed down and deepening ties to the land and heritage. | The project avoids synthetic pesticides and fertilisers. Additionally, POLFN reduces environmental pollution and fosters biodiverse habitats for native pollinators and beneficial insects. Organic practices like composting and crop rotation improve soil fertility and carbon sequestration, aiding climate change mitigation while promoting resilient landscapes to protect ecological balance. | POLFN significantly benefits climate change through organic agricultural practices. By promoting soil health via composting and cover cropping, it enhances carbon sequestration, reduces reliance on energy-intensive synthetic fertilizers, and increases ecosystem resilience against climate stressors, ensuring long-term food security for Pacific Island communities. |
| **Vanuatu: Women-Led Climate Resilience and Adaptation** | Vanuatu | This initiative is women empowering, leading to increased community cohesion, social inclusion, and enhanced capacity for climate resilience. Specifically, it strengthens social networks, preserves cultural knowledge through the integration of women's traditional practices, and improves overall community well-being by addressing gender disparities in resource management and decision-making. | The initiative helps women adopt sustainable practices that enhance ecosystem resilience. This includes improving soil health through composting, conserving biodiversity with diversified farming, and promoting efficient water management. Together, these efforts reduce environmental degradation and strengthen the ecological integrity of Vanuatu's landscapes. | This initiative tackles climate change by helping women adopt sustainable farming practices that improve soil health and carbon sequestration while reducing chemical use. By promoting diversified farming and agroforestry, it strengthens ecosystem resilience to climate disturbances, ensuring food security and lowering vulnerability. This women-centered strategy mitigates climate change impacts and empowers communities to adapt, fostering a sustainable future for Vanuatu. |
| Agroforestry | | | | |
| **PROTEGE ("Pacific Territories Regional Project for Sustainable Ecosystem Management "** | New Caledonia \| French Polynesi \| Wallis & Futuna \| Pitcairn | This initiative respects and integrates traditional Pacific Islander knowledge and practices. PROTEGE emphasizes community-driven initiatives, ensuring that agroforestry systems are designed and implemented in ways that align with local customs, land tenure systems, and dietary preferences. This fosters a sense of ownership and promotes the transmission of intergenerational knowledge related to sustainable land management, enhancing social cohesion and cultural preservation alongside environmental benefits. | Enhanced biodiversity through the creation of varied habitats, improved soil health and fertility through organic matter input and nutrient cycling, and increased carbon sequestration contribute to climate change mitigation. Additionally, agroforestry systems regulate water cycles, reduce erosion, and improve water infiltration, while also strengthening ecosystem resilience to environmental stressors such as droughts and extreme weather events. | PROTEGE enhances carbon sequestration by increasing biomass both above and below ground, effectively removing atmospheric carbon dioxide. Furthermore, the diversification of crops and integration of trees strengthens ecosystem resilience to climate-related stresses like droughts and extreme weather events, reducing vulnerability. |
| **Integrated Agro-ecosystem Approach for enhancing** | Tuvalu | This project places a strong emphasis on integrating traditional Tuvaluan knowledge and practices into the agro-ecosystem. It prioritizes | Enhance ecological resilience in Tuvalu's vulnerable atoll environment. It focuses on improving soil fertility through composting and the use of | This initiative combats climate change impacts in Tuvalu by promoting climate-resilient agriculture. It diversifies crops and encourages salt-tolerant species, |

[125] Please note this list is not exhaustive and is based on projects identified through the project screening tool.

| | | | | |
|---|---|---|---|---|
| **Livelihoods and Climate Resilience in Tuvalu** | | community engagement, ensuring that interventions are culturally appropriate and aligned with local land ownership structures and social norms. By revitalizing traditional food systems and promoting participatory decision-making, the project aims to strengthen social cohesion and empower communities to sustainably manage their resources, fostering a sense of ownership and cultural continuity. | native species, increasing biodiversity by promoting diverse cropping systems, and enhancing water management through rainwater harvesting and efficient irrigation techniques. These efforts contribute to healthier ecosystems, improved ecosystem services, and increased resilience to environmental stressors like saltwater intrusion and extreme weather events. | enhancing food security against rising sea levels and saltwater intrusion. Agroforestry and soil carbon sequestration also help mitigate climate change by removing carbon dioxide. By boosting ecosystem resilience and supporting sustainable land management, the project assists Tuvalu in adapting to climate change's adverse effects. |
| Resilient Gene Pools | | | | |
| **Centre for Pacific Crops and Trees (CePaCT)** | Regional scope, but CePaCT is physically located in Fiji | Safeguarding crops vital to Pacific Island traditions and food systems. Protecting traditional varieties, especially staples like taro, enhances cultural identity and fosters knowledge sharing across generations. Distributing resilient varieties ensures traditional farming practices and foodways survive, reinforcing community bonds and safeguarding the socio-cultural fabric tied to these resources. | CePaCT preserves diverse crop and tree genetic resources, including traditional varieties, to safeguard biodiversity and enhance ecosystem stability. It distributes climate-resilient planting materials that promote robust agricultural systems capable of withstanding environmental stressors. This approach supports sustainable land management, reduces reliance on monocultures, and fosters healthier soil and water, contributing to ecological balance. | The project enhances Pacific Island communities' capacity to adapt to climate changes like rising temperatures, drought, and saltwater intrusion by conserving climate-resilient crop varieties. Preserving genetic diversity ensures access to traits that withstand these stressors, strengthening food security. Promoting diverse agricultural systems also aids carbon sequestration and improves soil health, helping mitigate climate change effects. |
| **Aligning genetic resources, production and post-harvest systems to market opportunities for Pacific Island and Australian cocoa** | Fiji \| Samoa \| Solomon Islands \|Vanuatu | This project enhances cocoa-growing communities by revitalizing traditional farming and empowering local producers. By emphasizing high-quality cocoa for niche markets, it promotes cultural pride, craftsmanship, and ownership in agricultural knowledge. It also fosters intergenerational knowledge transfer, preserving cultural heritage linked to cocoa cultivation while improving livelihoods and community resilience. | Sustainable cocoa production through agroforestry combines cocoa with native trees and crops, boosting biodiversity, soil health, and wildlife habitats. It meets market demands for sustainably sourced cocoa, encourages eco-friendly practices, curbs deforestation, and enhances ecosystem resilience. Improved post-harvest techniques reduce waste and minimize the environmental impact of cocoa processing, creating a sustainable value chain. | Enhances climate resilience by promoting climate-adapted cocoa varieties and sustainable farming. Diversifying production reduces vulnerability to climate risks like droughts. Targeting high-quality markets incentivises farmers to adopt sustainable practices, improving soil carbon sequestration and reducing greenhouse gas emissions. The project fosters a climate-resilient cocoa sector that adapts to change, supporting long-term food security and livelihoods. |

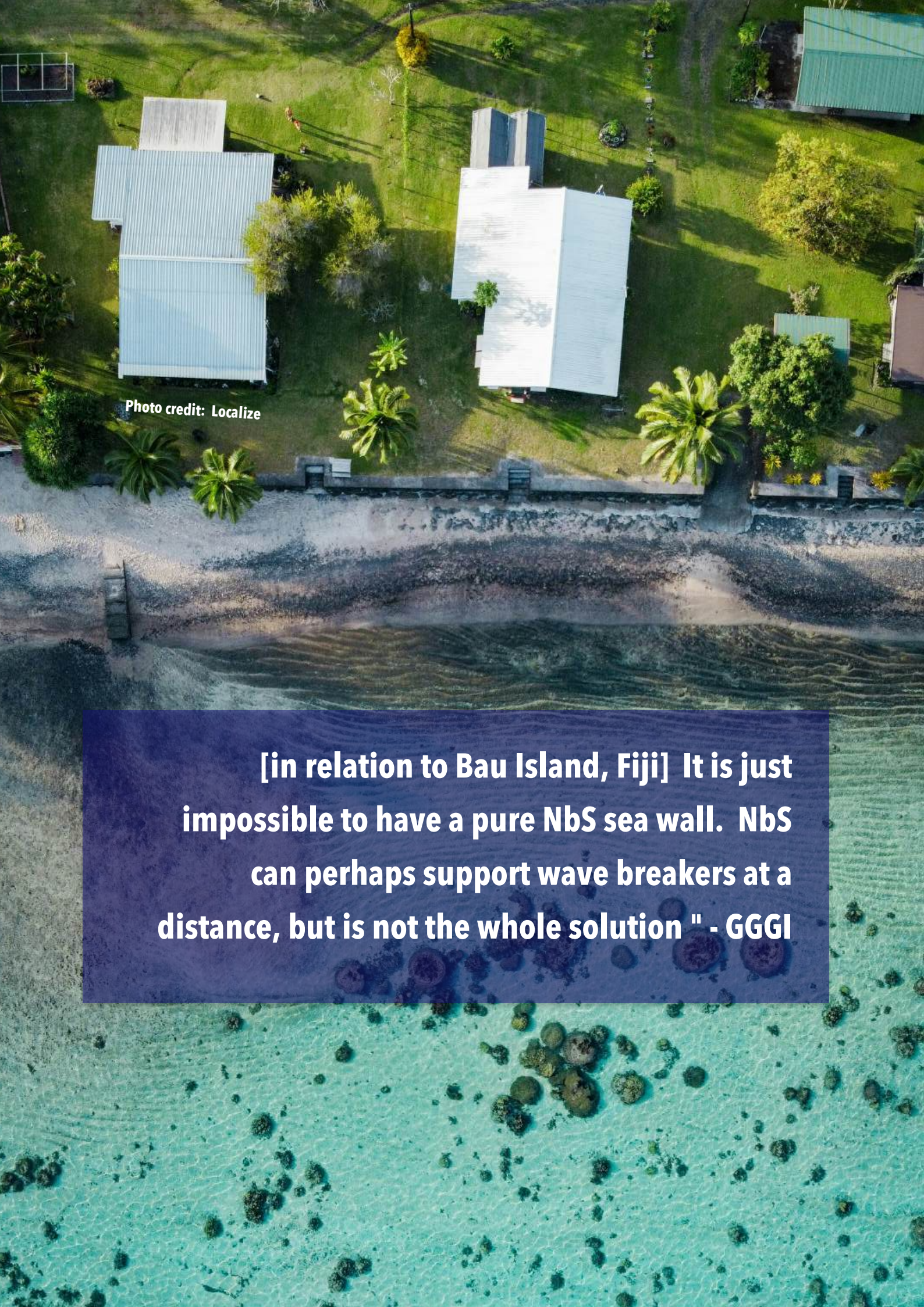


Photo credit: Localize

**[in relation to Bau Island, Fiji] It is just impossible to have a pure NbS sea wall. NbS can perhaps support wave breakers at a distance, but is not the whole solution " - GGGI**

# URBAN

## BACKGROUND

**The Pacific Islands are highly diverse in culture, geography, resources, and socio-economic conditions, leading to significant variations in urbanisation.** While 24% of the region's population is classified as urban[126], this figure increases to 48% when excluding PNG, and 55% when only small island countries and territories are included where land scarcity accelerates urban growth[127]. Since 2000, the number of urban areas with over 5,000 people has risen from 35 to over 50, yet the region's urbanization rate remains lower than the developing world average. The ocean plays a central role in Pacific livelihoods, with 90% of the population (excluding PNG) living within 5 km of the coast, and economies heavily dependent on marine and coastal resources[128].

**Defining "urban" in the Pacific is challenging due to the vast diversity of islands and settlements**. In atoll nations with limited land, villages and towns are often classified as urban due to high population density and growth rates. Traditional land ownership plays a crucial role in urban development, as kinship rights restrict land use by outsiders. Additionally, migration between villages, islands, and urban centres, further blurs the urban-rural distinction in PICTs.

**Urbanisation in the Pacific Islands presents significant sustainability and resilience challenges.** Limited land availability and rapid urban growth have led to overcrowding, informal settlements, and inadequate infrastructure. Pacific "Ocean Cities" are particularly vulnerable to climate change, facing rising sea levels, coastal erosion, and increasingly severe tropical cyclones, which threaten both urban populations and infrastructure.

To address these challenges, NbS offer a holistic opportunity for implementation across PICTs, by integrating natural resources closely connected to urban areas—such as coastal and marine ecosystems, forests, and freshwater systems. To this end, urban NbS is cross-cutting as it incorporates different NbS strategies.

## THREATS

***Limited Space:*** Pacific Island territories are small in both scale and land area, which limits options for implementing larger or more expansive interventions. Urban areas are often densely populated, leaving little available land for new green infrastructure without displacing existing uses.

***Land ownership and governance:*** issues further complicate implementation; customary and communal land tenure systems can make it difficult to secure long-term access or permission for projects, particularly in urban settings.

***Financing of upfront costs:*** Cost is another significant barrier, especially in resource-constrained communities where immediate development needs often take priority over long-term investments.

***Specialized Technical Capacity:*** Some nature-based solutions require specialized technical capacity, such as ecological engineering, hydrological modelling, or climate-resilient landscape design, which may not be readily available within small island communities. This

[126] Trundle, A. (2022, October 18). *Why cities are key to sustainable development in the Pacific Islands*. World Economic Forum. https://www.weforum.org/stories/2022/10/why-cities-key-development-pacific-islands/

[127] Campbell, J. (2019). *Climate change and urbanisation in Pacific Island countries* (Policy Brief No. 49). Toda Peace Institute. https://toda.org/assets/files/resources/policy-briefs/t-pb-49_john-campbell_climate-change-and-urbanisation-in-PICs.pdf

[128] Andrew, N. L., Bright, P., de la Rua, L., Teoh, S. J., & Vickers, M. (2019). Coastal proximity of populations in 22 Pacific Island Countries and Territories. *PLOS ONE, 14*(9), e0223249. https://doi.org/10.1371/journal.pone.0223249

creates dependency on external experts, which can increase project costs and reduce opportunities for local capacity-building. Moreover, without local expertise, there may be gaps in maintenance, monitoring, and adaptive management after implementation.

Additionally, successful interventions often require careful integration with existing infrastructure, a task made more difficult in areas with aging, fragmented, or poorly documented urban systems. These challenges necessitate coordinated planning, inclusive decision-making, and targeted investment in technical training and institutional support to unlock the full potential of NbS in island contexts.

*Figure 20 Coastal proximity of populations in the PICTs*[1]

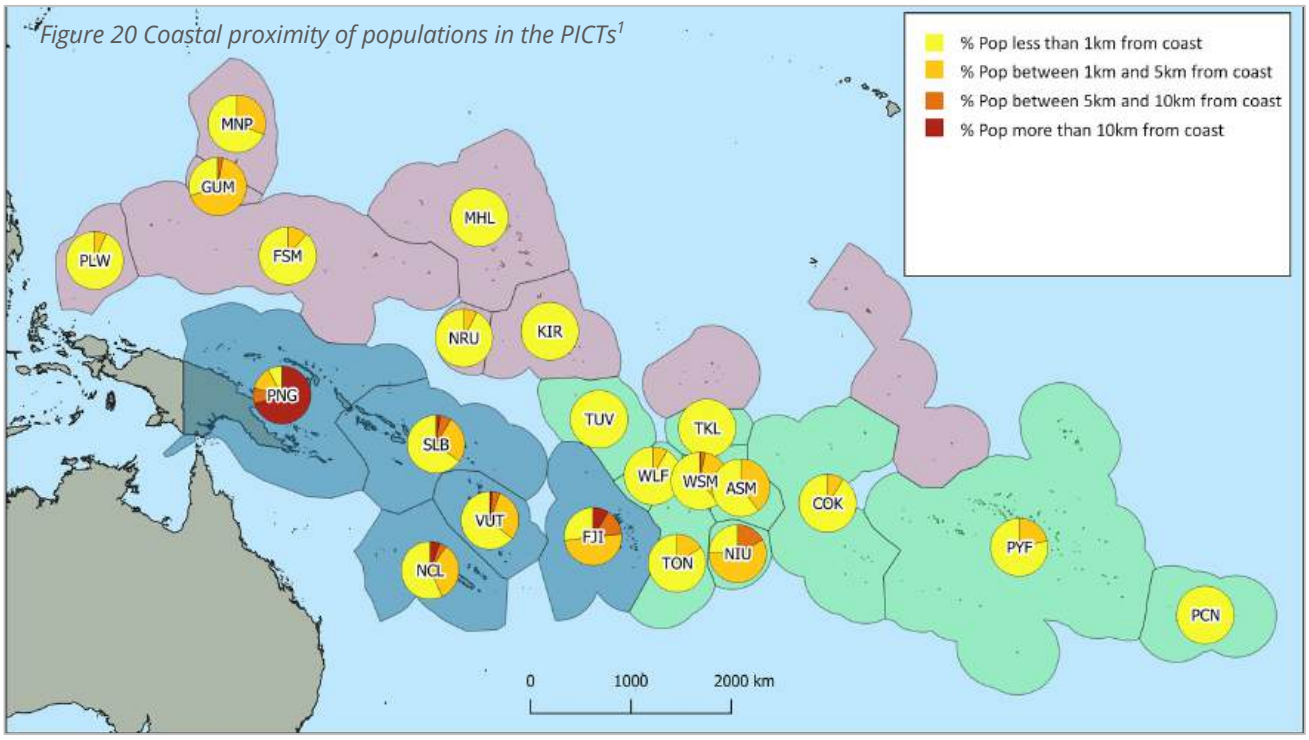
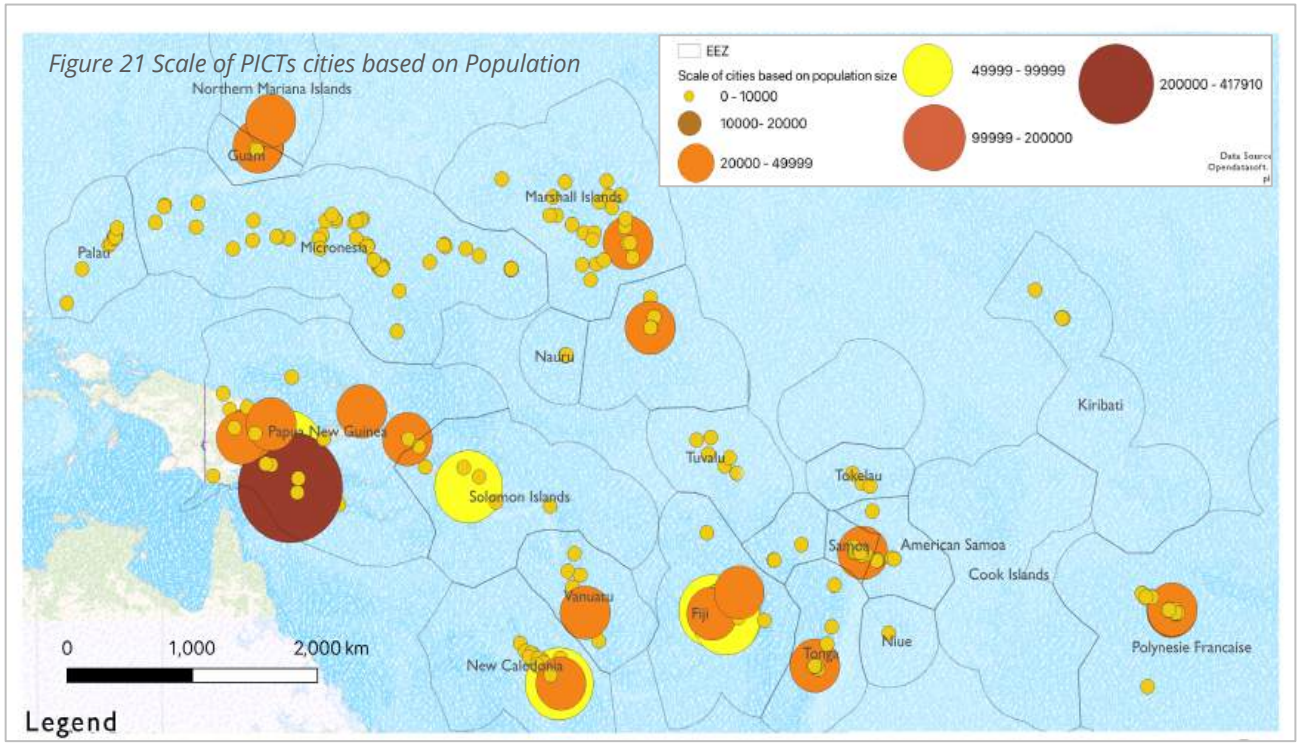



*Figure 21 Scale of PICTs cities based on Population*



## OPPORTUNITIES

Despite these challenges, urban nature-based solutions (NbS) offer significant and multifaceted opportunities for Pacific Island cities.

***Community-led initiatives:*** present a powerful pathway for designing and implementing context-specific solutions that reflect local needs, priorities, and values. These participatory approaches foster a strong sense of ownership, build social capital, and enhance the sustainability of interventions over time.

***The inclusion of Indigenous Knowledge****:* further strengthens NbS by incorporating traditional ecological practices, place-based understanding, and culturally appropriate design principles. This integration not only improves the ecological effectiveness of interventions but also helps preserve cultural heritage and promote intergenerational knowledge transfer.

***NbS can reduce physical impacts on coastal infrastructure and homes,*** providing a natural buffer against rising seas, storm surges, and flooding—hazards that are increasingly frequent due to climate change.

***Deliver co-benefits:*** NbS contribute to improved wellbeing through increased access to green space, opportunities for recreation, and community cohesion. They enhance air quality by filtering pollutants and cooling urban areas, mitigate urban heat island effects, and support improved habitation by making neighbourhoods more liveable and resilient. Additionally, NbS can play a vital role in water management, helping to reduce surface runoff, improve water quality, and recharge aquifers through systems such as bioswales, green roofs, and rain gardens.

The growing international recognition of NbS opens avenues for **external funding and partnerships**, including through climate finance and regional cooperation. Altogether, these opportunities position NbS as a vital and scalable approach for building resilient, healthy, and inclusive urban environments in Pacific Island contexts.

## IMPLEMENTATION OF URBAN NBS

**The implementation of NbS in Pacific Island cities is becoming increasingly crucial as urbanization accelerates, and climate change intensifies its impact on key economic centres**. The European Commission's Horizon 2050 Expert Group outlines seven key priorities for NbS[129]: regenerating urban spaces, enhancing human wellbeing, strengthening coastal resilience, restoring ecosystems and watersheds, promoting sustainable resource use, reducing disaster risk through natural buffers, and increasing carbon sequestration. These priorities closely reflect the Pacific context and the interconnected relationships between urban rural, land, marine, forest and freshwater ecosystems in place.

**Given the proximity of urban areas to coastlines and diverse land-use zones, Urban NbS in the Pacific adopts a holistic "ridge-to-reef" approach,** enhancing community climate resilience while strengthening the connection between urban development and the natural ecosystems of these island nations in varying scales. The small size of many Pacific islands and the close interconnection between their urban areas and surrounding marine and terrestrial ecosystems mean that urban resilience and environmental sustainability are inherently intertwined. Nature-based Solutions (NbS) play a vital role in addressing climate risks, enhancing biodiversity, and supporting sustainable development by harnessing the natural interactions between land, water, and coastal environments.

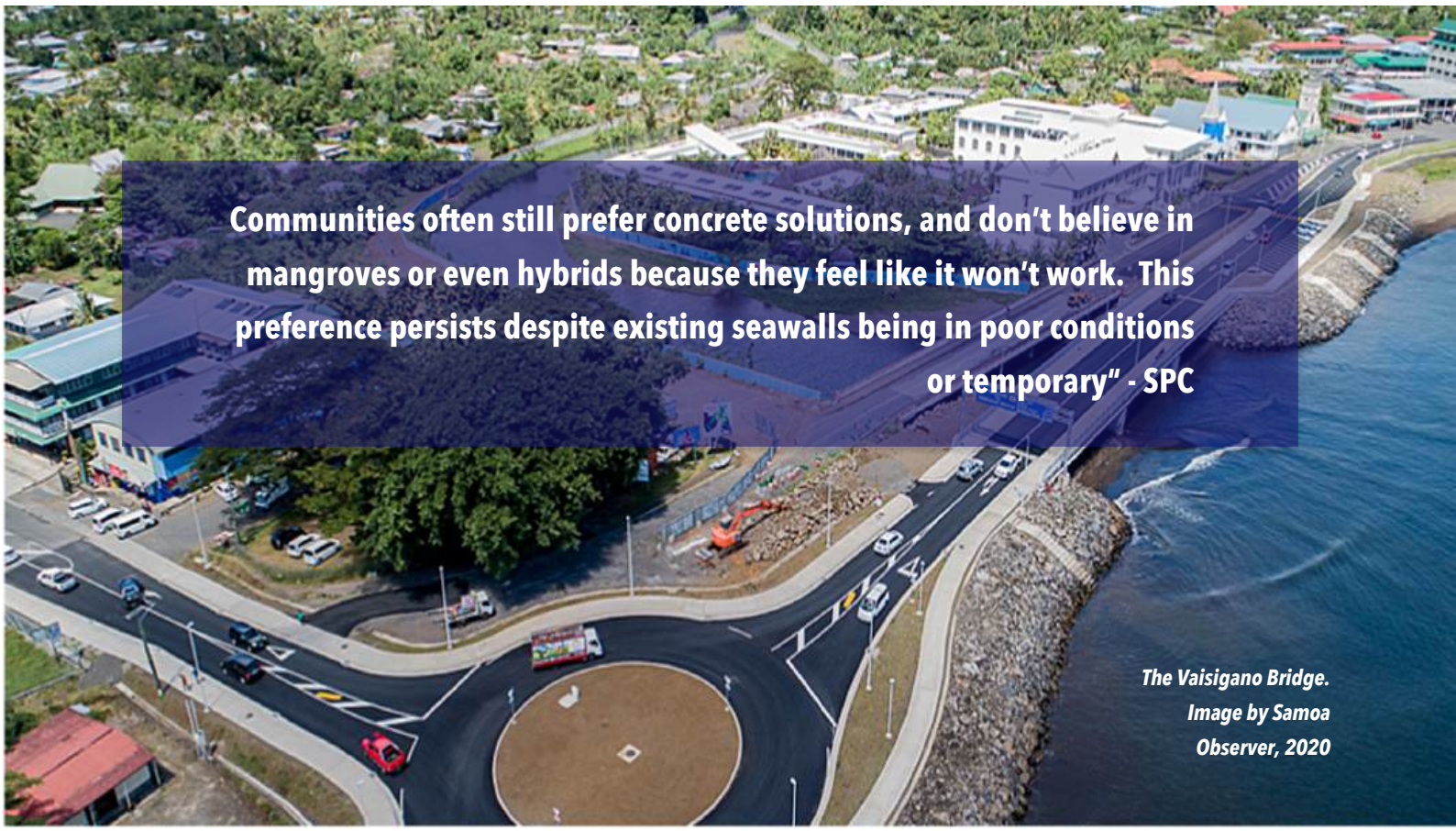
**Our analysis identified 8 ongoing NbS urban projects, along with recently completed initiatives from the past two years, implemented since 2022**. These projects primarily focus on climate adaptation, disaster risk preparedness, and resilience-building, reflecting that urban NbS takes a more climate-sensitive nature in the Pacific Island nations. Given the region's exposure to rising sea levels, coastal erosion, tropical cyclones, and freshwater stress, most NbS solutions aim to address these specific challenges within the local urban context of each project. The key NbS strategies implemented include **water catchment restoration** to improve freshwater availability, **rainwater harvesting promotion** to enhancing water security, **supporting measures for blue economic zone development** in coastal cities to promote sustainable coastal and marine resource management, and **ecosystem restoration** to strengthen natural resilience against climate impacts. The scale of NbS projects across the Pacific also varies widely—from large-scale urban initiatives in Samoa to small, neighbourhood scale rainwater harvesting schemes.

These initiatives reflect the gradual yet growing role of NbS in advancing sustainable urban development and climate resilience across the Pacific. The table below presents a subset of NbS projects and programmes identified, showcasing the diverse range of urban NbS initiatives identified in the Pacific cities.

*Table 6: Subset of Urban NbS projects identified in the screening tool*

| Project name and Source | Ecosystems and Urban Scale | Approach | Societal - socio cultural benefits | Key Ecological benefits | Climate change benefits |
|---|---|---|---|---|---|
| **Integrated Flood Management to Enhance Climate Resilience of the Vaisigano River Catchment in Samoa** | **Large Urban scale, Water resources** | **This project involves integrated flood management and integrated drainage system development** | **The project reduces disaster risk while sharing local knowledge and resources on climate change. The project also involves training on flood-related emergencies and the promotion of individual and community wellbeing.** | **The project provides ecosystem restoration, conservation and management.** | **Climate Adaptation** |
| **Development of Navakavu Blue Economic Zone (NBEZ) Masterplan** | **Large Urban scale, Coastal and Marine** | **This project develops policy oriented, nature based recreational and tourism activities.** | **The project reduces disaster risk and promotes economic growth, social inclusion and the preservation or improvement of livelihoods. The project also involves the development of a renewable Energy initiative and climate smart housing for communities** | **Protection of ocean resources, flora and fauna are prioritised in this project. Especially the Navakavu Marine Protected Area. The project also develops Climate-smart waste management systems to promote clean oceans** | **Climate adaptation & mitigation** |
| **Safe and clean water for all is the vision for Solomon Islands Water Authority (SIWA)** | **Peri-urban/ rural Water Catchments, Streams and underwater systems** | **This project aims to restore and protect important water catchments** | **There are community-based benefits for protecting and restoring forest across the catchment areas. The project also provides sustainable alternative livelihood planning. It also implements community led funding initiatives through imposing a fee for water stewardship.** | **The project aims to protect water sources from pollution and sedimentation. It also protects forest resources from the threats of logging and restoration.** | **Climate change adaptation and mitigation** |

| | | | | | |
|---|---|---|---|---|---|
| Rainwater Harvesting in the Marshall Islands | Suburb/neighbourhood scale, Freshwater resources | This project consists of engineered interventions (not using vegetation) for improving water security | This project reduces disaster risk and improves resilience. The project also promotes empowerment and equality, freshwater security and quality, this project also provides waste management, therefore, improving hygiene. | The project facilitates the prevention of disturbances while also providing education and knowledge. | Climate Adaptation |
| Enhancing Climate Resilience of Fiji's Coastal Communities Through the Provision of Nature Based Seawalls | Urban, Coastal and Marine | This project provides hybrid Solutions for Sea level rise | This project provides coastal inundation protection and resilience . | The project facilitates mangrove protection and restoration. However, it also enhances habitat provision, WHILE preventing disturbance in the form or erosion and storm damage. | Climate change Adaptation |
| NUWAO | Ki uta ki tai - from ridge to reef, with an emphasis on urban areas. | This project incorporates participatory research, urban design and traditional knowledge. | Sharing local knowledge and resources on climate change, Bridging the gap of modern NbS and traditional knowledge, Promotion of individual and community wellbeing | This project contextualises NbS for the Oceania region and provides a region specific NbS design guide related to urban settings. | Climate Adaptation |




*The Vaisigano Bridge. Image by Samoa Observer, 2020*

# METHOD OF URBAN NbS

## 1. Urban Coastal Protection

**In the next 30 years, Pacific Island nations like Tuvalu, Kiribati, and Fiji will face at least 6 inches (15 cm) of sea level rise[130]. NbS helps mitigate these impacts by restoring mangroves, coral reefs, and wetlands, which reduce wave energy, prevent coastal erosion, and enhance natural flood protection, strengthening long-term resilience.** Most urban centres and built infrastructure are located along the coast and 90% of the population (excluding PNG) lives near the sea. Many communities reside in low-lying, reef-fringed areas that depend on healthy ecosystems for protection, making NbS a key strategy for enhancing urban resilience.

**Coastal protection strategies across the Pacific vary significantly**, shaped by geographical and cultural diversity, degrees of isolation, access to funding, and differing levels of scientific, technical, and administrative capacity. These factors influence how cities and villages implement adaptation measures—ranging from fully engineered solutions like seawalls to purely nature-based approaches such as mangrove restoration. Morris et al. (2018) outlined three key categories of coastal protection design that integrate nature-based components to varying degrees[131]:

**Hard Nature-Based Design** – In this approach, nature-based elements are added to traditional hard infrastructure to improve aesthetics, ecological function, or biodiversity, but the structure's primary stability does not depend on these natural components. An example would be adding vegetation to an existing seawall.

**Hybrid Nature-Based Design**– This design integrates both hard structures and nature-based components that contribute to coastal protection. The natural elements, such as mangroves or coral reefs, may extend the lifespan of the infrastructure while enhancing ecological and biodiversity benefits.

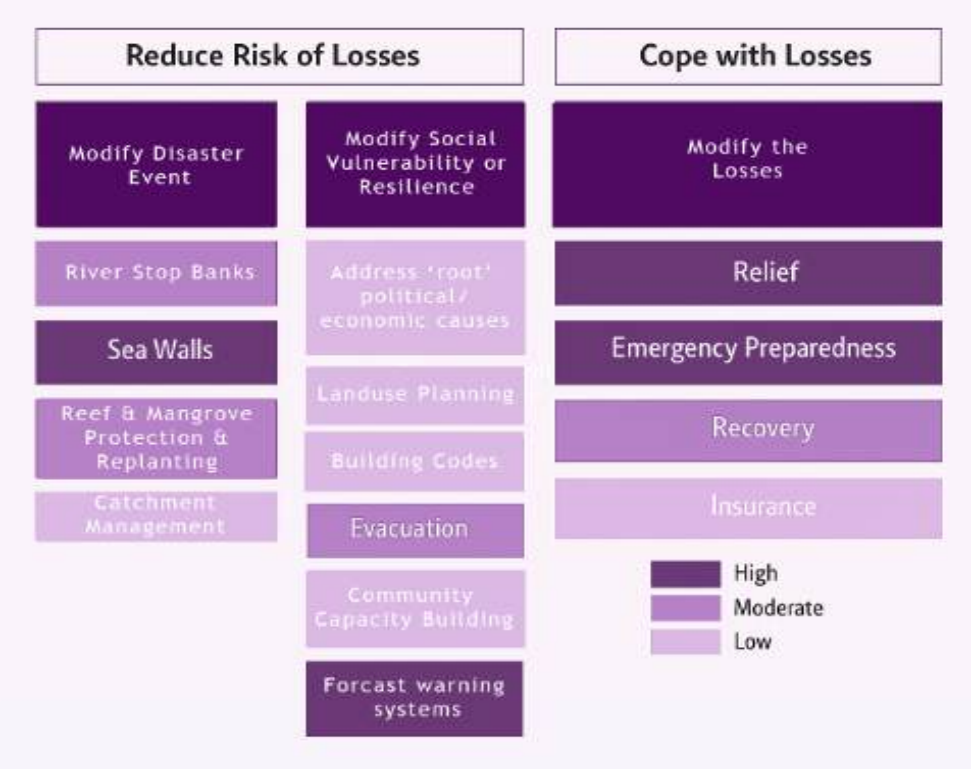



*Figure 22 The range of disaster risk reduction measures available to disaster risk managers and urban authorities in PICTs, and their levels of adoption[132]*

[130] **NASA. (n.d.).** *NASA analysis shows irreversible sea level rise for Pacific Islands.* NASA. https://www.nasa.gov/earth/climate-change/nasa-analysis-shows-irreversible-sea-level-rise-for-pacific-islands/#:~:text=In%20the%20next%2030%20years,sea%20level%20change%20science%20team.

[131] Morris RL, Konlechner TM, Ghisalberti M, Swearer SE. From grey to green: Efficacy of eco-engineering solutions for nature-based coastal defence. Glob Chang Biol. 2018 May;24(5):1827-1842. doi: 10.1111/gcb.14063. Epub 2018 Feb 16. PMID: 29350842.

[132] Ibid.

**Soft Nature-Based Design –** This approach relies entirely on natural solutions, such as mangroves, sand dunes, and reef restoration, as alternatives to hard infrastructure. These designs are dynamic and adaptable, primarily focusing on ecological and biodiversity enhancements while also providing coastal defence.

**A study examining disaster risk reduction (DRR) measures in PICTs found that seawall construction is the most adopted approach by urban authorities.** This reflects a strong reliance on hard infrastructure for coastal protection, with less emphasis on nature-based solutions such as reef conservation or mangrove restoration.[133]

**Stakeholder interviews also revealed that many communities perceive seawalls as offering greater protection from disasters**[134]. Concrete structures are often seen as more effective than NbS, with some believing that only solid, visible infrastructure can truly safeguard against sea-level rise and storm surges. **This belief presents a significant barrier to the implementation of soft NbS measures, highlighting the need for greater community education and awareness about the long-term benefits and effectiveness of NbS approaches**.

**Although hard engineering solutions are widely used in PICTs, NbS implementation evidence shows that, NbS are often more cost-effective for climate adaptation and long-term resilience**[135]**.** This presents valuable opportunities to promote NbS within the developing economic context of PICTs.

### Case Study: Seawalls and the Shift Toward Hybrid Solutions in Fiji Funded by the Kiwa Initiative

To address rising coastal risks, the Fiji Ministry of Waterways launched the project "Enhancing Climate Resilience of Fiji's Coastal Communities Through the Provision of Nature-Based Seawalls" targeting ten vulnerable coastal sites across Vanua Levu, Viti Levu, and a nearby island. The project aimed to reduce erosion and coastal inundation through a hybrid seawall design.

This design blends hard rock infrastructure with nature-based elements such as:

- Mangroves planted seaward of the wall to absorb wave energy.
- Vetiver grass planted along the crest to stabilise slopes and reduce erosion.

Mangroves provide natural wave attenuation, while vetiver grass adds geotechnical support and may help reduce wave overtopping. These natural additions also lower construction costs by reducing reliance on rock materials.

However, the success of this hybrid approach emphasizes the importance on careful design and site-specific feasibility. It was noted with greater importance that placement and density of mangroves must be optimised to maximise wave reduction, and vetiver plants must be maintained to ensure long-term structural support. Without these considerations, there is a risk that the hard infrastructure could be under-designed, reducing its overall effectiveness.

This project reflects a possibility of shift in Fiji towards sustainable and cost-effective coastal protection by integrating natural systems with engineered structures to enhance long-term resilience. It marks a move away from traditional reliance on hard infrastructure towards the inclusion of NbS within coastal adaptation strategies.

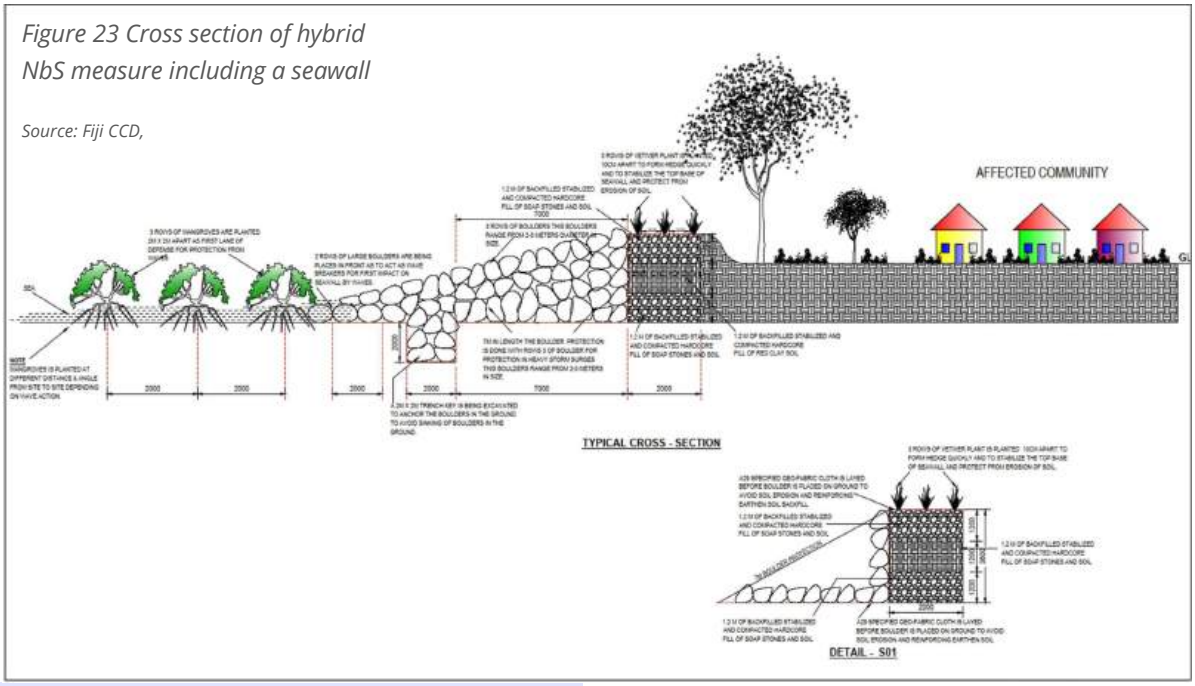
[133] **Campbell, J.** (2023, February 17). *Urbanisation and natural disasters in Pacific Island countries*. Retrieved from https://www.researchgate.net/publication/368571747_Urbanisation_and_Natural_Disasters_in_Pacific_Island_Countries

[134] Interview with SPC 2025

[135] Rao N.S., Carruthers T.J.B., Anderson P., Sivo L., Saxby T., Durbin, T., Jungblut V., Hills T., Chape S. (2013). An economic analysis of ecosystem-based adaptation and engineering options for climate change adaptation in Lami Town, Republic of the Fiji Islands. A technical report by the Secretariat of the Pacific Regional Environment Programme. Apia, Samoa: SPREP.

*Figure 23 Cross section of hybrid NbS measure including a seawall*

*Source: Fiji CCD,*




***Key Insights:*** *Local belief systems strongly shape the uptake of NbS, with many communities continuing to view seawalls as the only "real" form of protection. Shifting these perceptions requires inclusive planning processes, community co-design, and clear communication of the long-term benefits offered by soft and hybrid NbS approaches.*

**In line with this perspective, stakeholders highlighted the growing need to integrate NbS into existing frameworks, including municipal and local-level plans.** Rather than introducing new standalone policies, they emphasised embedding NbS within current planning instruments—such as coastal plans, local development strategies, and land-use regulations. This approach helps avoid policy proliferation and promotes the mainstreaming of NbS into regular planning and decision-making processes. Stakeholders also noted that this integration will require targeted training for national and provincial government officials in the planning and implementation of NbS, along with a strategic focus on fewer geographic or thematic areas to maximise impact and make the most efficient use of limited personnel and budgets.

**There is a growing shift in the Pacific towards adopting hybrid and soft NbS for coastal protection, which integrate natural systems with engineered structures or rely entirely on ecosystem-based approaches.** These strategies aim to enhance resilience and sustainability, reducing dependence on traditional hard infrastructure. For instance, Vanuatu's Climate Change and Disaster Risk Reduction Policy 2016–2030[136] recognises ecosystem-based approaches as a core area in the policy, emphasising the importance of "soft" measures such as coastal vegetation in combination with structural defences.

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***Key Insight:*** *There is a growing shift toward hybrid coastal protection approaches that blend engineered infrastructure with nature-based elements to enhance resilience and sustainability.*

## 2. Urban Flood Management

**Urban flooding is an escalating challenge in both inland and coastal towns across the Pacific**. Major flood events have led to significant damage and loss of life in several PICs, especially in capital cities like Suva (Fiji), Apia (Samoa), and Honiara (Solomon Islands). In response, a variety

[136] Government of Vanuatu & Pacific Community (2015). The Vanuatu Climate Change and Disaster Risk Reduction Policy 2016–2030. Retrieved from: https://www.nab.vu/sites/default/files/nab/vanuatu_cc_drr_policy_minus_att4v4.pdf. Port Vila/Noumea: Government of Vanuatu.

of NbS have been implemented at different scales to reduce flood risks and improve urban resilience. A leading example of hybrid NbS in the Pacific is the Vaisigano Catchment Project (VCP) in Samoa[137], funded by the Green Climate Fund (2017–2023[138]. Designed to reduce flood risk in the 3,200-Catchment—serving over 40,000 people in Apia—the project combined engineered infrastructure with NbS to strengthen urban resilience.

Key interventions included: 1) Watershed restoration and community-based catchment planning to reduce runoff and promote sustainable land use. 2) Urban drainage upgrades to improve stormwater management. 3) 'Cash for work' programmes, employing 35 youth to support reforestation. 4) EbA grants, benefiting 582 households, CSOs, NGOs, and businesses. 5) A PES pilot in Maagiagi and Malololelei, linked to upstream afforestation—though hindered by certification challenges.

Despite some implementation challenges, particularly related to the PES component, the VCP has successfully addressed urban flooding issues. It demonstrates how integrated, large-scale hybrid NbS can provide effective flood protection while delivering ecological and community benefits in urban Pacific contexts.

***Key Insight:*** *Flood-resilient urban NbS are most effective when they integrate upstream ecological restoration with downstream combinations of engineered and green infrastructure, creating a holistic catchment-to-coast approach.*

## 3. Urban Tree Planting

Urban tree planting in the Pacific offers valuable benefits for climate adaptation, carbon sequestration, and biodiversity, even in small-scale settings. While large urban forests are often not feasible—particularly in densely populated atoll cities with limited space—planting trees in urban areas can still provide important functions such as shade, cooling, erosion control, and improved liveability.

Projects across the Pacific, such as PEBACC and PACRES in Vanuatu, have shown how tree planting and community-led greening efforts can support both ecosystem restoration and urban resilience. Under the PACRES initiative, 24 trained community change agents planted 500 mahogany seedlings during a workshop aimed at promoting ecosystem restoration and climate resilience[139]. At a larger scale, the PEBACC project in Port Vila have planted approximately 3,000 native and fruit trees, along with vetiver grass, primarily along the coastline and riverbanks of Blacksands—one of the city's largest informal settlements[140].

**These activities play a critical role in stabilising soil, reducing erosion, improving air quality, and creating opportunities for food, fuel, and income generation**. Additionally urban tree planting and community gardens offer a broad range of co-benefits that extend beyond environmental resilience. They contribute significantly to human health and well-being by improving air quality. Green areas have been shown to reduce PM2.5 by 25% and PM10 by 37% compared to non-green areas[141]. Moreover, urban

[137] Latai-Niusulu, A., Taua'a, S., Lelaulu, T., Pedersen Zari, M., & Bloomfield, S. (2024). Working with nature, working with Indigenous knowledge: Community priorities for climate adaptation in Samoa. Nature-Based Solutions, 6, 100144. https://doi.org/10.1016/j.NbSj.2024.100144

[138] Green Climate Fund. (n.d.). Integrated flood management to enhance climate resilience of the Vaisigano River Catchment in Samoa (FP037). https://www.greenclimate.fund/project/fp037

[139] The University of the South Pacific. (2021, July 21). *USP-EU PACRES implements tree planting for sustainability initiatives to communities in Vanuatu*. Pacific Centre for Environment and Sustainable Development (PaCE-SD). https://www.usp.ac.fj/pace-sd/projects/intra-acp-gcca-pacres/pacres-articles-and-stories/usp-eu-pacres-implements-tree-planting-for-sustainability-initiatives-to-communities-in-vanuatu/

[140] Kiddle, G. L., Loubser, D., & Pedersen Zari, M. (2025). *Port Vila, Vanuatu: Strengthening urban resilience through ecosystem-based adaptation*. Pacific Ecosystem-based Adaptation to Climate Change (PEBACC).

[141] Mare Srbinovska, Vesna Andova, Aleksandra Krkoleva Mateska, & Maja Celeska Krstevska. (2021). The effect of small green walls on reduction of particulate matter concentration in open areas. *Journal of Cleaner Production, 279*, 123306. https://doi.org/10.1016/j.jclepro.2020.123306

tree planting contributes to the creation of cooler microclimates, which is particularly important in Pacific towns experiencing increasing urban heat. The widespread proliferation of impermeable surfaces in cities like Suva and Papeete highlights the urgent need to integrate NbS into urban planning—not only to mitigate heat stress and restore ecological balance, but also to foster social cohesion through the development of urban parks and green spaces.

**These efforts can be further strengthened through partnerships with government agencies and complemented by other initiatives, such as backyard gardening**—as demonstrated in the PEBACC project. Such approaches enhance food security, reduce pressure on natural forests, and promote the efficient use of limited urban space. Even at a small scale, urban greening plays a vital role in building more sustainable, liveable, and climate-resilient Pacific cities.

These examples offer compelling evidence that tree planting can be effectively integrated into urban environments across the Pacific, contributing to both ecological restoration and climate resilience. They also highlight a valuable opportunity for PICTs, where urbanisation and the growth of informal settlements present ongoing challenges. By actively involving residents of informal settlements in the design and implementation of these initiatives, there is significant potential to foster grassroots-level NbS that are responsive to the unique needs and contexts of Pacific urban areas.

***Key Insights*** *In densely populated atoll cities with limited land availability urban tree planting and backyard gardens offer vital adaptation benefits, supporting climate resilience, food security, and community.*


*Photo credit: Vidi drone*

# WATER RESOURSES

## BACKGROUND

**Rivers, streams, lakes, wetlands, watersheds and the hydrological cycle itself are part of the living waters that connect humans and ecosystems together:** Without pure, fresh and spring water; there is disease, pollution, stagnancy and depletion. NbS, being nature-centred, provide approaches to restore, protect and well manage water for both safe human consumption and for ecosystems to flourish. It is not possible to easily separate water from land use, urban, agriculture, forestry or coastal and marine, water truly connects them all. Water is not only essential for **water uses** and **water availability** for domestic, agricultural, industrial etc, including considerations of **water quality** and **quantity,** but also for **ecosystem health** considering **wastewaters**, and **water extraction**, and disaster risk reduction **managing flood waters** and **water retention.** Throught these aspects all sectors are connection by water.

⇒ **Coastal and marine** – run off from urban, agricultural and land use practices impact the ecosystems and coastal water quality directly. This can be caused from both sediment and pollution. Wastewater disposal is also a particular issue within this relationship.

⇒ **Forestry and Land Use** – practices upstream affect water quality and security downstream. The species of tree and vegetation used also affects the amount of groundwater available for other uses.

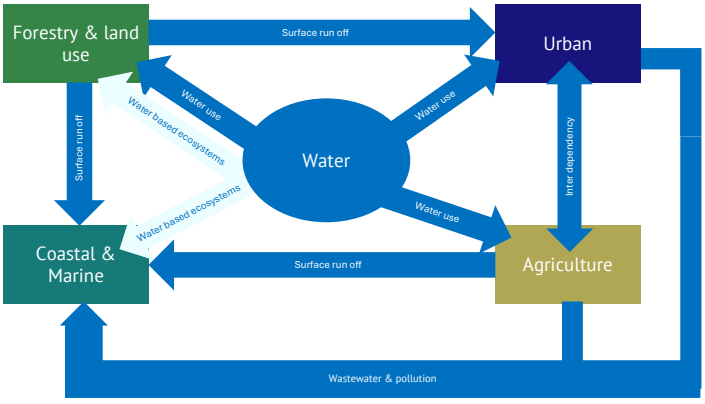
⇒ **Agriculture** – without water crops cannot grow and livestock cannot be sustained. Moreover, it is important to have reliable water sources during water scarce times. Water flow from upstream / inland to agriculture is essential to consider mitigating for heavy rainfall events to protect crops. Wastes and wastewater management systems that prevent pollution in runoff or during extreme weather events is also an important consideration concerning this relationship.

⇒ **Urban** – Human habitation needs both secure potable water for consumption and water for domestic uses. Flood management from heavy precipitation events requires water retention interventions protecting infrastructure and homes. Additionally, wastewater is produced from this sector needed to be address for healthy ecosystems.

***Key insight:*** *Water is essential regardless of the sector of project, and NbS design should always consider the flow of water into or from the area of focus.*

**The freshwater resources of PICTs are highly variable, comprising some of the global extremes in terms of availability and access.** Countries and territories vary widely in both the availability and accessibility of freshwater, as well as the ways that these resources are managed. Notably PICTs typically struggle with limited freshwater supplies. Culturally and hydro-geographically diverse, PICTs share challenges including small land areas, limited groundwater, high rainfall dependence, and restricted institutional and technical capacity for universal

*Figure 24: Water as a central element to all NbS projects*



water access [142] PICTs vary in their geology, hydrogeography and resultant ecology, and as such each island is unique. Restoring and protecting water resources for all life, human and ecological system, needs to meet not only these physical considerations, but also the socio-cultural realities of the whole system. The following table highlights how NbS can address the challenges and support natural water flows to improve ecological and socio-economic challenges.

**PICTs vary in their geology, hydrogeography and resultant ecology, and as such each island is unique. To restore and protect resources for all life human and ecological systems, both physical and socio-cultural considerations need to be taken.** The following table highlights how NbS can address key challenges and support natural water flows to improve ecological and socio-economic challenges.

***Key insight:*** *The physical diversity of island nations leads to different water resource challenges and solutions. Local knowledge and application are essential to developing socio-culturally appropriate solutions.*

## THREATS

Freshwater resources in the Pacific are diverse depending on the geologic, climatic and socio-economic conditions. The following box elaborates on the geologic diversity, however we can summaries broadly:

***Climate change:*** *Increasing intensity and frequency of climate change hazards, such as prolonged droughts, extreme flooding, and sea-level rise, could overwhelm the capacity of natural systems to provide* ***water lens protection, ground water recharge****, and* ***flood control.***

***Pollution:*** *Pollution from agricultural runoff, industrial activities, and untreated wastewater can severely degrade the quality of freshwater sources,*

***Over extraction:*** *In some cases, where urban populations have increased, water sources have been over extracted and contaminated, leading to the need for alternative sources.*

***Saltwater Intrusion:*** *Sea-level rise and over-extraction of groundwater are increasing saltwater intrusion into coastal aquifers, threatening both drinking water and agriculture.*

***Catchment Degradation:*** *Deforestation, land clearing, and poor land management in upper catchments lead to erosion, sedimentation, and reduced water quality and supply downstream.*

***Infrastructure Limitations:*** *Aging or inadequate water supply infrastructure (pipes, tanks, pumps) can lead to major losses ("non-revenue water"), contamination, and unreliable access.*

***Natural Hazards Beyond Climate Change:*** *Cyclones, landslides, volcanic activity, and tsunamis can damage water sources and infrastructure, disrupt supply and contaminate freshwater.*

***Population Growth and Urbanization:*** *Rapid urban growth can exceed planning and infrastructure capacity, leading to both over-extraction and pollution hotspots.*

***Invasive Species:*** *Invasive plants (like water hyacinth) or animals can clog waterways, reduce water storage, and alter ecosystem services.*

***Governance and Management Gaps:*** *Weak enforcement of water resource management, unclear land tenure, or lack of community engagement can undermine protection and sustainable use.*

## OPPORTUNITIES

NbS offers long term sustainable solutions to some of the challenges and threats to freshwater including:

***Climate change adaptation & risk reduction:*** *NbS can enhance the resilience of freshwater systems to climate change impacts. For instance, healthy vegetation in riparian areas can buffer against*

[142] N Schofield and Hemant Ojha, 2024. Chapter 2 State of Freshwater resources in the Pacific. In A Dansie et al. The Water, Energy and Food Security Nexus in Asia, . https://doi.org/10.1007/978-3-031-25463-5_2

*increased flooding and drought events, while the preservation of coastal ecosystems can help prevent saltwater intrusion into freshwater sources due to sea-level rise and storm surges.*

***Water quality & availability:*** *NbS can improve the availability and quality of freshwater resources. For example, restoring wetlands can enhance water filtration and aquifer recharge, while protecting forests in water catchments helps regulate water flow and reduce erosion, thus minimizing sedimentation in water sources. NbS also helps reduce nutrient loads and pesticide runoff through buffer zones.*

***Ecosystem health:*** *Healthy ecosystems support biodiversity. In some cases, some plants can even help clean up pollution through bioremediation.*

***Agriculture productivity:*** *Water availability is essential for food production. NbS solutions both green and hybrid can support water retention and protect against flood events.*

***Sanitation:*** *There are some NbS systems that can treat wastewater through filtration beds, bioremediation and restored wetlands.*

***Community Empowerment & Local Management:*** *NbS approaches—especially community-based watershed management and participatory monitoring—empower local communities and support traditional knowledge, improving stewardship and sustainability.*

***Disaster Risk Reduction Beyond Flooding:*** *NbS for water management can help reduce risk of landslides, stormwater surges, and drought impacts, offering multi-hazard resilience.*

***Cost Savings and Resource Efficiency:*** *NbS solutions (like watershed protection, green infrastructure) can be more cost-effective over the long term than grey infrastructure, with lower maintenance costs and co-benefits.*

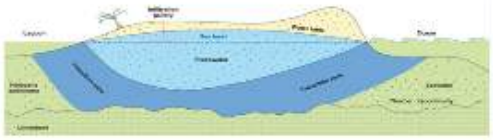
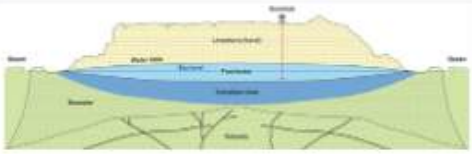
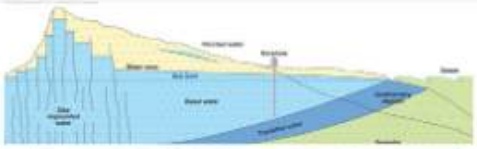
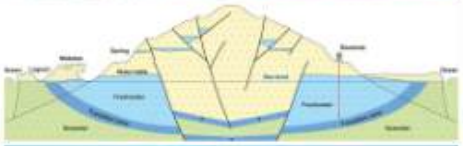
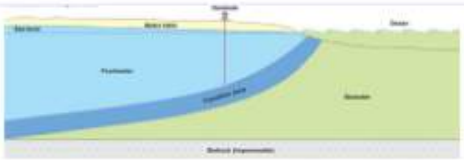
***Livelihood and Socioeconomic Co-benefits:*** *Healthy water ecosystems support fisheries, tourism, recreation, and cultural values, providing broader socioeconomic benefits beyond water supply alone.*

***Integration with Policy and Planning:*** *NbS can be mainstreamed into integrated water resource management (IWRM), national adaptation plans, urban planning, and disaster risk strategies—creating synergy with existing priorities.*

***Restoration of Traditional Water Systems:*** *Revitalizing traditional water management practices (like taro pits, traditional wells, or forested catchments) as NbS opportunities builds resilience and cultural heritage.*


***Photo credit: WISH+***

*Table 7: Water challenges and NbS opportunities across geology*

| Island types | Hydrogeography | Water resource | Challenges & NbS opportunities |
|---|---|---|---|
| **Atolls / Carbonate**<br><br>*Republic of the Marshall Islands, ~95% Kiribati, Tuvalu. ~20% Federal States of Micronesia (FSM),, Tokelau* |  <br>  | Potential groundwater as a freshwater lens.<br><br>Unlikely for surface water.<br><br>Some islands with neither freshwater lens or surface water. | - Highly susceptible to low rainfall periods +rainwater dependent – *grey-green structures for rainwater harvesting. Restoration of Traditional Water Systems and agricultural practices.*<br>- Natural water scarcity increased inundation due to SLR, storm surges – *Ecosystem restoration & coastal management*<br>- Lagoonal contamination and pollution – *Restoration of lagoonal ecosystems & native remedial plants, IWRM.* |
| **Limestone**<br><br>*Nauru, Niue, Palau <20% Palau & Tonga ~75%* |  <br>  | Nauru – Limited ground and surface water<br><br>Niue & ~75% Tonga – Potential for groundwater + unlikely for surface water | - Rainwater dependent – *grey-green structures for rainwater harvesting. Restoration of Traditional Water Systems and agricultural practices.*<br><br>- Water scarcity due to the high permeability of limestone resulting in salinisation, escalated by managed abstraction – *grey-green structures for rainwater harvesting.* |
| **High volcanic islands**<br><br>*Samoa, Hawaii, >75% FSM, ~25% Cook Islands, ~25% Tonga, ~25% Vanuatu, <20% Fiji* |  <br>  | Ground and surface water available and accessible.<br><br>Freshwater lakes can exist in crater. | - *Climate risk of landslides storm water surges and droughts – Restoration of upland forests, riparian zones and native ecosystems., flood plain restoration.*<br>- Availability of water for whole watershed users and ecosystems – *Community Integrated water management approaches, Payment for Ecosystem service for upper watershed restoration and protection, permaculture approaches to land use, food production and water retention. Aquifer recharge methods. Restoration of Traditional Water Systems and agricultural practices.*<br><br>- Water quality & pathogens – *Community Nature based bioremediation by restorative processes1 Riparian buffer zones, and watershed restoration practices focused on reducing run off on contaminants from agriculture*<br><br>- Waste water as a contamination issue for both fresh water and marine water habitats – *Wastewater reuse systems, wetland restoration,* |
| **Composite**<br><br>PNG ~80%, Fiji ~55% Islands, <25% Vanuatu, ~10% Solomon Islands |  <br>  | Potential for both ground and surface water. | |
| **Complex**<br><br>Papua New Guinea, ~80% Fiji, ~75% Solomon Islands, ~50% Vanuatu, New Caledonia, |  <br>  | Potential for both ground and surface water. Perennial streams exist. Dams for hydroelectricity possible particularly high in groundwater | |

# IMPLEMENTATION OF WATER RESOURSE NBS

**Our analysis identified 9 ongoing NbS water resource projects, that have been implemented since 2022, with NbS principles.** There are examples from the last 2.5 years of efforts to support water resources through restoration, protection and management of natural ecosystems covering the full ridge to reef. Our analysis captured the following themes in the water centred projects: ***ridge to reef approaches; riparian vegetation and forests restoration*** to improve the fresh water ecology and quality; ***Integrated watershed management and Payment for Ecosystem services models***; ***Permaculture*** for water retention for food security, coupled with ecosystem rehabilitation; and ***Community-led restoration & conservation***, see the table below for some of the projects. There are some obvious gaps in NbS practice across PICTs in the water sector, notably wastewater management and aquifer recharge. These are areas where the region could benefit from piloting, research and knowledge sharing from other regions.

*Table 8: Subset of Water resource NbS projects identified in the screening tool. (Please note this list is not exhaustive and is based on projects identified through the project screening tool)*

| Project name and Source | Country | NbS type | Societal - socio cultural benefits | Key Ecological benefits |
|---|---|---|---|---|
| **-PaFresH20 - protecting freshwater resources for increased climate resilience in the Pacific Islands** | Solomon Islands<br>Papau New Guinea | **Protection** | This project improved water security, sanitation and fresh water. Furthermore, it strengthened water governance. | The project also facilitated improved freshwater ecology protection through rehabilitated infrastructure along with NbS for long term sustainability. |
| **NAKAU – water catchment restoration, Honiara** | Solomon Islands | **Protection Restoration** | This project enabled community-based forest conservation and water protection. Furthermore, it fostered inclusivity of landowners as it was co-created with them and in partnership with the Water authority. The aim of the project was to provide safe water for all. The projected also boosted livelihood security which was built in through PES model for landowners. The project also enabled rehabilitation of limestone sinkholes and underwater systems. | This project enabled participatory planning for 1403 Ha and protection and restoration of 718 Ha. It further fostered protection for logging through community and landowner action, with a logging company withdrawing in early 2025. |
| **KIWA / WWF - Protection and Restoration of Riparian Zones of the Nera (PERENNE)** | New Caledonia | **Restoration** | This project prioritised the inclusion of women and youth in planting and nursery operations. | This led to riverbank riparian forest protection & restoration for watershed & ecosystem health with the river central. The shading of river creates cooler waters with high oxygen levels, leading to the thriving of nursery areas. Furthermore, native riparian forest ecosystems slow surface run off and improve water quality. |

| | | | | |
|---|---|---|---|---|
| **KIWA / Association Pu Tahi Haga no Ganaa- ARU KOMO, preservation of the water resource on the Anaa atoll** | French Polynesia | **Restoration** | This project reappropriated ancestral horticultural techniques | The project therefore addresses issues caused by invasive species, whilst supporting native tree restoration. This ultimately supports natural Hydrodynamic processes.<br>The project also improved water resource availability and quality through restoration of unique forest ecosystems, and improved climate change adaptation. |
| **PEBACC - Tagabe River Ecosystem Restoration** | Vanuatu | **Restoration** | This project boosted community livelihoods, while also reducing disaster risk. The project also facilitated freshwater security, waste management and sanitation. | The project facilitated the restoration of riparian vegetation along the river, floodplain and Mangroves at the mouth of river. This provided climate adaptation benefits against the effects of flooding in the lower reaches. The project also provided habitats, while also improving water quality, and providing biodiversity benefits for 2976 Ha. |
| **KIWA / Tonga National Youth Congress (Inc.) - Biodiversity management and conservation** | Tonga | **Restoration** | This project prioritised youth-led community work. | The project culminated in the restoration of Ha'apai Island ecology and water by replanting of natural water which retained species. The project also provided natural water cleaning mechanisms. |
| **KIWA / LLEE Fiji - Engaging Mobilisation for Positive Outcome in Water, Ecosystem, and Resilience (EMPOWER)** | Fiji<br>Solomon Islands<br>Tuvalu | **Management Restoration** | This project emphasised community-driven development of interventions, thereby strengthening governance. | The project enabled riparian zone management and restoration to increase water resource availability & quality. Furthermore, the project reduced invasive species, and improved biodiversity. |
| **KIWA / WCS - Watershed Interventions for Systems Health Plus (WISH+)** | Fiji<br>Papua New Guinea<br>Solomon Islands | **Management** | This project was. centred around and driven by indigenous landowners. It addressed disease issues from water-based pathogens. | IWM supported ecosystems across wetlands. Furthermore, the establishment of refugia addressed threatened forest and wetland biodiversity. The project also reduced impacts of climate related disasters, particularly through flood mitigation and water purification services. Moreover, it enables carbon storage in restored watersheds. |
| **KIWA / Fundacao Permakultura Timor Lorosa'e- Scaling up climate adaptation strategies, including water resource restoration, environmental rehabilitation, and sustainable food systems** | Timor Leste | **Restoration Management** | This project centred community centred design for health and social well-being, through building capacity for sustainable food security. The project also Improved diets, nutrition, and livelihood security. | The project used a permaculture centred land design for regenerative agriculture and rehabilitated natural environments to improve ecosystem functioning and biodiversity. The project ultimately supported climate change adaption. |

# METHODS OF WATER RESOURSE NBS

Based on the examples from 2022-2025 we can divide the types of water NbS into; 1 - those that restore ecosystems and vegetation; 2 – those that look at the whole watershed and 3 – those that utilise water retention for agriculture. Although not exemplified well in the region, it is also interesting to highlight those with huge opportunity for PICTs; 4 – those that restore aquifers and 5 – those that support wastewater treatment and sanitation. All in some way address water quality, water availability and water flow.

## *1. Ecosystem restoration & management*

Riparian ecosystems along riverbanks are a more common NbS intervention utilised to improve water quality through provided filtration for water run-off and shading to the river waters itself, lowering water temperatures. However there are many other ecosystem restoration types that can support water security:

⇒ **Protecting and restoring forest cover in water catchments:** Island freshwater lenses are often small and easily depleted or contaminated. Healthy forests enhance rainwater infiltration, recharge these lenses, and regulate stream flow, ensuring a more reliable supply of freshwater, especially during dry seasons. Care is needed however to ensure the right species and the right management for long term sustainability.

⇒ **Floodplain Restoration and Flood Management:** Reconnecting rivers to floodplains, managed retreat or restoration of floodplain wetlands can support slowing water flow and aid in flood management.

⇒ **Agroforestry and Silvopastoral Systems:** Integrating trees and shrubs into farmland or grazing land, improves water infiltration, soil moisture, and reduces runoff.

⇒ **Restoring coastal vegetation (mangroves, coastal forests):** These act as natural buffers against saltwater intrusion, a significant threat to freshwater resources in low-lying atolls and coastal areas due to sea-level rise and storm surges. Healthy coastal ecosystems help maintain the integrity of freshwater lenses.

⇒ **Rehabilitating degraded reefs:** While not directly a freshwater ecosystem, healthy coral reefs provide crucial coastal protection, reducing wave energy and the risk of saltwater inundation of freshwater sources during extreme weather events.

⇒ **Reviving traditional water management practices:** Integrating ecosystem restoration with traditional knowledge about water conservation and sustainable land management can enhance water security at the community level.

## *2. Whole watershed restoration & management*

Addressing water issues for islands or countries with watersheds, at a water catchment level is a holistic and effective approach, and brings in ridge to reef approach that has cross-cutting benefits from land to marine ecosystems. Importantly such a holistic approach considers water users (human, animal and plant) upstream and downstream. This integrated approach supports; water security and quality, ecosystem health and climate resilience. Within one watershed there are multiple interconnected ecosystems ; from ridge forests, with NbS interventions including reforestation and afforestation, to coasts with NbS interventions addressing wetlands, and the whole river system itself, with riparian buffer zones and Sustainable Land Management practices. Agricultural and urban practice also link into this, with pollution control and management and water demand management improving efficiencies of water use.

## *3. Water retention for agriculture*

Water retention techniques and permaculture offer promising solutions for agricultural water security and health in PICTs. Permaculture's design principles mimic natural ecosystems, emphasizing water harvesting (e.g., swales, ponds), soil health improvement (organic matter, reduced tillage), and water-wise cropping systems (drought-tolerant varieties, mulching). These methods enhance water infiltration, reduce runoff and erosion, and build resilient agricultural systems

less reliant on external inputs. By optimizing water use and improving soil fertility, they contribute to food security, environmental sustainability, and healthier agricultural practices in Pacific Island ecosystems.

### 4. Aquifer recharge

Aquifer recharge, as a Nature-based Solution (NbS), holds significant potential for enhancing water security in PICTs. By facilitating the infiltration of surface water into underground aquifers through methods like infiltration basins, constructed wetlands, and managing vegetation, PICTs can replenish vital groundwater resources. This approach helps buffer against drought, reduces saltwater intrusion in coastal aquifers, and provides a more reliable and sustainable source of freshwater for drinking and other uses. Aquifer recharge, leveraging natural processes, offers a cost-effective and environmentally sound strategy to strengthen long-term water security in these vulnerable island nations.

### 5. Wastewater management & sanitation

Whilst there is limited demonstration of this as an NbS intervention in PICTs; utilizing wastewater treatment as a Nature-based Solution (NbS) offers a sustainable pathway for PICTs to enhance water security, improve water quality, and protect ecosystem health. Constructed wetlands, biofilters, and stabilization ponds harness natural processes to treat wastewater, removing pollutants and pathogens effectively and often at lower costs than conventional methods. This treated effluent can be safely reused for irrigation or non-potable purposes, augmenting water resources. Furthermore, these systems create valuable habitats, supporting biodiversity and contributing to overall ecosystem health by reducing harmful discharges into sensitive marine and freshwater environments.

### Case Study - Riparian restoration Case study: Tagabe River Project, PEBACC

A €5.8 million regional initiative facilitated by SPREP. Supported by the Kiwa Initiative with contributions from the EU, AFD, Global Affairs Canada, Australian Government DFAT, New Zealand MFAT, and FFEM. Aims to enhance climate change resilience in ecosystems, economies, and communities across Fiji, Vanuatu, Solomon Islands, New Caledonia, Wallis, and Futuna over four years.

A crucial component of PEBACC+ focused on **riparian restoration in Vanuatu,** addressing biodiversity loss and **threats to freshwater supply** for over 50,000 Port Vila residents, where **u**rban development near floodplains has increased flood susceptibility and reduced community resilience. The Tagabe River Management Committee, SPREP, Vanuatu Department of Forestry, Tagabe River community were the primary designers of the interventions; re-establishing riparian vegetation and mangroves to mitigate flooding and adapt to sea-level rise. One main aspect of the project was the improvements to the **Tagabe River Nursery,** to support seedling production for restoration. **This project highlighted the importance of** Integration of local planting knowledge for tailoring restoration efforts and maximizing environmental, social, and economic benefits.

**Lessons Learned:**

- Focusing on critical ecosystems like riparian zones can have significant positive impacts on biodiversity, water security, and community resilience.
- Unmanaged urban expansion can exacerbate vulnerability to climate change impacts like flooding.
- Restoring natural ecosystems like riparian vegetation and mangroves provides cost-effective and sustainable solutions for flood mitigation and climate adaptation.
- Improvements to facilities like the Tagabe River Nursery directly contribute to the success of restoration efforts.
- Climate adaptation needs not only physical protection from hazards but also ensuring access to essential resources like freshwater.
- Incorporating local ecological understanding enhances the effectiveness and sustainability of environmental restoration projects.
- Assessing the impact of projects over time is crucial for demonstrating success and informing future interventions.

# RECOMENDATIONS

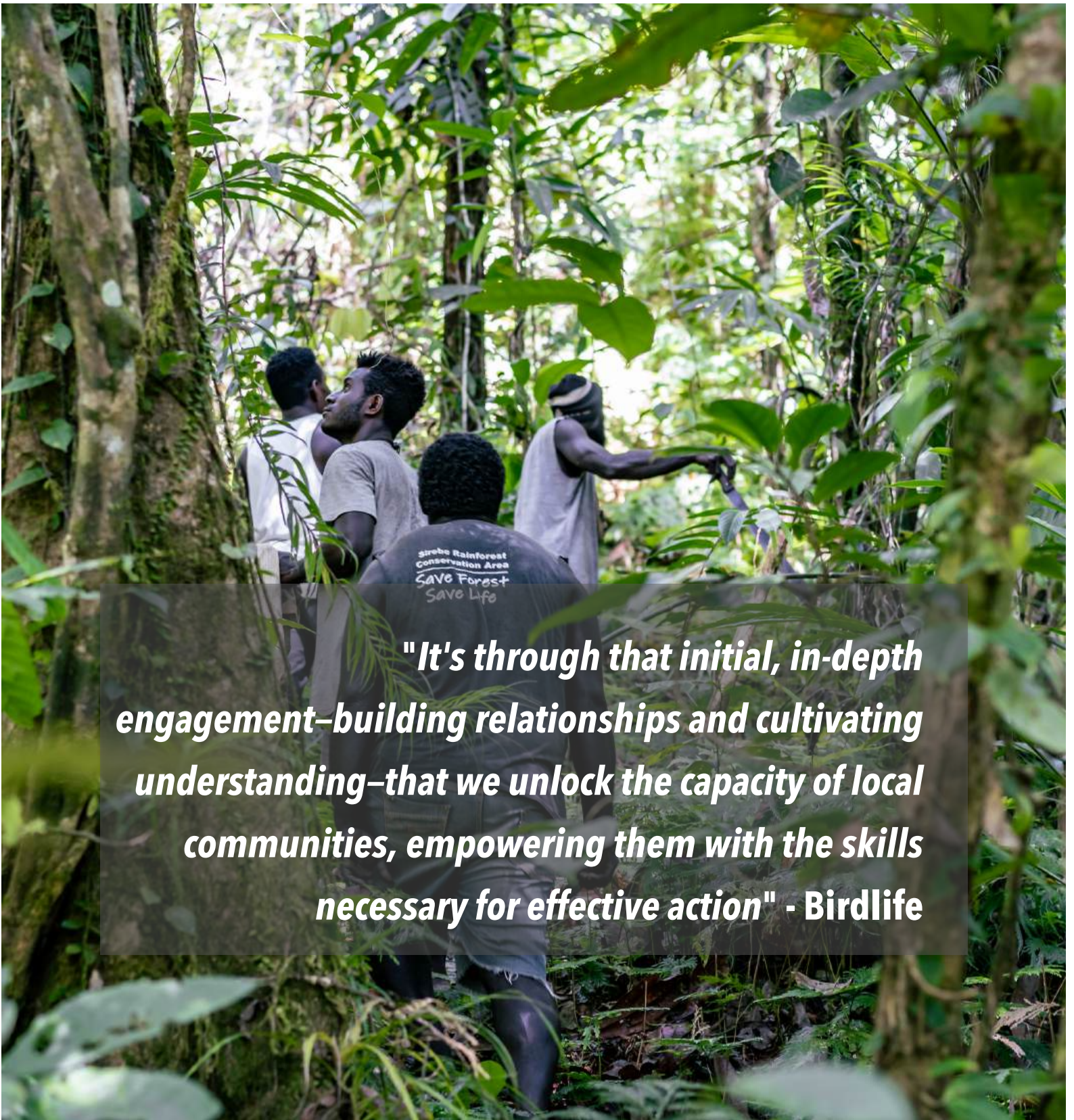
*Table 9: Key recommendations across the NbS Implementation sectors*

| NbS type | Learnings |
|---|---|
| **Cross-sectoral** | |
| All | **Communication Strategies:** Develop communication strategies to clearly articulate the meaning and benefits of NbS to diverse stakeholders, using practical examples and tailoring definitions to the PICTs context.<br><br>**Context-specific guidelines:** Support and encourage the development and application of context-specific guidelines and standards for NbS in the Pacific. This should involve integrating **traditional knowledge with scientific approaches** (see Sea Grapes project), designing NbS projects that are in line with local cultural contexts and community needs for livelihoods and food security.<br><br>**Holistic Approach:** Adopt a holistic, integrated approach to NbS that transcends rigid sectoral boundaries, recognizing the inherent interconnectedness of land, ocean, water resources, urban settlements, and agriculture. Water, for instance, connects all sectors. |
| Protection (Ecosystems) | **Trade-offs:** Identify and address trade-offs between conservation and resource use early in NbS projects, ensuring stakeholders understand these trade-offs from the outset and establishing clear mechanisms to manage them to avoid conflict and ensure long-term success. Applying the **Conservation Measures Partnerships** framework highlights the importance of ensuring stakeholders understand these trade-offs from the outset and establish clear mechanisms to manage them. This involves implementing critical steps to avoid conflict and ensure long-term success. |
| **Coastal and marine** | |
| Protection | **Financing through Carbon Markets:** Despite challenges in accessing carbon markets, there is a **significant opportunity for PICTs to finance coastal and marine ecosystem protection through the voluntary carbon market**, particularly using blue carbon credits from mangroves and seagrass meadows. This can also help meet international targets of protecting 30% of marine areas by 2030. |
| Restoration | **Mangrove Restoration:** For mangrove restoration, **site selection and ongoing management are crucial for sustainable and functional mangroves**, as many past efforts have shown poor results due to factors like planting the wrong species in the wrong place and a lack of understanding of site-specific conditions. Projects should define SMART (Specific, Measurable, Achievable, Relevant, and Time-bound) ecological and social goals, conduct feasibility assessments, and address the drivers of degradation. Community engagement is crucial for long-term success. Scientific knowledge (e.g., sediment surveys, pH levels) is needed to complement traditional practices.<br><br>**Coral Reef Restoration: Heat-resilient coral reef restoration practices are essential** for the survival of these critical ecosystems. Successful initiatives need to consider project objectives, site assessment, selection of appropriate techniques and coral species with attention to genetic diversity, realistic costs, and **science-based and systematic long-term monitoring.** |
| Management | **Community-Based Fisheries Management (CBFM): Community-based fisheries management, centred on ecological principles, offers an effective and replicable model** for the region, addressing challenges like overfishing and ensuring food security. Scaling up CBFM requires significant national and regional support, including adequate budgets and staffing for fisheries agencies. |

| NbS type | Learnings |
|---|---|
| **Forestry and Land Use** | |
| Protection | **Carbon Markets and Community Ownership:** Emerging carbon markets offer a major opportunity to protect forests while creating sustainable income streams for local communities, but these initiatives **must be carefully planned with strong governance, clear land rights, transparent benefit-sharing mechanisms, and robust safeguards** to ensure community trust and lasting impact. Forest protection, especially through "proforestation," is a high-impact NbS for carbon removal and climate mitigation. |
| Restoration | **Long-term Maintenance: Effective restoration of ecosystem functioning requires long-term maintenance**, which must be built into the project design and funding periods.<br><br>**Right Species, Right Place:** For restoration to be effective, it is **essential to plant the right native species in the right place for the right reason.** This requires a science-based approach and local guidelines on appropriate species. Restoration should prioritize ecological restoration over commercial forestry.<br><br>**Community-led & Strategic Land Use:** Restoration efforts are most effective when locally led, with communities actively involved in site selection and long-term maintenance (ideally for at least 10 years). It is important to avoid restoring high-quality agricultural land; instead, integrate trees into agroforestry systems or utilize areas like hedgerows and riparian zones. |
| Management | **Sustainable Forestry on Customary Land: Sustainable forestry on customary land requires genuine community ownership**. Donors and governments should adopt **participatory, culturally sensitive approaches that respect traditional tenure systems** and promote harmony through adaptation, not imposition. Navigating complex and fragmented customary land tenure, including the Free, Prior, and Informed Consent (FPIC) process, is crucial but can be time-consuming.<br><br>**Capacity Building:** There is a need for targeted capacity building to address the lack of technical skills in propagation, nursery establishment, and basic plantation techniques among staff and local communities. |
| **Agriculture** | |
| Management | **Integrating Traditional and Modern Knowledge: Safeguarding traditional knowledge while incorporating modern techniques is key to ensuring the future of agriculture in PICTs**. This involves creating platforms for knowledge-sharing between indigenous communities, farmers, and scientists.<br><br>**Agroforestry: Agroforestry can serve as a highly effective NbS in PICTs, not only creating sustainable livelihoods but also restoring upstream forests and land**. However, **care must be taken in the sourcing of species** to avoid introducing invasive species. Its success depends on strong community engagement and aligning initiatives with environmental goals and local livelihoods.<br><br>**Water Security: Water security must be addressed within any agricultural project**, particularly considering climate-driven weather events like droughts and floods. This includes techniques like improved rainwater harvesting and soil conservation.<br><br>**Mainstreaming NbS Principles:** Agriculture NbS principles should be embedded in national climate policies, especially those related to Climate Change Adaptation and Disaster Risk Reduction Frameworks, despite the term "NbS" not always being explicitly used.<br><br>**Agrobiodiversity:** Maintaining agrobiodiversity strengthens ecological functions like pollination, pest control, and nutrient cycling, which are essential for long-term productivity and food security. |

| NbS type | Learnings |
|---|---|
| **Urban** | |
| All | **Holistic Flood Resilience: Flood-resilient urban NbS are most effective when they integrate upstream ecological restoration with downstream combinations of engineered and green infrastructure, creating a holistic catchment-to-coast approach**.<br><br>**Policy Integration: Rather than introducing new standalone policies, NbS should be embedded into existing land-use plans, coastal strategies, and development controls**4849. This requires strong institutional coordination across planning, environment, and disaster authorities, and a strategic focus on priority geographies.<br><br>**Research and Evidence:** Continued research is needed on the effectiveness of urban NbS in coastal ecosystems and their ability to reduce disaster risk, to build greater trust in these solutions. This research should also identify contextual entry points for embedding NbS into urban plans, coastal policies, and building codes, generating evidence on long-term cost savings.<br><br>**Indigenous Knowledge Integration:** Initiatives like NUWAO[143] are leading this effort by integrating Indigenous knowledge with contemporary urban planning and design, providing practical resources for creating healthy and resilient urban spaces. . The Nature-based Solutions Design Guide for Te Moananui Oceania, developed under NUWAO, serves as a practical resource for urban designers, planners, policymakers, and communities.<br><br>**Addressing Local Beliefs:** Shifting perceptions that prioritize hard infrastructure (like seawalls) over NbS requires inclusive planning processes, community co-design, and clear communication of the long-term benefits offered by soft and hybrid NbS approaches<br><br>**Urban Greening:** Even in densely populated areas, urban tree planting and backyard gardens offer vital adaptation benefits, supporting climate resilience, food security, and community well-being. They contribute to cooler microclimates, improved air quality, and soil stabilization**.** |
| **Water** | |
| All | **Water-Centric Design: Water is essential across most NbS projects**, impacting water availability for human use, freshwater ecosystems and biodiversity, water quality, and water flows (such as floodwaters affecting urban and agricultural sectors). NbS design should always consider the flow of water into or from the area of focus.<br><br>**Leveraging Existing Experience:** There is a **significant opportunity for PICTs to implement more water-centric NbS practices, building on successful ridge-to-reef project experiences** like WISH+.<br><br>**Local Knowledge:** The physical diversity of island nations necessitates **local knowledge and application to develop socio-culturally appropriate solutions** for water resource challenges.<br><br>**Upstream Ecosystems: Upstream ecosystems support water flows and natural groundwater recharging processes**. Protecting and restoring forest cover in water catchments can enhance rainwater infiltration and regulate stream flow.<br><br>**Wetlands: Wetlands support both biodiversity and water purification**, reducing sedimentation in coastal zones. Floodplain restoration can also aid in flood management.<br><br>**Coastal Protection: Functioning coral reefs and coastal forests, including mangroves, reduce storm surges and saline intrusion into freshwater resources.**<br><br>**Permaculture:** Water retention techniques and permaculture offer promising solutions for agricultural water security and health, enhancing water infiltration, reducing runoff, and building resilient agricultural systems.<br><br>**Wastewater Management and Bioremediation:** Despite knowledge gaps, there are **opportunities to utilize NbS for wastewater management and bioremediation of polluted areas** across PICTs. |

| NbS type | Learnings |
|---|---|
| All | **Aquifer Recharge and Sanitation: Aquifer recharge and sanitation are two major gap areas in NbS implementation** across the Pacific that present significant opportunities for enhancing water security.<br><br>**Whole Watershed Management:** Addressing water issues at a water catchment level is a holistic and effective approach, bringing in a ridge-to-reef perspective that supports water security, quality, ecosystem health, and climate resilience. |




***"It's through that initial, in-depth engagement–building relationships and cultivating understanding–that we unlock the capacity of local communities, empowering them with the skills necessary for effective action"*** **- Birdlife**

# CAPACITY BUILDING

## DYNAMIC CAPACITY BUILDING: INTEGRATING LOCAL ECOLOGICAL KNOWLEDGE

**Capacity building in NbS empowers individuals, organisations and societies to navigate challenges and realise socioeconomic and environmental aspirations** [144] . It enhances capabilities by cultivating the skills and knowledge necessary for effective project implementation, stimulating innovative approaches into policy frameworks, and continuously adapting to an ever-evolving world.

Centuries of **local ecological knowledge** (LEK) cultivated by Pacific islanders have allowed their communities to manage natural resources sustainably and harmoniously. As seen in the NbS sectors above, many of today's NbS draw inspiration from practices deeply rooted in these traditional systems. These approaches reflect cultural values, beliefs, and livelihoods that consider humans an integral part of nature. For instance, Fiji's *Vanua* system embodies this philosophy by recognising the interconnectedness of people, land, sea, and the spiritual world, emphasising the responsibility to maintain balance within the larger ecosystem. As earlier highlighted in the overarching themes, these values, which are rooted in perceiving oneself as part of nature, are critical to designing effective and holistic NbS [145].

**Acknowledging and integrating LEK does not diminish scientific knowledge; it strengthens it**. Tackling climate challenges requires blending traditional wisdom with modern science. Therefore, it is important as it empowers communities to share insights and co-create solutions, which is key to navigating the uncertainty of a rapidly changing world. This integration also requires building technical capacity beyond tasks like planting trees. While important, integration goes beyond this approach, fostering reflexive processes to understand complex socio-ecological feedback loops. For instance, a coastal community in Kiribati facing rising sea levels needs more than mangrove restoration techniques. They also need to comprehend climate scenarios, ecosystem dynamics and human-nature interactions to design long-term, adaptable solutions.

*Table 10: Key aspects of NbS-capacity-building.*

| | |
|---|---|
| **Promoting Community Engagement and Empowerment** | Effective capacity-building works closely with local communities, enabling them to take ownership of the development and address local challenges. Incorporating LEK and practices into capacity-building initiatives foster culturally relevant and sustainable solutions. |
| **Developing Skills and Knowledge** | Targeted training programmes, workshops, and educational activities are essential for building expertise in specific areas. Capacity-building efforts may focus on |

[144] Seddon N., Chausson A., Berry P., Girardin C.A., Smith A. and Turner B. (2020). Understanding the value and limits of Nature-based Solutions to climate change and other global challenges. Philosophical Transactions of the Royal Society B 375: 20190120.

[145] Pierce, C. A. E. (2022). The Effectiveness of Formal and Traditional Learning about Climate and Disaster Resilience in Vanuatu. Bishop Grosseteste University.

| | |
|---|---|
| | technical skills in sectors such as agriculture, forestry, and fisheries, as well as essential project management competencies, including reporting, financial management, and monitoring and evaluation. |
| **Strengthening Institutional Capacity** | Enhancing an organisation's ability to operate efficiently and fulfil its mission is crucial. This involves improving governance structures, management processes, and technical expertise to foster long-term effectiveness and resilience. |
| **Mainstreaming Innovative approaches into Policies and Strategies** | Ensuring the long-term sustainability of capacity-building efforts requires integrating participatory methodologies and new approaches—such as NbS—into existing plans, policies, and governance. |

### Integrating Traditional Ecological Knowledge into Nature-based Solutions in the Pacific

Traditional ecological knowledge (TEK) is integral to the design, implementation, and success of Nature-based Solutions (NbS) across Pacific Island Countries (PICs). The following examples highlight how indigenous practices contribute to sustainable environmental management and climate resilience:

- **Fiji**: The revival of *tabu* areas (customary marine closures enforced by local chiefs) has led to the regeneration of coastal fisheries and coral reefs. These no-take zones enhance biodiversity, support food security, and bolster climate resilience (World Bank, 2022).

- **Samoa**: In the Fagaloa Bay–Uafato Tiavea Conservation Zone, communities practice traditional agroforestry, integrating native trees, crops, and medicinal plants. This approach restores soil fertility, supports ecosystem health, and aligns with *fa'a Samoa* land management traditions (UNESCO World Heritage Centre, n.d.).

- **Kiribati**: Traditional coastal planting involves using native vegetation, such as *te bangabanga* (*Scaevola taccada*), to stabilize sand dunes and protect against sea-level rise and erosion. These practices are cost-effective and culturally integrated (Thaman et al., 2021).

- **Vanuatu**: *Tambu* (sacred) forests are managed through customary tenure systems, serving as de facto conservation areas. These forests contribute to carbon storage, biodiversity conservation, and ecosystem-based adaptation (Techera, 2012).

- **Solomon Islands**: Traditional weather forecasting—based on observations of animal behavior, tides, and plant phenology—is increasingly integrated into modern early warning systems, enhancing community preparedness for climate-related events (Pacific Standard, 2017).

### References


Pacific Standard. (2017). *Combining tradition and modern science to survive climate change in the Pacific Islands*. https://psmag.com/environment/cop23-combining-tradition-and-modern-science-in-the-pacific-islands

Thaman, R. R., Faka'osi, T., & Smith, A. (2021). A review of uses and status of trees and forests in land-use systems in Samoa, Tonga, Kiribati and Tuvalu with recommendations for future action. Retrieved from https://www.researchgate.net/publication/

Techera, E. J. (2012). Customary law and community-based natural resource management in Samoa. *Pacific Conservation Biology*, 18(1), 1–9. https://doi.org/10.1071/PC120001

UNESCO World Heritage Centre. (n.d.). *Fagaloa Bay – Uafato Tiavea Conservation Zone*. https://whc.unesco.org/en/tentativelists/5090/

World Bank. (2022). *Ocean protectors: How the old ways of protecting the ocean are new again in Fiji*. https://www.worldbank.org/en/news/feature/2022/04/13/ocean-protectors-how-the-old-ways-of-protecting-the-ocean-are-new-again-in-fiji

# CAPACITY BUILDING: THE CATALYST FOR TRANSFORMATIVE CHANGE

NbS provides a transformative method for addressing socio-environmental challenges; however, its success relies on **empowering individuals, communities, and institutions**. Capacity-building plays a key role in unlocking the potential of NbS, **promoting new perspectives and driving long-term change** [146]. Investing in capacity-building can tackle pressing issues and reshape how people relate to nature.

**At the centre of this transformation is the empowerment of local communities** [147]. When equipped with the knowledge and skills to implement and manage NbS, they become active stewards of the natural environment they live in. Empowering these communities begins with education tailored to their socioeconomic needs and environmental context. This highlights the earlier mentioned point concerning integrating traditional and Indigenous knowledge, which have long been essential for survival and adaptation, with modern techniques. Perhaps most importantly, it involves developing long-term programmes that guarantee sustainable growth rather than relying on short-term interventions.

As communities become more involved in NbS initiatives, they perceive the relationship between men, women, youth, and nature through a **more inclusive lens**, recognising diverse roles and knowledge systems. Participation in these initiatives often fosters a deeper appreciation of nature's value both for its intrinsic worth and its many benefits to local communities, particularly for marginalised groups, including Indigenous peoples and racial minorities. [148] This transformation of attitudes strengthens a **culture of stewardship**, where individuals, regardless of gender, age or background, are empowered to protect and preserve their natural environment for future generations , ensuring that decision-making is equitable and representative of all voices.


[146] Tomaskinova et al. (2020). Capacity-building and networking events for nature-based solutions and re-naturing in Malta. Research Ideas and Outcomes, 6, e60893. https://doi.org/10.3897/rio.6.e60893

[147] Nesshöver et al., (2017). The science, policy and practice of nature-based solutions: An interdisciplinary perspective. Science of The Total Environment, 579, 1215–1227. https://doi.org/10.1016/j.scitotenv.2016.11.106

[148] SPREP. (2025). Integrating gender equity, disability and social inclusion in nature-based solutions for climate adaptation.

## Case Study: Capacity-building and Inclusion Transforming Conservation in Rennell Island (Solomon Islands) (BIRDLIFE, 2025[5]) Link to the project site

The unchecked spread of invasive species in East Rennell, particularly the black rat (*Rattus rattus*), has placed immense pressure on the region's biodiversity. The East Rennell World Heritage Site (ERWHS), home to endemic birds, snails, and other species found nowhere else, has suffered significant ecological damage, with rats preying on native fauna and destroying food crops. In response, BirdLife International and the Lake Tegano World Heritage Site Association (LTWHSA) launched a rat suppression project. However, when it came to selecting rangers for monitoring and control activities, men were initially preferred by local leaders due to the physical nature of the work and safety concerns. This reinforced existing gender roles, limiting opportunities for women to contribute.

As community discussions around the project deepened, women began advocating for their participation, recognising the monitoring efforts' value and wanting to participate in conservation activities that directly impacted their food security and livelihoods. Their involvement started informally—observing, asking questions, and eventually requesting to contribute. With growing community support, women were trained in rat monitoring techniques, bait station management, and data collection. Today, they play an essential role in tracking the project's effectiveness. Joy Teahe from Niupani Village, for instance, now leads data compilation efforts, ensuring that biodiversity monitoring is accurate and well-organized. "*Before, I never really paid attention to the birds around me*," she says. "*Now, I can identify them and understand how important it is to protect them*."

Presley Noatangu, a young man from Hutuna Village with a speech impediment, faced lifelong challenges being excluded in village activities. Through the project, his talent with computers and mapping was recognised, and he now manages bait grid maps and assists with bird monitoring. His role is to shift perceptions of disability within the community. "*People didn't think I could contribute before," he shares. "Now, they see my work and understand my value*."

By making space for women and people with disabilities in conservation, the project has sparked a broader cultural shift. What started as an environmental initiative has grown into a movement for inclusion—one where conservation is no longer seen as the work of a few, but as a shared responsibility that belongs to everyone.

**Capacity-building empowers communities with the skills to act**[149]. Theoretical, practical and adaptive management training provides the tools for managing and evaluating NbS projects. With these new skills, locals acquire the necessary knowledge to implement and monitor project effectiveness. As a result, they are better collaboration between government, the private sector, civil society and academia can be sparked. In the context of NbS, this usually involves the co-creation of institutional arrangements that support the collective management of natural resources. These innovations drive systemic change, fostering and being fostered by ***collaborative networks*** [151] that can span multiple sectors and geographical regions.

prepared to sustain these efforts and share their knowledge with others.

**Capacity-building also plays a key role in leveraging socio-ecological benefits.** [150] As communities gain confidence and knowledge, new forms of

Another aspect of capacity building is addressing the systemic barriers that prevent NbS. Many regions face significant challenges, such as limited human capacity, a lack of collaboration and a heavy reliance on grey infrastructure. **Capacity development helps to remove these barriers, enabling a more**

[149] Kiwa. (2023). Kiwa Initiative: Capacity Needs Assessment for Implementing Nature-based Solutions for Climate Change Adaptation. Pacific Community. www.kiwainitiative.org

[150] Padovezi et al. (2024). Native seed collector networks in Brazil: Sowing social innovations for transformative change. People and Nature, pan3.10692. https://doi.org/10.1002/pan3.10692

[151] E Co. (2025). Climate finance and collaborative networks: Catalysing socio-ecological innovation for transformative change (28th GCF Insight). E Co. Consulting.

**holistic approach to environmental management** [152].

**Capacity building influences politics and governance**[153], by enhancing decision-maker's awareness to integrate NbS into policies. When policymakers recognise the economic, social, and environmental benefits of NbS, they are more likely to enact supportive regulations. Promoting inclusive decision-making ensures local communities' voices and knowledge are respected in policy discussions.

### Collaborative networks: Synergy for capacity-building.

By bringing together diverse stakeholders around a shared goal, collaborative networks promote social learning, develop local agency capacity and stimulate innovative solutions tailored to local needs. These networks foster trust, address knowledge gaps, and empower local communities to drive change. By enabling the exchange of experiences and expertise, collaborative networks improve the implementation and long-term sustainability of NbS initiatives. Collective action within these networks allows donors, communities, governments, companies, and NGOs to align their efforts, leverage resources, and scale up successful initiatives[8].

### How can a Collaborative Network empower Community-Led Conservation? Link to the project site

The Indonesia Locally-Managed Marine Area (LMMA) Network exemplifies how a ***collaborative network*** can empower communities to manage marine resources sustainably. Across the Indonesian archipelago, small-scale fishers and coastal communities have long depended on the ocean for their livelihoods. However, overfishing, habitat destruction, and climate change threaten marine biodiversity and the well-being of those who rely on it. In response, the LMMA Network emerged as a grassroots-driven initiative, demonstrating how local stewardship, supported by strategic partnerships, can lead to lasting environmental and social benefits.

***A Community-Centred Approach to Marine Conservation:*** At the heart of the LMMA Network is a commitment to local leadership. Traditional marine management practices, such as sasi—a customary system of temporary fishing bans—have been revitalised and integrated with modern conservation science. Communities set priorities, design marine protected areas (MPAs), and establish regulations tailored to their ecological and socioeconomic realities. This bottom-up approach ensures conservation measures align with local needs and cultural values, fostering strong community buy-in and long-term commitment.

***Knowledge Sharing and Capacity Building:*** The LMMA Network is more than just a collection of marine protected areas; it is a dynamic learning platform. Through peer exchanges, training workshops, and participatory monitoring, communities share best practices and adapt successful strategies to their local contexts. Scientific knowledge is blended with indigenous expertise, enhancing the effectiveness of marine management efforts. The network strengthens collective resilience against threats such as illegal fishing and coral reef degradation by equipping local leaders with the tools to assess and address environmental challenges.

***Bridging Local Action with National and Global Agendas:*** While rooted in community action, the LMMA Network has gained recognition at national and international levels. It collaborates with NGOs, government agencies, and research institutions to secure policy support and financial resources. This multi-level engagement has enabled the expansion of LMMAs across Indonesia, contributing to national marine conservation targets and global biodiversity commitments. Furthermore, the network's success is a model for other coastal nations seeking to implement community-driven conservation strategies.

***A Scalable and Sustainable Model:*** The Indonesia LMMA Network highlights the power of localised governance in achieving large-scale conservation outcomes. Combining traditional knowledge, scientific research, and collaborative partnerships has strengthened marine ecosystems while improving the livelihoods of coastal communities. Its approach demonstrates that when communities are given the agency and resources to manage their environments, they become stewards of change, ensuring the health of their oceans for generations to come.

[152] Youngs, K., Johnson, J., & Basel, B. (2022). Review of nature-based solutions in the Pacific region: Focus and opportunities. Report prepared for WWF-Australia. Climate Resilient by Nature initiative, funded by the Australian Government Department of Foreign Affairs and Trade (DFAT).

[153] Scolobig, et al., (2025). Policy, finance, and capacity-building innovations for scaling nature-based solutions. In Nature-Based Solutions in Supporting Sustainable Development Goals (pp. 129–151). Elsevier. https://doi.org/10.1016/B978-0-443-21782-1.00002-6

# THE ROLE OF STAKEHOLDER GROUPS

**Knowledge exchange is essential for successfully implementing and scaling NbS** (Kiwa, 2023[6]). Developing such an exchange requires the active involvement of a wide array of stakeholders, each bringing their unique expertise, skills, and resources. Donors, governments, NGOs, businesses, and local communities—including historically excluded groups such as Indigenous peoples, women, and youth—each bring unique and complementary strengths to enhancing NbS capacity for collective action.

In ***collaborative networks***, these stakeholders generate synergies, strengthening impact, promoting innovation and catalysing transformative change. These networks act as harmonising platforms for meaningful capacity-building initiatives, integrating theoretical, practical, academic, traditional, formal, informal, applied and theoretical knowledge, while encouraging individual reflection and collective action.

*Table 11: The role of stakeholder groups in NbS capacity building.*

| Stakeholder's Group | ROLE on NbS capacity building |
|---|---|
| **Donors and funding channels.** *E.g.: New Zealand MFAT, EU, GEF, AFD, GCF, GIZ* | **Strategic funding**: Ensure financial resources are allocated efficiently, consider long-term goals, and align with local priorities. |
| Multilateral and regional organisations. *E.g.: SPC, SPREP, GGGI* | **Strategic partnerships**: Collaborate with intermediaries to enhance local funding access and project implementation capacity.<br>**Strategic planning**: Coordinate funding entities to prevent duplication and enhance support for large-scale NbS initiatives. |
| **Governments, national and subnational.** *E.g.: Ministeries, Secretaries,* | **Supportive Policies:** Create frameworks aligning climate goals and biodiversity, incorporating local perspectives for better outcomes.<br>**Mainstream NbS**: Integrate nature-based solutions into national development plans and sectoral policies to amplify their impact.<br>**Environmental Education**: Promote awareness campaigns for NbS.<br>**Professional Training**: Set up specialised courses for practitioners and policymakers to build skills for effective NbS implementation and monitoring.<br>**Coordination and Leadership**: Foster collaboration across multiple sectors to align initiatives and drive success.<br>**Empowerment**: Back NbS skill training for government staff and local stakeholders. |
| **Non-Governmental Organisations.** *E.g.: IUCN, WWF, BirdLife, CI, One Reef International, TierraMar, Naka* | **Project implementation:** Offer technical expertise on NbS.<br>**Local agency:** Equip communities with skills and knowledge for sustained NbS efforts.<br>**Advocacy:** Promote NbS's at local, national, and global stages.<br>**Facilitating:** Bridge gaps between communities, governments, and the private sector, fostering cohesive action. |
| **Universities and research centres.** *E.g.: University of South Pacific, University of Hawaii, Fiji National University, University of the Sunshine Coast, RMIT University* | **Data management:** Standardise datasets and develop regional databases for reliable data sharing.<br>**Research and evidence:** Conduct studies to assess NbS effectiveness and policy development.<br>**Technical assistance:** Build capacity for NbS implementation and regulation development.<br>**Knowledge sharing:** Publish research, create knowledge platforms, and recognise local expertise.<br>**Partnerships:** Collaborate with governments, traditional leaders, and international researchers to strengthen restoration efforts.<br>**Formal Training:** Develop and deliver formal courses related to NbS. |
| **Grassroots Organisations.** | **Knowledge**: Share local ecological wisdom in all project cycle.<br>**Legitimacy**: Align project demands with local needs.<br>**Ownership**: Amplify community-based and stewardship approaches.<br>**Socioecological Innovation**: Co-creation local solutions |

| Stakeholder's Group | ROLE on NbS capacity building |
|---|---|
| **Private Sector.** *E.g.: Nakau* | **Support:** Sharing expertise, financing awareness-raising campaigns and capacity-building related to NbS, as well as promoting local collective socio-environmental actions. **Influence**: Use their purchasing power to leverage more sustainable and fair supply chains. |

# CURRENT STATE

Stakeholder interviews revealed that a **diverse network**, including SPREP, SPC, GGGI, various NGOs like IUCN, WWF, Birdlife, TNC, consulting firms, national governments, and funding initiatives such as the Kiwa Initiative, engage in capacity-building for NbS in the Pacific region. Their efforts span policy integration, technical training, financial analysis, community engagement, and practical implementation.

**Funding is vital for NbS capacity in the Pacific**. Major bilateral donors like New Zealand's MFAT, Australia's DFAT, EU and France contribute Official Development Aid (ODA) for collaborative projects. Multilateral funds, including GEF and GCF, act as an intermediary, pooling ODA and other finance from donors to finance climate projects and technical assistance that supports NbS. Development banks like the World Bank and ADB also channel resources into climate adaptation. Regional organisations and initiatives including KIWA Initiative, SPREP and IUCN play a role improving access to and implementing these funds. Philanthropic groups such as the Great Barrier Reef Foundation and Bezos Earth Fund contribute as well. More discussions on this are found in the finance sector of this report.

**Private sector** involvement in NbS capacity building in the Pacific is limited but holds potential, especially in tourism and mangrove restoration. Expanding engagement requires addressing knowledge and investment gaps, with opportunities in carbon credits, biodiversity credits, and ecotourism opportunities.

Capacity-building on NbS in the Pacific engages various stakeholders and is tailored to each audience. It targets **decision-makers and officials** at provincial and district levels, focusing on NbS standards, socio-economic benefits, and integration with local policies. However, there is a concern about inadequate regional approaches, highlighting the need for detailed assessments of specific country needs.

For **project managers** overseeing the implementation of NbS initiatives, training has been focused on project development, financial management, monitoring, and evaluation. While training, the improvement of the ability to report results and organise collective efforts is prioritised for **technicians from local governments, NGOs, and grassroots organisations**. For both, managers and technicians, there is also an effort to develop practical skills in governance, emphasising GEDSI (Gender Equality, Disability and Social Inclusion) approaches.

Training **local communities** is a project priority. Common initiatives include workshops on restoration techniques, agroforestry, and natural regeneration. Interviewees stressed the importance of conducting trainings in the local language, engaging community leaders, and using participatory methods. These approaches integrate traditional knowledge into NbS development, ensuring solutions adapt to local realities. This also enhances the exchange between scientific and traditional knowledge, mobilising local actors for collective action and fostering socio-ecological innovations. Understanding social dynamics and respecting community livelihoods is crucial for projects to support local autonomy in sustainable natural management and monitoring resources.


### Case study - Cultivating Expertise: Kiwa's Micro-Qualification Approach to NbS (Kiwa, 2023[6])

The development of the micro-qualification has been done by SPC and SPREP in partnership and with the assistance of a Kiwa's expert group to strengthen the climate resilience and biodiversity conservation of islands and territories in the Pacific. The initiative sees capacity building in NbS as essential to achieving its goal. For this reason, it includes developing and promoting a regional NbS micro-skills framework.

Designed in collaboration with regional partners and academic institutions, the micro-skill offers a standardised and accredited pathway for individuals to gain experience in various facets of NbS. The structure covers essential modules on a range of critical topics related to NbS implementation, such as:

- NbS fundamentals: Understanding the principles, concepts and applications of NbS in the Pacific context.
- Project development and management: Design, planning, implementation and evaluation skills.
- Technical aspects: Expertise in ecosystem assessment, restoration and climate-smart agriculture.
- Socio-economic considerations: Incorporating gender equality, social inclusion and traditional knowledge into NbS initiatives.
- Policies: Integrating NbS into policies and planning frameworks. Kiwa's support for micro-skilling goes beyond framework development.

The Initiative has funded the creation of training materials, supported train-the-trainer programmes and facilitated the integration of micro-skilling into the curricula of several Pacific universities. This ensures the programme is accessible to a wide range of people, from community members and professionals to government officials and academics.

This micro-skills approach has many advantages:

- Standardisation: Ensures consistency and high quality in regional NbS training.
- Recognition: Trainees receive formal certification, which improves their professional credibility and increases their employability.
- Flexibility: The modular design allows individuals to personalise their learning paths according to their unique needs and interests.
- Sustainability: By integrating micro-skilling into existing institutions, Kiwa promotes long-term training.

By investing in comprehensive, locally-led capacity building, Kiwa is cultivating a growing network of NbS advocates in the Pacific. This skilled and knowledgeable workforce is crucial to promoting the widespread adoption of NbS and ensuring the long-term resilience of Pacific island communities and ecosystems.

# CAPACITY-BUILDING NEEDS FOR EFFECTIVE NBS

**In the Pacific, capacity-building for NbS is a multifaceted and ongoing process that aims to enhance the skills of individuals, communities, organisations and governments to effectively plan, implement, manage and sustain NbS initiatives to tackle environmental and social challenges, especially climate change and biodiversity loss.**

**NbS calls for knowledge integration**. This requires a thoughtful and inclusive capacity-building approach tailored to each community's needs and context. To avoid a top-down approach, it is vital first to acknowledge the capacities already in place and build upon them. Community-based organisations and initiatives, such as those following the "Live and Learn" philosophy, demonstrate how adapting training to local audiences ensures relevance and acceptance.

Capacity-building needs a **flexible and multidisciplinary strategy combining formal and non-formal training approaches**[154]. Formal methods, while better suited for long-term capacity building, focus on strengthening the ability of universities and research institutions to teach and train. This includes designing accredited and certified courses that can be offered on a rolling basis to support continuous learning. On the other hand, non-formal methods provide more immediate and accessible solutions, such as creating a pool of skilled local trainers and simplifying or localising training materials to reach broader audiences effectively.

**Capacity building for NbS needs to be tailor-made.** Micro-qualifications (formal training), regional training through project implementation (informal training), and training-of-trainers models can help decentralise knowledge-sharing and build local expertise. For example, workshops and technical seminars provide practical, hands-on opportunities to enhance community skills. However, many lessons and best practices remain undocumented or siloed within organisations. Platforms for sharing knowledge and lessons learned are critical, enabling people working on the ground to exchange insights and build collaborative networks (e.g. the GGGI reporting and documentation database and the Pacific data Hub). These platforms are evolving and need further development to maximise their potential.

**Beyond technical skills, capacity-building needs to focus on project management and collaborative networks.** Successful NbS projects require robust management across all project lifecycle phases—from design and execution to monitoring and adaptive management. For instance, large-scale reforestation in the Solomon Islands needs strong financial literacy, effective monitoring systems, and reliable partnerships to succeed. Simplified and accessible project management tools can help communities take ownership of projects, ensuring resources are used efficiently and outcomes are achieved.

Finally, **supportive and well-coordinated policies** are essential for scaling NbS. Governments play a key role in embedding NbS into national climate adaptation plans, biodiversity action frameworks, and development strategies. For example, Palau's marine protected areas showcase how effective policies can incentivise and mainstream NbS implementation. Capacity-building at the governmental level must include training decision-makers to understand the complexities of NbS and to create and enforce policies that foster their implementation.

To achieve transformative outcomes, capacity-building must be inclusive, adaptable, and multidisciplinary. This aligns traditional knowledge with modern science, helping communities and governments secure sustainable futures

154 **Formal Training**: A structured learning process with a predefined curriculum, delivered by accredited institutions, leading to recognized certifications or qualifications.

**11 Non-Formal Training**: A flexible, often short-term learning approach outside traditional institutions, focusing on practical skills and knowledge without formal certification, such as workshops, on-the-job training, or community-based programs.

*Table 12* summarises the specific training needs by profile (Table 3). These needs were identified during interviews with key stakeholders and can help tailor future capacity-building programmes to different professional profiles.

*Table 12: NbS-capacity-building: who needs what?*

| Specific capacity-building needs | PRIOTITY PROFILE | | | | |
|---|---|---|---|---|---|
| | Decision-Makers | Project Managers | Technical Personnel | Researcher | Local Community |
| Align training programs with regional needs. | x | x | | x | |
| Awareness of NbS relevance to policy goals. | x | x | | | |
| Capacity to integrate qualitative approaches for gender equity and social inclusion. | | x | x | x | |
| Community development skills. | | | x | x | x |
| Contextualising NbS terminology with local examples. | x | | x | | x |
| Empowering communities to manage projects independently. | | | x | | x |
| Ensuring women, youth, and people with disabilities are represented. | | x | x | x | x |
| Examples of how to incorporate NbS into existing policies. | x | x | x | x | x |
| Expertise in project development and management. | | x | | | |
| Inclusion in decision-making processes. | | | x | | x |
| Knowledge of successful NbS cases for up scaling policy implementation. | x | | | | |
| Linking NbS with local, Indigenous, and traditional knowledge (LITK). | | | x | x | x |
| Monitoring and evaluation techniques, including gender equity and social inclusion. | | x | x | x | |
| NbS funding possibilities. | | x | | x | |
| NbS standards and criteria. | | x | | x | |
| Peer-to-peer and face-to-face learning incorporating LITK. | | | x | | x |
| Policy coordination | x | | | | |
| Socioeconomic benefits of NbS. | x | x | x | x | x |
| Soft skills, including trust and conflict management. | | x | x | x | x |
| Specific, targeted training rather than general programs. | | | x | | x |
| Support to implement and advocate NbS and meet donor requirements. | x | x | x | | |
| Technical skills, such as, agroforestry, best agricultural practices, fisheries, bioeconomy. | | | x | x | x |
| Training in implementing and managing locally tailored NbS projects. | | x | x | x | x |
| Training to integrate NbS into local plans. | | x | x | x | |
| Transdisciplinarity[155] | x | x | x | x | |
| Work and process planning skills. | | x | x | x | |

[155] Transdisciplinarity represents inclusive dialogue between disciplines and sectors, co-producing policy-relevant and action-oriented knowledge.

# METRICS OR INDICATORS FOR CAPACITY DEVELOPMENT

Capacity building is a fundamental aspect of the successful implementation of NbS. Monitoring and evaluating their progress and results is essential to ensure that capacity-building initiatives are effective and have a lasting impact. This involves establishing clear metrics or indicators that can track and measure the impact of these initiatives.

The effectiveness of capacity development can be monitored and evaluated using qualitative and quantitative methods.

- Qualitative methods capture in-depth insights into the changes in knowledge, skills, attitudes, and behaviours resulting from capacity-building initiatives. These methods can include interviews, focus group discussions, surveys, and case studies.

- Quantitative methods measure the tangible products and results of capacity building, such as the number of people trained, the adoption of new practices or the increase in project implementation success rates.

Using a combination of these methods, regular monitoring and evaluation allows for adaptive management, ensuring that capacity development initiatives remain relevant and responsive to the evolving needs of individuals, communities and organisations.

A series of indicators can be used to track and measure the impact of NbS capacity development initiatives. These indicators should be context-specific and aligned with the goals and objectives of the initiatives. Some recommended indicators include:

***Individual level:***

- **Knowledge:** Increased awareness and expertise in NbS concepts and practices.
- **Skills:** Enhance skills in project design, implementation, **management**, and monitoring, including financial literacy and reporting.
- **Attitudes:** Improved attitudes towards NbS and increased appreciation of nature's value in tackling socio-environmental challenges.
- **Behaviours:** Adoption of new practices and behaviours that support implementing NbS initiatives.

***Organisational level**:*

- **Institutional capacity:** Enhanced governance, management, and technical knowledge in NbS organisations.
- **Collaboration:** Greater collaboration among stakeholders, including governments, NGOs, communities, and research institutions.
- **Policy integration:** Integration of NbS into policies and strategies at local, national and regional level.

***Community level:***

- **Empowerment:** Increasing the capacity of communities to participate in decision-making processes related to NbS and to take ownership of project implementation and management.
- **Social capital:** Strengthening social networks, trust and collective action in communities involved in NbS initiatives.
- **Resilience:** Increasing the strength of communities to cope with climate change and other socio-environmental challenges through implementing NbS.

# KEY CHALLENGES

The successful implementation of NbS in the Pacific faces several capacity-building challenges:

### *Resource constraints*

One of the most pressing challenges is the scarcity of financial and human resources. Developing NbS capacity requires sustainable investment, but funding cycles are generally too short to guarantee long-term success. In addition, the shortage of trained professionals limits the ability to implement and scale up NbS initiatives

### *Global demands vs. Local needs*

Global demands represented by international frameworks, such as the IUCN standards for NbS, often do not reflect Pacific countries' unique environmental, social, cultural and political contexts. Many project managers find these global standards complex and difficult to apply. The development of Pacific-specific NbS assessment frameworks would improve relevance and applicability.

### *Connecting formal and informal educational approaches*

Although the non-formal training offered by specific projects provides practical knowledge applicable to the local context and the project's needs, it generally takes place in a way disconnected from formal education. This lack of integration limits the potential for continuity and deepening of learning, making it difficult to create educational and professional trajectories that can strengthen communities' autonomy in the long term.

### *Strengthening collaborative networks*

Community engagement is vital for the successful implementation of NbS. Establishing collaborative networks can enhance capacity building by facilitating knowledge exchange, leveraging pedagogical innovations and connecting formal education and training institutions.

### *Funding and financial sustainability*

Complex application processes constrain larger, programmatic funding from entities. To ensure sustainable capacity-building, efforts should focus on strengthening local organisations to meet funders' requirements, training stakeholders in diversified funding access, advocating for longer funding cycles, and investing in local trainers and accessible training materials. The discussion on financing is further developed in the chapter **Finance for NbS.**

### *Sustainability and exit strategies*

Sustaining Pacific NbS capacity-building requires more than short-term projects—it demands lasting institutional support. By embedding NbS principles into policies and education, knowledge becomes part of the system rather than fading with project cycles. Investing in local trainers and tailored materials strengthens regional expertise, reducing dependence on external support. Stronger institutions, equipped with project management offices and integrated NbS strategies, can drive independent action and long-term implementation. True sustainability also lies in community ownership, where indigenous knowledge guides lasting stewardship.

**OPPORTUNITIES**

The following opportunities address the key capacity gaps identified in this chapter, linking lessons learned with stakeholder contributions to drive effective change.

***Integrating Traditional and Local Ecological Knowledge (LEK) into Capacity-Building***

- ***Capacity gap:*** The disconnection between formal scientific training and community-based knowledge limits the effectiveness and ownership of NbS initiatives.
- ***Opportunity:*** Recognising and embedding LEK alongside scientific knowledge enhances NbS design and implementation, fostering locally relevant solutions.
- ***Stakeholder Contribution:*** Universities and research institutions can facilitate knowledge co-production, while grassroots organisations and community leaders provide lived expertise.
- ***Lessons Learned:*** Projects incorporating LEK see greater local buy-in, resilience, and long-term sustainability.

***Expanding Inclusive Training and Skill Development***

- ***Capacity gap:*** Limited access to specialised NbS training, particularly for women, youth, and people with disabilities, restricts participation and innovation.
- ***Opportunity:*** Develop targeted training programmes that address technical skills, project management, and governance while ensuring accessibility.
- ***Stakeholder Contribution:*** NGOs, multilateral organisations, and donors can support local training initiatives, while governments integrate these into national strategies.
- ***Lessons Learned:*** Including underrepresented groups strengthens social capital, diversifies perspectives, and improves project outcomes.

***Strengthening Collaborative Networks for Knowledge Exchange***

- ***Capacity gap:*** Siloed efforts and a lack of coordination reduce the scalability and effectiveness of NbS projects.
- ***Opportunity:*** Establish platforms for peer-to-peer learning, regional knowledge-sharing, and multi-stakeholder collaboration to build collective capacity.
- ***Stakeholder Contribution:*** Governmental bodies can bolster regional hubs, with civil society and private sector participants providing resources and expertise.
- ***Lessons Learned:*** Well-connected networks enhance cross-sectoral learning, reduce duplication, and accelerate implementation.

***Enhancing Policy Integration and Institutional Capacity***

- ***Capacity gap:*** NbS is often absent from national policies, limiting funding and institutional support.
- ***Opportunity:*** Strengthen governance structures to mainstream NbS into development plans, climate adaptation strategies, and biodiversity policies.
- ***Stakeholder Contribution:*** Decision-makers and policy analysts can champion NbS integration, supported by research institutions providing evidence-based recommendations.
- ***Lessons Learned:*** Institutional support ensures long-term viability and unlocks funding opportunities.

## KEY RECOMMENDATIONS

- ⇒ ***Ensure Sustainable Funding Mechanisms:*** Develop financial strategies that include long-term investments, blended finance, and community-managed funds.
- ⇒ ***Foster Formal Education and Curriculum Development.*** Collaborate with universities, vocational institutes, and schools to integrate NbS concepts, ecosystem management, and climate adaptation into formal curricula. Support the development of accredited short courses, degree modules, and field-based learning tailored to Pacific realities.
- ⇒ ***Implement Training-of-Trainers (ToT) Programmes.*** Invest in Training-of-Trainers approaches to build a cadre of local facilitators and NbS champions who can scale up delivery of practical skills, mentor others, and ensure sustainability and local ownership of capacity-building efforts.
- ⇒ ***Promote Gender Equality, Disability, and Social Inclusion (GEDSI) in Capacity Building.*** Explicitly design and monitor capacity-building activities to be accessible and inclusive, ensuring that women, youth, people with disabilities, and other marginalized groups are both participants and leaders in NbS knowledge and practice.
- ⇒ ***Support On-the-Job Learning and Exchange Placements.*** Encourage secondments, internships, and exchange placements within and between Pacific institutions, NGOs, and communities to enable hands-on learning, practical experience, and sharing of good practices in NbS.
- ⇒ ***Develop Digital and Distance Learning Platforms.*** Leverage digital technologies, e-learning platforms, and mobile tools to expand access to NbS knowledge and training—especially for remote islands and outer communities. This can include online modules, webinars, resource libraries, and discussion forums.
- ⇒ ***Strengthen Monitoring, Evaluation, and Learning (MEL) Capacity.*** Build technical skills and institutional systems for participatory monitoring, evaluation, and adaptive learning so that lessons from NbS projects inform ongoing practice and policy.
- ⇒ ***Encourage Cross-Sectoral Capacity Building.*** Promote joint training and dialogue between sectors (e.g., water, forestry, urban, disaster management) to foster integrated solutions and break down silos in NbS planning and delivery.

*"Because existing NAPs, ocean strategies, and coastal plans often lack integration the work of many organisations operating in the region involves promoting the integration of NbS into these various plans, emphasising how they can speak to each other more effectively*

*- WWF Pacific.*

Photo credit: Marek Oken

# POLICY MAINSTREAMING

## BACKGROUND

Mainstreaming generally means ensuring that a particular issue is constantly considered, reflected in and integrated into broader decision making processes and activities, essentially with the result that this issue becomes broadly accepted and is viewed as a normal aspect impacting processes and activities. The importance of mainstreaming NbS as innovative and cost-effective measures into policies to simultaneously address climate change and natural hazard risks and conserve and restore biodiversity has been recognised by global research communities, policymakers, and practitioners.

## STATUS OF NBS IN REGIONAL POLICIES

**In PICs, CCA, DRR and biodiversity conservation are driven by the following key national plans, policies and strategies: National Adaptation Plans (NAP), National Biodiversity Strategy and Action Plans (NBSAP), Climate Change policies, DRR and DRM plans, and Joint National Adaptation Plans (JNAP).**

A full list of national policies, plans, strategies and legislation relevant to CCA, DRR and biodiversity conservation in the PICs is provided by SPREP. SPREP (2023) conducted a detailed analysis of the level of integration of NbS into national documents for Fiji, Kiribati, Palau, Solomon Islands, Tuvalu, and Vanuatu[156]

The role of NbS for Climate Change Adaptation (CCA) and Disaster Risk Reduction (DRR) is receiving increasing recognition in PICs

## GLOBAL POLICY AGENDAS

Global frameworks and strategies for sustainable development emphasise the importance of the environment and biodiversity in assisting ecosystems and communities faced with climate change, natural hazards, and other shocks, become more resilient. These include:

- ***The Convention on Biological Diversity (CBD)***
- ***The Sendai Framework for Disaster Risk Reduction 2015-2030***
- ***The Paris Agreement***
- ***The 2030 Agenda for Sustainable Development***
- ***The 2016 IUCN World Conservation Congress,[1]***
- ***The NbS for Climate Manifesto[1]***
- ***The Global Assessment Report on Biodiversity and Ecosystem Services (IPBES, 2019)***
- ***The Leaders Pledge for Nature[1]***
- ***Kunming-Montreal Global Biodiversity Framework***
- ***Presidencies of both the G7 and G20 groups[1]***
- ***The United Nations Convention to Combat Desertification (UNCCD)[1]***
- ***The IUCN Global Standard for NbS***

[156] SPREP (2023) Kiwa Initiative Capacity Needs Assessment for Implementing Nature-based Solutions for Climate Change Adaptation: Literature & Policy Review Supplement: Mainstreaming Nature-based Solution approaches into relevant policies and frameworks. Noumea, New Caledonia: Secretariat of the Pacific Regional Environment Programme. Available at: https://library.sprep.org/sites/default/files/2023-09/Lit-Policy-Review_Mainstreaming_Kiwa-Cap-Needs-Assessment.pdf (Accessed: 17 November 2024).

[157], [158], [159], [160], [161], [162]. However, while national documents include and integrate ecosystem and/or nature-based elements, they do not contain direct reference to NbS as a terminology[163]. This signals a need to promote NbS more vigorously within the region. However, this may prove challenging as relevant national policies and plans such as the Nationally Determined Contributions (NDCs) and NAPs are not well understood by stakeholders at the sub-national levels.

Nevertheless, there have still been significant efforts to integrate principles of NbS into regional frameworks that guide CCA, DRR and biodiversity conservation work in the PICs. These include:

- ***The 2050 Strategy for the Blue Pacific Continent*** [164] encourages sustainable ocean management, which aligns with nature-based strategies to preserve marine ecosystems.
- ***The Pacific Coral Reef Action Plan 2021-2030*** intends to focus the region's coral-reef conservation and management[165].
- ***The Framework for Nature Conservation and Protected Areas in the Pacific Islands Region 2021-2025*** [166] provides guidance for the region on key priorities for biodiversity conservation and ecosystem management.
- ***The Pacific Resilience Standards*** (PRS) [167] have been developed to support the implementation of the FRDP. The standards also ensure that resilience building in the region is Integrated, inclusive, informed and sustained.
- ***The Vemööre Declaration: Commitments to nature conservation action in the Pacific***

[157] IUCN (2019) *Nature-based Solutions for Climate Change Adaptation & Disaster Risk Reduction*. Available at: https://climate-adapt.eea.europa.eu/en/metadata/publications/nature-based-solutions-for-climate-change-adaptation-disaster-risk-reduction (Accessed: 20 January 2025).

[158] NIWA (2019) *Opportunities for nature-based solutions to support adaptation in the Pacific region*. Hamilton, New Zealand: National Institute of Water & Atmospheric Research Ltd.

[159] SPREP (2023) *Kiwa Initiative Capacity Needs Assessment for Implementing Nature-based Solutions for Climate Change Adaptation: Literature & Policy Review Supplement: Mainstreaming Nature-based Solution approaches into relevant policies and frameworks*. Noumea, New Caledonia: Secretariat of the Pacific Regional Environment Programme. Available at: https://library.sprep.org/sites/default/files/2023-09/Lit-Policy-Review_Mainstreaming_Kiwa-Cap-Needs-Assessment.pdf (Accessed: 17 November 2024).

[160] Turner, B. *et al.* (2022) 'The Role of Nature-Based Solutions in Supporting Social-Ecological Resilience for Climate Change Adaptation', *Annual Review of Environment and Resources*, 47(1), pp. 123–148. Available at: https://doi.org/10.1146/annurev-environ-012220-010017.

[161] UNDRR (2024) *Nature-based solutions for comprehensive disaster and climate risk management: Toolkit for integrated planning and implementation of disaster risk reduction and climate change adaptation*. United Nations Office for Disaster Risk Reduction. Available at: https://www.undrr.org/publication/nature-based-solutions-comprehensive-disaster-and-climate-risk-management-toolkit (Accessed: 17 November 2024).

[162] WWF (2022) *Review of Nature-based Solutions in the Pacific Region: Focus and Opportunities*. World Wildlife Fund. Available at: https://assets.wwf.org.au/image/upload/f_pdf/2022_MCC_WWF_Review_of_NbS_in_the_Pacific?_a=ATO2Ba20 (Accessed: 17 November 2024).

[163] SPREP (2023) *Kiwa Initiative Capacity Needs Assessment for Implementing Nature-based Solutions for Climate Change Adaptation: Literature & Policy Review Supplement: Mainstreaming Nature-based Solution approaches into relevant policies and frameworks*. Noumea, New Caledonia: Secretariat of the Pacific Regional Environment Programme. Available at: https://library.sprep.org/sites/default/files/2023-09/Lit-Policy-Review_Mainstreaming_Kiwa-Cap-Needs-Assessment.pdf (Accessed: 17 November 2024).

[164] PIFS (2022) *2050 Strategy for the Blue Pacific Continent*. Suva, Fiji: Pacific Islands Forum Secretariat. Available at: https://forumsec.org/2050 (Accessed: 17 November 2024).

[165] SPREP (2021) *Pacific Coral Reef Action Plan 2021–2030*. Apia, Samoa: Secretariat of the Pacific Regional Environment Programme. Available at: https://www.sprep.org/sites/default/files/30-SPREP-Meeting/Officials/Eng/WP-8.2.3_Att.1.rev_.1-Pacific_Coral_Reef_Action_Plan_Members_Endorsement.pdf (Accessed: 10 January 2025).

[166] SPREP (2021) *Pacific Islands Framework for Nature Conservation and Protected Areas 2021-2025*. Apia, Samoa: Secretariat of the Pacific Regional Environment Programme. Available at: https://www.sprep.org/pirt/framework-for-nature-conservation-and-protected-areas-in-the-pacific-islands-region-2021-2025 (Accessed: 17 November 2024).

[167] PIFS (2021) *Pacific Resilience Standards - A Practitioner's Guide*. Suva, Fiji: Pacific Islands Forum Secretariat. Available at: https://reliefweb.int/report/world/pacific-resilience-standards-practitioners-guide-december-2021 (Accessed: 10 January 2025).

***islands region, 2021-2025*** represents commitments by PICs to implement NbS and sustain social-ecological systems as a fundamental response to: climate impacts; disaster risk management; water and food insecurity; and threats to human health [168].

- ***The Framework for Resilient Development in the Pacific*** (FRDP) seeks to reduce the exposure of PICs to climate and disaster risk, support low carbon development and improve disaster response and reconstruction[169]

## STATUS OF NBS INTO NATIONAL POLICIES AROUND THE WORLD

**National governments play a key role in fostering the use of NbS. Governments need to design an institutional, policy, regulatory and financial enabling environment that facilitates the uptake of NbS by both public agencies across levels of government as well as private actors** [170]**.** However, from the examination of these two groups of Islands in this section, it can be argued that National governments need to be more intentional in explicitly including NbS into government policy. Such implementation is likely to promote the implementation of NbS within relevant regions.

## OECD Countries

In their review of OECD countries, OECD found that references to NbS range from countries simply stating that they recognise the importance of these approaches as part of climate change adaptation, to the explicit reference of using NbS for addressing specific hazards[171].

**Even though most OECD countries have incorporated the concept of NbS into their national adaptation plans, very few suggest more concretely how NbS should be featured in implementation.** Only six countries make such references to concrete implementation measures. These include the creation of policies mandating the use of green drainage systems, the monitoring of ecosystem services, and the proposition of policies requiring the use of natural flood prevention mechanisms. However, there was an absence of quantitative and measurable targets relating to NbS deployment and performance within all the national adaptation policies.

## United States Islands

*The Climate Strong Islands Declaration* (USA) sets forth a set of principles, challenges, and opportunities faced by island communities in the U.S. and serves as a call-to-arms to help these communities respond to the climate crisis in an effective way[172]. Within this declaration a policy framework was created centred around "how U.S Islands can lead on climate resilience through better public policy."[173] While robust, the policy framework does not explicitly speak to NbS signalling an absence of these solutions within policies in the region.

A full list of national policies, plans, strategies and legislation relevant to CCA, DRR and biodiversity conservation in the PICTs is provided by SPREP (2023). SPREP (2023) conducted a detailed analysis

[168] SPREP (2020) *Vemööre Declaration: Commitments to nature conservation action in the Pacific islands region, 2021-2025*. Secretariat of the Pacific Regional Environment Programme. Available at: https://www.sprep.org/sites/default/files/30-SPREP-Meeting/Officials/Eng/WP%208.2.2_Att.2.rev_.1%20-%20Vemoore%20Declaration.pdf (Accessed: 9 January 2025).

[169] SPC *et al.* (2016) *Framework for Resilient Development in the Pacific - An Integrated Approach to Address Climate Change and Disaster Risk Management (FRDP) 2017 – 2030*. Suva, Fiji: Pacific Community (SPC), Secretariat of the Pacific Regional Environment Programme (SPREP), Pacific Islands Forum Secretariat (PIFS), United Nations Development Programme (UNDP), United Nations Office for Disaster Risk Reduction (UNISDR) and University of the South Pacific (USP). Available at: http://gsd.spc.int/frdp/assets/FRDP_2016_Resilient_Dev_pacific.pdf (Accessed: 13 January 2021).

[170] OECD (2020) *Nature-based Solutions for adapting to water-related climate risks*. Policy perspectives Environment Policy Paper No. 21. Washington, D.C.: Organisation for Economic Co-operation and Development. Available at: https://www.oecd.org/en/publications/nature-based-solutions-for-adapting-to-water-related-climate-risks_2257873d-en.html (Accessed: 20 January 2025).

[171] OECD (2020) *Nature-based Solutions for adapting to water-related climate risks*. Policy perspectives Environment Policy Paper No. 21. Washington, D.C.: Organisation for Economic Co-operation and Development. Available at: https://www.oecd.org/en/publications/nature-based-solutions-for-adapting-to-water-related-climate-risks_2257873d-en.html (Accessed: 20 January 2025).

[172] Climate Strong Islands Network (2025) *Climate Strong Islands Declaration*. Available at: https://www.climatestrongislands.org/#:~:text=The%20Climate%20Strong%20Islands%20Declaration,general%20public%20to%20help%20these (Accessed: 10 January 2025).

[173] ibid

of the level of integration of NbS into national documents for Fiji, Kiribati, Palau, Solomon Islands, Tuvalu, and Vanuatu.

Because existing NAPs, ocean strategies, and coastal plans often lack integration, the work of many organisations operating in the region involves promoting the integration of NbS into these various plans, emphasising how they can speak to each other more effectively. A further challenge in promoting NbS is that relevant national policies and plans such as the Nationally Determined Contributions (NDCs) and NAPs are not well understood by stakeholders at the sub-national levels.

Key recommendations for national governments to strengthen policy instruments put forward by IPBES (2019) are to expand and strengthen ecologically representative, well-connected protected-area networks and other effective area-based conservation measures; to protect watersheds; and to provide incentives and sanctions for reducing pollution.

NbS can be further promoted by supporting the implementation of the long-term goals and 2030 targets of the Global Biodiversity Framework (GBF) into domestic policy and legislation and through the preparation of updated National Biodiversity Strategy and Action Plans. This also involves proactively engaging with international partners to deliver the cooperation mechanisms set out in the GBF (IPBES, 2019).

In addition, developing a coordinated national approach to nature conservation and restoration, overseen by a coordinating body, would set out an overall national strategy to restore nature through more sustainable land use across different economic activities (e.g., food production, biomass production, afforestation, etc.), with tangible nature restoration commitments set for – and tailored to – different economic sectors. The Framework should clearly identify how land will be prioritised for nature and biodiversity restoration, carbon storage, farming energy production and other key uses. This national approach to nature restoration should then be integrated in future updates to the Net Zero Strategy and future NAPs.

Photo credit: Jayne Jenkins

***"NbS activities are reflected under the Conservation and biodiversity Priority Areas, which aligns to Fiji's priorities and international commitment"***

***– I Taukei Affairs, Fiji***

# RECOMMENDATIONS FOR NBS MAINSTREAMING IN POLICY

## 1. Strengthen national policy instruments

**NbS can be promoted by supporting the implementation of the long-term goals and 2030 targets of the Global Biodiversity Framework (GBF) into domestic policy and legislation. This will include the preparation of updated National Biodiversity Strategies and Action Plans.** This also involves proactively engaging with international partners to deliver the cooperation mechanisms set out in the GBF[174].

## 2. National holistic approach

**A significant challenge in mainstreaming NbS into government policies is the lack of coordination within government. This is characterised by existing silos between different ministries and sectoral line agencies; limited mandates of government agencies; and competing interests and priorities of different government departments, all of which create barriers for coordination and collaboration on NbS.** Currently, the responsibility for NbS quite often lies solely with environment ministries, and as a result their integration tends to be limited to environment policies. Instead, a "whole of government" approach should be taken to ensure that NbS are mainstreamed into key national policies and strategies addressing biodiversity, climate change, disaster risk management, infrastructure, health, sustainable development, and other relevant climatic, environmental and socio-economic challenges.

***Key insight:*** *Enhancing coordination and collaboration through a multisectoral approach to NbS can be facilitated by convening in-country focal points, creating a national policy framework for NbS, and strengthening engagement with international and regional partners and cooperation mechanisms.*

## 3. Improve awareness and buy-in through advocacy and public diplomacy

**A lack of political will and commitment to the global commitments on biodiversity and climate change have been identified as major barriers to NbS[175].** Challenges exist in ensuring that there is buy-in at all levels of government. Sometimes, work with local stakeholders has been stopped if higher-level management does not see the value of the project. For this reason, it is important to have a plan for influencing government at all levels. In order to increase the understanding, recognition and buy-in of the value of NbS among decision-makers, several stakeholders reported including advocacy and public diplomacy in their work.

***Key insights:*** *Efforts to mainstream NbS can be hampered by policy cycles, which means it is not always possible to update a policy when there is a need or an opportunity to do so. For this reason, it is important to align with the timing of policy updates to ensure that NbS considerations are included.*

[174] IPBES (2019) *Global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services*. Zenodo. Available at: https://doi.org/10.5281/ZENODO.3831673.

[175] SPREP (2023) *Kiwa Initiative Capacity Needs Assessment for Implementing Nature-based Solutions for Climate Change Adaptation: Literature & Policy Review Supplement: Mainstreaming Nature-based Solution approaches into relevant policies and frameworks*. Noumea, New Caledonia: Secretariat of the Pacific Regional Environment Programme. Available at: https://library.sprep.org/sites/default/files/2023-09/Lit-Policy-Review_Mainstreaming_Kiwa-Cap-Needs-Assessment.pdf (Accessed: 17 November 2024).

Increasing public diplomacy efforts in the Pacific would be transformative, the restoration of ecosystems is the solution to solving many of the current problems. These efforts also aim to ensure that NbS does not just become another "buzz word" but is understood for the significant implications it has for communities and ecosystems.

***Key insight:*** *Integrating NbS into national planning processes and policy frameworks helps to ensure that government ministries see NbS to achieve strategic priorities.*

## 4. Learn from existing initiatives

**NbS should be seen as a tool to achieve broader strategic priorities of governments.** This means that instead of promoting NbS as an isolated objective, it should be presented to accomplish health outcomes, protect infrastructure, and address other important policy goals. An important aspect of the work of SPC and SPREP to promote the uptake of NbS in the Pacific Region is to support countries in aligning NbS with existing international and regional policy frameworks, as well as mainstreaming NbS into existing national policies, strategies and action plans including NAPs, biodiversity strategies, development plans, and environmental impact assessments (EIAs). Rather than advocating for new coordination mechanisms, SPREP's work supports the use of existing systems under national biodiversity strategies and national ocean policies to better integrate and implement NbS.

***Key insight:*** *It is important to increase coordination between donors & funders, government ministries, and NGOs to ensure effective use of resources & avoidance of duplication of efforts. Additionally, including NbS as a mandatory element of all economic development projects may enhance financing mechanisms for it.*

### Case study: The Promoting Pacific Island Nature Based Solutions (PPIN) project

Mainstreaming is one of the three objectives of the PPIN project (capacity building and cost benefit analysis being the other two). PPIN is mainstreaming NbS in Fiji, Tonga, and Vanuatu. This involves identifying the country's needs and integrating NbS into their existing frameworks. In Fiji, SPREP is integrating NbS into customary land leases by including environmental management elements through the development of a natural resource management policy. In Tonga, SPREP is supporting the integration of NbS into the environmental impact assessment (EIA) sector. In Vanuatu SPREP is helping to integrate NbS into the country's first NAP.

## 5. Demonstrate the benefits and trade-offs of NbS

**A key part of integrating NbS into policy is demonstrating its effectiveness as a tool for climate change adaptation and disaster risk reduction.** In addition, evidence is needed to show that NbS can provide long-term socio-economic and environmental benefits that often exceed those of engineered solutions. The value of working with nature can be showcased by highlighting good practice examples from communities and regions in which NbS have been successfully applied.

## 6. Remove legislative barriers and set clear targets

**Issues around customary land rights and land use have been identified as a barrier to NbS by several stakeholders.** NbS mainstreaming efforts need to consider customary land rights and regulations, but this can be complex as legislation is often unclear. Several interviewees pointed to the need to enhance legislation and to develop a national land-use framework to provide clarity and guidance on customary land rights. There are still some ways to go in developing such a legal framework, however efforts have been made to legally address other issues relating to NbS.

For example, in Fiji, SPREP works on addressing land use issues related to voluntary carbon markets (VCM), ensuring alignment with national priorities and emissions abatement targets.

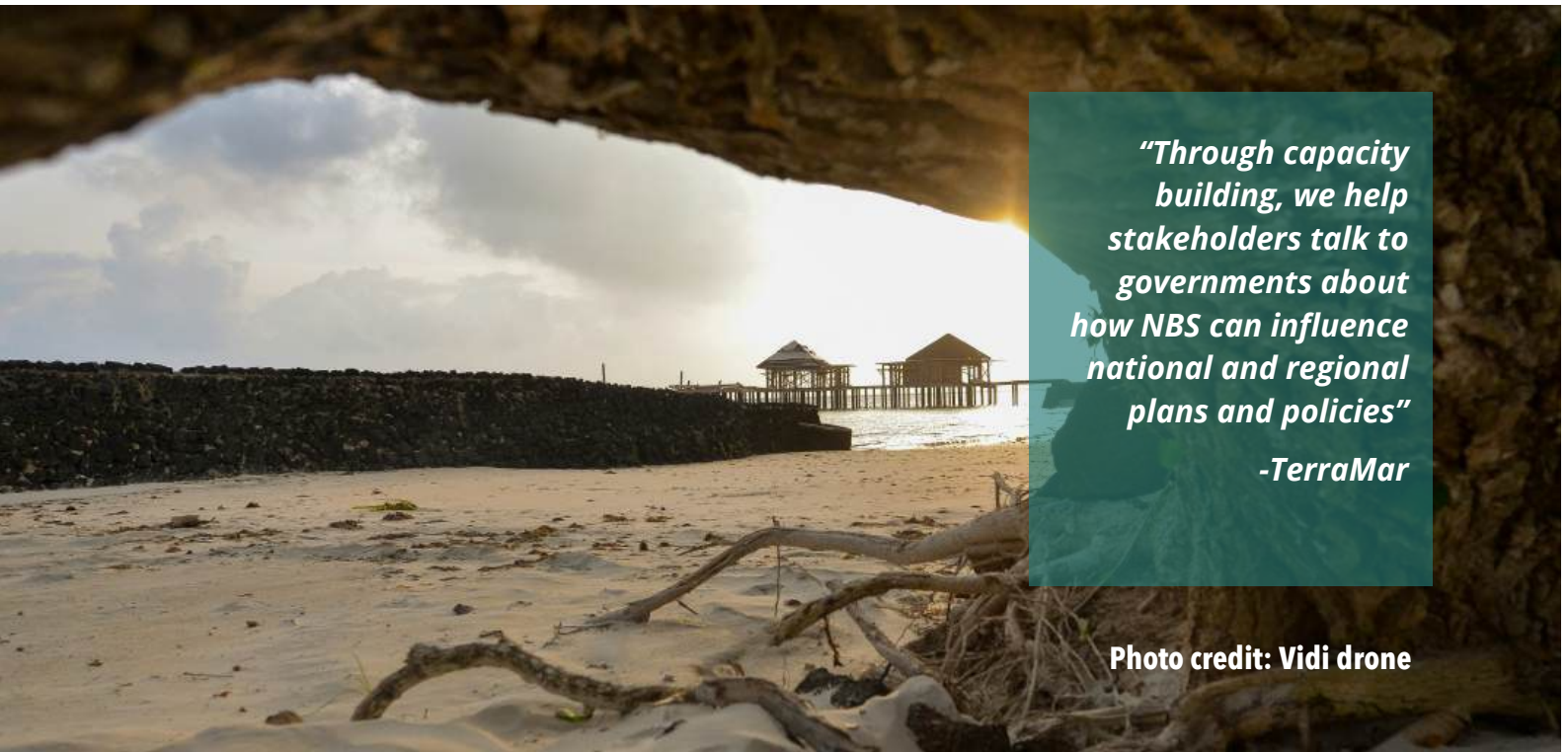
***Key insight:*** *While developing new policies that incorporate NbS is important, compliance and enforcement of existing laws and regulations is equally important. However, the capacity for enforcement is currently low. Furthermore, effective implementation of NbS in often hindered by missing links in co-ordination mechanisms.*

## 7. Let communities take the lead

**Many organisations highlighted the importance of localisation, local level planning, and locally led development (LLD) when implementing NbS**. This is also critical in mainstreaming NbS policy as a robust understanding of NbS by the local population can lead to them driving the mainstreaming of NbS in policy through a bottom-up approach. Specific measures to enhance this have been discussed in the Capacity Building chapter.

## KEY RECOMMENDATIONS

- ⇒ Take a long-term holistic approach to NbS requiring a whole-of-governance and cross-sectoral approach to enhance coordination and collaboration *amongst* government agencies and *between* government agencies, international donors and funders, and implementing organisations.
- ⇒ Evidenced-based decision making and the need to set clear and realistic targets, and to identify the benefits as well as potential trade-offs in designing and implementing NbS projects.
- ⇒ Localisation, local level planning, and locally led development to ensure that projects are aligned with Indigenous perspectives and consistent with Indigenous knowledges and practices.
- ⇒ Measuring success and learning from good practice through demonstration projects, as well as improving compliance and enforcement were also seen as critical to the success of NbS efforts in the PICTs.



***"Through capacity building, we help stakeholders talk to governments about how NBS can influence national and regional plans and policies"***

***-TerraMar***

**Photo credit: Vidi drone**

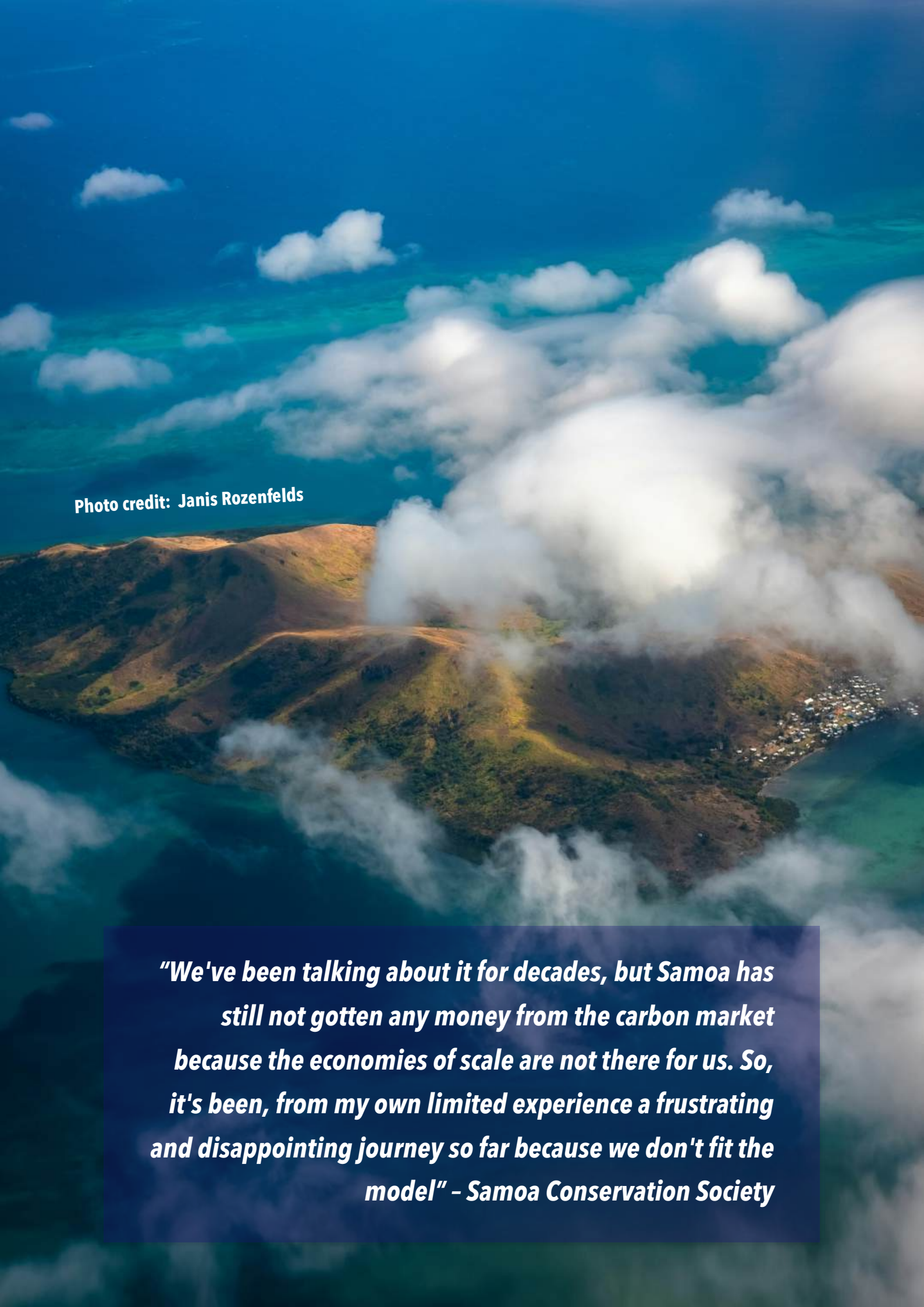


Photo credit: Janis Rozenfelds

*"We've been talking about it for decades, but Samoa has still not gotten any money from the carbon market because the economies of scale are not there for us. So, it's been, from my own limited experience a frustrating and disappointing journey so far because we don't fit the model" – Samoa Conservation Society*

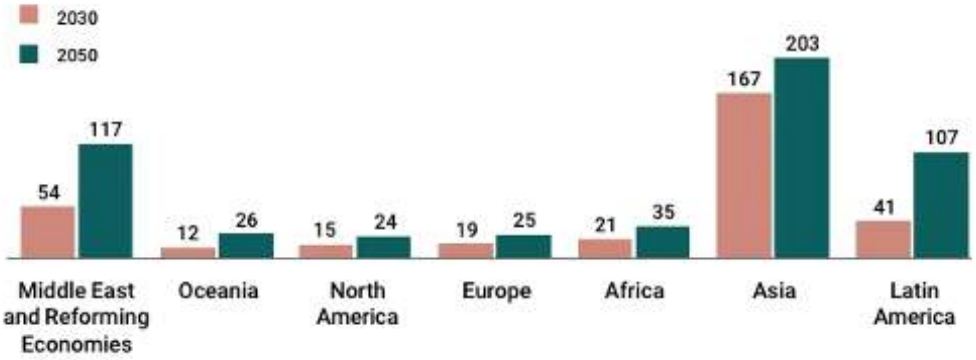
# FINANCE FOR NBS

## GLOBAL CONTEXT AND TRENDS

USD 200 billion is invested in nature-based solutions annually, which is a third of what is needed (USD 542 billion) to reach Rio Convention targets for climate and biodiversity by 2030.[176] In comparison, USD 7 trillion of finance flows with a direct negative impact on nature such as industry, fossil fuels and agricultural expansion. Realigning these financial flows towards NbS is the most impactful action to sustainably reduce ecosystem degradation and strengthen the resilience of the ecosystem services they provide.

Public finance accounts for 82% (USD 165 billion) of total NbS finance flows, whereas 18% came from private finance (USD 35 billion) in the form of biodiversity offsets and credits, sustainable supply chains and impact investment. The fastest growing areas for private finance were in philanthropy and blended finance deals such as blue bonds. By 2030, private finance is projected to increase from 18% to 33% (USD 100 billion), showing promising signs of improvement.

*Figure 25: Additional NbS investments needs per year by region, USD billion*




## PACIFIC REGIONAL CONTEXT AND CURRENT STATUS

Many Small Island Developing States (SIDS) and least developed countries (LDCs) have received little or no climate funding that supports NbS-like approaches, even though these countries are financially constrained domestically, and many have significant natural ecosystems to manage. For SIDS, USD 673 million in climate funding was committed to NbS projects between 2016 and 2020, yet only 36% (USD 245 million) of this was for the Pacific islands. [177] This is comparatively low considering the Pacific region manages the largest marine areas of SIDS.

From the NbS projects analysed as part of this report, USD 93 million was funded into the Pacific for projects starting between 2022 and 2024. The main donors include the New Zealand's Ministry of Foreign Affairs and Trade, Australian Centre for International Agriculture Research, French government, Australian Department of Foreign Affairs and Trade, Asian Development Bank, and Government of Canada. While many of the donors are involved in implementing NbS funding activities across the region, others, such as the New Zealand Ministry of Foreign Affairs and Trade (MFAT), have been building governance structures for NbS. These include including policies and procedures within Pacific governments for a common understanding and approach to NbS.

Official Development Assistance (ODA) plays a crucial role in financing NbS, providing direct funding, capacity building, and mainstreaming NbS

[176] : United Nations Environment Programme (2023). State of Finance for Nature: The Big Nature Turnaround – Repurposing $7 trillion to combat nature loss. Nairobi. https://doi.org/10.59117/20.500.11822/44278

[177] Stockholm Environment Institute, 2022. Assessing finance for nature-based solutions to climate change. DOI: https://doi.org/10.51414/sei2022.052

into develop planning. ODA can flow through regional initiatives such as the KIWA initiative, a multi-donor fund (involving ODA from France, EU, Canada, Australia, and New Zealand) dedicated to financing NbS in the Pacific. Meanwhile, organisations like SPREP and IUCN often act as implementing entities or partners, leveraging ODA to assist countries in preparing strong project proposals for larger climate funds like the Green Climate Fund (GCF) and the Global Environment Facility (GEF). ODA also supports mainstreaming NbS into development planning to ensure that they are not standalone projects but rather integral to sustainable development.

In 2023, Conservation International (CI), the International Union for the Conservation of Nature (IUCN) and the Pacific Islands Forum Secretariat jointly hosted the Blue Pacific Coastal Nature-based Solutions Policy and Finance Workshop, with over 80 participants representing 10 Pacific islands. The workshop found that access to climate financing remains a significant challenge for accelerating NbS, particularly among community groups and civil society organisations, and also national governments. Access to funding is a constraint, as funding processes are slow and complicated to access. For example, proposal writing in English limits some countries' access. Other key takeaways include:

- National budget support for NbS is lacking. Most funding is grant-based or through regional organisations and typically tied to specific projects and site-based.
- Parametric sovereign insurance has limited uptake due to prohibitive premiums. The Pacific regional insurance sector is not well developed and expanding insurance to nature is difficult since general disaster insurance is uncommon.
- Enticing private sector investment can be challenging given the small domestic industries.
- Domestic banking industries are small and, where national development banks exist, they have narrow focuses.

# EXISTING AND EMERGING FINANCIAL MECHANISMS

Mechanisms to invest in nature range from grants and philanthropy; equity; nature-linked bonds and loans; and outcome-based financing such as Payments for Ecosystem Services. Blended finance can support these different mechanisms, along with new business models for mobilising investment in nature. Nevertheless, conventional solutions can also be applied to the nature sector in the same way that renewable energy, for example, is invested in existing markets.[178] The development of a nature market is therefore imperative, translating innovative as well as conventional mechanisms into a nature-based market. The commitment of governments to pioneer high-integrity nature markets and create trusted standards will help finance to flow into nature projects where it is most needed. An overview of supportive policies for this has been developed by Conservation International, available here.

## 1. Grants and Philanthropy

Grants and philanthropy play a vital role in projects which conventional finance can't fulfil. However, volumes are constrained, and continuity of funding can present a challenge. This means that grant funding is only scalable to a certain point.

Most current NbS work in the Pacific is primarily funded through grants, often from donor governments like Australia and New Zealand. However, this reliance solely on grant funding raises concerns about the long-term financial sustainability of projects. Projects often struggle with long-term sustainability after the initial funding ends.

Philanthropy plays an important role as a funding source for climate change, often bearing the risk of projects and therefore acting as an accelerator for further funding. Examples in the Pacific include Global Greengrants Fund, 350 Pacific and Pacific Life Foundation. Emerging models such as Philanthropic-Public-Private Partnerships (PPPP) are providing new solutions to leverage the enormous capacity of philanthropy, bringing together diverse actors to drive capacity and develop opportunity.

***Key Insight:*** *Long-term financial sustainability of NbS projects is a concern, as many projects rely heavily on short-term grant funding.*

[178] Nature-based Solutions for Business: Unlocking Finance, Global Compact Network UK, 2024

## 2. Voluntary Carbon Markets (VCMs)

Carbon markets can be used to provide financing for NbS projects through the sale of carbon credits. These can be generated by nature-based carbon from forests and mangroves. High-integrity nature-based projects need to use rights-based approaches that deliver climate, biodiversity and social benefits, upholding the rights and the role of Indigenous People and local communities through participatory governance and equitable benefits sharing. The Voluntary Carbon Market (VCM) provides an opportunity to leverage private investment into nature-based solutions, however, efforts are needed to continually strengthen methodologies and certification certificates to ensure they lead to tangible benefits. [179]

VCMs have been largely untapped in the Pacific to date, largely due to low institutional capacity, complex land tenure arrangements, and complex methodologies and procedures, as outlined further in the barriers section below. Nevertheless, there has been growing demand and interest in support of their ecosystems and livelihoods, predominantly from their forest and mangrove habitats. There are currently only 12 registered VCMs in the Pacific, amounting to 2,866,265 credits mainly from PNG and Fiji in the forestry and energy sectors. [180]

Since many large companies and investors have net zero targets by 2050, there is a growing demand for high impact carbon credits from nature-based solutions. However, demand is outstripping supply, with demand having doubled in the last year.[181] Developing the market that can bridge supply and demand of carbon credits from nature-based solutions is a crucial part of leveraging sufficient finance for NbS.

## 3. Biodiversity credits

Biodiversity credits are a promising area for financing nature. However, biodiversity credits currently only channel USD 8 million but are expected to be scaled-up over the coming years to rapidly scale finance through compliance-led credit markets.

**GCF Samoa Integrated Flood Management to Enhance Climate Resilience for the Vaisigano River Catchment (VCP) Project (2020-2024)**

**Accredited Entity:** UNDP **Implementing partners:** Live & Learn Environmental Education, Nakau Programme, Ekos, James Atherton, Samoa **Total project financing:** Conservation Society.

USD 66 million

**Challenges:** This GCF project sought to recommend different Payment for Ecosystem Services options as a "direct" payment for watershed ecosystem services, using forest carbon financing. However, the project did not progress to full PES certification or market access. Several challenges arose, including eligibility and feasibility criteria as well as the small scale of the project that made pursuing certification with Plan Vivo and Verra challenging. A major obstacle was the 2024 Forest Reference Level (FRL) report, which significantly reduced potential carbon credits from forest protection due to revised baseline deforestation rates in Samoa (a high forest, low deforestation country). Much of the land originally identified was owned by Government of Samoa and land tenure issues were highly sensitive.

**Lessons learned:** Financial incentives were not the only factor motivating landowners, with natural and cultural values seen as intangible benefits. Recommended next steps include expanding the project scale to multiple sites to secure better economies of scale and placing greater emphasis on restoration activities. Forest restoration offers GHG emission removals which meet a growing demand for removal credits, fetching higher prices to ensure project feasibility. VCM projects will also benefit from policies and coordination between national schemes and project scale activities, avoiding double counting with NDC and Article 6 trading. Projects could develop a "Foundation" to create a grouped project of multiple activities to increase economies of scale and impact.

[179] BirdLife International, 2023. Nature-Based Carbon Offsetting, policy position.

[180] Mackenzie, E. and Allen, M. (2023) *The state of voluntary carbon markets in the Pacific. Report to WWF, Sustineo*. Available at: https://assets.wwf.org.au/image/upload/f_pdf/CRxN_the_state_of_voluntary_carbon_markets_in_the_Pacific (Accessed: 17 November 2024).

[181] https://climateassetmanagement.com/investment-strategies/

### Case study: Pacific Blue Carbon Program

**Total project financing:** USD 6.3 million, 2018-2024

Partnership with the Department of Industry, Science and Resources (DISR), Conservation International, the Climate Finance Lab and CSIRO to build capacity to protect and restore blue carbon ecosystems in Fiji and PNG.

This program included activities to measure, report and verify carbon in mangroves and seagrasses and incorporate this information in countries' greenhouse gas accounts, and climate and related policies. As part of this program, Conservation International developed blue carbon projects to demonstrate viability of carbon offsets through protection of marine ecosystems.

**Key findings:**

⇒ Long-term blended finance, including the use of carbon credits and community enterprises, is essential for realising the full benefits of NbS and leveraging their contributions to biodiversity, livelihoods, and climate. While NbS offer attractive impact investment opportunities, exploring the potential of biodiversity credits is a promising form of finance.

⇒ Studies suggest that NbS offer greater efficiency and cost-effectiveness than (grey) non-nature-based alternatives. Compared to top-down climate adaptation programs, NbS projects with active community engagement and long-term sustainability potential make them more likely to achieve lasting impact.

⇒ Increased resource allocation can amplify efficiency and impact. Increasing project site visits or exploring alternative funding approaches could enhance outcomes. For example, compensating community members for their restoration work could accelerate the pace of restoration, considering the urgency of climate change impacts.

The market for nature-based investments is still immature, reflected by a lack of demand for biodiversity credits.[182] Policy constraints combined with an absence of appropriate governance and standards holds back the supply side from engaging. Suppliers of NbS projects need to have confidence that there will be a market. Furthermore, the term NbS is being misunderstood. This calls for a need to define "integrity" (i.e. in terms of the project, credit, operator and buyer) and sector manuals to describe the nature-positive contribution of investments. Building a pipeline of bankable NbS projects with credible and regionally agreed standards which demonstrate additionality, will be a promising effort to support increased uptake from investors.

## *4. Blue bonds and blue carbon*

There is significant potential for blue carbon ecosystems such as mangroves and seagrasses for climate change mitigation for Small Island States. Blue bonds are emerging as an effective way to leverage private finance towards the blue economy. By example, HSBC and Earth Security have developed a concept for a "mangrove bond", raising capital to finance mangrove conservation and restoration. Investments are typically aimed at large-scale projects of USD 50 million and above and the framework is being used to scale mangrove conservation financing across multiple mangrove-rich countries, resulting in the M40 Mangrove Bond Initiative.[183] In the Pacific region, UNDP launched Fiji's first ever Sovereign Blue Bond in November 2023 which includes a priority area focusing on nature-based solutions for coastal protection (interview with IUCN).[184] It has allocated USD 10 million to four projects so far.

## *5. Debt-for-Nature*

Debt-for-Nature Swaps involve purchasing foreign debt, converting that debt into local currency and using the proceeds to fund conservation activities. These haven't been done in PICs yet but there is potential and interest in using them. Stakeholders are watching how these develop and setting up the supporting systems to enable these in the future. It was emphasised that the Pacific region needs a

[182] Nature-based Solutions for Business: Unlocking Finance, Global Compact Network UK, 2024

[183] Earth Security Group

[184] https://www.undp.org/pacific/press-releases/launch-fijis-first-ever-sovereign-blue-bond

strong voice to advocate for them to turn this into reality.

### 6. Payment for Ecosystem Services

Various participants including the Samoa Conservation Society and WWF Australia discussed Payment for Ecosystem Services (PES) as a mechanism to value and monetize ecosystem services. Under PES, particularly when applied to NbS, the conservation and restoration of ecosystems is incentivised through payments to land owners or resources users, with the aim of securing the provision of ecosystem services. PES aims to address market failures through the creation of these incentives and can be applied to ecosystem services including water purification, carbon sequestration, invasive species management, biodiversity conservation and flood protection. The GCF Samoa Integrated Flood Management to Enhance Climate Resilience for the Vaisigano River Catchment (VCP) Project (2020-2024) described in the case study above is one such example being applied in the Pacific islands.

Other types of sustainable financing exist with resources generated being reinvested into site management. For example, Palau's Protected Area Network is financed through entry fees generated from tourists. There's also exploration into investment-type fund scenarios to sustain area management.

***Key Insight:*** *Access to climate financing remains a significant challenge for accelerating NbS, especially for community groups, civil society organizations, and national governments in the Pacific. Complex application processes and stringent criteria from larger funds poses barriers.*

## BARRIERS AND CHALLENGES

Nature is not the easiest asset to invest in due to several market failures and barriers.

⇒ ***Weak policy and regulation:*** The ecosystem services that nature provides tend to see them labelled as public goods, making private investment in NbS challenging. This is exacerbated by weak policy and regulation which does not incentivise private investment.

⇒ ***Scarcity of high-integrity, bankable projects:*** NbS projects tend to be smaller in scale, complex to measure and have long timelines for financial returns. There is a lack of a transparent pipeline of projects for investors. NbS projects and developers are hugely diverse.

⇒ ***Standardisation:*** NbS has not been standardised as an asset class, therefore making them less investible. Clear definitions and criteria for both NbS and investment readiness are important.

⇒ ***Information shortfalls:*** There is a lack of data on the financial performance of NbS, compounded by low confidence and capacity on private finance.

⇒ ***Access to funding***: Finding long-term funding that isn't grant-based and goes further than existing three-to-five-year funding periods is challenging for the region. While carbon projects can generate modest monetary benefits for communities, mechanisms to access global funding from funds such as Adaptation Fund, Green Climate Fund and Asian Development Bank is very difficult for national governments due to their complexity and lack of skilled personnel.


**Photo credit: Looking over the Sirebe Protected Area, Solomon Islands. Photo: Douglas Jnr Pikacha**

⇒ ***Complying with safeguards and the volume of paperwork:*** The amount of evidencing can make it hard for governments to apply, often requiring them to partner with organisations like Conservation International. Further, countries can't currently meet a lot of the criteria required by larger funds, such as the financial control and policy environment.

⇒ ***A lack of coordination between donors:*** This has resulted in a duplication of effort, for example resulting in three similar projects funded by three different donors.

⇒ ***Low volume of carbon credits:*** A key challenge in the Pacific is the volume of carbon credits available from small land areas, meaning that the region often doesn't have the large volumes being sought. Significant monitoring efforts are also needed.

⇒ ***Low institutional capacity is a barrier to scaling investments in VCMs:*** particularly when it comes to working with Indigenous Peoples and complex land tenure arrangements. Tenure of lands and forests managed by Indigenous People (IPs) can lead to their carbon rights being poorly understood. Yet, to demonstrate the permanency of carbon sequestration from VCM projects, there needs to be a proof of secure land tenure and formal land titles, often over a 30-year period, which can add additional complexity in the Pacific.

***Key Insight:*** *Voluntary carbon markets (VCMs) and biodiversity credits offer potential for private financing of NbS, however, they remain largely untapped in the Pacific due to low institutional capacity, complex land tenure arrangements, and an immature market.*

## Case study: Nakau carbon projects

Nakau is a social purpose company working with Indigenous communities to protect and restore forests and other ecosystems through carbon and nature projects. They are a long-term partner with Live and Learn Environmental Education, a not-for-profit NGO registered in Australia who work on environmental issues across the Pacific and Southeast Asia.

The primary goal of Nakau is to ensure Indigenous Peoples are the primary beneficiaries of forest carbon projects. This comes from a recognition that some carbon projects led by other developers have often harmed Indigenous communities.

Nakau works specifically with the Plan Vivo Climate Standard, which focuses on Indigenous Peoples, smallholder farmers and landowners in the PIC. The Standard also requires a minimum of 60% of benefits to go to project owners, the customary landowners. With Indigenous Peoples' rights at the heart of their work, Nakau prioritises a thorough, co-designed approach with local communities, emphasising Free, Prior and Informed Consent (FPIC).

Fieldwork is done by local NGO partners, ensuring that people of the same culture are leading the design and FPIC. As Nakau said "[Project coordination] is all done by a local NGO partner in each country. So that means that it's Solomon Islanders sitting down with Solomon Islanders doing all the design and FPIC".

Each project takes 3-4 years and between 20-25 meetings to develop, compared to an average of 18 months and 2-4 meetings in other programmes. This ensures people avoid the risk of signing away their rights and that communities hold the ownership of credits.

Nakau's approach prioritises local ownership and rights over maximising the size of protected areas. Projects are typically very small (approximately 1,000 to 3,000 hectares for projects) compared to other carbon projects (some exceeding 100,000 hectares). This can make scaling a challenges and project viability can be impacted by small land parcels. To overcome this, Nakau is working with Plan Vivo to involve local clusters of smaller projects, each independently viable and controlled by local tribal groups. While scaling is a challenge, their commitment to ethical practices and long-term capacity building makes them an important player in the Pacific context.

From a policy perspective, Nakau would like to see more flexible or tiered regulations that incentivise smaller projects, rather than the current models which prioritise large projects.

**More information: Nakau.org.**

*Table 13: NbS financing gap, recommendation and action in PICTs*

| Identified gap | Recommendations | Stakeholder actions |
|---|---|---|
| **Complex land tenure arrangements** and low institutional capacity to scale VCM investments and work with Indigenous Peoples and land tenure arrangements | ⇒ In any landscape with multiple legal ownership and access rights, landscape level interventions must have clear project level legal and governance relationships. | ⇒ Develop Memorandums of understanding (MOU) between the government and landowners, establishing a carbon trading entity, and land boundary and beneficiary mapping. |
| **Return on investment expectations are difficult to achieve.** There is an immature market for nature-based solutions. | ⇒ Managing the return on investment expectations of investors as well as aligning the longer investment timelines required for nature projects, often in the region of 30-years+. | ⇒ International NGOs can help to communicate the business case to the private sector. |
| **Developing high-integrity projects lack budget and capacity** to meet requirements. They are also time consuming and requires expensive measurement, reporting, and verification (MRV) | ⇒ Leveraging private sector investment to support NbS requires collaboration among ministries, specifically among climate change and environment, finance, trade and investment and foreign affairs. | ⇒ National governments can create regulations that dictate how the international private sector can operate, requiring them to implement NbS or DRR measures for their Pacific operations. |
| **The term NbS is being misunderstood**. Policy constraints combined with an absence of appropriate governance and standards holds back the supply side from engaging. | ⇒ Define "integrity" and develop sector manuals to describe the nature-positive contribution of investments. Education and outreach is needed to communicate the benefits of NbS across sectors, including on NbS definitions and climate change. | ⇒ Governments, in partnership with multilateral organisations can continue to build a pipeline of bankable NbS projects with credible and regionally agreed standards which demonstrate additionality, will support increased uptake from investors. |
| **Demand is outstripping supply** for carbon credits from nature-based solutions. Developing the market that can bridge supply and demand of carbon credits from nature-based solutions is a crucial part of leveraging sufficient finance for NbS. | ⇒ Article 6 trading, where Pacific Island nations participate in carbon credit trading under the Paris Agreement, provides an opportunity for countries to bolster funding to implement climate projects. | ⇒ Public sector focus setting up the systems for inventories and Article 6 frameworks, while private sector can continue to explore the voluntary carbon market which may offer more immediate opportunities. |
| **Benefits sharing:** Complex land ownership arrangements, elite capture, and high numbers of community involvement make benefits sharing challenging | ⇒ Develop locally owned benefit sharing plans to ensure that benefits are tailored to the needs of the community. Some projects recommend against cash payments and instead split the profits to a community fund or for livelihood projects. | ⇒ Non-Governmental Organisations such as WWF can offer technical expertise on benefits sharing mechanisms, along with private sector specialist like Nakau that can support community-owned projects. |
| **Access to long-term funding** to difficult due to their complexity and lack of skilled personnel. Consistent and predictable climate finance is needed to increase community level initiatives. | ⇒ Countries need to be well enough established in terms of governance to access funding opportunities for themselves. Build internal, country-owned initiatives and in-house capacity. Over time, countries should aim to build long-term financing mechanisms. | ⇒ Public sector support to prioritise institutional capacity building, training in finance and proposal writing within their countries. Support from multilateral organisations to enhance local funding access and project implementation capacity. |
| **A lack of coordination between donors** has resulted in a duplication of effort, for example resulting in similar projects funded by different donors. | ⇒ Coordination across donors and partners is essential to ensure that NbS is seen as important and receives the necessary support. Catalysing alignment between needs and donors is one essential area that requires strengthening in the region. There is a need to connect the various holders of data and promote data exchange. | ⇒ Regional agencies like PIFS and SPREP can act as a conduit for sharing and strengthening NbS strategy and lessons learned regionally, with support from international NGOs. More resilient and NbS inclusive approaches are more likely to get approved at international level. |

### *Measuring success and monitoring effectiveness*

A project can only be investable if it can convert its economic and social benefits into revenue streams and it has a clear route to market. This requires estimating the whole-life costs and revenue of individual small projects, to show that they can deliver a financial return. Furthermore, investor returns have to be balanced with a fair revenue share with local communities. Valuing the costs and benefits to local communities over 30 years can be difficult, requiring the support of government agencies and shared knowledge on the cost of interventions.

Showing how individual NbS can be investable is essential for attracting large-scale investment into landscape programmes. "Stacking" is a concept that promotes the multiple benefits of different ecosystems to be valued on the same landscape, enabling local communities developing nature projects to benefit from multiple streams of income. [185] This can help to bridge the gap between small projects and larger landscapes.

Making assumptions about the typical resourcing needs for interventions, as well as ongoing maintenance, and other risks such as implementation delays, are important parts of risk forecasting for investors. The required timelines of nature investments also need to be considered. Running costs for 30+ years are often required to show the economic viability of a project.

**KEY RECOMMENDATIONS**

- ⇒ **Develop Innovative and Blended Finance Mechanisms.** Promote the development and scaling-up of innovative finance models—such as blended finance (combining public, private, and philanthropic capital), green bonds, impact investing, and payments for ecosystem services—to diversify and increase funding sources for NbS.
- ⇒ **Addressing complex land tenure arrangements and ensuring equitable benefit sharing** with Indigenous Peoples and local communities are crucial for successful and sustainable NbS projects, particularly in the context of carbon markets.
- ⇒ Building **in-house capacity within Pacific Island nations for finance and proposal writing** is vital to improve access to global funds.
- ⇒ **Build Local Capacity for Market Readiness and Project Development.** Invest in capacity building for governments, local communities, and project developers on carbon/biodiversity standards (e.g., VCS, Gold Standard, Plan Vivo), MRV (Monitoring, Reporting, Verification), project registration, and credit issuance. Provide training on how to navigate market procedures, contracts, and risk assessment.
- ⇒ Demonstrating the **investment potential of individual NbS projects** by valuing their multiple benefits ("stacking") and showing a clear route to market with balanced investor returns and community benefits is essential for attracting large-scale investment.
- ⇒ **Strengthen Data, Baselines, and Monitoring Systems**. Develop and maintain robust data and monitoring systems for carbon stocks, biodiversity values, and ecosystem health. Use participatory approaches and remote sensing to ensure reliable baselines, project transparency, and long-term credibility.

[185] https://assets.publishing.service.gov.uk/media/642542ae60a35e000c0cb148/nature-markets.pdf

*"It's very important that whatever we're doing is not just a standard three-year project and then you move on to the next project. It's something that can be grown and become a longstanding implementation"* - **New Zealand Ministry of Foreign Affairs and Trade (MFAT)**

Photo credit: Jean-Yves Myer

# MEL

## CONCEPTUAL AND METHODOLOGICAL CHALLENGES

NbS are designed to address multiple objectives simultaneously, including tackling societal and ecological challenges while ensuring economic viability.

However, their multi-objective nature, the complexity of the dimensions they aim to address, and the interactions between these dimensions present significant challenges for monitoring and evaluation (M&E)[186].

In the Pacific, these challenges are amplified by the region's diverse ecosystems and capacities for implementation and assessment[187].

### *Defining effectiveness*

The concept of *effectiveness*, a core component of the NbS definition in the UNEA-5 resolution, is central to M&E processes. However, as also underlined in the previous sections, the definition of effectiveness is often contextual and shaped by the different interpretations of NbS. Research has shown that there is a general tendency to associate effectiveness primarily with the ecological outcomes of NbS implementation [188].

Sowińska-Świerkosz and colleagues[189] proposed a framework for assessing NbS effectiveness that considers ecological, economic, and social benefits, as well as adaptability and the ability to minimise trade-offs. Similarly, the European Commission [190] emphasises that effectiveness should be evaluated based on how well NbS address specific societal challenges while simultaneously providing benefits for biodiversity and human well-being. This requires evaluation frameworks able to assess multiple outcomes across different scales and timeframes.

In contexts such as the Pacific, where traditional ecological knowledge and customary management practices are common in the management of NbS, it is crucial to capture the diverse definitions of "effectiveness". Jupiter and colleagues [191] found that successful NbS in Fiji, Vanuatu, and Solomon Islands incorporated traditional knowledge into both implementation and monitoring frameworks, leading to more culturally appropriate outcomes.

However, as emerged from the interviews, unclarity about what to identify as "effective" and the scope of the related evaluation criteria has also resulted in a multiplication of evaluation criteria and indicators, complicating M&E efforts.

***Key insight:*** *"Effectiveness" should combine ecological, social, and economic aspects for a comprehensive evaluation of NbS.*

[186] Cohen-Shacham, E., Walters, G., Janzen, C., & Maginnis, S. (2019). Core principles for successfully implementing and upscaling nature-based solutions. *Environmental Science & Policy, 98*, 20–29. https://doi.org/10.1016/j.envsci.2019.04.014

[187] Wyborn, C., Datta, A., Montana, J., Ryan, M., Leith, P., Chaffin, B., ... & van Kerkhoff, L. (2019). Co-producing sustainability: Reordering the governance of science, policy, and practice. *Annual Review of Environment and Resources, 44*, 319–346. https://doi.org/10.1146/annurev-environ-101718-033103

[188] Sowińska-Świerkosz, B., & García, J. (2022). What are Nature-Based Solutions (NBS)? Setting core ideas for concept clarification. *Nature-Based Solutions, 2*, 100009. https://doi.org/10.1016/j.NbSj.2022.100009

[189] Barbara Sowińska-Świerkosz and Joan García, 'A New Evaluation Framework for Nature-Based Solutions (NBS) Projects Based on the Application of Performance Questions and Indicators Approach', *Science of The Total Environment* 787 (15 September 2021): 147615, https://doi.org/10.1016/j.scitotenv.2021.147615.

[190] European Commission, Directorate-General for Research and Innovation. (2021). *Evaluating the impact of nature-based solutions: A handbook for practitioners*. Publications Office of the European Union. https://data.europa.eu/doi/10.2777/244577

[191] Jupiter, S. D., Cohen, P. J., Weeks, R., Tawake, A., & Govan, H. (2014). Locally-managed marine areas: Multiple objectives and diverse strategies. *Pacific Conservation Biology, 20*(2), 165–179. https://doi.org/10.1071/PC140165

## *Defining perspectives*

Another key challenge in NbS evaluation is determining whose perspective is prioritised.

The European Commission's Handbook for Practitioners on Evaluating the Impact of NbS [192] suggests that, given their transdisciplinary nature, M&E efforts should adopt a transdisciplinary approach also resting on consultative processes, as this will enable a theory of change that can incorporate different viewpoints. This facilitates ownership, which is critical for ensuring that monitoring can be sustained over time.

The Pacific Islands Framework for Nature Conservation and Protected Areas 2021-2025 emphasises the importance of inclusive governance in NbS implementation and evaluation.

However, while there is a call for M&E frameworks to include marginalised voices in the definition of "success", there is limited evidence on the extent to which this has taken place. Additionally, there is a lack of evidence on whether participatory processes are used to identify key M&E elements, such as evaluation criteria or the underlying theories of change.

Interviews highlighted a disconnect between existing guidelines and frameworks and the realities of the Pacific context, alluding to the need for more context-sensitive M&E approaches. For example, standardised indicators often fail to capture culturally significant ecosystem services such as spiritual connections to land and sea [193]

***Key insights:*** *Participatory approaches in defining evaluation criteria are necessary for locally relevant M&E frameworks.*

## *Temporal considerations*

The temporal dimension presents another critical challenge for NbS M&E efforts, as many ecological processes manifest over long time horizons. For this reason, Seddon and colleagues[194] claim that effectiveness should be assessed across multiple temporal scales.

In the Pacific region, this challenge is particularly relevant given the accelerating impacts of climate change, including sea-level rise and increasing frequency of extreme weather events [195]. For example, Paxton and colleagues[196] highlight that short-term evaluation timeframes might not be appropriate for assessing the effectiveness of coastal ecosystem interventions, as their effectiveness often becomes apparent only after years of implementation.

For this reason, it is crucial that M&E efforts align with the temporal scales of the ecological and social processes they aim to influence, which, in turn, requires the identification of causal nexuses and appropriate timeframes. This often means monitoring systems that extend beyond conventional 3–5-year project cycles.

***Key insights:*** *Effective M&E requires monitoring timeframes that match critical socio-ecological processes, often extending over long-time horizons.*

[192] Directorate-General for Research and Innovation (European Commission), *Evaluating the Impact of Nature-Based Solutions*.

[193] Pascua, P., McMillen, H., Ticktin, T., Vaughan, M., & Winter, K. B. (2017). Beyond services: A process and framework to incorporate cultural, genealogical, place-based, and Indigenous relationships in ecosystem service assessments. *Ecosystem Services, 26*, 465–475. https://doi.org/10.1016/j.ecoser.2017.03.012

Seddon, N., Chausson, A., Berry, P., Girardin, C. A. J., Smith, A., & Turner, B. (2020). Understanding the value and limits of nature-based solutions to climate change and other global challenges. *Philosophical Transactions of the Royal Society B: Biological Sciences, 375*(1794), 20190120. https://doi.org/10.1098/rstb.2019.0120

[195] Eulalia Gómez Martín et al., 'Assessing the Long-Term Effectiveness of Nature-Based Solutions under Different Climate Change Scenarios', *Science of The Total Environment* 794 (10 November 2021): 148515, https://doi.org/10.1016/j.scitotenv.2021.148515.

[196] Paxton, A. B., Arkema, K. K., Ferranti, L. R., Gittman, R. K., Walters, L. J., Guerry, A. D., ... & Smee, D. L. (2024). Evidence on the performance of nature-based solutions interventions for coastal protection in biogenic, shallow ecosystems: A systematic map. *Environmental Evidence, 13*, 28. https://doi.org/10.1186/s13750-024-00350-5

## *Baseline establishment and target-setting*

A critical aspect of M&E is the establishment of baselines / benchmarks against which changes can be measured. In the Pacific context, this can be challenging due to data gaps, resource constraints, and the dynamic nature of ecosystems under climate change[197].

Pre-intervention ecological assessments are necessary for baseline establishment. Conditions in similar ecosystems can be used to define baselines when data is scarce or absent[198]. This should be complemented by socio-economic assessments to capture the related pre-intervention conditions[199].

For target-setting, participatory approaches involving communities in defining success metrics have been experimented with to increase ownership, define plausible achievements and legitimise diverse knowledge systems in M&E [200], [201]. In similar instances, target-setting requires a structured approach including stakeholder mapping, community-led definition of success metrics, and integration of scientific thresholds with local priorities, among others[202]. Climate-informed planning to account for environmental changes has been recommended by McLeod and colleagues as essential for realistic goal-setting in the region[203].

***Key insight:*** *Baselines comprising ecological, social, and economic dimensions provide the foundation for meaningful M&E. Target-setting should be participatory and realistic to align with local context.*

## *Participatory monitoring*

Monitoring is oftentimes a costly task, particularly considering the timeframes for NbS to "mature" and outcomes to manifest. The involvement of stakeholders in monitoring can reduce costs while simultaneously building local capacity and ownership. As Dalimunthe[204] states, stakeholder engagement in planning and implementing NbS contributes to their understanding of effectiveness, which in turn enhances local ownerships and capacities in monitoring.

Dacks and colleagues[205] demonstrated, through a case study in Fiji, that community-led monitoring of marine protected areas not only produced valuable data but also built local capacity and ensured that evaluation metrics were culturally appropriate.

***Key insight:*** *Community-led monitoring can increase local ownership, reduce long-term costs, and ensure culturally appropriate evaluation metrics.*

[197] Terry Hills et al., 'Pacific Island Biodiversity, Ecosystems and Climate Change Adaptation: Building on Nature's Resilience', n.d.

[198] Ángel Borja, Daniel M. Dauer, and Antoine Grémare, 'The Importance of Setting Targets and Reference Conditions in Assessing Marine Ecosystem Quality', *Ecological Indicators*, Marine Benthic Indicators, 12, no. 1 (1 January 2012): 1–7, https://doi.org/10.1016/j.ecolind.2011.06.018.

[199] Albert, C., Schröter, B., Haase, D., Brillinger, M., Henze, J., Herrmann, S., ... & Wittmer, H. (2021). Planning nature-based solutions: Principles, steps, and insights. *Ambio, 50*(8), 1446–1461. https://doi.org/10.1007/s13280-020-01365-1

[200] Kiss, B., Wamsler, C., & Bussin, M. (2022). Citizen participation in the governance of nature-based solutions. Environmental Policy and Governance, 32(3), 247–272. https://doi.org/10.1002/eet.1987

Giordano, R., & Pagano, A. (2023). Participatory modelling for NBS co-design and implementation. In E. López-Gunn, A. M. Hernández-Mora, & T. Zikos (Eds.), Greening water risks: Natural assurance schemes (pp. 67–89). Springer International Publishing. https://doi.org/10.1007/978-3-031-25308-9_5

[201] Sangha, K. K., Edwards, T., Costanza, R., & Muir, K. (2025). A nature-based solutions assessment framework integrating Indigenous biocultural and ecosystem services perspectives: An Australian example. *Ecological Indicators, 172*, 113230. https://doi.org/10.1016/j.ecolind.2025.113230

[202] Wyborn, C., Datta, A., Montana, J., Ryan, M., Leith, P., Chaffin, B., ... & van Kerkhoff, L. (2019). Co-producing sustainability: Reordering the governance of science, policy, and practice. *Annual Review of Environment and Resources, 44*, 319–346. https://doi.org/10.1146/annurev-environ-101718-033103

[203] Elizabeth Mcleod et al., 'The Future of Resilience-Based Management in Coral Reef Ecosystems', *Journal of Environmental Management* 233 (1 March 2019): 291–301, https://doi.org/10.1016/j.jenvman.2018.11.034.

[204] Syarifah Aini Dalimunthe, 'Who Manages Space? Eco-DRR and the Local Community', *Sustainability* 10, no. 6 (June 2018): 1705, https://doi.org/10.3390/su10061705.

[205] Rachel Dacks et al., 'Investigating the Role of Fish and Fishing in Sharing Networks to Build Resilience in Coral Reef Social-Ecological Systems', *Coastal Management* 48, no. 3 (3 May 2020): 165–87, https://doi.org/10.1080/08920753.2020.1747911.

# IMPLEMENTING MONITORING

## *Indicators of NbS performance*

In the NbS discourse, performance can be measured against a before-the-intervention baseline or a benchmark, which could include alternative NbS approaches, non-NbS interventions, or no intervention at all. These approaches are not mutually exclusive.

However, there are no universal indicators to measure NbS effectiveness, considering the different aspects their design and implementation can take, the target landscapes, the scale and similar considerations.

Existing NbS definitions point to the need to demonstrate effectiveness across different dimensions, including environmental, social and economic aspects. A crucial consideration is also the need to demonstrate that such effectiveness can be maintained over different time horizons.

Furthermore, integrating diverse values remains a challenge, particularly regarding the intangible aspects of NbS, which are frequently overlooked due to technical limitations and the absence of consensus on measurement approaches. Marijuan and colleagues[206] proposed using the ecosystem services categories developed by IPBES and related indicators against the IUCN guidelines to understand the impact of NbS.

***Key insights:*** *Sets of indicators should balance environmental, social, and economic dimensions and capture "effectiveness" over different spatial and time scales.*

## *Developing MEL frameworks*

Effective MEL planning starts at inception and requires the definition of a clear theory of change. Participatory approaches also help prioritise criteria and indicators that are socially and ecologically meaningful, while accounting for their practicality of their implementation.

Ecological and cultural contexts should be used to define protocols before monitoring begins. These will help identify appropriate times, methods, and permissions for data collection that respect local customs and traditional authorities, [207] while aligning with the appropriate ecological processes[208].

Additionally, tiered indicator approaches that include both simple metrics and more complex scientific measurements can be used to monitor multiple dimensions at the core of the NbS concept, including social justice [209] . These approaches are beneficial as they respond to different levels of monitoring capacity while maintaining data integrity.

Integration of scientific data with traditional ecological knowledge creates more comprehensive and robust frameworks, particularly valuable in Pacific Island contexts where data limitations exist[210].

[206] Marijuan, R., Brown, L. E., Cai, Y., Caussade, B., Gkoumas, V., Lago, M., ... & Virdis, M. R. (2024). Evaluating the impact of nature-based solutions on the provision of water-related and water-dependent ecosystem services. *Nature-Based Solutions, 6*, 100194. https://doi.org/10.1016/j.NbSj.2024.100194

[207] Malsale, P., Fa'anunu, 'O., Fong, T., Fong-Lomavatu, M., Esau, D., & Anderson-Berry, L. (2018). Protocols and partnerships for engaging Pacific Island communities in the collection and use of traditional climate knowledge. *Bulletin of the American Meteorological Society, 99*(12), 2471–2489. https://doi.org/10.1175/BAMS-D-17-0163.1

[208] Nunn, P. D., Kumar, R., Barrowman, H. M., Chambers, L., Fifita, L., Gegeo, D., Gomese, C., McGree, S., Rarai, A., Cheer, K., Esau, D., Fa'anunu, 'O., Fong, T., Fong-Lomavatu, M., ... & Wongbusarakum, S. (2024). Traditional knowledge for climate resilience in the Pacific Islands. *WIREs Climate Change, 15*(4), e882. https://doi.org/10.1002/wcc.882

[209] Goodwin, S., Kabisch, N., Sahakian, M., Grafakos, S., & Davis, M. (2024). Measuring the contribution of nature-based solutions beyond climate adaptation in cities. *Global Environmental Change, 89*, 102939. https://doi.org/10.1016/j.gloenvcha.2024.102939.

[210] Vierros, M. K., Armitage, D. R., Charles, A., & Nakamura, J. (2020). Considering Indigenous peoples and local communities in governance of the global ocean commons. *Marine Policy, 119*, 104039. https://doi.org/10.1016/j.marpol.2020.104039

Sterling, E. J., Pascua, P., Sigouin, A., Gazit, N., Mandle, L., Betley, E., ... & McCarter, J. (2017). Biocultural approaches to well-being and sustainability indicators across scales. *Nature Ecology & Evolution, 1*(12), 1798–1806. https://doi.org/10.1038/s41559-017-0349-6

Practical implementation can benefit from multi-language data collection tools. Furthermore, visual reporting formats can improve communication of monitoring results to diverse stakeholders or be used to facilitate monitoring across different literacy levels[211].

***Key insight:*** *MEL frameworks should respond to different ecological and cultural processes, while accounting for the practical feasibility of monitoring efforts. These should accommodate able to scientific and traditional ecological knowledge that can help overcome data gaps.*

## Data management and integration

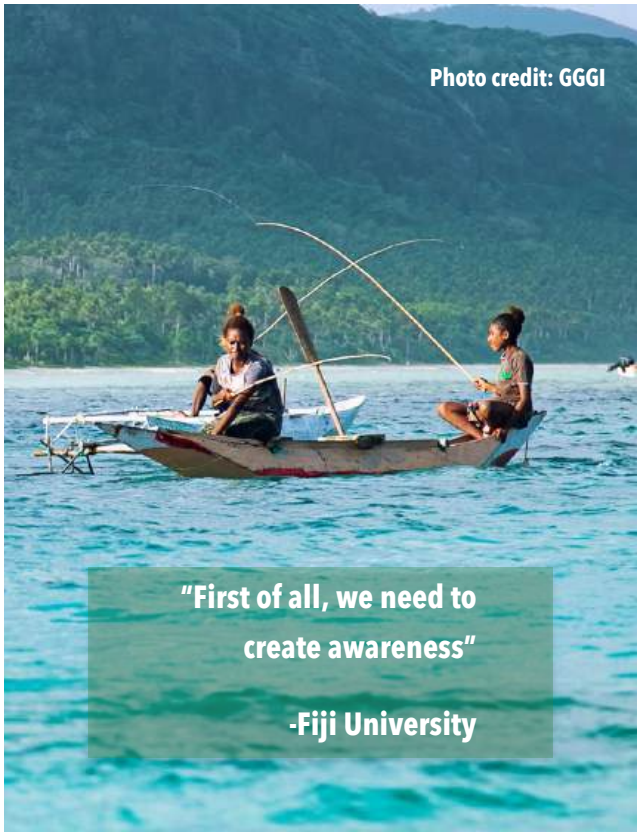
Effective M&E requires robust systems for collecting, managing, integrating, and sharing data from different sources. Pacific NbS initiatives face unique challenges in data management due to the integration of different knowledge systems and the often-limited data management infrastructure.

Knowledge system integration protocols and governance mechanisms are necessary where traditional ecological knowledge and scientific data coexist[212]. In similar contexts, the importance of data sovereignty principles that ensure Indigenous communities maintain rights over their knowledge, have been emphasised by various scholars for traditional knowledge protection[213].

Technical approaches to data integration have been proposed, including databases allowing different data formats to be compared and analysed[214]. In similar instances, mixed methods approaches that combine quantitative measurements with qualitative assessments might be necessary to provide comprehensive evaluation while accommodating different knowledge systems in M&E efforts.

Community data ownership mechanisms have been successfully implemented in several Pacific NbS initiatives[215]. Veitayaki *et al*[216] highlight how community benefit from collected data can strengthen long-term monitoring sustainability.

***Key insights:*** *Integration of diverse knowledge systems requires measures and protocols for data sovereignty and standardisation while maintaining flexibility and the integrity of the underlying knowledge systems.*




[211] Jupiter et al., 'Locally-Managed Marine Areas'.
Govan, H., Aalbersberg, W., Tawake, A., & Parks, J. (2009). 'Locally-Managed Marine Areas: A guide book'

[212] Cullen-Unsworth, L. C., Hill, R., Butler, J. R. A., & Wallace, M. (2012). A research process for integrating Indigenous and scientific knowledge in cultural landscapes: Principles and determinants of success in the Wet TroPICs World Heritage Area, Australia. *The Geographical Journal, 178*(4), 351–365. https://doi.org/10.1111/j.1475-4959.2011.00451.x

[213] Carroll, S. R., Garba, I., Figueroa-Rodríguez, O. L., Holbrook, J., Lovett, R., Materechera, S., … & Hudson, M. (2020). The CARE Principles for Indigenous data governance. *Data Science Journal, 19*(1), Article 43. https://doi.org/10.5334/dsj-2020-043

[214] Sangha, K. K., Edwards, T., Costanza, R., & Muir, K. (2025). A nature-based solutions assessment framework integrating Indigenous biocultural and ecosystem services perspectives: An Australian example. *Ecological Indicators, 172*, 113230. https://doi.org/10.1016/j.ecolind.2025.113230

[215] Campion, O. B., Waina, L. T., James, G., Fogarty, H., Bayliss, P., & Ens, E. J. (2023). Monitoring and evaluation of Indigenous land and sea management: An Indigenous-led approach in the Arafura Swamp, Northern Australia. *Ecological Management & Restoration, 24*(2–3), 75–88. https://doi.org/10.1111/emr.12586

[216] 'ResearchGate. (n.d.). *Living from the sea: Culture and marine conservation in Fiji*. Retrieved March 15, 2025, from https://www.researchgate.net/publication/269696304_Living_from_the_Sea_Culture_and_Marine_Conservation_in_Fiji

**Case study: Watershed Interventions for Systems Health (WISH), Fiji, Wildlife Conservation Society, 2019 - 2021**.

The Watershed Interventions for Systems Health in Fiji (WISH Fiji) project was designed to address the complex interactions between environmental and **public health risks in selected watersheds in Fiji**. The project was developed around a theory of change linking NbS for watershed restoration and enhanced human health outcomes.

More specifically, the project aimed to **reduce water-related diseases** by enhancing the ecological health of the watersheds, in turn requiring strengthened environmental stewardship, and coordinated governance mechanisms.

The project adopted a **participatory approach to identify risks, prioritise interventions, and monitor system responses**. A key element of this approach was the integration of local and scientific knowledge to contribute to the building of ownership of the watershed management and governance processes reinforced via the project.

**Baseline data collection was essential to identify appropriate interventions** to address the issues previously discussed with stakeholders and establish monitoring processes accordingly. With the participation of local stakeholders, baseline information was gathered on land and water use, water and sanitation infrastructure, water quality, ecosystem conditions, and recent cases of water-related diseases.

The project also **used a theory of change to link ecological health with economic costs** (stemming from the negative implications of degradation on human health) to attract policy and financial support. This partly contributed to the establishment of a cross-sectoral National Drinking Water Quality Committee, endorsed by Fiji's Cabinet in October 2022. The committee was responsible for improving coordination for water governance also by integrating water quality monitoring with disease surveillance programmes.

WISH Fiji shows how a **clear theory of change not only can facilitate monitoring and establishing causal impact but can also serve to secure institutional support** by clearly identifying the process through which NbS can (help) address societal challenges.

# FUTURE DIRECTIONS AND RECOMMENDATIONS

## 1. Integrated monitoring frameworks

From the analysis and stakeholders' interviews, it emerges that there is a clear need for integrated monitoring frameworks that can capture the multidimensional outcomes and impacts of NbS while remaining practical. Raymond and colleagues [217] propose an "impact evaluation framework" that considers pathways from NbS actions to outcomes to guide M&E efforts. The identification of indicators and common aspects to assess NbS should be complemented by context-specific metrics to strike a balance between the need for standardisation and greater flexibility to accommodate different realities. The European Commission's Handbook for Practitioners on Evaluating the Impact of NbS[218] proposes such an approach, with recommended indicators that can be adapted to local circumstances.

## 2. Participatory approaches to defining "effectiveness"

As highlighted in previous sections, evaluation is further complicated by the absence of a standardised definition and different interpretations of the "NbS" concept, as well as the often-unclear objectives regarding what needs to be monitored and evaluated. A clear theory of change that incorporates multiple knowledge systems and perspectives is essential for a shared understanding and definition of "effectiveness" across different stakeholder groups. This process should involve actors at different levels, from micro-level (e.g., communities) to macro-level (e.g., policymakers setting evaluation criteria).

Some of the frameworks discussed in this section can be used to guide the process.

## 3. Knowledge sharing

Enhanced knowledge sharing across NbS initiatives can accelerate learning and improve evaluation approaches. Cohen-Shacham et al [219] call for the development of communities of practice around NbS implementation and evaluation. Regional platforms such as the Pacific Resilience Partnership and the Pacific Islands Roundtable offer potential avenues to coordinate monitoring approaches and share data across Pacific countries, potentially contributing to more comprehensive assessment of NbS effectiveness at scales.

## 4. Technologies for monitoring

Emerging technologies, such as remotely sensed satellite or drone imagery, offer opportunities to enhance monitoring efficiency. Earth observation data, and mobile applications for citizen science are just some examples for reducing the burden and costs of comprehensive NbS monitoring and evaluation[220]. In the Pacific, where geographical remoteness can pose a logistical challenge to "traditional" monitoring approaches, similar solutions may allow to circumnavigate similar constraints and abate costs.

## 5. Capacity and resource requirements

Effective M&E for NbS in the Pacific requires specific capacities and resources that are often limited or unevenly distributed across the region and often concentrated in central government agencies rather than distributed to local implementation sites[221].

Institutional capacity needs encompass data management systems and cross-sectoral coordination mechanisms. Capacity building

[217] Raymond, C. M., Kenter, J. O., Gould, R. K., Muraca, B., Rawluk, A., Kendal, D., ... & Pascual, U. (2023). An inclusive typology of values for navigating transformations towards a just and sustainable future. *Current Opinion in Environmental Sustainability, 64*, 101301. https://doi.org/10.1016/j.cosust.2023.101301

[218] European Commission, Directorate-General for Research and Innovation. (2021). *Evaluating the impact of nature-based solutions: A handbook for practitioners*. Publications Office of the European Union. https://data.europa.eu/doi/10.2777/244577

[219] Cohen-Shacham, E., Walters, G., Janzen, C., & Maginnis, S. (2019). Core principles for successfully implementing and upscaling nature-based solutions. *Environmental Science & Policy, 98*, 20–29. https://doi.org/10.1016/j.envsci.2019.04.014

[220] Pettorelli, N., Laurance, W. F., O'Brien, T. G., Wegmann, M., Nagendra, H., & Turner, W. (2018). Satellite remote sensing of ecosystem functions: Opportunities, challenges and way forward. *Remote Sensing in Ecology and Conservation, 4*(2), 71–93. https://doi.org/10.1002/rse2.59

[221] 'University of the Sunshine Coast. (n.d.). *Adaptation to climate change: Contemporary challenges and perspectives*. Retrieved March 15, 2025, from https://research.usc.edu.au/esploro/outputs/bookChapter/Adaptation-to-Climate-Change-Contemporary-Challenges/99450846602621

approaches that have proven effective include learning networks [222] , among others.

Resource mobilisation strategies must address the challenge of sustaining M&E beyond initial project timeframes. Blasiak et al [223] highlight the need to explore (alternative) financing models that can support long-term monitoring activities. (See Chapter on Finance for NbS for further details)

## KEY RECOMMENDATIONS

- ⇒ *Integrated frameworks should balance standardisation with flexibility, connecting NbS actions to outcomes through clear causal pathways.*
- ⇒ *Participatory development of theories of change that accommodate diverse knowledge systems can build shared understanding of "effectiveness".*
- ⇒ *Regional knowledge-sharing platforms can accelerate learning across the Pacific, supporting standardisation where appropriate.*
- ⇒ *Technologies, such as drones or satellite imagery, can overcome geographical challenges of monitoring across dispersed Pacific islands.*


[222] Björn Wickenberg, Kes McCormick, and Johanna Alkan Olsson, 'Advancing the Implementation of Nature-Based Solutions in Cities: A Review of Frameworks', *Environmental Science & Policy* 125 (1 November 2021): 44–53, https://doi.org/10.1016/j.envsci.2021.08.016.

[223] Robert Blasiak et al., 'Towards Greater Transparency and Coherence in Funding for Sustainable Marine Fisheries and Healthy Oceans', *Marine Policy* 107 (1 September 2019): 103508, https://doi.org/10.1016/j.marpol.2019.04.012.

# Conclusion: Building Momentum for Nature-Based Solutions in the Pacific

We are currently at a pivotal moment for Nature-based Solutions (NbS) in Pacific Island Countries and Territories (PICTs). Faced with the converging forces of urbanization, rapid population growth, increasing poverty, and intensifying climate change impacts, PICTs recognise the urgent need to integrate NbS as a socio-economic and environmental necessity. While the concept of using natural systems to address challenges is deeply rooted in Indigenous practices, exemplified by the region's history of nature utilization, the formal application of 'NbS' is relatively new but gaining traction.

This report provides a snapshot of a dynamic landscape, revealing a growing momentum across the region. We see NbS increasingly applied, with a strong focus on coastal and marine protection, climate resilience, and community-based conservation initiatives. Projects are predominantly community-driven, reflecting a tendency towards participatory approaches and acknowledging that many efforts support nature-based solutions through locally led initiatives. The analysis highlights significant opportunities to further transform the potential of NbS into practical action, underpinned by dedicated funding initiatives such as the Kiwa Initiative, and support from major climate finance funds like the Green Climate Fund (GCF) and the Global Environment Facility (GEF). Organizations across regional bodies, NGOs, and national governments are actively driving implementation and supporting the enabling environment.

However, the journey is just beginning. Challenges persist, including uneven geographical representation of projects and research, particularly in sectors like water resource management, urban development, and agriculture (despite a notable number of projects linked to agriculture). Access to sustained, long-term financing remains a significant hurdle, especially for community groups, civil society organizations, and national governments, often hampered by complex application processes and stringent criteria. The need to define and measure the effectiveness of NbS, particularly across ecological, social, and economic dimensions, and over appropriate timeframes, presents both conceptual and methodological challenges. Furthermore, capacity gaps exist across various stakeholder groups, from decision-makers to local communities, in areas like technical implementation, project management, and integrating diverse knowledge systems.

Systematically building capacity, from local communities upwards, is essential for sustained success. This means recognizing the power of women in capacity retention, fostering local research and academic capacity, and providing practical, contextual skills development through formal accreditation and regional training hubs. A fundamental opportunity lies in integrating traditional and local ecological knowledge with scientific expertise in capacity building and project implementation, fostering local ownership and creating more effective, context-specific solutions.

Crucially, the insights from this report illuminate clear pathways forward, building on the existing momentum. There is immense scope to integrate NbS more effectively into national policies and regulatory frameworks, ensuring policy coherence and leveraging NbS for climate resilience, biodiversity, and socio-economic development. This requires strengthening national policy instruments, adopting a holistic national approach, and improving awareness and political buy-in through advocacy and public diplomacy. Demonstrating the tangible benefits and assessing trade-offs of NbS is vital for increasing their adoption.

Mobilizing long-term, diversified financial flows is paramount. This involves increasing finance flows to PICTs, strengthening local capacity to meet funders' requirements, and training stakeholders in accessing diverse funding sources. Innovative mechanisms such as blue carbon initiatives, and exploring biodiversity credits hold significant promise, alongside efforts to build a pipeline of bankable NbS projects and develop credible, regionally agreed standards for nature markets.

Finally, establishing simple, sustained, and locally appropriate indicators and frameworks for monitoring and evaluation is crucial for measuring success, demonstrating impact, and facilitating adaptive management. This necessitates integrated monitoring frameworks that balance standardization with flexibility, participatory approaches to defining "effectiveness," enhanced knowledge sharing, and the strategic use of technology to overcome geographical challenges.

The trajectory for NbS in the Pacific is set towards accelerated action and deeper integration. By prioritizing local leadership, embedding traditional knowledge, strengthening institutional capacity, unlocking innovative finance, and refining monitoring practices, PICTs can harness the full potential of nature to build a resilient and sustainable future for their people and ecosystems. The collaborative efforts of governments, regional bodies, NGOs, communities, and the private sector, acting in concert, will be the driving force behind this transformative wave. The seeds have been planted; now is the time for concerted action to cultivate their growth and scale their impact across the Pacific region.

# ANNEX A

## PROJECT DATABASES

| Context | Name | Weblink |
|---|---|---|
| Pacific | Kiwa Initiative | https://kiwainitiative.org/fr/projets |
| Pacific | Climate Resilience by Nature Program | https://www.climateresilientbynature.com/projects |
| Pacific | Pacific Conservation Database | https://www.pacificislandsroundtable.com/pacific-conservation-database |
| Pacific | Pacific Blue Carbon Program | https://www.conservation.org/projects/our-blue-carbon-program |
| Pacific | SPC Project List | https://gem.spc.int/key-work |
| Pacific | Nakau Programme | https://nakau.org/ |
| Pacific | NUWAO Project | https://nuwao.org.nz/ |
| Pacific | GGGI Projects | https://gggi.org/region/pacific/ |
| Global | Urban Nature Atlas | https://una.city/ |
| Global | Nature-based Solutions Initiative | https://casestudies.naturebasedsolutionsinitiative.org/case-search/ |
| UK | WWF NbS accelerator UK | https://experience.arcgis.com/experience/5f7788e99dc94a54be8ccbd5123523c0/page/PROJECTS?views=View-2 |
| Global | IUCN Projects | https://iucn.org/our-work/topic/nature-based-solutions-climate/our-work/NbS-climate-projects |
| Global | IFAD | https://www.ifad.org/en/projects-list |

# LEARNING KNOWLEDGE AND NEWS PLATFORMS

| Context | Name | Weblink |
|---|---|---|
| Pacific | SPC resources | https://gem.spc.int/resources |
| Pacific | SPC News | https://gem.spc.int/news |
| Pacific | Live and Learn Resources | https://livelearn.org/resources/ |
| Pacific | Kiwa Initiative News | https://kiwainitiative.org/en/news |
| Pacific | Nature-based Solutions Design Guide for Te Moananui Oceania | https://nuwao.org.nz/wp-content/uploads/2024/05/NUWAO-NBS-Downloadable_Guide.pdf |
| Global | Coastal Adaptation Training | https://coast.noaa.gov/digitalcoast/training/ |
| Global | WWF reports on NbS | https://wwf.panda.org/discover/our_focus/climate_and_energy_practice/what_we_do/nature_based_solutions_for_climate/ |
| Global | Nature-based Solutions Knowledge Hub | https://NbShub.naturebasedsolutionsinitiative.org/ |
| Global | NbS Management Hub | https://iucn.org/our-work/topic/iucn-global-standard-nature-based-solutions/NbS-management-hub |
| UK | Nature-based Solutions Triple Win Toolkit 2021 | https://hub.jncc.gov.uk/assets/376d989f-0563-4e7f-b034-c79108f63758 |
| Global | GGGI Resources | https://gggi.org/flagship-publications/ |
| Global | IUCN Academy | https://iucnacademy.org/ |
| Global | Nature-based Solutions for Disaster and Climate Resilience Training by UNEP | https://pedrr.org/mooc/ |

# TOOLS AND DATA TO EVIDENCE NBS PROJECTS

| Context | Name | Weblink |
|---|---|---|
| Pacific | SPC Ocean Tools | https://gem.spc.int/data-and-tools |
| Pacific and the USA | NOAA Sea Level Rise Calculator | https://coast.noaa.gov/digitalcoast/tools/sea-level-calculator.html |
| Pacific | Pacific Data Hub | https://stats.pacificdata.org/?lc=en |
| Pacific | Pacific Environment Data Portal | https://pacific-data.sprep.org/ |
| Global | NbS Benefit explorer | https://NbSbenefitsexplorer.net/ |
| Global | Global NCS Opportunity Viewer | https://app.naturebase.org/map/ |
| Global | NbS evidence Platform | https://www.naturebasedsolutionsevidence.info/evidence-tool/ |
| Global | The IUCN Global Standard for Nature-based Solutions | https://NbS-sat.iucn.org/ |

# ANNEX B

## NBS PROJECT LIST

Projects or programmes screened as Nature-based Solutions in the Pacific starting between 2022 - 2025

| Project / Programme Name | Implementing agency | USD (in millions) | Donor |
|---|---|---|---|
| PaFresH20 - protecting freshwater resources for increased climate resilience in the Pacific Islands (2022-2027) | Pacific Community (SPC) and PWWA. | 15 | Green Climate Fund (GCF) |
| Engaging Mobilisation for Positive Outcome in Water, Ecosystem, and Resilience (EMPOWER) / KIWA Initiative (2022-2026) | Live & Learn | 1.8 | KIWA Initiative (EU, AFD, GAC, DFAT, MFAT) |
| Advancing NbS with Youth and Vulnerable Groups in Niue / KIWA Initiative (2022-2026) | Niue Department of Environment and UNDP | 1.5 | KIWA Initiative (EU, AFD, GAC, DFAT, MFAT) |
| Invasive Species Management for Resilient Ecosystems (INSPIRE) / KIWA Initiative (2024-2026) | BirdLife | 4 | KIWA Initiative (EU, AFD, GAC, DFAT, MFAT) |
| Protection and Restoration of Riparian Zones of the Nera (PERENNE) / KIWA Initiative (2023-2025) | New Caledonia Department of Environment and local communities | 1.3 | KIWA Initiative (EU, AFD, GAC, DFAT, MFAT) |
| UA HUKA / KIWA Initiative (2022-2026) | Association Vaiku'a I te manu o Ua Huka | 1.6 | KIWA Initiative (EU, AFD, GAC, DFAT, MFAT) |
| Biodiversity management and conservation / KIWA Initiative (2022-2026) | Conservation International Pacific Islands. | 1.8 | KIWA Initiative (EU, AFD, GAC, DFAT, MFAT) |
| Coastal protection / Nature-based seawalls / KIWA Initiative (2022-2026) | GGGI, Fiji Ministry of Waterways | 1.9 | KIWA Initiative (EU, AFD, GAC, DFAT, MFAT) |
| Reforestation and coral reef restoration / KIWA Initiative (2022-2023) | Tonga Ministry of Environment and local communities. | 0.18 | KIWA Initiative (EU, AFD, GAC, DFAT, MFAT) |

| | | | |
|---|---|---|---|
| Kyeema Foundation - Community-led Coral Reef Restoration: Community, Corals and Chickens (2022-2023) | Kyeema Foundation | 1.2 | DFAT (CRxN) |
| World Vision - Farmer Managed Natural Regeneration (2022) | World Vision | 2.5 | DFAT (CRxN) |
| Action Aid - Ni-Vanuatu Women Leading Solutions to Climate Change (2022-2025) | Action Aid Vanuatu | 1.8 | DFAT (CRxN) |
| Micronesia Community-based Fisheries Management as a Nature-based Solution for Coastal Resilience (MiCOAST) (2023-2026) | WWF-Pacific and local communities | 2.2 | Kiwa Initiative |
| Safeguarding Rennell Island livelihoods and biodiversity from invasive species (2022-2024) | BirdLife | 2.2 | KIWA Initiative (EU, AFD, GAC, DFAT, MFAT) |
| Fa'atura te Tahatai - Restoration and enhancement of coastal ecosystems in the Society Islands (2023-2026) | IUCN French National Committee, Te mana o te moana, Tahitian historical society, Te ora naho - FAPE, research delegation | 1.8 | French government via le Fonds vert – France nation verte; Fondation de France |
| Watershed Interventions for Systems Health Plus / WISH+ (2022-2026) | The Wildlife Conservation Society (WCS) | 2.5 | KIWA Initiative (EU, AFD, GAC, DFAT, MFAT) |
| Naturebased Solutions for Forests and People / Climate Resilient by Nature / Nakau Programme (2022-2024) | Live & Learn | | Australian Department of Foreign Affairs and Trade and WWF-Australia |
| FOREST VALUE ENHANCEMENT PROJECT / Solomon Islands Threshold Program (2022-2025) | Nakau, the Natural Resources Development Foundation (NRDF), Live & Learn Environmental Education and the Solomon Islands Threshold Program | 6.5 | Millennium Challenge Cooperation |
| WATER CATCHMENT RESTORATION, Honiara (2022-2025) | Nakau, Live and Learn | | Asian Development Bank's assistance to the Solomon Islands Government as part of the Urban Water Supply and Sanitation Sector Project, with funding also from the |

| | | | |
|---|---|---|---|
| | | | Global Environment Facility. |
| Management and restoration of O Le Pupu Pue National Park / KIWA Initiative (2022-2024) | Samoa Conservation Society (Inc.) | 0.08 | KIWA Initiative (EU, AFD, GAC, DFAT, MFAT) |
| Fiji - GCF NAP Readiness / GCF NAP readiness (2023-2025) | GGGI | 1.5 | GCF NAP readiness |
| Managing Invasive Species for Climate Change Adaptation in the Pacific: Natural Enemies / Natural Solutions (NENS) programme (2023-2026) | Island Conservation, Birdlife International Pacific, Pacific Biosecurity, and the Pacific Community a | 9.9 | New Zealand's Ministry of Foreign Affairs and Trade (MFAT) i, Secretariat of the Pacific Regional Environment Programme (SPREP), Manaaki Whenua - Landcare Research (MWLR), and the New Zealand Department of Conservation (NZDOC) |
| Rainwater Harvesting in the Marshall Islands: Addressing Climate Vulnerability in the Water Sector (ACWA) in the Marshall Islands (2023) | United Nations Development Programme (UNDP) Pacific Office in Fiji | 24.7 | Green Climate Fund (GCF) and Government of The Republic of the Marshall Islands (RMI) |
| Empowering youth in biodiversity management and conservation in Tonga (2022-2025) | Tonga National Youth Congress (Inc.) | 0.125 | KIWA Initiative (EU, AFD, GAC, DFAT, MFAT) |
| AQUA-Pearl: Scaling up community-led nature based oyster aquaculture for climate resilience in Fiji / Nature-based Climate Solutions in Aquaculture Food Systems in Asia-Pacific (AQUADAPT (2023-2027) | IISD along with the Wildlife Conservation Society, the Pacific Community, and J. Hunter Pearls, in cooperation with Fiji's Ministry of Fisheries. It is supported by the International Development Research Centre (IDRC) and Global Affairs Canada. | 1.405 | IDRC and the Government of Canada |
| Securing Kiribati's Natural Heritage: Protected areas for community, atoll, and island climate resilience (2022-2023) | Ministry of Environment, Lands and Agricultural Development, Ministry of Fisheries and Marine Resource Development | 0.203 | GEF Trust Fund |
| R2R Reimaanlok Looking to the Future: Strengthening Natural Resource Management in Atoll Communities in the Republic of Marshall Islands Employing | United Nations Development Programme | 0.035 | GEF |

| | | | |
|---|---|---|---|
| Integrated Approaches (RMI R2R) (2022-2027) | | | |
| Integrated Agro-ecosystem Approach for enhancing Livelihoods and Climate Resilience in Tuvalu (2022-2025) | Food and Agriculture Organization | 2.6 | GEF |
| Reefs of Hope (2023-2030) | Corals for Conservation (C4C) | | |
| Climate Adaptation and Protected Areas (CAPA) (2023-2026) | Wildlife Conservation Society and the WWF for Nature | | Global Affairs Canada |

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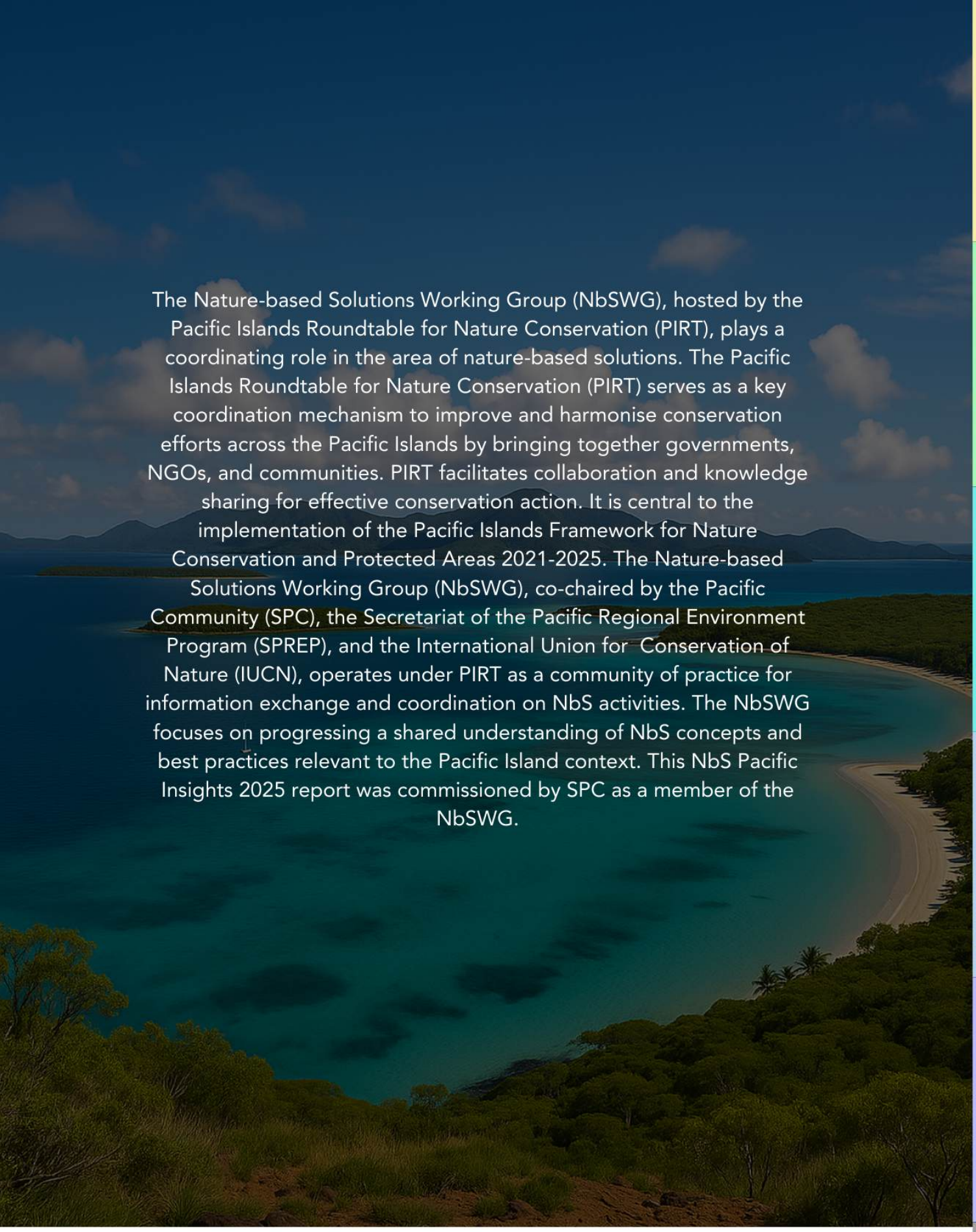

The Nature-based Solutions Working Group (NbSWG), hosted by the Pacific Islands Roundtable for Nature Conservation (PIRT), plays a coordinating role in the area of nature-based solutions. The Pacific Islands Roundtable for Nature Conservation (PIRT) serves as a key coordination mechanism to improve and harmonise conservation efforts across the Pacific Islands by bringing together governments, NGOs, and communities. PIRT facilitates collaboration and knowledge sharing for effective conservation action. It is central to the implementation of the Pacific Islands Framework for Nature Conservation and Protected Areas 2021-2025. The Nature-based Solutions Working Group (NbSWG), co-chaired by the Pacific Community (SPC), the Secretariat of the Pacific Regional Environment Program (SPREP), and the International Union for Conservation of Nature (IUCN), operates under PIRT as a community of practice for information exchange and coordination on NbS activities. The NbSWG focuses on progressing a shared understanding of NbS concepts and best practices relevant to the Pacific Island context. This NbS Pacific Insights 2025 report was commissioned by SPC as a member of the NbSWG.

Pacific Islands Roundtable
for Nature Conservation