

ADAPTING COASTAL CITIES AND TERRITORIES TO SEA LEVEL RISE IN THE PACIFIC

Challenges and Leading Practices



OCEAN & CLIMATE
PLATFORM



SHARING SOLUTIONS WITH COASTAL
CITIES TO TACKLE SEA LEVEL RISE

Partners



Sustainable, transformative and resilient for a Blue Pacific



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The Ocean & Climate Platform, Who are we?

The Ocean & Climate Platform (OCP) is an international network bringing together more than 100 organisations from civil society (NGOs, research institutes, foundations, local authorities, international organisations, and private sector entities). Created in the run-up to COP21 in Paris, the OCP aims to promote scientific expertise on the major role played by the ocean and its ecosystems in the climate system, and to advocate for better consideration of these interactions by national and international decision-makers. Building on the wide-ranging expertise of its members, the OCP brings light to concrete solutions to protect the ocean, its biodiversity, and the climate.

The OCP's mandates in international fora

- The Ocean & Climate Platform holds the **observer status** to the **United Nations Framework Convention on Climate Change (UNFCCC)**, along with several key roles:
 - ▶ Focal point for “Ocean & Coastal Zones”, Marrakech Partnership for Global Climate Action (MP-GCA) led by the High-Level Climate Champions, it mobilises non-state actors to raise ambition and accelerate climate action.
 - ▶ Expert for “Ocean and Coastal Zones”, Nairobi Work Programme on Adaptation (NWP-Ocean), which provides a knowledge hub to better integrate marine and coastal issues in Parties’ adaptation and resilience strategies.
 - ▶ Taskforce Lead for “Ocean and Coastal Zones”, Sharm el-Sheikh Adaptation Agenda (SAA), which rallies both countries and non-state actors behind a shared set of adaptation actions.
 - ▶ Informal advisor for the Ocean and Climate Change Dialogue (OCCD), mandated by the COP, it convenes Parties and non-party stakeholders to strengthen ocean-based action under the UNFCCC processes.
- The OCP has been participating in the **French governmental review of the IPCC reports**, including the Sixth Assessment Reports (AR6) and the Special Reports on 1.5°C and the Ocean and Cryosphere (SROCC).
- The OCP is also an observer organisation to the **United Nations Convention on Biological Diversity (CBD)** and to the **United Nations Economic and Social Council (ECOSOC)**.
- The OCP, together with the Varda Group, has been mandated by the governments of France and Costa Rica to facilitate the mobilisation of civil society for the preparation of the **3rd United Nations Ocean Conference (UNOC)** in Nice in June 2025.

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The Sea'ties Initiative

The Sea'ties Initiative aims to facilitate the development of public policies and the implementation of adaptation solutions to support coastal cities threatened by rising sea levels. Led by the Ocean & Climate Platform, the initiative is intended for elected representatives, administrators and stakeholders involved in this transition as a forum to exchange knowledge and experiences of sustainable solutions towards coastal resilience. Sea'ties is an international initiative which mobilises coastal experts and cities from five regions of the world featuring a diversity of climatic, geographic, social, economic and political contexts. A diversity of solutions has already been implemented across the world and can be inspirational for other coastal cities and territories. By making connections between real world experiences and characterising them through illuminating scientific works, we can promote the most suitable practises and support the choices of political decision-makers and regional administrators.

Primary goals

1/ **Compile scientific knowledge and data** into accessible summaries and databases, identifying and analysing solutions deployed by coastal cities across the world.

2/ **Foster the emergence of good practices and facilitate the exchange of knowledge and experiences** between coastal stakeholders during regional workshops. Leverage collective reflection for the identification of enabling factors for the deployment of sustainable adaptation solutions.

3/ **Encourage the integration of adaptation challenges into public policies** by promoting real world experience complemented with scientific knowledge, and by submitting policy recommendations to decision makers so they can integrate the most suitable solutions into their international and national public policies.

Regional workshops

Five regional workshops were organised between 2021 and 2023, mobilising experts and key stakeholders working on adapting coastal cities and territories to sea level rise. By facilitating the exchange of knowledge, practices and experiences, and highlighting the plurality of approaches and solutions implemented across the world, these workshops informed the production of recommendations and the advocacy work of the Ocean & Climate Platform.



Reference tools and documents

The Sea'ties Initiative contributes to the enhancement and diffusion of knowledge on adaptation issues through the production of scientific papers, reference tools and documents to the address of the scientific community, policymakers and the public.

• [Policy Recommendations for Coastal Cities to Adapt to Sea Level Rise](#)

The Policy Recommendations for coastal cities to adapt to sea level rise draw upon the expertise and on-the-ground experiences of over 230 stakeholders mobilised during regional workshops and are supported by 80 organisations worldwide. Intended for local, national, regional and international decision-makers, they highlight four priority actions: (1) Solutions: Planning long-term adaptation responses tailored to the local context, (2) Social justice: Prioritising social imperatives in adaptation policies, (3) Knowledge: Developing new ways to generate and share operational knowledge on adaptation, (4) Finance: Building a sustainable finance approach for coastal cities.

• [Regional Reports](#)

Each Sea'ties workshop, complemented by preliminary interviews, informs the production of a regional report providing an overview of the current obstacles and needs to be addressed to implement adaptation strategies. Intended for decision-makers and stakeholders willing to pursue transformational change on their coasts, the reports shed light on good practices to inspire action. The reports "Adapting Coastal Cities and Territories to Sea Level Rise: Challenges and Leading Practices" in [Northern Europe](#), the [Mediterranean region](#), the [U.S. West Coast](#) and [West Africa](#) are available on the [Sea'ties webpage](#).

• [The Sea'ties Declaration](#)

Initiated by the OCP, the French Government and the City of Brest, with the support of ICLEI and Race to Resilience, the Sea'ties Declaration commits more than 40 mayors, governors, and city networks across the world to the challenges of adapting coastal cities and territories to sea level rise. Highlighting four priority strategies, the Declaration is a call to accelerate adaptation action addressed to the international community.

• [Scientific Article - Designing Coastal Adaptation Strategies to Tackle Sea Level Rise](#)

The article "Designing Coastal Adaptation Strategies to Tackle Sea Level Rise" is a synthesis of scientific literature and presents four archetypes of adaptation strategies to sea level rise. These are analysed according to their governance modalities and characterised based on their degree of implementation complexity. This synthesis was co-written by scientists from the RTPi-Sea'ties, co-led by the OCP and CNRS, and was published in the Journal Frontiers in Marine Science, Ocean Solutions in November 2021.

• [The Blue-Tinted White Paper, Investment Protocol: Unlocking Financial Flows for Coastal Cities Adaptation to Climate Change and Resilience Building](#)

highlights the financial gaps and opportunities for coastal cities' adaptation and provides recommendations to unlock financial flows at scale.

• [Policy Brief - Adapting Coastal Cities and Territories to Sea Level Rise](#)

The policy brief "Adapting Coastal Cities and Territories to Sea Level Rise" addresses the challenges faced by stakeholders in the field of adaptation, and highlights the essential elements of a sustainable transition of coastal territories.

• [Map of Solutions](#)

The Map of Solutions is an interactive cartography listing adaptation responses implemented around the world. It provides project leaders with feedback, takeaways, and cautionary remarks to inform the design and the implementation of adaptation.

Editorial

SECRETARIAT OF THE PACIFIC REGIONAL ENVIRONMENT PROGRAMME

The increasing rise in global mean sea level due to climate change is an existential issue for Pacific Island Countries and Territories. According to the Intergovernmental Panel on Climate Change's (IPCC) Sixth Assessment Report (AR6), climate impacts and loss and damage will rapidly escalate above 1.5°C, where extreme sea level events will occur more frequently and severely, underscoring the critical importance of adaptation to secure the future existence and livelihoods of Pacific communities.

These challenges, long raised by Pacific Island countries and territories at the global level, strongly echo the mandate and vision given by our Members to the Secretariat of the Pacific Regional Environment Programme (SPREP) to ensure "A resilient Pacific environment sustaining our livelihoods and natural heritage in harmony with our cultures". We had this vision in mind when we established the Pacific Climate Change Centre, hosted at SPREP in Apia, Samoa, as the Centre of excellence for climate change information, science to services, capacity building, and innovation, mandated to provide practical information, support, and training to address the adaptation and mitigation priorities of Pacific Island communities. These challenges are also well captured in the 2050 Strategy for the Blue Pacific Continent that reinforces commitment and collaboration to advance Pacific regionalism based on seven key thematic areas including 1) climate and disasters and 2) ocean and natural environment.

Building resilience to cope with rising sea levels isn't limited to technical measures, but involves cross-sectoral approaches, including land use and urban development policies, resilient infrastructure planning, disaster risk reduction and management, nature-based solutions for ecosystem-based adaptation, locally led and adaptive governance mechanisms, such as coastal dynamic adaptive pathways to combine short-term actions and longer-term strategies and policies. Landownership in the

Pacific is over 90% under communal traditional ownership in all Pacific Island Countries. This means that building resilience and adaptation needs the consent and participation of traditional owners and the community.

While many adaptation projects are being implemented within the Pacific region, there is a critical need to better highlight sea level rise related issues and challenges, and further develop regional capacities through knowledge sharing on good practices and solutions. As part of SPREP and the Pacific Climate Change Centre's support to Pacific Island countries and territories in their adaptation journey, the workshop contributed to strengthening regional cooperation on this topic, by bringing together a diversity of stakeholders involved in coastal adaptation across the region (government representatives, practitioners and implementing partners, researchers, NGOs, the private sector, financial institutions, etc.).

The collaboration between SPREP, the Pacific Climate Change Centre, and the Ocean & Climate Platform through the Sea'ties initiative has continued in the lead up to COP28 in Dubai, where the regional and global policy recommendations based on the workshop outcomes have been showcased.

Beyond COP 28, SPREP remains committed to support its members in anticipating and implementing adaptation strategies to strengthen climate resilience in the face of continued sea level rise. It is my hope that this report is timely and impactful in moving us towards the collective actions needed to address this existential issue for the Pacific.

Sefanaia Nawadra,
Director General of SPREP



Editorial

THE TEREHĒAMANU COMMUNITY OF COMMUNES, FRENCH POLYNESIA

The Terehēamanu Community of Communes brings together five municipalities located on the main island of Tahiti, and representing 70 percent of the land area. Its members are Papara, Teva I Uta, West Taiarapu, East Taiarapu and Hitiaa O Te Ra, which are themselves made up of 13 associated municipalities.

Endowed with immense cultural and environmental wealth, Terehēamanu has been undergoing accelerated change for several decades. Across the territory, the impacts of climate change and the risks associated with rising sea levels are increasingly pronounced. To address these challenges, the region will transform itself and transition economically, ecologically, and socially. The foundations of this transition are rooted in three principles: a society anchored in the values of solidarity and transmission; a dynamic local economy based on innovation; a balanced, resilient, and environmentally sound regional development.

To realise its potential for the future, which is closely linked to the coast and the ocean, the community of communes is actively considering possible ways of adapting to sea level rise. Exchanges with neighbouring countries and internationally are therefore invaluable to learn from projects that have already been implemented and to anticipate and prepare the adaptation of the territory, its inhabitants, activities, and biodiversity in an appropriate and dignified manner - notably through the creation of a nature reserve and the definition of a comprehensive inter-municipal development plan, consolidated on the original names of lands in the traditional knowledge. Driven by the determination to embrace the future while continuing to transmit ancestral knowledge, the Community of Communes is committed to the collective reflection that has contributed to the production of this report and reaffirms the need for collaborations through initiatives such as Sea'ties.

Tearii Te Moana ALPHA
President of the Terehēamanu
Community of Communes



PURPOSE OF THIS BRIEF

This report draws on discussions held during the Sea'ties workshop "Adapting coastal cities and territories to sea level rise in the Pacific", held on July 10-12, 2023, in Nadi, Fiji, complemented by 12 individual interviews held in April and May 2023, with experts working across the Pacific. The workshop was organised by the Ocean & Climate Platform in collaboration with the Secretariat of the Pacific Regional Environment Programme (SPREP), and the Pacific Climate Change Centre (PCCC), with financial support of the Fonds Pacifique (French Ministry of Europe and Foreign Affairs), the Pacific Climate Change Centre, and SPREP through the KIWA Initiative technical assistance programme. It mobilised 55 stakeholders, including elected officials, government officials, practitioners, scientists, and NGO representatives, from 16 Pacific Island countries and territories (PICTs) and beyond to discuss adaptation practices and needs encountered in the region. Starting with an overview of sea level rise and adaptation challenges in the Pacific, the discussions explored the regional tools available or to be developed to implement dynamic and adaptive adaptation strategies, the potential of Nature-based Solutions in building resilience, the means of empowering local populations in adaptation planning, as well as recommendations from the region to be raised to the international community.

Intended for decision-makers, urban planners, practitioners, and all actors involved in adapting coastal cities and territories to sea level rise, this report provides lessons learnt so far and an insight into some of the leading practices developed across the PICTs and Aotearoa New Zealand, along with the remaining challenges that they still face. As part of a wider series of regional studies, it complements the conclusions of previous reports, dedicated to the regions of [Northern Europe](#), the [Mediterranean](#), the [U.S. West Coast](#), and [West Africa](#). This report addresses priorities to advance regional and local knowledge, ways to foster locally-led adaptation at the right spatial scale, and the tools and support for designing and implementing long-term adaptation strategies.

This report acknowledges the critical importance to avert, minimise and address loss and damage (L&D), as well as the pivotal leadership of Pacific countries in advancing international negotiations on L&D. However, the topic of L&D is beyond the scope of this report, which focuses on adaptation action to limit the extent of climatic damages.

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ACRONYMS

- | | |
|--|--|
| CAP - Coastal Adaptation Pathway | NbS - Nature-based Solution |
| CBA - Community-based approaches | PCCC - Pacific Climate Change Centre |
| DAPP - Dynamic Adaptive Pathways Planning | PICTs - Pacific Islands Countries and Territories |
| EbA - Ecosystem-based Adaptation | PRIF - Pacific Region Infrastructure Facility |
| EIA - Environmental Impact Assessment | PSIDS - Pacific Small Islands Developing States |
| ESRAM - Ecological and Socio-economic Resilience Analysis and Mapping | RCP - Representative Concentration Pathway |
| FFEM - French Facility for Global Environment | RMI - Republic of Marshall Islands |
| GCF - Green Climate Fund | SIDS - Small Island Developing States |
| GDP - Gross Domestic Product | SLR - Sea level rise |
| GHG - Greenhouse gases | SPC - Pacific Community |
| GIS - Geographical Information System | SPREP - Secretariat of the Pacific Regional Environment Programme |
| LIDAR - Light Detection and Ranging | TCDC - Thames Coromandel District Council |
| ILK - Indigenous and Local Knowledge | UNFCCC - United Nations Framework Convention on Climate Change |
| L&D - Loss and Damage | |
| LLA - Locally-led Adaptation | |
| MEL - Monitoring, Evaluation and learning | |

SUMMARY FOR POLICYMAKERS

Pacific Island Countries and Territories are facing rapidly changing ocean and coastal conditions due to climate change, and are particularly vulnerable to sea level rise (SLR). In a region where many islands are low-lying, where the vast majority of the population lives by the ocean⁵ and where the coast is rapidly urbanising,⁶ SLR is an existential issue and it is paramount to fast-track both mitigation and adaptation action.

1

ADVANCING KNOWLEDGE TO INFORM COASTAL ADAPTATION STRATEGIES WHILE OPERATING WITH LIMITED RESOURCES

Overcoming the numerous knowledge gaps relative to both ocean and coastal changes as well as solutions that hinder coastal adaptation is contingent on increasing investment and support in local researchers and faculties across multiple fields. Meanwhile, the recognition and appropriate use of Indigenous, traditional, and local knowledge is key to develop effective, fair, and sustainable adaptation strategies. Indigenous and traditional knowledge holders ought to be involved in knowledge co-production through equitable opportunities rooted in balanced partnerships. Furthermore, the monitoring, evaluation, and exchange of lessons learnt from past and current projects can help better understand and devise Pacific-based solutions to SLR. Given the urgency of the situation, context-specific and actionable knowledge are now more than ever needed for designing and implementing sustainable coastal adaptation strategies.

2

DELIVERING LOCALLY-LED ADAPTATION, COORDINATED AT REGIONAL LEVEL

Delivering robust and sustainable solutions for coastal cities and territories in the Pacific requires that adaptation planning is locally-driven. Strengthening capacities and resource co-management among national and local authorities, communities, and important agents of change such as women, is key to deliver effective, appropriate, and autonomous adaptation strategies. In line with this, planning with traditional practices – such as customary land tenure systems – rather than against them can help overcome many obstacles. Moreover, collaboration across neighbouring localities and even whole islands is critical to avoid transfers of impacts, expand the range of solutions available, and address several priorities synergically. National and regional bodies and organisations can facilitate this knowledge sharing to avoid maladaptation and to further develop capacities in addressing specific issues and contexts.

3

PLANNING FOR LONG-TERM ADAPTATION WHILE PREPARING FOR IMMEDIATE THREATS

Coastal cities and territories in the Pacific are faced with the long-term threat of SLR combined with near-term extreme events, in a context of multiple development and adaptation priorities. As a result, measures can often be reactive. Long-term, dynamic, and adaptive adaptation strategies can jointly meet different needs through the phased implementation of adaptation measures across space and time. Nature-based Solutions are suited to such an approach and can be adequately combined with other, timely measures, to result in adaptive pathways that can remain effective under a range of future SLR trajectories. Regional and international cooperation will be critical to facilitate technical and institutional capacity building, while national and local measures are essential to address non-climatic threats and impacts on coastal ecosystems, in order to strengthen coastal resilience in the face of SLR.

^{5/} 90% of Pacific islanders live within 5km of the coast, excluding Papua New Guinea.

^{6/} Over 50% of the total population of the Pacific region is expected to be urban by 2050.



INTRODUCTION

Distinctive exposure of Pacific coastal cities and territories to sea level rise

From low-lying atoll islets to eroded volcanic peaks of several hundred metres elevation, the shorelines of Pacific islands display a diversity of landscapes and ecosystems.^{7,8} However, all Pacific Island Countries and Territories (PICTs) are facing rapidly changing ocean and coastal conditions due to climate change, despite being insignificant emitters of greenhouse gases (0.03% of global carbon emissions).⁹ By 2100, sea level could rise by 30-60 cm, and up to 1.01 metres if GHG emissions are not sharply reduced.¹⁰ In addition to the long-term threat of sea level rise (SLR), the Pacific islands are exposed to sudden disturbances such as extreme climate events with annual economic losses estimated to account for nearly 5% of the combined GDP of the Pacific Small Islands Developing States (PSIDS).¹¹ For instance,

category 5 Tropical Cyclone Winston severely hit Fiji in 2016, causing loss of lives, leaving 131,000 people homeless, and inflicting 2 billion Fijian dollars in damage to the country – corresponding to 20% of its GDP.¹² Moreover, SLR compounds with other climate change impacts such as droughts, floods, and ocean acidification, resulting in a complex risk landscape in the region.

The overwhelming majority of the region's population lives by the ocean with 90% of Pacific islanders (excluding Papua New Guinea)¹³ and 65% of New Zealanders¹⁴ living within 5km of the coast. Although the Pacific region presents a variety of urbanisation profiles – from large metropolitan areas such as Greater Suva in Fiji, Port Moresby in Papua New Guinea, South Tarawa in Kiribati, to provincial towns and villages – it collectively experiences rapid urbanisation, with an urban population expected to exceed 50% by 2050.^{15,16}

As elsewhere in the world, Pacific coastal cities concentrate population and valuable assets, including well over 50% of the region's built infrastructure.¹⁷ In addition, many communities live on reef fringed or reef mediated shores that are not only low-lying, but also have a distinct behaviour linked to well-functioning reef ecosystems for their formation. Indeed, reef island formation and dynamics are governed by differential island erosion and accretion through time, notably

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resulting in island migration on reef platforms.¹⁸ However, these reefs are negatively affected by changes in sea levels, storm frequency, along with water temperature and acidification, impacting the formation of shorelines.¹⁹ The remoteness and boundedness of islands,²⁰ along with the occurrence of informal settlements in at-risk areas,²¹ further entrenches the vulnerability of coastal cities and territories.

Consequences of SLR could extend beyond coastal cities and to entire nations. Indeed, the wellbeing, lifestyles, languages, and identities of the Pacific countries and their populations are at stake. SLR could lead to the relocation of entire populations and raises concerns about national borders, maritime zones, and the very sovereignty of PICTs.²² Anticipating these difficulties, PICTs are asserting their boundaries,²³ exploring digitised solutions - with Tuvalu presenting itself as the first digital nation through the development of its [digital twin](#)²⁴ - and are actively involved in the Loss and Damage Dialogue that they helped instigate in climate negotiations in 1991, a year ahead of the creation of the United Nations Framework Convention on Climate Change (UNFCCC).^{25,26} Therefore, while

climate change mitigation must remain an absolute priority to limit the extent of SLR as much as possible, coastal adaptation is also a fundamental requirement in response to current and future SLR.

A long-standing regional mobilisation and a variety of adaptation measures

The Pacific Nations have long raised the alarm about SLR. In 1989, the Small States Conference of Sea Level Rise mobilised 14 SIDS from across the world, including many Pacific countries. It resulted in the Malé Declaration on Global Warming and Sea Level Rise,²⁷ calling on SIDS to implement adaptation and the international community to urgently provide support while mitigating climate change. In recent years, SLR has been increasingly regarded as a key issue in the region. The Statement on coastal erosion and marine submersion, released in 2022 by the Association of Mayors of New Caledonia testifies to the importance of coastal adaptation for local authorities.²⁸ Following this early and growing recognition of the need for adaptation, responses to SLR are now wide-ranging across the region. Yet, they remain insufficient relative to risks.

Geographical and cultural diversity, degrees of isolation, access to finance, and scientific, technical and administrative capability result in various approaches to coastal adaptation. Most cities and villages seek to implement protection measures. For instance, the South Tarawa islets in Kiribati have extensively developed engineered coastal structures, among which 95% are seawalls.²⁹ Other cities are exploring the potential of Ecosystem-based Adaptation such

as with mangrove planting in Labasa, Fiji,³⁰ and accommodation solutions such as building elevation in Kouaoua, New Caledonia.³¹ Land reclamation is also increasingly looked into, notably in Kiribati and Tuvalu, and planned relocation has been tested in several localities like Solosolo in American Samoa and Vunidogoloa in Fiji.^{32,33} These resolutely action-oriented stances refute the narrative of helplessness and the trope of “drowning islands” that tend to prevail in coverage of SLR in the region.^{34,35} Sharing experiences, challenges, and solutions is therefore needed and timely in order to assess and discuss which knowledge is available to date, what are the adaptation options and lessons learnt from past and current interventions, and how the region can best anticipate and prepare for long-term and robust adaptation strategies.

Regional barriers to adaptation

Despite a regional recognition of the importance of coastal adaptation, coastal cities and territories in the Pacific face a number of challenges in implementing adaptation action. They may lack the resources and data to plan and implement strategic measures. In particular, regional and local relative sea level changes, as well as coastal dynamics, are often little known. Meanwhile, comprehension of how implemented solutions interplay and perform with their social-ecological environment is limited and calls for more feedback and experiences to be shared among local authorities or project managers. This hinders the

development of practice-oriented information and tailored adaptation responses, anchors cities in a cycle of emergency responses and recovery, and the development of adaptation measures that tend to be small-scale and geared to the short-term.³⁶

Adaptation strategies are often led by external players with little involvement of local populations, resulting in measures that might fail to include the diversity of socio-cultural contexts within the Pacific. As such, many local authorities remain dependent on external aid.³⁷ Effective responses to the issues at stake require higher ambition, innovation, the use of dynamic, adaptive pathways, and greater linking of local initiatives across the region.

Concurrently, national adaptation plans and policies may not always support and strengthen local coastal governance, where adaptation action takes place. In this respect, regional cooperation organisations can play a critical role in facilitating the shift from short to long-term action by providing clear guidelines and technical support to local decision-makers. In particular, given the multiple development needs of coastal cities and territories in the Pacific, adaptation to SLR cannot be considered in isolation of other socio-economic and environmental priorities. Rather, it can support the achievement of sustainable development goals and objectives across Pacific coastal cities. Reframing adaptation towards long-term and transformative planning is necessary to unlock the co-benefits that can result from effective, sustainable, and equitable adaptation strategies, to not just maintain but improve sustainable development and human well-being in coastal areas.

18/ Kench, P. S., and Brander, R. W. (2006). Wave processes on coral reef flats : implications for reef geomorphology using Australian case studies. *Journal of Coastal Research*, 22, 209-223. <https://doi.org/10.2112/O5A-0016.1>

19/ Webb, A. P., and Kench, P. S. (2010). The dynamic response of reef islands to sea-level rise: evidence from multi-decadal analysis of island change in the Central Pacific. *Global and Planetary Change*, 72, 234-246. <https://doi.org/10.1016/j.gloplacha.2010.05.003>

20/ IPCC, 2022: Summary for Policymakers [Pörtner, H.-O., Roberts, D.C., Poloczanska, E.S., Mintenbeck, K., Tignor, M., Alegría, A., Craig, M., Langsdorf, S., Löschke, S., Möller, V., Okem, A. (eds.)]. 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* [Pörtner, H.-O., Roberts, D.C., Tignor, M., Poloczanska, E.S., Mintenbeck, K., Alegría, A., Craig, M., Langsdorf, S., Löschke, S., Möller, V., Okem, A., Rama, B. (eds.)]. Cambridge University Press, Cambridge, UK and New York, NY, USA, pp. 3-33, doi:10.1017/9781009325844.001.

21/ UN Habitat. (2020). *National Urban Policy: Pacific Region Report*. https://unhabitat.org/sites/default/files/2020/06/pacific_nup_report_web.pdf

22/ Freestone, D., Cicek, D. (2021). *Legal Dimensions of Sea Level Rise: Pacific Perspectives*. World Bank, Washington, DC. <http://hdl.handle.net/10986/35881>

23/ Declaration on Preserving Maritime Zones in the Face of Climate Change-related Sea-Level Rise (2021). <https://www.forumsec.org/2021/08/11/declaration-on-preserving-maritime-zones-in-the-face-of-climate-change-related-sea-level-rise/>

24/ Tuvalu, The First Digital Nation. <https://www.tuvalu.tv/>

25/ Intergovernmental Negotiating Committee for a Framework Convention on Climate Change. Fourth Session. Geneva, 9-20 December 1991. Consolidated working document, Annex, [V.] Insurance Mechanism. <https://unfccc.int/resource/docs/1991/a/eng/misc17a09.pdf>

26/ The first Pacific Loss and Damage Dialogue, organised by the SPREP and Climate Analytics, was held from 17-19 July 2023 in Samoa.

27/ Republic of Maldives. (1989). Malé Declaration on Global Warming and Sea Level Rise. <https://www.islandvulnerability.org/slr1989/declaration.pdf>

28/ Association des Maires de Nouvelle-Calédonie (2022). Déclaration de l'Association des Maires de Nouvelle-Calédonie sur l'Érosion côtière et la submersion marine, 2022.

29/ Duvat, V., Magnan, A., Pouget, F. (2013). Exposure of atoll population to coastal erosion and flooding: a South Tarawa assessment, Kiribati. *Sustainability Science*, 8, 423-440. <https://doi.org/10.1007/s11625-013-0215-7>

30/ Singh, S. (2017). “Civil Servants Plant Mangroves Along Foreshore In Labasa”. Fiji Sun. <https://fijisun.com.fj/2017/09/29/civil-servants-plant-mangroves-along-foreshore-in-labasa/>

31/ Plan d'urbanisme directeur de la commune de Kouaoua (Kaa wii paa) <https://www.province-nord.nc/sites/default/files/actions/thematiques/urbanisme/pud/iii-pud-kouaoua-reg.pdf>

32/ Talaneï.com (2016). “Climate Change Forces Solosolo to Move Inland”. <https://www.talaneï.com/2016/05/12/climate-change-forces-solosolo-to-move-inland/>

33/ McMichael, C., Katonivaluiku, M. and Powell, T., 2019. Planned relocation and everyday agency in low lying coastal villages in Fiji. *The Geographical Journal*, 185(3), pp.325-337

34/ Klöck, C., Fink, M. (Eds.). (2019). *Dealing with climate change on small islands: Towards effective and sustainable adaptation*. <https://doi.org/10.17875/gup2019-1208>

35/ Weatherill, C. K., (2022). Sinking Paradise? Climate Change Vulnerability and Pacific Island Extinction Narratives. *Geoforum*, 145, 103566. <https://doi.org/10.1016/j.geoforum.2022.04.011>

36/ Nunn, P., Aalbersberg, W., Lata, S., Gwilliam, M. (2014). Beyond the core: community governance for climate-change adaptation in peripheral parts of Pacific Island Countries. *Regional Environmental Change*, 14(1), 221-235. <https://doi.org/10.1007/s10113-013-0486-7>

37/ Parsons, M., Nalau, J. (2019). *Adaptation Policy and Planning in Pacific Small Island Developing States*. Research Handbook on Climate Change Adaptation Policy (Edward Elgar Publishing, 2019), 273-90, <https://www.elgaronline.com/display/edcoll/9781786432513/9781786432513.00022.xml>

Drawing on the Sea'ties workshop "Adapting coastal cities and territories to sea level rise in the Pacific", organised by the Ocean & Climate Platform and the Secretariat of the Pacific Regional Environment Programme (SPREP), and the Pacific Climate Change Centre (PCCC), held on July 10-12, 2023, in Nadi, Fiji, this report presents an overview of current practices and remaining challenges to roll out and strengthen coastal adaptation strategies in the region. It aims to provide guidance and resources on how to conduct and facilitate long-term and dynamic adaptation strategies that are well-informed and locally-led, to deliver efficient, place-based, and culturally specific responses, by addressing three topics:

1 Increasing understanding of SLR issues and adaptation knowledge is critical and requires substantial investments in scientific research, applied projects, and indigenous, traditional, and local knowledge, as well as networks and partnerships to enable mutual learning and knowledge sharing.

2 Adaptation strategies should be led by local actors, take better account of socioeconomic, cultural, and customary realities, and be coordinated across neighbouring localities, in order to maximise the effectiveness and sustainability of coastal adaptation.

3 Emergency needs in the face of coastal hazards can be reconciled with the need for long-term adaptation to SLR through dynamic and adaptive planning. This shift in planning approaches involves increased regional and international cooperation, and the use of locally appropriate solutions, such as Nature-based Solutions for adaptation.



1 ADVANCING KNOWLEDGE TO INFORM COASTAL ADAPTATION STRATEGIES WHILE OPERATING WITH LIMITED RESOURCES

KEY MESSAGES:

- Substantial investment is needed across multiple research fields to improve understanding of ocean and coastal dynamics at regional and local levels, as well as of available adaptation responses. This involves increased support for the training of researchers in the region, greater recognition of their work, and enhanced funding for locally driven projects. Meanwhile, cross-training between local and international experts is important to devise effective Pacific-based adaptation.
- Indigenous, traditional, and local knowledge is relevant to coastal monitoring and must be used to guide decision making on the most appropriate solutions. Its proper use requires equitable opportunities for knowledge co-production and the participation of all relevant actors in decision making as equal partners.
- Documenting adaptation projects and sharing experiences between coastal cities and all stakeholders involved in the region can contribute to accelerating knowledge production and uptake.

One of the primary challenges for Pacific coastal cities to adapt to SLR lies in the lack of information about relative SLR, coastal dynamics, and adaptation responses available. Scarce historical records, gaps in reporting networks, and heterogeneity of available data limit the understanding of local SLR while the diverse and highly dynamic geomorphic and meteorological features of the region remain poorly understood. Meanwhile, global SLR baselines are not necessarily relevant to the Pacific region, inducing errors in digital elevation models. To avoid elevation errors, it is critical that islands have sufficient ground control points (tide gauges, Continuously Operating Reference Stations and Global Navigation Satellite Systems) in order to ensure that location-specific drivers and amplifiers of sea level rise are accounted for, such as subsidence

with average rates of 1–2 mm/year for most locations in the Pacific³⁸ - or differential reef island erosion and accretion.³⁹ Interannual and decadal sea level variations, trade winds and subtropical highs also contribute to both variations in extreme climate events and sea levels.^{40,41}

38/ Pacific Region Infrastructure Facility. (2022). Guidance for Managing Sea Level Rise Infrastructure Risk in Pacific Island Countries https://www.theprif.org/sites/default/files/documents/PRIF_SLR-Report_Digital_o.pdf

39/ Kench, P. S., and Brander, R. W. (2006). Wave processes on coral reef flats : implications for reef geomorphology using Australian case studies. *Journal of Coastal Research*, 22, 209–223. <https://doi.org/10.2112/O5A-0016.1>

40/ Subtropical highs are semi permanent high-pressure atmospheric features located over the tropical ocean, which influence atmospheric circulation and the climate.

41/ Church, J.A., White, N.J., Hunter, J.R. (2006). Sea-Level Rise at Tropical Pacific and Indian Ocean Islands. *Global and Planetary Change*. 53 (3). pp. 155–68. <https://doi.org/10.1016/j.gloplacha.2006.04.001>

In addition, scant monitoring of adaptation projects limits the development of a regional understanding of success factors for the deployment of solutions and pitfalls to avoid. Appropriate adaptation strategies involve bridging regional knowledge gaps and facilitating the exchange and pooling of data, know-how and experiences to provide practice-oriented information.

1.1. Bridging knowledge gaps to deliver appropriate solutions

In-situ data is sparse and numerous knowledge gaps remain about coastal risks. Indeed, while some coastal observatory networks exist, such as OBLIC (see Case Study 1), they are sporadic and difficult to develop. Concurrently, research programmes on coastal risks are insufficient and tend to lack interdisciplinarity, which hinders the emergence of a regional corpus of adaptation science. To remedy the lack of scientific knowledge available in the region, a few precursor projects have been initiated. Notably, the Roi-Namur Island project, led by USGS, studies relative contribution and interactions of tides, waves, storm surges, and bathymetry with sea levels across the region and how it affects the formation of coral reefs.⁴² Similarly, the Futurisks interdisciplinary project investigates coastal risks and adaptation solutions to climate change in French overseas territories, drawing on studies of meteorological events over the last century to gain a better understanding of the processes controlling coastal erosion and marine submersion today and in the future.⁴³ Further efforts and substantial investments are needed to develop more interdisciplinary research programmes and to ensure they are accessible to students, scholars, and faculties from the region. In addition, the production of in-situ data requires the strengthening and multiplication of regional initiatives and networks such as the Pacific Islands Global Ocean Observing System (PI-GOOS) - which collects and interprets data relative to coastal and island dynamics, relying, for instance, on satellites, GPS, and LiDAR technologies, and the Pacific Island

42/ USGS Pacific Coastal and Marine Science Center (2022). Coral Reef Project: Roi-Namur Island. <https://www.usgs.gov/centers/pcmsc/science/coral-reef-project-roi-namur-island>

43/ La Rochelle Université. News. Le projet interdisciplinaire « FUTURISKS » (2022). <https://www.univ-larochelle.fr/actualites/le-projet-interdisciplinaire-futurisks/>

Observing System (PacIOOS) which contributed to the development of the American Samoa Sea Level Rise Viewer.⁴⁴

BOX 1

Fugro: Developing digital tools to support climate adaptation planning in the Pacific

Fugro is a world-leading Geo-data company with a vision to co-design digital solutions for coastal communities and decision-makers globally, empowering them to improve coastal adaptation management via data-driven insights. LiDAR (Light Detection and Ranging) is commonly used to measure both topographically and bathymetrically across the coastal interface. Creating a high-resolution (cm-scale), full-coverage, three-dimensional representation of coastal infrastructure, vegetation, ground elevation and water depths, as well as vitally supporting higher fidelity hydrodynamic coastal modelling. Authorities can use such information for different applications, such as urban planning and risk assessment from climate-induced hazards, including sea level rise and floods to a much higher degree of accuracy, reducing uncertainty and improving the quality of decision making. The 3D visualisation of the LiDAR data enables easy communication of the risks to ensure political and coastal community engagement and awareness. One success story in the Pacific region is the use of Fugro's LiDAR data in Tuvalu's Coastal Adaptation Plan (TCAP). With this data set, numerous products were derived by The Pacific Community (SPC). These products include: a Digital Elevation Model (bathymetry and topography), inundation models for different climate projections, shoreline change over time and risks on different assets. These valuable products pushed the boundaries regarding precision, beyond what can be done with open-access data, or observations at specific points in space. Such a solution can be rolled out across the Pacific with the acquisition of LiDAR and other remote sensing datasets.

44/ Baizeau, C., Anderson Tagarino K., Stopa, J.E., Thompson, P.R. (2023). American Samoa Sea Level Rise Viewer. Version 1.03. Prepared by the Pacific Islands Ocean Observing System (PacIOOS) for the University of Hawai'i Sea Level Center (UHSCL) <http://pacioos.org/shoreline/slr-amsam/>

Besides the understanding of coastal risks, a clear appreciation of the feasibility and impacts of adaptation responses is necessary to opt for the best suited solutions for a specific area while avoiding negative effects on adjacent areas. **The systematic recording and reporting on adaptation projects could foster the rapid emergence of a regional knowledge base supported by compelling evidence.** Currently, limited evidence and evaluation of adaptation responses hinder learning from existing projects and can result in the repetition of failed approaches. In particular, the performance of Ecosystem-based Adaptation (EbA) in the region and their underlying factors are poorly understood despite benefiting from growing international investment. Indeed, marine and coastal ecosystems are not only efficient carbon sinks, but they can be efficient and cost-effective in reducing wave energy and erosion.⁴⁵⁻⁴⁶ Moreover, some marine and coastal ecosystems have even shown to be resilient to climatic shocks.⁴⁷ For example, in the central equatorial Pacific, coral reefs have historically recovered from bleaching events.⁴⁸ At times, EbA can be the only adaptation response available to remote communities. However, the failure of EbA projects is not uncommon, notably due to rapidly changing climate and environmental conditions that undermine their effectiveness and survival. Besides, the timescale of ecosystem restoration does not necessarily enable immediate safety from coastal hazards. It is critical to gain a better understanding of the capacity of coastal ecosystems to absorb climatic shocks, endure anthropic pressures, and adapt to climate change impacts in the long-term (e.g., ocean warming and acidification), to best choose where and how to conduct EbA. For instance, many

45/ Menéndez, P., Losada, I.J., Torres-Ortega, S., Narayan, S., Beck, M.W. (2020). The Global Flood Protection Benefits of Mangroves. *Scientific Reports*, 10, 4404. <https://doi.org/10.1038/s41598-020-61136-6>

46/ Seddon, N., Smith, A., Smith, P., Key, I., Chausson, A., Girardin, C., House, J., Srivastava, S., Turner, B. (2021) Getting the message right on nature-based solutions to climate change. *Global Change Biology*, 27, 8. <https://doi.org/10.1111/gcb.15513>

47/ O'Leary, J.K., Fiorenza Micheli, F., Airolidi, L., Boch, C., De Leo, G., Elahi, R., Ferretti, F., Graham, N.A.J., Litvin, S.Y., Low, N.H., Lummis, S., Nickols, K.J., Wong, J. (2017). The Resilience of Marine Ecosystems to Climatic Disturbances. *BioScience*, 67, 3, p208-220. <https://doi.org/10.1093/biosci/biw161>

48/ Barkley, H.C., Cohen, A.L., Mollica, N.R., Mollica, N.R., Brainard, R.E., Rivera, H.E., DeCarlo, T.M., Lohmann G.P., Drenkard, E., J., Alpert, A.E., Young, C.W., Vargas-Angel, B., Lino, K.C., Oliver, T.A., Pietro, K.R., Luu, V.H. (2018) Repeat bleaching of a central Pacific coral reef over the past six decades (1960–2016). *Communications Biology*, 1, 177, <https://doi.org/10.1038/s42003-018-0183-7>

mangrove planting initiatives fail globally (up to 80% according to Wetlands International)⁴⁹ due to improper restoration practices and an over-reliance on planting that neglects to address the underlying drivers of environmental loss and degradation. **This underlines the necessity to invest in the monitoring of EbA and to share the conclusions of both successful and failed projects to avoid repeating the same mistakes.** Encouraging the development of pilot EbA projects that integrate their continuous monitoring and whose results are readily available in open databases could strengthen knowledge of Pacific-based EbA. In line with this, the [Kiwa initiative](https://www.kiwa.org/)⁵⁰ not only funds Nature-based Solutions, it also supports knowledge exchange between organisations and partners that implement them and provides well-documented case studies, although the limited funding timeframe restricts the extent to which lessons can be derived. Such knowledge is needed to develop replicable methodologies to evaluate the feasibility and sustainability of EbA and to monitor their performance over time. Integrating externalities and co-benefits in these methodologies could substantially increase access to funding, effective planning, and the success rates of EbA. A pioneering initiative in this regards, the [Guidebook for Monitoring and Evaluating Ecosystem-based Adaptation Interventions](https://www.friendeducation.org/), produced by Friends of ecosystem-based Adaptation, breaks down the different steps in designing and implementing effective monitoring and evaluation, to enable project leaders to adjust their practices, better communicate on progress with beneficiaries, and better report to their donors.⁵¹ The SPREP also produced the [Pacific Impacts Analysis \(iA\) methodology](https://www.sprep.org/).⁵² Resulting from the Global Climate Change Alliance Plus Scaling up Pacific Adaptation (GCCA+ SUPA) project, it provides Pacific-based guidance to objectively assess the impact of completed adaptation interventions, based on a set of indicators to be considered over four stages of the impact analysis assessment, and

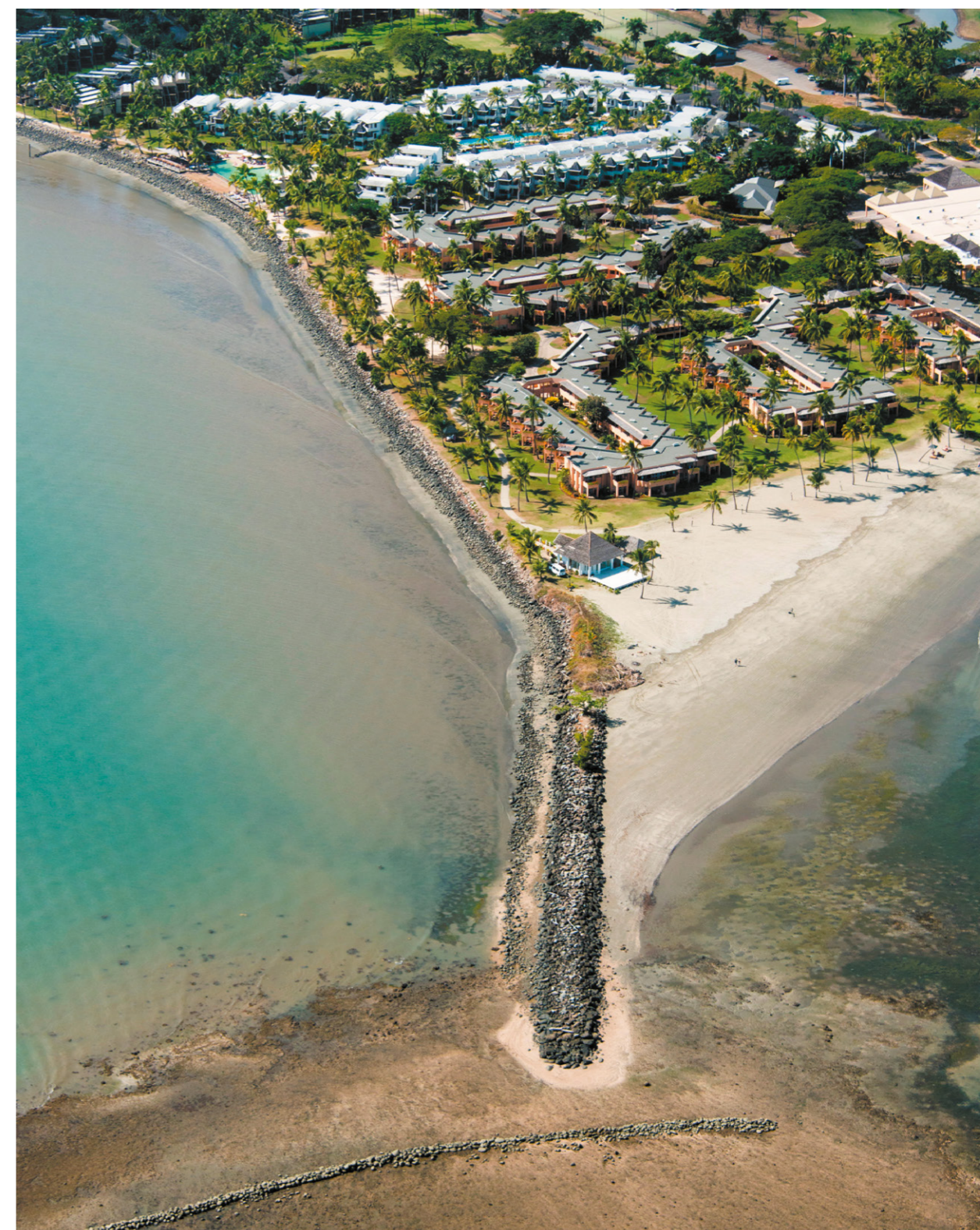
49/ The Source 2022: Annual Review. Wetlands International <https://online.flipflop.com/view/1050085233/>

50/ Kiwa Initiative. <https://kiwainitiative.org/en/>

51/ GIZ, UNEP-WCMC and FEBA (2020) Guidebook for Monitoring and Evaluating Ecosystem-based Adaptation Interventions. Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, Bonn, Germany

52/ Fiu, M., and Roma G. (2023). Learning from the Past: A Handbook for Impacts Analysis Methodology. Secretariat of the Pacific Environmental Programme, Apia. Samoa. <https://library.sprep.org/sites/default/files/2023-07/SUPA-Impact-Methodology-Guide.pdf>

identifies those aspects that can be replicated and scaled up. The methodology has been applied to assess the impacts of adaptation measures across several sites in Tonga.⁵³



53/ Secretariat of the Pacific Regional Environment Programme (SPREP). (2022). Snapshot 2021: Coastal Protection Measures - Tonga: Assessing impact at intervention level. Apia, Samoa <https://library.sprep.org/sites/default/files/2022-09/SUPA-Snapshot-Impacts-Tonga.pdf>

Adaptom: Assessing nature-based coastal defence as a climate adaptation solution in small islands

The ADAPTOM project (2022-2025) maps and assesses nature-based projects aimed at reducing coastal erosion and marine flooding in French islands. The assessment considers three areas, including enabling conditions, the risk reduction potential of projects and the externalities generated, which encompass eight variables: the local context, governance, funding, social acceptability, technical effectiveness, the co-benefits and disbenefits generated, and the project's broader contribution to climate adaptation.

The analysis of 25 NbS projects highlighted ten soft limits to nature-based adaptation: (i) the long-windedness of administrative processes, e.g. related to technical intervention on the Public Maritime Domain and protected areas and species; (ii) the lack of flexibility of funding bodies' rules and discrepancy between the duration of projects and the time until full effectiveness; (iii) the lack of political support, due to the prioritisation of problems considered more urgent; (iv) difficulties to involve stakeholders in the long run; (v) conflicts, i.e. public/private and due to restrictions to beach accessibility; (vi) the lack of local human and technical capacities; (vii) knowledge gaps on some restoration techniques; (viii) the lack of ecological awareness among some stakeholder groups; (ix) the lack of evidence on NbS effectiveness to reduce risk; (x) the small spatial scale of projects. One hard limit to nature-based adaptation was identified: the degradation of marine ecological conditions, causing the failure of coral restoration at some locations.

1.2. Facilitating access to knowledge

In addition to numerous knowledge gaps that remain, existing data is often not readily disseminated to decision-makers, practitioners, and local populations. In fact, primary data tends to be disaggregated and hard to access and many adaptation projects are led in isolation, without being tracked or monitored. The lack of evidence and evaluation of these projects hinders learning about adaptation solutions in the Pacific and can result in the multiplication of inadequate strategies. **By gathering and standardising localised data, regional collaborative networks and resource hubs can foster the dissemination of knowledge and practices, improve the understanding of risks, vulnerabilities and adaptation options, and provide replicable methodologies for adaptation.** For instance, regional coastal observatories to monitor, assess, and centralise the impacts of SLR, extreme climate events, and anthropogenic impacts on the coastlines, its ecosystems and uses, are key to build up knowledge and enable informed decision-making at the right scale. Open-data platforms such as

[Vanuatu Globe](#)⁵⁴ can also optimise the availability and access to accurate datasets and SLR models, facilitating cooperation across several municipalities and territories. Likewise, the [Pacific Resilience Nexus](#) is a data hub for the Pacific which centralises all disaster and resilience knowledge resources,⁵⁵ while the [Pacific Climate Change Portal](#)⁵⁶ centralises climate resources and news..

54/ Government of Vanuatu, National Advisory Board on Climate Change & Disaster Risk Reduction. Vanuatu Globe.

<https://www.nab.vu/lidar-maps-vanuatu-globe-o>

55/ Pacific Community, Pacific Data Hub, Pacific Community Resilience Nexus <https://nexus.pacificdata.org/#/>

56/ Pacific Climate Change Portal <https://www.pacificclimatechange.net/>



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Pacific Ocean Sustainability Pathways (PACPATH): Identifying sustainability pathways towards resilient coastlines

Coastal communities must have the capacity to withstand or recover quickly from threats. The principle of sustainability should guide management planning so that communities may persist into the future without depleting natural resources. A transdisciplinary approach that includes all facets of society – government agencies, universities, nonprofit groups, and local leadership – is necessary to understand the full scope of the issues and develop relevant and effective solutions. The Pacific Ocean Sustainability Pathways (PACPATH) project aims to do this by involving diverse stakeholders in collaborative workshops. These aim to co-develop a comprehensive list of relevant issues; indicators to adequately assess the extent of the issues; and pathways toward practical, relevant solutions. PACPATH prioritizes collaboration between scientists, government officials, resource managers, and traditional leadership, and aims to codevelop strategies with strong local relevance. Workshops were held in New Caledonia and Fiji. Participants created a shared vision of coastal and ocean sustainability and identified actions to fight the impacts of climate change on the ocean and coastal livelihoods. This resulted in the production of socio-environmental report cards with values and threats, indicators and their status, available on www.pacpath.org. This joint expert assessment combines the wealth of different types of knowledge and is intended to support the future actions and requests in the field of monitoring, research and adaptation.

It is also critical to ensure the appropriation of knowledge by stakeholders so that they can make informed decisions as part of the planning process. Tools such as Sandwatch,⁵⁷ an educational process developed specifically for students, teachers, and communities in SIDS to monitor their coastal environment, can help improve local understanding of coastal climate risks. Meanwhile, serious games – interactive, problem-solving games that simulate coastal dynamics and the impacts of land-use and adaptation planning decisions – can be great learning mediums and facilitate conflict resolution and planning. The National Institute of Water and Atmospheric Research of Aotearoa New Zealand has developed the serious game *My Coastal Futures* to help people understand climate change impacts and spark conversations about coastal adaptation.⁵⁸

1.3. Combining local, traditional and indigenous knowledge with scientific approaches

People in the Pacific have developed and refined indigenous knowledge – vast place-based and culturally-specific knowledge – that supported their livelihood over long periods of time. Indigenous knowledge can occasionally be discordant with local realities due to climate change impacts, is progressively being lost in the places where it is not valued, and is not solicited by all because some stakeholders place more trust in scientific data and engineered approaches.⁵⁹ **However, mobilising Indigenous, traditional and Local knowledge (hereafter referred to as ILK) to assess risks, vulnerabilities, and solutions can help fill important knowledge gaps and provide critical guidance for decision making.** For instance, the ‘cyclone houses’ (*gamali*) of Pentecost, Vanuatu, have proved better able to withstand hurricane winds

than their counterparts made from modern materials.⁶⁰ Participatory approaches can be particularly relevant to involve traditional knowledge holders and the wider population in generating local knowledge. In line with this, *OBLIC* (see *Case study 1*), the coastal observatory of New Caledonia, involves locals’ in-situ observations, their memories, and traditional knowledge to complement scientific data in the mapping of coastal risks and vulnerabilities.⁶¹

Leveraging ILK entails the creation of equitable opportunities for knowledge co-production and collaboration in decision-making, at all governance levels. Enabling measures such as dedicated funding, guidance, or the requirement to integrate ILK into planning are rarely provided. Some governments and local authorities across the Pacific have started to recognise ILK, such as in Vanuatu, where national legislation addressing disaster risk reduction promotes the integration of indigenous knowledge,⁶² and in Aotearoa New Zealand where the Vision Mātaurangais mainstreamed in all priority investment areas to mobilise and support Māori knowledge, people and resources. In French Polynesia, local authorities such as the Terehēamanu Community of Communes are reinstating historical local toponymy, which provides valuable indications on the localities and their vulnerabilities, for instance mobile grounds that are unsuitable for development. Formalising and mainstreaming the use of ILK, notably by means of guidance, can facilitate the appropriate understanding and application of ILK and help prevent inappropriate collecting methods and over-solicitations of local communities. In addition, it is important to recall that ILK are multidimensional, place-based, and evolving knowledge bases. Some knowledge can therefore be more relevant than other, involve sociocultural distinctions, and be gender-differentiated. On Tanna Island, Vanuatu, men traditionally hold knowledge about weather indicators, which can be mobilised as early warning indicators, and women hold knowledge about traditions, behaviours, and gardening, which



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can be actioned for deciding over the solutions to adopt, such as which species to work with for EbA.⁶³ Recognising these sociocultural differences, linked to livelihood strategies, is necessary in planning as it may incur diverging preferences between men and

women, social groups, and populations. Engagement opportunities must be designed accordingly, to ensure that all perspectives are represented.

57/ Unesco, Small Island Developing States. Sandwatch. <https://www.unesco.org/en/sids/sandwatch>

58/ NIWA, Science, Resources. My Coastal Futures online game. <https://niwa.co.nz/climate/information-and-resources/my-coastal-futures-online-game>

59/ Granderson, A.A. (2017). The Role of Traditional Knowledge in Building Adaptive Capacity for Climate Change: Perspectives from Vanuatu. *Weather, Climate, and Society* 9, 3, pp. 545-561. <https://doi.org/10.1175/WCAS-D-16-0094.1>

60/ Ahmed, I., McDonnell, T. (2020). Prospects and constraints of post-cyclone housing reconstruction in Vanuatu drawing from the experience of tropical cyclone Harold. *Progress in Disaster Science*, 8, 100126. <https://doi.org/10.1016/j.pdisas.2020.100126>

61/ Government of New Caledonia. DIMENC. OBLIC (New Caledonia Coastal Observatory). <https://dimenc.gouv.nc/la-dimenc/nos-partenaires/observatoire-du-littoral-de-nouvelle-caledonie>

62/ Government of the Republic of Vanuatu. Vanuatu Climate Change and Disaster Risk Reduction Policy 2016-2030. https://policy.asiapacificenergy.org/sites/default/files/vanuatu_cc_drr_policy_minus_att4v4.pdf

63/ Nalau, J., Becken, S., Schliephack, J., Parsons, M., Brown, C., Mackey, B. (2018). The Role of Indigenous and Traditional Knowledge in Ecosystem-Based Adaptation: A Review of the Literature and Case Studies from the Pacific Islands. *Weather, Climate, and Society*, 10, 841-865. <https://doi.org/10.1175/WCAS-D-18-0032.1>

Coastal Observatory of New Caledonia (OBLIC)

SUMMARY

OBLIC federates New Caledonian stakeholders within a local partnership network bringing together technical representatives, from government departments to local authorities and public organisations. It improves knowledge of coastal hazards and their impact on people, property and ecosystems and disseminates knowledge relating to coastal risks. OBLIC also provides support to institutional actors, leaders, and practitioners in planning the adaptation of New Caledonia's coastline.

CLASSIFICATION

-  **Risks:** Submersion, erosion
-  **Typology of solutions:** Research-action, capacity-building, knowledge sharing activities
-  **Geographical location:** New Caledonia
-  **Typology of actors:** Local, regional authorities, research institutes, State services

OBJECTIVES

OBLIC aims to:

1. Federate New Caledonian stakeholders within a local partnership network to promote dialogue, share information, coordinate actions, develop collaborations, and pool expertise and resources;
2. Improve knowledge of the phenomena, mechanisms and actions of society likely to affect coastal dynamics;
3. Ensure the acquisition, storage, analysis and dissemination of reference data relating to coastal dynamics and risks;
4. Support practitioners of New Caledonia by providing them with scientific and technical expertise,
5. Develop a risk culture by raising public awareness of coastal risks.



ACTIVITIES

OBLIC enables the coastal monitoring of New Caledonia through geomorphological and sedimentological field observations, in situ topo-morphological surveys, and mappings of coastal changes using aerial photos or satellite images. A study of the characterisation and mapping of the marine submersion hazard is underway (BRGM-IRD). OBLIC is also involved in the analysis of coastal erosion impacts on marine turtle nesting, as well as in the evaluation of solutions for coastal risk reduction and adaptation through its participation in various research projects, including relating to Nature-based Solutions. In addition, the [OBLIC portal](#) provides a space for sharing and disseminating all information and data acquired.



RESULTS

- Regular meetings of stakeholders involved, such as during the annual meeting of the OBLIC user committee;
- Definition of beach profiles, using the Emery framework in particular;
- Maintaining of the coastal monitoring and observation network since 2014 (35 islets and 17 coastal sites located on Grande Terre, Île des Pins and the Loyalty Islands). The aim of this network is to characterise past, current and future dynamics and trends in coastal systems and to provide keys to understanding how they function in relation to forcing factors and by placing them in the context of climate change.
- Typological mapping of the New Caledonian coastline and coasts potentially subject to erosion, marine submersion, and landslides, conducted in partnership with the French Geological Survey (BRGM) (2016).

KEY TAKEAWAYS



- (1) Participatory monitoring is a fundamental aspect of this programme, and involves local authority staff, NGOs, and schools.
- (2) Partnerships are key to overcoming local limits and shortages in data.



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2 DELIVERING LOCALLY-LED ADAPTATION COORDINATED AT REGIONAL LEVEL

KEY MESSAGES:

- Locally-led adaptation is more likely to deliver long-term and no-regrets strategies, in autonomy from external parties. This approach can be in line with traditional practices and systems, such as land tenure systems, and can be better supported by the population. It entails the attribution of decisional power and resources management to local authorities while external agencies and government authorities play supporting and empowering roles.
- Women possess essential skills, knowledge, and experience that make them powerful agents of change. Embedding gender dimensions into adaptation planning and placing women in leadership positions play a major role in reducing vulnerabilities and delivering adequate and equitable solutions.
- Planning for adaptation holistically and in collaboration with neighbouring cities, territories, or islands as appropriate, can expand the range of available solutions and provide the opportunity to address several priorities in synergy.
- Depending on local situations, customary land tenure systems and kinship networks can be seen either as obstacles or levers for coastal adaptation, including to conduct transformative action such as relocation. They cover a range of key issues in designing and implementing adaptation strategies, and can reach greater acceptance as they enable the sustenance of desired livelihoods.

Adaptation projects in the Pacific are often driven by external actors, following Western-based guidelines, concepts, and priorities. This approach can be at odds with the socio-cultural contexts of local populations who often remain attached to their cultural heritage and traditions. Instead, the delivery of appropriate adaptation solutions depends on integrating local values and strengthening local agency. External aid also tends to focus on short-term, small-scale projects led in isolation. This approach fails to address the need for long-term planning and funding. In addition, the diversity of climatic, geographic, demographic and socio-economic features of the Pacific allows for an ingenious combination of solutions, while the interconnectedness of landscapes and territories calls for collaborations across territories and islands. The coordination of holistic adaptation strategies at larger scales can ensure that the responses deployed meet the challenges faced by coastal cities.

2.1. Working with local values to design place-based adaptation

Understanding and integrating perceptions, values, social norms, and customary rights is key to supporting effective adaptation.

Indeed, cultures, customs, and traditional leadership play important roles in decision-making, including in urban territories. Accounting for the perceptions of SLR – how stakeholders witness and relate to coastal changes, what they believe to be the causes of these changes, and what actions they prioritise to address them – is also pivotal to adequately communicate with and engage local communities. For instance, a study conducted in Tuvalu, Samoa, and Tonga suggests that people living in smaller localities are more attuned to coastal and climatic changes than people living in larger cities, and that they mostly attribute these changes to the overuse of resources.⁶⁴ Another study, conducted on Tanna Island, Vanuatu, showed that stakeholders' discourses and preferences regarding coastal adaptation can also be gender-differentiated, with traditional practices, known as *Kastom*, skewed towards men whereas women can be more inclined to solutions regarded as modern.⁶⁵ Grasping these variations in awareness and perceptions can help identify and overcome the barriers to adaptation action, to foster effective collaborations, e.g. between communities living by the ocean and further inland, and to support the identification of adaptation benefits to target in priority. Where SLR is not perceived as a priority compared to the many other challenges faced by coastal cities, efforts must be directed towards raising awareness and demonstrating that the development of a territory is not only compatible with but also inseparable from coastal adaptation to achieve long-term benefits. Providing professional training on climate risks to local authorities and developing participatory approaches that engage all stakeholders in observing the impacts

64/ Beyerl, K., Mieg, H.A., Weber, E. (2019). Comparing Perceptions of Climate-Related Environmental Changes for Tuvalu, Samoa, and Tonga. In *Dealing with Climate Change on Small Islands: Towards Effective and Sustainable Adaptation*, ed. Klöck, C., Fink, M. (Göttingen: Göttingen University Press, 2019), 143-74. <https://doi.org/10.17875/gup2019-1215>

65/ Buckwell, A., Fleming, C., Muurmans, M., Smart, J.C.R., Ware, D., Mackey, B. (2020). Revealing the dominant discourses of stakeholders towards natural resource management in Port Resolution, Vanuatu, using Q-method. *Ecological Economics*, 177, 2020. <https://doi.org/10.1016/j.ecolecon.2020.106781>

of climate change on their shoreline can contribute to these efforts, and must build on a good understanding of local perceptions and values.⁶⁶

BOX 4

Impacts and responses to sea level rise on the front lines: Evidence from local people from across the Marshall Islands

In the Republic of the Marshall Islands extensive consultations with communities were conducted to inform the National Adaptation Plan.⁶⁷ Multiple methods were used in 123 days of site visits across 15 atolls and islands to hear from 1362 people. The consultations show that people in the Marshall Islands strongly aspire to continue living in their homelands. Yet this aspiration is threatened by climate change. People are observing changes in their environments, including rising sea levels, increasing air temperatures, and increasing drought and more erratic rainfall. These changes are widespread and are undermining livelihoods, causing food and water insecurity, damaging infrastructure, increasing illness, and diminishing social interactions. There is damage to infrastructure and crops, and there are losses of health, land, and social opportunities. Everyone consulted expressed a strong preference for in-situ adaptation to avoid forced migration. Marshallese people are adapting and coping the best ways they can, but these responses are constrained by low incomes and a lack of access to services. They have good ideas about what forms adaptation might take in the future, including diverse strategies and technologies to protect and accommodate sea level rise, but they cannot implement these themselves, and so require financial and technical assistance from the international community.

66/ Terorotua, H., Duvat, V., Maspataud, A., Ouriqua, J. (2020). Assessing Perception of Climate Change by Representatives of Public Authorities and Designing Coastal Climate Services: Lessons Learnt From French Polynesia, *Frontiers in Marine Science* 7. <https://www.frontiersin.org/articles/10.3389/fmars.2020.00160>

67/ International Organisation for Migration, Jo-Jikum, Marshall Islands Conservation Society, The University of Melbourne and Women United Together Marshall Islands. 2023. "My heritage is here" : Report on Consultations with Communities in the Marshall Islands in Support of the Development of the National Adaptation Plan. International Organisation for Migration: Majuro. https://www.iom.int/sites/g/files/tmzbd1486/files/documents/2023-11/nap_marshallislandsresearch_report_v1.pdf

The priority in adapting coastal cities to SLR is to avoid maladaptation, i.e., the deployment of inappropriate responses to coastal hazards whose unintended consequences hampers the ability to cope with existing and future risks, resulting in no reduction - or even an increase - in vulnerability. **As such, the successful conception and implementation of adaptation responses ought to integrate local socio-economic and power dynamics, alongside geophysical risks, to prevent the exacerbation of existing inequalities.** Gender dimensions in particular tend to be overlooked when exposure, vulnerability, preparedness, coping capacities, as well as involvement in decision making can be influenced by gender roles, imparting a clear need to embed them in coastal adaptation.⁶⁸⁻⁶⁹ Despite progress in gender-responsive work in the Pacific region in the last decades,⁷⁰ gender dimensions have been poorly integrated into adaptation strategies and women and female-headed households remain particularly subject to coastal changes. Not only do women more often work outside the formal economy than men, but they are also typically engaged in sectors that are vulnerable to extreme climate events, SLR and erosion, such as tourism, small scale fisheries and the harvesting of coastal and intertidal seafood. It is thus essential to consider gender differentiated but also cumulative, intersectional vulnerabilities in planning. This encompasses the systematic collection of sex-disaggregated socioeconomic data, the provision of inclusive and gender responsive participatory processes, and inclusion of gender dimensions in all adaptation projects. As critical social capital mobilisers, women are at the forefront of preparation and recovery action. They can fast-track knowledge transfer, assist each other, and establish grassroot insurance schemes amongst themselves.⁷¹ **Leveraging women's knowledge and skills**

68/ Erman, A., De Vries Robbe, S.A., Thies, S.F., Kayenat, K., Maruo, M. (2021). Gender Dimensions of Disaster Risk and Resilience: Existing Evidence. World Bank. <https://doi.org/10.1596/35202>

69/ Le Masson, V., Lim, S., Budimir, M., Podboj, J. S. (2016) Disasters and violence against women and girls: can disasters shake social norms and power relations? Overseas Development Institute. <https://cdn.odi.org/media/documents/11113.pdf>

70/ Unisea, A. (2022). Pacific Regional International Waters Ridge to Reef Project Regional Gender Overview. Produced and published by GEF Pacific International Waters Ridge to Reef Regional Project. Pacific Community, 20 pp https://www.pacific-r2r.org/sites/default/files/2022-05/Pacific_Regional_International_Waters_Ridge_to_Reef_Project_Regional_Gender_Overview.pdf

71/ McNamara, K.E., Clissold, R., Westoby, R. (2021). Women's Capabilities in Disaster Recovery and Resilience Must Be Acknowledged, Utilized and Supported. *Journal of Gender Studies*, 30, 1, 119-25. <https://doi.org/10.1080/09589236.2020.1801397>

in disaster response, recovery and preparedness entails placing them in leadership positions. This encompasses the provision of clear, tractable objectives and associated regional and national guidelines in terms of gender equality at all decisional levels. It also implies increased investment in their capabilities, as well as making gender equality explicit in finance aimed at SLR adaptation.⁷² The [Pacific Ridge to Reef project](https://www.pacific-r2r.org/)⁷³ is applying those principles, with dedicated gender reports on all activities as part of its reviewing process, and by placing women in leadership positions. Meanwhile, it is also important to recognise that women are powerful agents of change, resilience building, and repositories of useful knowledge.⁷⁴ In line with this, the [Shifting the Power Coalition](https://www.actionaid.org.au/programs/shifting-the-power-coalition-2/),⁷⁵ a women-led regional alliance that federates close to 100,000 grassroots movements in seven Pacific countries, focuses on strengthening women's influence, activism, and innovations in responding to disasters and preparing for climate change.

The planning and implementation of adaptation strategies must account for traditional organisations, customs, and land tenure practices, to reinforce collective action and transformational change along the coast and ensure that no one is left behind in the process. Traditional land tenure practices, where land areas and fishing grounds are retained by a clan or a village, divided among families and individuals and transferred through gifts or inheritance, can be critical when planning and designing adaptation options. Ownership over land can be an obstacle to moving away from an area at risk, and certain land uses can aggravate risks, for instance, the conversion of mangroves and marshes into agricultural land worsens erosion. In addition, informal land leases and the subdivision of lots can result in the expansion of informal settlements, limiting the ability of governments to support populations at risk through both adaptation

72/ Wabnitz, C.C.C., Blasiak, R., Harper, S., Jouffray, J.-B., Tokunaga, K., Norström, A.V. (2021) Gender dynamics of ocean risk and resilience in SIDS and coastal LDCs. Ocean Risk and Resilience Action Alliance (ORRAA) Report. <https://oceanrisk.earth/wp-content/uploads/2022/12/ORRAA-Gender-and-ocean-risk.pdf>

73/ GEF Pacific R2R - Ridge to Reef. <https://www.pacific-r2r.org/>

74/ Mcleod, E., Arora-Jonsson, S., Masuda, Y.J., Bruton-Adams, M., Emaurois, C.O., Gorong, B., Hudlow, C.J., James, R., Kuhlken, H., Masike-Liri, B., Musrasrik-Carl, E., Otselberger, A., Relang, K., Reyuw, B.M., Sigrah, B., Stinnett, C., Julita Tellei, J., Laura Whitford, L. (2018). Raising the voices of Pacific Island women to inform climate adaptation policies. *Marine Policy*, 93, pp 178-185. <https://doi.org/10.1016/j.marpol.2018.03.011>

75/ ActionAid. Shifting the Power Coalition. <https://actionaid.org.au/programs/shifting-the-power-coalition-2/>



and recovery processes.^{76, 77} However, adaptation measures that are compatible with traditional land tenure practices can allow for livelihoods to be maintained and can be a powerful lever to undergo complex change such as planned relocation.

Planned relocation within customary territories can be facilitated compared to non-customary ones. Indeed, communities and families are more open to moving to areas where they have land ownership, relatives, or links through customary lineage, resulting in a reduction of delays, expenses and disputes usually associated with formal land allocation.

For instance, Vunidogoloa, in Fiji, was relocated two kilometres inland, to an area belonging to customary lineages closely related to the community. The site was provided without a formal process nor financial compensation, while Fiji's Disaster Risk Reduction Programme provided the majority of the funding associated with relocation costs.⁷⁸ In this perspective, strengthened GIS capacities can assist in land-use planning, in integrating climate and disaster risks, and in identifying vulnerable communities, while improved administrative processes could facilitate lease granting to customary land.

76/ UN Habitat. (2020) National Urban Policy Pacific Region Report. https://unhabitat.org/sites/default/files/2020/06/pacific_nup_report_web.pdf
 77/ Fitzpatrick, D. (2022). Research Brief on Land Tenure and Climate Mobility in the Pacific Region, Pacific Islands Forum Secretariat. https://environmentalmigration.iom.int/sites/g/files/tmzbd1411/files/documents/PRP%20Briefs_Land%20Tenure_Final.pdf
 78/ Charan, D., Kaur, M., Singh, P. (2017). Customary Land and Climate Change Induced Relocation—A Case Study of Vunidogoloa Village, Vanua Levu, Fiji. In: Leal Filho, W. (eds) Climate Change Adaptation in Pacific Countries. Climate Change Management. Springer, Cham. https://doi.org/10.1007/978-3-319-50094-2_2

2.2 Empowering locally-led action for appropriate solutions

Externally-led adaptation is frequent in the Pacific, notably due to local gaps in capacity and resources, but can easily result in inappropriate strategies and leave coastal cities dependent on international funding and executors.⁷⁹ **In contrast, locally-led adaptation (LLA) is rooted in the empowerment of local populations, supports local autonomy in the long-term, and is more likely to deliver no-regrets and sustainable strategies.**⁸⁰ In LLA and to some extent in community-based approaches (CBA), local populations remain custodians of operational decision-making, but a key distinction lies in the fact that LLA does not assume homogeneity of a community within a geographical area. This approach recognises the multiplicity of identities and interests, and the necessity to integrate all priorities within a coastal city, neighbourhood, or territory. As such, LLA is more likely to foster the development of long-term, place-based, and effective adaptation strategies and even the unlocking of co-benefits beyond risk-reduction, including regarding non-climate related pressures, and their fair distribution among

79/ Westoby, R., McNamara, K.E., Kumar, R., Nunn, P. From community-based to locally led adaptation: Evidence from Vanuatu. *Ambio*, 49, 1466–1473 (2020). <https://doi.org/10.1007/s13280-019-01294-8>
 80/ McNamara, K.E., Clissold, R., Westoby, R., et al. An assessment of community-based adaptation initiatives in the Pacific Islands. *Nature Climate Change*, 10, 628–639 (2020). <https://doi.org/10.1038/s41558-020-0813-1>

the population. Evocatively, between 2010 and 2014, of USD 748 million in funding committed to 15 Pacific countries, 86% was solely project-based. In contrast, locally funded initiatives can account for long-term considerations associated with SLR and have been shown to be more likely to perform better.⁸¹

Notwithstanding, LLA can, at times, spark disputes over diverging priorities, result in elite capture of project management and even in maladaptation.⁸² **In this respect, it is worth recalling that the goal of LLA is not to burden local populations with the responsibility to orchestrate their adaptation from start to finish, but rather to ensure that they are in a position of power regarding the choices that are usually made on their behalf.** Indeed, in some archipelagic groups where most funds for climate change adaptation is directed to small 'core' areas, typically greater urban areas, the 'periphery' of localities is forced to organise its adaptation in autonomy but less informed by global knowledge and with little to no support.^{83, 84} External support from donors and agencies should come in the form of funding, expertise, data provision made available to and controlled by local networks and decision-makers.^{85, 86}

Coinciding with this principle, the Government of Aotearoa New Zealand is exploring options to fund locally-led adaptation activities, and in particular

81/ Atteridge, A., Canales, N. (2017). Climate Finance in the Pacific: An Overview of Flows to the Region's Small Island Developing States. Stockholm Environment Institute, working paper no.2017-04. <https://mediamanager.sei.org/documents/Publications/Climate/SEI-WP-2017-04/SEI-WP-2017-04-Pacific-climate-finance-flows-FM.pdf>
 82/ McGinn, A., Solofa, A. (2020) Chapter 12: Multi-level governance of climate change adaptation: A case study of country-wide adaptation projects in Samoa. In: Managing Climate Change Adaptation in the Pacific Region [Filho, W.L. (ed.)]. Springer, Berlin Heidelberg, pp. 231-253. https://doi.org/10.1007/978-3-030-40552-6_12
 83/ Nunn, P., Aalbersberg, W., Lata, S., Gwilliam, M. (2014). Beyond the core: community governance for climate-change adaptation in peripheral parts of Pacific Island Countries. *Regional Environmental Change*, 14 (1), 221-235. <https://doi.org/10.1007/s10113-013-0486-7>
 84/ Nunn P, Kumar R. (2019). Measuring Peripherality as a Proxy for Autonomous Community Coping Capacity: A Case Study from Bua Province, Fiji Islands, for Improving Climate Change Adaptation. *Social Sciences*, 8,8,225. <https://doi.org/10.3390/socsci8080225>
 85/ Westoby, R., Clissold, R., McNamara, K.E., Ahmed, I., Resurrección, B.P., Fernando, N., Huq, S. (2021). Locally Led Adaptation: Drivers for Appropriate Grassroots Initiatives. *Local Environment*, 26, n2, 313-19, <https://doi.org/10.1080/13549839.2021.1884669>
 86/ McNamara, K.E., Clissold, R., Westoby, R. et al. (2020) An assessment of community-based adaptation initiatives in the Pacific Islands. *Nature Climate Change*, 10, 628–639 (2020). <https://doi.org/10.1038/s41558-020-0813-1>

community-led relocation, in accordance with Maori values and priorities.⁸⁷

BOX 5

Fiji's Climate Relocation of Communities Trust Fund

The Fiji Government established a dedicated Trust Fund to support relocation where necessary, alongside its Planned Relocation Guidelines (2018) and Standard Operating Procedures for Planned Relocation (2023). The Climate Relocation of Communities (CROC) Trust Fund is the world's first national Trust Fund to be linked to a government legislated, community-driven process for the planned relocation of communities as a means of proactive retreat from the impacts of climate change when 'in-situ' adaptation efforts fail. The Trust Fund is further supported by its Financial Guidelines which establishes guiding mechanisms for the disbursement of funds for relocation. To fund the increasing need for planned relocation in Fiji, the Government of Fiji contributes seed funding to the Trust Fund by way of a stipulated percentage of the Environment Climate Adaptation Levy, a Levy taxed on luxury services and utilities. Additionally, development partners and donors contribute bilaterally to Fiji's efforts in relocating its most vulnerable communities through the Trust Fund. Innovative funding avenues must be explored due to the limitations existing in the multilateral climate financing architecture which must be addressed by the Loss and Damage Fund. Two information briefs are available to examine these aspects in greater depth.⁸⁸

87/ Ministry for the Environment of New Zealand, Community-led retreat and adaptation funding: Issues and options (2023) <https://environment.govt.nz/publications/community-led-retreat-and-adaptation-funding-issues-and-options/>
 88/ Fiji's Climate Relocation of Communities Trust Fund (2023). Fiji's Climate Relocation of Communities Trust Fund Information Brief 1: An introduction to the Climate Relocation of Communities Trust Fund for communities and the public. <https://fijiclimatchangeportal.gov.fj/wp-content/uploads/2023/05/CROCF-Information-Brief-1.pdf>



2.3. Cooperating across cities and islands to broaden the range of solutions

Coordinating planning at the right scale is key to deploy transformative change and effectively deliver on local priorities, especially on islands where space is limited, land uses overlap, and climate change impacts compound. Islands' sizes and boundedness, combined with their ecological continuity and their social-ecological systems organised around the notion of community, imply that solutions cannot be devised in isolation. Therefore, the design and delivery of robust and appropriate responses to SLR in coastal cities and territories requires a

reconsideration – and integration – of the most appropriate scales of action from local and national to regional level. Planning for holistic adaptation can provide an opportunity to address several priorities in synergy, e.g. freshwater access, food security, health, and housing. For instance, the Republic of Nauru is planning for the managed relocation of people and infrastructure to Topside, the higher elevation area of the island, as part of its [Higher Ground Initiative \(HGI\)](#).⁸⁹ Currently in its consultation phase, this project incorporates the many needs of Nauru, such as affordable housing, economic diversification, food security, health and wellbeing, water security, cultural restoration

89/ Department of Climate Change and National Resilience of the Republic of Nauru. Higher Ground Initiative (HGI). <https://www.climatechangenauru.nr/higher-ground-initiative>

and land rehabilitation of previously mined areas, among others. Coordinating urban planning with coastal area management and freshwater watershed management is also particularly relevant in Pacific cities and territories and more likely to generate co-benefits. Integrated watershed management is already applied in Fiji, Solomon Islands and Papua New Guinea through the [Watershed Interventions for Systems Health Plus \(WISH+\) programme](#) coordinated by the Wildlife Conservation Society and financed by the Kiwa initiative.⁹⁰ The project involves the restoration of forests, wetlands, coastal and marine ecosystems. This aims to mitigate floods and achieve other goals such as carbon capture and storage, biodiversity conservation, and the reduction of disease outbreaks.

Operating in accordance with the interconnectedness of physical and ecological processes across the ridge-to-reef connectivity can reduce maladaptation risks and maximise co-benefits. **Such is the core principle of the “whole of island” framework, rooted in the understanding of all interlinkages between landscapes and seascapes, economic sectors, and social-ecological systems, and involving the shared governance of resources.**⁹¹ The Lomani Gau project, in Gau Island, Fiji, abides by this principle. Coordinated by the Island Council where all villages are represented, the project promotes the rehabilitation of coastal habitat, the preservation of unlogged cloud forests, and integrated resource management across all activities involving natural resources on the island. A clear objective of this project is to ensure that social organisations and populations are empowered and have access to its co-benefits. Some adaptation options in fact necessitate cross-jurisdictional cooperation, such as planned relocation, which entails the reorganising of whole communities rather than single houses. In the planned relocation of the Fijian villages of Vunidogoloa and Vunisavisavi, social acceptance was notably reached on the basis that the relocation was driven by local communities rather than the central

90/ Kiwa Initiative. WISH +, Implementing Integrated Watershed Management for Biodiversity, Climate Resilience and Human Health Co-Benefits into the Pacific Communities. <https://kiwainitiative.org/en/projects/implementing-integrated-watershed-management-for-biodiversity-climate-resilience-and-human-health-co-benefits-into-the-pacific-communities>

91/ Veitayaki, J., Holland, E. (2019). 9 Lessons from Lomani Gau Project, Fiji: A Local Community's Response to Climate Change. In Pacific Climate Cultures [De Gruyter Open Poland] 121-38. <https://doi.org/10.2478/9783110591415-010>

government.⁹² In areas where internal relocation is not feasible, inter-island and/or international migration is a possibility in the long-term and as a last resort, and will require acute cooperation on very large scales and strong guidelines to assist Pacific countries, cities, and territories in this endeavour. In line with this, the Pacific Islands region has also committed to a regional policy tool for climate mobility: the Pacific Regional Framework on Climate Mobility, an initiative of the Pacific Climate Change Migration and Human Security programme. Upon completion, this framework will propose a coordinated approach to climate-induced human mobility in the Pacific. Special attention will have to be given to the most vulnerable population groups, and those who primarily engage in subsistence livelihoods and may not be able to qualify for the jobs available in the places where they could migrate.

92/ Singh, P., Charan, D., Kaur, M., Railoa, K., Chand, R. (2020). Place Attachment and Cultural Barriers to Climate Change Induced Relocation: Lessons from Vunisavisavi Village, Vanua Levu, Fiji. In: Leal Filho, W. (eds) Managing Climate Change Adaptation in the Pacific Region. Climate Change Management. Springer, Cham. https://doi.org/10.1007/978-3-030-40552-6_2

L-TAP: Tuvalu's Long-term Adaptation Plan



SUMMARY

L-TAP - Tuvalu's Long-Term Adaptation Plan - is designed to ensure the country's population can remain safely in Tuvalu beyond 2100. It notably involves the provision of raised land to accommodate staged relocation of people and infrastructure, new and upgraded housing and transport facilities, as well as improved water supply. Depending on future changes in sea level and requirements after 2100, a second phase involving additional land raising is also incorporated into L-TAP planning.

CLASSIFICATION

- Risks:** Submersion, erosion, salinization
- Typology of solutions:** Planning document, accommodation, managed retreat, hard protection, soft protection
- Geographical location:** Fongafale, Tuvalu
- Typology of actors:** Local, regional authorities, research institutes, State services

OBJECTIVES

Tuvalu is an atoll nation whose capital Funafuti has an average of elevation 0.5m above normal spring high tides, making it particularly vulnerable to SLR. 46% of the central built area of Fongafale, the largest islet of the capital Funafuti, is already below sea level. By 2050, it is estimated that half of the land area of Fongafale will become flooded by daily tidal waters and by 2100, 95% of the land area may be flooded by routine high tide. In response to the pressing challenges incurred by SLR, the Government of Tuvalu, with the support of the United Nations Development Programme (UNDP), has developed L-TAP: Tuvalu's Long-Term Adaptation Plan. L-TAP is designed to accommodate the national population safely beyond 2100. It also incorporates responses to several development challenges, such as sustainable water, improved food security, and energy supply.



ACTIVITIES

The L-TAP builds on the comprehensive data collected through airborne LiDAR technology to map Tuvalu's atolls and the work of the successful Tuvalu Coastal Adaptation Project (TCAP), financed by the Green Climate Fund and implemented by UNDP. This baseline data has been foundational to better assess the relationship between sea level rise and land elevation across all 9 atolls of Tuvalu and understand their relative merits in respect to long term adaptation engineering potential.

The L-TAP involves the provision of 3.6 square km of raised land to accommodate staged relocation of people and infrastructure over time. Funafuti already attracts urban drift from the outer islands to the Capital generating Tuvalu's largest and mixed community. These dynamics combined with geophysical characteristics mean efforts for staged relocation are now centred on Fongafale. The land expansion will allow for future development of housing, facilities, public recreation areas, and a protected sandy beach, as well as improvements to the harbour and airport. The new reclaimed land will be graded to facilitate stormwater drainage, and improvements to the airport will incorporate large scale rainwater catchments and collection. While L-TAP is designed to remain safe beyond 2100, it nonetheless incorporates the potential for a Phase II, depending on future needs, involving new elevated levels on existing land in Fongafale.



3 PLANNING FOR LONG-TERM ADAPTATION

KEY MESSAGES:

- Dynamic and adaptive strategies facilitate the phasing of adaptation measures across space and time, to address both urgent needs with immediate and transitional measures and longer-term needs with transformative solutions.
- Regional and international cooperation is needed to bridge gaps in knowledge as well as in technical and institutional capacity. Clear regional guidelines and enhanced peer learning can support the shift from recovery action to long-term planning required for the effective adaptation of coastal cities and territories to coastal hazards and sea level rise.
- Ecosystem-based adaptation involves the protection, sustainable management, or restoration of coastal and marine ecosystems. Their cost-effectiveness, suitability for Pacific coastal cities, and the co-benefits they provide to local populations can make them ideally geared to dynamic and adaptive planning.

Facing many environmental and social challenges, coastal cities and territories in the Pacific are often forced to operate within a framework of emergency or recovery rather than preparedness. Reframing adaptation towards long-term planning is essential to avoid maladaptation while dynamic and adaptive planning enables the articulation of strategies over time to cope with both immediate risks of extreme climate events, and slow onset events such as SLR. By deploying phased strategies, coastal cities and territories can implement robust solutions that combine different adaptation responses to jointly address several development needs and provide co-benefits for their inhabitants. Notably, ecosystem-based adaptation (EbA) can reduce risks but also provide cascading benefits for people and multiple economic sectors.

3.1. Developing dynamic approaches for responsive strategies

Dynamic adaptive strategies can ease the articulation of immediate action and longer-term ones, by sequencing the implementation of different measures, according to evolving social needs and environmental conditions.⁹³ This approach is highly relevant and can be adapted to Pacific coastal cities, given their exposure to tropical storms combined with SLR, and the high uncertainties surrounding their intensity, frequency, and rate. These uncertainties underscore

93/ Haasnoot, M., Kwakkel, J. H., Walker, W. E., & ter Maat, J. (2013). Dynamic adaptive policy pathways: a new method for crafting robust decisions for a deeply uncertain world. *Global environmental change*, 23(2), 485-498. <https://doi.org/10.1016/j.gloenvcha.2012.12.006>



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the need for flexible strategies that do not lock coastal cities in a single pathway. In dynamic adaptive planning, anticipation of the future and constant monitoring of the coastline must remain proactive to ensure that required actions are taken well before tipping points are reached. Multi-hazards assessments are useful to understand the full range of threats facing a city or a territory, and to maximise synergies by identifying the solutions that can address several fronts.

Aotearoa New Zealand developed [national guidelines](#) that support adaptive coastal and riverine management in coastal councils through a 10-step decision cycle encompassing the entire process of policy making, and including an uncertainty framework to support dynamic adaptive planning pathways.⁹⁴ Instead of focusing solely on the degree of likelihood of a consequence of SLR or other coastal hazards, these guidelines are rooted in continuous assessment and management, and the testing of ideas against a range of future scenarios before making decisions. The different possible decision outcomes are obtained using a logic flow from the current situation to different future scenarios -

94/ Coastal Hazards and Climate Change – Guidance for Local Government in New Zealand (2017) Government of New Zealand, Ministry for the Environment. <https://environment.govt.nz/publications/coastal-hazards-and-climate-change-guidance-for-local-government/>

over time frames of at least 100 years and including the highest projections amounting to 1.88 metre of elevation under RCP8.5 - linked to different levels of uncertainty. The guidelines also provide principles for inclusive community engagement, crucial to the definition of triggers that activate the shift from one pathway to another. Indeed, triggers reflect what is acceptable for a given community in relation to particular factors such as changes in the frequency and rate of extreme weather events, erosion and SLR, recurrence of saltwater intrusion, changes in land use and development, age of coastal assets, or unsustainable costs of measures in place. The Thames Coromandel District Council (TCDC) has used these guidelines to facilitate its community-driven adaptation journey. Convening 100 meetings with the population TCDC was able to define a total of 138 coastal adaptation pathways, encompassing all sections of its coastline - a feat that would not have been possible without the input of its communities (see [Case study 3](#)).

Pacific countries are progressively turning to the dynamic and adaptive approach to planning. In its National Adaptation Plan, the Republic of Marshall Islands (RMI) announced that it would develop adaptation pathways at the national level, together with partners. Mid and long-term adaptation responses include planned relocation in outer islands, also described

as “semi-rural areas” where it would be physically and socially feasible to do so.⁹⁵ As part of this effort, the World Bank produced several [pathways for the Majuro atoll](#),⁹⁶ where the capital of the RMI is located. Modelling the impacts from three SLR intervals (0.5 metres, 1 metre, 2 metres) and over three planning horizons (30, 50, and 100 years), the study identified potential risks and pathways linked to four primary approaches, based on the severity of SLR. The first approach, protect and raise, includes early warning systems, ecosystem-based adaptation and seawalls complemented by raising buildings and land raising. The second approach, protect and reclaim, integrates all responses covered in the previous approach, with the addition of land reclamation. Protect and relocate, the third approach, brings forth the responses of landward relocation and potential relocation to other islands due to high risks of inundations, extreme storms and severe water intrusions contaminating aquifers. As a last resort, international migration is considered in the protect and migrate approach.

To better equip cities and territories for dynamic and adaptive planning, greater institutional and technical support is needed. In line with this, regional cooperation organisations and national governments are already developing frameworks for adaptation planning, and monitoring, reporting and evaluation guidelines to help local authorities adapt to SLR, although this information tends to be dispersed. The Secretariat of the Pacific Regional Environment Programme has developed and regularly updates guidelines for the Pacific for climate hazards assessments, monitoring and evaluating beach erosion, environmental impact assessments, and community participation. For instance, the [Good Practice Guidelines in Environmental Impact Assessment for Coastal Engineering in the Pacific](#)⁹⁷ supports the implementation of national environmental impact assessment (EIA) legal requirements. It compiles information on how to conduct multi-criteria analysis of projects ranging from coastal protection to coastal development, taking into account physical, biological and social parameters, by providing methodologies and resources for accessing relevant data. **The development**

95/ Adaptation Communication Report (2020). Climate Change Directorate (CCD), Republic of the Marshall Islands (RMI). https://unfccc.int/sites/default/files/resource/RMI-AdaptationCommunication_Dec2020.pdf
96/ The World Bank. (2021) Adapting to rising sea levels in Marshall Islands. <https://storymaps.arcgis.com/stories/8c715dcc5781421ebff46f35ef34a04d>
97/ SPREP (2022). Good Practice Guidelines in Environmental Impact Assessment for Coastal Engineering in the Pacific. <https://library.sprep.org/sites/default/files/2022-11/practice-environmental-impact-assessment.pdf>

of a Pacific central clearing house, for instance under the [Pacific Resilience Partnership](#),⁹⁸ could further facilitate coastal adaptation by providing a one-stop shop for local decision-makers, encompassing technical advice, information and tools, and enhancing regional collaboration and knowledge exchange.

BOX 6 Pacific Region Infrastructure Facility: Guidance for Managing Sea Level Rise Infrastructure Risk

Many of the low-lying regions within Pacific Island Countries are likely to exceed adaptation limits, even under low greenhouse gas emissions pathways. In recognition of the pressure on infrastructure in the coastal margins from sea level rise, strategic long-term planning is needed to manage risks and it needs to reconcile with the uncertainty of future climate change and variability in social, cultural, economic, environmental values and capacity to cope. In its contribution to addressing this issue, the Pacific Region Infrastructure Facility launched its 2022 report “[Managing Sea Level Rise Infrastructure Risk in Pacific Island Countries](#)”.⁹⁹ This report offers strategic guidance by contextualising sea level rise up to the year of 2150 for 13 Pacific Island Countries; step-by-step application of the dynamic adaptive pathways planning (DAPP) and transitional guidance (in lieu of adaptation plans) for various infrastructure types, planning horizons, and infrastructure importance. The DAPP approach is a powerful process for managing and adapting to climate change. It recognizes that climate change effects vary from place to place, and that decision-makers face unavoidable uncertainty about ongoing sea level rise.

98/ Pacific Resilient Partnership. <https://www.resilientpacific.org/>
99/ Pacific Region Infrastructure Facility. (2022). Guidance for Managing Sea Level Rise Infrastructure Risk in Pacific Island Countries. https://www.theprif.org/sites/default/files/documents/PRIF_SLR-Report_Digital_0.pdf



3.2. Leveraging Ecosystem-based Adaptation

Ecosystem-based Adaptation (EbA) integrate the use of biodiversity and ecosystem services into an overall strategy to adapt to the adverse impacts of both current climate variability and long-term change. EbA can provide no-regret options for coastal adaptation strategies as they tend to be cost-effective and deliver co-benefits to biodiversity and societies. Combining EbA measures, through conservation and restoration activities, with other adaptation responses, for instance hard protections in the short-term and land reclamation or planned relocation in the long-term, can be a fruitful and sustainable way of developing dynamic and adaptive strategies, effective under a range of future SLR trajectories. In fact, immediate responses to SLR already include the utilisation of local resources from coastal ecosystems, as in Ngawanola, in the Temotu province of the Solomon Islands, where a local community is using coconut trees - combined with new lines of mangroves - as

a protection against waves.¹⁰⁰ In this case and many others, EbA can be actioned beyond emergency responses and rolled out in the long-term to tackle several issues at once, for instance by combining ecosystem conservation with livelihood activities, such as agroforestry as piloted in the [Sigatoka Sand Dunes National Park](#).¹⁰¹ The project, coordinated by the National Trust of Fiji and supported by the Kiwa Initiative, mobilises 80% of the local community in forest restoration and agroforestry, and in reducing the spread of invasive species to the nearby sand dunes ecosystem - especially relevant to reinforce the coastline against erosion, extreme climate events, and SLR. To help assessing, planning and implementing EbA for climate change, SPREP has developed an Ecological and Socio-economic Resilience Analysis and Mapping (ESRAM) approach, that can be combined with Ecological and Socioeconomic Vulnerabilities

100/ Row, M.Z., (2023). "Case study: Ngawanola Coastal Adaptation to Sea Level Rise." Presented on July 11, 2023, during the Sea'ties workshop "Adapting coastal cities and territories to sea level rise in the Pacific", at the Tanoa International Hotel, in Nadi, Fiji.

101/ Kiwa initiative. Building coastal resilience/ dune ecosystem in Fiji. <https://kiwainitiative.org/en/projects/building-coastal-resilience-forest-restoration-invasive-management-actions-and-the-heritage-in-young-hands-program-project>

and Opportunities Assessments (ESVOA), in order to assess and identify, in a participatory approach, key ecosystems, ecosystem services, vulnerabilities, as well as relevant and priority EbA options for adaptation and resilience planning within different timeframes (2030, 2050, and up to 2100). The outcomes of the ESRAMs conducted in Port Vila and Honiara from 2016 and 2020 under the SPREP-led [PEBACC project](#) continue to be the evidence and policy basis for EbA actions in these urban areas (see Box 7).

While there is a great need to assess and learn from EbA projects, including to understand their ecological limitations, combining them with small, low-impact engineering into what is known as "green-grey infrastructures" or "hybrid solutions" could potentially reduce vulnerability and secure stronger adaptation outcomes than with hard protections only.¹⁰² For instance, formal evaluation of the Kiribati Adaptation Project showed that nature-based components were more successful than

102/ UNFCCC and IUCN. 2022. Innovative Approaches for Strengthening Coastal and Ocean Adaptation - Integrating Technology and Nature-based Solutions. United Nations Climate Change Secretariat. Bonn. <https://unfccc.int/sites/default/files/resource/InnovativeApproachesforStrengtheningCoastaland%20Ocean.pdf>

hard infrastructure.¹⁰³ In the recent years, Fiji has seen the development of "Nature-based Solutions Seawalls" or "hybrid seawalls" as part of the Viro Village Hybrid Coastal Protection Program in 2020 in Viro, Ovalau, now extended to other coastal areas around the Fiji islands. Hybrid seawalls consist of a vegetated buffer of mangrove hedges planted as the first line of defence and followed by a backstop wall built out of locally sourced boulders, and vetiver grass cultivated behind the wall for extra protection. This low-cost approach is attracting growing interest in Fiji and the Pacific region, and will need to be monitored to assess and refine its effectiveness over the long run, both to face SLR impacts and to address other environmental and social issues for coastal communities.

Deployed in urban settings, EbA can strengthen cultural connections to the environment, be a means to promote traditional ecological knowledge, and generate a sense of pride in and stewardship of the ecosystems. In Apia, Samoa, the Planning and Urban Management Authority, responsible for administering Apia's urban growth, conducted work to revitalise Apia's waterfront. With the objective to improve attractiveness, functionality, and safety, the project includes enhanced green spaces that can both act as natural buffers against coastal hazards and provide recreational spaces to the city's inhabitants. Similarly, the [2016-2030 Climate Change and Disaster Risk Reduction Policy of Vanuatu](#) identifies targeted EbA action throughout the ridge-to-reef connectivity. The policy notably prioritises coastal revegetation and ridge-to-reef solutions that build on existing locally managed areas and habitats, ecosystems, and carbon sinks.¹⁰⁴ Importantly, Vanuatu recognises ILK as relevant to ecosystems management and adaptation planning, and plans to include it into school curricula.

103/ Kiddle, G. L., Bakineti, T., Latai-Niusulu, A., Missack, W., Pedersen Zari, M., Kiddle, R., Chanse, V., Blaschke, P., Loubser, D. (2021). Nature-Based Solutions for Urban Climate Change Adaptation and Wellbeing: Evidence and Opportunities From Kiribati, Samoa, and Vanuatu. *Frontiers in Environmental Science*, 9. <https://doi.org/10.3389/fenvs.2021.723166>

104/ Vanuatu Climate Change and Disaster Risk Reduction Policy 2016-2030. (2015). Government of the Republic of Vanuatu. https://www.preventionweb.net/files/46449_vanuatuccdrpolicy2015.pdf

As promising as EbA is for Pacific coastal cities and territories, significant knowledge gaps remain, hampering its effective deployment. Indeed, most knowledge of EbA, in particular in urban contexts, originates from Europe and the United States of America.

There is therefore a need for case studies and data on successful and unsuccessful applications of coastal EbA in the Pacific so that implementation, evaluation and monitoring of Pacific-based EbA can be further strengthened to cope with SLR. On-the-ground actions and regional cooperation have recently and rapidly developed in this space,

through different programmes and initiatives (Kiwa Initiative, Promoting Pacific Island Nature-based solutions, Climate Resilient by Nature, NUWAO, etc.). Among other activities, these initiatives all involve monitoring, evaluation and learning (MEL) to further develop capacities and support coastal EbA in policy and practice. While advocating coastal EbA at regional, national and local scales, these initiatives also support many on field experiments and learning-by-doing which contribute to an overall adaptive management approach in the face of SLR impacts and related uncertainties.

BOX 7

Box 7: Pacific Ecosystem-based Adaptation to Climate Change Plus (PEBACC+)

PEBACC+ is a regional project implemented by the Secretariat of the Pacific Regional Environment Programme (SPREP) and funded by the Kiwa Initiative and the French Facility for Global Environment (FFEM).¹⁰⁵ Following the first phase of PEBACC (2015-2020), the project seeks to strengthen the resilience of ecosystems, economies, and communities to the impacts of climate change in Fiji, Vanuatu, Solomon Islands, New Caledonia, Wallis and Futuna, through the development and institutionalisation of ecosystem-based Adaptation to climate change. The project includes restoration and community-based management of terrestrial, coastal, and marine ecosystems in the five countries and territories. Among the various project sites, the ESRAM in Vanuatu (carried out under phase one of PEBACC) identified for Port Vila the need to replant and regenerate areas where mangroves and other important coastal tree species have been depleted, and implement policy to strengthen protection of mangrove habitat at the urban, provincial, and national level. It also identified the Tagabe River catchment area as a priority area, where restoration and rehabilitation are continued through nurseries, tree planting and restoration of the riverbanks. Such activities are also conducted as part of the same process (ESRAM prioritising and guiding EbA activities) within the Honiara Botanical Garden and the Barana Nature & Heritage Park in Solomon Islands. New project sites include the Savusavu Blue Town Initiative (Vanua Levu, Fiji), with development of an integrated coastal zone management plan, as well as the Greater Noumea area (New Caledonia), where mangrove rehabilitation will be carried out as part of the "urban mangroves 2030 roadmap", in partnership with the Southern Province, municipalities of the Greater Noumea area, and the University of New Caledonia. As for other coastal ecosystem restoration,¹⁰⁶ the PEBACC+ project will build on existing and latest guidelines on mangrove restoration, and will be able to provide new case studies to be shared with other projects and initiatives within the region.

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105/ Kiwa Initiative. PEBACC + <https://kiwainitiative.org/en/projects/scaling-up-ecosystem-based-adaptation-to-climate-change-in-the-pacific-islands>

106/ Such as the "Best practice guidelines for mangrove restoration" recently released by the Global Mangrove Alliance and the Blue Carbon Initiative. See Beeston, M., Cameron, C., Hagger, V., Howard, J., Lovelock, C., Sippo, J., Tonneijk, F., van Bijsterveldt, C. and van Eijk, P. (Editors) 2023. Best practice guidelines for mangrove restoration. Best-Practice-for-Mangrove-Restoration-Guidelines-v2.pdf (mangrovealliance.org)



Thames Coromandel District Council Shoreline Management Pathways Project

THAMES COROMANDEL DISTRICT COUNCIL,
IN PARTNERSHIP WITH PARE HAURAKI



SUMMARY

Thames Coromandel District Council (TCDC) established a framework for the management and reduction of risks to people, property, the environment and taonga associated with coastal hazards along the Coromandel coast. To this end, 138 Coastal Adaptation pathways were developed, one for each unique stretch of the Coromandel Peninsula's shoreline, to address near-term issues while considering how local communities and hapu may need to adapt in the long-term. The definition of these pathways was enabled by a community-led journey based on locals' values and risk appetites.

CLASSIFICATION

-  **Risks:** Submersion, erosion
-  **Geographical location:** Coromandel, North Island, New Zealand
-  **Typology of solutions:** Planning document, capacity-building, knowledge sharing activities, hard protection / soft protection, accommodation, managed retreat
-  **Typology of actors:** Local, regional authorities, regional institution, State services, companies and professional organisations

OBJECTIVES

In April 2019, TCDC started their shoreline management planning project for the Coromandel's 400 km of coast. The aim was to establish a framework for the sustainable management of risks to people, property, the environment and tāonga associated with coastal hazards. To this end, Coastal Adaptation Pathways were developed.

The CAPs follow the DAPP approach, which recognises that climate change-related coastal hazards are not certain and difficult to predict. Consequently, the pathways developed are intended to be flexible and designed to be dynamic (or adapted). If the predicted hazards do not occur, or do not occur as predicted, the pathway can be revised and actions (such as protect or retreat) may not need to be taken. The challenge relates to not acting too early (and investing to mitigate risks that are not realised) or too late.



ACTIVITIES

The project consisted in the development of Coastal Adaptation Pathways (CAPs) that address immediate, short- and medium-term issues, considering how communities may need to adapt in the longer term. To this end, important community engagement activities were conducted, including over 100 meetings. The project team worked with [Coastal Panels](#) to define coastal assets, coastal hazards, and to integrate local values to prioritise areas of action and design the CAPs. Panel members were nominated representatives from Mana Whenua, Community Boards, community organisations, business and citizens, tasked with representing the views of their community. Broader forms of public consultation at key milestones were also conducted to enable Coastal Panels to justify, clarify, and revise recommendations in response to public feedback.

RESULTS

138 CAPs, one for each unique stretch of the Coromandel Peninsula's shoreline, were produced. CAPs develop tailored, flexible solutions to reduce the risk from coastal hazards to an acceptable or tolerable level; and to ensure the long-term sustainability and resilience of the Coromandel's coast communities for the next 100 years. They build on the aspirations and concerns of TCDC's communities and the principles of kaitiakitanga - the ethic and practice of safeguarding the natural environment and sustaining its resources, on which people depend. By their nature, the pathways will require review as new information becomes available, circumstances change or triggers for action are met. Key outputs for each of the 138 CAPs have been integrated in [i-reports](#), including detailed hazard information available to the public. In addition, an interactive [Map Viewer](#) enables all community members to access information about predicted coastal erosion and coastal flooding.

KEY TAKEAWAYS



- All activities conducted were based on the steps set out in the 2017 Coastal Hazards Guidance of the New Zealand Ministry for the Environment, and the Coastal Panels were supported by technical experts.
- Enabling Council and the Community to achieve the aims and objectives of the project will be the key measure of success. However, it is relevant to highlight that TCDC has already received the [2023 national award for environmental leadership](#) for this project from Taitura (Local Government Professionals Aotearoa)



RESOURCES

Presentations made at the Sea'ties Workshop Adapting Coastal Cities to Sea Level Rise in the Pacific

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