Pacific Perspectives 2022: Accelerating Climate Action

SUBREGIONAL OFFICE FOR THE PACIFIC

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Pacific Perspectives 2022: Accelerating Climate Action

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Foreword

Climate change is at the heart of policy discourse in the Pacific. Pacific leaders have been resolute in their efforts to secure a future for their citizens by accelerating policy shifts that recognise the primacy of climate change in advancing development aspirations. At the same time, they have emerged as leaders in the global fight against climate change, combining their voices to drive home the urgency of implementing climate actions today in order to keep the 1.5-degree Celsius goal alive. The historic decision taken by the international community at the United Nations Framework Convention on Climate Change Conference of the Parties (COP27), held in November 2022, to establish a "loss and damage" fund was due, in part, to the perseverance and persuasiveness of the Pacific delegation.

Despite these efforts, the development of the Pacific Small Island Developing States have been set back by the outbreak of the COVID-19 pandemic and the triple crises of food, fuel and finance. Several major natural disasters, ranging from severe tropical cyclones to the 2022 volcanic eruption in Tonga, have taken place in the midst of the COVID-19 pandemic, complicating humanitarian responses. This highlights the cascading impacts of disasters and reaffirms the importance of building resilience across all sectors.

In this regard, the key theme of this year's *Pacific Perspectives 2022: Accelerating Climate Action* is integration. This publication focuses on the disaster-climate-health nexus (Chapter 1); strengthening ocean and climate synergies (Chapter 2); promoting climate-smart and digital trade policy measures (Chapter 3); and enabling a sustainable energy transition (Chapter 4). It is clear that climate actions must not only be scaled up, but also integrated across these various sectors.

It is our hope that the findings, analyses, regional experiences, and policy recommendations contained in this publication will help Pacific member States and other stakeholders to formulate effective climate policies. I am pleased to acknowledge the strong collaboration between ESCAP and the various members of the Council of Regional Organisations in the Pacific (CROP), as well as the valuable contributions of Pacific and international experts, development agencies, and UN staff to this year's *Pacific Perspectives*.

Andie Fong Toy
Head
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Introduction

The Pacific region is at a crossroads. The advancement of the Sustainable Development Goals aspirations across all sectors are facing the test of international solidarity. The Pacific Small Island Developing States (PSIDS) contribute less than 0.03 per cent of the world's total greenhouse gas emissions but are amongst the most vulnerable to the impacts of climate change. They are made up of a land area of only half a million square kilometres, and of low-lying atolls that do not reach more than a few meters above current sea levels.

Natural disasters and the impacts of climate change, together with vulnerabilities stemming from physical characteristics, remoteness and lack of necessary infrastructure, are having a profound impact on sustainable development across all sectors in the Pacific SIDS. For example, the percentage of the population in Fiji suffering from food insecurity increased from 4.2 per cent in December 2020 to 11.4 per cent in February 2021 due to Tropical Cyclone Ana which formed in late January 2021, while Tropical Cyclone Pam in Vanuatu caused economic loss and damage estimated at 64 per cent of GDP in 2015, demonstrating that development gains can be set back by years due to a single weather event.

Unsurprisingly, countries in the Pacific have had longstanding concerns about the impacts of climate change.[1] In 2015, leaders of the Pacific Islands Forum published a Declaration on Climate Change Action, in which they expressed their deep concern about the growing threat posed by climate change to the economic, social, environmental and cultural well-being and security of Pacific Island Countries and Territories, and their peoples.[2] This was followed by the 2019 Kainaki II Declaration for Urgent Climate Action Now, the strongest statement the Pacific Islands Forum has ever issued collectively on climate change.[3]

Pacific delegations have also been active in the conferences held under the framework of the United Nations Framework Convention on Climate Change (UNFCCC). Pacific leaders led the push at the 2015 United Nations Climate Change Conference (COP 21) to adopt the target to limit global warming to 1.5 degrees Celsius above pre-industrial levels. Meanwhile, the efforts and leadership of the Pacific SIDS, as well as other countries, led to the historic decision to establish a "loss and damage" fund at the 2022 United Nations Climate Change Conference (COP 27) held in Sharm El-Sheikh, Egypt in November 2022.

Historically, the PSIDS have had to overcome several unique development challenges. But the effects of climate change, the COVID-19 pandemic, and rising fuel and food prices due to geopolitical tensions are creating some of the most adverse socio-economic impacts ever faced by the PSIDS in their history.

Against this backdrop, the Subregional Office for the Pacific of the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) pulled together the latest reports and evidence on climate change in the Pacific subregion. A major theme which emerged was the need to integrate climate change considerations across the various sectors, which could foster synergies between different policy areas to achieve climate goals. *Pacific Perspectives 2022: Accelerating Climate Action* focuses on four thematic areas: disaster resilience; ocean and climate synergy; climate smart and digital trade; and energy transition.[4]

Pacific Perspectives 2022: Accelerating Climate Action is structured as follows:

Chapter 1, *Tackling the disaster-climate-health nexus* looks at the complex relationship between natural disasters, climate change and biological hazards which affect people's health. While the number of fatalities from natural disasters has gone down in the PSIDS, the number of people affected has risen from 1.2 million to 5.5 million in the last decade. This has been partly due to the rising frequency and growing intensity of natural hazards, with COVID-19 adding another layer of vulnerability in the last few years. The chapter highlights the climate and biological hazard risk hotspots in PSIDS according to future scenarios given by the Representative Concentration Pathway (RCP) and Shared Socio-economic Pathways (SSP) analyses, including increasing extreme events like floods and related biological hazards. It then goes on to describe the priority adaptation strategies, such as the strengthening of early warning systems and application of frontier technologies. There are already many regional frameworks and initiatives to facilitate cooperation, some of which are working towards improving the knowledge base on disasters and climate change, and others which are establishing innovative mechanisms for financing and risk management. As building resilience to natural disasters is an over-arching goal for the Pacific region, there is still scope for strengthening cooperation in this area.

Chapter 2, *Ocean and climate synergies*, identifies ocean and climate synergies, consistent with the Kainaki II Declaration mentioned above which highlighted the importance of the ocean-climate nexus. There is growing evidence of how ocean warming, acidification, deoxygenation, ice melt, and sea level rise are having devastating impacts on the ocean in the Pacific and around the world. Rising sea levels are particularly concerning to Pacific communities, as it is estimated that around 50 per cent of the population resides within 10 km of the coastline. At the same time, there is also more and more evidence which shows that a restored and protected ocean would help mitigate the impact of storms and sea level rise, saving lives and livelihoods, and reducing economic costs of damage and recovery. In this regard, ocean-based solutions to climate change are attracting the attention of both researchers and policymakers. For example, coastal and ocean ecosystems have a large carbon sink capacity and hence play a crucial role in mitigating climate change through carbon sequestration. The chapter also describes the need to conserve and protect marine ecosystems, as they not only help with climate change mitigation and adaptation, but also provide a wide range of co-benefits. However, the growing scientific understanding of the ocean and climate nexus is yet to be reflected properly in policy and action. Many governments in the Pacific and their development partners are therefore stepping up efforts to enhance exchanges between the scientific and political communities. There is also a need to build the capacities of scientists from the region and improve the data for relevant research. Advances in science and research will also raise awareness about how the Pacific subregion can make significant contributions to climate change mitigation.

Chapter 3, *Climate-smart and digital trade* describes how trade policies can help countries access goods and services that can help mitigate climate change, while digitizing trade can reduce the impact that trade itself has on the environment. Some Pacific countries have already begun making their trade policy more digital and climate-smart through the removal of tariffs for environmental goods and services, but few countries have developed comprehensive national trade strategies which reflect environmental issues and climate-smart policies. From an environmental perspective, the digitalization of trade has both positive and negative repercussions. ESCAP studies have shown that the implementation of an electronic single window could lead to considerable environmental gains as it cuts down time and steps in trade processes. However, digital technologies themselves require energy and are estimated to be responsible for 4 per cent of GHG emissions. Moves towards digitalization and digital trade therefore need to balance environmental and sustainability issues. As the promotion of digital trade is conditional to having access to electricity as well as the Internet and digital services, more attention should be given to increasing the proportion of the population which has access to these basic services.

Chapter 4, *Energy transition* describes the context, relevance and opportunities for the energy transition in the Pacific. It outlines the Pacific context of Sustainable Development Goal 7 (SDG 7) and its targets, including the trade and consumption of different energy sources. At present, oil makes up about 80 per cent of the region's total energy supply, of which 52 per cent is used for transport and 37 per cent for electricity generation, with a fuel bill of about $6 billion per year, constituting anything from 5 per cent to 15 per cent of the gross domestic product of the PSIDS. In view of the high cost of importing fuel, which has been pushed even higher by the global energy crisis, it is even more important for the Pacific countries to reduce their dependence on fossil fuels. In this regard, the current crisis provides a clear opportunity for the energy transition. In many cases, renewable sources can deliver clean energy at a lower cost than conventional sources, making the business case for further investments in renewable energy strong. Measures to improve the efficiency of energy can also help improve energy security. The chapter discusses recent efforts to harmonize energy strategies at the subregional level, and offers priority areas for governments to focus on in order to achieve SDG 7 and the energy-related Nationally Determined Contributions.

The Way Forward concludes with a four-point climate agenda. It describes the support that is available to policymakers through intergovernmental organizations, multilateral development banks and other frameworks, and stresses the roles which regional cooperation can play to deliver the goals described in this publication.

Endnotes

1 Pacific Islands Forum Leaders began expressing concerns about climate change in the late 1980s. See for example, 19th South Pacific Forum Communique, 21 September 1988.

2 https://www.forumsec.org/wp-content/uploads/2017/11/2015-Pacific-Island-Forum-Leaders-Declaration-on-Climate-Change-Action.pdf

3 https://www.forumsec.org/2020/11/11/kainaki/

4 The draft report of the Pacific Perspectives 2022 was reviewed by a wide array of experts, policymakers, and development practitioners, including those who participated in an Expert Group Meeting in 27–28 October 2022. Many participants drew attention to the extensive number of regional frameworks and initiatives which are already active in addressing climate change in the Pacific. The current report therefore tried to present a snapshot of some of these initiatives, though not all organizations and initiatives could be included due to limitations of space. The general consensus of the review process was that it is important for the PSIDS to build on these initiatives in order to scale-up climate actions and collectively strengthen their resilience to climate change, natural disasters, and other threats.

CHAPTER 1

Tackling the disaster-climate-health nexus

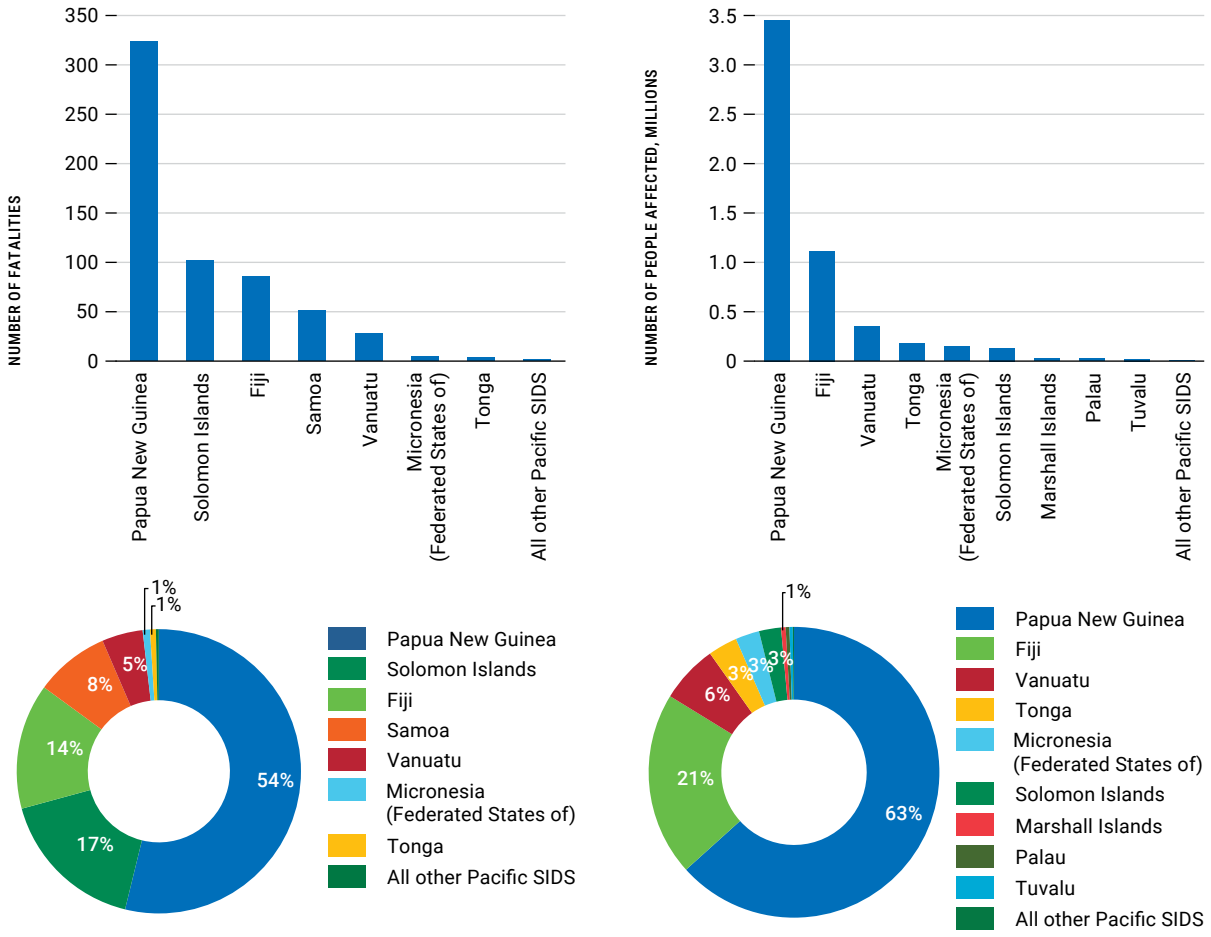
1.1 Context and relevance

While many people continue to suffer from natural hazards in the Pacific Small Island Developing States (PSIDS), significant progress has been made in reducing the number of disaster-related deaths. The number of fatalities decreased by 70 per cent over the past three decades, from just over 3000 between 1991 and 2000, to about 1000 between 2011 and 2020 (Figure 1.1). However, the number of people affected by disasters rose from 1.2 million between 2001 and 2010 to 5.5 million between 2011 and 2020. This shift is primarily due to an increase in climate-related hazards, such as drought and storms, over the past decade. This is also reflected in the types of disasters causing fatalities: while the number of fatalities from earthquakes fell drastically after 2000, those resulting from droughts, storms, floods and extreme temperatures increased (Figure 1.2).

In this regard, the disaster riskscape of the Pacific SIDS has been reshaped in recent years by converging risks under a new disaster-climate-health nexus, which has increased the vulnerability of populations to cascading hazards.[1] ESCAP's report, *Adaptation and Resilience Pathways for Pacific SIDS*, launched in 2022, shows that a warming climate brings along multiple, interacting risks. Weather events that occurred during the COVID-19 pandemic between 2020 and 2022 demonstrated how intersecting natural and biological hazards can prolong the health and economic disruptions arising from disasters. For example, amidst rising COVID-19 cases, Tropical Cyclone Harold, a category 5 cyclone, hit Fiji, the Solomon Islands, Tonga and Vanuatu in April 2020. It had a particularly harsh impact on Vanuatu, destroying between 80 and 90 per cent of homes and displacing over 27 per cent of the nation's population. Then in January 2022, tropical cyclone Cody affected the whole of Fiji with heavy precipitation that brought floods, damaging nearly 1600 households.[2]

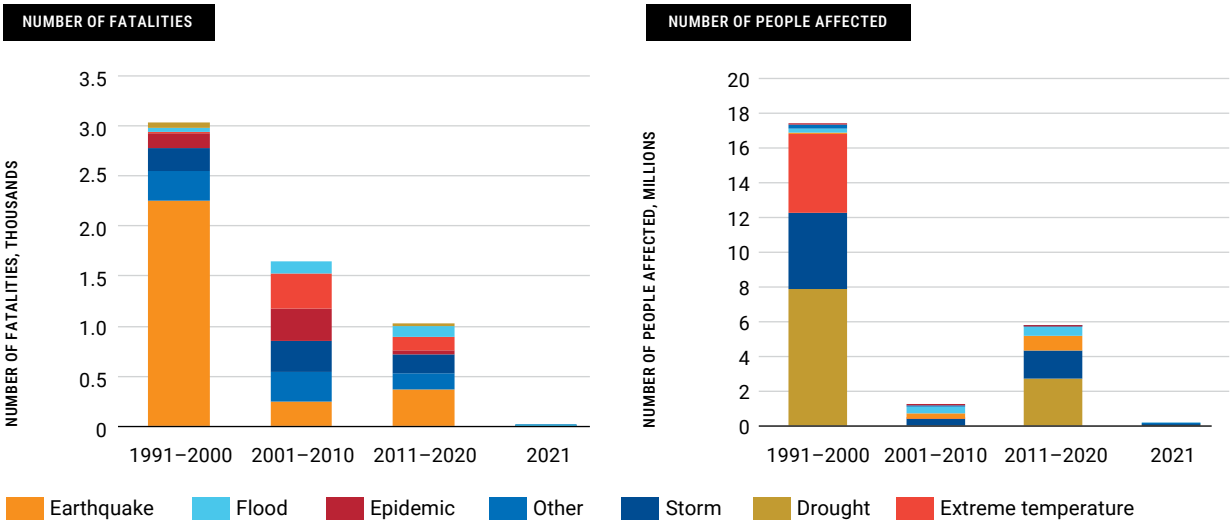
Meanwhile, countries in the Pacific subregion are also susceptible to geological disasters such as earthquakes and volcanic eruptions. The devastating Hunga Ha'aipai volcanic eruption on 15 January 2022, affected 87,000 people in Tonga, or over 80 per cent of the population, at a time when the country was still grappling with COVID-19.[3] It also triggered tsunami waves in Fiji, Samoa, the Solomon Islands and Vanuatu. To complicate matters further, the year 2022 marks the third consecutive year of La Niña in the Pacific, marking the first time this has happened since 1950. As has already been seen in Papua New Guinea, Kiribati and Tuvalu, countries in the Pacific face the risk of further droughts, as well as flooding, due to the effects of La Niña. These conditions are affecting infrastructure, crops, and livelihoods, and raise food security concerns.[4] The convergence of natural and biological hazards is especially severe on the most vulnerable population groups.

FIGURE 1.1 Number of fatalities and people affected by natural hazards in the Pacific, by country (2011–2020)



Source: ESCAP (2022), Pathways to Adaptation and Resilience in Pacific SIDS. Accessed from: https://www.unescap.org/kp/2022/asia-pacific-disaster-report-2022-escap-subregions-pathways-adaptation-and-resilience

FIGURE 1.2 Number of fatalities and people affected by natural hazards in the Pacific, by type of hazard (2011–2021)



Source: ESCAP (2022), Pathways to Adaptation and Resilience in Pacific SIDS. Note that data for 2021 was limited.

These trends reflect the potential for reversing progress in disaster risk reduction in the face of increased climate variability. In view of these challenges, countries in the Pacific must invest in climate adaptation strategies which are appropriate for their specific circumstances in order to reduce economic losses, build resilience, and accelerate progress on the Sustainable Development Goals, especially those goals related to disaster risk reduction, such as Goal 13 on "Climate action", Goal 14 on "Life below water", and Goal 15 on "Life on land". At the national level, strategic foresight and understanding of systemic risk, coupled with a robust risk governance framework, is needed.

At the same time, there is tremendous scope for strengthening resilience through regional approaches. For example, the Pacific Resilience Partnership (PRP), an alliance of different stakeholder groups and communities of practice working on climate change, disaster risk management and sustainable development, has successfully put the strategic involvement of the PSIDS onto the global climate change agenda. In September 2018, the Pacific Islands Forum in Nauru also adopted the Boe Declaration on Regional Security, which recognized an expanded concept of security, including human, cyber and environmental security.[5] As will be discussed below, regional approaches can pool collective knowledge and take advantage of the latest climate science to inform the specific needs of the PSIDS.

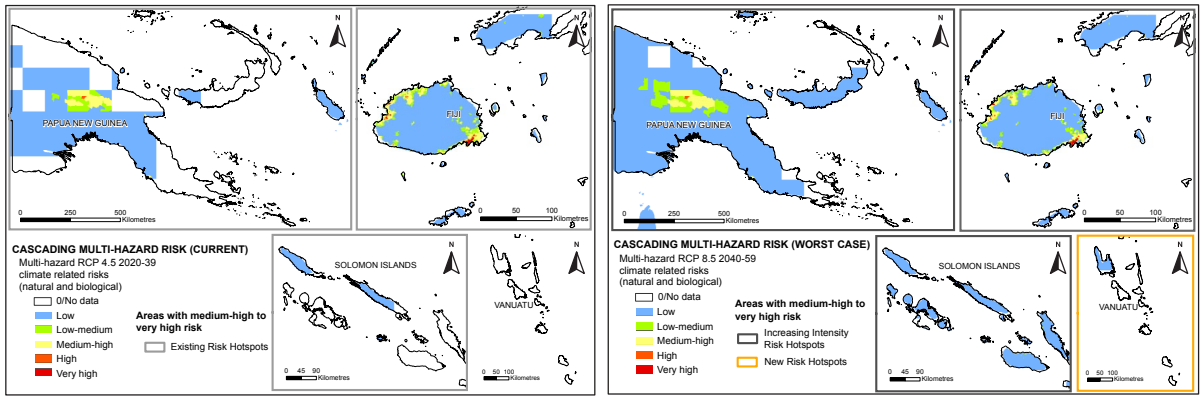
1.2 Current perspectives

1.2.1 Shifting contours of the disaster riskscape of the PSIDS

To assist countries to anticipate possible future impacts of climate change, the Intergovernmental Panel on Climate Change (IPCC) sets out various scenarios of different greenhouse gas concentration trajectories and their impacts. Figure 1.3 illustrates the exposure to multiple climate-related hazards and associated diseases under a moderate climate change scenario (Representative Concentration Pathway, or RCP, 4.5) and a worst-case climate change scenario (RCP 8.5). Under the worst-case scenario, existing hotspots in Papua New Guinea and Fiji will expand and become more complex, and new hotspots will emerge in the Solomon Islands and Vanuatu. Under the worst-case climate change scenario, over 3 million people, or 27 per cent of the Pacific subregion's population, will be exposed to multi-hazard risks from climate-related hazards. In Fiji, the exposure of the population will be much higher, covering over half a million people, or 64 per cent of the total population.

According to the new Intergovernmental Panel on Climate Change (IPCC) models (6th Coupled Model Intercomparison Project and Shared Socioeconomic Pathway), the PSIDS are also at risk of cyclones. Guam and the Northern Mariana Islands are prone to very strong or category 5 cyclones; the Federated States of Micronesia are prone to category 4 cyclones; and American Samoa, Fiji, New Caledonia, Palau, Samoa and Tonga are prone to category 3 cyclones.[6] These countries are likely to face higher risks in the future, as every increment of a degree between 1.5°C and 2°C translates into increasesed risks of tropical cyclones in the PSIDS (Figure 1.4).

FIGURE 1.3 **Emerging multi-hazard risk hotspots for climate-related disasters under moderate (RCP 4.5) and worst-case (RCP 8.5) climate change scenarios in the Pacific SIDS**



Sources: ESCAP calculations, based on Global Assessment Report on Disaster Risk Reduction (GAR) Risk Atlas, 2015; Climate Change Knowledge Portal, 2018; Disability-Adjusted Life Years (DALYs) estimates 2000-2019; and UN WPP-Adjusted Population Density 2020, v4.11; and UN Geospatial.

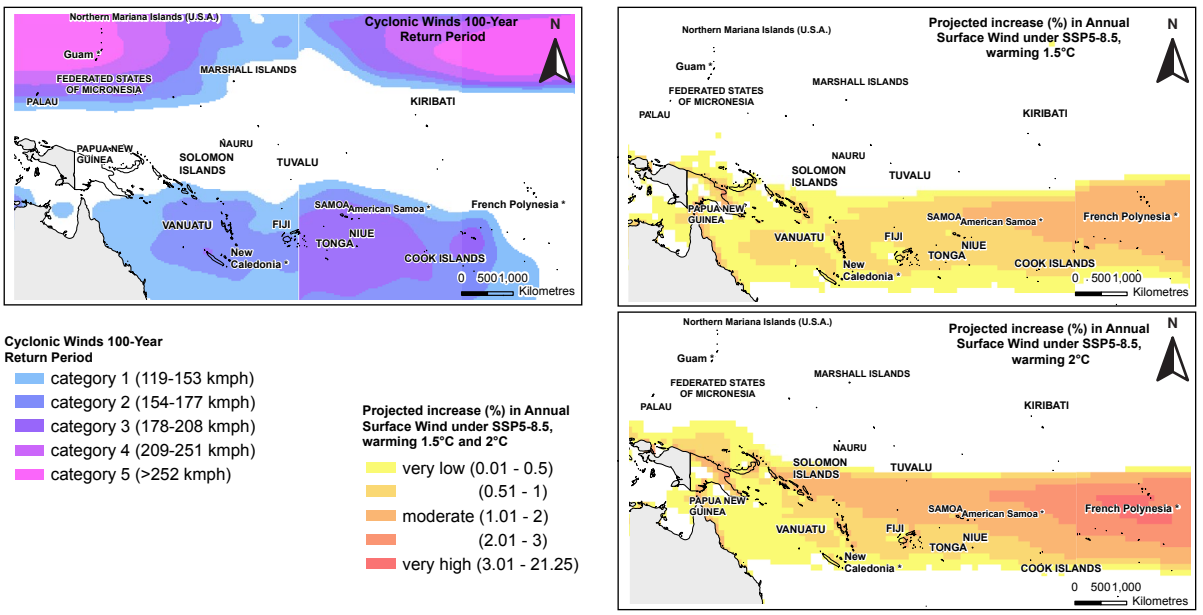
Notes: 1. Cascading Hazard Risk is obtained from multi-hazard file that consists of highest intensity of GAR Cyclone Wind within 100 year return period: Climate projection data for flood, drought and heatwaves under RCP 45 in 2020-2039 and under RCP 8.5 in 2040-2059 by Population and DALYS for related mult-hazard.

2. Current scenario refers to RCP 4,5 in 2020-2039. The worst case scenario refers to RCP 8.5 in 2040-2059.

Disclaimer: The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations.

Partly due to these weather-related hazards, the PSIDS are also becoming more vulnerable to additional risks from floods and related diseases, which directly affect human health and have high economic and social costs (Figure 1.5). The business-as-usual, worst-case scenario is RCP 8.5, which sees global warming at an average of 8.5 watts per square metre across the planet and an increase of about 4.3˚C, compared with pre-industrial temperatures, by 2100. Figure 1.6 reveals the growing risk posed by floods under this scenario, which will see the number of people exposed to floods increasing from just over 200,000 to over 2.5 million. Countries such as Tuvalu and American Samoa, which have had no recorded flood events in the past two decades, will be at highest risk under the worst-case scenario.[7]

FIGURE 1.4 **Intensifying cyclone risks under new climate change scenarios (Shared Socio-economic Pathways)**



Sources: ESCAP based on Global Assessment Report on Disaster Risk Reduction (GAR) Risk Atlas, 2015; IPCC WGI Interactive Atlas - Coupled Model Intercomparison Project Phase 6 (CIMP6), 2021; and UN Geospatial.

Notes: 1 Cyclone data consists of all cyclone wind categories with a return period of 100 years and an intensity of 119 to more than 252 km/h. Cyclonic wind intensity categories are based on Saffir-Simpson scale.

2. Projected increase in Annual Surface Wind Change under SSP5-8.5 ranges from 0 and above.

3. The reference period for the projected change in Annual Surface Wind Change under SSP 5-8.5 is 1995-2014.

4. *Indicates Non-Self-Governing Territory.

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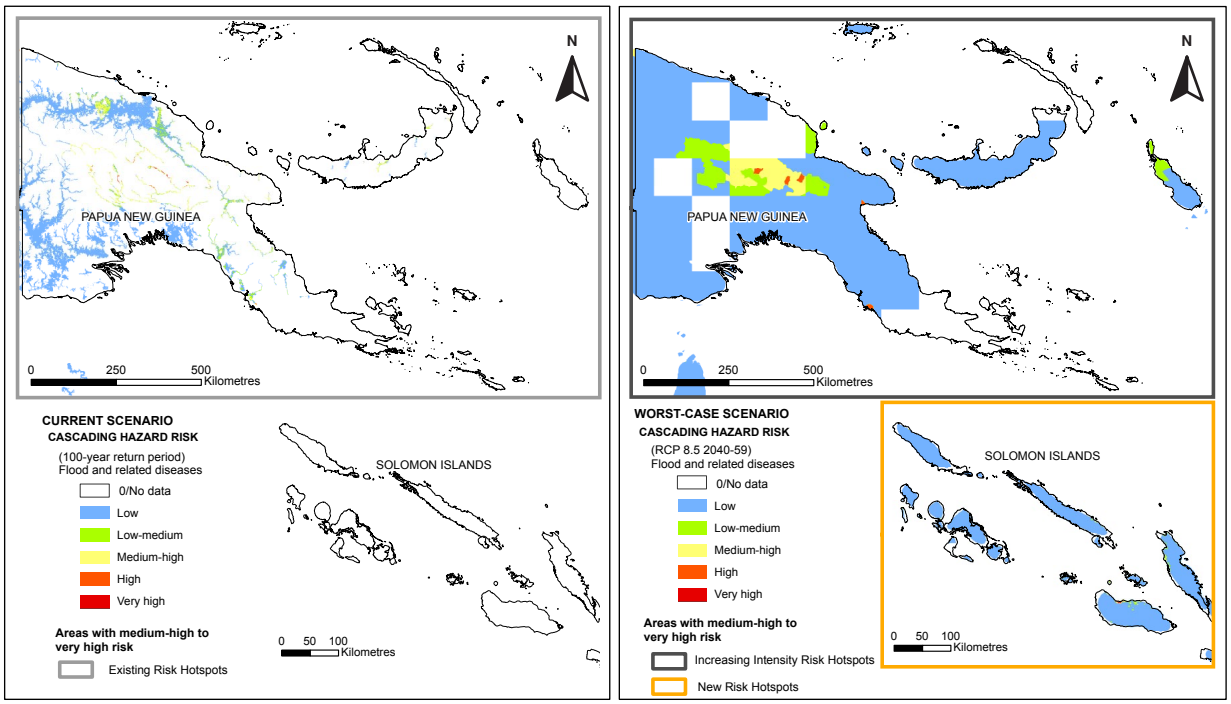
FIGURE 1.5 Expansion of the flooding riskscape under current and worst-case (RCP 8.5) scenarios in Papua New Guinea and the Solomon Islands

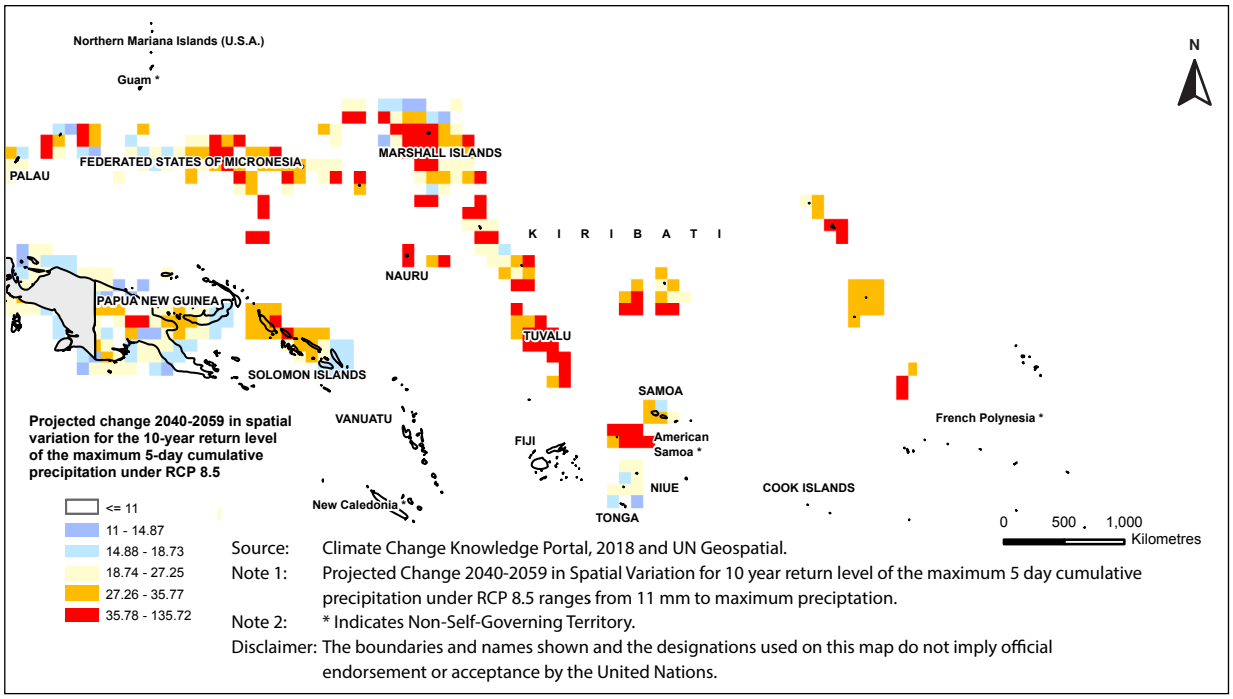


Sources: ESCAP calculations, based on Global Assessment Report on Disaster Risk Reduction (GAR) Risk Atlas, 2015; Climate Change Knowledge Portal, 2018; Disability-Adjusted Life Years (DALYs) estimates 2000-2019; and UN WPP-Adjusted Population Density 2020, v4.11; and UN Geospatial.

Notes: 1. Cascading hazard risk is obtained from Flood hazards 100 years and Projected Change 2040-2059 in Spatial Variation for the 10-year return level of the maximum 5-day cumulative Precipitation under RCP 8.5 by population and Disability Adjusted Life Years (DALYS).
2. Projected Change 2040-2059 in Spatial Variation for 10 year return level of the maximum 5-day cumulative Precipitation under RCP 8.5 ranges from 11mm to maximum precipitation amount.
3. DALY indicators for flood related diseases consist of diarrheal diseases, measles, hepatitis A, malaria, dengue and drowning.

Disclaimer: The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations.

FIGURE 1.6 Maximum 5-day cumulative precipitation amount projected to return in a 10-year period in the Pacific, RCP 8.5, 2040–2059



Source: Climate Change Knowledge Portal, 2018 and UN Geospatial.

Note 1: Projected Change 2040-2059 in Spatial Variation for 10 year return level of the maximum 5 day cumulative precipitation under RCP 8.5 ranges from 11 mm to maximum preciptation.

Note 2: * Indicates Non-Self-Governing Territory.

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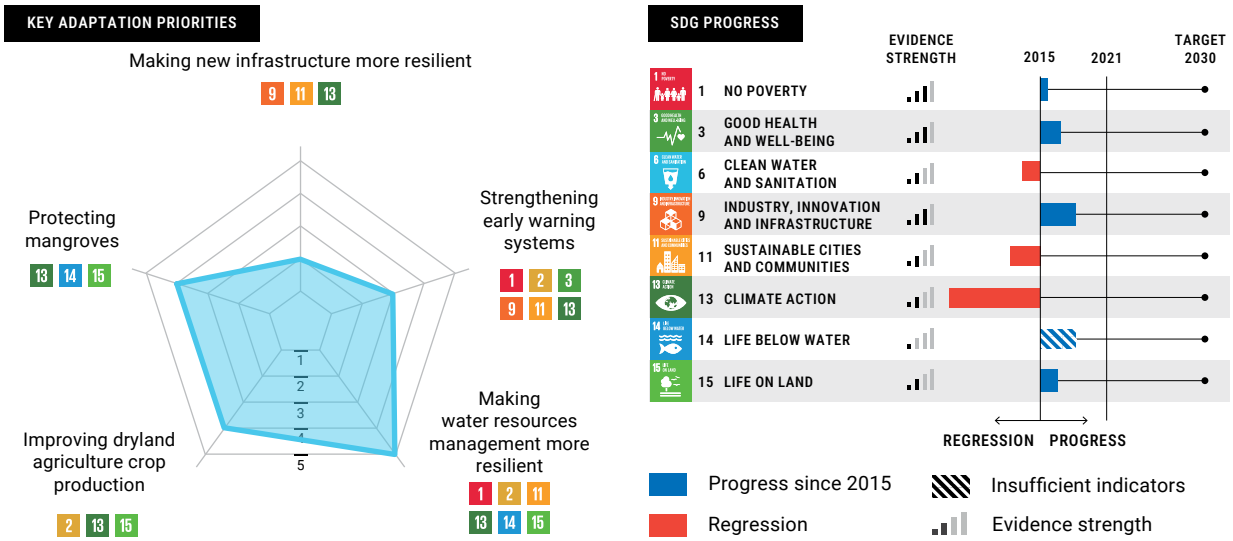
Source: ESCAP (2022), Pathways to Adaptation and Resilience in Pacific SIDS

1.2.2 Priority adaptation strategies for the PSIDS

Given the scenarios described above and the limited financial and human resources available, the PSIDS are striving to prioritize actions on disaster risk reduction, climate change mitigation and adaptation. To assist them, ESCAP's Risk and Resilience Portal identified the top adaptation priorities for the PSIDS based on the five priorities identified by the Global Commission on Adaptation, which yield a high cost-benefit ratio for building resilience.[8] These are 1) making water management systems more resilient; 2) protecting mangroves; 3) improving dryland agriculture crop production; 4) strengthening the early warning systems; and 5) making new infrastructure more resilient.[9] As Figure 1.7 shows, these measures are closely linked to the SDGs.

FIGURE 1.7 How the five priority adaption measures support the SDGs in the Pacific SIDS



Source: ESCAP's Risk and Resilience Portal

These measures are also aligned with the adaptation commitments declared by many countries in their latest Nationally Determined Contributions (NDCs) in the water, agriculture and food security, ecosystem and biodiversity, and health sectors. Hence, investing in these measures will bring about transformative adaptation outcomes. Additionally, community-led adaptation actions have proven to be effective for resilience building in PSIDS (Box 1.1).

Of particular interest is the call for better early warning systems. A 2021 WMO report noted that globally, most of the SIDS which contributed data have inadequate forecasting/warning services for riverine floods, flash floods, and drought: nine out of 11 PSIDS reported having inadequate flash flood forecasting/warning services, and only one PSIDS reported providing full and adequate capacity (Figure 1.8).[10] Strengthening early warning systems gained momentum as a key action area at the UN Framework Convention on Climate Change Conference of the Parties (UNFCCC COP) 27 in Egypt in November 2022 and was highlighted by the UN Secretary-General António Guterres, who stated 'We must make sure that every person, community and nation has access to effective early warning systems within the next five years'[11]. This call to action is especially pertinent for the SIDS, where it is estimated that nearly one out of three persons lack access to effective early warnings.[12]

BOX 1.1 **Case study of Locally-led Climate Actions in the Pacific**

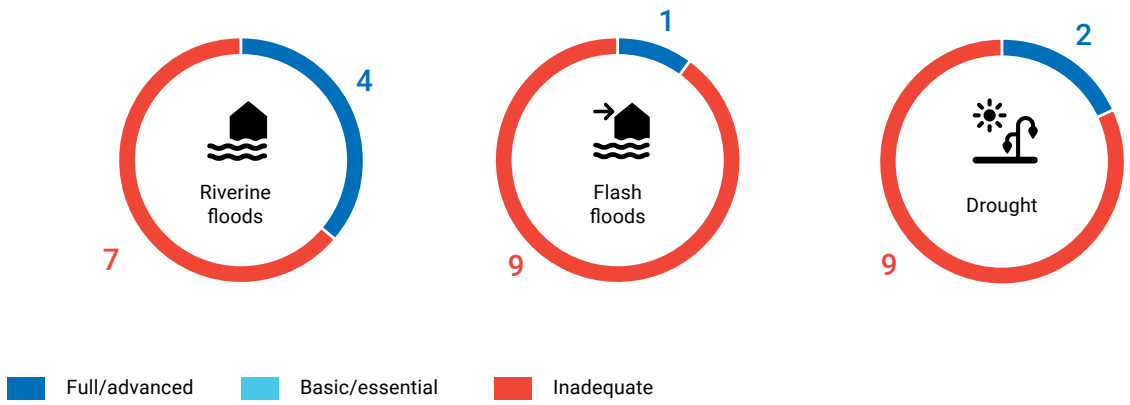
Community-based adaptation has long been championed as an approach that leads to more equitable outcomes, as it not only ensures that climate and development priorities are self-identified by community members, but also enables local voices to influence and shape climate actions that are better suited to local contexts.

RMIT University, Melbourne, has a long-standing presence in Solomon Islands, having first updated a climate vulnerability assessment for the capital city, Honiara, in 2014. The multi-disciplinary research team continues its work on bottom-up climate action planning with communities, civil society organizations, NGOs, and local governments through the Climate Resilient Honiara project. Local climate actions, devised and validated with community members, include a portfolio of hard actions (engineering drainage upgrades), soft actions (nature-based solutions to combat flooding, riverbank erosion and landslides), and capacity strengthening (best practice training for urban gardens).

For example, RMIT staff supported a local project team who ran workshops with 5 informal settlements in 2021 to better understand their housing needs and identify locally-appropriate approaches to enhance the disaster resilience of local housing before and after a disaster. Women, youth and people with disabilities were all part of the development of the inclusive and disaster resilient shelter guide. The key messages from the guide are now being developed into comic-style storybooks, drawn by young local artists and written in Pidgin, to make them more accessible to members of local communities and therefore help raise awareness. The strong relationships with local partners in Honiara allowed for project work to continue, even during the period of COVID-19 travel restrictions.

For more information about the resilient shelter guide, go to:
https://rmit.figshare.com/articles/report/Inclusive_and_Disaster_Resilient_Shelter_Guide_Urban_Informal_Settlements_Honiara_Solomon_Islands/19094600

FIGURE 1.8 **Number of SIDS with early warnings available to the population at risk (based on data provided by 11 SIDS)**

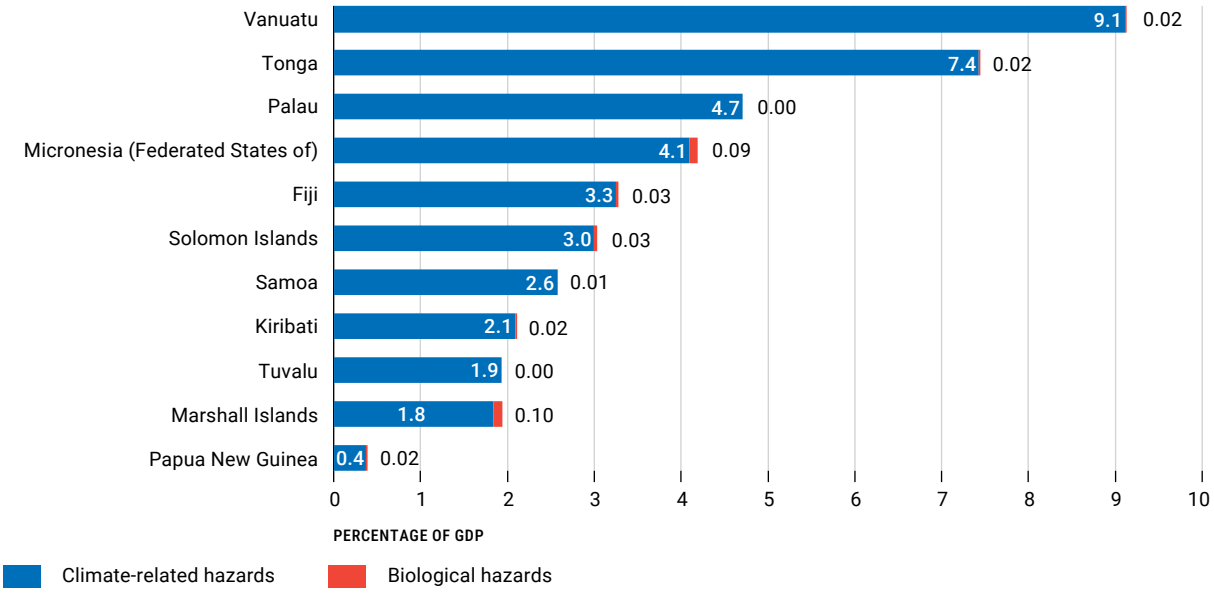


Source: WMO, State of Climate Services. https://public.wmo.int/en/media/press-release/early-warnings-all-initiative-gains-momentum

1.2.3 Facing up to the financing needs of mitigation and adaptation

To address the disaster-related SDGs in Asia and the Pacific, ESCAP estimated the full cost of adaptation for climate-related and biological hazards under the worst-case climate scenario (RCP 8.5) for each country (for more information about the methodology used, see Annex).[13] For the Pacific SIDS, the total annual adaptation cost is estimated at $487 million, with $480 million as the adaptation cost for climate-related hazards and $7 million as the adaptation cost for biological hazards. At the country level, the highest total adaptation cost is estimated at $181.6 million for Fiji, followed by $88.9 million for Papua New Guinea, and $81.1 million for Vanuatu. Figure 1.9 presents the costs of adapting to climate change as a percentage of GDP, which varies from about 9.1 per cent in Vanuatu, to less than 0.5 per cent in Papua New Guinea. As will be discussed below, further work is needed to fine-tune the methodologies used to estimate adaptation costs, as this will facilitate mechanisms to fund interventions.

FIGURE 1.9 **Cost of adapting to climate-related and biological hazards in Pacific SIDS, as percentage of GDP**



1.3 Regional Initiatives and Concrete Actions

Pacific Resilience Partnership

The Framework for Resilient Development in the Pacific: An Integrated Approach to Address Climate Change and Disaster Risk Management (FRDP) provides guidance and support for building resilience to climate change and disasters in the Pacific. The FRDP is being translated from paper to action through the Pacific Resilience Partnership (PRP), which was established in 2017 and is led by the Pacific Islands Forum Leaders. By sharing experiences and lessons learned, harmonising approaches and fostering collaboration, the PRP is working towards the collective goal of building climate and disaster resilience in the Pacific.[14]

In September 2018, the Pacific Islands Forum in Nauru also adopted the Boe Declaration on Regional Security which recognized an expanded concept of security, including human, cyber and environmental security, and frames regional responses to emerging security issues.[15] Notably, the Boe Declaration on Regional Security:

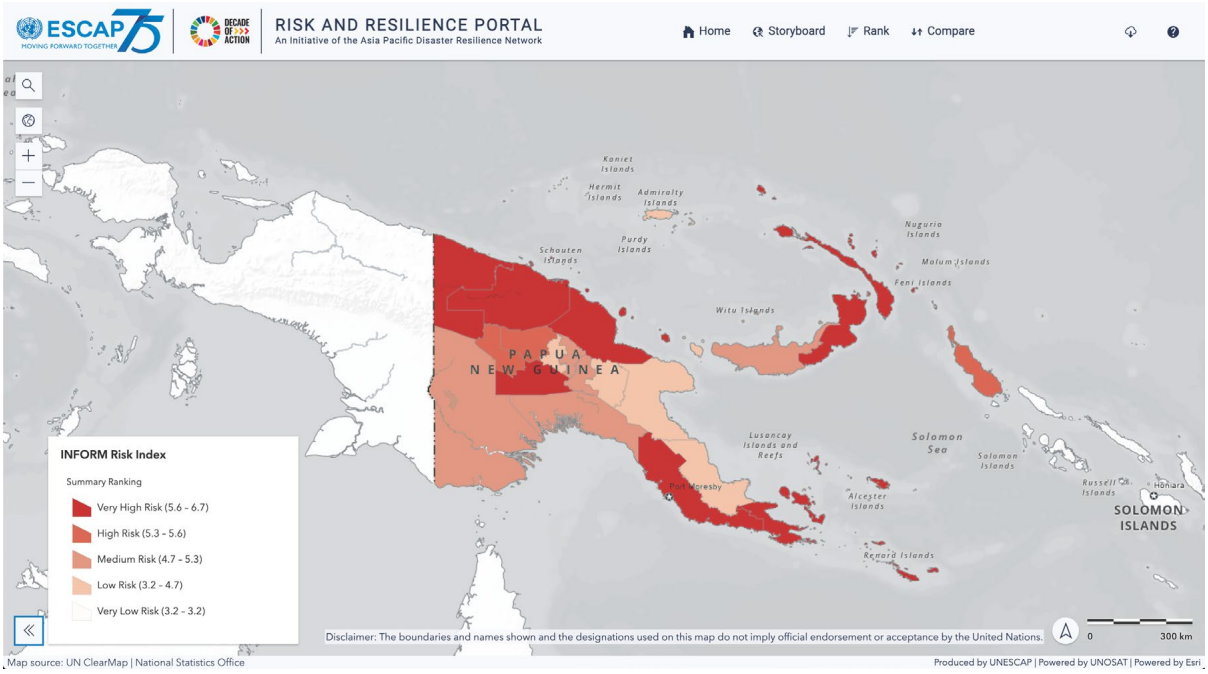
- recognized that climate change remains the single greatest threat to the livelihoods, security and well-being of the peoples of the Pacific;
- recognized the complex security challenges faced by the region, framed by the expanded concept of security – human, environment and resources, transnational and cyber;
- recognized the need for strengthening respective national security approaches as the basis for regional security; and was
- a call to action for stronger, more cohesive regional security cooperation and coordination.

Risk and Resilience Portal

The Risk and Resilience Portal, developed by ESCAP and the United Nations Satellite Centre (UNITAR-UNOSAT), is a one-stop shop to ensure that the vast array of data on hazards, climate change, social, economic, and health can be analysed by policymakers and development researchers to make risk-informed decisions that span across multiple sectors. This portal is also equipped with a Decision Support System (DSS), which provides contextual analysis of risk based on the INFORM Sub-National Risk Index which scores exposure, vulnerabilities and capacities for each township (Figure 1.10).

When the DSS is loaded, users can click on their administrative areas to find information about hazard vulnerability and coping capacity factors that contribute to risks in their area, together with key indicators and climate adaptation priorities. By using the rank function within the portal, policymakers at the central government level are able to compare the risk ranking of different administrative areas in terms of exposure to hazard vulnerability and coping capacity. Such comparisons between administrative units will allow users to understand vulnerabilities and to prioritize actions to address them.

FIGURE 1.10 Risk and Resilience Portal: A decision support system for Papua New Guinea



Source: ESCAP, Risk and Resilience Portal, Available at rrp.unescap.org. Disclaimer: The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations.

The Weather Ready Pacific Decadal Programme of Investment

This initiative was proposed by the Meteorological Services of the Pacific States and Territories under the Pacific Meteorological Council (PMC)[16] and endorsed by the Pacific Islands Forum Leaders meeting in 2021. It aims to strengthen the capacity of the region through investments in ocean, land and atmospheric monitoring, sharing of data, improved Multi Hazard Early Warning Systems (MHEWS) across the region, and strengthened coordination with response agencies. Such investments build resilience by strengthening their capacity to deal with extreme weather events.[17]

Pacific Ecosystem-based Adaptation to Climate Change (PEBACC)

Ecosystem-based Adaptation (EbA) is a holistic approach to adaptation planning that seeks to harness the potential of healthy ecosystems and biodiversity to strengthen social and ecological resilience. The Pacific Ecosystem-Based Adaptation to Climate Change (PEBACC) project was funded by the International Climate Initiative (IKI) and implemented from 2015 to 2020 by the Secretariat of the Pacific Regional Environment Programme (SPREP) in Fiji, Vanuatu and Solomon Islands. The PEBACC+ project developed and implemented a participative approach to analysing climate and non-climate threats as a basis for adaptation planning in several pilot sites. This work led to the development of comprehensive master plans in close collaboration with stakeholders and local communities.

The second phase of the project, PEBACC+ Pacific Ecosystem-based Adaptation for Climate Change Plus, will strengthen and diversify existing activities and integrate ecosystem-based adaptation into public policies. Key components of the project include:

- **Component 1:** Strengthen stakeholders' experience in the practical implementation of EbA and Nature-based Solutions (NbS) as a climate change adaptation strategy in Fiji, Vanuatu and the Solomon Islands.
- **Component 2:** Integrate and support the implementation of the EbA and NbS approach as a strategy contributing to climate change adaptation in New Caledonia and Wallis & Futuna.
- **Component 3:** Strengthen regional cooperation between Pacific Countries and Territories in the area of EbA by promoting the sharing of experiences and lessons learned from projects to increase the resilience of populations and ensure the sustainability of EbA implementation activities.[18]

Pacific Catastrophe Risk Insurance Company (PCRIC)

The Pacific Catastrophe Risk Insurance Company (PCRIC) traces its origins to a pilot insurance program launched by the World Bank in 2013 under the Pacific Catastrophe Risk Assessment and Financing Initiative (PCRAFI). The PCRIC offers financial products to provide PICs with finance in the immediate aftermath of a natural disaster event. By providing rapid liquidity to affected PICs, PCRIC helps countries respond quickly and sustain hard-won development gains. As the PCRAFI pilot program ended in 2015, finance ministers from across the Pacific demonstrated strong support for ongoing access to disaster risk financing options. This led to the formation of the Pacific Catastrophe Risk Insurance Facility, which consists of two legal entities – the Pacific Catastrophe Risk Insurance Foundation (PCRIF), and the PCRIC, which is wholly owned by the Foundation. PCRIC policies renew on the 1st of November every year for a 12-month period.[19]

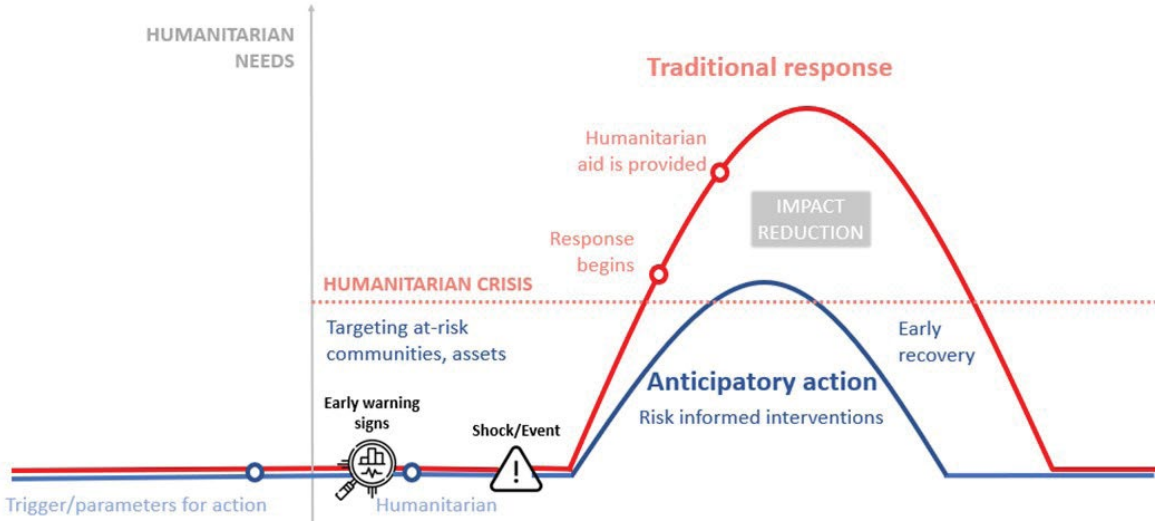
1.4 Priorities and next steps

As this chapter has discussed, the Pacific SIDS face a complex set of risks arising from climate change and biological hazards. To build resilience and implement SDG 13 (Climate action), it is critical to identify existing and potential vulnerable groups under the 1.5°C and 2°C global warming scenarios, as well as to provide appropriate adaptation measures. In particular, the differences between the larger islands and the atoll islands should be accounted for when assessing risks, as they face different threats and vulnerabilities.[20] The following actions are available for ESCAP member States and other stakeholders to support these goals.

Strengthen early warning for all in Pacific SIDS

Given that there are still gaps in the effectiveness of early warning systems in the Pacific, one of the most urgent priorities for PSIDS is to upgrade their multi-hazard early warning systems. As Figure 1.11 illustrates, early warnings play a pivotal role in building overall resilience by enabling anticipatory action. Investing in anticipatory adaptation measures will not only protect lives and livelihoods but also help protect development gains in the long term.[21]

FIGURE 1.11 Tackling the extent of humanitarian crisis by anticipatory action



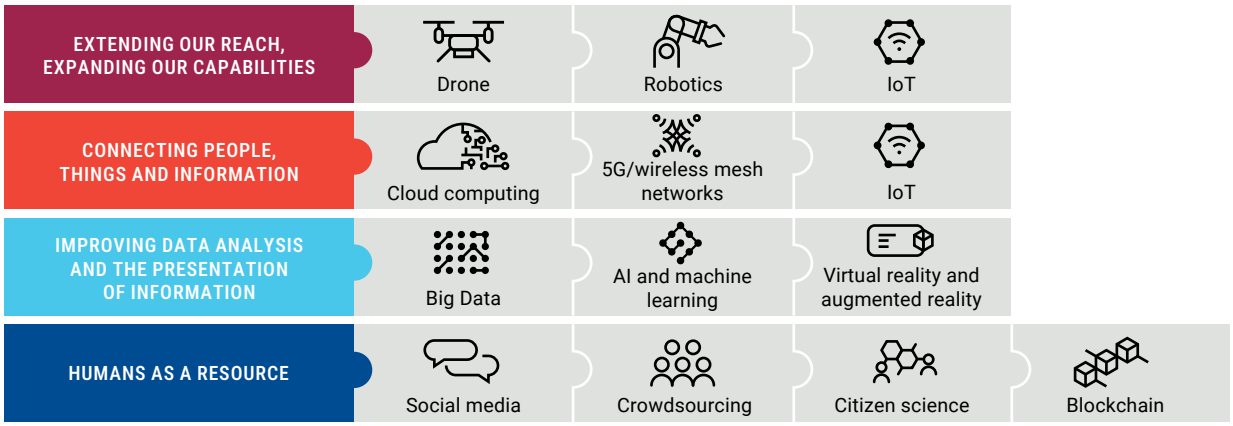
Source: WMO, State of the Climate in the South-West Pacific, 2021. https://library.wmo.int/doc_num.php?explnum_id=11387

Regional initiatives have also proven to be useful for pooling experiences and resources. ESCAP, for example, has piloted early warning and impact forecasting systems in Fiji, Papua New Guinea, and Samoa through the Regional Integrated Multi-hazard Early Warning System for Africa and Asia (RIMES). It also co-published the annual *State of the Climate in the South-West Pacific*,[22] which highlighted the gaps between risk, impact, and policy responses, with the World Meteorological Organisation. To realize the goal of achieving "Early Warning for All in the Pacific SIDS by 2025", strong subregional partnership mechanisms, such as the ESCAP-WMO Typhoon Committee and the Panel on Tropical Cyclones, could be established in the PSIDS. Both of these intergovernmental regional bodies have supported the exchange of knowledge, best practices, and mutual support, to better prepare for natural disasters for over 50 years.

Use frontier technologies and digital solutions to drive transformative adaptation

Frontier digital technologies and innovative ecosystems can drive solutions for resilience. Such technologies include Big Data, robotics, 5G mobile technologies, drones and satellite data (Figure 1.12). Advances in risk analytics, social protection, and early warning systems for seasonal and long-term impact-based forecasting can contribute to disaster risk reduction. For example, the Yavusa Navakavu, or "The Tribe Navakavu", successfully used remote sensing and GIS technology for land use planning and were able to access funding for interventions on the basis of the evidence shown in their map (Box 1.2). Regional cooperation can also enhance the effective utilization of such technologies as it facilitates the pooling of knowledge. The importance of such solutions was demonstrated when technical innovations were utilized to tackle overlapping natural hazards and the COVID-19 pandemic.

FIGURE 1.12 Frontier technologies for disaster risk reduction and health care



Source: Revised from United Nations Department of Economic and Social Affairs, Division for Public Institutions and Digital Government, and United Nations Office of Disaster Risk Reduction Global Education and Training Institute, "Risk-informed Governance and Innovative Technology for Disaster Risk Reduction and Resilience", Training Module, 2020.

Integrate adaptation, loss and damage to address climate-related impacts

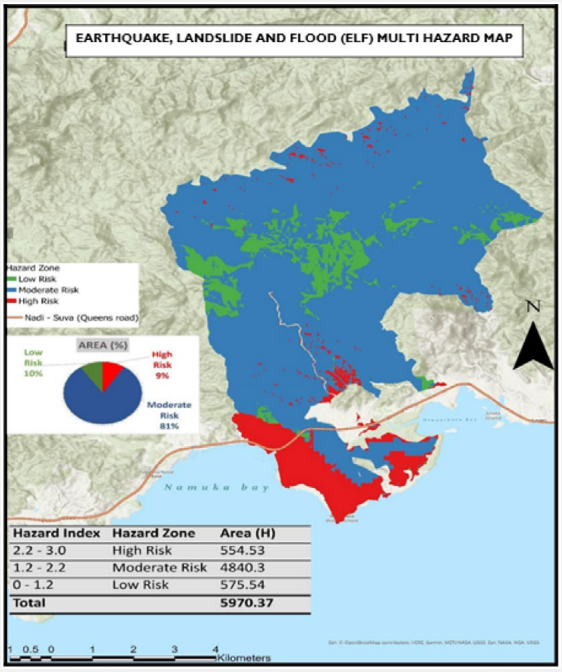
At the UNFCCC COP27 held in Egypt in November 2022, the question of who should bear the cost of loss and damage from climate change was extensively discussed.[23] In this context, The prime minister of Samoa Hon. Fiamē Naomi Mata'afa insisted that, "Loss and damage must remain firmly on the table as we continue to witness increasing occurrences and severity of climate change impacts everywhere." [24] Negotiations led to the establishment of a new funding arrangement for providing the assistance needed to respond to loss and damage by mobilizing new and additional resources. Additionally, the Transitional Committee on the operationalization of the new fund must include two members from the SIDS out of the 14 developing country members, along with ten developed country members.[25]

Although the details of this mechanism, including who should pay into the fund and who should qualify for loss and damage, still need to be developed and agreed, it is a remarkable milestone for the Pacific SIDS who disproportionally bear the cost of climate change and need support to recover, build resilience, and adapt to the changing climate. The momentum gained during the COP27 should be built on to establish the fund as soon as possible. Furthermore, methodological aspects of loss and damage mechanisms should be developed to support the seamless integration of adaptation, loss and damage in the PSIDS context.

BOX 1.2 **Case study of the Yavusa Navakavu, Fiji Islands: A success story of DRR bottom-up approach, social inclusion and applying Blue Economy principles in localizing SDGs**

The Yavusa Navakavu or The Tribe Navakavu is the first ever local community in Fiji to localize the SDGs through land use planning using remote sensing and GIS technology. The word *Yavusa* in iTaukei language means *Tribe* and *Navakavu* is the name of the Land-Owning Unit (LOU) in the province of Rewa sharing an administrative boundary with Fiji's capital, Suva. The success of this approach allowed the local community to access funding through the United Nations worth more than $120,000 Fijian dollars for the construction of a nature boardwalk project on their mangrove sanctuary.

Creating a multi-hazard map with the LOU was one of the highlights of this work. Knowing the hazardous areas for development and the economic value of their resources helps the Yavusa Navakavu to conserve the fragile ecosystem and sustainably develop their resources for the welfare of their community as a whole.



Integrate grey and green infrastructure to build resilience

Critical infrastructure must be disaster resilient to avoid cascading impacts and supply chain disruptions. ESCAP recommends a three-pillared approach that includes dynamic scenario planning; lifecycle assessments; and multi-stakeholder engagement, with multiple interdependencies among the three pillars.[26] Building resilient water infrastructure and nature-based solutions such as wetlands and mangroves yields a higher benefit cost ratio in the context of countries in the Pacific. Mangroves, for example, can substantially reduce the annualized average loss due to tropical cyclones in Fiji, Papua New Guinea, the Solomon Islands, and Vanuatu. However, between 1992 and 2019, mangrove forest areas were found to have decreased by around 10.1 per cent in Fiji, 3.2 per cent in the Solomon Islands, and 2.2 per cent in Vanuatu. These countries are also characterized by intensifying and emerging risk hotspots. Integrating grey and green infrastructure is key to building resilience in PSIDS.

Multisectoral approaches can accelerate transformative adaptation measures

A review of updated Nationally Determined Contributions (NDCs) and National Adaptation Plans (NAPs) reveals that agriculture and food security, coastal zone, water, infrastructure/cities/urbanization, ecosystem and biodiversity and health make up 75 per cent of adaptation finance needs in the Pacific SIDS. A shift towards the water-energy-food nexus approach can potentially transform adaptation outcomes with inter-sectoral synergies and convergence of policy actions.

Strengthen regional initiatives

Given that the risks faced by the PSIDS are predominantly transboundary, adaptation measures in NAPs, NDCs, Voluntary National Reviews (VNRs) and Disaster Risk Reduction (DRR) strategies should look at areas where regional approaches can complement national efforts. The Pacific Risk Resilience Platform and existing subregional cooperation architecture are key enablers. As mentioned above, ESCAP's Risk and Resilience Portal,[27] with climate risk profiles on adaptation priorities for PSIDS, is also an important initiative.

Policymakers should also tap into the rich array of educational and research resources spread across the region. In this regard, the Association of Pacific Rim Universities (APRU) serves as a major connector for Asia-Pacific research universities to solve global challenges. Throughout the COVID-19 pandemic, the APRU network engaged faculty, students, senior administrators and international partners in a wide range of program activities. Along with university education initiatives on virtual learning, many collaborations are based on United Nations Sustainable Development Goals.[28]

Another important recent initiative is the 2050 Strategy for the Blue Pacific Continent, adopted in July 2022, which outlines key thematic areas for urgent and appropriate action, including 'Climate change and disasters' and 'Technology and connectivity.' Into the future, this Strategy will be critical for building resilience in the region and supporting the achievement of the SDGs.

Endnotes

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18 Pacific Ecosystem-based Adaptation to Climate Change (PEBACC). https://www.sprep.org/pebacc
19 Pacific Catastrophe Risk Insurance Company (PCRIC) https://pcric.org/
20 An atoll is a ring-shaped coral reef, island, or series of islets. The atoll surrounds a body of water called a lagoon. As the reef expands, the interior island usually begins to subside, and the fringing reef turns into a barrier reef. When the island completely subsides beneath the water leaving a ring of growing coral with an open lagoon in its centre, it is called an atoll. https://education.nationalgeographic.org/resource/atoll
21 https://library.wmo.int/doc_num.php?explnum_id=11387
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CHAPTER 2

Ocean and climate synergies

2.1 Context and relevance

It is now widely recognized that climate change poses a severe threat to the sustainability of the oceans. Systemic changes, such as ocean warming, acidification, deoxygenation, ice melt, and sea level rise, are already having devastating impacts on the lives and livelihoods of coastal communities.[1] Sea-level rise is particularly concerning because the populations of many Pacific Small Island Developing States (PSIDS) are concentrated close to the shoreline.[2] For instance, in Cook Islands, Nauru, Niue, Palau, Samoa, Solomon Islands, Tonga, and Vanuatu, around 55 per cent of the population live within 500 m of the coast, while for Kiribati, the Republic of Marshall Islands, and Tuvalu, this figure ranges between 98 to 99 per cent of the population.[3] There is now clear evidence that the mean sea level has risen ca. 10–15 cm in much of the western tropical Pacific, and by ca. 5–10 cm in much of the central tropical Pacific, since satellite records began in 1993. This has resulted in increases in the frequency of minor flooding.[4] One study suggests that between 0.66 to 1.7 million people in the Pacific Islands and many more coastal populations will be forced to migrate owing to rising sea levels by 2050.[5]

Another serious concern is ocean acidification, which has caused the pH levels in the tropical Pacific Ocean to decrease by 30 per cent (0.11 pH units) since the early 19th century.[6] Falling pH levels are expected to lead to more harmful algal blooms and negative impacts on fish stocks. The Representative Concentration Pathway (RCP) 8.5, adopted by the IPCC's Fifth Assessment Report, predicts not only further acidification, but also an increase in mean sea surface temperature globally, rising heat content in the ocean water, decreasing ocean oxygen, continued ice sheet mass losses, and, consequently, a rising global mean sea level.[7] Under RCP8.5, the number of marine heat waves is also expected to increase to 100–200 days/year by 2050, and to over 300 days/year closer to the equator.[8]

Against this backdrop, there has been growing interest in identifying and demonstrating ocean-based solutions to climate change. For example, more and more evidence is available which shows that a restored and protected ocean would help mitigate the impact of storms and sea level rise, saving lives and livelihoods, and reducing economic costs of damage and recovery. Furthermore, "blue carbon", or the carbon naturally sequestered by the world's oceans, is rapidly gaining the attention of policymakers and scientists. This carbon is captured by living organisms and is stored in the underlying sediments of mangroves, salt marshes, and seagrass for millennia.[9] Representing more than 55 per cent of the green carbon (carbon removed by photosynthesis and stored in the plants and soil of terrestrial ecosystems), coastal and ocean ecosystems have a large carbon sink capacity and hence play a crucial role in mitigating climate change through carbon sequestration.

However, the growing scientific understanding of the ocean and climate nexus is yet to be reflected properly in policy and action. This is recognized by many PSIDS, who have identified the importance of research, data and building internal research capacities to enable them to address issues pertaining to climate change and ocean management. The 2050 Strategy for the Blue Pacific Continent, for example, approved by Pacific Leaders in July 2022, highlighted the importance of scientific research, innovation, and use of data and information to inform policies, and emphasized that cultural values and traditional knowledge should be reflected in measures to conserve the ocean. While the PSIDS are very small contributors to greenhouse gas emissions, advancement of research in blue carbon may demonstrate how the Pacific can make significant contributions to climate change mitigation.[10]

2.2 Current Perspectives

2.2.1 Ocean-based activities to counter and adapt to climate change

According to one study, ocean-based activities could provide up to one-fifth of the carbon mitigation needed to meet the Paris Agreement goals by 2050, reducing global greenhouse gas emissions by up to 4 billion tonnes of CO_2 equivalent in 2030 and up to 11 billion tonnes in 2050.[11] In this regard, the efforts of governments, non-governmental organisations and communities across the Pacific subregion to protect and restore coastal and marine ecosystems, such as mangroves, seagrass, and salt marshes, are a good example of such an ocean-based activity. In addition to contributing to climate change mitigation through their ability to sequester and store carbon in soils and vegetation, these ecosystems offer a wide range of co-benefits.[12] Vegetated habitats buffer acidification[13] and an increase of marine species enhances the productivity of surrounding areas, which can help buffer against climate impacts and increase their resilience.[14] A report commissioned by the Ocean Panel calculated that every $1 invested in mangrove conservation and restoration generates a benefit of $3.[15] Additionally, conservation of existing mangroves yields higher benefits (88:1) than restoring degraded ones (2:1), indicating that conserving mangroves now is cheaper than restoring them later.[16]

Some countries in the Pacific are also paving the way in the establishment of marine protected areas, or MPAs (Box 2.1). Data shows that MPAs grew by a global average of 15.1 per cent between 2000 and 2020, and that by 2021, the average coverage of protected areas in relation to marine areas (Exclusive Economic Zones) was 19.64 per cent. According to the Intergovernmental Panel on Climate Change (IPCC), establishing networks of protected areas would help maintain ecosystem services, including carbon uptake and storage.[17] The Special Report on the Ocean and Cryosphere in a Changing Climate (SROCC), published by the IPCC, states that the restoration of vegetated coastal ecosystems, such as mangroves, tidal marshes, and seagrass meadows (coastal blue carbon ecosystems), could provide climate change mitigation through increased carbon uptake and storage of around 0.5 per cent of current global emissions annually (*medium confidence*). This is in addition to other services, such as sea-level rise mitigation.

BOX 2.1 **Marine Protected Areas in the Pacific Islands**

In 2008, Kiribati established the first mega MPA. The Phoenix Island Protected Area (PIPA) is a 408,250 km^2 expanse of marine and terrestrial habitats in the Southern Pacific Ocean. The area encompasses the Phoenix Island Group, one of three island groups in Kiribati, and is the largest designated MPA in the world. Some other Pacific Islands have followed suit and established their own mega MPAs. For example, one of the biggest MPAs in the world is found in Palau. The Palau National Marine Sanctuary (PNMS) covers 475,077 km^2 and surrounds much of the Republic of Palau. Coming into effect in 2020, the MPA covers 80 per cent of Palau's national waters and prohibits all extractive activities such as fishing and mining. Locally managed fisheries are permitted to operate within the remaining 20 per cent of Palau's EEZ.

Sources: Conservation International, 2008; Cirilla, 2020.

The success of the MPAs also rests on the involvement of communities. For example, the Fiji Locally Managed Marine Protected Area Network has become a model for engaging communities to reduce overfishing within MPAs (Box 2.2). At the 2022 UN Ocean Conference in Lisbon, there were numerous Voluntary Commitments relating to the Pacific, including some on the sustainable management of the ocean and marine ecosystems, sustainable aquaculture, community-based fisheries management, and promoting gender equality in sustainable fisheries management and development, among others.

BOX 2.2 **Fiji Locally Managed Marine Protected Area Network (FLMMA)**

Traditional fisheries management practices have been used for many centuries throughout much of the Pacific. One of these practices includes the establishment of a tabu area: an area of reef in which all fishing is prohibited. These tabu areas were traditionally put in place for 100 nights after the death of a prominent chief or village leader. After this period, the tabu was lifted and the then abundant fish were harvested for a feast to celebrate the passing of the senior member of the community.

In the 1990s, dwindling catches and fish sizes in inshore fisheries led a community in Verata, Tailevu, on Fiji's main island, to work together with government and non-government organization (NGO) partners to reinvigorate the traditional practice of tabu. The results were outstanding and support spread rapidly among other communities. There are now over 400 villages around Fiji working with government and NGOs under the umbrella of the Fiji Locally Managed Area (FLMMA) network. These villages all have one or more tabu areas within their traditional fishing ground of iQoliqoli. They manage this together with additional restrictions on what can be caught, when and how.

Source: https://lmmanetwork.org

2.2.2 Financing ocean science and research on ocean – climate synergies

National governments are currently the key sources of financing for ocean science.[18] While national investments in ocean science differ around the world, the average is only 1 per cent of national research budgets.[19] This is a small proportion compared to the estimated US$1.5 trillion which the ocean contributed to the global economy in 2010, a figure expected to double to US$3 trillion by 2030 (OECD, 2016). Meanwhile, in 2017, the share of gross domestic expenditure on research and development (GERD) dedicated to ocean science was on average only around 1.7 per cent of total GERD.

However, the number of private foundations and corporate donation programmes involved in ocean activities is growing.[20] In 2017, approximately $500.5 million were allocated to ocean-related projects globally, out of which $149.4 million were allocated to more than 1,000 marine science projects. In comparison, a total of $668.2 million were provided to marine science projects by private foundations and donors through more than 6,000 different grants between 2013 and 2017. These figures underscore the importance of building partnerships with the private sector.

2.2.3 Data and research on the ocean, its ecosystems, and their interaction with human pressures

Ensuring the sustainability and resilience of coastal and marine ecosystems while integrating and balancing different ocean uses to optimise the overall ocean economy can be achieved by applying integrated ocean management (IOM), a holistic, ecosystem-based and knowledge-based approach.[21] However, to design and monitor policies for IOM, governments need sufficient data and the capacity to analyse this data. To date, however, not all countries have been adequately equipped to manage their ocean data

and information, and as a result, some rely on other countries to conduct the modelling and projections needed for climate mitigation and adaptation. Poor data availability on the ocean and its ecosystems also negatively affects countries' abilities to make evidence-based decisions on the management and use of coastal and marine resources. For example, there is some data for the PSIDS which show some progress on beach litter collection and coastal eutrophication, and some information is also available on the share of sustainable fisheries.[22] However, it is difficult to find other data for monitoring SDG 14, "Conserve and sustainably use the oceans, seas and marine resources for sustainable development."

In this regard, open access and data sharing are critical for capacity building and climate resilience. One initiative which is gaining support is the creation of a "digital twin" of the ocean. The Digital Twins of the Ocean (DITTO) is an international project led by the GEOMAR Helmholtz Center for Ocean Research Kiel and Kiel University – Germany to create a high-resolution, multi-dimensional, and near real-time virtual representation of the ocean.[23] It is a digital framework for sharing marine data, ocean observations, modelling and simulations, artificial intelligence (AI), and specialized tools including best practice. Users will be able to access, manipulate, analyse, and visualize marine information, as well as to create scenarios addressing issues such as energy, mining, fisheries, tourism, and nature-based solutions (NbS). DITTO will empower ocean professionals, including scientific users, to create their own local or topical digital twins of 'their ocean issue' by using standard workflows. Such a DITTO has been proposed for the Pacific region, among other oceans of the world.

2.3. Regional initiatives and concrete actions

Pacific Climate Change Centre (PCCC)

The Pacific Climate Change Centre (PCCC), hosted at the Secretariat of the Pacific Regional Environment Program (SPREP), is the regional centre of excellence for climate change information, research, and innovation. It organizes activities to build capacities in adaptation, mitigation, climate services and project development, and also promotes applied research on these topics. One of its missions is also to improve the information flows between various stakeholders, including met services, climate practitioners, policy makers, scientists and those implementing policies, programmes and projects. It offers space for visiting researchers who are working on issues concerning climate change in the Pacific subregion.

Regional Climate Consortium for Asia and the Pacific (RCCAP)

The Regional Climate Consortium for Asia and the Pacific, or RCCAP, is a community of practice that aims to facilitate the development, dissemination, and application of climate information in support of climate resilient development. The RCCAP portal encompasses climate information, guidance material and other resources developed by the Commonwealth Scientific and Industrial Research Organisation (CSIRO) and its partners, for both Asia and the Pacific Islands. In 2017, CSIRO and SPREP produced guidance material to assist national meteorological and hydrological services and their sectoral stakeholders to jointly undertake national/sub-national climate change risk assessments.[24]

Office of Pacific Ocean Commissioner (OPOC)

The Office of Pacific Ocean Commissioner (OPOC), established within the Pacific Islands Forum Secretariat (PIFS), has a range of responsibilities. It provides coordinated advice on cross-sectoral ocean issues to countries, such as Biodiversity Beyond National Jurisdiction (BBNJ) and marine spatial planning, and supports regional preparatory processes to review and develop ocean policy, identifies emerging issues and reports progress under SDG14. An important output of the OPOC is the Blue Pacific Ocean Report (BPOR), which examines progress in key regional and international ocean initiatives in the key ocean sectors and proposes strategies to facilitate effective regional and sectoral collaboration.[25]

2.4 Priorities and next steps

Realizing ocean-based solutions requires three key components: capacity development, ocean technology diffusion, and resource mobilization. The PSIDS must be more ambitious in pushing forward these three areas, as well as in strengthening cooperation on ocean science and technology amongst countries in the region. The following actions are available for ESCAP member States and other stakeholders to support these goals.

Strengthen the links between ocean and climate change science

In recent years, the silos between ocean and climate change science have been breaking down gradually. Ecosystem-based approaches can enhance convergence between these areas. Cooperation on the use of ocean science to inform climate policy must consider the best decisions for ecosystem health and integrity, regardless of national jurisdictions. In this regard, more investment is needed in research and technology for blue carbon storage and blue carbon accounting. For example, the protection and restoration of coastal ecosystems, such as mangroves, coral reefs, seagrass, and salt marshes, will enhance the health and integrity of these ecosystems, but more research is needed to estimate how to calculate their contribution to climate change mitigation and adaptation. More attention is also needed to identify policies which integrate the two goals of climate change mitigation and adaptation, an approach which is gaining more and more support.

Build research capacities in PSIDS

Scientific research on blue carbon could increase recognition of the value of the ocean and ecosystem as carbon sinks, which in turn could assist the PSIDS in their policy decisions and advocacy on the sustainable management of their ocean. Further work is needed to fill knowledge and data gaps, for example on how to quantify these coastal ecosystems.[26] To promote this research, however, there is a need to increase the number of ocean scientists and experts from the PSIDS, in particular female scientists.[27] In this regard, some have noted that the Ocean Decade offers an unprecedented opportunity to fast-track gender equality and the empowerment of women in ocean science by embedding gender equality as a cross-cutting principle in the planning, implementation, and application of ocean science.[28]

Promoting early-career scientist networks in ocean science and facilitating the involvement of young scientists in determining research priorities will also be critical to building capacity, promoting intergenerational equity, and advancing the understanding of the ocean-climate nexus. Investing in ocean science capacity will become increasingly critical for achieving the goals of the Paris Agreement and the 2030 Agenda. In this regard, it is worth noting that regional academic networks such as those fostered by the Pacific Climate Change Centre, described above, as well as the Association of Pacific Rim Universities (APRU), described in Chapter 1, are already in place to support this priority area.

Expand and facilitate access to data

Researchers are only as effective as the data they can collect and analyse. Access to data is therefore critical for fostering research, as well as in supporting decision-makers to make informed decisions. For example, knowledge and data sharing on ecosystem conservation and restoration are critical for helping ecologists better understand how context affects restoration outcomes, to increase the predictive capacity of restoration actions, and to help provide better information for evidence-based decision-making, and to scale-up approaches to meet targets for restoration.[29]

The Global Ocean Science Report (GOSR) observed that the demand for easier access to the findings of ocean science is increasing.[30] At the same time, the report found that countries are inadequately equipped to manage their ocean data and information, and that this is hampering open access and data sharing. There are also gaps in terms of consistent and interoperable data which can be used by scientists

and decision-makers across the globe. Therefore, the GOSR recommended that the identification and mainstreaming of incentives for open data access be pursued as two key transformations during the Ocean Decade. Pacific countries may leverage valuable open platforms, such as the Pacific Data Hub[31] of the Secretariat of the Pacific Community. Expanding the Global Ocean Observing System (GOOS) is also an important initiative for strengthening the collection of ocean data. Into the future, the achievement of the Digital Twins of the Ocean project would be a great step in this direction. Given that it is important that the digital twin accurately and comprehensively represent the Pacific Ocean, collaboration between all stakeholders, including bilateral, trilateral, and multilateral partners and national statistics agencies and ocean observation agencies, is critical.

Enhance the Science-Policy Interface

As demonstrated in this chapter, scientific developments are produced by a variety of stakeholders, including scientific institutions, the private sector, academia, and civil society organizations. Engaging all stakeholders in the policymaking process can enhance the science-policy interface for ocean-based solutions to address climate change. At the global level, a good example of a mechanism to create an effective science-policy interface is the Ocean Panel, of which Australia, Fiji and Palau are members, which works with government, business, financial institutions, the science community, and civil society on pragmatic solutions for transitioning to a sustainable ocean economy.

In this regard, regional and national dialogue platforms also have a vital role in helping to translate ocean science into effective policymaking. As described earlier in this chapter, various organizations such as SPREP, PIFS, and the Pacific Community (SPC), have been very active in creating and strengthening regional institutions, policies, and collaborative initiatives. Inviting scientists and researchers to these initiatives can facilitate dialogue with policymakers and support the design and implementation of evidence-based policies. Conversely, policy-makers may also call upon scientists to provide evidence on emerging trends or policy areas. For example, at the 2022 United Nations Ocean Conference in Lisbon, several delegations, including Palau, Fiji and Samoa, joined calls for a moratorium on deep seabed mining, noting that the risks could outweigh any potential benefits.[32] Regional platforms can foster discussions on such common issues of concern.

Maximize the use of technology

The diffusion of technologies is fundamental to the promotion of ocean-based solutions. Technology diffusion can be accelerated through regional cooperation on capacity building activities to data access, data collection and sharing, observation systems, as well as technical support to take advantage of scientific developments. Technology transfer and capacity development activities can also be facilitated through south-south collaboration among countries in the Pacific, as well as with countries from other subregions.

Increase financing for interventions and research on climate-ocean synergies at the same time

During the UNFCCC COP27, PSIDS called for decisive action on climate change. A statement made by Pacific Elders' Voice, an independent group of former Pacific leaders, called for a stop on subsidies for fossil fuels, and for countries to instead redirect these subsidies to vulnerable countries to use for adaptation measures and to transition to clean energy.[33] The Pacific Elders' Voice also called for new and additional sources of finance, the allocation of 50 per cent of the total share of pre-2025 climate finance for adaptation, and the provision of finance for loss and damage. This funding would enable PSIDS to invest more in resilient infrastructure to adapt to climate change.

The PSIDS should work collectively to mobilize resources to address common challenges. Funding is also needed to strengthen cooperation on both national programs and transboundary initiatives in ocean science and technology. Support from bilateral and multilateral partners is needed to increase the number of scientific projects that are implemented and piloted in PSIDS. Public-private partnerships may also be a possible vehicle for mobilizing external funding.

Endnotes

1 IPCC, 2019
2 Castillo et al., 2022
3 Kumar et al., 2018
4 Marra et al., 2022
5 Kumar, 2020
6 Johnson, Bell, & Gupta. 2016. Pacific islands ocean acidification vulnerability assessment. In SPREP https://www.sprep.org/attachments/Publications/FactSheet/Oceans/ocean-acidification-pacific.pdf
7 IPCC, 2015
8 Holbrook et al., 2022
9 Nelleman et al., 2009
10 However, there are also concerns about the potential unintended consequences of some ocean based CO2 removal approaches that are largely untested to-date. The American Geophysical Union (AGU) recently announced an initiative to develop an ethical framework for climate intervention, which includes ocean-based CO2 removal as a first measure (AGU, 2022). The goal of this initiative is to convene stakeholders at the upcoming COP 27 to develop this further. Engaging in this dialogue will be important for Pacific nations.
11 Hoegh-Guldberg et al. (2019) estimated that ocean-based solutions to climate change can vastly contribute to the reduction of CO2 emissions.
12 Hoegh-Guldberg et al., 2019
13 Hoegh-Guldberg et al., 2019
14 Gattuso et al. 2018
15 Konar and Ding, 2020
16 Konar et al. 2020
17 IPCC, 2019. This observation was given with medium confidence in the evidence-base.
18 IOC-UNESCO, 2021b
19 IOC-UNESCO, 2017
20 IOC-UNESCO, 2020; IOC-UNESCO, 2021b
21 Winther et al., 2020
22 https://www.unescap.org/kp/2022/asia-and-pacific-sdg-progress-report-2022
23 https://www.oceandecade.org/actions/digital-twins-of-the-ocean-ditto/
24 CSIRO and SPREP, 2017
25 OPOC, 2021
26 IPCC, 2019
27 Although the PSIDS did not submit information to the Global Ocean Science Report, which presents the status of research capacity in ocean science, if the average in the Pacific is similar to the global mean, then it means that female ocean science researchers represent less than 40% of the total. IOC-UNESCO, 2020.
28 Sun et al., 2022
29 Ladouceur et al., 2022
30 IOC-UNESCO, 2021
31 https://pacificdata.org/
32 https://www.un.org/en/conferences/ocean2022
33 https://pina.com.fj/2022/11/04/statement-by-pacific-elders-voice-unfccc-cop27-sharm-el-sheikh-republic-of-egyps/

CHAPTER 3

Climate-smart and digital trade

3.1 Context and relevance

Numerous authors have demonstrated that trade can be an engine of sustainable economic growth and poverty reduction, as well as a channel for achieving the Sustainable Development Goals.[1] Both physical trade and trade in services, especially tourism, are key components of the economies of most Pacific Small Island Developing States. However, international trade has some potential downsides for the environment, as trade growth has also been associated with larger GHG emissions. There is therefore a pressing need for governments to adopt "climate-smart" trade policies. These are government policies which aim to limit greenhouse gas emissions (GHG) affecting foreign trade, such as eliminating fossil fuel subsidies, liberalizing trade in environmental goods and services, and reducing cross-border trade inefficiencies, and non-tariff measures.[2]

At the same time, one of the effects of the COVID-19 pandemic was to accelerate the adoption of digitally-enabled transactions of trade in goods and services, or the "digitalization" of trade processes. The digitalization of trade has a wide range of implications for the Pacific Small Island Developing States (PSIDS). From the perspective of trade, it helps overcome the physical distance and time barriers between suppliers and buyers, and reduces the investment cost required to operate a cross-border business, particularly for micro, small and medium enterprises (MSMEs). In addition, digital platforms allow buyers and sellers from around the world to meet and exchange goods and services, resulting in reduced search costs. For example, there is evidence that SMEs that used digital tools, such as webpages and digital delivery, have a higher propensity to become exporters and to scale up.[3] These benefits can facilitate the integration of PSIDS into global value chains.

From an environmental perspective, however, the digitalization of trade has both positive and negative repercussions. On the positive side, trade digitalization can contribute to climate change mitigation in various ways. First, the digitalization of trade procedures eliminates the need for physical documents, reducing the use of paper and enabling a more efficient use of existing human resources and logistics infrastructure. Secondly, digital trade can facilitate access to cheaper digital inputs, such as technological software, that can be used to transition to greener business models. Third, trade digitalization reduces the need for the physical provision of services, and can therefore potentially reduce the carbon footprint from the transport of cross-border professional service providers.

On the negative side, digital technologies themselves are estimated to be responsible for 4 per cent of GHG emissions, and their energy consumption is increasing by 9 per cent a year.[4] The PSIDS transition towards digitalization and digital trade therefore needs to balance environmental and sustainability issues. Furthermore, policy interventions on climate-smart and digital trade should consider the specific characteristics of the PSIDS. For instance, PSIDS do not have a significant manufacturing base, making the adoption of internal carbon pricing a less suitable solution to reduce emissions in the region. Also, the limited size of the PSIDS markets calls for a regional approach to the harmonization of labels and energy performance requirements for appliances and equipment.

In this regard, digital and climate considerations on trade can accelerate the greening of trade while helping to address climate change. At the same time, the Pacific must also address some basic policy issues, starting with expanding access to the internet and digital technologies, as well as integrating climate-related considerations into trade policies.

3.2 Current perspectives

3.2.1 Harnessing trade policies to improve access to climate-friendly goods and services

Climate-smart trade policy measures can help PSIDS to access goods and services that help mitigate climate change. For example, many governments have implemented measures such as tariff policies to reduce the cost of energy-generating technologies and goods. Some PSIDS countries have focused on reducing or eliminating the tariffs for solar panels, batteries, turbines, windmills, and other goods needed for deploying renewable energy projects, while other countries have removed tariffs for less polluting goods such as electrical vehicles to increase their affordability. For example, in 2017, Samoa suspended import duties for all material used as inputs for renewable energy projects through the Customs Tariff Amendment Act No.15. Papua New Guinea has also slashed its tariffs for solar equipment imports**.**

The reduction or elimination of tariffs on digital goods could also help reduce the price of environmental technologies in PSIDS. Digital goods such as Internet of Things (IoT) smart sensors, combined with artificial intelligence (AI) and predictive modelling, could help curb emissions. In addition, IoT and AI software can contribute to increased energy efficiency across all sectors of the PSIDS economies by deploying smart metering systems that optimize energy distribution and pricing. In addition to tariff reductions, non-tariff and trade facilitation measures have also been integrated into the policy mix of PSIDS (Table 3.1).

TABLE 3.1 Examples of climate-smart and digital trade policies and initiatives in selected PSIDS

	Policy/ Initiative name	Policy description
Samoa	The Energy Management Act 2020 *(Non-Tariff measure)*	All products covered by the Act and the Regulations must now meet Minimum Energy Performance Standards, and some also have to carry a standard energy label when they are offered for sale.
Fiji	Environmental incentives (*Tariff measure)*	Companies or entities involved in importation of Renewable Energy Goods are eligible for Duty concession under Code 264, Part (iii) of the Customs Tariff, as follows: (i) Solar and electrical charging stations, energy storage systems and related components at a rate of Free Fiscal Duty, Free Import Excise and 9 per cent VAT.
Vanuatu	Electronic Single window (*Trade facilitation initiative*)	Vanuatu's Electronic Single Window system enables businesses to submit and pay for import and export certificates, licenses and permits online

Source: ESCAP staff assessment

However, few countries have yet to develop comprehensive national trade strategies which reflect environmental issues and climate-smart policies. Tuvalu, which recently launched a climate-smart trade strategy called the National Trade Development Strategy (TNTDS) 2022 – 2026, is one exception (Box 3.1). Apart from Tuvalu, the national strategies drafted and implemented on climate change and digital trade show that the PSIDS vision in these two areas are fragmented. Climate-smart considerations in the national trade policy or overarching digital policies are scarce. For instance, Vanuatu's 2022 "National E-commerce Strategy and Roadmap" and Tonga's 2021 "E-commerce Strategy and Roadmap" could be strengthened by incorporating provisions or initiatives related to climate-smart and cross-border digital trade. Moreover, there are opportunities to include the use of digital trade policies in the "Kiribati Climate Change Policy" and the "Tonga Climate Change Policy: A Resilient Tonga by 2035".

BOX 3.1 The Tuvalu National Trade Development Strategy (TNTDS) 2022–2026: A climate-smart national trade strategy

The Government of Tuvalu developed the Tuvalu National Trade Development Strategy (TNTDS) 2022 – 2026 in cooperation with ESCAP and the Enhanced Integrated Framework (EIF) for Trade-Related Assistance for the Least Developed Countries. This strategic plan sets out prioritized measures to direct the growth of trade in Tuvalu during the next five-years. With the TNTDS, Tuvalu takes steps to integrate environmental concerns into its trade policy for delivering climate-smart trade, including recommendations from the UNESCAP Asia Pacific Trade and Investment Report 2021. The strategy proposes that Tuvalu should take an active role in the negotiation of climate change related agreements to ease access to appropriate, reliable, affordable, modern, and environmentally sound technologies.

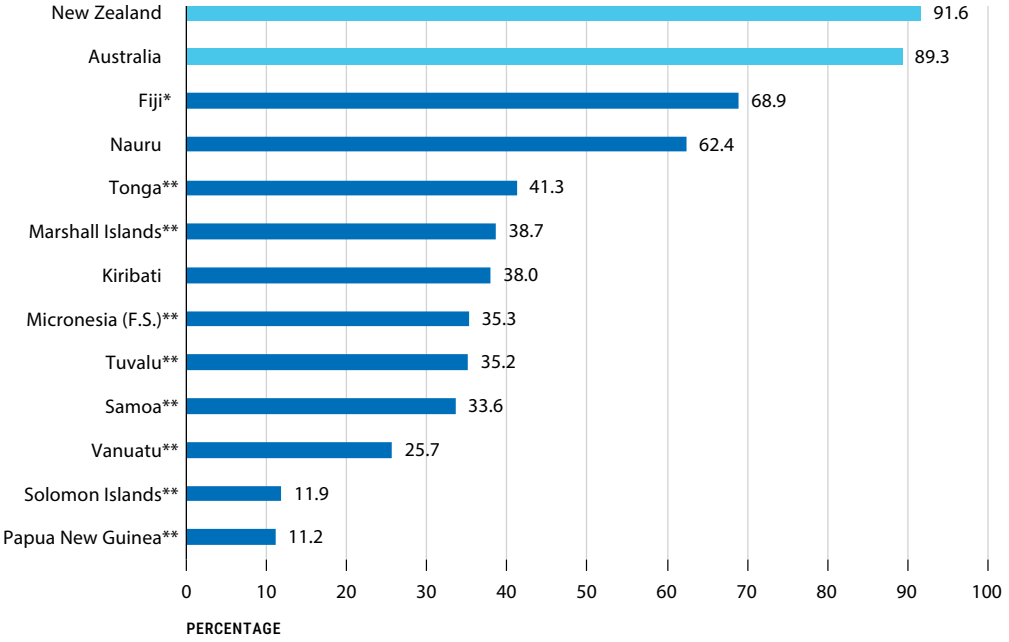
Source: Government of Tuvalu (2022) Tuvalu National Trade Development Strategy (2022 – 2026); Basu et al. (2022) Developing a post-COVID 19 recovery strategy: the case of Tuvalu https://www.unescap.org/blog/developing-post-covid-19-recovery-strategy-case-tuvalu#

Multilateral approaches to trade liberalization can also help reduce barriers on the trade of environmental goods. In 2012, countries belonging to the Asia Pacific Economic Cooperation (APEC) pledged to reduce tariffs and nontariff barriers on goods and services related to environmental goods. In 2014, New Zealand, Australia and another 44 countries participated in negotiations on the plurilateral Environmental Goods Agreement of the WTO that intended to eliminate tariffs of products used for energy and resource efficiency projects. Another ground-breaking initiative to follow is the Agreement on Climate Change, Trade and Sustainability, which was launched recently by Fiji, Costa Rica, Iceland, New Zealand, Norway, and Switzerland. This trade agreement intends to be the first climate-smart trade agreement and aims to remove tariffs for environmental goods and services, eliminate fossil fuel subsidies, and encourage the promotion and application of voluntary eco-labelling programs and mechanisms.

3.2.2 Promoting broadband access and affordability and greening the telecommunications sector

Digital divides remain pervasive across the Pacific, limiting the access of businesses and individuals to digital trade. Less than 12 per cent of the population in Papua New Guinea and Solomon Islands use the internet, along with just one-quarter in Vanuatu, one-third in Samoa and less than 40 per cent in Kiribati, Marshall Islands, Micronesia and Tuvalu (Figure 3.1). These numbers contrast starkly with the shares of internet users in Australia (89.6 per cent of the population), New Zealand (91.5 per cent), Fiji (68.9 per cent) and Nauru (62.4 per cent).

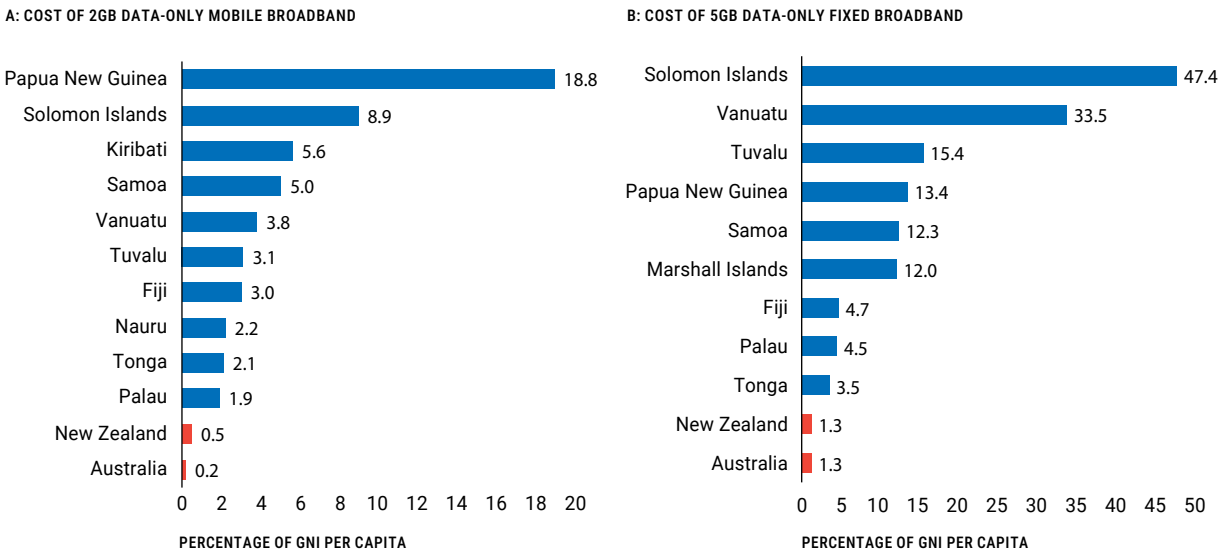
FIGURE 3.1 **Individuals using the internet in the Pacific (percentage of total population), 2020 or latest available year**



Source: ITU data. Notes: * 2018 data; ** 2017 data

One of the leading causes of the low levels of internet usage in the Pacific, and a factor contributing to digital divides between countries, is the high cost of fixed or mobile broadband in many of the smaller Pacific islands. The cost of 2GB of data-only mobile broadband is equivalent to nearly 19 per cent of gross national income (GNI) per capita in Papua New Guinea, 9 per cent in Micronesia and Solomon Islands, and around 5 per cent in Kiribati and Samoa (see panel A in Figure 3.2). To put this in context, the cost of 2GB of data-only mobile broadband in Papua New Guinea is 94 times higher than in Australia and 37 times higher than in New Zealand. The relative costs of fixed broadband are even higher for some Pacific countries. The cost of 5GB of fixed broadband is equivalent to nearly half (47 per cent) of GNI per capita in Solomon Islands and around one-third in Vanuatu, compared with just 1.3 per cent in Australia and New Zealand, and 3.5 per cent in Tonga (see panel B in Figure 3.2).

FIGURE 3.2 **Broadband costs in Pacific countries (percentage of GNI per capita), 2021**



Source: Commonwealth Secretariat, London; ITU data

As PSIDS progress work on improving the coverage and access to the broadband through the deployment of submarine cables and satellite connections, the energy efficiency of the telecommunications sector is emerging as a fundamental issue for assuring climate-smart and digital trade. According to GSMA (2019), energy usage constitutes 20 to 40 per cent of telecommunications operating expenses, and with the future deployment of 5G networks there is a potential that the percentage will increase. In the PSIDS, telecommunications towers located in remote and distant locations tend to rely on diesel generators that have a considerable carbon footprint. Furthermore, given the need for electricity to power computers, the digitalization of trade depends heavily on reliable energy supply, which is a major challenge in the region. This is one area where energy policies and telecommunications policies could work more closely together.

3.2.3 Digitalizing trade processes to facilitate trade and reduce costs

The digitalization of cross-border trade procedures enables faster clearance times, a more transparent and predictable process, and less bureaucracy. According to one study, the introduction of paperless trade reduced the export compliance trade procedures by more than half, from almost 100 hours to less than 50 hours.[5] Findings suggest that the introduction of an electronic trade single window system in Costa Rica, where firms could submit their sanitary and phytosanitary permits, increased exports in value and in quantity while also expanding the number of exporter firms.[6] Digital trade facilitation can also help to make trade greener. A study of the Asia-Pacific region found that implementation of paperless trade can reduce the GHG emissions of an average trade transaction by 32–86 kg, which, for the entire Asia Pacific region, could represent a reduction of between 8.9 and 23.4 million tons of CO_2.[7]

Despite the potential competitiveness and environmental gains of implementing digital trade facilitation, PSIDS have the lowest implementation rate of trade facilitation measures (40.1 per cent), and lag particularly in the implementation of paperless trade measures (Figure 3.3). The UN Global Survey on Digital and Sustainable Trade Facilitation also found considerable policy gaps among PSIDS for having a cross-border paperless trade. While five out the 12 PSIDS have ratified the WTO Trade Facilitation Agreement, only Vanuatu has developed and implemented electronic single windows. ESCAP, UNEP and UNCTAD research has estimated that the implementation of an electronic single window in Vanuatu led to considerable environmental gains (Box 3.2).

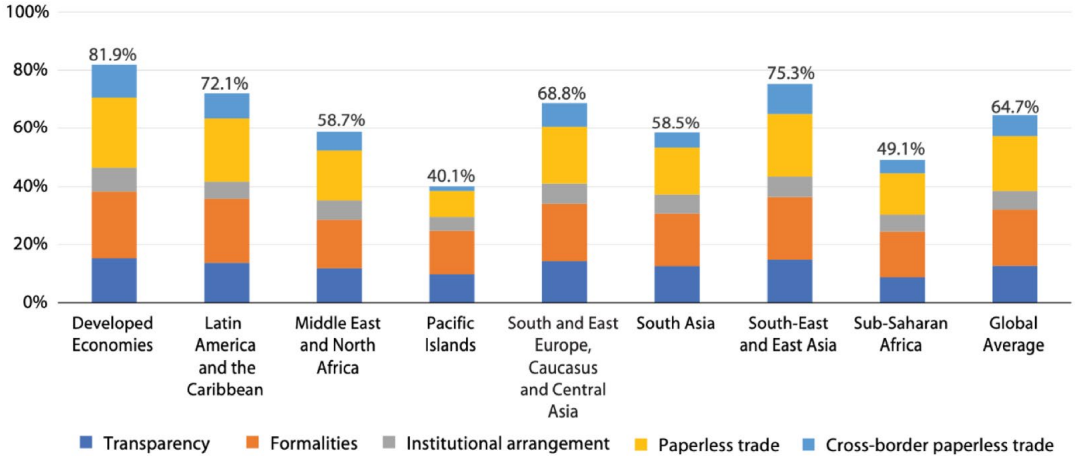
BOX 3.2 Vanuatu Electronic Single Window: towards more climate-smart and digital trade

On March 24, 2020, the Government of Vanuatu launched the Vanuatu Electronic Single Window (ESW) project, an initiative co-funded by the Enhanced Integrated Framework (EIF) and the Government of Australia through the Governance Growth Program. With the ESW, foreign and local businesses can have access to a single online entry point platform where they can submit and fulfil all import, export, and transit-related regulatory requirements, such as certificates, licenses and permits. As the system is digitalized, businesses reduce their costs of printing and photocopying through paperless transactions.

According to ESCAP estimates, the implementation of the ESW also resulted in a 95 per cent decrease in the use of paper, that is equivalent to a reduction of CO_2 emissions by at least 5,827 kg. Furthermore, additional reduction on the footprint of these processes was achieved through the ESW for Sanitary and Phytosanitary certificate application processes. The digitalization led to a reduction of 86 per cent of trips between the customs department and the biosecurity administration.

Sources: Vanuatu Single Window National Project; ESCAP Asia-Pacific Trade and Investment Report 2021: Accelerating Climate-smart Trade and Investment for Sustainable Development

FIGURE 3.3 Average implementation rates of trade facilitation measures around the world



Source: Digital and Sustainable Trade Facilitation: Global Report 2021 Based on The UN Global Survey on Digital and Sustainable Trade Facilitation, 2021. Available at untfsurvey.org

Most PSIDS are still missing regulation on e-transaction laws, consumer protection, privacy data protection and cybersecurity, that are crucial for having a thriving digital trade. Without a clear regulatory framework on these areas, consumers, producers, and traders will be less willing to conduct online transactions (Table 3.2). Nonetheless, countries are taking steps towards reforming their regulatory framework to encourage digital trade processes. Papua New Guinea, for example, introduced the Electronic Transactions Act 2021 to provide a legal framework for national and cross-border e-transactions by legally recognizing electronic signatures in transactions. Also in 2021, with the commencement of the Electronic Transactions Act, Kiribati became one of the first countries of the world to adopt the UNCITRAL Model Law on Electronic Transferable Records (MLETR) that provides digital trade documents the same legal validity as their paper-based equivalent.

TABLE 3.2 Current inventory of digital-enabling legislation

Country	Electronic transactions legislation	Consumer protection	Privacy and data protection	Cybercrime legislation
Fiji	The Electronic Transactions Act 2008	N/A	N/A	Cybercrime Act 3 of 2021
Kiribati	N/A	N/A	N/A	Cybercrime Act Act 10 of 2021
Republic of Marshall Islands	N/A	N/A	N/A	N/A
Federated States of Micronesia	N/A	N/A	N/A	N/A
Nauru	N/A	N/A	N/A	N/A
Palau	N/A	N/A	N/A	N/A
Papua New Guinea	N/A	N/A	N/A	N/A
Samoa	N/A	N/A	N/A	N/A
Solomon Islands	N/A	N/A	N/A	N/A
Tonga	N/A	Consumer Protection Act 2016	N/A	Computer Crimes Act 14 of 2003
Tuvalu	N/A	N/A	N/A	N/A
Vanuatu	Electronic Transactions Act No. 24 of 2000	N/A	N/A	Cybercrime Act of 2021

Source: Based on ADB (2022) and ESCAP assessments

3.2.4 Exploring new types of trade

Some PSIDS, including the Republic of the Marshall Islands, Palau and Vanuatu have recently explored the potential to expand their participation in trade in financial services provided on blockchain platforms through different approaches. For example, Palau introduced the "Root Name System", a digital residency program that allows individuals to open banking and brokerage accounts. Vanuatu, through the Financial Dealers Licensing Act No. 9 of 2021, introduced licenses for conducting digital asset activities.

However, recent literature has shown that cryptocurrency-related activities, such as crypto mining, have considerable environmental impacts; one study, for example, found that the high electricity consumption of crypto mining has a higher environmental footprint than gold mining.[8] Therefore, PSIDS interested in exploring this emerging field should consider the experience of jurisdictions that have regulated crypto polluting activities; in 2022, for example, the State of New York passed Bill S6486D which bans crypto mining operations that use carbon-based fuel to power their facilities.

3.3 Regional initiatives and concrete actions

PSIDS have undertaken multiple initiatives for achieving regional integration and transforming their economies into a regional market. Given the global nature of international trade, many of these agreements reach beyond the Pacific subregion. Some of the key agreements and cooperation frameworks are described below.

Pacific Island Countries Trade Agreement (PICTA)

The most prominent is the Pacific Island Countries Trade Agreement (PICTA), which aims to liberalize trade among the member countries. However, as this agreement dates from 2001, there are no digital and climate change provisions in it. The PICTA Trade in Services Protocol has introduced commitments on strategic sectors, including tourism, transport, financial services, telecommunications, and environmental services, but has no specific climate-smart provisions.

Pacific Agreement on Closer Economic Relations (PACER) Plus

While the Pacific Agreement on Closer Economic Relations (PACER) Plus that entered into force in December 2020 does not include specific provisions on digital and climate-smart trade, it does include provisions to promote cooperation to modernize customs processes and procedures, such as automating systems, capacity building for customs officials, and support to review customs legislation. The services chapter also introduced commitments for liberalizing incoming services and investment in agriculture, fisheries, manufacturing, tourism and energy.

Pacific Regional E-commerce Strategy and Roadmap

The Pacific Regional E-commerce Strategy and Roadmap, published in 2021, provides a regional strategy setting out some common standards for digital trade and norms to avoid regulatory fragmentation in the region. The strategy features relevant digital and climate-smart measures, such as having a fully interoperable electronic single window among the member countries and the mutual recognition of trade documents in electronic format.

EU-Pacific Regional Protocol under the European Union (EU) / African, Caribbean, Pacific Group of States (ACP) Partnership Agreement (Cotonou Agreement)

The new Partnership Agreement negotiated in 2021 between the Organisation of African, Caribbean and Pacific States (OACPS) countries and the European Union also has a Pacific Regional Protocol, in which the Parties recognize the contribution of digital technology to trade facilitation and agree to cooperate towards appropriate Pacific regional digital platforms for national and cross-border trade.

These types of trade agreements can benefit from the experiences of similar agreements in other regions, such as the Digital Economy Partnership Agreement (DEPA) between Singapore, Chile and New Zealand, which recognizes electronic versions of trade documents, aims for the interoperability between data exchange systems, and provides for the sharing of best practices for deploying electric, remote controlled and autonomous vehicles to improve the efficiency of cross border logistics.

3.4 Priorities and next steps

Despite the geographic, demographic, and economic challenges of the PSIDS, a wide range of opportunities for climate-smart and digital trade exist for the PSIDS. The following actions are available for ESCAP member States and other stakeholders to support these goals.

Increase access to the Internet and digital services and integrate digital and energy policies

The promotion of digital trade is conditional to having access to the Internet and digital services. The recent deployment of low-orbit satellites and connections to submarine cables are expected to boost digital connectivity in the Pacific subregion. Initiatives such as the ESCAP feasibility studies on the Pacific Internet Exchange Point (IXP) are expected to improve the Internet's affordability, latency, and traffic capacity, while the International Telecommunications Union (ITU) program on Smart Islands aims to deliver connectivity and help communities reap the benefits of the digital economy. At the same time, the use of digital devices depends on the availability of electricity sources. When designing broadband roll-outs, ICT and energy policies need to be designed in tandem so that people can have reliable access to both the electricity grid and to broadband at affordable prices.

Remove tariffs on goods and services which support the environment

Given the current context of mounting fuel prices following geopolitical tensions, as well as the high reliance of PSIDS on fossil fuels for energy production and for the functioning of telecommunications networks, PSIDS should try to eliminate tariffs for goods used as inputs to renewable energy projects to sustain renewables deployment. To embrace technological neutrality, it would be better if tariff exception were not technology-specific but covered to inputs used in all renewable technologies.

As PSIDS are net importers of digital technological goods, PSIDS should also remove tariffs of digital enabling technologies, including IoT devices (HS Code 8471).[9] While IoT devices have 0 per cent tariffs in some PSIDS such as Kiribati and Vanuatu, in Nauru, Tuvalu, Solomon Islands and Tonga, the tariffs range between 3 per cent and 10 per cent. IoT devices can help reduce carbon output through smart grids that make the production and consumption of energy more efficient and cost-effective. Also, by cutting tariffs for IoT devices, PSIDS local producers will be able to access cheaper productivity-enhancing goods. In the hospitality sectors, smart grids could help curb the inefficient use of energy. IoT devices could also improve the competitiveness of primary sectors, including major exporting sectors such as fishing, agriculture, forestry, and mining. For example, IoT devices could assist with managing overfishing by tracking catches, reducing operational costs by monitoring pest and soil conditions in agriculture, and protecting forests from illegal deforestation.[10]

To further develop climate-smart and digital trade, PSIDS can strengthen cooperation through initiatives such as the regional agreements noted above, as well as training and support for MSMEs and independent businesspeople.

In this regard, more climate-smart and digital trade considerations could be incorporated into regional agreements such as the PACER Plus and PICTA when the time comes for their reviews.

Promote cross-border paperless trade procedures

Paperless trade can reduce time, costs and redundancies in trade procedures, with tangible benefits for traders, shippers and consumers. Many PSIDS have begun to take steps towards facilitating digital trade through national strategies, but more efforts are needed to develop sound regulatory frameworks for the digital economy and to adopt relevant laws on electronic transactions and e-Customs, as this would foster trust among the agents involved in digital cross-border transactions. Governments can access support for these steps by becoming parties to the Framework Agreement on Facilitation of Cross-border Paperless Trade in Asia and the Pacific, a UN treaty on digital trade facilitation measures for trade and development.[11] The treaty has a dedicated intergovernmental platform for capacity building and technical assistance, that can benefit PSIDS in their transition towards paperless trade.

However, as noted above, digital technologies, including electronic single windows, can be energy intensive. As most PSIDS are highly dependent on fossil-fuel for energy production and consumption, there is a need to also consider how to mitigate the negative impact of the energy sources which will drive these technologies. Furthermore, the PSIDS should also begin stepping up policies on the management of E-waste, as electrical and electronic equipment are one of the fastest growing waste streams in many countries.

Greening the logistics and transportation sectors

PSIDS ports and shipping performance are characterized by high operating costs and low connectivity, partly due to diseconomies of scale, greater distances from overseas markets, and lower levels of digitalization.[12] For example, the digitalization of port services can streamline docking procedures and reduce GHG emissions of vessels waiting for berth allocation. Other policy options for PSIDS include grant schemes for deploying zero-emission vessels and charging infrastructure, and cutting tariffs on electric vessels to encourage the electrification of the maritime transport sector. These measures could be complemented by the Blue Pacific Shipping Partnership, which has been launched to support a 100 per cent carbon-free domestic maritime transport sector.

Fostering skilled human resources for climate-smart and digital trade

While the Pacific subregion is strong in human resources development, the fast pace of technological change makes it difficult to keep up with developments. For example, IoT devices are constantly being upgraded and training must be conducted regularly. Governments and educational institutions may need to develop dedicated programs on the various aspects of climate-smart and digital trade. In this regard, "Aid for Trade" programs could help support PSIDS to address skills gaps. In addition, fostering the movement of highly skilled workers could also facilitate the smooth transition by bringing required skills. PSIDS could complement the provisions for facilitating intraregional movement of workers in regional agreements, such as the PICTA Trade in Services Protocol and the PACER Plus, with other measures, including incentives for fostering inward investments and acceptance of skilled workers from outside of the region.

Endnotes

1 UNCTAD, 2016; Wang, 2004
2 ESCAP 2021. *Asia-Pacific Trade and Investment Report 2021: Accelerating Climate-Smart Trade and Investment for Sustainable Development,*
3 Andrenelli and Lopez, 2019
4 Shift Project, 2019
5 Ferro et al., 2016
6 Carballo et al., 2022
7 Duval and Hardy, 2021
8 Jones et al. , 2022
9 HS code 8471automatic data processing machines and units thereof; magnetic or optical readers, machines for transcribing data on to data media in coded form and machines for processing such data, not elsewhere specified or included.
10 Vodafone "Using IoT to prevent illegal logging in Romania" https://www.vodafone.com/news/planet/using-iot-prevent-illegal-logging-romania
11 Framework Agreement on Facilitation of Cross-border Paperless Trade in Asia and the Pacific | ESCAP (unescap.org)
12 UNCTAD, 2021

CHAPTER 4

Energy transition

4.1 Context and relevance

Energy is a key contributor to economic development as most production and consumption activities involve energy as a primary input. Conventional energy resources amongst the Pacific Small Island Developing States (PSIDS) are thinly distributed, with only Papua New Guinea having proven, viable oil and gas resources. Furthermore, the sparse distribution of the population means that the market lacks the economies of scale needed for large power grid development, resulting in increased costs for transporting equipment and delivering maintenance. The PSIDS are therefore reliant on imported oil for transport and for fuel for electricity generation, leaving them vulnerable to price and supply shocks.

Considerations of energy security provide another important layer of context, due partly to this heavy reliance on imported fossil fuels. The challenge that this presents to the subregion's energy security is clearly apparent in light of the compounding crises, brought about by global energy supply shortages and price spikes stemming from geopolitical tensions, local economic devastation resulting from the COVID-19 pandemic, and the local impacts of natural disasters, which are occurring with increased frequency due to climate change.

However, as seen in other parts of the world, one of the impacts of these multiple crises has been a renewed effort to find alternative sources of energy. In this regard, the Pacific subregion presents very good potential for renewable energy development, and local economies are well suited to the deployment of modular generation technologies as well as microgrids and smart grids. For example, there are excellent solar resources across the region. Geothermal power also has potential in many locations but is at various stages of development, while good potential also exists for biomass and biofuel production, the latter based on oil crops such as palm. Developments in Papua New Guinea, Fiji, the Solomon Islands and Vanuatu are also demonstrating that hydropower offers another good source. Wind resources are generally limited, although small wind farms are operating in several countries and there is the potential for several hundred megawatts of wind farm development across the subregion. Finally, ocean (tidal and wave) resources are recognized to be enormous and widespread, but the technology to harness this is years, if not decades, from commercial realization.

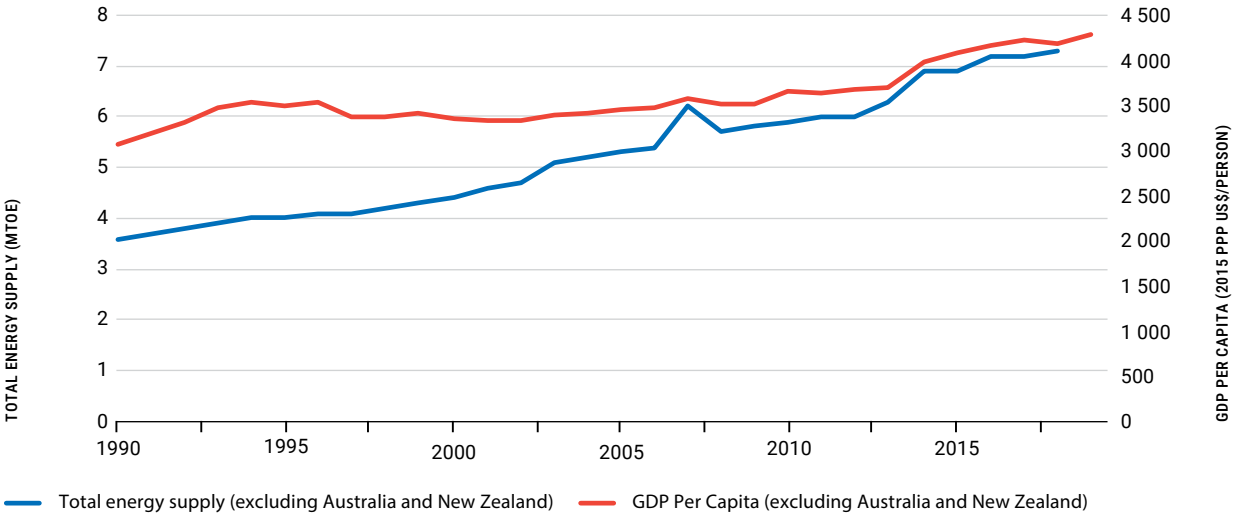
The causal links between energy and economic development mean that the energy needs of the Pacific subregion will continue to grow in the coming years. This growth will be dictated by the availability of local energy resources, development and commercialization of technologies, and policy frameworks at national, regional and global levels. Energy planners and policymakers of the Pacific must negotiate a challenging landscape: seeking to deliver the energy needs of their growing economies plus the ambitious targets set under Sustainable Development Goal 7 and the Paris Agreement and Glasgow Climate Pact, while ensuring the ongoing security of energy supply in a difficult global geopolitical environment.

4.2 Current perspectives

4.2.1 The energy transition and energy trade flows

Energy consumption in the economies of PSIDS closely correlates with GDP. As Figure 4.1 shows, both energy consumption and economic development grew quite strongly in the decade prior to the COVID-19 pandemic.

FIGURE 4.1 **Total energy supply and GDP per capita of countries in the Pacific (excluding Australia and New Zealand)**



Sources: IEA, United Nations Statistics Division (UNSD), and World Population Prospects; via the Asia Pacific Energy Portal

Most Pacific countries remain highly dependent on imported petroleum fuels and are expected to do so for some years into the future. Oil makes up about 80 per cent of the region's total energy supply, of which 52 per cent is used in transport, 37 per cent for electricity generation and 12 per cent for other applications such as process heating (SPC, 2020). Furthermore, at an estimated value of USD 6 billion, the costs of fuel imports make up between around 5 and 15 per cent of GDP for each economy. Almost all fuels are imported from outside of the subregion. There is limited energy trade between island countries, except for bunkering and petroleum re-exports out of Guam and Fiji.

These imports present a region-wide economic burden and a challenge to energy security. They weaken macro-economic stability, erode the balance of trade, and exacerbate the financial challenges for end-users, including households, businesses, and the power utilities. The recent period of high price volatility has further demonstrated the risks of relying on imports, as well as the inability of small economies to negotiate and secure beneficial fuel supply contracts. In addition, experts have noted the increasing vulnerability of coastal bulk fuel storages to spills and damage from rising sea levels and natural disasters.

On a positive note, the high cost of imported fossil fuels provides a clear opportunity for an energy transition. In many cases, renewable sources can deliver clean energy at a lower cost than conventional sources, while the business case for energy efficiency is also strong. Overall, the renewable energy contribution is relatively low at present, at 17.1 percent of the total energy supply. Renewable electricity now makes up approximately 28 per cent of the electricity generation mix, with petroleum accounting for the remaining 72 per cent. This proportion has remained relatively static for the last two decades, with most of the renewable portion derived from hydropower on the larger islands. Outside of Papua New Guinea and Fiji, renewable electricity as a percentage of generation grew from 14 per cent in 2000 to 21 per cent in 2017. Most of this growth was in solar photovoltaic (PV) generation, although significant bioenergy and geothermal electricity generation capacity is also available.

Interest in the energy transition across the Pacific is apparent from policy discussions held by the G20, who emphasized the importance of the energy transition for archipelagic and island states under the 2022 Indonesia Presidency; the International Union for Conservation of Nature's (IUCN) Climate Change Mitigation and Risk Reduction Programme; the Archipelagic and Island States Forum (AIF); and the Pacific Islands Development Forum (PIDF).

4.2.2 Current trajectories for achieving SDG 7

Sustainable Development Goal 7 aims to ensure access to affordable, reliable, sustainable, and modern energy for all (Box 4.1). Under the Paris Agreement, countries have also committed to Nationally Determined Contributions (NDCs), which are pledges made by each country to limit national emissions. As the energy sector is the largest contributor to GHG emissions in most countries, it is given a high priority in each country's NDCs. However, despite significant progress, many PSIDS will fall short of their SDG and NDC targets. In particular, a large proportion of renewable energy and energy efficiency opportunities remain unfulfilled, despite some positive renewable energy developments, the implementation of Mandatory Energy Performance Standards (MEPS) for electrical appliances in some countries, and the introduction of energy efficiency regulations for lighting and buildings.

BOX 4.1 **Energy-related targets under SDG 7**

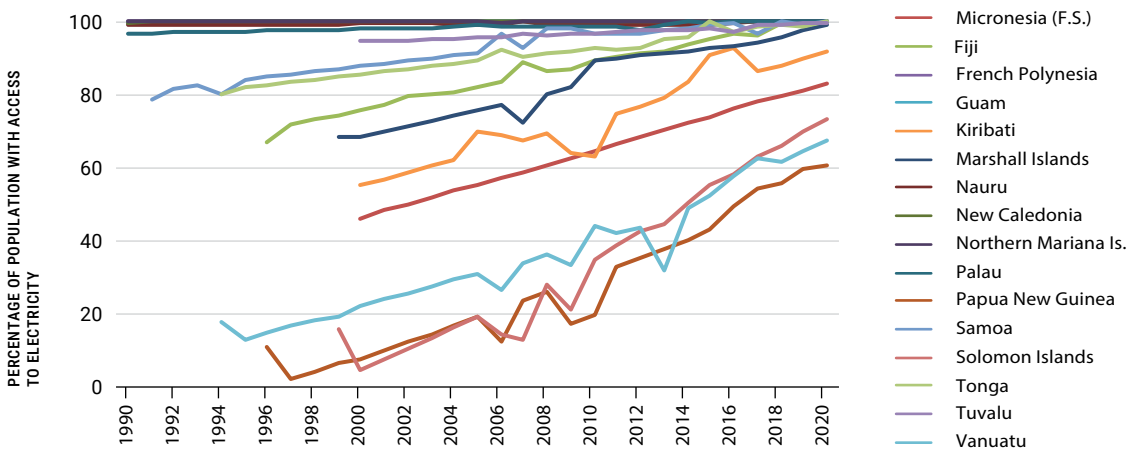
SDG 7 aims to ensure access to affordable, reliable, sustainable, and modern energy for all. It has three main targets:

- **Target 7.1.** "By 2030, ensure universal access to affordable, reliable and modern energy services." Two indicators are used to measure this target: (a) the proportion of the population with access to electricity; and (b) the proportion of the population with primary reliance on clean cooking fuels and technology.
- **Target 7.2.** "By 2030, increase substantially the share of renewable energy in the global energy mix". This is measured by the renewable energy share in the total final energy consumption and is calculated by dividing the consumption of energy from all renewable sources by the TFEC. Renewable energy sources considered in this calculation include hydropower, solid biofuels (including traditional uses), wind, solar, liquid biofuels, biogas, geothermal, marine (wave and tidal energy), and waste.
- **Target 7.3.** "By 2030, double the global rate of improvement in energy efficiency", as measured by the energy intensity of the economy. This is the ratio of the total primary energy supply (TPES) and GDP. Energy intensity is an indication of how much energy is used to produce one unit of economic output. As defined by the IEA, TPES is made up of production plus net imports, minus international marine and aviation bunkers, plus stock changes. For comparison purposes, GDP is measured in constant terms at 2017 PPP.

In addition, SDG 7 also includes target 7.A – promote access, technology and investments in clean energy, and target 7.B – expand and upgrade energy services for developing countries.

Reviewing the current status of indicators for SDG 7 target 7.1 on energy access, the lowest rate of access to electricity is found in the Melanesian countries Vanuatu, Solomon Islands and PNG, with rates of access between 60 and 75 per cent in 2020 (Figure 4.2). The rate of access is increasing rapidly in all parts of the Pacific, but far more needs to be done in order to deliver electricity access to all households by 2030. Much of this will be achieved through the installation of stand-alone solar home systems. Experts now suggest employing metrics such as the "modern energy minimum" of consumption of at least 1,000 kWh per year as a better indicator of access.

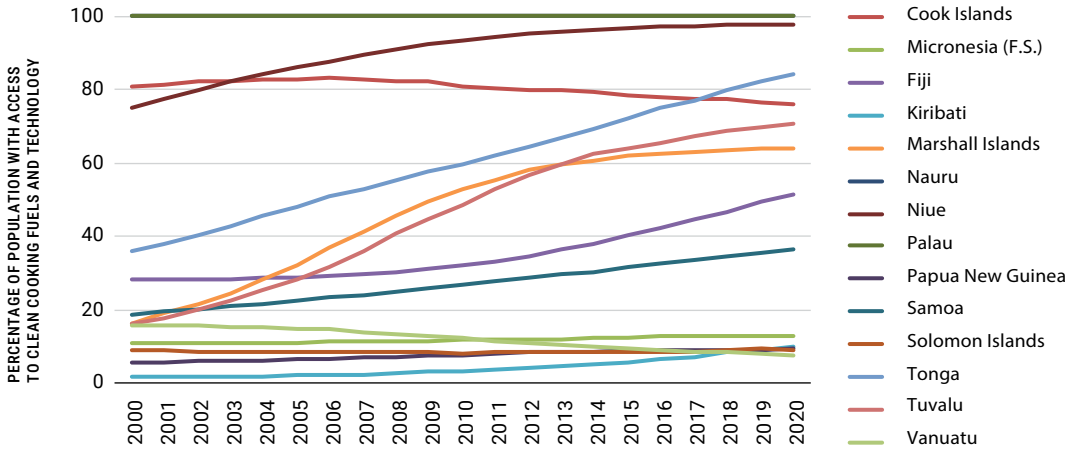
FIGURE 4.2 **Proportion of population with access to electricity**



Note that data was unavailable for Niue, American Samoa and Cook Islands. Source: World Bank Group, via the Asia Pacific Energy Portal

On the other hand, the PSIDS are not on track to deliver universal access to clean cooking fuels and technology by 2030. As Figure 4.3 shows, in 2020, almost 10 million people across the Pacific lacked access to clean cooking, the bulk of whom (8.1 million people) were in Papua New Guinea. Furthermore, the rate of access to clean cooking in many countries is stagnating and, in some cases, even declining. This has implications for people's health, especially women and children, as biomass cooking has been shown to cause illnesses including pneumonia, stroke, heart disease and lung cancer, and leads to almost 4 million premature deaths per year worldwide. Fuel gathering also has opportunity costs, consuming considerable time that may have been spent on other productive activities such as income generation and education, and in some locations presenting a risk of injury or violence.

FIGURE 4.3 **Proportion of population with access to clean cooking fuels and technologies**



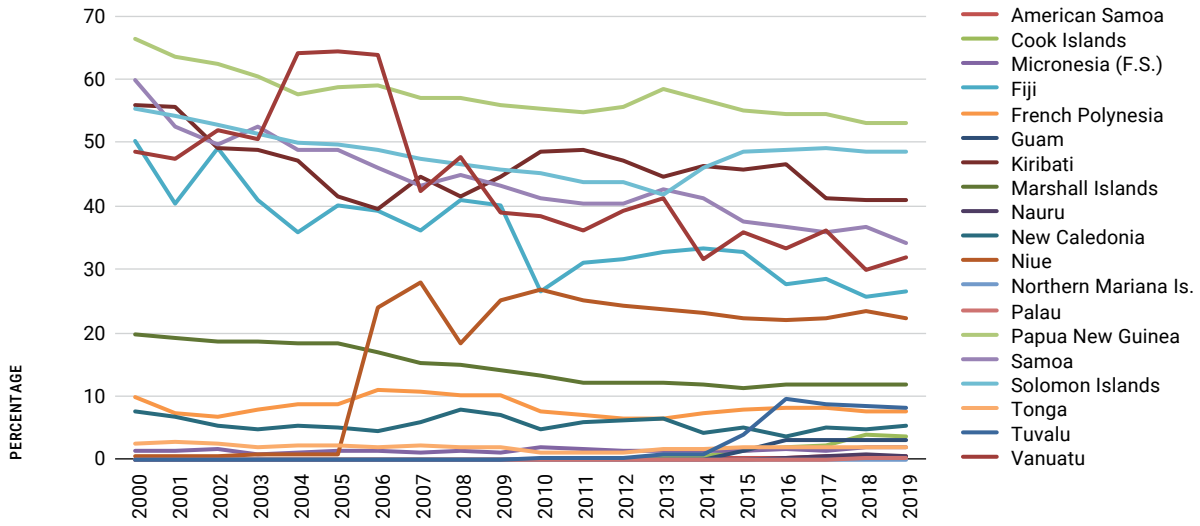
Note that data was unavailable for New Caledonia, Northern Mariana Islands, American Samoa, French Polynesia and Guam.
Source: World Health Organization, via the Asia Pacific Energy Portal.

Regarding SDG 7 Target 7.2 on renewable energy, Figure 4.4 plots the indicator for this target, renewable energy's share of total final energy consumption, or TFEC. The figure suggests that there has not been much progress in the TFEC, but this may be an overly pessimistic picture because data for this indicator is not widely available beyond 2019, and several major renewable energy developments across the region are in planning, under construction or recently commissioned. For example, there are over 100 megawatts of renewable energy projects planned for development in Fiji this decade (see Figure 4.5), which will see

the share of renewable sources of electricity production grow from 59 per cent in 2018 to 71 per cent in 2030, with the renewable energy share of TFEC expected to grow from 9.7 per cent in 2018 to 13.6 per cent in 2030 under current policies.

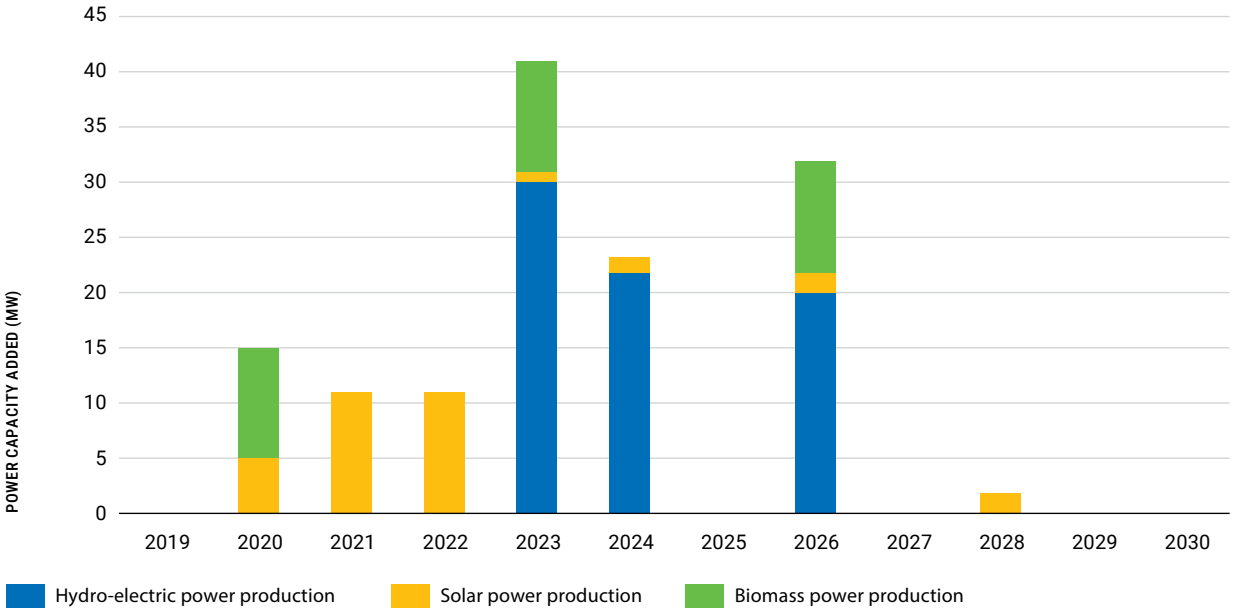
Furthermore, the extraordinary growth of the solar PV industry seen elsewhere in the world is also apparent in the Pacific, where the installed capacity has grown at a remarkable average annual growth rate of 33 per cent for nearly two decades. Analysts have noted that if total generation continues to grow at 2 per cent per year and PV generation continues to grow at just half the rate of 2000–2017, which is likely given that the costs of developing new solar PV will probably be lower than the operating costs of existing petroleum-based generation, PV would account for 43 per cent of generation by 2040. If hydropower and other renewables are included, renewable electricity would account for over 60 per cent of generation in 2040.

FIGURE 4.4 **Renewable energy as a share of total final energy consumption**



Sources: IEA, UNSD and IRENA, via the Asia Pacific Energy Portal

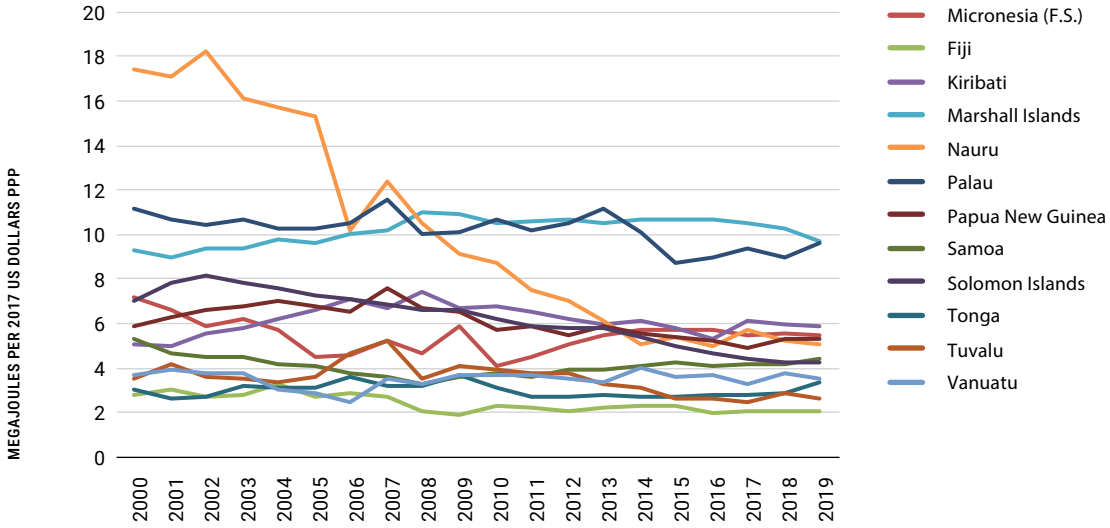
FIGURE 4.5 **Planned capacity expansion in Fiji, 2020 to 2030**



Source: Fiji, 2021

Lastly, SDG 7 Target 7.3 aims to double the global rate of improvement in energy efficiency, as measured by the ratio of the total primary energy supply (TPES) to GDP. As with renewable energy, energy efficiency shows immense potential for cost-effective applications throughout the Pacific. Most, if not all, countries and territories have specific policy goals for improving their demand-side energy efficiency, with at least nine explicitly including improved energy efficiency among their NDC commitments. In practice, however, improvements in end-use energy efficiency in electricity and transport appear to have been very limited, with the ratio of TPES to GDP in most countries appearing to be quite steady (Figure 4.6). The most obvious counterexample to this is Nauru, but here, the improvement in energy productivity is largely attributed to the denominator, as the country more than doubled its GDP between 2010 and 2019.

FIGURE 4.6 Energy intensity



Sources: IEA and UNSD, via the Asia Pacific Energy Portal.

4.2.3 Strengthening evidence-based policy-making

One of the weaknesses of policy-making for the energy sector in the Pacific is the limited availability of data as well as the capacity to identify synergies between the various constituent elements of SDG 7, namely increasing access to modern energy services, improving energy efficiency, reducing emissions from the energy sector, and increasing the share of renewable energy. To address this gap, ESCAP developed the National Expert SDG Tool for Energy Planning (NEXSTEP) to support the development of national SDG7 roadmaps. This tool enables policymakers to make informed policy decisions to support the achievement of the SDG7 and emission reduction targets. The three key steps of the methodology are:

- **Energy modelling** to estimate the share of different energy resources and identify the technological interventions needed to achieve those shares;
- **Economic analysis** to identify the economically feasible options/interventions; and
- **Scenario analysis** to determine/identify policies that are feasible for implementation in the national context.

NEXSTEP has been implemented to develop SDG 7 Roadmaps for both Fiji and Tonga, while a Roadmap is now being developed for the Federated States of Micronesia and another project planned in Kiribati. To demonstrate, the highlights from the recommendations to Fiji and Tonga are provided in Box 4.2 and Box 4.3, respectively.

BOX 4.2 **Policy directions from the SDG7 Roadmap for Fiji**

The key policy recommendations to help Fiji achieve the SDG 7 and NDC targets include:

- **A** Ramping up renewable power capacity is cost-effective and contributes to both climate and sustainability objectives. Renewable power has become cheaper than conventional fossil fuel-based generation. Least-cost optimization analysis suggests that an early ramp-up of renewable power generation and reducing fossil-fuel-based generation to a minimum provide a larger financial benefit and pave the path towards a 100 per cent renewable power goal by 2036.
- **B** To achieve universal clean cooking access, NEXSTEP proposes electric cooking stoves and LPG stoves as alternative technologies to the rocket wood stove, as they require minimal follow-up and reduce indoor air pollution. The choice between electric cooking stoves and LPG stoves is dependent on the household power supply capacity. Implementation of this programme will cost the Government of Fiji US$2.4 million to US$3.4 million, but is expected help achieve universal access to clean fuels and technologies for cooking by 2030.
- **C** A multi-sectoral approach should be taken to realise the potential for energy efficiency improvements. Ample energy saving opportunities can be found in the residential, commercial and transport sectors. Policies such as minimum energy performance standards and labelling schemes for appliances as well as building codes should be considered to leverage the energy reduction potential, while providing positive financial gains.
- **D** Transport sector energy efficiency measures are the key to achieving substantial energy savings and emissions reduction. The transport sector has the highest share of energy demand and relies on imported oil products. Progressive transport policies, such as minimum fuel economy standards and increasing the share of hybrid vehicles, are needed to reach the SDG energy efficiency and NDC conditional targets.

Source: Fiji, 2021

4.2.4 Energy policies in a time of crises

The risks of the Pacific's high reliance on imported fossil fuels have been exemplified in recent times. Border closures and reduced travel due to the COVID-19 pandemic ravaged local tourism-dependent economies, reducing national finances. In 2020, tourism earnings declined significantly for Fiji (84.8 per cent), Papua New Guinea (72.9 per cent), Samoa (88.4 per cent), Solomon Islands (79.7 per cent) and Tonga (67.8 per cent), compared with 2019. In 2020, the tourism industry saw 150,000 workers lose their jobs in Fiji, while Vanuatu and Samoa reported a loss of workers of 70 per cent and 26 per cent, respectively.[1]

Natural disasters, including Cyclone Harold in April 2020 and the eruption of the Hunga Tonga–Hunga Ha'apai volcano in January 2022, also caused widespread damage to infrastructure. While countries were able to overcome the fuel importation and logistical challenges that followed these events with relatively minor disruption, they highlighted the susceptibility of critical infrastructure with single points of failure, such as oil import terminals. In addition, these experiences highlighted the importance of installation standards for new energy infrastructure, which must be built to withstand more frequent and intense natural disasters. Geopolitical crises provided a third layer of shock to these compounded crises, producing oil market volatility and price spikes that are difficult for local economies to absorb.

These combined issues have highlighted existing vulnerabilities faced by PICTS and exposed systemic gaps in government and business preparedness. There are clear opportunities to mitigate some of the risks by reducing reliance on imported fuels, increasing the share of local renewable energy, and reducing the overall demand for energy through improvements to energy productivity.

BOX 4.3 **Policy directions from the SDG7 Roadmap for Tonga**

The key policy recommendations to help Tonga achieve SDG 7 and NDC targets, as well as enhance energy security and build back better from the COVID-19 pandemic, include:

A Improving energy efficiency beyond the SDG 7 target is economically feasible and will reduce fuel import dependency. Negative and low-cost measures, including efficient lighting, Minimum Energy Performance Standards (MEPS), switching to electric transport and improving fuel economy standards, have a solid business case with a quick return on investment.

B Tonga can achieve its NDC target of renewable electric power generation if it increases its ambition. The SDG scenario recommends investments in solar and wind energy in line with the Tonga Power Limited Business Plan 2020–2025. However, the current plan of 52 per cent by 2030 can be increased to 70 per cent, in line with TERM 2010–2020, by using an integrated approach of energy efficiency, energy storage to increase the capacity factor, and prioritizing renewables with zero additional investments.

C Diesel-fired power generation is no longer cost-effective compared with renewables, and new deployment of this technology should be avoided. Least-cost optimization analysis suggests that lifecycle costs of renewables are cheaper than diesel-fired technologies. The results from optimization indicate early investments in renewables will generate greater benefits compared to late interventions.

D Efforts to achieve universal access to clean cooking need to increase. LPG cooking stoves are the recommended technology option to achieve this target for Tonga. Implementation of this programme will cost the Government of Tonga US$ 100,000, considering a full subsidization on the upfront stove costs for the households, to achieve universal access to clean fuels and technologies for cooking by 2030.

Source: Tonga, 2021

4.3 Regional initiatives and concrete actions

Given that the Pacific includes some of the most vulnerable countries to climate change, the PSIDS have turned to regional approaches to advocate and implement strategies to counter the effects of climate change. For example, there are at least ten organizations, programmes or centres in the Pacific with significant regional or subregional energy-sector activities, including:

1 the Pacific Community (SPC);

2 Pacific Centre for Renewable Energy and Energy Efficiency (PCREEE) in Tonga, hosted by SPC;

3 Pacific Climate Change Centre (PCC) at SPREP in Samoa;

4 Maritime Technology Cooperation Centre Pacific (MTCC), hosted by SPREP and SPC;

5 Pacific Centre for Environment and Sustainable Development PACE-SD, at USP in Fiji;

6 Micronesian Center for Sustainable Transport (MCST), a collaboration between the Marshall Islands and USP;

7 Office of the Pacific Energy Regulators Alliance (OPERA), based at SPC;

8 Energy Fiji Ltd.'s regional power utility training centre, affiliated with PPA;

9 Regional Pacific NDC Hub Based at SPC in Fiji, with 15 PICT members and five international and regional partners; and

10 Global Green Growth Institute (GGGI) with a regional office in Fiji, and a strong energy focus.

Several key intergovernmental initiatives which these organizations are leading are detailed below.[2] The Pacific's tertiary institutions also play a key role in supporting policymakers, programmes delivery partners and emerging local industries, as described in Box 4.4.

BOX 4.4 **Tertiary Institutions and the Clean Energy Transition in the Pacific**

While all PSIDS are striving to find the balance between achieving energy security, making energy affordable and accessible, and meeting their international climate change commitments, they have specific requirements and disparate renewable energy resources. There is an urgent need to develop solutions which are based on reliable data.

The tertiary institutions of the Pacific are well placed to carry out research and feasibility studies on developing and adapting appropriate energy technologies for individual countries and helping to formulate evidence-based enabling policies.

Institutions like the University of the South Pacific (USP) and Fiji National University (FNU) are engaged in applied research that investigates energy resources beyond small solar PV. Current research areas include energy modelling, geothermal power, biomass power, ocean energy, waste to energy and clean cooking energy, among others. Work is also being done in improved control systems and storage devices to help integrate higher amounts of intermittent electricity into small island grids.

Tertiary institutions also provide sustainable energy related training at all levels – from technicians and installers to system designers and energy management professionals. For example, the University of the South Pacific (USP) is working with the Sustainable Energy Industry Association of Pacific Islands (SEIAPI) to offer accredited solar training courses to regional technicians. Solomon Islands University (SINU) has plans to establish a diploma programme in solar PV technology.

Tertiary institutions have a duty to carry out impactful research by closely collaborating with government departments, private sector, community-based organisations, NGOs, and donors to help achieve sustainable development through clean energy transitions.

Source: Atul Raturi (USP) and Ravita Prasad (FNU)

OPERA - Office of the Pacific Energy Regulator Alliance

Robust, predictable, and effective regulations are essential to attracting private sector investment into energy sectors across the Pacific. However, utility regulation in the region remains in its infancy. In most PSIDS, electricity services are provided by state-owned, vertically integrated natural monopolies, with sector regulatory decisions potentially influenced by political imperatives, often on an ad hoc and unpredictable basis. Regulatory and governance regimes of this nature, especially in capital-constrained environments, do not provide for efficient management of scarce resources and often limit investor confidence. To address this issue, the Office of the Pacific Energy Regulators Alliance (OPERA) promotes modern regulation of energy utilities in the Pacific by developing a regional platform to deliver capacity building, enable the exchange of knowledge and skills, and help countries to address common challenges. The 2022 OPERA Annual Meeting, held in Nadi, Fiji, on 11 October 2022, was attended by OPERA members from Cook Islands, Fiji, Palau, Papua New Guinea, Samoa, Solomon Islands, Tonga and Vanuatu.

FESRIP – Framework for Energy Security and Resilience in the Pacific

Pacific leaders endorsed the Framework for Energy Security and Resilience in the Pacific (FESRIP): 2021 – 2030 in August 2021. FESRIP was developed by the Pacific Community, in collaboration with PIFS, SPREP, USP, PPA, PRIF, UNDP, IRENA and the Pacific Island Countries and Territories (PICTs). Through the FESRIP, leaders envision a future where Pacific people have universal access to secure, robust, sustainable, and affordable electricity, transport, fuel and household energy services. The FESRIP identifies 6 priority categories that cover 23 priority areas for action through regional, sub-regional and bilateral approaches. It is seen as a vehicle for accelerated progress on the SDGs, the SAMOA Pathway, Nationally Determined Contributions (NDCs) and respective country energy roadmaps. Successful implementation of this ambitious agenda at the country level will require a coordinated plan of action involving all stakeholders.

PEGSAP – Pacific Energy and Gender Strategic Action Plan

Since 2003, the Pacific region has been working towards mainstreaming gender in the energy sector, including clean and renewable energy. This work contributed to the establishment of the Pacific Energy and Gender Network, the development of awareness-raising materials, workshops and trainings, and the development of the second regional Pacific Energy and Gender Strategic Action Plan (PEGSAP) 2020–2030. A key objective was the development of research on gender and energy in the Pacific region, an area that was lacking up to this point. This work began with a gender-based assessment on the energy sector in Fiji, Kiribati, the Marshall Islands, Samoa, Solomon Islands and Tuvalu, conducted by the Pacific Community. After consultation with stakeholders, the findings and recommendations from this publication were used to develop an action plan for dismantling barriers to women's involvement in clean energy projects in all countries and territories. PEGSAP 2020–2030 was launched at the Clean Energy Workshop and Women in Energy Conference on 5 October 2022. The action plan addresses objectives at the institutional, service provider, society/community, and individual levels.

Regional E-mobility Policy and Programme

Sustainable mobility offers an alternative to reduce fossil fuel dependency, increase energy security, mitigate climate change effects, and underpin the Pacific Islands' domestic economies without further harming the environment. The Fourth Pacific Regional Energy and Transport Ministers' Meeting, held from 18 to 20 September 2019, in Apia, Samoa, requested the Pacific Centre for Renewable Energy and Energy Efficiency (PCREEE) and the United Nations Industrial Development Organization (UNIDO) to assist in the development of a regional e-mobility policy and program. The Pacific Islands e-mobility readiness programme covers land transport only, while tackling the issue of electric vehicles and other innovative solutions. The programme provides technical assistance in sustainable e-mobility policy and regulatory frameworks, standards and guidelines, awareness-raising and promotion, and demonstration and upscaling. The programme envisions that by 2030, 10 different models of manufacturer-supported, mainstream EVs are available in the PIC markets and 50 per cent of all mainstream EVs are charged through devices that are enabled to be charged through managed-charging.[3]

Regional cooperation to design and achieve energy goals

Independent advice to governments and utilities on how to achieve, review or revise their goals can be delivered efficiently through regional collaboration. Governments are working closely with the Pacific NDC hub mechanism to help PICTs refine and implement their NDC commitments. Meanwhile, SPC's Fourth Pacific Regional Energy and Transport Ministers' Meeting in 2019 recognized the role of the energy and transport sectors under the Blue Pacific's regional priorities, agreed to align energy and transport regional frameworks to the "2050 Strategy for the Blue Pacific Continent", and endorsed ESCAP's effort to develop NEXSTEP, an integrated energy policy and planning tool that highlights the role of carbon tax and fossil fuel subsidies in its least cost financing options (see Section 4.2.3).

TABLE 4.1 National energy targets and indicators

		Installed Capacity, MW (2019)				Installed Capacity: RE Breakdown, MW (2019)					Off-grid
Pacific SIDS	Energy target	Total	Non-RE	RE	% RE	Solar	Hydro	Wind	Bioenergy	Geothermal	(MW)
Cook Islands	100% renewable electricity generation by 2020	25	18	7	27.7	7					0.156
Fiji	100% access by 2020 and 100% renewable electricity generation by 2030	357	145	212	59.4	10	138	10	54		4.571
Kiribati	Achieve at least 45% reduction of fossil-fuel energy generation by 2025	9	7	3	30.4	3					1.397
Marshall Islands	20% renewable electricity generation by end of 2020 with at least 95% access	30	29	2	5.3	2					0.667
Micronesia, Federated States of	50% decrease in diesel imports by 2020 and 30% renewable electricity generation	29	26	3	9.5	2		1			0.395
Nauru	30% increase in efficiency, 50% electricity supply from renewables, and 24/7 grid electricity supply with minimal interruptions by 2020	18	17	1	4.7	1					0.008
Niue	80% renewable energy generation by 2025	3	2	1	31.1	1					
Palau	45% renewable electricity generation and 35% energy efficiency improvement by 2025	33	32	1	3.8	1					0.117
Papua New Guinea	70% of households to have access to electricity and 100% renewable electricity generation by 2030	1,037	703	333	32.2	1	258		18	56	151.695
Samoa	100% renewable electricity generation by 2025	60	32	28	47.1	14	14	1			0.014
Solomon Islands	79% of electricity from renewables by 2020	67	64	4	5.4	3			1		2.324
Tonga	50% renewable electricity generation and 100% access by 2020	25	18	8	30.5	6		2			0.251
Tuvalu	100% renewable electricity generation and 30% efficiency improvement by 2020	5	3	2	41.7	2					1.332
Vanuatu	100% renewable electricity generation and 100% access by 2030	33	23	10	30.2	3	1	3	3		1.365
	Total Pacific DMCs	**1,702**	**1,119**	**615**	**36.1**	**56**	**411**	**17**	**76**	**56**	**164.292**
	% of Installed Capacity	100%	66%	36%		3%	24%	1%	4%	3%	
	Subtotal PIC 12	308	271	70		45	15	7	4	0	8.026
	% of Installed Capacity	100%	88%	23%		15%	5%	2%	1%	0%	

Source: ADB, 2021.

4.4 Priorities and next steps

The assurance of access to affordable, reliable, sustainable, and modern energy production for all and the achievement of commitments under the Paris Agreement and Glasgow Climate Pact require a multifaceted approach. The following actions are available for ESCAP member States and other stakeholders to support these goals.

Set ambitious targets to achieve SDG 7

At the national level, 14 PSIDS have adopted national targets for increasing the deployment of renewable energy technologies, improving energy efficiency and/or improving the rates of energy access (Table 4.1). Several governments have undertaken regulatory reforms to empower regulators to regulate the energy sector to improve performance in the provision of energy services, leading to some successes. For example, improvements to Tonga's distribution networks at the behest of the regulator have reduced losses from 12 to 5 per cent.

For small island countries and small isolated grids, the achievement of 100 per cent renewable electricity by 2030 is both technically and commercially feasible and provides advantages in energy security. Analysis indicates that early investments in renewables will generate greater benefits compared to late interventions. Policies should also consider the phase-out of electricity generation from imported fossil fuels. The new deployment of diesel-fired power generation is not cost-effective and should be avoided. Moratoriums on new developments are an effective, unambiguous market signal.

Progressive transport policies, such as minimum fuel economy standards and increasing the share of hybrid or electric vehicles, should also be considered to reduce the heavy reliance of the transport sector on imported fuel. Transport is referenced in the NDCs of eight PSIDS (Federated States of Micronesia,

Kiribati, Palau, Republic of the Marshall Islands, Solomon Islands, Tonga, Tuvalu and Vanuatu) and only the Republic of the Marshall Islands has specified a clear target for reducing transport emissions. There are currently separate regional frameworks for energy (in general) and marine transport, but none for land transport. Fiji, the Republic of the Marshall Islands, Samoa, Vanuatu, the Solomon Islands and Tuvalu have agreed to collaborate to reduce petroleum fuel use in marine transport by up to 40 per cent by 2030 and 100 per cent by 2050, but it has been argued that progress in improving energy efficiency and developing renewable energy in the transport sector is "… inhibited by the 'silo' nature of the major regional actors".[4]

Meanwhile, substantial energy saving opportunities can be found in the residential, commercial and transport sectors. Policies such as appliance performance standards, labelling schemes and building codes can leverage the energy reduction potential while providing positive financial gains. The Pacific Appliance Labelling and Standards program (PALS 2019) is one example of success: implemented by SPC between 2012–2019, the programme has supported ten countries to implement Minimum Energy Performance Standards and Labelling. Fiji. Samoa, Solomon Islands, Vanuatu and Tuvalu have enacted these standards while Kiribati, Cook Islands, Tonga, Niue and Papua New Guinea have progressed to the drafting stage.

Integrating energy access policies with other sectoral agendas

At present, the integration of the clean cooking agenda into national energy policies and strategies is hampered by a lack of policy attention, and further challenged by traditional policy silos which prevent take-up of opportunities for collaboration across sectors. Energy access policies should:

- ensure that the clean cooking and electricity access agenda is embedded and prioritized in energy policies and strategies;
- support pro-poor growth and rectify inequalities in wealth, gender and geography;
- include the setting of unified goals and targets for universal electrification and access to clean cooking technologies, including supporting the development of roadmaps and the application of ongoing evaluation and feedback systems to ensure their effective implementation; and
- adopt minimum standards to improve the reliability and quality of electricity supplies, including setting targets for a modern energy minimum (consumption of at least 1,000 kWh per person per year) and consideration of ESMAP's multi-tier framework on energy access which evaluates availability, capacity, reliability and affordability.

Creating enabling policy and regulatory environments

National energy systems should be planned with a long-term view of future energy needs and costs while considering the much-needed shifts in the energy supply. It is essential that systems enable investment with an assurance of a return. One central aim of planning should therefore be to support the de-risking of investment. Further, many situations call for the strengthening of governance arrangements through improvement of regulatory frameworks and institutions and by advancing the technical capability of energy utilities.

Support capacity-building for policy design and planning

At the country level, there is a need to enhance capability and capacity in the setting of domestic policy and energy systems planning. In this regard, it is widely recognized that policymakers, experts and intergovernmental agencies struggle to obtain sufficient energy data for planning purposes throughout the subregion. In a 2019 resolution at SPC's Fourth Pacific Regional Energy and Transport Ministers' Meeting, Pacific energy ministers noted the data management challenges of the Pacific Islands and called on the World Bank to urgently appraise and treat the SPC data funding proposal as a matter of priority. The collation of data on key energy indicators are key to planning and managing each country's NDCs, and a subregional framework for gathering this information would be a fundamental step in the right direction.

Engage with financiers and the private sector

Most PSIDS are unlikely to achieve their SGD 7 and NDC goals without direct investment from governments, utilities and development agencies, and innovative financing mechanisms will be required to better engage with investors from the private sector. Energy system plans, strategies and roadmaps should describe the business case for investment and enable the deployment of innovative finance and payment mechanisms,[5] including the government-led facilitation of power purchase on behalf of communities and the enabling of micro finance for energy efficient products and appliances. Markets should be opened to enable competition, especially in new and emerging areas such as microgrids and charging infrastructure for e-mobility. Policies should be communicated to financiers through the development of investment prospectuses and other means. The various stakeholders need to cooperate to facilitate "bankable" projects. For example, studies on deep drilling are required to confirm the geothermal resource, while monitoring of potential wind farm sites will assist wind project proponents and financiers to better understand the behaviour of wind resources.

Monitor and integrate new technologies into policy

Decentralized systems based on renewable energy have proven to be cost-effective and sustainable solutions for delivering socioeconomic benefits to remote island communities. Policies should support the integration of mini- and off-grid solutions into national policy, emphasizing the use of local renewable energy supplies over imported fossil fuels, and leverage developed countries' experience with smart metering and other advanced technologies to manage networks and enable innovative financing and payment systems. Clean cooking programmes should seek to leverage the rapidly increasing levels of access to electricity by considering the deployment of energy efficient electric cooking technologies.

Into the future, wave power and green hydrogen are two areas of technological development with signs of possibility. While wave technology proponents have suffered many setbacks over a long period of endeavor, the enormous resource that is available across the Pacific Ocean warrants ongoing consideration. Green hydrogen is an emerging area that shows great promise, and policymakers from the Pacific should actively engage with technical experts from around the world to ensure that appropriate options are considered as they become feasible.

Strengthen subregional cooperation

Policymakers should collaborate through existing Pacific initiatives to support the scaling-up of local capability and capacity through coordinated training and knowledge transfer. They can use the opportunities offered during Pacific meetings to align their approach and to ensure collective advocacy of their perspectives in ensuing discussions. Immediate opportunities for this include:

- Supporting the Implementation of the Framework for Energy Security and Resilience in the Pacific (FESRIP) 2021–2030;
- Enhancing Women participation in Energy through the implementation of the Pacific Energy Gender Strategic Action Plan (PEGSAP) 2020–2030; and
- Fostering E-mobility in the Pacific through the implementation of the Pacific Regional E-mobility Programme currently implemented by SPC through PCREEE.

Endnotes

1 PIF, 2022
2 Text describing OPERA, FESRIP, PEGSAP and the Regional E-mobility Policy and Program provided courtesy of SPC.
3 Managed charging is an approach to charging electric vehicles which balances the vehicles' energy needs with the pressure on the charging site to support a more reliable and resilient grid.
4 USP, 2017
5 Tools such as the SIDS Clean Energy Toolkit that was developed by the Commonwealth Secretariat and Sustainable Energy for All are available to support the evaluation of financing options

The Way Forward: A Four-Point Climate Action Agenda

Against the backdrop of the increasingly complex disaster riskscape facing countries in the Pacific, the current publication described several key areas which offer opportunities for synergistic and concerted actions to address climate change challenges. Many of the PSIDS governments are already taking transformative actions to strengthen their resilience to climate change impacts and other transboundary challenges. The publication demonstrates that significant gaps remain, for example in terms of capacities to analyse and monitor climate change; to integrate climate issues into trade, energy, transport, telecommunications and natural disaster risk reduction; and to involve communities in designing climate actions, among other areas. However, the publication also stresses that the acceleration of climate action is possible with the right set of policy mix across sectors, and that tremendous progress has been made in establishing regional and subregional frameworks for cooperation in addressing climate change.

The current chapter describes how the governments, civil society, and research community of the PSIDS can leverage these cooperative mechanisms to broaden their ambition and catalyse development financing sources to support their climate strategies. It proposes a four-point agenda based on the four themes discussed in this publication, namely (a) integrate the disaster-climate-health nexus; (2) strengthen ocean and climate policy synergies; (3) promote climate-smart and digital trade policy measures; and (4) enable sustainable energy transitions.

The following discussion focuses on selected areas for strengthening regional cooperation.

1. Integrate the disaster-climate-health nexus

Given that there are still gaps in the effectiveness of early warning systems in the Pacific, one of the most urgent priorities is to upgrade multi-hazard early warning systems. Regional initiatives have been useful for pooling experiences and resources, and these can be utilized to supplement existing early warning mechanisms and systems in the Pacific. ESCAP, for example, piloted early warning and impact forecasting systems in Fiji, Papua New Guinea, and Samoa through the Regional Integrated Multi-hazard Early Warning System for Africa and Asia (RIMES). ESCAP and RIMES are working together with the PSIDS to expand the scope of their work. Strong subregional partnership mechanisms, such as the ESCAP-WMO Typhoon Committee and the Panel on Tropical Cyclones, could also be established in the Pacific.

Regional cooperation can also facilitate the pooling of knowledge, especially about how to use new technologies to analyse data and model climate trends. As demonstrated by the Yavusa Navakavu, working with local communities to use data from remote sensing and GIS can empower them to plan their own climate responses and development measures (see Box 1.2 in Chapter 1). Meanwhile, knowledge sharing workshops at the regional level can be held to discuss how to address the adaptation priorities identified in the country climate risk profiles using ESCAP's Risk and Resilience Portal. The importance of such solutions was demonstrated when technical innovations were utilized to tackle overlapping natural hazards and the COVID-19 pandemic. In this context, the momentum gained during the COP27 should be built on to establish the "loss and damage" fund as soon as possible and recognize the launch of Executive Action Plan for the Early Warnings for All by 2027, while the seamless integration of adaptation measures can be supported by aligning them with existing Asia and the Pacific frameworks.

2. Strengthen policymaking on ocean and climate synergies

As the impacts of climate change are increasingly felt across the Pacific, it is clear that measures to address them cannot be separated from efforts to protect the ocean. In this regard, the synergies between ocean and climate policies should be further explored and harmonized. Protecting marine ecosystems and achieving the dual goals of climate change mitigation and adaptation, including protecting and restoring coastal ecosystems such as mangroves, coral reefs, seagrass, and salt marshes, will enhance the health and integrity of these ecosystems. While the proportional footprint of GHG emissions in Pacific is low, there

are still opportunities for mitigation action. Within the Pacific regional architecture, governments and developments partners need to facilitate the dialogue between scientists and policymakers to support the design and implementation of evidence-based ocean policies.

To raise ambition and strengthen cooperation on ocean science and technology amongst Pacific countries, there is a need to invest in research and technology for blue carbon storage and blue carbon accounting. The PSIDS and their partners can collectively mobilize financing for cooperation in ocean science and technology, both to support national-level programs, as well as for regional and transboundary initiatives. Financing is also needed to promote technology transfer and capacity development activities, including south-south collaboration among Pacific nations, and between them and developing countries in other subregions.

3. Promote climate-smart and digital trade policy measures

Most PSIDS depend on trade in physical commodities and services for economic growth and development. In recent years, some governments have started to adopt "climate-smart" trade policies, such as substituting fossil fuel subsidies with more targeted social support policies such as direct cash transfers (or investing in education and healthcare), liberalizing trade in environmental goods and services, and reducing cross-border trade inefficiencies. The digitalization of trade procedures can expand the capacity for trade due to time and cost savings, as well as reduce the environmental impacts of trade. However, digitalization is conditional on having access to the Internet and digital services. The recent deployment of low-orbit satellites and connections to submarine cables are expected to boost digital connectivity in the Pacific subregion.

To further develop climate-smart and digital trade, PSIDS can strengthen cooperation by incorporating more climate-smart and digitalization considerations into Pacific regional agreements, such as the PACER Plus and PICTA, when the time comes for their review. Governments can access support for these steps by becoming parties to the Framework Agreement on Facilitation of Cross-border Paperless Trade in Asia and the Pacific, which entered into force in 2021. Furthermore, the Blue Pacific Shipping Partnership, which strives for a 100 per cent carbon-free domestic maritime transport sector, should be taken forward. Development partners have an important role in fostering such cooperation, as well as supporting capacity building for both government and private sector actors, especially MSMEs.

4. Enable sustainable energy transitions

Given their small size and remoteness, the PSIDS face several unique challenges concerning energy generation and distribution. With the exception of Papua New Guinea, most PSIDS depend on the import and trade of fossil fuels, which puts a burden on their foreign exchange. This has been further exacerbated by the ongoing geopolitical tensions. The sparse distribution of the population also means that the market lacks the economies of scale needed for large power grid development. However, these challenges are also catalysts for the development of renewable energy resources. The Pacific presents excellent potential for renewable energy development using existing proven hydro power, solar and wind technologies, while further research may yet uncover opportunities for deployment of other renewable energy technologies such as biomass and biofuels, wave and tidal energy or geothermal power into the future. Local economies are well suited to the deployment of modular generation technologies, microgrids and smart grids.

To realize a sustainable energy transition, the PSIDS need to renew efforts to achieve SDG 7, including by increasing the deployment of renewable energy technologies, improving energy efficiency and improving the rates of energy access. This requires support for the scaling-up of local capability and capacity through coordinated data collection and dissemination, training and knowledge transfer, while using the opportunities offered during Pacific regional meetings to align approaches. New technologies must be further investigated to assess their suitability for the Pacific context. There are many regional initiatives which could be further strengthened, including the Framework for Energy Security and Resilience in the

Pacific (FESRIP) 2021–2030; the Pacific Energy Gender Strategic Action Plan (PEGSAP) 2020-2030; and the Pacific Regional E-mobility Programme, to name just a few. Innovative financing mechanisms will also be required to attract investors from the private sector.

ESCAP's readiness to strengthen regional cooperation in the Pacific

ESCAP is the most inclusive intergovernmental platform in Asia and the Pacific which is dedicated to supporting the region's development aspirations. By putting people at the center of policymaking, the ESCAP Commission remains the most agile and vibrant anchor to accelerate climate action and promote international solidarity. ESCAP has been working with other agencies in the Pacific to enhance the availability of regional public goods. In this regard, it firmly supports the 2050 Strategy for the Blue Pacific Continent, adopted by the Pacific Islands Forum Leaders in 2022. This Strategy calls for urgent and appropriate action, including on climate change and disasters, and highlights regional policy initiatives and approaches to protect people and the planet. Into the future, the 2050 Strategy will be critical for building resilience in the region and supporting the achievement of the Sustainable Development Goals.

At the national level, ESCAP could build closer relationships with the ministries and departments of planning, development, environment, climate change, trade and energy ministries in PSIDS to strengthen resilience, including nature-based solutions and ecosystem-based adaptation. By utilizing technology and advanced online tools, member States and stakeholders can receive technical assistance in their planning and decision-making efforts, particularly in many of the areas discussed in this publication, including climate change, natural disasters and resilience, ocean science, trade and energy transition. ESCAP Regional Institutions[1] can facilitate capacity-building on technology development and transfer through north-south and south-south modalities and frameworks.

Meanwhile, at the subregional and regional levels, technological solutions to support PSIDS in addressing their development requirements could be provided through existing regional cooperative frameworks. ESCAP will support measures to strengthen linkages between these frameworks and the UN Sustainable Development Cooperation Framework 2023–2027. This will help bridge national, subregional and regional efforts to combat climate change and ensure that climate change actions are integrated into sustainable development strategies at every level.

Endnotes

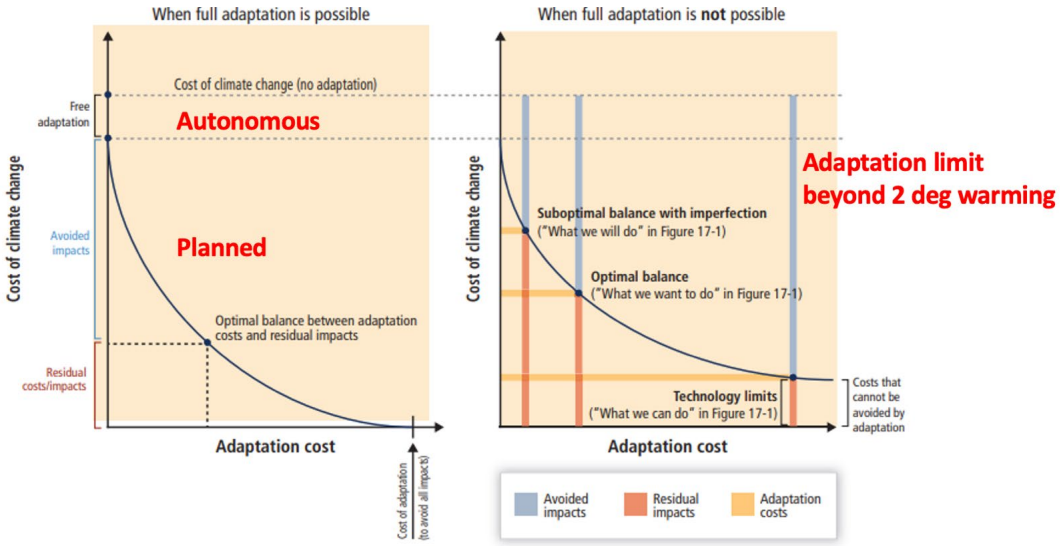
1 ESCAP has five regional institutions that support the substantive divisions of ESCAP in their goals. Each regional institute has a governing council. Governing councils are responsible for reviewing the institutes' administration and financial status; implementation of the programme of work; advising the institute directors on the formulation of the programme of work. https://www.unescap.org/about/regional-institutions

Annex 1: Methodology for estimating the Annual Adaptation Cost for Natural and Biological Hazards

Introduction: calculating climate adaptation costs

The climate adaptation costs are derived from the total annual adaptation costs for climate- related hazards and adaptation costs for biological hazards. These are based on ESCAP calculations of the Average Annual Losses (AAL) due to climate-related hazards and health sector losses due to biological hazards. Overall, the 2018 IPCC report (figure below) and World Bank and UNFCCC studies on financing for adaptation are used to derive the adaptation cost estimates.

FIGURE Cost of adaptation and residual cost of climate change



Source: IPCC, 2018.

Adaptation cost for climate related hazards and biological hazards

Adaptation costs for climate-related hazards are calculated based on the Average Annual Losses (AAL) from climate related hazards under the worst-case climate scenario (RCP 8.5). This AAL under RCP 8.5 is then multiplied by the climate adaptation multiplier to get the **adaptation costs for climate related hazards**. Similarly, the **adaptation costs for biological hazards** are calculated by multiplying the Biological Hazards AAL with the health adaptation multiplier. The adaptation costs for climate-related hazards and biological hazards are then added up to derive the total annual adaptation cost.

Climate adaptation multiplier

Following a World Bank study, the cost of climate proofing is taken to be 20 per cent of the financial exposure to climate-related hazards.[1] The Pacific Small Island Developing States are an exception, as the exposure is taken to be 40 per cent, given the higher infrastructure losses during disasters.[2] Similarly, following World Bank and UNFCCC studies, the health-related costs of adaptation are estimated to be equivalent to nearly 30 per cent of health-related losses.[3]

The detailed ESCAP methodology is available at: https://www.unescap.org/sites/default/d8files/2021-08/APDR-2021-Methodology%20Annex_0.pdf

1 World Bank, An Investment Framework for Clean Energy and Development (Washington, D.C., World Bank, 2006)
2 Economic and Social Survey of Asia and the Pacific 2019: Ambitions beyond Growth (United Nations publication, 2019).
3 Estimating the cost of health adaptation, World Health Organization, Available at: https://unfccc.int/sites/default/files/resource/CGE_wenbinar%236_presentation.pdf

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Pacific Perspectives 2022: Accelerating Climate Action proposes a four-point agenda based on the themes discussed in this publication, namely (a) integrate the disaster-climate-health nexus; (2) strengthen ocean and climate policy synergies; (3) promote climate-smart and digital trade policy measures; and (4) enable sustainable energy transitions. It is clear that climate actions must not only be scaled up, but also integrated across these various sectors. ESCAP remains committed to accelerating climate action through regional cooperation in Asia and the Pacific.