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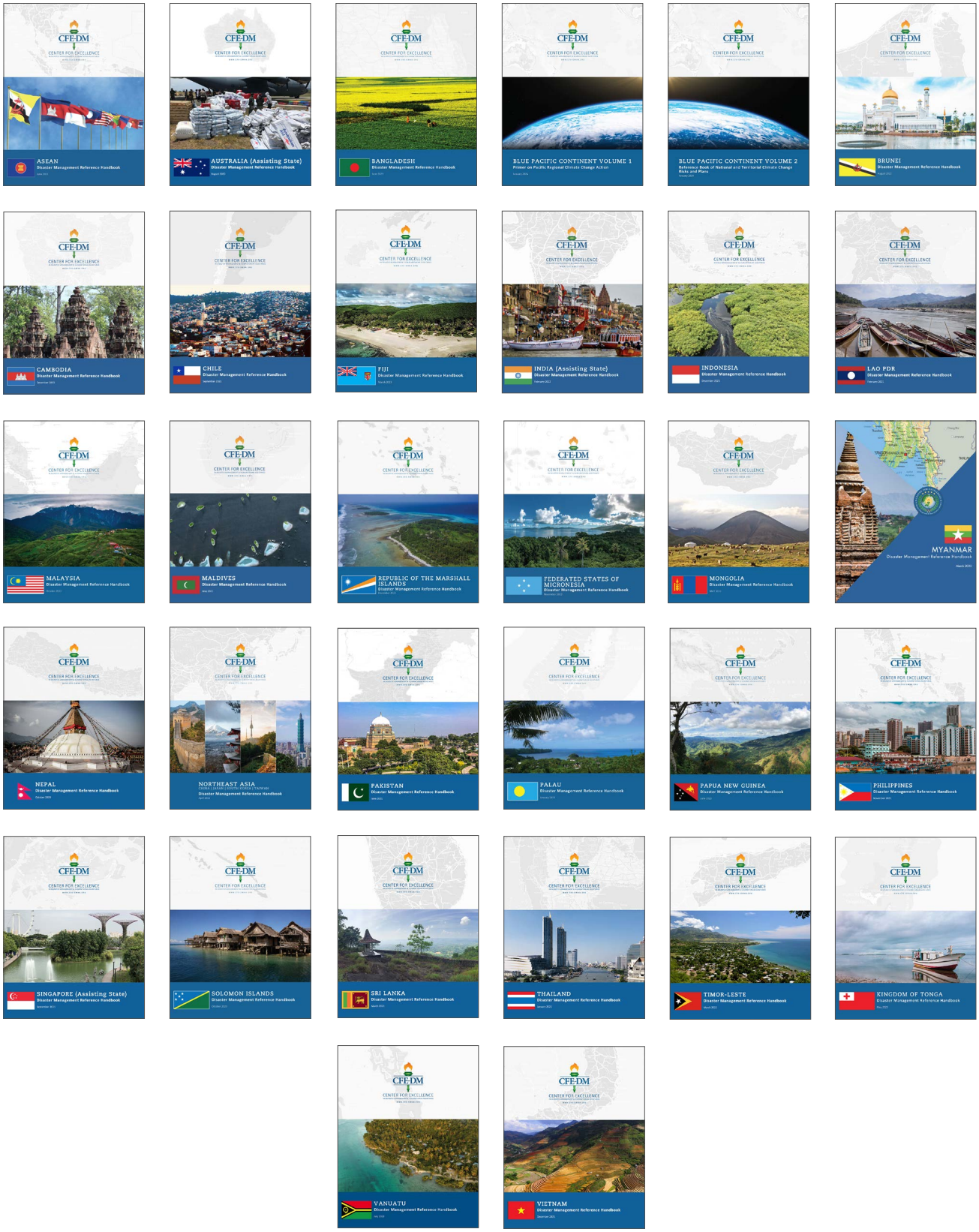
BLUE PACIFIC CONTINENT VOLUME 2

Reference Book of National and Territorial Climate Change Risks and Plans

January 2024

Disaster Management Reference Handbook Series

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Acknowledgements

Front Cover

Original photo by NASA. ISS007-E-07304 (13 June 2003) --- This view of Earth's horizon was taken by an Expedition 7 crewmember onboard the International Space Station (ISS), using a wide-angle lens while the Station was over the Pacific Ocean. https://eol.jsc.nasa.gov/SearchPhotos/photo.pl?mission=ISS007&roll=E&frame=7304

Disclaimer

This handbook has been prepared in good faith based on resources available at the time of publication. Information was gathered from the public domain, from local and government sources, as well as from subject matter experts. Where possible, a link to the original electronic source is provided in the endnote (reference) section at the end of the document. While making every attempt to ensure the information is relevant and accurate, the Center for Excellence in Disaster Management and Humanitarian Assistance (CFE-DM) does not guarantee or warrant the accuracy, reliability, completeness, or currency of the information in this publication. Each handbook is a working document and will be updated periodically as new and significant information becomes available. We hope that you find these handbooks informative, relevant, reliable, and useful in understanding disaster management and response. We welcome and appreciate your feedback to improve this document and help fill any gaps to enhance its future utility. For feedback, comments, or to request a printed copy please email cfe.dmha.fct@pacom.mil. Please visit our website to download copies of this publication and other products (https://www.cfe-dmha.org). All parts of this publication may be reproduced, stored in retrieval systems, and transmitted by any means without the written permission of the publisher.

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Letter from the Director

The United States National Oceanic and Atmospheric Administration reported that 2023 was the warmest year on record and warned that the world would need to be prepared for that level of warming to drive extreme weather and rising sea levels.* During the year, droughts, floods, and violent storms struck every corner of the globe.

The Center for Excellence in Disaster Management and Humanitarian Assistance (CFE-DM) knows the potential for climate change-influenced hazards to become disasters as happened in our own back yard, the Pacific Ocean, throughout 2023. From the twin tropical storms – Judy and Kevin – that struck Solomon Islands and Vanuatu in February and March through the fires that devastated Lahaina, Maui, in August, and the droughts that suffocated parts of Micronesia and Tonga in the autumn, the potential magnitude of suffering is clear. And the CFE-DM is committed to partnerships that build the resilience of communities across the Pacific – and globally.

The Center's work on understanding the impacts of climate change has matured since we took on the mission for U.S. Indo-Pacific Command (INDOPACOM) in 2022. We ran our first climate change wargame in December that year, and our engagements with regional partners have built on that success. Through 2023, we joined U.S. and regional governments, humanitarians, and military forces to share data on climate change impacts and to seek a common understanding of how we can adapt to try to insulate ourselves from the worst of those impacts.

Although the CFE-DM has built climate change information into its regular engagements, such as humanitarian assistance and disaster response workshops in the Federated States of Micronesia, Marshall Islands, Palau, Papua New Guinea, Samoa, Solomon Islands, and Tonga – we know that it is Pacific Island communities themselves that are the leading forces in planning and implementing projects that will secure the futures of their people and their islands.

To begin to understand the work of the inter-governmental and non-governmental organizations, academic programs, and advocacy initiatives active in the Pacific Islands region, the CFE-DM presents this two-volume "Blue Pacific Continent." It takes as its starting point the leadership of the Pacific people themselves through their states and communities. Volume I provides both a primer on organizations rooted in the Pacific and an examination of what is at stake for the region. Volume II collates the national and territorial contexts, hazards, and government plans to address the impacts of climate change. Taken together, the CFE-DM hopes that these "Blue Pacific Continent" volumes are a resource for U.S. Department of Defense (DoD) and government personnel who may be working on the issues of climate change and security with partners in the Pacific region.

Sincerely,



Joseph D. Martin, SES
Director

* National Oceanic and Atmospheric Administration (NOAA). 2023 wa the world's warmest year on record, by far. U.S. Government. 12 January 2024. https://www.noaa.gov/news/2023-was-worlds-warmest-year-on-record-by-far#:~:text=%E2%80%9CNot%20only%20was%202023%20the,both%20more%20frequent%20and%20severe.

About the Center for Excellence in Disaster Management & Humanitarian Assistance

Overview

The Center for Excellence in Disaster Management and Humanitarian Assistance (CFE-DM) is a United States (U.S.) Department of Defense (DoD) organization comprised of nearly 30 subject matter experts that provide academic research, civil-military coordination training, and operational insights to support decision making before, during, and after crises. The Center is designed to bridge understanding between humanitarians, civilian, and military responders. CFE-DM partners with a diverse group of governmental and nongovernmental actors, as well as academic institutions to increase collaborations and capabilities in humanitarian assistance and disaster response. While maintaining a global mandate, the Indo-Pacific region is our priority of effort and collaboration is the cornerstone of our operational practice. The Center is a direct reporting unit to U.S. Indo-Pacific Command (USINDOPACOM) and is located on Ford Island, Joint Base Pearl Harbor-Hickam, Hawaii.

Vision

The Joint Force, allies, and partners are fully prepared to conduct and support foreign humanitarian assistance.

Mission

CFE-DM builds crisis response capacity in U.S. and partner militaries, enhances coordination and collaboration with civilian and foreign partners, and strengthens those relationships to save lives and alleviate human suffering before, during, and after humanitarian crises.

Contact Information

Center for Excellence in Disaster Management and Humanitarian Assistance
456 Hornet Ave
JBPHH, HI 96860-3503
Telephone: +1 (808) 472-0518
https://www.cfe-dmha.org

INTRODUCTION

This volume is intended as a companion to Blue Pacific Continent, Volume I – Primer on Pacific Regional Climate Change Action.

This reference book offers an overview of Pacific countries and territories with a focus on government or administration institutions, policies, and plans for disaster risk reduction (DRR) – including disaster management – and climate change adaptation (CCA). Where available, these profiles offer some details on civil society partners involved in climate change action, including mitigation and adaptation. Finally, each profile includes information on climate and hazard early warning systems established or planned in each country or territory along with some of the key infrastructure networks that play a role in addressing climate change and that are vulnerable to climate change impacts.

The 25 countries and territories profiled are American Samoa, Australia, Cook Islands, Fiji, French Polynesia, Guam, Kiribati, Marshall Islands (Republic of), Micronesia (Federated States of), Nauru, New Caledonia, New Zealand, Niue, Northern Mariana Islands (Commonwealth of), Palau, Papua New Guinea, Pitcairn, Samoa, Solomon Islands, Timor-Leste, Tonga, Tuvalu, Vanuatu, and Wallis and Futuna.

While the profiled states and territories range in physical area, population size, economy, culture, and other facets, they are included together in this book because they are members of key Pacific regional agencies and institutions that, among other mandates, work to promote adaptation to and mitigation of climate change impacts. More broadly, they act – frequently in unison – on the local, national, regional, and international stages to address the issue of climate change. With certain exceptions, the countries and territories included in this volume are small island developing states (SIDS) which, according to the United Nations (UN) Economic and Social Commission for Asia and the Pacific (ESCAP), "share a set of geographical, environmental, economic, and social challenges, and have unique development needs that make them extremely vulnerable"[1] to the changes being wrought in the world by the increasing concentration of greenhouse gasses (GHG) in the atmosphere – emissions that largely did not originate in the Pacific SIDS.

The states and territories included here employ a range of strategies and tactics to implement risk reduction for both sudden onset disasters and problems that emerge more slowly. Several island states have fully integrated DRR and CCA together in their policies and plans in recognition of the fact that climate change exacerbates the hazards that these states confront and, combined with vulnerabilities, can turn hazard-related events into disaster events. These strategies, policies, and plans have varying degrees of interconnection with those of other regional and international states and territories. In many cases, Pacific Islands are part of or in treaty or compact relationships with Australia, France, New Zealand, the United Kingdom (UK), or the United States (U.S.), and these relationships have direct bearing on how the islands mitigate risk and prepare for, respond to, and recover from disasters, including those linked to climate change.

Action to mitigate and adapt to climate change is not a new concept in the Pacific region, but advocacy by many countries and territories increased in volume after 2015 when leaders in the Pacific Islands Forum (PIF) – to which many of the states in this book belong – published their Declaration on Climate Change Action in which they plainly stated that the impacts of climate

1 UNESCAP. Pacific Perspectives 2023: Advocating the aspirations of Small Islands Developing States. United Nations. 2023. https://repository.unescap.org/bitstream/handle/20.500.12870/6552/ESCAP-2023-RP-PACIFIC-PERSPECTIVES.pdf?sequence=1&isAllowed=y#:~:text=The%20major%20themes%20of%20Pacific,need%20to%20prioritize%20building%20resilience.

change are existential threats to their people and territories.[2] All of the independent states among the Pacific Island Countries and Territories (PICT) profiled in this reference book have also submitted a first Nationally Determined Contribution (NDC) to the Secretariat of the UN Framework Convention on Climate Change (UNFCCC) to detail their ambitions for CCA and decarbonization; many have also submitted updated, enhanced, or second NDCs since 2020. Although many of the targets in these NDCs are conditional on international support – i.e., financing[3] – they still frequently allow the PICTs to point to their own ambitions as examples for larger countries – who are more significant GHG emitters – to emulate.

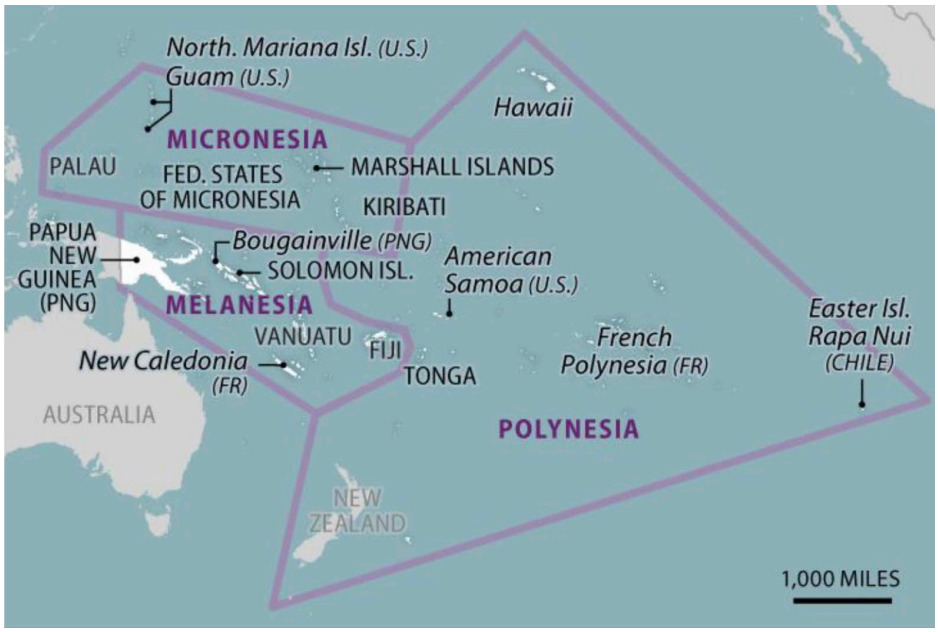


Figure 1: Map of the Pacific Islands Region

Figure 1 shows a map of the Pacific Islands region, stretching from Hawaii to New Zealand and from Rapa Nui to Australia and Papua New Guinea; it also marks the historic divisions of the region into the ethno-linguistic and cultural zones of Melanesia, Micronesia, and Polynesia.[4] Many of the countries and territories covered in this book are marked; those not marked are Cook Islands, Nauru, Niue, Samoa, Timor-Leste, Tokelau, Tuvalu, the UK territory of Pitcairn, and France's Wallis and Futuna. Of note, this volume does not cover the U.S. State of Hawaii or Chile's Easter Island (Rapa Nui) as Chile does not participate in the referenced climate change-oriented regional organizations, and the U.S. states operate under differing laws and authorities than do the U.S. territories in the region.

In many cases, the PICTs in this book coordinate or cooperate on climate change issues via a constellation of regional political, economic, scientific, and other organizations. Those organizations are detailed in Blue Pacific Continent, Volume I where the region's climate change-oriented frameworks, declarations, and action plans are also discussed. The present book is crafted such that interested readers can either maintain it as an integrated reference or extract the country / territory profile in which they are interested. As such, each profile includes a separate endnotes section.

2 UNESCAP. Pacific Perspectives 2022: Accelerating Climate Action. https://repository.unescap.org/bitstream/handle/20.500.12870/5161/ESCAP-2022-RP-Pacific-perspectives.pdf?sequence=1&isAllowed=y

3 United UNESCAP, United Nations Environment Programme, United Nations Children's Fund. 2022 Review of Climate Ambition in Asia and the Pacific: Raising NDC targets with enhanced nature-based solutions. 2022. https://www.unicef.org/eap/media/12896/file/ESCAP-2022-RP-2022-Review-Climate-Ambition-Asia-Pacific.pdf

4 Congressional Research Service. In Focus: The Pacific Islands. 14 November 2023. https://crsreports.congress.gov/product/pdf/IF/IF11208



COUNTRY AND TERRITORY PROFILES

American Samoa

American Samoa includes the six easternmost islands of the Samoan archipelago in the south-central Pacific Ocean and one far-removed atoll, Swains. Five of the islands are inhabited. The islands lie some 2,600 kilometers (km; 1,600 miles) northeast of New Zealand and 3,500 km (2,200 miles) southwest of Hawaii. With the exception of Rose and Swain Atolls, the islands of American Samoa are high, rugged islands of volcanic origin. Tutuila, the main island and home to Pago Pago, the capital, makes up 135 km^2 (52 square miles)[1] of the country's entire 224 km^2 (86.5 square miles).[2] The islands of Ofu, Olosega, and Ta'u make up the Manu'a group, lying east of Tutuila.[3] Figure 2 shows a map of American Samoa.[4]

In the 2020 U.S. census, American Samoa was home to 49,710 people,[5] with an estimated 97% of all inhabitants living on Tutuila.[6] Rose Atoll is a national wildlife sanctuary; Swains hosts a community of fewer than 20 people, and the Manu'a islands are home to just more than 1,000.[7] More than 90% of the population is ethnically Samoan. The Samoan way of life, or fa'a Samoa, is communal, and the basic unit of social organization is the extended family (aiga). The influence of the aiga plays out on the national political level with chiefs (matai), selected by their extended families, forming village and district councils, which control and run local affairs. Most Samoans speak both Samoan and English. The people are U.S. nationals with the right to enter and reside in the United States but are not citizens.[8]

The Samoan Archipelago was initially settled in approximately 1000 BCE. These settlers were part of the eastward Lapita expansion throughout the southern Pacific. The first recorded contact with Europeans dates to 1722 when vessels from the Dutch West India Company sighted several of the Samoan islands. French voyagers followed and were, in turn, followed by Christian missionaries in 1830. The First Samoan Civil War (1886-1894) among claimants to the title of King of Samoa saw Germany intervene as it was looking to expand its political and commercial interests. To protect its own commercial interests, the U.S. sent three warships, and Britain also sent a ship. An eventual settlement only lasted four years before the Second Samoan Civil War (1898-1899), also about royal succession. To end that war, the island chain was divided at the Tripartite Convention. The eastern islands were ceded to the U.S. in 1900 (Tutuila) and 1904 (the three Manu'a islands). They served as a coaling station under U.S. Navy administration from 1900 until 1951. Despite one attack by Japanese forces in 1942, the islands mostly served as a jungle training center for U.S. forces. In the post-war era, control of the territory was transferred to the U.S. Department of Interior in 1951.[9] Local demand for control of their country's affairs led to the first local gubernatorial election in 1977.[10]

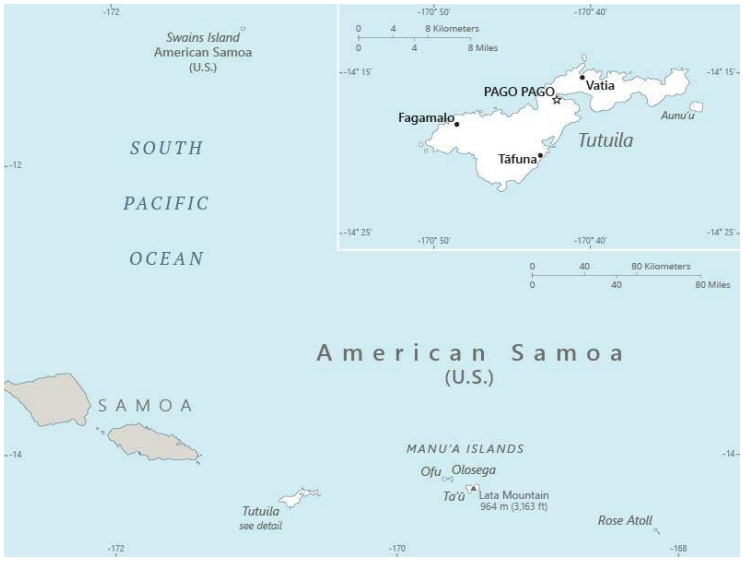


Figure 2: Map of American Samoa

American Samoa is an unincorporated, unorganized territory of the United States. Under jurisdiction of the U.S. Secretary of the Interior, American Samoa drafted its own constitution in 1967. The territory's chief executive is the governor, who is selected by popular election. There

is a bicameral legislature, Fono, whose members are elected by a mixture of universal suffrage and selection by councils of chiefs. Since 1981, American Samoa has sent a non-voting delegate to the U.S. House of Representatives. Each island has several administrative districts, each with an appointed governor; districts may be divided into counties.[11]

Hazards and Climate Change

Hazards that American Samoa confronts include coastal erosion, cyclone, drought, earthquake, flooding, hazardous materials, heat, land- and mud-slide, pandemic, storm surge / high surf, subsidence, tsunami, volcanic eruption, and wild fire. As climate change and see level rise impacts grow, these hazards may become more or less of a threat.

Between 1966 and 2020, the territory experienced 14 declared disasters, and they ranged from the Coronavirus Disease 2019 (COVID-19) pandemic through tropical storms and a devastating tsunami in 2009. Flooding is the most common disaster, and hazards associated with flooding – e.g., landslides, debris flows, etc. – are common causes of death, injury, and property damage. According to the U.S. National Oceanic and Atmospheric Administration (NOAA), there were more than 125 flood events in American Samoa during the period 1994-2020, and there have been 11 disaster declarations due to floods. Although American Samoa lies outside most major cyclone tracks, it does occasionally experience a major storm, as when 2018's Gita brought torrential rains that caused flooding and landslides. Between 1970 and 2020, nine major storms hit the islands. Major droughts occurred in 1974-75, 1983-84, 1998, and 2011, and communities experienced water rationing and curtailed work as industries that require water were forced to shutter. While earthquakes occur frequently in and around American Samoa, their direct impacts have been minimal historically. In fact, the greatest impacts on the territory from seismic activity has been from tsunamis generated by those quakes; the September 2009 tsunami that killed 32 and devastated parts of Tutuila is an example. Vulcanism as a source of seismicity does have the potential to impact American Samoa. The only active volcano in the region is the submarine volcano, Vanilulu'u, east of the Manu'a islands; there is no recorded history of impacts on American Samoa from activity at this volcano. Vector- and water-borne diseases as well as infectious diseases are common in the territory, and recent outbreaks of dengue (2017-18) and measles (2019) prepared residents to respond to the COVID-19 pandemic.[12]

The climate is tropical with abundant precipitation. Precipitation can vary greatly year-on-year and among regions of the islands; while the airport receives some 3,175 millimeters (mm; 125 inches) of rain annually,[13] just a few miles away, Pago Pago receives 5,000 mm (200 inches) of rain annually. Temperatures are constant with the average ranging approximately 21-32°C (70-90°F).[14] The prevailing winds throughout the year are easterly, interrupted more often in summer than winter, and sometimes associated with tropical cyclones and disturbances. Typhoons are common from December to March. Tropical cyclones impact the island chain with tropical storm-force winds on average once every three years.[15] The drier months are June through September although heavy rains are still common during this time.[16]

The potential for climate change to affect American Samoa is high. Already, the average number of "hot" days (above 32°C / 90°F) has been rising from nine days each year in the mid-20th century to 22 days each year in the 2010s, and the number of "cool" nights has decreased. As rainfall patterns are strongly affected by El Niño Southern Oscillation (ENSO), how that phenomenon shifts under climate change scenarios will also have an impact. As of 2021, there had been a trend of increasing rainfall in the dry season, but there is little agreement about how ENSO will behave, and future trends are unclear although occurrences of extreme rainfall are expected to become more frequent. Globally, tropical cyclone frequency is expected to slow, and the area around American Samoa is

expected to see a 5-50% drop in the occurrence of cyclones.[17] Table 1 details various hazards and the potential trends and impacts under climate change scenarios.[18]

Government Institutions, Policies, and Plans for Disasters and Climate Change

The Territorial Hazard Mitigation Council launched in 2003 and is the body ensuring that the Hazard Mitigation Plan is updated to meet

Phenomenon	Trend	Projections	Impacts
Coastal erosion	Severe weather (wind, waves, etc.) and construction cause erosion and accretion in/around key infrastructure and buildings	Loss of vegetation will exacerbate erosion; ENSO changes / strengthening as La Niña events tend to bring stronger wind and waves; weakened coral reef protection allows stronger wave action	Low-lying areas submerged, and debris (sand and rock) blocking roadways; displacement of cultural assets and people
Cyclone	Annual probability of 41% that a cyclone will hit the islands; annual probability of 8% that a major storm will strike; more powerful storms tend to occur in El Niño years	Decrease in frequency of storms overall alongside increased intensity of storms that do occur	High winds, heavy rains, and storm surge more frequently damage structures, contaminate water sources, and speed up coastal erosion
Drought	Past droughts have tended to emerge in the year following strong El Niño events	Overall precipitation expected to be more abundant, but when a drought does occur, it is expected to be more intense	Sedimentation of water sources and loss of vegetation; halts to schooling and economic activity, especially tuna canning
Earthquake / Tsunami	Regional events send tsunami waves that can erode shorelines	No indication of rising threat	Regional seismic and tsunami events can exacerbate the impacts of sea level rise, coastal erosion, and land subsidence
Flooding	Common – more than 125 events between 1994 and 2020; associated with heavy rainfall as well as storm surges, high surf, and tsunami	Annual rainfall expected to increase by up to 10% by 2050; extreme events expected to be more frequent and drive threat of flooding; more intense tropical storms expected	Key populated areas have a 90% probability of experiencing annual floods; damage to buildings and infrastructure will increase along with contamination of water supplies
Heat	Temperatures are relatively consistent year-on-year and seasonally; 2020 saw three record-breaking heat days; increase in average annual temperature of 0.14°C (0.24°F) between 1950 and 2009	Areas at higher elevations will experience more frequent heat waves; average annual temperatures expected to increase by 0.61-0.72°C (1.1-1.3°F) by 2050 and 1.06-1.39°C (1.9-2.5°F) by 2090	Increased incidence of "heat disorders," sunburn, cramping, exhaustion, and sun stroke with children and the elderly most impacted but people who work outside also at high risk
Land- or mud-slide	Associated with heavy rainfall or in areas that have suffered wildfire destruction of vegetation; tend to affect upslope areas	Increase in precipitation and strong storms could increase frequency of slides	Areas downslope from slides will see buildings and communities hit by debris
Pandemic / Epidemic Disease	Dengue is endemic, and other mosquito-borne illness are common; gaps exist in vaccine uptake	Wetter environment may promote mosquito breeding; flooding or drought will impact water sources	Increase in vector- and water-borne ailment outbreaks
Sea Level Rise	Average rise of 2.41 mm (0.10 inches) per year (1948-2009); post-tsunami (2009) rise has been five-times faster due to subsidence	Tuvalu (Polynesia)	Increased damage during hurricane and tsunami; more frequent nuisance floods during heavy rains; salinization of water sources; loss of developed land and cultural sites; seepage of land-based pollutants into coastal waters where coral are impacted

Table 1: Potential Climate Change Impacts on Hazards in American Samoa

the requirements of the U.S. Federal Emergency Management Agency (FEMA) and the U.S. Disaster Management Act of 2000 to ensure that American Samoa is eligible for federal assistance and grants before, during, and after an emergency. The Council is headed by the Lieutenant Governor and has the following responsibilities:

- Assist the Governor's Office and Government in identifying hazard mitigation issues and opportunities facing the Territory for the purpose of developing a comprehensive hazard mitigation strategy.
- Prepare strategies, policies, and reports on hazard mitigation issues, including hazard mitigation policy recommendations to the Governor, the Fono, and key territorial agencies involved in mitigation related areas within their normal agency missions.
- Ensure that territorial agencies collaborate and cooperate fully to develop and execute sustainable hazard mitigation actions that will reduce the risks posed by all hazards to the Territory.
- Coordinate with and support territorial agencies' efforts in obtaining and administering federal and other grants, including post-disaster mitigation grants available pursuant to the Robert T. Stafford Disaster Relief and Emergency Assistance Act, for the purposes of promoting hazard mitigation opportunities within the Territory.
- Identify and prioritize mitigation activities, on an annual basis, for funding under mitigation funds that become available.
- Encourage and support the solicitation of grant support through other Territorial agencies for hazard mitigation activities.[19]

Offices that are members of the Council and with key roles in disaster management, DRR, and CCA include:

- Office of Disaster Assistance and Petroleum Management (ODAPM) – Located within the Governor's Office, ODAPM staff manage Council and stakeholder meetings and application of the hazard mitigation plan; the OADPM was formed by an executive order in 2014
  - The State Hazard Mitigation Officer (SHMO) works within ODAPM to manage all hazard mitigation-related funding activities
- American Samoa Department of Homeland Security (ASDHS) – In addition to tasks that link it to work done by the U.S. Department of Homeland Security, ASDHS is the lead agency in all efforts for the preparation of the Territory against natural or man-made disasters, and it coordinates with federal agencies to secure and receive federal assistance in order to prepare for or to recover from natural or man-made disasters. ASDHS is responsible for coordinating, consolidating, and collaborating efforts of component agencies into a whole that supports the overall purposes of all-hazard preparedness, response, detection, deterrence, prevention, and enforcement.
  - The ASDHS Territorial Emergency Management Coordination Office (TEMCO) coordinates assistance, resource management, and emergency response and recovery efforts. The Disaster Assistance Coordinator (TEMCO Manager) reports to the Director of ASDHS. TEMCO is responsible for development and revision of territory-wide disaster plans and for the development, coordination, and annually updating the Disaster Assistance Plan (aka Territorial Emergency Operations Plan). The office is responsible for the primary Emergency Operations Center (EOC), which serves as the central communications and command center for reporting emergencies and coordinating Territorial response activities. The office also operates and staffs the 24/7 Center, an emergency communication center staffed 24 hours each day. TEMCO administers and implements all Emergency Management Programs, Hazard

Mitigation, Preparedness and Prevention, Response, and Recovery programs. TEMCO also manages the Emergency Management Performance Grant, National Tsunami Hazard Mitigation Programs, Hazardous Materials Emergency Preparedness Grant Program, and Disaster Assistance programs. The Disaster Assistance programs include the Great American Samoa Shakeout, National Preparedness Month, and the National Cyber Security Month.

- American Samoa Power Authority participates on the Hazard Mitigation Council and has expanded their capabilities by developing a Green Operations Building for water and wastewater, proactively seeking funding, and improving and hardening power, water, and wastewater systems.
- The Department of Local Government's Office of Samoan Affairs participates on the Council in order to advise on how mitigation efforts, laws, and plans adhere to traditional views of Samoan land and lives.
- The Department of Commerce houses the American Samoa Coastal Management Program, Project Notification and Review System, National Marine Sanctuary of American Samoa, and the Geographic Information System User Group, each of which plays a role in disaster mitigation. The Department participates in the Council and contributes data and resources to the Hazard Mitigation Plan. The Project Notification and Review System is a key tool as the primary mechanism for mitigating the risk of natural hazards by controlling the location of new structures and avoiding development in hazardous areas.
- American Samoa Environmental Protection Agency (ASEPA) is fully funded by the U.S. Environmental Protection Agency (EPA) Region 9 through an EPA Consolidated Environmental Program Grant awarded on a fiscal year budget period. ASEPA's Climate Change Branch looks at sea level rise and other impacts to fresh water and the Territory's ecosystem. In addition to playing an active role on the Council, it is a working member of the Governor's Renewable Energy Committee and works with communities on developing sustainable and renewable energy options.
- Department of Public Safety includes fire fighters who are present across four fire stations on Tutuila and who respond to all emergencies accompanied by ASDHS and Emergency Medical Services.

The American Samoa Hazard Mitigation Plan 2020 is the current overarching plan that assesses the territory's hazards and capabilities. Its goal is to reduce the risk of all natural hazards in order to alleviate loss of life and property and ensure the well-being of the people. Its objectives are:

- Promote effective land use planning and regulation, as well as public awareness, in order to reduce damage from natural hazards.
- Improve infrastructure development standards with special attention to mitigating the increasing flood hazard.
- Develop and implement hazard mitigation projects aimed at reducing the risk of damage and destruction of existing assets and infrastructure from the full range of natural disasters threatening the Territory.
- Improve building codes and standards, as well as training programs, in order to reduce disaster damage from strong winds, earthquakes, and tsunamis.
- Develop public information and education programs in order to reduce disaster damage from strong winds, earthquakes. and tsunamis.
- Fund related planning projects to strengthen mitigation standards, research, education, and outreach efforts.[20]

Office of Disaster Assistance and Petroleum Management

997653 Star Enterprise Building, Lions Park, Pago Pago, AS 96799
Tel: 684-699-1330

American Samoa Department of Homeland Security

Homeland Sec. Compound – Tafuna, Pago Pago, AS 96799
Tel: 684-699-0414

American Samoa Territorial Emergency Management Coordination (TEMCO)

P.O. Box 1086, Pago Pago, AS 96799
Tel: 684-699-6415

American Samoa Environmental Protection Agency

ASEPA Building – Utulei, Pago Pago, AS 96799
Tel: 684-633-2304

Early Warning Systems

Although the traditional way to alert residents of an emergency – a bell hanging from a tree – is still present in many villages, it has been augmented with modern communications and advanced warning systems. TEMCO, ASDHS, and the National Weather Service (NWS) coordinate alert and activation protocols. In addition to producing weather forecasts, reports, and warnings, NWS receives tsunami warnings from the Pacific Tsunami Warning Center.

There is an early warning system in place for all islands via NOAA Weather Radio (NWR) and tsunami sirens. The NWS Office activates the NWR alarm for watches and warnings including tsunamis, hurricanes, flash flooding, etc. and has a provision for Civil Emergency Messages such as Hazardous Materials Spills. The NWS Office is operational 24 hours every day. Alerts are also broadcast over the Emergency Alert System (EAS), which becomes activated via KKHJ radio station as the Local Primary Broadcast system. The EAS does weekly testing of the system as required by the Federal Communications Commission. The NWR program also includes observations, forecasts, and climate and outreach information such as hurricane preparedness activities. Every school and every village mayor has an NWR. Although some of the Manu'a Islands do have a strong signal, not all villages do, and work continues to identify weak signals and improve them.[21]

The NWS Weather Service Office (WSO) Pago Pago is the U.S. national forecaster's only southern hemisphere office. Located near the airport, the WSO operates 24 hours every day and issues public forecasts and warnings, and it delivers coastal and marine advisories and warnings in Samoan and English. The WSO is linked closely to the Central Pacific Hurricane Center in Honolulu, Hawaii, the Meteorological Services Office in Apia, Samoa, and with the Regional Specialized Meteorological Center (RSMC) in Nadi, Fiji; it works with these offices to deliver cyclone information and advice. It also cooperates closely with the Pacific Tsunami Warning Center on monitoring seismic and tsunami events that could impact American Samoa.[22] In addition to weather and warning information, it collects data for hydrology and climate reports. The WSO is linked into a satellite constellation for communications.[23]

National Weather Service WSO Pago Pago

789 Airport Road, Pago Pago, AS
Tel: 684-699-9130

Central Pacific Hurricane Center

2525 Correa Rd, Suite 250, Honolulu, HI 96822

Pacific Tsunami Warning Center

Building 176, 1845 Wasp Boulevard, Honolulu, HI 96818
Tel: 907-745-4212
Email: *ntwc@noaa.gov*

Infrastructure

American Samoa relies on its airport and seaports to bring goods, services, and fuel. The Department of Port Administration oversees all of these ports of entry and transshipment.

Pago Pago harbor is the main harbor; there are an additional two small boat harbors on Tutuila, and the Manu'a Islands have three small boat harbors.[24] Pago Pago has a container terminal, multi-use wharf, service wharf used

by government vessels, and an inter-island ferry/cargo terminal. The very small harbors of Auasi (on Tutuila) and Aunu'u serve local boats traveling between Tutuila and its neighbor. All vessels arriving in American Samoa from overseas must call at Pago Pago before moving on to the smaller harbors.[25]

The Utulei Tank Farm (for petroleum products) is located in Pago Pago Harbor along the main road in the village of Utulei. Due to its location, the Tank Farm is vulnerable to storm surge, sea level rise, and tsunami flood waters. The oldest tanks from among the farm's 10 tanks, as of the 2020 hazard mitigation planning process, were from the 1980s. In total, they have a storage capacity of 29,512 barrels. The fuel dock is located south of the Commercial Container pier, on the west rim of Pago Pago Harbor. The fuel dock is connected to the storage area by three petroleum pipelines. In the 1990s, the Utulei Tank Farm was protected by a wall designed to contain an oil spill and to withstand 217 km per hour (135 miles per hour) winds and an 8.4 magnitude earthquake; however, it is not designed to withstand the force from a major tsunami, storm surge, or sea level rise event.[26]

Pago Pago International Airport is located in the Tafuna area of Tutuila. The Airport Tank Farm Satellite is located on the west end of the Pago Pago International Airport parking lot. It contains six horizontal bullet tanks with a total storage capacity of 3,048 barrels.[27] The airport lies just 9.8 meters (m; 32 feet) above sea level; there are two runways – one that is 3,048 x 46 m (10,000 x 150 feet) and a second that is 1,158 x 30 m (3,800 x 100 feet) – and both are asphalt. Fitiuta airport on Ta'u lies 34 m (110 feet) above sea level and has one concrete runway that measures 975 x 23 m (3,200 x 75 feet). The Ofu airport stands just 2.7 m (9 feet) above sea level and has one concrete runway that measures 610 x 18 m (2,000 x 60 feet).[28]

There is one main highway that runs east-west along the coast of Tutuila. Two highways cross the island from north to south, and they cut through very steep sections of the island and may be covered by debris from landslides.[29] The Department of Public Works, Civil Highway Division is tasked with building and repairing the main, secondary, and connecting roads of the islands.[30]

The American Samoa Power Authority, a government corporation, owns and operates two generating plants and the electric grid on Tutuila and two small generating plants and grids serving the Manu'a group. Total generating capacity is about 40 Megawatts (MW), most of it from the Tafuna and Satala plants on Tutuila. The Power Authority also provides drinking water and wastewater treatment. Pumping, treating, distributing, and collecting water consume a significant share of electricity generation. Nearly all of American Samoa's electricity is supplied by generators consuming No. 2 diesel fuel. As the country tries to move toward renewable energy, the American Samoa Renewable Energy Committee adopted a charter that commits it to developing a long-term strategic energy plan that creates a sustainable energy future. In 2008, American Samoa adopted a net metering law that allows owners of small solar or wind facilities installed primarily for the consumer's use to receive credit for excess power sent to the grid. The present renewable energy program includes a 1.75-MW solar photovoltaic array near the Tafuna power station, 24 smaller arrays on rooftops of government buildings, and solar hot water heating for Tutuila's LBJ Tropical Medical Center.[31] The Power Authority maintains water wells across Tutuila with many clustered in the western districts.[32]

In the 2020 hazard mitigation plan, the government notes that the country's one hospital – LBJ Hospital – is sited in a flood zone. Although efforts have been made to address flooding, long-term planning is focused on a new – albeit prohibitively expensive – hospital.[33]

Department of Port Administration

639 Airport Road, Pago Pago, 96799
Seaport: 684-633-4251
Airport: 684-699-9101

American Samoa Power Authority
P.O Box PPB, 1st Road Airport, Pago Pago, AS 96799
Tel: 684-699-1234

Civil Society Partners

The American Samoa Red Cross was chartered and authorized in 1923. The chapter provides training on lifesaving skills and has responded to various disaster, including several cyclones and the 2009 tsunami.[34]

American Samoa Service Center
2635 Airport Road, Pago Pago, AS 96799
Tel: 684-699-6011

American Samoa Association of non-governmental organizations (ASANGO) is an umbrella organization that represents various territorial non-governmental organizations (NGO) and that provides coordination and leadership to member NGOs.

American Samoa Association of NGOs (ASANGO)
PO Box 1788, Pagopago, American Samoa
684 699 6575
Email: *asango@piango.net*

Pacific Island Health Officers' Association (PIHOA) was established in 1986 by the health officials of the six U.S.-Affiliated Pacific Islands (USAPI) - American Samoa, Guam, Commonwealth of the Northern Mariana Islands (CNMI), Marshall Islands, Federated States of Micronesia (FSM), and Palau. PIHOA was intended to provide a regional, collective voice for advocacy and policymaking to address common health concerns to strengthen local and regional health system capabilities, capacities, and community resilience. It supports partnership engagement and provision of technical assistance to USAPI health departments and ministries. PIHOA membership comprises the six USAPI chief health officials, their deputies, Micronesia State directors, chief executive officers of USAPI public hospitals, and 13 Pacific regional professional associations, USAPI academic institutions, and development partners.[35]

Chief Executive Officer, LBJ Tropical Medical Center
Fagaalu, American Samoa 96799
Tel: 684-633-1222
Email: *pit@lbj.as*

Disclaimer: This handbook has been prepared in good faith based on resources available at the time of publication. Where possible, a link to the original electronic source is provided in the endnotes. While making every attempt to ensure the information is relevant and accurate, the CFE-DM does not guarantee or warrant the accuracy, reliability, completeness, or currency of the information herein. This information will be updated periodically, and we welcome and appreciate your feedback to improve this document and help fill any gaps to enhance its future utility. For feedback or comments, please email: **cfe.dmha.fct@pacom.mil**.

American Samoa Notes

1 Wendt, Albert, et al. American Samoa. Encyclopedia Britannica. 13 November 2023. https://www.britannica.com/place/American-Samoa

2 CIA World Factbook. American Samoa – Geography. https://www.cia.gov/the-world-factbook/countries/american-samoa/

3 Wendt, Albert, et al. American Samoa. Encyclopedia Britannica. 13 November 2023. https://www.britannica.com/place/American-Samoa

4 CIA World Factbook. American Samoa – Map. Accessed 13 November 2023. https://www.cia.gov/the-world-factbook/static/maps/AQ-map.jpg

5 United States Census Bureau. Census Bureau Releases 2020 Census DHC Summary File for American Samoa. 20 July 2023. https://www.census.gov/newsroom/press-releases/2023/2020-dhc-summary-file-american-samoa.html#:~:text=Demographic%20Characteristics%20in%202020,median%20age%20was%2027.7%20years.

6 Pacific RISA. American Samoa. https://www.pacificrisa.org/places/territory-of-american-samoa/

7 Territory of American Samoa Hazard Mitigation Plan. 2020. https://odapm.as.gov/hazard-mitigation-plan

8 Wendt, Albert, et al. American Samoa. Encyclopedia Britannica. 13 November 2023. https://www.britannica.com/place/American-Samoa

9 South Pacific Watersports and Fitness. The long and storied history of American Samoa. https://www.touramericansamoa.com/about-samoa

10 Wendt, Albert, et al. American Samoa. Encyclopedia Britannica. 13 November 2023. https://www.britannica.com/place/American-Samoa

11 Wendt, Albert, et al. American Samoa. Encyclopedia Britannica. 13 November 2023. https://www.britannica.com/place/American-Samoa

12 Territory of American Samoa Hazard Mitigation Plan. 2020. https://odapm.as.gov/hazard-mitigation-plan

13 Pacific RISA. American Samoa. https://www.pacificrisa.org/places/territory-of-american-samoa/

14 Wendt, Albert, et al. American Samoa. Encyclopedia Britannica. 13 November 2023. https://www.britannica.com/place/American-Samoa

15 Pacific RISA. American Samoa. https://www.pacificrisa.org/places/territory-of-american-samoa/

16 Territory of American Samoa Hazard Mitigation Plan. 2020. https://odapm.as.gov/hazard-mitigation-plan

17 Keener, V., et al. Climate Change in American Samoa: Indicators and Considerations for Key Sectors. Report for the Pacific Islands Regional Climate Assessment (PIRCA). Honolulu, HI: East-West Center. 2021. https://www.eastwestcenter.org/publications/climate-change-in-american-s%C4%81moa-indicators-and-considerations-key-sectors

18 Territory of American Samoa Hazard Mitigation Plan. 2020. https://odapm.as.gov/hazard-mitigation-plan

19 Office of Disaster Assistance and Petroleum Management. Hazard Mitigation Council – About. https://odapm.as.gov/hm-council

20 Territory of American Samoa Hazard Mitigation Plan. 2020. https://odapm.as.gov/hazard-mitigation-plan

21 Territory of American Samoa Hazard Mitigation Plan. 2020. https://odapm.as.gov/hazard-mitigation-plan

22 National Weather Service. WSO Pago Pago Office. https://www.weather.gov/ppg/office

23 National Weather Service. WSO Pago Pago – About Us. https://www.weather.gov/ppg/wsopagooffice

24 Territory of American Samoa Hazard Mitigation Plan. 2020. https://odapm.as.gov/hazard-mitigation-plan

25 Department of Port Administration. Seaports. https://portadministration.as.gov/seaports/port-of-pago-pago

26 Territory of American Samoa Hazard Mitigation Plan. 2020. https://odapm.as.gov/hazard-mitigation-plan

27 Territory of American Samoa Hazard Mitigation Plan. 2020. https://odapm.as.gov/hazard-mitigation-plan

28 Department of Port Administration. Airports. https://portadministration.as.gov/airports/pago-pago-international-airport

29 Territory of American Samoa Hazard Mitigation Plan. 2020. https://odapm.as.gov/hazard-mitigation-plan

30 Department of Public Works. Civil Highway Division. https://asgpublicworks.as/civil_highway

31 Territory of American Samoa Hazard Mitigation Plan. 2020. https://odapm.as.gov/hazard-mitigation-plan

32 American Samoa Power. Water Division. https://www.aspower.com/water.html

33 Territory of American Samoa Hazard Mitigation Plan. 2020. https://odapm.as.gov/hazard-mitigation-plan

34 American Red Cross. In Service to American Samoa. https://www.redcross.org/local/hawaii/about-us/locations/american-samoa.html

35 PIHOA. About PIHOA. https://www.pihoa.org/mission-history-strategic-plan/

Header photo by U.S. Government Accountability Office. Excrpeted from U.S. GAO Report: American Samoa: Economic Trends, Status of the Tuna Canning Industry, and Stakeholders' Views on Minimum Wage Increases on Flickr.com. https://flic.kr/p/2jaU65r, https:// www.gao.gov/products/GAO-20-467

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Australia is comprised of the mainland of the Australian continent, the island of Tasmania, and numerous other islands. The country has a wide variety of landscapes, with desert in the center, tropical rainforests in the northeast, and mountain ranges in the southeast, southwest, and east.[1] The country covers more than 7.7 million km^2 (nearly 3 million square miles) of land. Figure 3 is a map of Australia.[2]

The country's first inhabitants, the Aboriginal people, are believed to have migrated from Asia more than 60,000 years ago.[3] Although other Europeans had sighted, mapped, and visited the continent, the first voyage of Captain James Cook landed in 1770, when he claimed what is now New South Wales for Britain and where the British government would eventually establish a penal colony; the First Fleet, made up of 11 ships carrying convicts arrived in 1788.[4] Between 750 and 780 convicts plus 550 crew, soldiers, and family members, landed at Sydney Cove. Over the next 80 years, British courts sentenced more than 160,000 conflicts to transportation to Australia.[5] Britain extended its possession over the whole of the continent in the 1820s through emigration by free settlers. The next four decades saw rapid change, as six self-governing colonies were formed, the point of arrival for transported convicts shifted, and mineral deposits were discovered, the last event of which triggered renewed interest in populating and exploiting the interior of the country. Economic development by Europeans ravaged Aboriginal life. Displacement, conflict, and disease left tens of thousands of Aboriginal Australians dead. Meanwhile, conventions to unite the six colonies and to create a federation met in 1891 and 1897–98 to prepare drafts for a national constitution. The final draft Constitution was confirmed by referendum, and the Commonwealth of Australia came into existence on 1 January 1901. At that time, the European population of the continent had reached over 3.3 million people while there were fewer than 95,000 Aboriginal Australians whose number had halved in 50 years.[6]

During World War I, some 330,000 Australians served, and 60,000 died. When war came again, the nation responded; during World War II, some 30,000 Australians died fighting in Britain, the Mediterranean, North Africa, and the Pacific. After Allied victory, Australia enjoyed a post-war economic boom that continued into the 1970s. Nonetheless, the country felt the swings of government seen elsewhere in the world as social, economic, and political currents saw consumers and voters supporting differing methods of producing, consuming, and taxation. The second half of the 20th century also saw a revived Aboriginal activism whereby Aboriginal people gained the franchise, were counted in the national census, saw legal wins in labor law, became more visible in politics, sport, and culture, and reasserted the importance of their ability to practice their own ways of life.[7] Meanwhile, Australia become more active in global conflict, and Australian troops joined U.S. forces in Korea and Vietnam before taking on peacekeeping roles in Papua New Guinea's Bougainville, Timor-Leste,

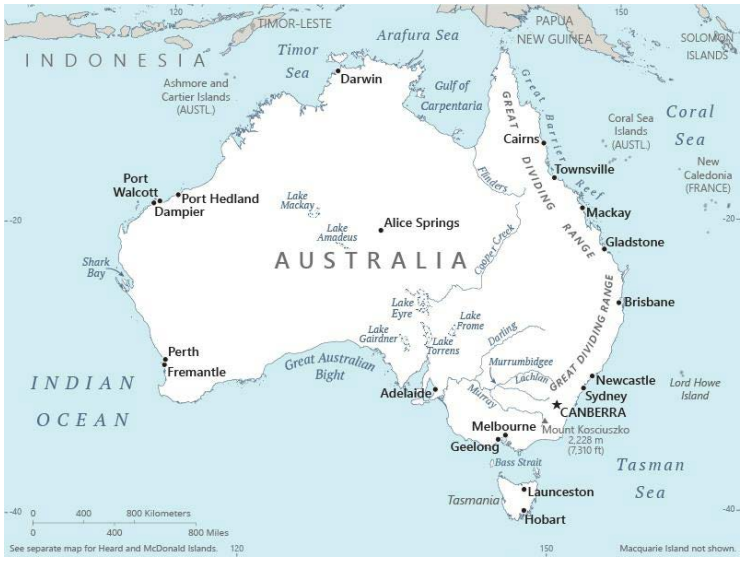


Figure 3: Map of Australia

and the Solomon Islands.[8]

Australia has a federal system of government, based on the Westminster model. Powers are distributed between a national government, the Commonwealth, and the six states (New South Wales, Queensland, South Australia, Tasmania, Victoria, and Western Australia). The Australian Capital Territory and the Northern Territory have self-government arrangements. Australia is further comprised of eight territories: Ashmore and Cartier Islands, Australian Antarctic Territory, Christmas Islands, Cocos (Keeling) Islands, Coral Sea Islands, Jervis Bay Territory, Norfolk Islands, and Territory of Heard Island and the McDonald Islands.[9] The Prime Minister is the head of the federal government and is from the majority party in the national parliament.[10] States are governed by a Premier, also chosen from the majority party in the state parliament.

As of August 2021, the national Bureau of Statistics' census counted more than 25.4 million people in Australia. Nearly 80% of the population lived in eastern states and territories, and the greater Sydney metropolitan area was home to more than 5 million, the largest population agglomeration in the country. The population is multi-ethnic with indigenous Aboriginal and Torres Strait Islanders making up only 3.2% of the population (812,728), and more than 50% of the population were either born overseas or are the children of parents born overseas.[11]

Hazards and Climate Change

Australia is exposed to bushfires, flooding, storms, and drought. Historically, bushfires, floods, landslides, and cyclones have caused loss of life and significant damage to property and infrastructure.[12] Climate change is creating less predictable and more extreme weather patterns in Australia.[13]

Australia's climate is highly variable across geography, season, and year. Monsoon winds from the north, the Madden-Julian Oscillation, El Niño Southern Oscillation (ENSO), various trade winds, troughs, and tropical depressions, and the Sub-Tropical Ridge are just some of the influences that influence the climate.[14] To take just one of these influences, under "normal" ENSO conditions, the ocean surface north and northeast of Australia is typically 28-30°C, and this warm area of ocean (compared to the cooler eastern Pacific) is a source for convection and is associated with cloudiness and rainfall. During a La Niña phase, stronger trade winds increase the temperature of waters north of Australia, which then sees more clouds and rainfall, eastern, central, and northern parts of the country see a wetter wet season. In an El Niño year, trade winds weaken, and warmer surface water builds up in the central Pacific. Cloudiness and rainfall north of Australia are suppressed, and eastern and northern Australia receive below average winter–spring rainfall.[15] Given the size of the country and the variety of climate zones present, broadly, the average temperature in summer (December to March) is 29°C (84°F), and winter (June to August) average temperature is 13°C (55°F). The northern areas of the continent are tropical and experience a wet and a dry season; the east coast is sub-tropical, the central region is desert, the western region is dry Mediterranean, and the southern coasts are temperate.[16] Figure 4 graphs the average monthly minimum, mean, and maximum temperatures and precipitation for Australia for the period 1991-2020.[17]

Simulations from climate models demonstrate that increased GHG lead to fewer low-pressure systems and a stronger subtropical ridge alongside an increase in the intensity of heavy rainfall, including from thunderstorms. In consonance with these modelling observations, southern Australia, which receives much of its rainfall during the cooler months of the year from low-pressure systems and cold fronts, has, during recent decades, seen fewer of these systems. There has also been an increase in the number of high-pressure systems over southern Australia, which sees dry, clear weather and little rainfall.[18] In its 2022 State of the Climate report, the Bureau of Meteorology discussed various climate trends and projections. Australia's climate has warmed since national records began in 1910, with most warming occurring since 1950. This shift has impacts on human health,

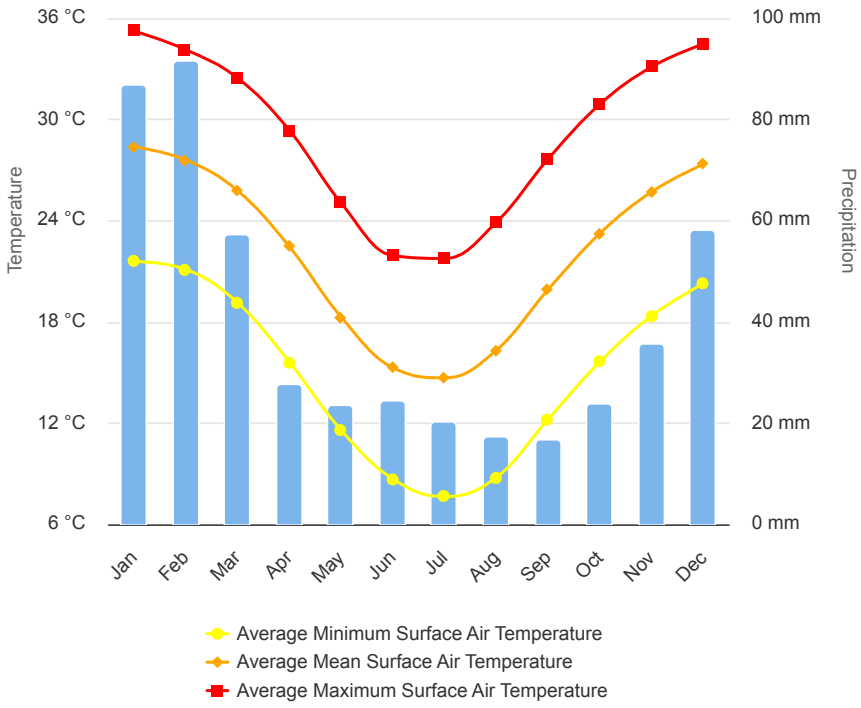


Figure 4: Average Monthly Temperature and Precipitation, Australia (1991-2020)

ecosystems, and infrastructure. Although the frequency of extremely cold days and nights has declined across Australia, parts of southeast and southwest Australia have seen significant cool season drying. Australian rainfall is highly variable and is strongly influenced by ENSO, the Indian Ocean Dipole, and the Southern Annular Mode. Still, long-term trends show less abundant rain in the south and more abundant rain in the north while snowfall accumulation has also fallen in temporal, alpine regions of the country.[19] Table 2 details some of the climate change-influenced phenomena that Australia faces as well as trends, projections, and potential impacts of these hazards.[20]

Government Institutions, Policies, and Plans for Disasters and Climate Change

Australia's domestic disaster management plans, policies, agreements, and strategies reflect a whole-of-government approach. The country maintains close collaboration between civil and military entities to respond to internal hazards such as bushfires, droughts, cyclones, and other natural disasters.[21]

Responding to natural disasters in disaster affected communities is primarily the responsibility of state and territory governments. The Department of the Prime Minister and Cabinet is responsible for maintaining and updating the Australian Government Crisis Management Framework (AGCMF), which underpins other crisis plans. The latest AGCMF was released in December 2021.[22] During a national emergency, state and territory governments manage emergency responses for their jurisdictions. A state or territory government may seek federal assistance when jurisdictional capacity has been exhausted, and they may request non-financial assistance from the federal government under the Commonwealth Government Disaster Response Plan (COMDISPLAN).[23]

The National Emergency Management Agency (NEMA) was formed in 2022 to combine the efforts of the former Emergency Management Australia and the National Recovery and Resilience Agency.[24] NEMA is under the direction of the Minister for Emergency Management, a portfolio under the Department of Home Affairs.[25] It is led by a Coordinator-General.[26] The agency provides oversight and guidance as well as funding programs and initiatives that help communities to prepare, respond, and recover, working with communities, industry, and NGOs to share lessons learned, providing national leadership on policy development and strategy, and providing round-the-clock all-hazards monitoring and operational coordination for domestic and international emergencies. NEMA operates through the National Situation Room (NSR) and AGCMF. The NSR was previously known as the Australian Government Crisis Coordination Centre. It is a 24-hour crisis management

Phenomenon	Trend	Projections	Impacts
Bushfires	Based on the Forest Fire Danger Index, the frequency of dangerous fire weather days has increased, especially in the south and east and during spring and summer; La Niña years are associated with a lower number of days with high Index values through southern and eastern Australia	Changes in fire weather through impacts on temperature and relative humidity; changes in rainfall will affect the amount of available fire fuel; increased CO2 in the atmosphere will increase the rate and amount of plant growth, which may also affect fuel load	Extreme bushfires can generate thunderstorms within smoke plumes and can lead to extremely dangerous fire conditions and new fires generated from lightning strikes produced within those smoke plumes
Flooding	Flash floods happen across the country; low-lying areas adjacent to rivers suffer from riverine flooding; flatter regions can suffer flooding that lasts several weeks	Extreme rainfall will increase as east coast low-pressure systems and tropical cyclones become fewer but more extreme	Flooding tends to isolate towns, create major disruptions to road and rail links, and can cause death; damage to homes and business will increase
Cyclones	Cyclones are common but activity varies from year to year; the number of cyclones generally declines with El Niño and increases with La Niña; a downward trend in the number of tropical cyclones has been observed since 1982	Modelling sees increased risk of cyclones as storms increase in strength	Intense tropical cyclones can cause catastrophic winds, storm surge, extreme rainfall, and flooding of homes and food supply; forced evacuations can follow along with damage to infrastructure and industry
Drought	Long-term declines in rainfall and drier, hotter conditions; since 2000, rainfall in Southeast Australia has declined by 15-25% alongside a 50% decline in riverine streamflow	Continued drying in the southwest during winter and spring; longer periods of drought on average in the south and east	A decline in soil moisture caused by increased water loss from plants and soil can result in crop failure
Rainfall	Decline of 16-20% in southwest rainfall since 1970, and 12% decrease in the southeast since the 1990s; rainfall has increased across most of northern Australia since the 1970s; heavy rainfall events are becoming more intense as short-duration (hourly) rainfall events have increased by 10%	Declining trend in rainfall and a shift to more high-pressure systems, fewer low-pressure systems, and a reduction in the number of cold fronts that produce rainfall	Short-duration extreme rainfall events are often associated with flash flooding; urban environments will experience flash flooding during heavy downpours
Heat	Average annual rise of 1.47°C (2.5°F) since 1910; increase in number of extreme nationally averaged daily heat events (temperatures over 39°C / 102°F); very high monthly maximums occurred 2% of the time in 1960–1989 but more than 11% of the time in 2007–2021; frequency of extreme cold declined except in southeast and southwest, which have seen significant cool season drying, increased heat loss, resulting in frost	Continued warming, with more extremely hot days and fewer extremely cool days	Extreme heat has caused more deaths in Australia than any other natural hazard and has major impacts on ecosystems and infrastructure

Table 2: Climate Change-Influenced Phenomena and Impacts, Australia

coordination facility that conducts all-hazards monitoring and delivers situational awareness to state and territory emergency centers. The NSR also coordinates physical government emergency assistance and manages the National Security Hotline.[27]

During an emergency, the AGCMF calls upon government to use the National Coordination Mechanism (NCM), which brings together agencies of the federal, state, and territory governments along with industry and private sector stakeholders to coordinate, communicate, and collaborate. The NCM operationalizes the AGCMF and takes a sector-based approach via collaborative forums (sector meetings) to address the specific impacts of a national crisis. The NCM mechanism is facilitated by NEMA to deliver advice to the Australian Government Crisis and Recovery Committee and conduct integrated and coherent planning, identification of escalation triggers and actions, implementation, governance, and communication arrangements. Figure 5 shows the NCM.[28]

The Australian Government Disaster Response Plan (COMDISPLAN) details the disaster response from the government with regard to requests for assistance from state and territory governments and with regard to potential international requests for assistance.[29]

COMDISPLAN consists of three phases: STANDBY, ACTIVATED, and DEACTIVATED. STANDBY is the default status, under which monitoring, planning, and training and exercising occur. Where an event or disaster is imminent or has occurred, NEMA activates COMDISPLAN and triggers the following actions:

- NSR advises appropriate stakeholders via email that COMDISPLAN has been

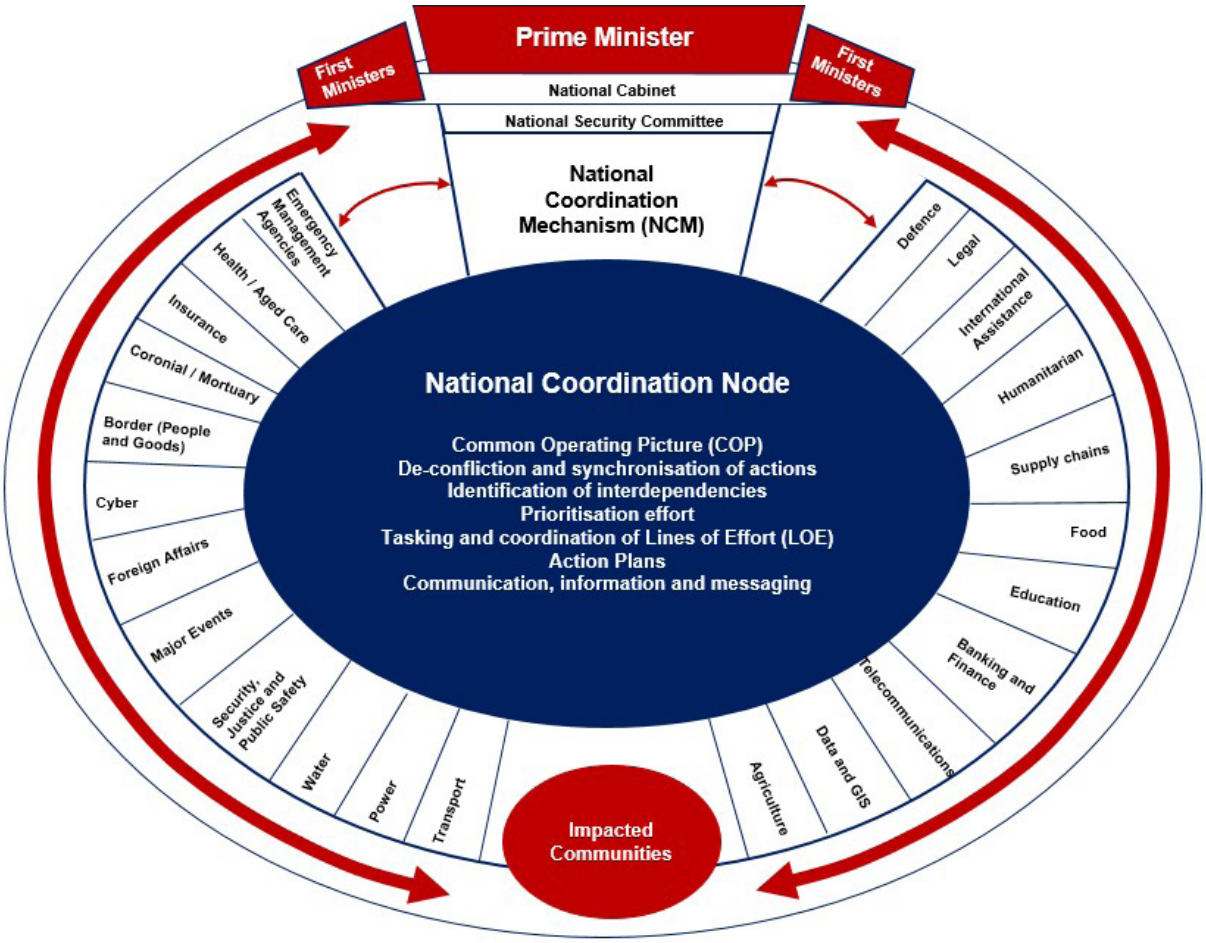


Figure 5: Australia's National Coordination Mechanism

ACTIVATED

- An NSR Crisis Coordination Team may be stood up
- Request/s for assistance received by the Australian Government are approved by the Minister responsible for emergency management
- NSR provides task requests to the Australian Government agency providing the assistance
- Jurisdictions/agencies in conjunction with the NSR will cooperatively undertake approved tasks
- Jurisdiction/agency situation updates are provided to the NSR on an agreed basis
- NSR provides stakeholders with regular situational awareness.

Once an event has concluded, NEMA deactivates COMDISPLAN. Resources are returned to the parent agent, and NSR advises stakeholders via email of COMDISPLAN DEACTIVATION. COMDISPLAN reverts to STANDBY phase.[30]

In addition to planning for response and recovery, NEMA undertakes DRR via the National Disaster Risk Reduction Framework and National Strategy for Disaster Resilience. National action plans and programs put these frameworks into practice. The National Disaster Risk Reduction Framework was released in April 2019 and sets out the national foundations for reducing existing risk, minimizing new risk, and delivering better climate and disaster risk information. The Framework, which was co-designed by government and non-government stakeholders, intends to provide national decision makers with the right tools and information to better understand the risks and make risk-informed decisions. The Second National Action Plan (2023) to implement the National Disaster Risk Reduction Framework was developed in consultation with industry, academia, NGOs, communities, and agencies of the local, state and territory, and commonwealth governments. The National Action Plan reflects what communities say is needed and considers the existing and future opportunities for DRR. All of these Frameworks and Plans build on the National Strategy for Disaster Resilience (2011), which acknowledged the increasing severity and regularity of disasters and the need for a coordinated, cooperative national effort to enhance capacity to withstand and recover from emergencies and disasters. The National Strategy described disaster resilience as the collective responsibility of all levels of government, businesses, the non-government sector, and individuals.[31]

Additional bodies working in the disaster management space are the Australian Institute for Disaster Resilience and Australian Civil Military Centre (ACMC). The Australian Institute for Disaster Resilience enhances disaster resilience through leadership, professional development, and knowledge sharing. It works with government, community, research, education, and the private sector to share extensive knowledge and experience in Australia and countries assisted by Australia.[32] ACMC engages with government departments and agencies, NGOs, and international partners, including the UN, to improve the outcomes of civil-military-police crisis responses to conflict and disasters in the Asia-Pacific as well as other areas. The Centre's portfolio responsibility resides with the Minister for Defence. The ACMC is responsible for the management of whole-of-government lessons learned from civil-military-police coordination in conflicts and natural disasters overseas.[33]

The federal Department of Climate Change, Energy, the Environment and Water (DCCEEW) is tasked with protecting Australia's natural environment and heritage sites, helping respond to climate change, and manage water and energy resources. It was established in 2022 to deliver on the Government's climate change and energy agenda. Among other tasks, the Department drives climate action and investment in technologies that lower emissions and provides data and analysis on climate, energy, and the environment. It is a regulatory agent that enforces laws relating to protection of the environment and biodiversity, use of pollutants

and hazardous substances, offshore greenhouse gas storage, and other issues.[34]

Agencies and bodies under the DCCEEW are:

- The Australian Energy Regulator, which regulates wholesale and retail energy markets and energy networks
- The Australian Institute of Marine Science, Australia's tropical marine research agency
- The Australian Renewable Energy Agency, which works to accelerate Australia's shift to affordable and reliable renewable energy
- The Bureau of Meteorology, the national weather, climate, and water agency
- The Clean Energy Finance Corporation, which mobilizes capital investment in renewable energy, low-emission technology, and energy efficiency projects
- The Clean Energy Regulator, responsible for accelerating carbon abatement
- The Climate Change Authority, which provides independent, expert advice to the government on climate change policy
- And various other bodies that facilitate the development of national responses to agriculture, water, and environment issues, help to inform policy, programs, and activities, and advise the minister.

Under the DCCEEW, the Energy and Climate Change Ministerial Council brings together the Minister for Energy and Climate Change and relevant ministers from each Australian state and territory, and New Zealand to work together on issues and reforms in the energy and climate change sectors.[35]

Australia's climate change strategies include:

- Net Zero 2050 plan, as outlined in the 2022 Annual Climate Statement to Parliament and consistent with the recommendations of the Climate Change Authority.
- The Powering Australia plan, focused on creating jobs, reducing pressure on energy bills, and reducing emissions by boosting renewable energy.
- Emissions reduction incentives for business, industry, and consumers; these incentives include the Emissions Reduction Fund, Climate Active Carbon Neutral Standard certification, and the Renewable Energy Target scheme.[36]

Australia submitted an updated Nationally Determined Contribution (NDC) to the UNFCCC secretariat in 2022. The NDC saw Australia commit to reducing GHG emissions by 43% below 2005 levels by 2030 and reaffirm its target to achieve net zero emissions by 2050 in addition to implementing investments in clean energy sectors.[37] As of latter 2023, the country was working to develop its first National Adaptation Plan that will build on an ongoing National Climate Risk Assessment.[38]

The Roles and Responsibilities for Climate Change Adaptation in Australia 2012 outlined the responsibilities of each level of Australian government to plan and implement adaptation activities. At the time, the underlying philosophy was that private parties would be responsible for managing risks to private assets and incomes while governments would primarily be responsible for managing risks to public goods and assets, including the natural environment, and government service delivery on behalf of the community, and that government would create an institutional, market, and regulatory environment to support and promote private adaptation. Under the Roles and Responsibilities, the Commonwealth takes a leadership role by:

- Providing national science and information, such as national and regional climate projections, climate change science and national adaptation research
- Managing Commonwealth assets and programs, to include defense facilities, some national parks and reserves, community health facilities, and emergency management assets
- Providing leadership on national adaptation reform to allow adaptation based on local conditions, in collaboration with States and Territories and in consideration of the needs of vulnerable communities
- Maintaining a strong, flexible economy and a well-targeted social safety net.

The focus for State and Territory Governments was on ensuring appropriate regulatory and market frameworks and encouraging climate resilience and adaptive capacity. Local governments are responsible for a broad range of services, the administration of a range of Commonwealth, State, and Territory legislation, and the management of a substantial number of assets and infrastructure, including assets and infrastructure of local, regional, state, and national significance. Local governments' role is to advocate upward the needs of local and regional communities, to communicate directly with communities, and to respond appropriately and in a timely manner to local changes.[39]

The National Climate Resilience and Adaptation Strategy 2021–2025 outlines how the Australian Government will fulfil the 2012 Roles and Responsibilities. The Strategy operates across the natural, built, social, and economic domains to drive adaptation that is informed by the best available science and information, delivered through partnerships and investments, and guided by effective governance and coordination. The Strategy's objectives focus on driving investment and action, improving climate information and services, and assessing progress and improving over time. The Strategy supports Australia's ongoing adaptation commitments and actions under the Paris Agreement even as it recognizes that adaptation goes hand-in-hand with action to reduce emissions, laid out in Australia's Long Term Emissions Reduction Plan.[40]

The Climate Change Authority advises the government on Australia's climate change policies and future emissions reduction targets.[41] Founded by statute in 2011, the Authority is an independent body that provides the government advice on the preparation of the Annual Climate Change Statement to Parliament and on GHG emissions reduction targets. Second, it undertakes reviews and makes recommendations on emissions reductions funding and GHG and energy reporting. Finally, it conducts and commissions its own independent research and analysis.[42]

National Emergency Management Agency
GPO Box 133, Canberra City ACT 2601
Email: *nationalactionplan@nema.gov.au*

Department of Climate Change, Energy, the Environment and Water (DCCEEW)
Tel: 1800 920 528

Early Warning Systems

The Bureau of Meteorology is Australia's national weather, climate, and water information and advisory agency. Its warning products cover drought, floods, fires, storms, tsunami, and tropical cyclones. The Bureau also undertakes research into scientific and environmental issues in support of its operations and services.[43] The Bureau is the accountable authority for the Australian Climate Service (ACS), which provides data, intelligence, and advice on climate risks and impacts to support and inform decision-making. ACS is a partnership among the Bureau of Meteorology, the Commonwealth Scientific and Industrial Research Organisation (CSIRO), the Australian Bureau of Statistics, and Geoscience Australia. CSIRO provides climate observations and modelling, resilience, adaptation and transformation science, and practice to the ACS. The goal of ACS is to improve national climate and natural hazard risk knowledge, monitor Australian climate and disaster risks, trends, and changes, and build capability for climate and hazard risks decision-making.[44]

Bureau of Meteorology
700 Collins Street, Docklands, Brisbane QLD 4001
Tel: 03 9669 4000
http://www.bom.gov.au/

State and Territory Offices
Australian Capital Territory - 02 6232 3580
New South Wales - 02 9296 1555
Northern Territory - 08 8920 3800
Queensland - 07 3239 8700
South Australia - 08 8366 2600
Tasmania / Antarctica - 03 6221 2000
Victoria - 03 9669 4956
Western Australia - 08 9263 2222

Australian Climate Service
GPO Box 2334 Canberra ACT 2600
Tel: 02 6232 3504
Email: *ge_acs@bom.gov.au*

Infrastructure

Regulation and investment in transport, energy, and water infrastructure is decentralized. Governments in most states and territories have infrastructure agencies to provide guidance to their respective governments on planning and governance and to support greater collaboration across state borders.[45] The federal Department of Infrastructure, Transport, Regional Development, Communications and the Arts plays a role in supporting an efficient, sustainable, competitive, accessible, safe, and secure transport system through infrastructure investment.[46]

A key issue highlighted in the 2019 infrastructure audit was that the transport sector is the second largest emitter in Australia and its emissions are growing. Transport accounts for about 19% of Australia's emissions, with cars being the single largest contributor. Transport has shown the most rapid growth in greenhouse gas emissions since 1990, growing by 62.9%, and is projected to grow by a further 12% by 2030. In addition, CCA is a challenge. Major disruptions are expected under climate change scenarios where severe weather events are more frequent and more damaging as they prevent communities from being able to carry on their day-to-day lives or businesses. A January 2009 heatwave in Melbourne is calculated to have resulted in financial losses of approximately AUS$800 million (US$533.9 million), primarily due to electricity outages and transport network disruption. In cities, higher instances of extreme heat events can damage roads and shut down rail networks, while carbon dioxide can slowly accelerate the deterioration of concrete. Regional areas, which are heavily reliant on major highways, can face major disruption due to floods and bushfires. Rural and remote communities need transport access for necessities such as food and fuel but have to deal with the accelerated deterioration of road pavement through heat wear or flood damage, which can require additional urgent repairs. CSIRO, the Bureau of Meteorology, and the Australian Energy Market Operator have identified key future climate-related risks: increased demand during more frequent hot days and prolonged heat waves, increased bushfire risk to system assets, changing rainfall patterns affecting hydro generation and availability of cooling water for thermal generation, and changing wind speeds impacting wind generation and transmission infrastructure.

Most roads are the responsibility of local governments. Roads account for the vast majority of passenger kilometers travelled because of the dispersed nature of jobs and people. Roads are typically the most important and often only link between regional and remote communities and other centers, cities, and regions. Roads are also critical for transporting agricultural and mineral products. Road funding and maintenance is susceptible to the budget limitations of different levels of government, and in the absence of national framework to guide investment and maintenance, there is inconsistency between jurisdictions in the application of resources. Long-distance routes crossing state and territory borders are particularly at risk. Although a local authority may be responsible for maintenance and safety, the extent of the road network for which they are responsible and fiscal constraints limit their abilities to deal with degradation due to heavy vehicles and extreme weather.

There are over 160 regional and remote airports alongside 16 major airports. Airports are generally owned, operated, and maintained by local governments, which, as stated above, face significant fiscal constraints. Some 60% of airports operate at a loss because airports require substantial and ongoing expenditure on maintenance and safety and security compliance. Remote airstrips also face difficulties due to extreme weather and the limited ability of local government and communities to ensure they are safe. Australia's major international airports are privately operated, and governments' roles are

focused on regulation and long-term planning activities such as monitoring and reporting through the Australian Competition and Consumer Commission, regulatory oversight by the Productivity Commission, setting aviation safety standards, security, immigration, and customs processes, air traffic control and fire and rescue (through Airservices Australia), and providing supporting ground transport links such as local roads and public transport.

Regional railways include short-distance intercity services (e.g., Newcastle-Sydney-Wollongong, Melbourne-Ballarat, Sunshine Coast-Brisbane-Gold Coast, and Perth-Bunbury), long-distance intercity services (e.g., Sydney-Brisbane, Sydney-Canberra, and Sydney-Melbourne), and leisure and heritage services. Outside short-distance routes, rail is out-competed by air and road networks.

At least 99% of Australian households are connected to the electricity grid. For 22 million Australians – or 89% of the population – electricity is provided by the National Electricity Market, covering the eastern half of the continent. This market includes over 40,000 km (24,855 miles) of transmission lines and cables and supplies around 200 terawatt-hours of electricity each year. Beyond this grid, the Wholesale Electricity Market provides power in Western Australia. There are three smaller and separate networks in the Northern Territory, while many users in Australia's external territories, have stand-alone electricity systems. The domestic gas market is split into three regions - east, west, and north - based on the location of gas basins and pipelines that supply them. Wholesale gas is supplied to electricity generators and other large industrial users, as well as retail suppliers, who then sell it to businesses and households.

Water and wastewater services are delivered by around 196 businesses and local governments in Australia's cities and towns. There are also a range of smaller licensees that provide local and specialized services, including in remote communities. Water infrastructure can be split into two components:

- Urban water includes potable supply and wastewater services, as well as a range of integrated water-cycle components such as desalination, recycling, and stormwater in cities, towns, and remote communities. Depending on the region, bulk water services may be separate to or part of retail urban service providers.
- Productive water includes bulk water storage, delivery metering, and control assets. Productive water markets also include the provision of licensing, allocation, and trade of water from surface and groundwater sources, as well as entitlements for environmental and cultural purposes.

Beyond these services, many Australians in rural and remote areas rely on small, localized, or onsite systems, which include rural water bores, reservoirs, pumping stations, septic tanks, and other treatment and disposal systems for residential purposes.

The water sector relies heavily on rainfall to replenish storage, streams, and groundwater, and on vibrant ecosystems to support a reliable water cycle. Higher temperatures can increase the volume of water in storage lost through evapotranspiration. Extreme weather events (i.e., floods, cyclones, and bushfires) and long-term changes, such as rising sea levels and increased coastal inundation, can damage assets or disrupt wastewater treatment processes and bring heightened risks for the health of waterways, management of wet weather flows, and contaminants in residential areas.[47]

Civil Society Partners

As auxiliary to government, the Australian Red Cross has a duty to consider any request from government to supplement public humanitarian services. Founded in 1914 as the Australian Branch of the British Red Cross Society on outbreak of World War I, the Australian Red Cross helps Australians through disasters, emergencies, and the other challenges. In addition, it has participated in international responses, including the

2004 Indian Ocean tsunami and 2010 Haiti earthquake.[48] The chapter has more than 20,000 volunteers and provides Australians with preparedness resources, including the Emergency Redi workshops, a Get Prepared app, and the RediCommunities series of community-led workshops aimed at strengthening community resilience and preparing for disasters.[49]

Australian Red Cross

23-47 Villiers Street, North Melbourne, VIC 3051
Tel: 61 3 9345 1800
Email: *natinfo@redcross.org.au*
http://www.redcross.org.au/

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Australia Notes

1 Encyclopedia Britannica. Australia. 29 June 2020. https://www.britannica.com/place/Australia

2 CIA World Factbook. Australia – map. https://www.cia.gov/the-world-factbook/static/maps/AS-map.jpg

3 Department of Foreign Affairs and Trade. About Australia. Australian Government. Accessed 20 December 2023. https://www.dfat.gov.au/about-australia#introduction

4 Encyclopedia Britannica. History of Australia. Accessed 29 November 2023. https://www.britannica.com/place/Australia/The-ascendance-of-Australian-popular-culture; National Museum of Australia. Exile or opportunity? 1788: Captain Arthur Phillip establishes a convict settlement at Sydney Cove. Accessed 12 December 2023. https://digital-classroom.nma.gov.au/defining-moments/first-fleet-arrives-sydney-cove

5 National Museum of Australia. First Fleet. Accessed 12 December 2023. https://www.nla.gov.au/digital-classroom/year-4/first-contacts/themes/first-fleet

6 Encyclopedia Britannica. History of Australia. Accessed 29 November 2023. https://www.britannica.com/place/Australia/The-ascendance-of-Australian-popular-culture

7 Encyclopedia Britannica. History of Australia. Accessed 29 November 2023. https://www.britannica.com/place/Australia/The-ascendance-of-Australian-popular-culture

8 BBC. Country Profile – Australia. https://www.bbc.com/news/world-asia-15674351

9 Government of Australia, Department of Foreign Affairs and Trade. About Australia. Accessed 12 December 2023. https://www.dfat.gov.au/about-australia#democracy

10 Australian Government. About Australia. Website Accessed 25 June 2020. https://info.australia.gov.au/about-australia/our-country

11 Australian Bureau of Statistics. Snapshot of Australia. 28 June 2022. https://www.abs.gov.au/statistics/people/people-and-communities/snapshot-australia/2021

12 Australian Government. Geoscience Australia. Hazards. http://www.ga.gov.au/scientific-topics/hazards

13 Commonwealth of Australia. 2011. National Strategy for Disaster Resilience. Building the resilience of our nation to disasters. Australian https://www.homeaffairs.gov.au/emergency/files/national-strategy-disasterresilience.pdf

14 Bureau of Meteorology. Australian Climate Influences. http://www.bom.gov.au/climate/about/australian-climate-influences.shtml

15 Bureau of Meteorology. El Niño Southern Oscillation (ENSO). http://www.bom.gov.au/climate/about/australian-climate-influences.shtml?bookmark=enso

16 Go Study Australia. Australia's Climate. https://www.gostudy.com.au/australia/climate-australia/

17 World Bank Climate Change Knowledge Portal. Australia – Climatology. https://climateknowledgeportal.worldbank.org/country/australia/climate-data-historical

18 Bureau of Meteorology. State of the Climate 2022. http://www.bom.gov.au/state-of-the-climate/

19 Climate Change in Australia. Australian Climate Trends. https://www.climatechangeinaustralia.gov.au/en/changing-climate/climate-trends/australian-trends/

20 Bureau of Meteorology. State of the Climate 2022. http://www.bom.gov.au/state-of-the-climate/; Climate Change in Australia. Australian Climate Trends. https://www.climatechangeinaustralia.gov.au/en/changing-climate/climate-trends/australian-trends/; Australian Government. Geoscience Australia. 2019. Hazards. http://www.ga.gov.au/scientific-topics/hazards; Munich RE. 2019. Natural disaster risks in Australia and New Zealand increase. https://www.munichre.com/australia/australia-natural-hazards/index.html; Climate Council. Deluge and Drought: Australia's Water Security in a Changing Climate. November 2018. https://www.climatecouncil.org.au/wp-content/uploads/2018/11/Climate-Council-Water-Security-Report.pdf; ReliefWeb. 2011. Cyclone Yasi. https://reliefweb.int/

disaster/tc-2011-000015-vut; U.S. National Library of Medicine. 2012. https://www.ncbi.nlm.nih.gov/pubmed/22978739

21 Department of Home Affairs. Emergency Management Australia. http://archive.homeaffairs.gov.au/about/emergency-managemnt/em-australia

22 Australian Government Department of Home Affairs. Emergency response plans. https://www.homeaffairs.gov.au/about-us/our-portfolios/emergency-management/emergency-response-plans

23 Australian Government Department of Home Affairs. Australian Government Disaster Response Plan. COMDISPLAN 2017. https://www.homeaffairs.gov.au/emergency/files/plan-disaster-response.pdf

24 Australia Department of Home Affairs. About Emergency Management. https://www.homeaffairs.gov.au/about-us/our-portfolios/emergency-management/about-emergency-management

25 Australia Department of Home Affairs. Our Ministers. https://www.homeaffairs.gov.au/about-us/who-we-are/our-ministers

26 Australia Department of Home Affairs. Portfolio Board. https://www.homeaffairs.gov.au/about-us/who-we-are/our-portfolio

27 Australia Department of Home Affairs. About Emergency Management. https://www.homeaffairs.gov.au/about-us/our-portfolios/emergency-management/about-emergency-management

28 Australian Government Department of Home Affairs. National Coordination Mechanism. https://www.homeaffairs.gov.au/about-us/our-portfolios/emergency-management/about-emergency-management/national-coordination-mechanism

29 Australian Government Department of Home Affairs. Emergency Management. https://www.homeaffairs.gov.au/about-us/our-portfolios/emergency-management/emergency-response-plans

30 Australian Government. COMDISPLAN 2020: AUSTRALIAN GOVERNMENT DISASTER RESPONSE PLAN. https://www.homeaffairs.gov.au/emergency/files/plan-disaster-response.pdf

31 National Emergency Management Agency. Strategies and Frameworks. https://nema.gov.au/about-us/policies/strategies-and-frameworks

32 Department of Home Affairs. Emergency Management. Accessed 29 June 2020. https://www.homeaffairs.gov.au/about-us/our-portfolios/emergencymanagement/about-emergency-management

33 Australian Government. Australian Civil-Military Centre. What we do. Accessed 28 June 2020. https://www.acmc.gov.au/what-we-do

34 Department of Climate Change, Energy, the Environment and Water. What we do. https://www.dcceew.gov.au/about/what-we-do

35 Department of Climate Change, Energy, the Environment and Water. Our Portfolio. https://www.dcceew.gov.au/about/who-we-are/portfolio

36 Department of Climate Change, Energy, the Environment and Water. Roles and Responsibilities for Climate Change Adaptation in Australia. 2012. https://www.dcceew.gov.au/sites/default/files/documents/coag-roles-respsonsibilities-climate-change-adaptation_0.pdf

37 Australian Government. Australia's Nationally Determined Contribution: Communication 2022. https://unfccc.int/sites/default/files/NDC/2022-06/Australias%20NDC%20June%202022%20Update%20%283%29.pdf

38 Department of Climate Change, Energy, the Environment and Water. Climate Adaptation in Australia. Accessed 3 January 2024. https://www.dcceew.gov.au/climate-change/policy/adaptation

39 Department of Climate Change, Energy, the Environment and Water. Roles and Responsibilities for Climate Change Adaptation in Australia. 2012. https://www.dcceew.gov.au/sites/default/files/documents/coag-roles-respsonsibilities-climate-change-adaptation_0.pdf

40 Australian Government. National Climate Resilience and Adaptation Strategy 2021–2025. https://www.dcceew.gov.au/sites/default/files/documents/national-climate-resilience-and-adaptation-strategy.pdf

41 Department of Climate Change, Energy, the Environment and Water. Climate Change Strategies. https://www.dcceew.gov.au/climate-change/strategies

42 Climate Change Authority. About. https://www.climatechangeauthority.gov.au/about-cca

43 Bureau of Meteorology. About. http://www.bom.gov.au/inside/index.shtml?ref=hdr

44 Australian Climate Service. About. https://www.acs.gov.au/pages/about-the-australian-climate-service

45 Infrastructure Australia. An Assessment of Australia's Future Infrastructure Needs: The Australian Infrastructure Audit 2019. June 2019. https://www.infrastructureaustralia.gov.au/sites/default/files/2020-09/2019_AIAudit_may2020_update.pdf

46 Department of Infrastructure, Transport, Regional Development, Communications and the Arts. About us. https://www.infrastructure.gov.au/about-us

47 Infrastructure Australia. An Assessment of Australia's Future Infrastructure Needs: The Australian Infrastructure Audit 2019. June 2019. https://www.infrastructureaustralia.gov.au/sites/default/files/2020-09/2019_AIAudit_may2020_update.pdf

48 Australian Red Cross. About. https://www.redcross.org.au/about/

49 Australian Red Cross. Preparing for Emergencies. https://www.redcross.org.au/emergencies/

Header photo by Ondrej Machart on Unsplash.com. Uluru & Kata Tjura National Park, Australia. https://unsplash.com/photos/brown-lake-under-blue-sky-WEtXkeIlMoM

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Cook Islands

The Cook Islands are a self-governing island state in free association with New Zealand. It is comprised of 15 small atolls and islands, which are divided into the Northern and Southern Cook Islands. They have a combined total land area of 236.7 km^2 (91.4 square miles) spread over approximately 2,000,000 km^2 (770,000 square miles) of sea. The administrative seat is Avarua, on the island of Rarotonga.[1] Located in the South Pacific Ocean approximately 3,010 km (1,870 miles) northeast of New Zealand, the Cook Islands has a total enumerated population of 15,040, per the 2021 census.[2] About 70% of the population resides on the main island of Rarotonga, 20% live in the southern group, and the rest live in the north.[3] English and Cook Islands Maori are the official languages.[4] Figure 6 shows a map of the Cook Islands.[5]

Polynesians, mainly from what is now French Polynesia, were the only inhabitants of the Cook Islands until the 19th century. English and Tahitian missionaries of the London Missionary Society began arriving in 1821 and were the first foreigners to settle. A number of important ariki (chiefs) converted to Christianity early on, and the missionaries exerted a strong influence on the form of government that evolved in each of the islands. Some chiefs petitioned the United Kingdom to declare a protectorate, and the British government eventually complied in 1888. A single federal parliament was established. With some persuasion from New Zealand, chiefs of the largest islands petitioned for annexation, undertaken in 1901. After 1912, the federal parliament was allowed to lapse, and no direct representation at the national level occurred again until 1946, when a Legislative Council was organized. In 1965, the Cook Islands moved to self-government but retained a relationship of free association with New Zealand. The change in status brought greater autonomy, and the Cook Islands began developing relationships with the countries of the region. The islands entered into treaties as an independent political entity, became a founding member of the South Pacific Forum (now the Pacific Islands Forum) in 1971, and joined other international organizations.[6]

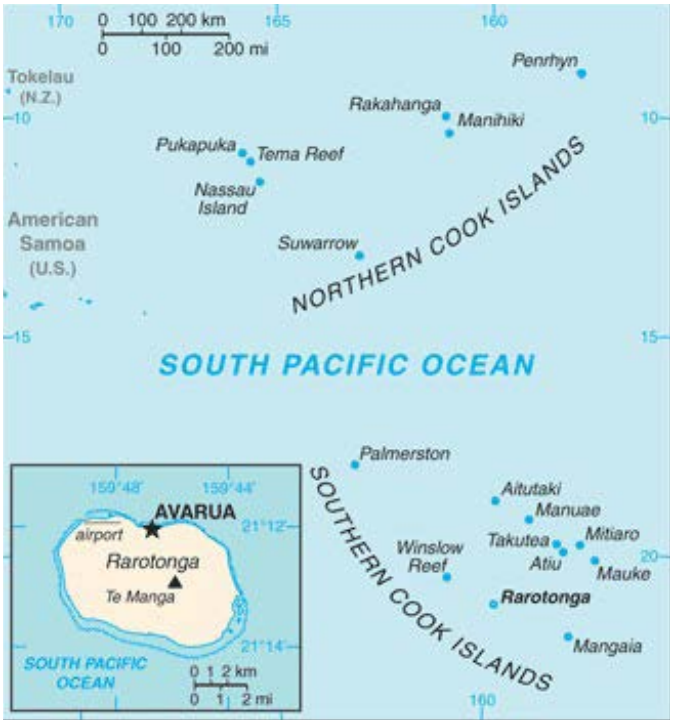


Figure 6: Map of the Cook Islands

Hazards and Climate Change

The Cook Islands are exposed to tropical cyclones with damaging winds, storm surge, and floods. It is also exposed to tsunami and earthquake.

The cyclone season in the Cook Islands starts in November and ends in April. During the 40 years between the 1970 and 2010 cyclone seasons, an average of 18 cyclones per decade developed within or crossed the Cook Islands Exclusive Economic Zone (EEZ). The Cook Islands is expected to incur an average annual loss of about US$4.9 million due to tropical cyclones.[7] In early 2005, within a five-week period the Cook Islands experienced five cyclones, four of which were rated as Category 5, and these events spurred disaster management restructuring.

The Cook Islands enjoy a warm and sunny climate year-round. The drier months are from April to November with an average temperature of 26°C (79°F). November to March marks the warmer season, with slightly higher humidity and occasional rainfall between December and March when the temperature ranges between 22°C (min; 72°F) and 30°C (max; 86°F).[8] Figure 7 graphs the monthly average minimum, mean, and maximum temperatures and precipitation for Cook Islands for 1991-2020.[9]

The Cook Islands are also vulnerable to the impacts of climate change, particularly due to rising temperatures and sea levels. The Cook Islands is projected to experience warming throughout the 21st century in the range of 0.6–2.7°C (1.08–4.86°F). The sea level near the Cook Islands is projected to increase throughout the 21st century, with models showing a very high confidence in this trend. While most of the Cook Islands have higher elevation than their Pacific neighbors, coastal communities are still exposed to a greater storm surge threat. The country's tourism infrastructure in the coastal zone is exposed to hazards. Potential intensification of the most extreme tropical cyclone events threatens significant damage and loss to residents, though it is difficult to clearly project future Pacific circulation patterns with current data and understanding.[10] Table 3 details some of the phenomena and their trends, projections, and potential impacts that confront Cook Islands under climate change scenarios.[11]

Government Institutions, Policies, and Plans for Disasters and Climate Change

The 2005 cyclones influenced the development of the Cook Islands emergency management approach and, in 2006, led to the establishment of Emergency Management Cook Islands (EMCI) under the Office of the Prime Minister and the 2007 enactment of a new Disaster Risk Management Act, which replaced the old Hurricane Safety Act of 1973.

The Strategic Roadmap for Emergency Management in Cook Islands 2018 - 2023 is the emergency management sector's contribution to support the Cook Islands Joint Implementation Plan. The strategic roadmap was developed to reform emergency management arrangements after extensive consultations with key stakeholders involved in national emergency and disaster response, including government ministries, NGOs, the private sector, and Volunteer Fire Brigades. The roadmap identifies priority actions to establish the necessary governance structure and legislation to provide the mandate to address two identified major gap areas:

i. The coordination of local emergencies that do not require declaration of a National Emergency but nevertheless have the potential for major impacts at the local level if not effectively addressed.

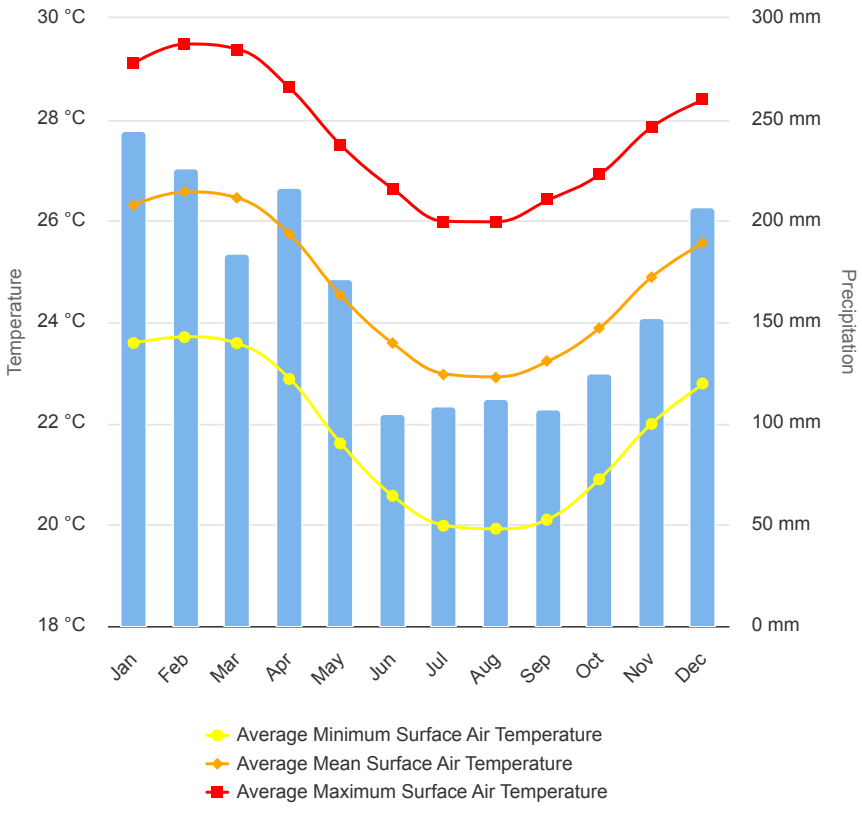


Figure 7: Average Monthly Temperature and Precipitation, Cook Islands (1991-2020)

Phenomenon	Trend	Projections	Impacts
Cyclone	Cyclone season runs November-April with high inter-annual variability in storm numbers; storms tend to occur more frequently in El Niño years; storms bring large storm swells to northern islands	Less frequent but more intense storms	Higher wind speeds cause greater damage to buildings, infrastructure, and trees
Drought	Driest months of the year are June-October; El Niño brings drier conditions to southern islands and wetter conditions to northern islands	Frequency projected to remain stable with slight increase Northern Islands under high emissions scenarios	Higher risk to potable water and agriculture in Northern Islands
Rainfall	Strongly affected by South Pacific Convergence Zone that fuels thunderstorm activity over the Southern Group and some rain over Northern Group from November to March.	Average projected to remain stable with small decrease in Northern Islands and more extreme events under high emissions scenarios	Extreme events cause more frequent flooding and erosion
Temperature	Changes in temperatures are tied to changes in surrounding ocean temperature; El Niño years see higher temperatures in northern islands; long-term increase in temperature since 1950 stands at 0.09°C (0.16°F) per decade; numbers of warm days and nights in a year have increased	Annual mean and daily extreme highs both expected to rise; by 2030, under very high emissions scenarios, Northern Islands will see a rise of 0.5-1.0°C (0.9-1.8°F) while Southern Islands see rise of 0.4-1.0°C (0.72-1.8°F)	Rise in heat-related health problems and lower human and agricultural productivity
Sea Level Rise	Annual rise of 4mm (0.16 inches) per year since 1993	Continued rise along with acidification; by 2030, rise in the Cook Islands could be 7-17cm (2.75-6.69 inches) under all emissions scenarios	More frequent coral bleaching events, higher waves during storms, and more coastal erosion

Table 3: Climate Change-Related Phenomena Trends, Projections, and Impacts (Cook Islands)

ii. The need for the establishment of a National Fire Service to effectively coordinate and manage the operations of the Volunteer Brigades and provide the mandate and resources for their continued operation in close collaboration with the Airport Fire Authority.

Notably, the strategic roadmap proposes a new Civil Defence Emergency Management coordinating body and structure to address both gap areas.[12]

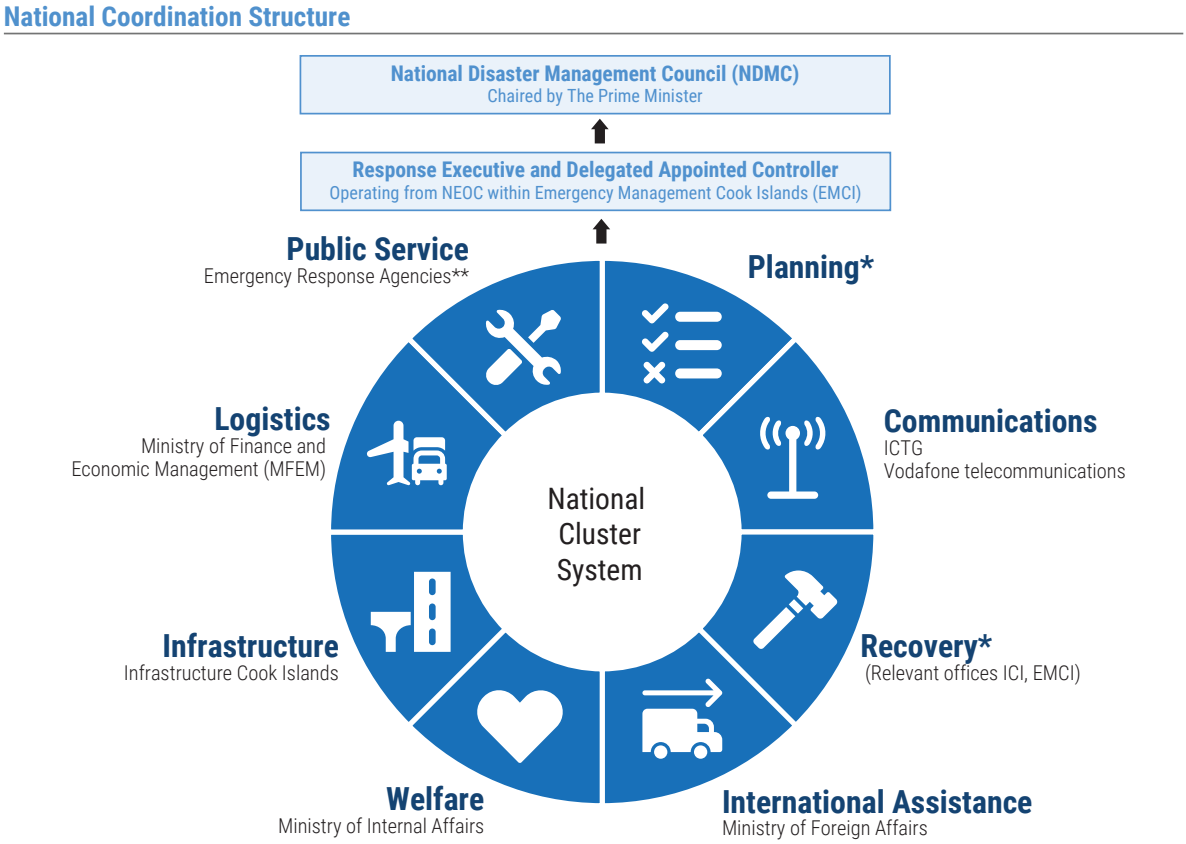
The "Joint National Action Plan for Disaster Risk Management and Climate Change Adaptation (JNAP) 2011-2015" provided a roadmap to guide the Cook Islands in implementing Priority 5 (Resilience) of the National Sustainable Development Plan 2011 -2015. The goal was to achieve a resilient and sustainable Cook Islands where people are resilient to disasters and climate change and able to achieve sustainable livelihoods. Two key objectives were to ensure that people were prepared for disasters and climate change impacts, and that the impacts of disasters and climate change were reduced.[13] This first JNAP was followed by "JNAP II – Are We Resilient?, The Cook Islands 2nd Joint National Action Plan: A sectoral approach to Climate Change and Disaster Risk Management 2016 – 2020," which laid out a plan of action to implement Goal 13 of the National Sustainable Development Plan,[14] with that goal being to strengthen resilience to combat the impacts of climate change and natural disasters.[15]

The National Sustainable Development Agenda 2020+ Annual Indicator Report released in 2023 showed indicators for each of 15 goals

indicating if they were on track, of concern, or off track. Goals 11 and 12 were most relevant to climate change or disaster management. The status of Goal 12, Climate Change, Resilience, Renewable Energy and Energy Efficiency, was "of concern, with signs of improvement." The greater areas of progress within this goal included increasing the percentage of population that has access to protection from category 3 or higher cyclones from 97.42% in 2019 to 98.87% in 2021 and decreasing the annual amount of fossil fuels imported by 3% from 2020 to 2021, excluding aviation fuel. The status of Goal 11, Our Biodiversity and Natural Environment, was "of concern" noting that achieving the goal "is a significant challenge, particularly on Rarotonga, where the development pressures are greatest." Greater areas of progress within the goal included increasing the percentage of protected ocean areas from 16% of the EEZ being marine protected areas in 2019 to 17% in 2021.[16]

In 2016, Cook Islands submitted its Intended NDC to the UNFCCC secretariat with the stated goal of reducing its already miniscule GHG emissions and with an emphasis on the need for external financial and technical support to achieve goals.[17] The country's NAP is contained within the JNAP, and its updated National Infrastructure Investment Plan (NIIP, 2021) targets infrastructure investment across 12 sectors to ensure coherence across the National Vision and Sustainable Development Agenda.[18]

The Cook Islands national coordination structure for disaster management and humanitarian assistance is shown in Figure 8, as depicted by the UN Office for the Coordination of Humanitarian Affairs (OCHA).[19] The coordination structure is based on the National Disaster Risk Management Act of 2023. The legal background for enactment of the new 2023 Act is provided by the National Disaster Risk Management Policy of 2022.



*No lead agency has yet been identified as lead as this is conditioned to the nature of the disaster.
**ICI (Ministry of Infrastructure Cook Islands), To Tatou Vai(Potable Water), Te Aponga Uira(Power), Police, Ministry of Transport, Red Cross, PUNA, PA-ENUA Administration.

Figure 8: Cook Islands National Humanitarian Coordination Structure

Emergency Management Cook Islands
Ara Tapu, Avarua, Cook Islands
Tel: 682 29 609
Facebook: emciCK
https://www.emci.gov.ck

Early Warning Systems

The Cook Islands Meteorological Service, which falls under the Ministry of Transport, provides weather updates, forecasts, and information and alerts for climate-related hazards. Their Early Action Rainfall Watch provides sector managers with a brief summary of recent rainfall patterns, particularly drought and the rainfall outlook for the coming months. The meteorological service also provides an island climate update including near-term outlooks relating to water stress and El Niño patterns.[20]

Seasonal tropical cyclone outlooks for the Pacific southwest region including the Cook Islands have been provided by the New Zealand National Institute of Water and Atmospheric Research and the Australian Bureau of Meteorology in collaboration with regional meteorological services including the Cook Islands Meteorological Services.[21]

At least nine Climate Information Early Warning Systems (CLEWS) have been installed in the Pa Enua (outer islands). The Cook Islands Meteorological Service, in partnership with the Disaster Resilience for Pacific Small Islands Developing States (RESPAC) with the UN Development Programme (UNDP), or RESPAC-UNDP, inaugurated one in 2019 in in Tukao on Manihiki Island. CLEWS contribute to monitoring of climate and weather on all inhabited islands of the Cook Islands, to reduce the impacts of severe weather and climate change. RESPAC-UNDP provides funding for CLEWS, which also facilitates the provision of required weather information for the safe operation of the domestic airline to the outer islands.[22]

Cook Islands Meteorological Service
Tel: 682 20603
Email: *mot.weather@cookislands.gov.ck*

Infrastructure

The Cook Islands face challenges in developing and maintaining infrastructure due to the limited size and scope of the economy, but the country confronts additional demographic, geographic, and environmental obstacles. The already small population is decreasing, the islands of the country are widely dispersed, and the natural environment is vulnerable to climate change and natural hazards.[23] The Ministry of Infrastructure Cook Islands (MICI) has overall responsibility for capital projects and some regulatory oversight over water and sanitation; it delivers infrastructure policy and works with development partners on projects.[24]

MICI is responsible for road maintenance, but new construction is tendered out to private companies. Island Councils have responsibility for maintaining roads under their jurisdiction. There are 295 km (183 miles) of road; 70% of the network is sealed. But even sealed roads sustain significant damage under normal traffic due to a lack of control of axle weights and the operation of overweight vehicles. Moreover, there is minimal roadside drainage, and heavy rains can cause pooling, flooding, and damage. On outer islands, most roads are unsealed.

Cook Islands Airports Authority (CIAA), a state-owned enterprise, manages the airports on Rarotonga and Aitutaki. Outer island airports (Atiu, Mangaia, Mauke, and Mitiaro in the Southern Group and Manihiki, Penrhyn, and Pukapuka in the Northern Group) have crushed coral runways and are managed by their respective Island Councils' Administration Community Groups with technical support from MICI and CIAA. Three outer inhabited islands do not have airstrips.[25] Rarotonga International can handle up to Boeing 747s. There are two gates, and the apron can accommodate up to three aircraft at a time. The airport sits at 6m (19 feet) of elevation, and its single runway dimensions are 2,329 × 45m (7,641 × 148 feet).[26] Aitutaki airport sits at 5.79m (19 feet) of elevation, and its one runway's dimensions are 1,824 × 30 m (5,984 × 98 feet).[27] All other airports have no facilities for handling large

numbers of passengers or large amounts of cargo. There is no refueling capacity.[28]

The Cook Island Ports Authority, a Crown-owned statutory corporation, manages the main ports – Avatiu on Rarotonga and Arutanga on Aitutaki. Avatiu Port, the principal port on Rarotonga, has undergone climate proofing and completed storage and operational area improvements. The port handles about 90% of food imports and 100% of the country's fuel supply.[29] Avatiu is capable of accommodating container or fuel tanker vessels up to 200 m (656 feet) in length; there is one 160-m (525-feet), 7-m (23-feet) draft conventional berth, and a storage area with space for up to 238 twenty-foot equivalent units (TEU) of containers. Additional storage warehouses cover a total of 6,800 square meters (73,195 square feet). There are no roll-on-roll-off (RORO) facility or dockside cranes; ships cranes must be used for loading and off-loading.[30] Arutanga Harbour is small, inside the reef, and large ships must dock outside the reef and barge cargo into the harbor two twenty-foot containers at a time.[31]

Electricity on Rarotonga is generated, distributed, and retailed by Te Aponga Uira (TAU), a state-owned enterprise, that meets 90% of the Cook Islands' electricity demand. Outer Islands continue to rely on household solar systems. Water supply is surface-fed from 12 catchment streams distributed over the Rarotonga; the water is filtered at source and gravity fed to all households. Eastern regions are subject to annual shortages (drought), and supplies are tanked to dry areas from the western side of the island.[32]

Figure 9 shows a Logistics Planning Map for the Cook Islands as produced by the Logistics Cluster, led by the World Food Programme (WFP).[33]

Ministry of Infrastructure Cook Islands
Main Road, Arorangi, Rarotonga. Cook Islands
682 20321
Email: *infrastructure@cookislands.gov.ck*

Cook Islands Airports Authority
PO Box 90, Rarotonga Airport, Rarotonga, Cook Islands
682 25890

Cook Island Ports Authority
PO Box 84, Avarua, Rarotonga, Cook Islands
682 21921
www.ports.co.ck

Te Aponga Uira
Avaura, Rarotonga, Cook Islands
682 20054
Email: *enquiries@electricity.co.ck*

Civil Society Partners

The Cook Islands Red Cross Society was initially established in 1989 as an incorporated society. In 2002, the National Society was formally established by the Cook Islands Red Cross Act as an auxiliary organization to the public authorities in humanitarian services. The National Society is headquartered in Tupapa and has several branches across Rarotonga and the outer islands. The National Society engages in a variety of programs, including first aid, disaster management, international humanitarian law, blood donor recruitment, community-based health, youth, and COVID-19.[34] The Cook Islands Red Cross has five full-time staff, six governing board members, and over 50 active registered volunteers in Rarotonga with more in the outer islands (Pa Enua), as of May 2023.[35]

Cook Islands Red Cross Society
682 22598
Email: *cookis@redcross.org.ck*

Kōrero O Te `Ōrau ("knowledge of the sky, land, and sea") is an environmental NGO incorporated in 2017. It consists of Cook Islanders dedicated to protecting the culture, environment, and natural resources of the nation. Diverse members bring expertise across geography, marine biology, climate change, policy, psychology, communications, accounting, information technology, and traditional

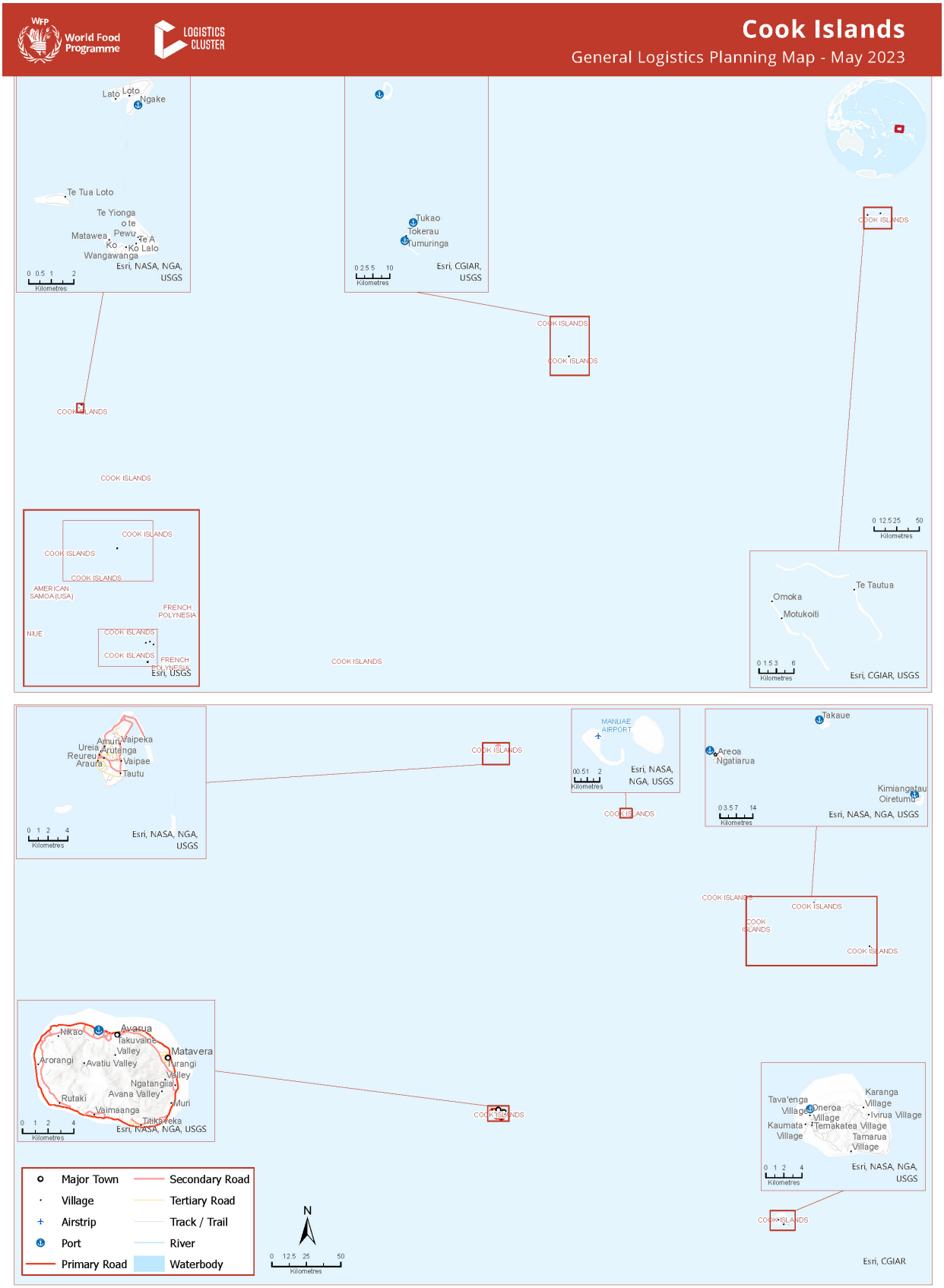


Figure 9: Cook Islands Logistics Planning Map

knowledge of Cook Islands culture.[36] Their focal areas include terrestrial and marine research, indigenous support, education support, and media outreach. Services provided include conducting environmental impact assessments and consultations, assisting with proposal writing, and providing organizations with project management to ensure compliance with Cook Islands law, and efficient development with environmental, socioeconomic, gender, and indigenous considerations.[37]

Kōrero O Te `Ōrau
PO Box 881, Avarua, Rarotonga, Cook Islands
682 73560 or 51995
Email: *korerooteorau@gmail.com*

Disclaimer: This handbook has been prepared in good faith based on resources available at the time of publication. Where possible, a link to the original electronic source is provided in the endnotes. While making every attempt to ensure the information is relevant and accurate, the CFE-DM does not guarantee or warrant the accuracy, reliability, completeness, or currency of the information herein. This information will be updated periodically, and we welcome and appreciate your feedback to improve this document and help fill any gaps to enhance its future utility. For feedback or comments, please email: **cfe.dmha.fct@pacom.mil**.

Cook Islands Notes

1 Foster, Sophie, Ronald G. Crocombe, and Marjorie Tuainekore Crocombe. Cook Islands, Encyclopedia Britannica, 13 November 2023. https://www.britannica.com/place/Cook-Islands

2 Cook Islands Government, Statistics for Development Division. Census of Population and Dwellings 2021, SPC. https://sdd.spc.int/digital_library/census-population-and-dwellings-2021

3 The Second Joint National Action Plan for the Cook Islands (JNAP-II). https://climatechange.gov.ck/wp-content/uploads/2019/10/JNAP-II-The-Second-Joint-National-Action-Plan-for-the-Cook-Islands.pdf

4 Cook Islands. Statecraftiness in The Pacific Islands. https://storymaps.arcgis.com/stories/b047ee4be82e47a8a6f3e580cf688d40

5 The Cook Islands – Map. The World Factbook, CIA, 2021. https://www.cia.gov/the-world-factbook/about/archives/2021/countries/cook-islands/map

6 Encyclopedia Britannica. History of the Cook Islands. https://www.britannica.com/place/Cook-Islands/History

7 PCRAFI. The Cook Islands: Disaster Risk Financing and Insurance, 2015, page 8.

https://openknowledge.worldbank.org/entities/publication/31b4bcbf-6fff-513f-bf57-e65adc6572a5

8 Cook Islands Tourism. Weather and Seasons. https://cookislands.travel/islands/weather-seasons#:~:text=The%20Cook%20Islands%20enjoy%20a,temperature%20of%2026%C2%B0C.

9 World Bank Climate Change Knowledge Portal. Cook Islands – Climatology. https://climateknowledgeportal.worldbank.org/country/cook-islands/climate-data-historical

10 World Bank Group. Climate Risk Country Profile: Cook Islands, 2021. https://climateknowledgeportal.worldbank.org/sites/default/files/country-profiles/15815-WB_Cook%20Islands%20Country%20Profile-WEB_4.pdf

11 Pacific-Australia Climate Change Science and Adaptation Planning Program. Current and future climate of the Cook Islands. 2015. https://www.pacificclimatechangescience.org/wp-content/uploads/2013/06/9_PACCSAP-Cook-Islands-11pp_WEB.pdf

12 Strategic Roadmap for Emergency Management (SREM) in Cook Islands 2018 – 2023, PRIF. https://www.theprif.org/sites/default/files/2020-08/Cook%20Islands%20Roadmap%20Emergency%20Mgt.pdf ; https://www.emci.gov.ck/publications/

13 Cook Islands Joint National Action Plan for Disaster Risk Management and Climate Change Adaptation (JNAP) 2011-2015, Pacific Climate Change Portal. https://www.pacificclimatechange.net/document/cook-islands-joint-national-action-plan-disaster-risk-management-and-climate-change

14 Cook Islands Government. JNAP II: THE COOK ISLANDS 2ND JOINT NATIONAL ACTION PLAN 2016-2020. https://climatechange.gov.ck/wp-content/uploads/2019/10/JNAP-II-The-Second-Joint-National-Action-Plan-for-the-Cook-Islands.pdf

15 National Sustainable Development Plan 2016-2020. UNEP Law and Environment Assistance Platform. https://leap.unep.org/en/countries/ck/national-legislation/national-sustainable-development-plan-2016-2020

16 Te Ara Akapapa'anga Nui 2020+ National Sustainable Development Agenda NSDA2020+ Annual Indicator Report, 2023. https://www.pmoffice.gov.ck/wp-content/uploads/2023/08/NSDA2020-Indicator-Report-Final-Digital.pdf

17 Cook Islands. Intended Nationally Determined Contributions. 1 September 2016. https://unfccc.int/sites/default/files/NDC/2022-06/Cook%20Islands%20INDCs-FINAL7Nov.pdf

18 PRIF. Cook Islands National Infrastructure Investment Plan 2021, Brief Summary. https://www.theprif.org/document/cook-islands/infrastructure-financing/cook-islands-national-infrastructure-investment-plan

19 OCHA. Cook Islands: Humanitarian Coordination Structure (As of 08 February 2023), ReliefWeb. https://reliefweb.int/report/cook-islands/cook-islands-humanitarian-coordination-structure-08-february-2023

20 Cook Islands Meteorological Service. Services – Climate and Oceans – Climate Update & EAR Watch. https://met.gov.ck/

21 Cook Islands Met Service. Tropical Cyclone Outlook 2021-2022. https://met.gov.ck/news/tropical-cyclone-outlook-2021-2022-0

22 UNDP. Launch of the Pa Enua Climate Information and Early Warning System in Manihiki, Cook Islands | United Nations Development Programme, 26 March 2019. https://www.undp.org/samoa/news/launch-pa-enua-climate-information-and-early-warning-system-manihiki-cook-islands

23 LogCluster. Cook Islands Logistics Infrastructure. September 2018. https://dlca.logcluster.org/2-cook-islands-logistics-infrastructure

24 Infrastructure Cook Islands. About Us. Accessed 20 December 2023. https://ici.gov.ck/about-us/

25 LogCluster. Cook Islands Logistics Infrastructure. September 2018. https://dlca.logcluster.org/2-cook-islands-logistics-infrastructure

26 LogCluster. 2.2.1 Cook Islands Rarotonga International Airport. September 2018. https://dlca.logcluster.org/221-cook-islands-rarotonga-international-airport

27 LogCluster. 2.2.2 Cook Islands Atiutaki National Airport. September 2018. https://dlca.logcluster.org/222-cook-islands-atiutaki-national-airport

28 LogCluster. 2.2.3 Cook Islands All Other National Airports. September 2018. https://dlca.logcluster.org/223-cook-islands-all-other-national-airports

29 LogCluster. Cook Islands Logistics Infrastructure. September 2018. https://dlca.logcluster.org/2-cook-islands-logistics-infrastructure

30 LogCluster. 2.1.1 Cook Islands Port of Avatiu. September 2018. https://dlca.logcluster.org/211-cook-islands-port-avatiu

31 LogCluster. 2.1.2 Cook Islands Port of Arutanga, Aitutaki. September 2018. https://dlca.logcluster.org/212-cook-islands-port-arutanga-aitutaki

32 LogCluster. Cook Islands Logistics Infrastructure. September 2018. https://dlca.logcluster.org/2-cook-islands-logistics-infrastructure

33 Logistics Cluster, WFP. Cook Islands: General Logistics Planning Map - May 2023. https://reliefweb.int/map/cook-islands/cook-islands-general-logistics-planning-map-may-2023

34 Etches, Melina. Red Cross an ever-present help, Cook Islands News, 7 May 2022. https://www.cookislandsnews.com/national/local/red-cross-an-ever-present-help/

35 Etches, Melina. Cook Islands Red Cross Society to mark 21st anniversary with 'open office day', Cook Islands News, 9 May 2023. https://www.cookislandsnews.com/uncategorised/internal/national/local/cook-islands-red-cross-society-to-mark-21st-anniversary-with-open-office-day/

36 Kōrero o te 'Ōrau, Facebook. https://www.facebook.com/korerooteorau/about_details

37 Kōrero O Te 'Ōrau. www.korerooteorau.org

Header photo by Bill Fairs on unsplash.com. Rarotonga, Cook Islands. https://unsplash.com/photos/trees-near-mountains-at-daytime-uRXwnUYib-I



Fiji is made up of more than 332 islands in the South Pacific. Located approximately 5,069 km (3,150 miles) southwest of Hawaii, Fiji's closest neighbor is Vanuatu. Many of Fiji's volcanically formed islands feature mountains and small beaches; approximately 150 of the islands are inhabited. The country has a total land area of 18,274 km^2 (7,056 square miles).[1] The four largest islands are Viti Levu, Vanua Levu, Taveuni, and Kadavu.[2] Together, Viti Levu and Vanua Levu make up 87% of Fiji's total landmass.[3] There are still some volcanos with thermal activity while others have not erupted in hundreds of years.[4] Figure 10 shows a map of Fiji.[5]

Austronesians are estimated to have first settled Fiji in 1220 BCE. Some time between 1000 and 500 BCE, Melanesians started to settle in Fiji and are said to be the closest ancestors of the present-day Fijian people.[6] By approximately 900 CE, Fiji was in the Tu'i Tongan Empire's sphere of influence, which started declining after 1200.[7] While European explorers first sighted Fiji in 1643, the islands remained relatively free of European contact until the early 1800s when European missionaries, whalers, traders, and deserters began to settle.[8] European muskets were an important factor in the chiefdom of Bau dominating western Fiji,[9] and the Bau chief, Cakobau's conversion to Christianity influenced most Fijians toward the Methodist church.

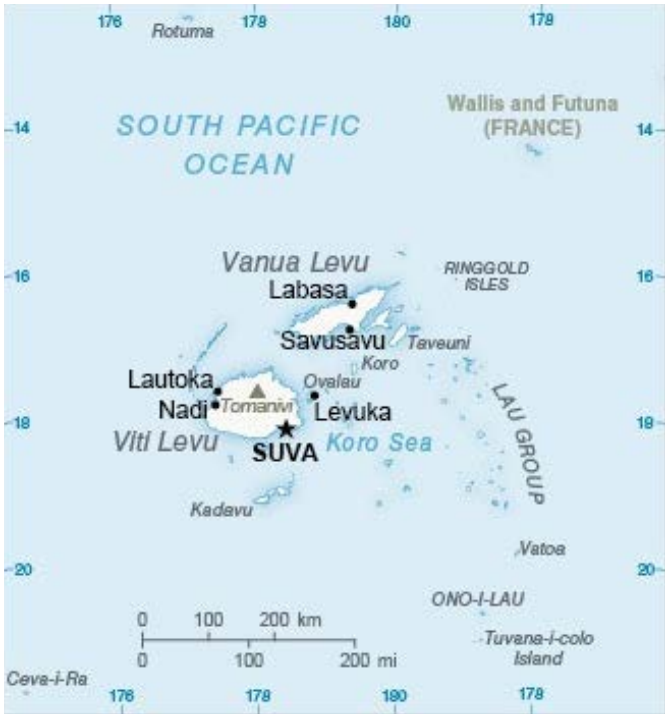


Figure 10: Map of Fiji

In the late 1800s, more Europeans arrived in Fiji to establish plantations, for whaling, or to engage in slave trading.[10] In 1874, Fiji became a British crown colony, and the British pacified the countryside, spread plantation agriculture, and introduced indentured laborers from the Indian sub-continent.[11] After the indenture system ended in 1920, the Indian community's political and economic grievances led to strikes and challenged the commercial and political domination of the small European community. Fiji gained independence in 1974 after becoming a fully sovereign and independent nation within the Commonwealth on 10 October 1970. Since the late 1980s, ethnic Indian and indigenous Fijian political players have struggled for dominance, and successive coups and ethnic violence have erupted on occasion.[12] Indigenous Fijians, also called iTaukei, comprise the majority of Fiji's population,[13] with the most recent census finding 475,739 (56.82%) iTaukei, 313,801 (37.48%) Indo-Fijians, and some 46,500 people of other descent.[14]

The Republic of Fiji (Matanitu ko Viti) is a parliamentary republic with separate offices holding the posts of head of state and head of government. The head of state is the President who is appointed by Parliament, which chooses between a candidate nominated by the Prime Minister and one nominated by the leader of the opposition. The head of government is the Prime Minister, who is the leader of the majority party in the national legislature.[15] The legislative branch is the Parliament, which makes laws, represents the community in discussions, investigates issues of importance to the community,

and scrutinizes the actions of government. The Parliament is a unicameral body[16] with a number of members adjusted by the Fiji Electoral Commission based on population proportions.[17] In 2022, the Parliament had 55 members.[18] The country is administratively divided into four divisions, Central Division, Northern Division, Eastern Division, and Western Division.[19] Each division is led by a commissioner, who plays a role in mainstreaming the Integrated Rural Development Framework and in coordinating government disaster operations at the divisional level.[20] The divisions are further subdivided into 14 provinces and one dependency.[21]

Hazards and Climate Change

The hazards that most threaten Fiji are storms, flooding, and drought. The country has nearly annual experiences with tropical cyclones that bring damaging winds and torrential rain. Over the longer-term, climate change will influence these hazards, increasing the risk to Fiji.

Fiji has a mild, tropical marine climate with slight seasonal variations. The wet summer season lasts from December through March, when daytime temperatures in Suva average 30-31°C (86-88°F). Humidity during summer is usually high, often reaching 90% or higher. The winter season is typically cooler and drier and occurs from May to October, when daytime temperatures in Suva average 26-27°C (79-81°F). During the coldest months of July to September when cool air sometimes arrives from the south, nighttime temperatures can drop to 14-15°C (57-59°F). Southeast trade winds blow steadily from March to October, with variable winds during the Southern Hemisphere summer.[22] Fiji is in the hurricane zone, and tropical cyclones are common, typically occurring between November and January. Fiji is also affected by El Niño Southern Oscillation (ENSO).[23] Figure 11 shows a graph of the monthly average minimum, mean, and maximum temperature along with the average monthly precipitation.[24]

Fiji is very vulnerable to the impacts of hazards exacerbated by climate change. Fiji has extremely high exposure to tropical cyclones and experiences effects of major storms on an annual basis. Fiji is also particularly exposed to rising sea levels, floods, and landslides. Warming is expected to continue.[25] Fiji is also highly vulnerable to climate extremes, including drought and rainfall events, and increases in the frequency and intensity of such events could threaten livelihoods, infrastructure, and human wellbeing.

Key community and economic vulnerabilities include the country's subsistence agriculture sector, coastal and marine resources, freshwater resources, and land management, as Fiji documented in 2020 in its Third National Communication (TNC) to the UNFCCC.[26]

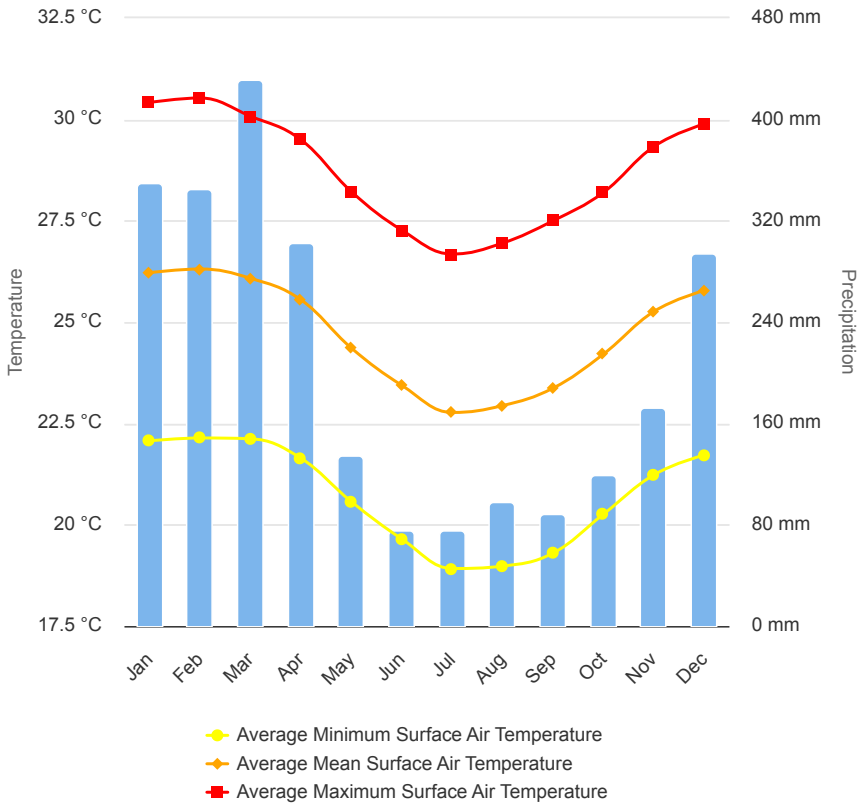


Figure 11: Average Monthly Temperature and Precipitation, Fiji (1990-2020)

Degradation of key natural resources is considered inevitable, as coral reefs and associated fisheries are significantly threatened and soil and water quality are likely to decline. As in many countries around the world, the impacts of climate change are likely to most affect Fiji's poor, marginalized, and remote communities. Due to the effects of climate change, the number of Fijians being pushed into poverty and hardship is projected to increase from 25,700 people per year to an estimated 32,400 per year by 2050. The growing cost of climate change-related disasters is likely to significantly rise as floods and cyclones are predicted to lead to asset losses up to 30% higher than current averages.[27]

Table 4 details the various climate change-influenced hazards that Fiji confronts as well as the trends, projections, and potential impacts of those phenomena.[28]

Government Institutions, Policies, and Plans for Disasters and Climate Change

The National Disaster Management Council (NDMC) is the overarching disaster management body with responsibility for ensuring policy coherence. The National Disaster Management Office (NDMO) is the chief implementing organization for disaster management. It is active in both coordinating response and formulating policy by advising the Cabinet, NDMC, and the National Disaster Controller (NDC). NDMO is under the jurisdiction of the Ministry of Rural and Maritime Development and Disaster Management (MRMDDM). The chair of the NDMC serves as the Minister of MRMDDM. In addition, each cabinet ministry has a permanent secretary that takes responsibility for disaster management and implementation of disaster policies for their respective ministries' areas of responsibility. The permanent secretary of MRMDDM generally is the NDC. During a disaster, the NDC essentially takes command and issues instructions on response actions to be taken by the NDMO and the National Emergency Operation Centre (NEOC). NDMO has three sections: emergency planning and coordination; training, education, and awareness; and risk management and policy research. NDMO is the national focal point for coordination with government agencies, donors, and other stakeholders.[29] Figure 12 shows the permanent DRR structures and the emergency operations disaster response structure for Fiji.[30]

When early warning mechanisms signal the potential for an extreme event, the NDMO is responsible for communicating key messages, activation and operation of the NEOC, and supervising the operation of provincial and district EOCs. The NEOC accommodates personnel from ministries and agencies relevant to the emergency so that communication and information sharing is centralized and streamlined.[31] The Fiji Cluster System is a government-led humanitarian coordination system and is comprised of:

- The Inter-Cluster led by the permanent secretary of MRMDDM
- Nine sectoral clusters led by the permanent secretaries of relevant ministries, and
- Supporting partners including the Fiji Red Cross (FRCS), Fiji Council of Social Services (FCOSS), and Fiji Business Disaster Resilience Council (FBDRC).

The Inter-Cluster is the mechanism for humanitarian coordination and inter-operability among sectoral Clusters, including for subnational humanitarian coordination with the local governments. The Inter-Cluster lead, NDMO, cluster leads and co-leads, and supporting partners make up the Inter-Cluster. UN OCHA plays an observer role within the national Cluster system.[32] For decades, it has been the government's position that NGOs are valuable contributors to all stages of the disaster management cycle, including preparedness, relief, and recovery. In order to be integrated into the official planning and execution process, including the Cluster system, NGOs must already have a presence in and relationship with their local (district or division) disaster management councils, and it will fall to these local councils to coordinate many NGOs within their regions. Many of the local or national NGOs who might participate in a disaster response are already coordinated under the umbrella of FCOSS or

Phenomenon	Trend	Projections	Impacts
Drought	Droughts usually occur during El Niño periods; rainfall varies widely inter-annually and geographically	Future drought probability projected to increase to 10% under most scenarios; frequency of future droughts overall is highly uncertain	Threats to human health and wellbeing as water sources dry up or are contaminated; livelihoods disruption
Flooding	River flooding an annual occurrence, more common during La Niña years; storm surges and high-pressure systems commonly drive swells that inundate coastlines	More pessimistic projections expect devastating flooding events to increase in frequency from once every 250 years to once every 5-25	Water quality diminished as intake stations, boreholes, pumping stations, and water treatment plants sustain damage; energy infrastructure inundated
Cyclone	High exposure and frequent storm landfalls; peak season is November-April	Global modelling indicates a general trend of reduced overall cyclone frequency but increased intensity and increased frequency of the most extreme cyclone events	Storm surge and heavy precipitation increase potential for coastal erosion and landslides; high winds damage coastal infrastructure, buildings, and trees; all risk heightened by sea level rise
Heat	Fiji already regularly experiences high maximum temperatures; temperatures have increased by 0.15-0.18°C (0.27-0.32°F) per decade	Long-term warming is expected to range between 0.6°C and 2.6°C (1.08°F and 4.68°F) by the 2090s when compared with the 1986–2005 baseline; all models project statistically significant increases in the annual probability of Fiji experiencing a heat wave	Human and agricultural productivity falls
Sea level rise	Sea level has risen in Fiji by 6 mm (0.24 inches) per year since 1993; some natural inter-annual variation due to ENSO phases	All models see sea level continuing to rise; by 2030, under a high emissions scenario, rise is projected to be 3-16 cm (inches)	Combined with other changes (storm surge, coastal erosion, etc.) higher chance of inundation, erosion, and saline intrusion

Table 4: Climate Change-Linked Phenomena, Trends, and Potential Impacts for Fiji

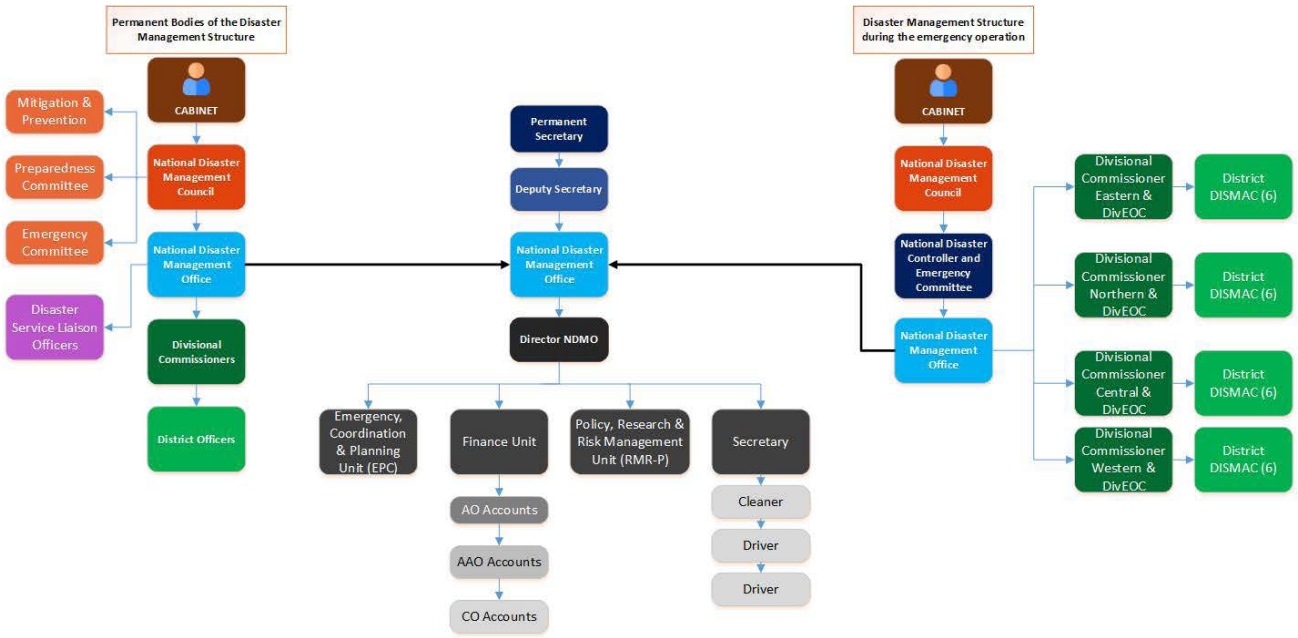


Figure 12: Fiji's Disaster Management Organization Structure

have a partnership with FRCS.[33]

The National Disaster Risk Reduction Policy 2018-2030 is aligned to the Natural Disaster Management Act 1998, which governs various activities within the disaster management cycle.[34] Under the Natural Disaster Management Act 1998, the responsibility for national disaster management rests with the NDC, who assumes powers on the formal declaration of a natural disaster.[35] There are national level, regional level, and global level frameworks, which contributed to the National Disaster Risk Reduction Policy. The adoption of the National Disaster Risk Reduction Policy 2018-2030 reflected lessons learned and gaps identified after the devastating consequences of the February 2016 Category 5 Tropical Cyclone Winston. The policy promotes good disaster risk governance and establishes priorities for future action, highlighting the importance of monitoring action and improved risk assessment.[36] The National Disaster Management Plan, 1995 provides guidance for the principal responsibilities of agencies, emergency operations, risk reduction and training, and informing the public regarding warnings and evacuation messaging. The aim of the Plan is to outline arrangements for control and coordination of all disaster related activities in Fiji.[37]

Fiji has ratified the Paris Climate Agreement and, in 2020, submitted its Updated Nationally Determined Contributions (NDC), which emphasizes the need for external support to meet the high costs of climate change mitigation and adaptation. Fiji passed the Climate Change Act 2021,[38] which provides guidance on developing long term climate change measures and recognizes links between gender equality, social inclusion, and the Sustainable Development Goals.[39]

The Climate Change Division (CCD) of the Office of the Prime Minister is the responsible national agency for addressing climate change policy issues. The CCD is guided by the Climate Change Act 2021 and the National Climate Change Policy (NCCP) and works in collaboration with government agencies, NGOs, regional and international agencies, and development partners. CCD has four work streams: adaptation, mitigation, oceans, and finance. The Prime Minister serves as the Minister Responsible for Climate Change,[40] and the CCD is the nationally designated authority (NDA) for international climate finance, especially the Green Climate Fund (GCF). The NDA Secretariat is facilitated and supported by the Ministry of Economy. The NDA coordination mechanism relies on various Sector Working Groups (SWG) that enable engagement, information exchange, and communication with internal and external stakeholders. There are currently four SWGs with membership that comprises experts (Consultative Members) and a general community of practice (Open Members); the SWGs are: Sustainable Livelihoods and Healthy Communities; Ecosystems and Ecosystem Services and Sustainable Land Management; Climate Resilient Infrastructure, Sustainable Energy, and Build Environment; and Sustainable Transport.[41]

The Climate Change Act of 2021 recognizes the global climate emergency. It established the National Climate Change Coordination Committee, the National Adaptation Plan Steering Committee, the Fijian Adaptation Registry, the Fijian Taskforce on the Relocation and Displacement of Communities Vulnerable to the Impacts of Climate Change, and the National Ocean Policy Steering Committee. It charges the government with developing and implementing a national climate change policy, and it detailed the Transport Decarbonisation Implementation Strategies and a National Ocean Policy. It set a net zero emissions target for 2050 and charged relevant agencies with conducting risk assessments and deciding on new building and infrastructure approvals. Finally, it made provisions for the implementation of sustainable financing.[42]

The NCCP (2018) has three central policy pillars: human rights, gender-responsiveness, and evidence. The Policy identifies eight core principles: sustainable well-being, social cohesion, inclusivity, partnership, agility,

urgency, transparency and communication, and integrated learning. Moreover, it emphasizes Fiji's global and regional priorities - oceans, loss and damage, human mobility and relocation, and climate action - to ensure domestic progress is not undermined by international circumstances.[43] The NCCP is bolstered by the National Climate Finance Strategy, which lays out investment priorities for climate adaptation and mitigation over the short (2022-2025) and medium term (2026-2029). The strategy covers twelve sectors: Agriculture, Blue Economy, Climate-Induced Relocation, Disaster Risk Management, Electricity, Forestry, Gender and Social Inclusion, Housing, Human Health, Climate Policy and Governance, Transport, and Water and Sanitation. The Ministry of Economy's Climate Change and International Cooperation Division is primarily responsible for monitoring implementation of the finance strategy.[44] An additional plan underpinning progress is the National Infrastructure Investment Plan (2023-2034) to guide infrastructure investment by prioritizing projects.[45]

Fiji's National Adaptation Plan (NAP) was launched in 2018; it outlines priorities to address the country's susceptibility to climate change-influenced hazards – e.g., cyclones, floods, and droughts – and to adapt to climate change. The NAP is an overarching plan for addressing national adaptation needs by providing public, private, and civil society stakeholders and development partners with a list of prioritized adaptation needs across various sectors. This prioritization ensures that adaptation actions and resources address the most pressing vulnerabilities and needs. All adaptation projects seeking development and climate finance must align to the priorities outlined in the NAP. Finally, the NAP serves as a guideline to build adaptive capacity and resilience, and integrate CCA into policies, programs, and processes.[46]

National Disaster Management Office (NDM0)
Nasilivata House, Ratu Mara Road, Samabula
Tel: 679 331 9250
Email: *neocfiji@gmail.co*

Climate Change Division, Office of the Prime Minister
Level 8 (East Wing), Ro Lalabalavu House, 370 Victoria Parade
P.O.Box 2351, Government Buildings, Suva, Fiji
Tel: 679 331 3411
Email: *ccicd@economy.gov.fj*

Early Warning Systems

Fiji has taken steps to establish comprehensive hazard warning systems. As the country's primary hazards are hydrometeorological, priority has been given to developing warning systems and processes for major storm events, including heavy rains, flash flooding, coastal flooding due to storm surge, and high winds. In late 2022, MRMDDM reported that it was working in cooperation with key stakeholders to ensure that residents were educated in how the early warning system (EWS) works to include how local information feeds into the system and what actions to take when a warning is received.[47]

Since 1995, Fiji Meteorological Service (FMS) has been designated Regional Specialised Meteorological Centre (RSMC) Nadi – Tropical Cyclone Centre by the World Meteorological Organization (WMO).[48] FMS, under the Ministry of Infrastructure and Meteorological Services, provides early warnings for cyclones, rain, and droughts, and it disseminates the information through SMS/text, social media, and radio and TV networks. The FMS has also developed an EWS for flash floods to complement the existing systems of various islands.[49]

As an implementing partner for Fiji's multi-hazard EWS, FMS works in concert with the NDMO to ensure that forecasts and warnings include impact-based forecasting to give warning recipients the "so what" of the information they receive. In its 2021-2024 Strategic Implementation Plan, FMS has a pilot project to integrate impact-based forecasting into its coastal inundation warnings and forecasts for all islands and all coasts. In addition, as of 2021, FMS became capable of delivering coastal inundation forecasting related to tropical cyclones for all areas under RSMC-Nadi's area of responsibility,

which extends from the Equator to 25°S and from 160°E to 120°W, covering from Nauru through all of French Polynesia.[50] RSMC-Nadi is tasked with detection, naming, and monitoring all tropical cyclones originating in this region.[51]

As part of the midterm review of the Sendai Framework, the UN Office for Disaster Risk Reduction (UNDRR) surveyed various stakeholders across the Asia-Pacific region to see how countries were faring in developing inclusive and accessible multi-hazard EWS by drawing on lessons from successes, including a number of women-led and disability-inclusive EWS. Two key systems include:

Fiji Women's Weather Watch (WWW) – Developed beginning in 2004 and named Women's Weather Watch in 2009, the system was built by FMS, femLINKpacific, and others; it involves two-way community radio, bulk SMS/text systems, social media, and local radio and media. The concept was rooted in findings that local women had been excluded from designing, planning, and implementing disaster relief and risk reduction efforts. WWW began with simple SMS messaging, with a focus on supporting community women leaders to understand and pass on the climate-related information and warnings.

In 2017, WWW launched a bulk SMS system and began utilizing other media, including a podcast and a comic series called HEROWINS to disseminate messages and awareness. WWW centers on communication between communities and the WWW hub during emergencies and across disaster cycles. The program delivers training on technical climate and weather knowledge, technology use, advocacy and communication skills, and harnessing traditional and local knowledge. When a warning or other information is received from FMS, local and diverse women consult on how to translate the information into corresponding messages appropriate for the context and in the local language before then making those messages available in a digital message bank for quick access and use. During a disaster scenario, warnings are received from FMS and the corresponding WWW message is found in the message bank and sent through the network. WWW network members can send live updates via SMS text messages back to the WWW hub in Suva.

Fiji Disabled People's Federation (FDPF) EOC – Founded in 2018 in partnership with the Australian Humanitarian Partnership, femLINKpacific, NDMO, and others, the FDPF EOC is part of the FDPF DRR unit that aims to build DRR capacities for persons with disabilities and advocates for inclusive DRR communications. The EOC is activated during a crisis and aims to strengthen inclusive disaster response and ensure persons with disabilities are not left behind. Email notifications are set up so that the EOC receives disaster information from the NDMO and FMS. The staff or volunteers from each of FDPF's member organizations then follow communication guidelines to share this information with their own community using the platforms and communication methods specific to each of them. Then, those organizations' community focal points are able to report back to the EOC on the status of persons with disabilities in their communities. Information is disseminated by SMS/text, phone calls, emails, video conferencing, and radio and TV campaigns. FDPF members undergo training in technical CCA and DRR knowledge, advocacy, and communication skills.[52]

Fiji Meteorological Service
Korowai Road, NAP 0351, Nadi Airport
Tel: 679 672 4888
Email: *fmscustomer@met.gov.fj*

Infrastructure

The 5-year and 20-year National Development Plan (NDP) for 2017-2036 lays out targets for water and sanitation, energy, education, and modernizing transport networks, among other plans for key economic and social development. Across all NDP targets, building climate resiliency into infrastructure is a key aspect of projects. Among the plans are adaptation and conservation projects to address the impacts of

rising sea levels and changing rainfall patterns.[53]

For on-island transport of people and cargo, roads are the primary method while ports are the primary means for moving cargo among the islands. Airports and fields are generally only useful for passenger transit as Nadi airport is the only facility with cargo handling equipment. The Ministry of Commerce, Trade, Tourism, and Transport (MCTTT) is the overall authority for transport sector policies and strategies with a focus on environmentally sustainable transport system development. The Department of Government Shipping Services is MCTTT's branch that can provide quick response services during or after a natural disaster. It falls under MCTTT's Deputy Secretary for Transport.[54]

A board-governed corporate body, Fiji Roads Authority (FRA), is the central body responsible for all of Fiji's roads and bridges, and for 47 jetties throughout the country. Fiji Ports Corporation Limited ("Fiji Ports"), a government-owned corporation operating semi-autonomously under MCTTT, is responsible for the administration of the ports of Suva, Lautoka, Labasa/Malau, and Levuka; other ports remain under the Ministry's control. Fiji Airports Limited is the government-owned company that operates 15 airports including the two international airports.

Nadi International Airport is the primary international airport; it is joined by Nausori International Airport and 13 other domestic airports, scattered throughout the country;[55] they include Labasa, Savusavu, Taveuni, Rotuma, Koro, Gau, Bureta, Vanuabalavu, Lakeba, Ono-i-Lau, Cicia, Moala, and Kadavu.[56] There are five ports of entry: Suva, Lautoka, Levuka, Wairiki, and Malau.[57] Suva and Lautoka, both on Viti Levu, have the capability to handle bulk and container freight. While Suva handles most of the country's general cargo, Lautoka handles the bulk of sugar and timber exports and is the base for local cruise vessels serving offshore resorts. Several privately-owned terminals handle petroleum, gas, bulk sugar, molasses, and wood chips. The country's minor ports can provide only basic services and are often constrained by weather and tides.[58]

FRA has overall management and oversight of the road network, including maintenance and planning.[59] FRA reports that there are 1,707 km (1,060 miles) of sealed roads and 5,818 km (3,615 miles) of unsealed roads under its management.[60] Topography restricts the 7,500-km (4,660-mile) road network to main ring or spine roads with feeders. The upshot is that travelers and transporters have few route alternatives.[61] As an illustration of the challenges confronting FRA, when Cyclones Yasa and Ana swept through Vanua Levu in December 2020 and January 2021, they severely damaged the island's roads. By mid-2021, the Transport Infrastructure Investment Sector Project – financed by the Asian Development Bank, World Bank, and Government of Fiji – had rehabilitated some roads under the leadership of FRA.[62] A key project being considered by FRA is a cross-island highway for Viti Levu to provide connection to interior communities as well as to build a transport link that is less exposed to sea level rise or other coastal hazards. The project was in the study phase under the 2022-2023 budget.[63]

The NDP called for safe water to reach 100% of urban areas by 2021 and outlying areas by 2030 with similar targets for 100% electricity access by 2021; an additional target for centralized sanitation services expects to reach 70% of the total population by the middle of the 21st century.[64] The Energy Fiji Limited (EFL) 10-year Power Development Plan plots out investments in new generation, transmission, and distribution.[65] Hydropower and imported oil account for nearly all of Fiji's electric power generation.[66] As of 2018, approximately 4% of Fiji's population (more than 32,000 people) had yet to be directly connected to the electricity grid, and those remaining unconnected tended to live in remote areas or informal settlements. Of households and businesses connected to the power grid, some 80% are connected to the main EFL grid while the remainder are based on solar home systems, village-based diesel generation, or mini-hydro. EFL's installed generation capacity in 2018 was 360.3 MW, of which 60% was renewable generation capacity. Actual 2030

EFL output is expected to be dominated by hydropower at 51.5% with other renewables - solar, wind, and biomass – increasing to nearly 20% from just 4.2% in 2018.[67] Most of Fiji's power lines are above ground. In the NDP, a focus on climate resiliency will see EFL moving lines underground where feasible.

At the writing of the NDP in 2017, 78% of the population and a reported 98% of urban communities had access to a fully treated and reticulated water supply. As a reticulated system, the Water Authority of Fiji (WAF) owns the pumping and water treatment system, pipework, reservoirs, and related equipment for the extraction, treatment, and delivery of water. Meanwhile, 71% of the population had access to improved sanitation; a reported 25% of the population used sewerage facilities while the remainder of those with access used septic tanks or other on-site management methods. To bolster rural access to safe water, a rural water program was slated to deliver tanks while remote and maritime communities were slated to be targeted with projects to access groundwater or use diesel-powered desalination technology.[68] WAF maintains 4,932 km (3,064 miles) of pipes that deliver treated drinking water to residential and commercial customers across the islands.[69] In addition to standard piped water for urban and peri-urban residents, WAF has a rural water service that delivers 2,000 liters (528 gallons) of water per fortnight by truck to households not connected to the pipe network.[70] A 2014 survey found that some 60% of residents of the Greater Suva Area were still using on-site sanitation systems such as septic tanks. Due to the prevailing shallow depth of soil, high rainfall, and lack of routine maintenance, overflows from septic tanks are common. Moreover, there are numerous informal settlements without adequate on-site sanitation, and in some cases, untreated wastewater is discharged directly to local creeks and waterways. Finally, assessments found that the Greater Suva Area could be expected to experience steadily rising population density that would strain even the existing wastewater system.[71]

Ministry of Commerce, Trade, Tourism, and Transport (MCTTT)
Levels 2 and 3, Victoria Parade, Suva
Tel: 679 3305 411
Email: *info@mcttt.gov.fj*

Fiji Roads Authority (FRA)
Level 4, Fiji Development Bank Building. 360 Victoria Parade, Suva
Tel: 679 3100114
Email: *info@fijiroads.org*

Fiji Ports Corporation Limited
Walu Bay, Muaiwalu House, Lot 1, Tofua Street, Suva, Fiji
Tel: 679 331 2700

Fiji Airports Limited
Tel: 679 672 5777

Energy Fiji Ltd.
2 Marlow Street, Ground Floor, Suva
Tel: 679 132 333

Water Authority of Fiji (WAF)
Shop 4 Post Fiji Arcade. CBD Suva
Tel: 679 334 6777

Civil Society Partners

The Fiji Red Cross Society (FRCS) was formed in 1952 as a branch of the British Red Cross and was recognized in 1972 as a National Society. The National Office of the Society is located in Suva. There are sixteen branches, located in Rabi, Rotuma, Seaqaqa, Savusavu, Bua, Taveuni, Labasa, Levuka, Rakiraki, Tavua, Ba, Lautoka, Nadi, Sigatoka, Suva, and Nalawa. The FRCS includes more than 300 volunteers.[72] It provides a yearly pre-cyclone briefing where the national society engages with its branches, the national government, and other humanitarian stakeholders. The FRCS maintains stockpiles in 36 locations throughout Fiji.[73]

Fiji Red Cross Society (FRCS)
22 Gorrie St., Suva, Fiji
Tel: 679 331 4133
Email: *info@redcross.com.fj*

Fiji Council of Social Services (FCOSS) serves as a focal point for Fiji's civil society organizations and supports development initiatives. It has upwards of 500 members or associated members for whom it delivers support for collaboration with either the national government or international agencies across the sectors of health, education, community, development, and environmental awareness. It not only serves district level councils of civil society organizations but also reaches up to PIANGO and international councils.[74]

Fiji Council of Social Services (FCOSS)
254 Waimanu Rd, Suva, Fiji
Tel: 679 999 7608

Founded after Cyclone Winston hit the country in 2016,[75] the Fiji Business Disaster Resilience Council (FBDRC) is one of nine councils under the umbrella of the Fiji Commerce and Employers Federation. It serves as the business representatives at the NDMO[76] and seeks to improve coordination among businesses, NDMO, and aid groups (UN or otherwise) during emergencies. Its key objectives are to reduce disaster risk, improve preparedness, facilitate response, and promote recovery. In service of these objectives, it has developed toolkits for Fiji's businesses and delivered trainings.[77] FBDRC can coordinate private sector engagement with government on resilience building, response, and recovery activities, collaborate with Fiji Commerce and Employers Federation and Business Link Pacific to help prepare business continuity plans for small enterprises, provide awareness and information sharing with members, and partner with international organizations to support recovery work.[78]

Fiji Commerce and Employers Federation
42 Gorrie St, Suva, Fiji
679 331 3188

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Fiji Notes

1 CIA World Factbook. Fiji: Geography. Accessed 4 January 2023. https://www.cia.gov/the-world-factbook/countries/fiji/

2 Vunidilo, Tarisi. Fiji, Norwood House Press, 2022.

3 Maps of Fiji. World Atlas. 2023. https://www.worldatlas.com/maps/fiji

4 Miller, Lauren. "What Landforms Make Fiji Unique?" Travel Tips – USA Today. 26 January 2023. https://traveltips.usatoday.com/landforms-make-fiji-unique-104042.html

5 CIA World Factbook. Fiji – map. https://www.cia.gov/the-world-factbook/static/maps/FJ-map.jpg

6 Fiji Pocket Guide. A Brief History of Fiji. https://fijipocketguide.com/a-brief-history-of-fiji/

7 Go-Fiji. Fiji History: European Arrival in Fiji. https://www.go-fiji.com/history.html

8 BBC. Fiji profile – timeline. https://www.bbc.com/news/world-asia-pacific-14919688

9 Encyclopedia Britannica. Fiji – History. https://www.britannica.com/place/Fiji-republic-Pacific-Ocean/History

10 Da Silva, Diego Barbarosa. Language Policy In Oceania: In The Frontiers Of Colonization And Globalization, Alfa, Rev. Linguíst 63 (2), Apr-Jun 2019, https://www.scielo.br/j/alfa/a/YPntRnVWDW5F8P8PYfJGP

11 Department of State. Background Notes: Fiji – History. https://1997-2001.state.gov/background_notes/fiji_0596_bgn.html

12 Al Jazeera. Sitiveni 'Rambo' Rabuka confirmed as Fiji's new prime minister. 24 December 2022. https://wwwaljazeera.com/sitiveni-rambo-rabu- ka-confirmed-as-fijis-new-prime-minister

13 Vunidilo, Tarisi. Fiji, Norwood House Press, 2022.

14 Government of Fiji, Bureau of Statistics. CENSUS 2007 GENERAL TABLES – File Name "03_Relationship-Ethnicity-and-Religion-by_Province-of-Enumeration_Fiji-2007." https://www.statsfiji.gov.fj/statistics/2007-census-of-population-and-housing.html; https://www.statsfiji.gov.fj/component/advlisting/?view=download&format=raw&fileId=1133

15 Encyclopedia Britannica. Fiji – Government and Society. https://www.britannica.com/place/Fiji-republic-Pacific-Ocean/Government-and-society

16 Constitution of the Republic of Fiji, 2013. http://www.electionsfiji.gov.fj/wp-content/uploads/2013/09/Constitution-of-the-Republic-of-Fiji-.pdf

17 Library of congress. Fiji: New Constitution Signed into Law. 9 September 2013. https://www.loc.gov/item/global-legal-monitor/2013-09-09/fiji-new-constitu- tion-signed-into-law/

18 Parliament of the Republic of Fiji. Fiji's System of Government. https://www.parliament.gov.fj/fijis-system-of-government/

19 World Atlas. Divisions of Fiji Map. 25 February 2021. https://www.worldatlas.com/maps/fiji

20 Government of Fiji. "Two New Divisional Commissioners Appointed." 17 March 2020. https://www.fiji.gov.fj/Media-Centre/News/TWO-NEW-DIVISIONAL-COMMISSIONERS-APPOINTED; "Divisional Commissioner Northern Appointed." 26 November 2020. https://www.fiji.gov.fj/Media-Centre/News/DIVISIONAL-COMMISSIONER-NORTHERN-APPOINTED

21 CIA World Factbook. Fiji: Government. Accessed 4 January 2023. https://www.cia.gov/the-world-factbook/countries/fiji/#government

22 Fiji Geography. Country Reports. Accessed 20 January 2023. https://www.countryreports.org/country/Fiji/geography.htm

23 NOAA. El Niño & La Niña (El Niño-Southern Oscillation). https://www.climate.gov/enso

24 World Bank Climate change Knowledge Portal. Fiji. Accessed 28 November 2023. https://climateknowledgeportal.worldbank.org/country/fiji/climate-data-historical

25 World Bank. Climate Risk Country Profile – Fiji. 2021. https://climateknowledgeportal.worldbank.org/sites/default/files/country-profiles/15854-WB_Fiji%20Country%20Profile-WEB.pdf

26 Fiji Ministry of Economy Climate Change and International Cooperation Division. (2020). Republic of Fiji Third National Communication: Report to the United Nations Framework for Climate Change. Suva, Fiji: Ministry of Economy. https://fijiclimatechangeportal.gov.fj/publication/republic-of-fiji-third-national-communication-report-to-the-united-nations-framework-for-climate-change/

27 Government of Fiji, World Bank, and GFDRR. "Climate Vulnerability Assessment: Making Fiji Climate Resilient," 2017. https://fijiclimatechangeportal.gov.fj/publication/climate-vulnerability-assessment-making-fiji-climate-resilient/#:~:text=Climate%20Vulnerability%20Assessment%3A%20Making%20Fiji%20climate%20resilient%20October,integrated%20with%20countries%E2%80%99%20existing%20development%20plans%20and%20objectives.

28 World Bank. Climate Risk Country Profile – Fiji. 2021. https://climateknowledgeportal.worldbank.org/sites/default/files/country-profiles/15854-WB_Fiji%20Country%20Profile-WEB.pdf; Naumann, G., Alfieri, L., Wyser, K., Mentaschi, L., Betts, R. A., Carrao, H., et al. (2018). Global changes in drought conditions under different levels of warming. Geophysical Research Letters, 45, 3285– 3296. https://doi.org/10.1002/2017GL076521; IDMC. "Flood displacement risk: Assessment for Fiji and Vanuatu in current and future climate scenarios." 12 December 2022. https://reliefweb.int/report/fiji/flood-displacement-risk-assessment-fiji-and-vanuatu-current-and-future-climate-scenarios; Pacific Climate Change Science Program. Current and future climate of the Fiji Islands. 2014. https://world.350.org/pacific/files/2014/01/1_PCCSP_Fiji_8pp.pdf

29 Ministry of Disaster Management and Meteorological Services, Government of Fiji. The Republic of Fiji National Disaster Risk Reduction Policy 2018-2030. 2018. https://www.rcrc-resilience-southeastasia.org/wp-content/uploads/2020/04/Natural-Disaster-Risk-Reduction-Policy-2018%E2%80%932030.pdf

30 NDMO. About – NDMO Structure. https://www.ndmo.gov.fj/about/

31 Ministry of Disaster Management and Meteorological Services, Government of Fiji. The Republic of Fiji National Disaster Risk Reduction Policy 2018-2030. 2018. https://www.rcrc-resilience-southeastasia.org/wp-content/uploads/2020/04/Natural-Disaster-Risk-Reduction-Policy-2018%E2%80%932030.pdf

32 National Disaster Management Office. Cluster System. Accessed 1 February 2023. https://www.ndmo.gov.fj/cluster-system/

33 National Disaster Management Office. Fiji National Disaster Management Plan. January 1995. https://www.ndmo.gov.fj/fiji-national-disaster-management-plan/

34 Fiji Red Cross Society. Disaster Management. 2 February 2023. https://fijiredcross.org/what-we-do/disaster-management/

35 Fiji National Disaster Management Office. Laws. Accessed 2 February 2023. https://www.ndmo.gov.fj/ndmo-act/

36 Ministry of Disaster Management and Meteorological Services, Government of Fiji. The Republic of Fiji National Disaster Risk Reduction Policy 2018-2030. 2018. https://www.rcrc-resilience-southeastasia.org/wp-content/uploads/2020/04/Natural-Disaster-Risk-Reduction-Policy-2018%E2%80%932030.pdf

37 Fiji National Disaster Management Office. Fiji National Disaster Management Act. Accessed 2 February 2023. https://www.ndmo.gov.fj/fiji-national-disaster-management-plan/

38 The Laws of Fiji. Climate Change Act 2021. https://laws.gov.fj/Acts/DisplayAct/3290

39 UNICEF. "UNICEF and UN Human Rights welcome Fiji's Climate Change Act." 28 October 2021. https://www.unicef.org/pacificislands/press-releases/unicef-and-un-human-rights-welcome-fijis-climate-change-act

40 Fiji Climate change and National Designated Authority Portal. About. https://fijiclimatechangeportal.gov.fj/about-ccd/

41 Fiji Climate change and National Designated Authority Portal. Who We Are. https://fijiclimatechangeportal.gov.fj/nda/who-we-are/

42 Grantham Research Institute on Climate Change and the Environment. Fiji: Climate Change Law 2021. https://climate-laws.org/document/climate-change-act-2021_8bf7

43 Fiji Ministry of Economy. Briefing note: Fiji National Climate Change Policy. https://fijiclimatechangeportal.gov.fj/wp-content/uploads/2022/01/Brief__Fiji_National_Climate_Change_Policy.pdf

44 Government of Fiji. National Climate Finance Strategy: Policy Brief. 2023. https://fijiclimatechangeportal.gov.fj/wp-content/uploads/2023/05/2022_National-Climate-Finance-Strategy.pdf

45 PRIF. Fiji National Infrastructure Investment Plan 2023-2034. https://www.theprif.org/document/fiji/national-infrastructure-investment-plans/fiji-national-infrastructure-investment-plan

46 Government of Fiji. Briefing Note: The National Adaptation Plan. https://fijiclimatechangeportal.gov.fj/wp-content/uploads/2022/01/Brief__Fiji_National_Adaptation_Plan_Policy.pdf

47 Devi, Shayal. Emery: Early warning systems will save lives. Fiji Times. 14 October 2022. https://www.fijitimes.com/emery-early-warning-systems-will-save-lives/

48 Fiji Meteorological Service. Home page. Accessed 2 February 2023. https://www.met.gov.fj/

49 UNDRR. Disaster Risk Reduction in the Republic of Fiji: Status Report 2019. Bangkok, Thailand. United Nations Office for Disaster Risk Reduction (UNDRR), Regional Office for Asia and the Pacific. https://www.preventionweb.net/publication/disaster-risk-reduction-republic-fiji

50 Ministry of Infrastructure and Meteorological Services. Fiji Meteorological Service Strategic Plan 2021-24. https://www.met.gov.fj/Fiji%20Meterological%20Service_Strategic_Implementation_plan.pdf

51 Terry, James and Gienko, Gennady. Developing a new sinuosity index for cyclone tracks in the tropical South Pacific. Natural Hazards. 59. 1161-1174. November 2011. 10.1007/s11069-011-9827-3. https://www.researchgate.net/figure/Area-of-responsibility-of-the-RSMC-Nadi-in-Fiji-grey-box-and-the-spread-of-island_fig1_225353473

52 United Nations Office for Disaster Risk Reduction (UNDRR). INCLUSIVE AND ACCESSIBLE MULTI-HAZARD EARLY-WARNING

SYSTEMS Learning From Women-Led Early-Warning Systems In The Pacific. March 2022. https://wrd.unwomen.org/sites/default/files/2022-03/Inclusive%20And%20Accessible%20Multi-hazard%20Early-warning%20Systems.pdf

53 Ministry of Economy. 5-Year & 20-Year NATIONAL DEVELOPMENT PLAN: Transforming Fiji. November 2017. https://www.fiji.gov.fj/getattachment/15b0ba03-825e-47f7-bf69-094ad33004dd/5-Year-20-Year-NATIONAL-DEVELOPMENT-PLAN.aspx

54 Ministry of Commerce, Trade, Tourism, and Transport. Costed Operational Plan 2020-2021. https://www.mcttt.gov.fj/wp-content/uploads/2022/09/2020_2021-COP.pdf

55 Fiji Airports. Corporate Profile. Accessed 16 December 2022. http://airportsfiji.com/corporate_profile.php

56 LogCluster. Fiji Aviation. May 2022. https://dlca.logcluster.org/display/public/DLCA/2.2+Fiji+Aviation

57 Fiji Ports. Facilities. Accessed 16 December 2022. https://www.fijiportsterminal.com/facilities

58 LogCluster. Fiji Port Assessment. May 2022. https://dlca.logcluster.org/display/public/DLCA/2.1.+Fiji+Port+Assessment

59 LogCluster. Fiji Road Network. March 2022. https://dlca.logcluster.org/display/public/DLCA/2.3+Fiji+Road+-Network

60 Fiji Roads Authority. Assets. Accessed 15 December 2022. https://www.fijiroads.org/what-we-do/assets/

61 LogCluster. Fiji Road Network. March 2022. https://dlca.logcluster.org/display/public/DLCA/2.3+Fiji+Road+-Network

62 Asian Development Bank. Roads to Prosperity. 3 March 2022. https://www.adb.org/news/photo-essays/roads-prosperity

63 Tuvuki, Simione. $376.7m set aside for Fiji's road network. FBC News. 15 July 2022. https://www.fbcnews.com.fj/news/budget-2022-23/376-7m-set-aside-for-fijis-road-network/

64 Ministry of Economy. 5-Year & 20-Year NATIONAL DEVELOPMENT PLAN: Transforming Fiji. November 2017. https://www.fiji.gov.fj/getattachment/15b0ba03-825e-47f7-bf69-094ad33004dd/5-Year-20-Year-NATIONAL-DEVELOPMENT-PLAN.aspx

65 EFL. About. Accessed 03 January 2022. https://efl.com.fj/about-us/

66 International Trade Administration. Fiji – Country Commercial Guide: Renewable Energy. 31 July 2022. https://www.trade.gov/country-commercial-guides/fiji-renewable-energy#:~:text=Presently%2C%2045%20percent%20of%20the,percent%20from%20biomass%20and%20wind.

67 UNESCAP. Energy transition pathways for the 2030 agenda: SDG7 roadmap for Fiji. 2021. https://hdl.handle.net/20.500.12870/4282 or https://repository.unescap.org/handle/20.500.12870/4282

68 Ministry of Economy. 5-Year & 20-Year NATIONAL DEVELOPMENT PLAN: Transforming Fiji. November 2017. https://www.fiji.gov.fj/getattachment/15b0ba03-825e-47f7-bf69-094ad33004dd/5-Year-20-Year-NATIONAL-DEVELOPMENT-PLAN.aspx

69 Water Authority of Fiji. About. Accessed 3 January 2023. https://waterauthority.com.fj/about/

70 Water Authority of Fiji. Services. Accessed 3 January 2023. https://waterauthority.com.fj/about/services/

71 Asian Development Bank. Urban Water Supply and Wastewater Management Investment Program (RRP FIJ 49001-002): SD 1 Sector Development Plan. https://www.adb.org/sites/default/files/linked-documents/49001-002-sd-01.pdf

72 Fiji Red Cross Society. Accessed 3 February 2023. https://fijiredcross.org/about-us/

73 Fiji Red Cross Society. Disaster Management. 2 February 2023. https://fijiredcross.org/what-we-do/disaster-management/

74 Chand, Anand, and Naidu, Suwastika. The Role of the Fiji Council of Social Services (FCOSS) in Service Delivery in Fiji: Some Thoughts. Fijian Studies Vol. 8 No. 1. Fiji Institute of Applied Studies. http://fias.org.fj/wp-content/uploads/FS/8(1)/FCOSS.pdf

75 Fiji Commerce and Employers Federation. Business Disaster Resilience Council. https://www.fcef.com.fj/our-councils/business-disaster-resilience/

76 FBDRC. Updates for CBI Newsletter. https://www.connectingbusiness.org/system/files/2020-08/CBi%20-%20Fiji%20FBDRC%20202008.pdf

77 Fiji Commerce and Employers Federation. Business Disaster Resilience Council. https://www.fcef.com.fj/our-councils/business-disaster-resilience/

78 FBDRC. Updates for CBI Newsletter. https://www.connectingbusiness.org/system/files/2020-08/CBi%20-%20Fiji%20FBDRC%20202008.pdf

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France's overseas territories in the Pacific, French Polynesia, New Caledonia, Wallis and Futuna, and Clipperton Island (uninhabited), account for 6,932,775 km^2 (2,676,759 square miles) of Exclusive Economic Zone (EEZ), more than 63% of the French worldwide EEZ. French Polynesia alone makes up 44% of the entire French EEZ. Based on these territories and this expanse of EEZ, France maintains a permanent military presence in New Caledonia and French Polynesia.[1] Estimates suggest that more than 10% of France's island territory in the Pacific could be inundated by rising sea levels by the middle of the 21st century.[2] Given these threats, France maintains several research institutes in these territories to address the various aspects of climate change and how it may impact the region. Table 5 shows several of these institutes and their focus subjects.[3]

France submits its Nationally Determined Contributions and updates to the UNFCCC Secretariat as part of the EU's unified submissions, most recently updated in October 2023. The EU and its member-states jointly committed to a legally binding target of a domestic reduction of net GHG emissions by at least 55% compared to 1990 by 2030.[4]

National organizations are also charged with climate risk monitoring and forecasting for the French territories. Météo-France is the national public meteorology service; it monitors climatic risks and long-term forecasts. There are two Météo-France inter-regional management offices: New Caledonia (also in charge of Wallis and Futuna) and French Polynesia. The Bureau of Geological and Mining Research (offices in New Caledonia and in French Polynesia) assesses the coastal risks in a context of climate change to understand cyclone phenomena, sea swells, and erosion.[5]

The French armed forces stationed in the Pacific, in both French Polynesia and New Caledonia, play a role in disaster response,[6] and France is frequently asked to provide humanitarian assistance to regional states beyond the French territories. The French Armed forces in New Caledonia (FANC) focus on Air-Land operations, and their responsibility zone extends over the whole of the Melanesian region (i.e., New Caledonia, Fiji, Vanuatu, Solomon Islands, and Papua New Guinea). FANC can be mobilized for humanitarian missions within the framework of the FRANZ Agreements or by bilateral request. The French Armed forces in French Polynesia (FAPF) focuses on naval expertise. Within French national territory, coordination between civilian and military forces is provided locally by the zone prefect, and between the ministries of Interior and Defense.

Humanitarian assistance and disaster relief in France's Pacific territories are provided for in the French Organization of Emergency

Research Institute	Location	Area of Research/Work
Louis Malarde Institute	Papeete	Biomedical, marine biotoxins, medical entomology, infectious disease
New Caledonian Agricultural Institute	Nouméa	Sustainable agriculture, agroecology, biodiversity, climate change and adaptation
Centre for Island Research and Environmental Observatory	Moorea	Coral reefs
Pasteur Institute	Nouméa	Medical entomology, arboviruses, leptospirosis, epidemiology
Research Institute for Development	Nouméa	Achieving Sustainable Development Goals
French Research Institute for Exploitation of the Sea	Tahiti	Marine and digital infrastructure, biological and physical resources oceanography and deep-sea ecosystems

Table 5: French Scientific Research Institutes in the Pacific Region

Response (ORSEC; Organisation de la Réponse de Sécurité Civile) plans under the jurisdiction of the French State. In French Polynesia and Wallis and Futuna, the prefect or high commissioner is in charge of the overall governmental response, in partnership with local authorities. They are assisted by the Interministerial Defense and Civil Protection Service, a Defense and Security Area Officer, and the Interministerial Zone Staff.[7] In New Caledonia, village (commune) mayors may trigger the mobilization of civil defense personnel and assets and, as such, act as Director of Operations. The villages have Community Safety Plans. If the response to an event overwhelms a mayor's available resources or if a disaster event covers more than one village, the President of New Caledonia may take oversight over the response. The High Commissioner of France for New Caledonia may oversee ORSEC activities in international waters surrounding the archipelago and may become involved in a response in case of an event that overwhelms local response resources. Such involvement by the High Commissioner requires formal notice to local authorities.[8] Throughout France's Pacific territories, civil security is based on firefighters and on civilians and soldiers attached to the civil security services of the State. Human and material resources are modest. The ratio of firefighters per 1,000 inhabitants is 2-3 for the three territories, compared to 3.7 for the whole of France.[9]

French Polynesia

French Polynesia is comprised of 118 islands in five island groups – Austral Islands, Gambier Islands, Marquesas Islands, Society Islands, and Tuamotu Islands. The Tuamotus and Gambiers are primarily coral atolls or "low" islands. The Society Islands, Marquesas, Australs, and some of the Gambiers are "high" volcanic islands. While French Polynesia is spread across an area larger than continental Europe, the total land area is about 3,521 km^2 (1,359 square miles).[10] A map of French Polynesia is shown in Figure 13.[11]

Archaeological evidence suggests that the Marquesas Islands were settled about 200 BCE by sailors from western Polynesia; these settlers subsequently moved onward to the Hawaiian and Society Islands. Large chieftainships formed on Tahiti, Bora-Bora, and Raiatea. European contact began with a sighting by Ferdinand Magellan in 1521, and mapping and claims followed over the next 300 years; by the late 19th century, all of the islands were under French control and were administered as the French Colony of Oceania. In 1940, voters on the islands chose to side with the Free French government of Charles de Gaulle, and many islanders fought alongside Allied armies during World War II. French Polynesia was made an overseas territory of France in 1946 and gained a territorial assembly as well as representation in the French National Assembly and French Senate. During the second half of the 20th century, movements toward more local autonomy waxed and waned. Meanwhile, the French government conducted nuclear testing in areas of the territory between 1963 and 1996, a year after a test in Mururoa triggered riots in French Polynesia. The territory became autonomous in 1984, and in March 2003, France changed the classification of French Polynesia from overseas territory to overseas collectivity, a declaration followed in 2004 by an increase in

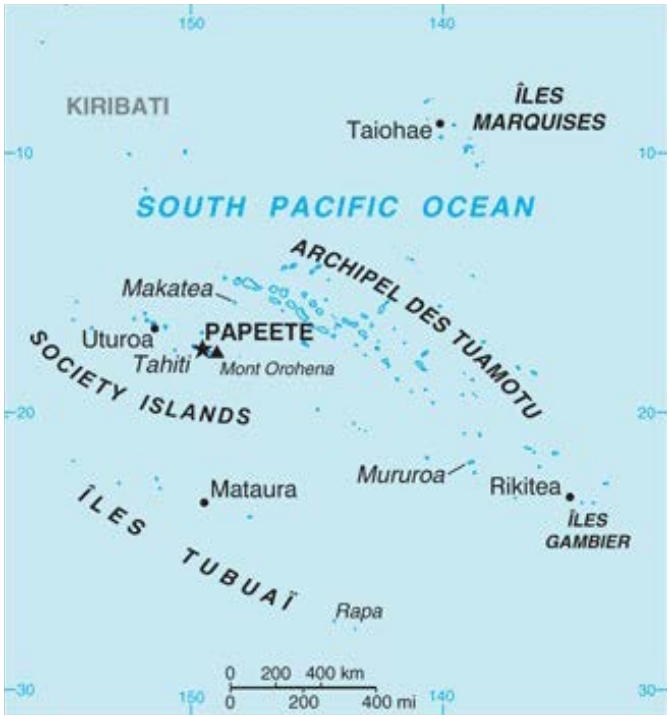


Figure 13: Map of French Polynesia

powers of self-government. Since then, power has rotated among politicians representing different visions of French Polynesia's future in relation to France.[12] In 2013, the UN General Assembly approved a resolution to re-inscribe French Polynesia on its decolonization list from which it had been removed in 1947 by France itself, and France continues to reject UN discussion of an independence referendum for French Polynesia despite a local assembly resolution seeking such a referendum, organized by France.[13]

The total population is around 273,000, but approximately two-thirds live on Tahiti, mainly in the capital, Papeete, and its outskirts. Polynesians comprise 78% of the population, Europeans 12%, and Asians 10%. French is the official language, although Tahitian is commonly used and three other Polynesian languages – Marquesan, Paumotu, and Mangarevan – are also spoken. The coastal and marine areas, where many businesses operate, is the economic and resource heartland. With an estimated per-capita gross domestic product (GDP) of US$16,600, French Polynesia is among the wealthier economies in the South Pacific after Australia, New Zealand, and New Caledonia. The services sector (especially tourism) contributes about 70% of GDP, industry (especially fishing, both coastal and off-shore) contributes 14%, and construction trades 17%. Most businesses are small, with 90% employing just one or two people.[14]

French Polynesia has a legal status in France as an overseas country, which entails greater autonomy than an overseas department or territory. The head of state is the French President, represented by an appointed high commissioner, who is in charge of matters including defense, foreign relations, and justice. The head of government is the president of French Polynesia, who is assisted by the Council of Ministers.[15] The constitution provides for a unicameral French Polynesia Assembly, which chooses the President (of French Polynesia) from among its members. The country is represented in the French Parliament by two deputies and two senators.[16]

Hazards and Climate Change

For five decades, from 1970 to 2023, French Polynesia experienced only eight reported disasters from natural hazards, including four tropical cyclones, three landslides, and a flood, according to EM-DAT, the international disaster database.[17] The French Polynesia islands are frequently subject to atmospheric depressions and cyclones, leading to high winds, heavy rain, flooding, and landslides. Located in a seismically active zone, French Polynesia also faces some risk from earthquakes and tsunamis.

Tropical cyclones pose a risk, particularly from November to March, which is the typical season for hurricanes or tropical cyclones for the South Pacific. Cyclone Oli in January-February 2010 was devastating, bringing widespread flooding and affecting Tubuai island (Australes archipelago), Bora Bora, Maupiti, Raiatea, Tahaa, Huahine islands (Iles sous le Vent group), Tahiti, Moorea, and Maiao island (Iles du vent group).[18] In January 2015, Cyclone Niko, a Category One storm, caused minimal damage but led to school closures in Moorea as it traversed between the Society Islands and the Tuamotu archipelago.[19]

Flooding is among the main risks from natural hazards – including torrential floods with higher flow speeds – in French Polynesia.[20] In January 2017, a state of natural disaster was declared after heavy rain hit Tahiti and Moorea and led to widespread flooding that substantially damaged homes and infrastructure. Many streets flooded in Papeete, and a bridge collapse cut the main road around the island of Tahiti. Thousands of households lost electricity and the international airport temporarily closed for crews to remove debris from the runway.[21] In February 2017, the flooding led to the death of a firefighter clearing debris in Faa'a.[22] In June 2017, flooding and landslides in the Marquesas Islands caused nearly US$1 million worth of damage. Three families on Nuku Hiva, the largest of the islands, were evacuated from their homes near an insecure riverbank. According to Benoit Kautai, the mayor of Nuku Hiva, rain had persisted intermittently for four months and had saturated the land and caused landslides across the archipelago; it also destroyed crops.[23]

French Polynesia is also vulnerable to certain disease outbreaks. As with much of the world, it was significantly affected by the COVID-19 pandemic. In contrast with Pacific Island nations that delayed local outbreaks by closing their borders, COVID-19 first reached French Polynesia in March 2020,[24] and the islands experienced significant waves of local transmission from September 2020 to January 2021, in August 2021, and in February 2022.[25] As of 18 October 2023, there had been 78,642 confirmed cases of COVID-19 with 649 deaths.[26] French Polynesia also experienced a significant outbreak of dengue in 2019, recording at least 2,373 cases of dengue fever that year.[27]

Given the islands' exposure to hydrometeorological hazards, French Polynesia is at risk of worse impacts from the influence of climate change on key hazards. Table 6 details some of the trends and projections for key phenomena related to climate change.[28]

Government Institutions, Policies, and Plans for Disasters and Climate Change

French Polynesia and other French territories in the Pacific are on the front line of feeling climate change's impacts in terms of coastal erosion, rising sea levels, and impacted maritime environments.

The launch forum for the development of the French Polynesia Climate Plan was held 4-6 July 2022. The open forum for the plan was held 22 November 2022 with approximately 100 participants, including country services, local authorities, associations, and economic actors. These fora contributed to developing the plan's development, with the co-construction phase of a concrete action plan anticipated by the end of 2023.[29] As part of the resulting French Polynesia Climate Plan (PCPF) 2022-2030, French Polynesia has ambitiously agreed to drastically reduce its GHG emissions. Its goal is to reduce its emissions by 50% by 2030, a target that requires an unprecedented acceleration of efforts to

Phenomenon	Trend	Projections	Impacts
Temperature	Temperature increase has accelerated since 1970; observed rise of 0.39°C (0.7°F) per decade for the period 1976-2003 in Tahiti Fava	Overall rise in surface temperatures expected, with variations in different geographic areas (+2.5°C [4.5°F] to the north of the Marquesas and +1.5°C [2.7°F] in the Southern Territories)	Impacts on human health an agricultural productivity; rise in vector-borne disease incidence
Rainfall	Since the mid-1970s, annual precipitation has increased by 50-100%, as measured by stations on the Marquesas	There are no specific precipitation projections for various islands; IPCC assessments show an increase in rainfall by 2100 in the north of the Marquesas (5-20%) during all seasons, a modest increase in precipitation on the Society Islands (5-15%) during the dry season (June, July, and August), and a modest increase in precipitation (5-15%) in the south of the Southern Territories during the wet season (December, January, and February); in the east of the Tuamotus, a large decrease in rainfall (-5-40%) during the wet season is projected	Nuisance flooding, changes to the growing season, contamination of drinking water, and increases in water- and vector-borne disease incidence
Sea level	High exposure and frequent storm landfalls; peak season is November-April	Projections indicate an average increase of 35 cm (13.78 inches) by 2100	Higher wave height during storms; coastal erosion and nuisance flooding

Table 6: Climate Change-Related Phenomena and Impacts (French Polynesia)

reduce the ecological footprint of activities and ensure a harmonious development path. The PCPF's pillars and sub-areas are:

PILLAR 1: DEVELOPING RESILIENT LOCAL TERRITORIES
- 1.1 - Promote Local Development and Urban Planning
- 1.2 - Leading by Example by Decentralizing Public Services
- 1.3 - Develop Local Circular Economy Sectors Throughout the Country
- 1.4 - Develop a Strategy for Infrastructure and Alternative Mobility Offers
- 1.5 - Building Sober and Resilient Building
- 1.6 - Strengthening and Improving Energy Infrastructure

PILLAR 2 - KNOWING, PRESERVING, RESTORING, AND ENHANCING NATURAL RESOURCES
- 2.1 - Apprehending, Characterizing, and Managing Climate Risks
- 2.2 - Preserving Terrestrial and Freshwater Ecosystems
- 2.3 - Preserving Coastal Ecosystems
- 2.4 - Preserving Marine Ecosystems

PILLAR 3 - LIVING AND CONSUMING SUSTAINABLY
- 3.1 - Controlling the Consumption of Goods and Services
- 3.2 - Changing Eating Behaviors
- 3.3 - Developing Local Processing and Distribution
- 3.4 - Controlling Energy Demand
- 3.5 - Optimizing Transport Efficiency
- 3.6 - Controlling the Production and Recovery Of Waste

PILLAR 4 - LOCAL AND CARBON-FREE PRODUCTION
- 4.1 - Accelerating Transitions in Local Food Production
- 4.2 - Reducing Dependence on Fenua Through a Circular Economy
- 4.3 - Supporting the Transition of Activities and an Employment/Training Policy
- 4.4 - Deploying Local Renewable Energies
- 4.5 - Developing Sustainable and Inclusive Tourism

PILLAR 5 - DEPLOYING CROSS-FUNCTIONAL GOVERNANCE
- 5.1 - Managing the Plan in a Cross-Functional Manner
- 5.2 - Supporting Change
- 5.3 - Identify Financial Levers for the Transition[30]

Following the PCPF, researchers have identified five main areas of action to better integrate the issue of climate change:

- Strengthening public risk management policies through better integration of climate risks (hazards and anthropogenic factors) and continuous adjustment of institutional framework documents.
- Promoting a "localized" science of climate risks through approaches that consider all the components of climate risks and that rely on new methods (expert judgment) that make it possible to renew the way in which climate risk is understood.
- Integrating the principle of ecological solidarity into the law, to allow the regulatory authorities to organize future development choices fully considering the climate issue.
- Renewing the approach to territorial planning by working to build a shared vision of "the territory we want" in a context of climate change and on an inter-generational scale.
- Raising awareness of climate risk at all levels of society, from national actors to local communities, by integrating the issue into school curricula, by encouraging a reconnection of young generations to their environment, and by accelerating the training of decision-makers and technical actors.[31]

The efforts of French Polynesia, as well as New Caledonia, to mitigate against and adapt to climate change are aided by a dedicated fund. Designed to help French communities in the

Pacific adapt to climate change, the "Green Fund equivalent" has been in operation since May 2017. It was created by French Parliament at the end of 2016 within the budget of the Ministry of Overseas Territories, and it was strongly supported by Polynesian and New Caledonian members of parliament. Its creation was a response to these areas being excluded from the Green Climate Fund (GCF). Developing countries, some of which are particularly exposed to climate change, have access to the GCF to help them ensure their energy transition. But the French autonomous collectivities of French Polynesia and New Caledonia were excluded. Thus, an equivalent fund was created, endowed with €13.5 million (US$14.3 million), which should make it possible to release a total of €100 million (US$106 million) in loans to the local authorities concerned, to fight against the effects of global warming.[32]

Under the Directorate of Construction and Development (Direction de la Construction et de L'aménagement), Natural Risk Prevention Plans (Plans de Prévention des Risques naturels, PPR) regulate land use with regard to natural risks to the area, including building bans or regulations. The purpose is to analyze the hazards in an area, determine areas exposed to risk, and prioritize development in risk-free or low-risk areas, or introduce urban planning, construction, and management requirements in higher-risk areas.[33] PPRs are established for Punaauia, Rimatara, and Rurutu. The Good Practice Guide for Coastal Construction and Development declares that, as of 1 January 2023, there is a building elevation mandate of 0.5 m (1.6 feet) above the natural terrain for areas deemed at low risk of extreme weather events including cyclones, and 1.0 m (3.3 feet) above the natural terrain for areas deemed at medium risk. High risk areas face a building ban.[34]

French Polynesia also supports other Pacific Island countries and territories during large-scale disasters and international responses. After Tropical Cyclone Yasa struck Fiji in December 2020, French Polynesia sent disaster relief goods valued at more than US$187,000. The 64 tons of relief items, including building materials and construction equipment, arrived by ship on 4 January 2021 and was coordinated through the Fiji Ministry of Foreign Affairs.[35]

In 2016, French Polynesia announced the creation of Taini Atea, a marine management area covering its entire EEZ, which is an area of 5 million km^2 (1.9 million square miles), nearly half the size of Europe. Taina Atea will be managed according to the traditional Rāhui legal system.[36]

The Pacific Community (SPC) in 2011 started an initiative to assist French Polynesia in mitigating the risk of natural disasters, focused on the Marquesas archipelago, which is exposed to tsunamis, and the Tuamotu archipelago, which experiences cyclonic waves. The initiative was part of a larger regional project aimed at reducing disaster risk in Pacific Overseas Countries and Territories (New Caledonia, French Polynesia, Wallis and Futuna, and Pitcairn (a territory of the UK), managed by SPC's Applied Geoscience and Technology Division.[37]

SPC's Pacific Territories' Initiative for Regional Management of the Environment (INTEGRE) provides support for integrated coastal management initiatives in the French Pacific overseas countries and territories of French Polynesia, New Caledonia, and Wallis and Futuna and the Pitcairn Islands. In French Polynesia, INTEGRE efforts include:

- Raiatea-Taha'a islands and their lagoon -- Assistance to the islands' sustainable economic development in agriculture, fisheries, and tourism and support for reducing pollution from business operations and developing sustainable economic activities.
- Tahiti Peninsula – Helping develop sustainable lagoon use by reducing human pressure and developing sustainable and innovative economic activities.
- Opunoho Bay and Valley – Helping develop sustainable tourism by implementing environmental protection activities on the site, developing ecotourism, and improving the community's living standards.

High Commissioner's Office, Civil Defense Directorate

59 avenue Pouvana'a a Oopa (en face du monument aux morts)
BP 115 - 98713 Papeete - Tahiti - Polynésie française
Tel: 289 40 46 85 17
Tel: 689 40 468 700 (24-hours, 7-days each week)
Emergency Tel: 18

Early Warning Systems

A disaster exercise for cyclone response occurs on an annual basis in French Polynesia. The High Commission organizes the cyclone exercises to better coordinate all the actors who would be mobilized in the event of natural disasters in the country. The annual cyclone exercise occurs every year before the arrival of the "hot" season (November to April). The High Commission mobilizes its troops as well as those of the country and associations for the protection of people and property, with the participation of gendarmes, national police, Météo-France, civil protection associations, and firefighters.[38]

Météo-France provides weather reports and alerts for French Polynesia, including monitoring and forecasting for tropical cyclones. Cyclone alert stages include:

- Standby – Absence of cyclone threat in the next 72 hours
- Cyclone Warning – a cyclonic disturbance poses a potential threat to part of French Polynesia in the next 72 hours.
- Orange Cyclone Pre-Warning – Cyclone threat poses a danger within 48 hours. This alert level may be maintained after the tropical cyclone passes, if it is envisaged it may return in the next 48 hours.
- Red Cyclone Warning – Indicates the cyclonic disturbance will affect part of French Polynesia in the next 12 to 18 hours with a risk of cyclonic conditions (average winds above 100 km per hour / 62 miles per hour). A driving ban will be announced six hours before this measure is activated, to allow the population to return to home or otherwise reach shelter.
- The Backup Phase - Purple Stage – After the passage of the cyclone, this safeguard phase is used if necessary to alert of indirect dangers remaining in the area, such as road networks remaining totally or partially impassable, uprooted trees, downed electrical wires, floods, landslides, etc. The aim of this phase is to assess damage, reactivate as many networks as possible, or plan relief for an island that has suffered major damage. Population movement bans can remain active. During this phase, deployment of a Reconnaissance and Evaluation Team and rescue detachments may be planned or implemented.

Cyclone alert phases for French Polynesia are managed according to the zones depicted in Figure 14.[39]

The Polynesian Centre for Tsunami Prevention (Centre Polynesien de Prevention des Tsunamis), located at the Geophysics Laboratory in Tahiti, participates in the tsunami warning system. The Centre monitors earthquakes that can generate potentially threatening tsunamis and issues an estimate of the arrival times and expected alert levels to the Directorate of Civil Protection.[40] In November 2022, French Polynesia was among 18 Pacific countries and territories that tested new early warning procedures for volcanic eruption-induced tsunamis. The test was part of a 2-hour live regional tabletop exercise, PacWave22-PICT, the first exercise fully dedicated to Pacific Island countries and territories, as part of the larger Pacific Wave 2022 Exercise. The Polynesian Centre for Tsunami Prevention and the UN Educational, Scientific, and Cultural Organization (UNESCO) hosted a WhatsApp group as part of information-sharing methods that were exercised. The new warning procedures for volcanically induced tsunamis were developed after the January 2022 eruption of the Hunga-Tonga Hunga-Ha'apai volcano and ensuing tsunami, which was devastating for Tonga.[41] In 2016, a 600-Watt tsunami siren was installed on the island of Maiao in the Society

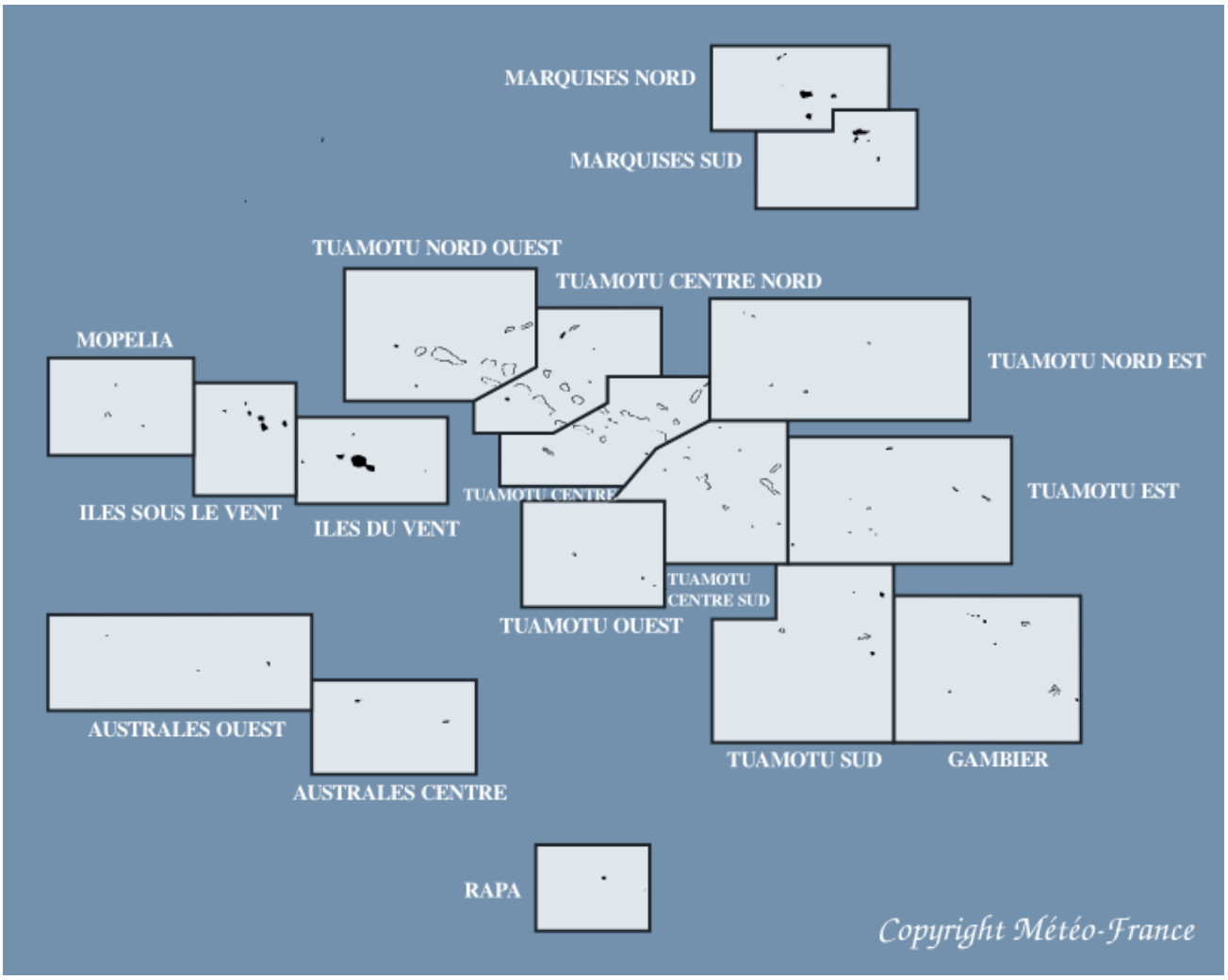


Figure 14: French Polynesia Geographical Zones for Managing Cyclone Alert Phases

Islands archipelago, as part of the larger project of Tsunami Early Warning System in Different Pacific Areas.[42]

Météo-France

BP 6005, 98702 FAAA, TAHITI, POLYNESIE FRANCAISE
Tel: 689 40 80 33 00
Email: *contact.polynesie-francaise@meteo.fr*

Infrastructure

Beginning in the mid-20th century, transportation facilities were constructed or greatly upgraded, including the development of a modern port in Papeete. Interisland shipping remains largely dependent on local unscheduled schooner sailings.[43]

There are more than 50 airports throughout the islands with only two listed as having runways over 3,000 m (9,843 feet); more than a dozen runways are still unpaved.[44] Development of outer-island economies has been boosted in the past half-century by construction of an international airport at Faaa, and the establishment of air services with Moorea, the Îles Sous le Vent, the western Tuamotus, the Marquesas, and the Tubuais.

French Polynesia has a relatively modest road network, but the great majority of roads are paved or stone-surfaced.[45] An early 2000s survey found a total of 2,590km (1,609 miles) of roads throughout the islands; of this total, more than 800km (497 miles) remained unpaved.[46]

Some estimates found that, in 2020, only 5% of total energy supply included renewables, and of the total renewable energy supply,

hydro accounted for nearly 80% with solar and bioenergy rounding out the supply. In terms of electricity generation, some 60% continues to rely on fossil fuels. Total installed generation capacity as of 2021 was 624 Gigawatt-hours (GWh), 148 GWh of which was renewable, dominated by hydro.[47]

Civil Society Partners

The French Red Cross (Croix-Rouge Française) has a network of more than 100,000 volunteers who assist in response to disasters in France, including its overseas departments and territories, such as French Polynesia.[48] The organization also provides training, through which it helps professionals in French Polynesia improve their skills in educational and social support, social service assistance, social and family economy advising, specialized education, educational instruction, and social and family intervention.[49]

Croix-Rouge Française – Territorial Delegation in French Polynesia

233 rue Pater – Pirae – Tahiti
Ancienne Maison des jeunes, Quartier Pater, Pirae
BP 4 492 – 98 713 – Papeete – Tahiti
Tel: 689 40 420 276 or 689 87 782 779
Facebook: CroixRougePolynesieFrancaise

The Association for the Right to Economic Initiative (Association pour le Droit à l'Initiative Economique, L'ADIE) has worked in French Polynesia since 2009 to help people start their own businesses through supported microcredit, including a focus in recent years on assisting families who have lost jobs. L'ADIE has 11 branches, 30 offices, and a regional office in French Polynesia. In 2021, French Polynesia initiated a framework cooperation agreement with the U.S. NGO Nature Conservancy, to improve its knowledge and strengthen its decision-making tools relating to the fragile marine environment that widely provides residents with food security and income.[50]

Agence Adie

Rue Paul Gauguin 20
Quartier du Commerce, 2eme etage, immeubles Gauguin
98714 Papeete
Tel: 689 40 53 44 23

French Polynesia has numerous environmental and ecologically oriented organizations:

- Manu Iti Faa Ora, formerly known as Colibris Tahiti, promotes sustainable development.
- Bio Fetia promotes organic farming and fair trade.
- The Polynesian Ornithological Society, "MANU," works for the protection of birds, their habitats and biodiversity by working with the population within the framework of a sustainable management of natural resources.
- The Oceania association aims to improve knowledge and protection of cetaceans (whales, dolphins, and porpoises) by supporting research, conservation, awareness-raising, and training.
- PEW Polynesia is the Polynesian establishment of the Pew Charitable Trusts, a U.S. NGO whose Environment Department proposes scientifically based policies to protect oceans, preserve wild lands, and promote clean energy. PEW Polynesia specializes in marine protection and is part of PEW's Global Ocean Legacy program.
- Tahiti Heritage promotes the natural and cultural heritage of French Polynesia through publication of articles and photos, field explorations, education in schools, and communication with the public.
- Te Fetia o Te Mau Mato develops, maintains, and marks hiking routes while also contributing to the protection of the environment.
- Te Mana o Te Moana works to protect the marine environment and raise public awareness through research, conservation, communication, and education activities. It manages the Moorea Sea Turtle Clinic, authorized by ministerial decree, and is

a member of the International Union for Conservation of Nature, Global Ocean Network, Blue Mission Foundation, WWF France, France Nature Environnement, Polynesian Maritime Cluster, Polynesian Union for Youth, and Society for Oceanic Studies.

- Te Ora Hau works to prevent and fight against noise pollution, providing technical support and encouraging respect for the environment.
- Te Rau Atiati A Tau A Hiti Noa Tu works for the protection of nature throughout French Polynesia.
- Tiai Moana - Sea Shepherd Tahiti works for the protection of marine life. It is affiliated with the international NGO Sea Shepherd Conservation Society, which works to stop the killing of marine wildlife and the destruction of their habitats.
- The Marine Mammal Study Group works to protect marine mammals.
- Tiai Fenua - Nana Sac Plastique works against the distribution of single-use plastic.
- Pae Pae No Te Ora raises public awareness on respecting beaches and lagoons and works to preserve lagoons by monitoring the rivers and streams flowing in and through the establishment of regulated fishing zones and coral restoration projects.
- Tamarii Fishermen's Point promotes the protection of the lagoon and its environment at Tahiti's Pointe des Pêcheurs.
- Tuihana safeguards natural, cultural, and religious sites on the island of Raiatea and neighboring islands of Taha'a and Huahine.
- Ia Vai Ma Noa Bora Bora supports socially, environmentally, and economically sustainable development and sponsors folklore, sporting, cultural, and religious events.
- The Association for Scientific and Historical Research About Eiao works to develop knowledge of Eiao Island and protect its biodiversity and archaeological and historical heritage.
- Vai Ku'a I Te Manu protects and promotes the environment of Ua Huka, including its birds and their habitats.
- Fatu Fenua No Makatea organizes projects to protect the biodiversity, environment, and tangible and intangible cultural heritage of the island of Makatea, the only elevated atoll in the Tuamotu archipelago.
- Rahui Nui No Tuhaa Pae promotes the creation and future management of a large marine area of the Austral Islands.
- Rima'ura Association protects and promotes the environment of Rimatara, including its birds and their habitats.
- Fenua Action–Health–Land–Education promotes the links between land, sea, health, and education with a focus on hygienic and dietary measures.[51]

New Caledonia

New Caledonia (Nouvelle-Calédonie) is a French collectivity in the southwestern Pacific Ocean, about 1,500 km (900 miles) east of Australia. The capital, Nouméa, is located on the island of New Caledonia, referred to as the Grande Terre (Mainland). The main island is the largest, is surrounded by coral reef, and contains about nine-tenths of the territory's total population of 273,400 people. About three-fifths of the total population live in the Nouméa area. The main island is some 50 km (30 miles) wide and 500 km (310 miles) long. It is divided by mountain ranges, with the east coast descending steeply to the sea in many places, and the west coast sloping more gradually. Other islands include the Loyalty Islands, which consist of the three main islands - Ouvéa, Lifou, and Maré - and numerous small islands, such as the Bélep Islands and the Île des Pins. These islands form more than 99% of the total land area, with the remainder made up of a number of far-flung, uninhabited islets such as Huon and Surprise islands in the D'Entrecasteaux Reefs, the atolls of the Chesterfield Islands and the Bellona Reefs, Walpole Island, Beautemps-Beaupré Atoll, and Astrolabe Reefs. France also claims Hunter and Matthew islands, but Vanuatu disputes that claim. UNESCO designated New Caledonia's lagoons, with their diverse reefs and associated ecosystems, as a World Heritage site in 2008.[52]

Figure 15 shows a map of New Caledonia.[53]

Melanesians make up more than two-fifths of the population and Europeans about one-third, and two distinct ways of life – kanak (Melanesian) and caldoche (European) – have arisen among them. The kanak identity is based on clan membership, and the caldoche way of life is essentially integrated into a cash economy. There is no official language, but French and Kanak have special legal recognition while 30 Melanesian languages are spoken.[54]

Melanesians settled the islands about 3000 BCE and developed their society relatively separately from outside influence until the 18th century. In 1774, Britain's Captain Cook landed at Balade, on the east coast of the main island, which he subsequently named New Caledonia. Cook's arrival was followed by the French navigator Antoine de Bruni, chevalier d'Entrecasteaux, in 1793, but regular contact with Europeans would not begin until 1841 when sandalwood traders from Australia and various missionaries arrived. France took possession of most of present-day New Caledonia in 1853, and the colony was frequently subject to local-colonial conflict over land and taxation as French authorities had alienated large areas of Melanesian land and relegated the inhabitants to reserves where forced labor, limitations on travel, and curfews were the rule. Even as they controlled the indigenous community, French colonial authorities brought in 22,000 French convicts and 60,000 indentured laborers. Most of the free white settlers were either former members of the French administration and armed forces, settlers from Australia and New Zealand, or former sugar planters from Réunion. The last major wave of white and Polynesian settlers occurred in the years ahead of and during the nickel boom of 1969–1972, and at this time, Melanesians became a minority in their own land. After 1953, all New Caledonians, regardless of ethnic origin, became French citizens, and Melanesians joined Europeans to seek full self-government in local affairs. They won a Territorial Assembly within a few years, but afterward, Melanesian and European voters separated over moving from self-government to independence. Since the 1980s, the independence movement has been led by the Kanak Socialist National Liberation Front (Front de Libération Nationale Kanak et Socialiste; FLNKS). After tri-partite negotiations, the Nouméa Accord of 1998 led to a change of status and the promise of holding of as many as three referendums on independence, to be deferred for 15–20 years. The first referendum, on 4 November 2018, resulted in a rejection of independence. The second referendum, on 4 October 2020, also resulted in rejection of independence, albeit by a slightly smaller margin than the 2018 vote. The third referendum was scheduled for 12 December 2021, and it went forward despite lingering pandemic controls and calls by pro-independence factions to delay. After pro-independence parties called a boycott, turnout was only 44%, and 96% of voters rejected independence.[55]



Figure 15: Map of New Caledonia

As of 2023, New Caledonia sends three representatives to the French parliament: two to the National Assembly and one to the Senate. The French President is the head of state, and the heads of government are a high commissioner appointed by France and the president of the New Caledonian government.[56] The New Caledonian

government is comprised of 30 directorates and services. Among them, 23 are entirely under the jurisdiction of the New Caledonia's government and seven are mixed in that they are placed under the authority of both the French State and New Caledonian government.[57] For internal administration, New Caledonia is divided into three provinces – Sud, Nord, and Îles Loyauté – that are further divided into 32 communes (villages).[58]

Hazards and Climate Change

Disaster risks for New Caledonia include storms, epidemics, and fire. The archipelago lies just west of the seismically active Vanuatu subduction zone where strong earthquakes are frequently produced. The earthquakes may pose a threat to the New Caledonian population, particularly when a tsunami is triggered. The coasts are also vulnerable to other inundation events such as wind waves, strong swells, and storm surges, all of which may cause coastal erosion, which enhances the baseline threat to human life and infrastructure when climate change-induced sea level rise is also considered.[59]

The vast majority of natural hazards experienced by New Caledonia in the past four decades are storms, followed by epidemic. Météo-France maintains a list of storms, including tropical depressions, that have caused damage in New Caledonia in the past 40 years; as of December 2023, there were 39 named storms on the list.[60] Figure 16 shows the average annual natural hazard occurrence from 1980-2020, during which time New Caledonia experienced six storms, according to the World Bank's Climate Change Knowledge Portal.[61]

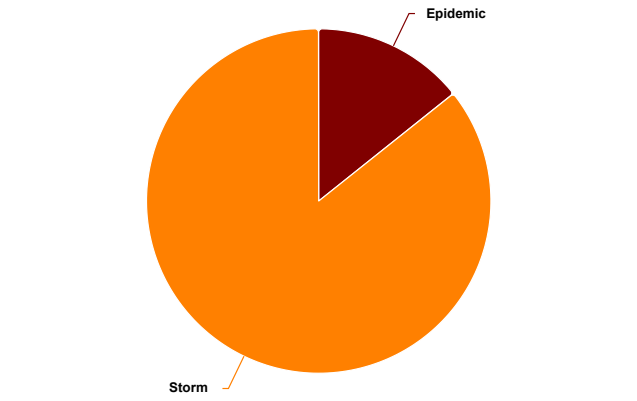


Figure 16: New Caledonia's Average Annual Natural Hazard Occurrence (1980-2020)

New Caledonia is also vulnerable to the effects of climate change, particularly its diverse marine ecosystem. The highest priorities for CCA, according to the UNESCAP Risk and Resilience Portal, include making water resources management more resilient, improving dryland agriculture crop production, and strengthening early warning systems.[62] Table 7 details some of the trends and projections for key phenomena related to climate change.[63]

Government Institutions, Policies, and Plans for Disasters and Climate Change

The Directorate of Civil Security and Risk Management (La Direction de la Sécurité Civile et Gestion des Risques) was created in 2014 and consists of four services:

- The Technological and Natural Risk Planning Department deals with major planning documents and risk management.
- The Operations and Risk Management Department organizes and develops New Caledonia's government operations center and civil security response.
- The Technical Assistance Service for civil security actors supports the improvement of the municipal civil security response, develops the network of approved civil security associations, advises municipalities on preventive medicine, hygiene, and occupational safety for firefighters.
- The Training Department manages the civil security training center, develops training and certification standards for civil security actors, and carries out initial training. It also leads and coordinates the network of associations and organizations that contribute to first aid training and the validation of training standards.[64]

The organization chart for the Directorate of Civil Security and Risk Management is shown in Figure 17.[65]

New Caledonia has also taken steps toward

Phenomenon	Trend	Projections	Impacts
Temperature	The hot season extends across 3.4 months, and the cool season across 3.1 months	An increase in temperature highs of 1°C (°F) under mid-range emissions scenarios and 1.4°C (°F) under high-emissions scenarios is expected for the period 2040–2060; an increase of 1.5°C (°F) under mid-range scenarios and 3.6°C (°F) under pessimistic scenarios is expected for the period 2080-2100; the hot season will extend by 2-6 months depending on emissions pathway	Impacts on human health an agricultural productivity; rise in vector-borne disease incidence
Rainfall	Average annual rainfall of 5mm (inches) per day; 70% of total rainfall occurs within 15 days; over the past 50 fears, there has been some evidence of a slight decrease in total rainfall	Increase in precipitation of up to 80mm (inches) each year for the period 2040-2060, and 33-73 mm (inches) each year for the period 2080-2100, depending on emissions scenario; dry season expected to extend by 2-6 months during the period 2080-2100, accompanied by an increase of almost 50% in rainfall during the wet season under high-emissions scenarios	Nuisance flooding, contamination of drinking water, and increases in water- and vector-borne disease incidence
Sea level	No indication of recent sea level rise	1-2m (feet) rise by 2100	Coastal erosion and flooding of key economic and cultural assets

Table 7: Climate Change-Related Phenomena and Impacts (New Caledonia)

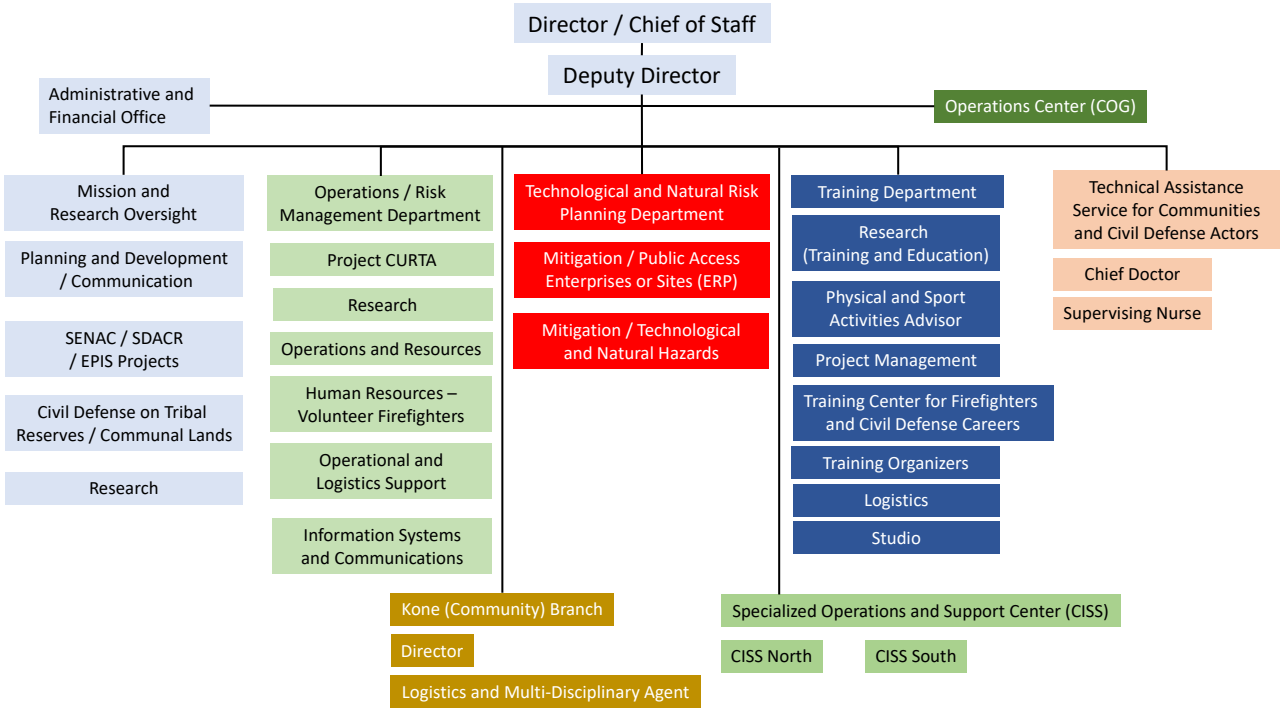


Figure 17: Organization of New Caledonia's Directorate of Civil Security and Risk Management

environmental preservation and protecting its marine ecosystem. In April 2014, the New Caledonian government created the Natural Park of the Coral Sea, which covers the territory's entire EEZ, about 1.3 million km^2 (501,932 square miles). Since then, the government has worked with the Pew Charitable Trusts, local NGOs, scientists, businesses, and the community to develop a management plan that will define the regions of the park, how they will be used, and their levels of protection. The territory's coral reefs and surrounding tropical lagoons form one of the healthiest, most extensive reef systems in the world. Its waters more than 9,300 identified species, including 1,700 species of fish, 473 species of coral, 48 species of sharks, 27 species of marine mammals, 32 species of seabirds, and four species of sea turtles. In 2018, the New Caledonia government voted to set up marine protected areas (MPA) surrounding five reefs—Chesterfield, Bellona, Astrolabe, Petrie, and Entrecasteaux. This would safeguard 28,000 km^2 (10,810 square miles) of waters from extractive activity.[66] However, these MPAs cover only about 2% of the territory's Natural Park of the Coral Sea.[67]

On 18 October 2023, the New Caledonian government voted to designated an additional 7.6% of its EEZ to be highly protected, now prohibiting industrial activities in 10% of the Natural Park of the Coral Sea that encompasses its entire EEZ.[68] New Caledonia residents indicated support during a public consultation period for the expanded protections, which consist of multiple marine protected areas that are designated as highly protected, prohibiting extractive activities such as mining, drilling, and fishing. Industrial activity is permitted in the rest of the park. Various stakeholders involved in the consultation process include the government, fishing industry, NGOs, and indigenous Kanak communities, who worked in collaboration to establish the new protections. New Caledonia's decision to highly protect 10% of its EEZ helps support the implementation of the Kunming-Montreal Global Biodiversity Framework, an agreement that calls for the protection of 30% of the world's ocean by 2030.[69]

Direction de la Sécurité Civile et Gestion des Risques

7 rue Paul DOUMER - Bâtiment N, BP M2, 98849 Nouméa Cedex
Tel: 687 20 77 00

Early Warning Systems

Early warning for several hazards and other weather services for New Caledonia is provided Météo-France. The Météo-France warnings and information for tropical depressions and cyclones follow the classification matrix shown in Figure 18.[70]

Wildfire risk is calculated twice a day and posted on Météo-France's New Caledonia website around 0830 local time for the current day and around 1700 local time for the next day. A map is color coded in accordance with the calculated fire risk. Red indicates extreme fire risk, orange indicates very high risk, yellow indicates high risk, and green indicates low to moderate risk of fire. Figure 19 shows the fire risk posted the morning of 30 October 2023.[71]

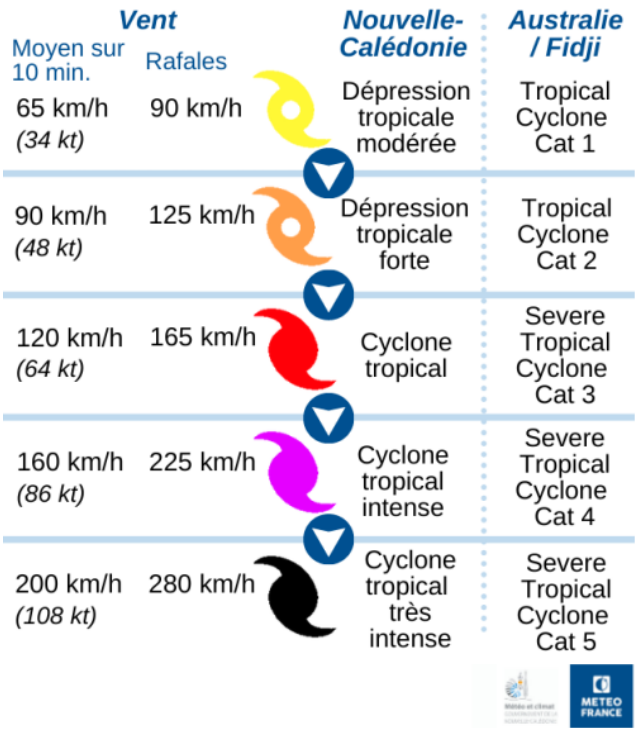


Figure 18: Météo-France's Classifications for Cyclones in New Caledonia

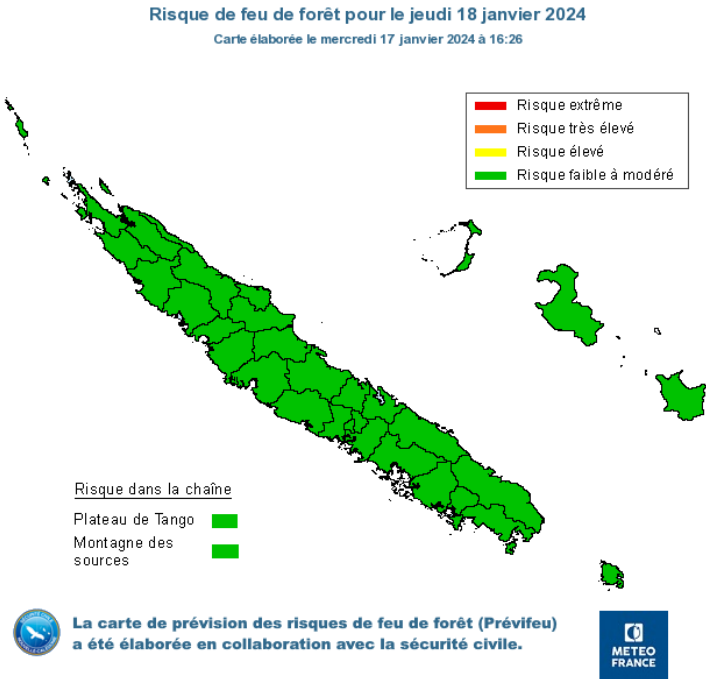


Figure 19: New Caledonia Fire Risk, Example Shown for 30 October 2023

Météo-France Nouvelle-Calédonie
5 rue Vincent Auriol - Faubourg Blanchot
BP M2 - 98849 Noumea Cedex
Tel: 687 27 93 00

Infrastructure

The main island of New Caledonia and the inhabited outer islands are ringed by roads; crossroads penetrate to the centers of the islands. The port of Nouméa handles the majority of ship traffic. Regular service is available for cargo and passengers. Magenta Airport near Nouméa is the international airport and is connected to outer islands.

Hydroelectric power from Yaté and Néaoua provides nearly half of New Caledonia's energy needs; the remainder is produced from thermal generators burning imported fuel oil. More than three-fourths of the energy produced is used in nickel refining.[72]

Civil Society Partners

New Caledonia has several approved organizations categorized as civil security associations. Their authorizations specify the types of missions they are approved for, ranging from rescue operations; support, assist, or protect the affected population; supervision of volunteers during actions supporting affected populations; emergency preparedness measures; and prevention, information, and risk awareness.[73] The following civil security associations are approved in New Caledonia with current approval orders through 2026:

Territorial delegation of the French Red Cross in New Caledonia (Croix Rouge)
MONTRAVEL - BP 130, 26 Rue du Docteur Collard, 98800 NOUMEA
Tel: 06 87 27 21 76
Email: *dt.nouvellecaledonie@croix-rouge.fr*

Order of Malta in New Caledonia (Ordre de Malte en Nouvelle-Calédonie)
Email: *yann.carpentier@lagoon.nc*

Civil Protection of New Caledonia (Protection Civile de Nouvelle-Calédonie)
Email: *adpcnc@lagoon.nc*

Association of Radio Amateurs in New Caledonia (Association des Radioamateurs en Nouvelle-Calédonie)
Email: *samvetea@gmail.com*
WWF: *secretariat@wwf.nc*

Center for Environmental Initiation of New Caledonia (Centre d'initiation à l'environnement de la Nouvelle-Calédonie):
Email: *cie@lagoon.nc*

Dumbéa Rivière Vivant (Dumbéa Living River):
Email: *dumbea.rivierevivante@gmail.com*

Territorial Committee of French First Aid Workers (Croix Blanche, Comité territorial des secouristes français):
Email: *acb-provincesud@outlook.fr*
or *ludaur@corail.nc*

Environmental Observatory (Observatoire de l'environnement):
Email: *secretariat@oeil.nc*[74]

The Pew Charitable Trusts support marine protection efforts in New Caledonia. The Pew Bertarelli Ocean Legacy Project has collaborated with New Caledonia's government, fishing industry, local organizations, and Indigenous Kanak communities to increase protections within the park's borders and to establish effective park management.

Wallis and Futuna

The Territory of the Wallis and Futuna Islands (Territoire des Îles Wallis et Futuna) is a self-governing overseas collectivity of France in the west-central Pacific Ocean. Geographically part of western Polynesia, it consists of the Wallis Islands (Uvea and surrounding islets) and the Horne Islands (Futuna and Alofi). The capital is Matâ'utu, on Uvea. The total land area is 140 km^2 (54 square miles).[75] Figure 20 shows a map of Wallis and Futuna.[76]

The population is 11,558, per the 2018 census.[77] The indigenous people are Polynesians, but there are significant differences between the languages and peoples of Uvea and the Futuna islands; Uveans share historical and cultural links with Tonga while Futunans share language and cultural links with Samoa. Villages are dispersed on the islands, mainly on the coast. About two-thirds of the population lives on Uvea, but there are no urban areas. Due to economic opportunities, the Uvean and Futunan population in New Caledonia is larger than that within the home islands, with the majority of expatriates in New Caledonia being Uveans. About 80% of the Wallis and Futuna population engages in subsistence farming. Most revenue comes from French government subsidies, licensing of fishing rights to Japanese and South Korean companies, import taxes, and remittances from expatriate workers in New Caledonia.[78]

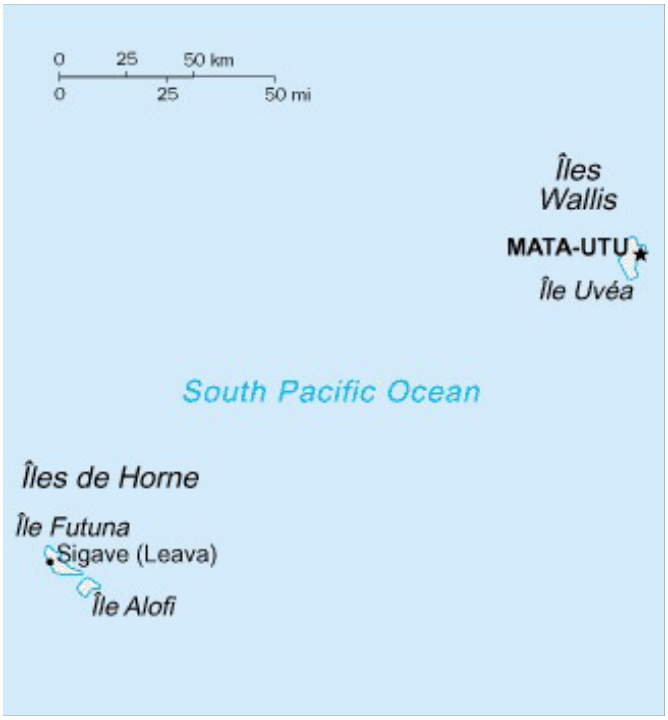


Figure 20: Map of Wallis and Futuna

The earliest inhabitants in Wallis and Futuna were people of the Lapita culture that spread from East Asia and Austronesia; they reached the islands by at least 800 BCE. Later waves of other Polynesian sailors reached the islands about 1400 CE: Samoans settled on Futuna, and Tongans on Uvea. The three chieftaincies of Uvea, Alo, and Sigave were in place when the islands of Wallis and Futuna were first encountered by Europeans in the 17th century. However, sustained contact did not occur until the whaling industry reached the area in the 1820s. Whalers were followed by missionaries. As early as the 1840s, the islanders petitioned for French protection, but the islands did not become protectorates until 1887 (Wallis) and 1888 (Futuna). Uvea hosted some 6,000 Allied troops during World War II, and this presence left roads, airfields, and anchorages that allow the island today to have a leg up over Futuna. In 1959, the islanders elected to become an overseas territory of France.

Wallis and Futuna is an overseas collectivity of France divided into three districts that correspond to three traditional political divisions, or paramount chieftaincies – i.e., Wallis, which includes all of Uvea, Sigave in southeastern Futuna, and Ali, which covers the rest of Futuna and the island of Alofi. A French-appointed chief administrator (administrateur supérieur) is the chief executive officer of the territory and serves as the president of the Territorial Council, which comprises the three paramount chieftains and

three others appointed by the president with the approval of the Territorial Assembly. Wallis and Futuna elects local representatives to the French Senate and National Assembly.[79]

Hazards and Climate Change

Like many Pacific islands, Wallis and Futuna faces several hazards, including tropical cyclones and other storms, earthquakes, and tsunamis. Figure 21 shows people affected by key natural hazards during the period 1980-2020, and the data indicates 4,500 people affected by storm in 1986, 20 people affected by earthquake in 1993, and 1,252 people affected by storm in 2012, per World Bank Climate Change Knowledge Portal data.[80]

During the period 2011-2013, the EU, the SPC, and the administration of Wallis and Futuna partnered to deliver an integrated program to reinforce the safety of people and infrastructure against natural disasters. The territorial government had commissioned a study of the tsunami hazard faced by the entire territory, allowing the identification of key zones at risk, reaction time available to the authorities before the tsunami hits, and maximum inundation height. The data led to the government investigating new evacuation routes and shelters, overhauling its crisis communication system, and improving its alert system with the installation of additional tsunami sirens and signage in strategic areas.[81] The January 2022 eruption of the underwater volcano in Tonga allowed for a review of disaster preparedness and response in Wallis and Futuna. While Wallis and Futuna archipelago was spared from a tsunami, during the alert only a few sirens worked and the gendarmes and firefighters had to go to the villages to warn the population. The authorities took stock of the means in place in the territory to deal with natural disasters.[82]

Given the islands' exposure to hydrometeorological hazards, Wallis and Futuna is at risk of worse impacts from the influence of climate change on key hazards. Table 8 details the temperature trend and projection under climate change.[83]

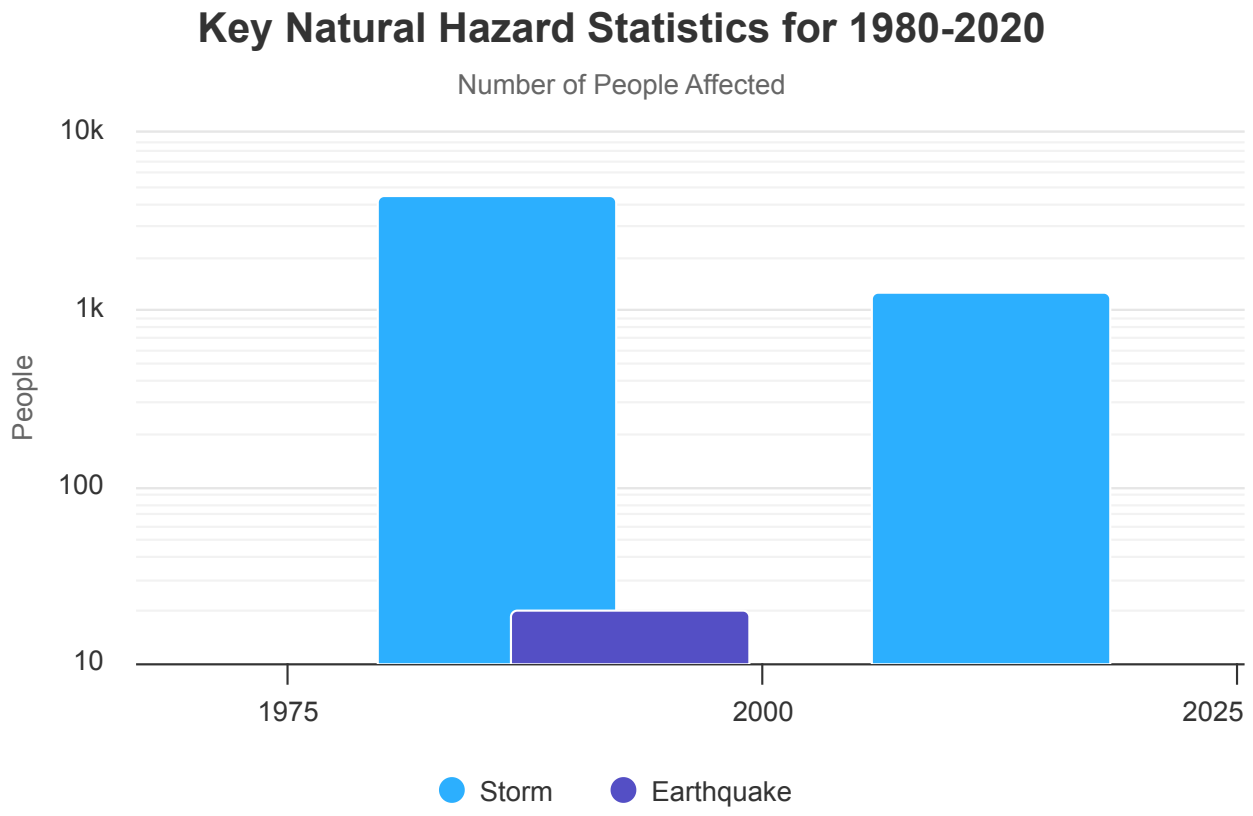


Figure 21: People Affected by Key Natural Hazards in Wallis and Futuna, 1980-2020

Phenomenon	Trend	Projections	Impacts
Temperature	Average temperature is 30°C (86°F) year-round; February is the warmest month	Temperatures will rise by an average of 1.1°C (1.98°F) across the islands	Impacts on human health an agricultural productivity; rise in vector-borne disease incidence

Table 8: Climate Change-Related Phenomena and Impacts (Wallis and Futuna)

Government Institutions, Policies, and Plans for Disasters and Climate Change

In 2017, Wallis and Futuna released its Sustainable Development Strategy covering 2017-2030 (La Stratégie de développement durable des îles Wallis et Futuna 2017-2030). The strategy's three main objectives are to preserve and enhance the living environment, strengthen social foundations, and fight against depopulation through shared development. These objectives are expanded in the development strategy's framework:

I. Preserve and enhance the living environment
   1. Environmental protection
      a. Preserve biodiversity
      b. Fight against pollution and treat waste
      c. Adapt to the effects of climate change and develop renewable energy
   2. Protect and improve quality of life
      a. Continue fighting against the high cost of living
      b. Guarantee the health of the population
      c. Sustain the pension system
      d. Develop sports practice with a view to the future

II. Consolidate and strengthen the foundations of society
   1. A cultural identity to be valued
      a. Improve knowledge of culture and traditional knowledge
      b. Protect and promote local cultural wealth
   2. Guarantee the cohesion of society
      a. By taking into account vulnerable populations
      b. Through a bold commitment to youth

III. Fight against depopulation through shared development and creating wealth
   1. Halting depopulation by creating wealth
   2. The urgency to act[84]

SPC's INTEGRE provided support for integrated coastal management initiatives in Wallis and Futuna, among other French Pacific overseas countries and territories, through project closure in 2018.[85] Integrated coastal management is the sustainable use of the coastline by reconciling socio-economic development with the safeguarding of biological, ecological, and cultural heritage for current populations and future generations. In Wallis and Futuna, there were significant challenges due to environmental impacts generated by illegal dumping, erosion of watersheds, effluents from pig farms, and the lack of effective waste management, including the disposal of hazardous waste such as oils and batteries, which risked polluting freshwater resources. INTEGRE focused on carrying out sustainable development projects with local stakeholders on Wallis Island and Futuna Island. INTEGRE also facilitated the development of an integrated coastal zone management plan, which linked to the Wallis and Futuna Sustainable Development Strategy.[86]

Civil security is the exclusive responsibility of the French State, per the 29 July 1961 statutory law. In the event of a major crisis exceeding the capacity of Wallis and Futuna's higher administration to respond, the territory of Wallis and Futuna is under the responsibility of the General Staff of the Defence and Security Zone of New Caledonia. Wallis and Futuna is the overseas collectivity that benefits the most annually from the French Ministry of Overseas Territories' civil security credits.[87]

Prefect's Office

B.P.16 - Mata'Utu, 98600 WALLIS ET FUTUNA
Tel: 00 681 72 27 27

Early Warning Systems

Météo-France is responsible for monitoring weather events for Wallis and Futuna and for safeguarding property and people, maintaining a world observation and climatology network station, and aeronautical assistance.[88]

The Prefect and higher administration of Wallis and Futuna participates in communicating disaster alerts and warnings, including for tropical cyclones or storms, earthquakes, and tsunamis.[89]

The Wallis and Futuna administration use the following categories for tropical cyclone warnings and alerts:

- The Pre-Alert – Activated when a tropical depression is reported in the Wallis and Futuna weather observation area. Media will disseminate a review of cyclone instructions.
- Alert #1 – Triggered when a cyclone is announced that is anticipated to impact the territory within 24 hours.
- Alert #2 – Activated when the arrival of the cyclone is imminent, and the storm is expected to affect the territory within six hours. Driving is prohibited. Residents are advised to not go out and listen to the radio.
- Alert #2 Safeguarding Phase – Before alert No. 2 is lifted, the Safeguarding Phase indicates danger persists and residents should not leave their shelter. During this phase, authorities send teams to assess damage on the main highways.
- End of Alert – The lifting of the alert confirms the cyclone has passed. Residents are advised not to touch electrical wires on the ground and to not make unnecessary telephone calls in order to not saturate the phone networks.[90]

Météo-France Nouvelle-Calédonie
5 rue Vincent Auriol - Faubourg Blanchot
BP M2 - 98849 Noumea Cedex
Tel: 687 27 93 00

Infrastructure

Hihifo Airport on Wallis is the main airport and is capable of handling aircraft up to the Airbus A320. It has one paved (asphalt) runway that is 2,100 × 45 m (5,890 × 148 feet) and is equipped to accommodate night operations. Pointe Vele Airport on Futuna has one paved runway that is 1,100 × 30 m (3,609 × 98 feet). The largest aircraft to operate on a regular basis to/from Pointe Vele is the Twin Otter. There are no facilities to accommodate night operations.

Mata'Utu port is situated on the eastern side of Wallis and is the main port of entry. It is the property of the territory. Operations are overseen by the Maritime Affairs, Port, Lighthouses, and Beacons Department (Service des Affaires Maritimes, des Ports, et des Phares & Balises – SAMPPB). The barrier reef, located about 5 km (3.1 miles) offshore, provides some protection from the swell; the swell and winds affect boats travelling through or moored alongside the wharf. Port activity is limited. During 2009–2013, port infrastructure was improved by lengthening the main wharf, extending the container storage area, expanding the cargo shed, deepening the berthing area, and making improvements designed to reinforce security. Mata'utu can handle ships up to 86.57 m (285 feet) in length. There is storage space for no more than 65 containers.

Port Leava is the only port on Futuna; it is situated on the southwest coast and is the property of the territory, overseen by SAMPPB. Surge from the swell may be a problem for ships berthed alongside the wharf. Leava can handle ships up to 86.57 m (285 feet) in length. There is storage space for no more than 13 containers.

Mata'Utu and Leava do not have any cargo handling equipment. When ships unload their cargo, private companies lease their own forklifts to the port. Cargo ships coming into the ports must have their own equipment. Cargo flow in Wallis and Futuna consists entirely of containerized import goods. Each time a ship calls at Mata'Utu Port, there are about 90 containers for both islands, including about 20 that are off-loaded at Mata'Utu Port to be unpacked and then repacked for Futuna, and ten or so more that remain on the ship to be directly offloaded on Futuna.[91]

Civil Society Partners

In 2019, a branch of the French Red Cross (Croix Rouge Française) was reactivated in Wallis and Futuna after being dormant for five years. The President of the Territorial Delegation of the French Red Cross of New Caledonia traveled to Wallis in March 2019 to help set up the structure and aid local volunteers in Uvea to inventory existing supplies. Recruitment was a priority since, upon reactivation in 2019, the Wallis and Futuna branch only had seven volunteers, who had been working for several months under the leadership of the New Caledonian territorial delegation of the Red Cross. Other priorities included training volunteers and raising awareness of natural disasters among schoolchildren.[92] In September 2019, a representative of the French Red Cross in the French Overseas Territories visited Wallis and Futuna to launch an awareness-raising operation with volunteers from the island in primary schools, including the Mata-Utu School in the central district of Wallis.[93]

During the COVID-19 pandemic, the French Red Cross in New Caledonia mobilized three volunteers on a mission to Wallis and Futuna to help prepare them for operations. They carried supplies to reinforce the vaccination center, including cots, tents, COVID-19 PCR tests, and personal protection equipment.[94]

In August 2022, the New Caledonian branch of the French Red Cross deployed a mission to Wallis and Futuna for two weeks. The mission focused on raising awareness among young schoolchildren about natural hazards and training people with disabilities. Natural hazard awareness-raising with schoolchildren in Wallis and Futuna was done as part of the Alert program,[95] which the French Red Cross originally initiated to raise awareness among primary school children about the natural risks specific to New Caledonia.[96]

French Red Cross Territorial Delegation in Wallis
Mata'utu Chez M. Serge Pruneau, 98600 Uvea
Tel: 06 81 72 13 68

Disclaimer: This handbook has been prepared in good faith based on resources available at the time of publication. Where possible, a link to the original electronic source is provided in the endnotes. While making every attempt to ensure the information is relevant and accurate, the CFE-DM does not guarantee or warrant the accuracy, reliability, completeness, or currency of the information herein. This information will be updated periodically, and we welcome and appreciate your feedback to improve this document and help fill any gaps to enhance its future utility. For feedback or comments, please email: **cfe.dmha.fct@pacom.mil**.

France Notes

1 Gori, Shourya. The Pacific frontier of France. Observer Research Foundation, Young Voices. 4 August 2023. https://www.orfonline.org/expert-speak/the-pacific-frontier-of-france/

2 Bachelier, Jérémy; and Pajon, Céline. "France and AUKUS: Bouncing Back to Live Up to Pacific Challenges." Briefings de l'Ifri. Institut français des relations internationales. 3 November 2022. ISBN: 979-10-373-0617-3. https://www.ifri.org/sites/default/files/atoms/files/bachelier_pajon_france_aukus_pacific_challenges_2022_0.pdf

3 Gori, Shourya. The Pacific frontier of France. Observer Research Foundation, Young Voices. 4 August 2023. https://www.orfonline.org/expert-speak/the-pacific-frontier-of-france/

4 European Union. Update of the NDC of the European Union and its Member States. 16 October 2023. https://unfccc.int/sites/default/files/NDC/2023-10/ES-2023-10-17%20EU%20submission%20NDC%20update.pdf

5 Gemenne, François; Alex, Bastien; and Baillat, Alice. Implications of Climate Change on Defence and Security in the South Pacific by 2030. Observatoire Défense et Climat. May 2019. https://archives.defense.gouv.fr/content/download/558233/9668077/OBS_Climat%20et%20d%C3%A9fense_201905-RE-Implications%20of%20Climate%20Change%20in%20the%20South%20Pacific%20by%202030%20-%20SPDMM%20Report.pdf

6 Goiran, Helene. The Role of the French Military on Key Issues for Oceania, East-West Center, 26 March 2018. www.eastwestcenter.org https://www.eastwestcenter.org/publications/the-role-the-french-military-key-issues-oceania

7 Gemenne, François; Alex, Bastien; and Baillat, Alice. Implications of Climate Change on Defence and Security in the South Pacific by 2030. Observatoire Défense et Climat. May 2019. https://archives.defense.gouv.fr/content/download/558233/9668077/OBS_Climat%20et%20d%C3%A9fense_201905-RE-Implications%20of%20Climate%20Change%20in%20the%20South%20Pacific%20by%202030%20-%20SPDMM%20Report.pdf

8 High Commissioner of the Republic of France in New Caledonia. Plan ORSEC de zone. 7 November 2018. https://www.nouvelle-caledonie.gouv.fr/contenu/telechargement/5225/40298/file/Plan+ORSEC+Zone.pdf

9 Gemenne, François; Alex, Bastien; and Baillat, Alice. Implications of Climate Change on Defence and Security in the South Pacific by 2030. Observatoire Défense et Climat. May 2019. https://archives.defense.gouv.fr/content/download/558233/9668077/OBS_Climat%20et%20d%C3%A9fense_201905-RE-Implications%20of%20Climate%20Change%20in%20the%20South%20Pacific%20by%202030%20-%20SPDMM%20Report.pdf

10 Vieux, Caroline, Peggy Roudaut, and Estelle Bonnet-Vidal. Action Plan French Polynesia: August 2014 – January 2018, Pacific Community, 2017. https://integre.spc.int/images/pdf/INTEGRE/telechargements/Action_Plan_French_Polynesia.pdf

11 CIA World Factbook. French Polynesia. https://www.cia.gov/the-world-factbook/countries/french-polynesia/map/

12 Foster, Sophie and West, Francis James. French Polynesia. Encyclopedia Britannica. 21 December 2023. https://www.britannica.com/place/French-Polynesia

13 Zweifel, Walter. No rush in French Polynesia for independence referendum. Radio New Zealand. 16 May 2023. https://www.rnz.co.nz/international/pacific-news/489984/no-rush-in-french-polynesia-for-independence-referendum

14 Vieux, Caroline, Peggy Roudaut, and Estelle Bonnet-Vidal. Action Plan French Polynesia: August 2014 – January 2018, Pacific Community, 2017. https://integre.spc.int/images/pdf/INTEGRE/telechargements/Action_Plan_French_Polynesia.pdf

15 Encyclopedia Britannica. French Polynesia. 2 October 2023. https://www.britannica.com/place/French-Polynesia/Government-and-society

16 Foster, Sophie and West, Francis James. French Polynesia. Encyclopedia Britannica. 21 December 2023. https://www.britannica.com/place/French-Polynesia

17 Centre for Research on the Epidemiology of Disasters (CRED), French Polynesia 1970-2023, Public EM-DAT platform. Accessed 18 October 2023. https://public.emdat.be/data

18 CRED. French Polynesia, Public EM-DAT platform.

19 RNZ News. Cyclone Niko downgraded, 24 January 2015. https://www.rnz.co.nz/international/pacific-news/264418/cyclone-niko-downgraded

20 Lamaury Y, Jessin J, Heinzlef C, Serre D. Operationalizing Urban Resilience to Floods in Island Territories—Application in Punaauia, French Polynesia. Water. 2021; 13(3):337. https://doi.org/10.3390/w13030337

21 RNZ News. State of natural disaster in Tahiti, 23 January 2017. https://www.rnz.co.nz/news/pacific/322920/state-of-natural-disaster-in-tahiti

22 RNZ News. Firefighter killed as torrential rains lash French Polynesia, 18 February 2017. https://www.rnz.co.nz/international/pacific-news/324804/firefighter-killed-as-torrential-rains-lash-french-polynesia

23 RNZ News. Flooding and landslides on French Polynesia's Marquesas, 24 June 2017. https://www.rnz.co.nz/international/pacific-news/333725/flooding-and-landslides-on-french-polynesia-s-marquesas

24 2020.04.17 - Statement by the High Commissioner on adaptations to containment measures in the archipelagos with the exception of Tahiti and Moorea (Déclaration du Haut-Commissaire sur les adaptations aux mesures de confinement dans les archipels à l'exception de Tahiti et Moorea), 17 April 2020. https://www.polynesie-francaise.pref.gouv.fr/Actualites/Communiques-de-presse/2020/Declaration-du-Haut-Commissaire-sur-les-adaptations-aux-mesures-de-confinement-dans-les-archipels-a-l-exception-de-Tahiti-et-Moorea

25 Edouard Mathieu, Hannah Ritchie, Lucas Rodés-Guirao, Cameron Appel, Charlie Giattino, Joe Hasell, Bobbie Macdonald, Saloni Dattani, Diana Beltekian, Esteban Ortiz-Ospina and Max Roser (2020) - "Coronavirus Pandemic (COVID-19)". Published online at OurWorldInData.org. https://ourworldindata.org/coronavirus/country/french-polynesia

26 WHO. French Polynesia, WHO Coronavirus Disease (COVID-19) Dashboard With Vaccination Data, accessed 19 October 2023. https://covid19.who.int/region/wpro/country/pf

27 Tahiti-Infos. 163 new cases of dengue fever - French Polynesia (France), ReliefWeb, 27 December 2019. https://reliefweb.int/report/french-polynesia-france/163-nouveaux-cas-de-dengue

28 Agence Francaise de Developpement. Pacific Ocean Regional Strategy 2019-2023. https://www.afd.fr/en/ressources/pacific-ocean-2019-2023-regional-strategy

29 Plan Climat. https://www.plan-climat-pf.org/public/publication.html

30 French Polynesia's 2022-2030 Climate Plan - Action Plan. https://www.plan-climat-pf.org/public/projet.html

31 Alexandre K. Magnan, Virginie Duvat, Valérie Ballu, Mélanie Becker, Pascale Braconnot, Stéphane Costa, Gonéri Le Cozannet, Lydie Goeldner-Gianella, Delphine Grancher, Olivier Maquaire, Agnès Michelot, Annabelle Moatty, Lucile Stahl, and Guy Woppelmann. L'Outre-Mer français face au défi de l'adaptation au changement climatique : l'exemple de la Polynésie française (French Overseas Territories facing the challenge of adapting to climate change: the example of French Polynesia), IDDRI, June 2022. https://www.iddri.org/en/publications-and-events/policy-brief/french-overseas-territories-facing-challenge-adapting-climate

32 Tahiti Infos. Climate change: the "Green Fund equivalent" releases 835 million FCPF for Polynesia, ReliefWeb, 20 July 2017. https://reliefweb.int/report/french-polynesia-france/changement-climatique-l-quivalent-fonds-vert-d-bloque-835-millions

33 French Polynesia Directorate of Construction and Development. Natural Risk Prevention Plan. https://www.service-public.pf/dca/plan-de-preventions-des-risques-naturels/

34 Directorate of Construction and Development. Guide to Good Practices for the Construction and Development of Land on the Coastal Edge (Guide des Bonnes Pratiques pour La Construction et L'amenagement de Terrains en Bordure Littorale) https://www.service-public.pf/dca/guide-de-bonne-pratique/

35 Government of Fiji. French Polynesia provides TC Yasa relief assistance to Fiji, ReliefWeb, 5 January 2021. https://reliefweb.int/report/fiji/french-polynesia-provides-tc-yasa-relief-assistance-fiji

36 IUCN. Navigating Island Earth: The Hawaii Commitments. https://www.hawaiiconservation.org/wp-content/uploads/Navigating-Island-Earth-Hawaii-Commitments.pdf

37 IISD. SPC Announces Cooperation with French Polynesia on Disaster Reduction, SDG Knowledge Hub, IISD, 17 March 2011. https://sdg.iisd.org/news/spc-announces-cooperation-with-french-polynesia-on-disaster-reduction/

38 Tahiti Infos. Cyclone exercise 2018: services and associations mobilize, ReliefWeb, 17 October 2018. https://reliefweb.int/report/french-polynesia-france/exercice-cyclone-2018-les-services-et-les-associations-se-mobilisent

39 Météo-France. What Is a Cyclone Warning? - Cyclone Warning in French Polynesia. https://meteo.pf/fr/connaissances/quest-ce-que-lalerte-cyclonique

40 CEA – DAM. TSUNAMI WARNING. https://www-dase.cea.fr/public/dossiers_thematiques/alerte_tsunami/description.html

41 UNESCO. 18 Pacific Island Countries and Territories Test New Early Warning Procedures for Volcanic Eruption-induced Tsunamis. 10 November 2022. https://www.unesco.org/en/articles/18-pacific-island-countries-and-territories-test-new-early-warning-procedures-volcanic-eruption

42 Telegrafia. Installation of Telegrafia's tsunami siren in the Pacific island of Maiao. https://www.electronic-sirens.com/installation-telegrafias-tsunami-siren-pacific-island-maiao/

43 Foster, Sophie and West, Francis James. French Polynesia. Encyclopedia Britannica. 21 December 2023. https://www.britannica.com/place/French-Polynesia

44 Island Studies. Jurisdiction Project – French Polynesia. 2016. https://islandstudies.com/files/2016/11/French-Polynesia.pdf

45 Foster, Sophie and West, Francis James. French Polynesia. Encyclopedia Britannica. 21 December 2023. https://www.britannica.com/place/French-Polynesia

46 Island Studies. Jurisdiction Project – French Polynesia. 2016. https://islandstudies.com/files/2016/11/French-Polynesia.pdf

47 International Renewable Energy Agency. Energy Profile – French Polynesia. 2021. https://www.irena.org/-/media/Files/IRENA/Agency/Statistics/Statistical_Profiles/Oceania/French-Polynesia_Oceania_RE_SP.pdf?rev=bb153396cdf5497da8b30c2e26b9f24c

48 French Red Cross (Croix-Rouge française). Our actions in France (Nos actions en France). https://www.croix-rouge.fr/nos-actions-en-france

49 French Red Cross. French Polynesia. https://competence.croix-rouge.fr/region/polynesie-francaise/

50 At the Council of Ministers on 09 June 2021 (Au conseil des ministres du 09 juin 2021), Polynesia the 1st. https://la1ere.francetvinfo.fr/polynesie/tahiti/polynesie-francaise/au-conseil-des-ministres-du-09-juin-2021-1031035.html

51 Ecological Associations, Bio-tiful Factory. https://www.biotiful-factory.com/youre-bio-tiful/associations-ecologiques/

52 D.L. Shineberg and Sophie Foster. New Caledonia, Encyclopedia Brittanica, 5 October 2023. https://www.britannica.com/place/New-Caledonia-French-unique-collectivity-Pacific-Ocean

53 CIA World Factbook. New Caledonia – Details – Country map. https://www.cia.gov/the-world-factbook/countries/new-caledonia/map

54 Foster, Sophie, and Shineberg, D.L. New Caledonia. Encyclopedia Britannica. 9 December 2023. https://www.britannica.com/place/New-Caledonia-French-unique-collectivity-Pacific-Ocean/History

55 Foster, Sophie, and Shineberg, D.L. New Caledonia. Encyclopedia Britannica. 9 December 2023. https://www.britannica.com/place/New-Caledonia-French-unique-collectivity-Pacific-Ocean/History

56 Foster, Sophie, and Shineberg, D.L. New Caledonia.

Encyclopedia Britannica. 9 December 2023. https://www.britannica.com/place/New-Caledonia-French-unique-collectivity-Pacific-Ocean/History

57 New Caledonia territorial government. Community at a Glance. https://gouv.nc/directions-et-etablissements-publics/la-collectivite-en-un-coup-doeil

58 Government of New Caledonia. Dossier sur les Risques Majeurs de la Nouvelle-Caledonie. 2015. https://securite-civile.gouv.nc/sites/default/files/documents/Dossier%20risques%20majeurs.pdf

59 Bruce E.O. Thomas, Jean Roger, Yanni Gunnell, Catherine Sabinot, Jérôme Aucan. A low-cost toolbox for high-resolution vulnerability and hazard-perception mapping in view of tsunami risk mitigation: Application to New Caledonia. International Journal of Disaster Risk Reduction, Volume 62, 2021, 102350, ISSN 2212-4209, https://doi.org/10.1016/j.ijdrr.2021.102350.

60 Météo-France. New Caledonia Weather - Cyclone History. https://www.meteo.nc/nouvelle-caledonie/cyclone/climatologie-des-cyclones

61 World Bank Group. New Caledonia, Climate Change Knowledge Portal. https://climateknowledgeportal.worldbank.org/country/new-caledonia/vulnerability

62 UNESCAP. New Caledonia, Resilience Portal, 2021. https://rrp.unescap.org/country-profile/NCL#paragraph-id--26605

63 Agence Francaise de Developpement. Pacific Ocean Regional Strategy 2019-2023. https://www.afd.fr/en/ressources/pacific-ocean-2019-2023-regional-strategy; Mulhern, Owen. Sea Level Rise Projection Map – Noumea. Earth.org. 7 August 2020. https://earth.org/data_visualization/sea-level-rise-by-2100-noumea/; Dutheil, Cyril, et al. Fine-scale rainfall over New Caledonia under climate change. Climate Dynamics. 10.1007/s00382-020-05467-0. 2021. https://www.researchgate.net/publication/344513690_Fine-scale_rainfall_over_New_Caledonia_under_climate_change/citation/download

64 New Caledonia territorial government. Emergency Preparedness and Risk Management. https://gouv.nc/file/26283/download?token=4m5N8PzJ https://gouv.nc/direction/securite-civile-et-gestion-des-risques

65 New Caledonia territorial government. Emergency Preparedness and Risk Management. Organizational Chart. https://securite-civile.gouv.nc/sites/default/files/documents/ORGANIGRAMME%20DSCGR.pdf

66 The Pew Charitable Trusts. New Caledonia Commits to Protecting More of Its Coral Sea Natural Park, 29 October 2018. https://www.pewtrusts.org/en/about/news-room/press-releases-and-statements/2018/10/29/new-caledonia-commits-to-protecting-more-of-its-coral-sea-natural-park

67 The Pew Charitable Trusts. New Caledonia's Marine Ecosystem, Among the Healthiest on Earth, Deserves Stronger Protection, 1 June 2021. https://www.pewtrusts.org/en/research-and-analysis/articles/2021/06/01/new-caledonia-marine-ecosystem-among-the-healthiest-on-earth-deserves-stronger-protection

68 Alberts, Elizabeth Claire. New Caledonia expands strictly protected coverage of its swath of the Pacific, Mongabay, 27 October 2023. https://news.mongabay.com/2023/10/new-caledonia-expands-strictly-protected-coverage-of-its-swath-of-the-pacific/

69 Oceanographic. New Caledonia protects 10% of its ocean, 29 October 2023. https://oceanographicmagazine.com/news/new-caledonia-protects-10-of-its-ocean/

70 Météo-France. Weather in New Caledonia. Cyclone - Current phenomena. https://www.meteo.nc/nouvelle-caledonie/cyclone/phenomenes-en-cours

71 Météo-France. Weather New Caledonia - Risk of forest fire https://www.meteo.nc/nouvelle-caledonie/risque-feu

72 Foster, Sophie, and Shineberg, D.L. New Caledonia. Encyclopedia Britannica. 9 December 2023. https://www.britannica.com/place/New-Caledonia-French-unique-collectivity-Pacific-Ocean/History

73 New Caledonia territorial government. Approved civil security associations of the ABCDE type, Civil Security of New Caledonia. https://securite-civile.gouv.nc/acteurs-de-la-securite-civile/les-associations-de-securite-civile-agreees-de-type-abcde

74 New Caledonia territorial government. LISTE DES ASSOCIATIONS AGREES DE SECURITE CIVILE - NOUVELLE CALEDONIE, 7 June 2023. https://securite-civile.gouv.nc/sites/default/files/documents/LISTE%20DES%20ASSOCIATIONS%20AGREES%20ABCDE_1.pdf

75 Government of France, National Institute of Statistics and Economic Studies (INSEE). Legal Populations of Wallis and Futuna Constituencies in 2018. https://www.insee.fr/fr/statistiques/3685976?sommaire=2121453

76 CIA World Factbook. Wallis and Futuna – Details – Map. https://www.cia.gov/the-world-factbook/countries/wallis-and-futuna/map

77 Government of France, National Institute of Statistics and Economic Studies (INSEE). Legal Populations of Wallis and Futuna Constituencies in 2018. https://www.insee.fr/fr/statistiques/3685976?sommaire=2121453

78 Foster, Sophie, and Robert C. Kiste. Wallis and Futuna, Encyclopædia Britannica, 21 September 2023. https://www.britannica.com/place/Wallis-and-Futuna

79 Foster, Sophie; and Kiste, Robert C. Wallis and Futuna. Encyclopedia Britannica. 1 December 2023. https://www.britannica.com/place/Wallis-and-Futuna/Economy

80 World Bank Group. Wallis and Futuna – Vulnerability, Climate Change Knowledge Portal. https://climateknowledgeportal.worldbank.org/country/wallis-and-futuna/vulnerability

81 SPC. Putting knowledge into action: Wallis and Futuna leads in disaster preparedness with support from SPC and the EU, 7 August 2013. https://gsd.spc.int/media-releases/1-latest-news/515-putting-knowledge-into-action-wallis-and-futuna-leads-in-disaster-preparedness-with-support-from-spc-and-the-european-union-

82 Wallis & Futuna La 1 Ere (The 1st). Update on the means in place in Wallis and Futuna to deal with natural disasters, 18 January 2022. https://la1ere.francetvinfo.fr/wallisfutuna/le-point-sur-les-moyens-en-place-a-wallis-et-futuna-pour-faire-face-aux-catastrophes-naturelles-1206157.html

83 Agence Francaise de Developpement. Pacific Ocean Regional Strategy 2019-2023. https://www.afd.fr/en/ressources/pacific-ocean-2019-2023-regional-strategy

84 Sustainable Development Strategy of Wallis and Futuna 2017-2030 (La Stratégie de développement

durable des îles Wallis et Futuna 2017-2030), Version 19 January 2017. https://www.wallis-et-futuna.gouv.fr/content/download/3090/23676/file/Strat%C3%A9gie%20de%20d%C3%A9veloppement%20durable%20des%20%C3%AEles%20Wallis%20et%20Futuna%202017-2030.pdf

85 SPC. Closure of the INTEGRE project in Wallis and Futuna - Territories Initiative for Regional Environmental Management, 22 March 2018. https://integre.spc.int/le-projet/tous-les-evenements/wallis-et-futuna/269-cloture-du-projet-integre-a-wallis-et-futuna

86 INTEGRE. Wallis and Futuna fact sheet. (Wallis et Futuna fiche pays). https://integre.spc.int/images/pdf/wf/CPS-fiche-pays-WF-web.pdf

87 Prefect of Wallis and Futuna. Civil Safety, Road Safety, Protection of People and Property - Emergency Preparedness, State and Territory Services in Wallis and Futuna. https://www.wallis-et-futuna.gouv.fr/Actions-de-l-Etat/Securite-civile-securite-routiere-protection-des-personnes-et-des-biens/Securite-civile

88 Prefect of Wallis and Futuna. State and Territory Services – Other services of the State and the Territory – Weather France (Météo-France). https://www.wallis-et-futuna.gouv.fr/Services-de-l-Etat-et-du-Territoire/Les-autres-services-de-l-Etat-et-du-Territoire/Meteo-France

89 Examples: The tsunami warning has been lifted in Wallis and Futuna, New Caledonia and Polynesia - Overseas the 1st, https://la1ere.francetvinfo.fr/l-alerte-tsunami-est-levee-a-wallis-et-futuna-en-nouvelle-caledonie-et-en-polynesie-950818.html ; Prefect of Wallis and Futuna on Twitter, https://twitter.com/Prefet986/status/1367627807942209540?ref_src=twsrc%5Etfw%7Ctwcamp%5Etweetembed%7Ctwterm%5E1367627807942209540%7Ctwgr%5E60ee7bc2c3faa9b73608768f375e74a17df51795%7Ctwcon%5Es1_&ref_url=https%3A%2F%2Fla1ere.francetvinfo.fr%2Fl-alerte-tsunami-est-levee-a-wallis-et-futuna-en-nouvelle-caledonie-et-en-polynesie-950818.html

90 Télécharger les Consignes cyclone. https://www.wallis-et-futuna.gouv.fr/contenu/telechargement/12691/105554/file/T%C3%A9l%C3%A9charger%20les%20Consignes%20cyclone.pdf

91 Pacific Community. Air and sea transport in Wallis and Futuna: report of a 2014 study. 2016. https://mcst-rmiusp.org/index.php/reference-library-main/download/28-pacific-shipping/357-spc-2014-air-and-sea-transport-wallis-futuna

92 Wallis & Futuna La 1 Ere (The 1st). The red cross is back on the fenua, 1 April 2019. https://la1ere.francetvinfo.fr/wallisfutuna/croix-rouge-retour-fenua-695748.html

93 Maniulua, Fatima. Natural disasters: the Red Cross raises awareness among the little ones of Wallis and Futuna, 5 September 2019. https://la1ere.francetvinfo.fr/wallisfutuna/catastrophes-naturelles-croix-rouge-sensibilise-petits-wallis-futuna-745583.html

94 French Red Cross. Covid-19: 3 volunteers mobilized in Wallis and Futuna, 18 March 2021. https://www.croix-rouge.fr/covid-19-vaccination/covid-19-3-benevoles-mobilises-a-wallis-et-futuna-2504

95 Prefect of Wallis and Futuna. Red Cross Mission in Wallis and Futuna, Wallis & Futuna La 1 Ere (The 1st), 30 August 2022. https://www.wallis-et-futuna.gouv.fr/Actualites/Mission-de-la-croix-rouge-a-Wallis-et-Futuna

96 Faatau, Jean-Tenahe. New Caledonia: The Red Cross raises awareness among children about the territory's natural hazards (Nouvelle-Calédonie: La Croix-Rouge sensibilise les enfants aux risques naturels du territoire), Outremers360, 11 December 2020. https://outremers360.com/bassin-pacifique-appli/nouvelle-caledonie-la-croix-rouge-sensibilise-les-enfants-aux-risques-naturels-du-territoire

Photo by Sébastien Jermer on unsplash.com. New Caledonia, Ilse of Pines. https://unsplash.com/photos/white-boat-on-body-of-water-near-green-palm-trees-n7DY58YFg9E

Guam

Guam is the southernmost island of the Mariana Archipelago; it is located at 13° 28' N, 144° 47' E. It has a total land area of 541.3 km^2 (209 square miles), and the highest point on the island is Mount Lamlam at 406 m (1,332 feet). Guam is located about 80 nautical miles west of the Mariana trench and has been repeatedly elevated and submerged as tectonic processes are carried out. The southern part of the island is dominated by volcanic features while the northern part is uplifted coral limestone very similar to the geology of the Commonwealth of the Northern Mariana Islands (CNMI) Rota, Tinian, Aguijan, and Saipan.[1] Figure 22 is a map of Guam.[2]

A native Chamorro (Austronesian) population was established on the island as early as 2000 BCE. Contact with Europe was made by Ferdinand Magellan in 1521, and the Spanish ruled the island between 1565 and 1898,[3] a period during which the native population declined by an estimated 90%.[4] Spain ceded Guam to the U.S. in 1898 after the Spanish American War, and the island came under control of the U.S. Navy, which used it as a refueling and communication station. On 8 December 1941, four hours after the attack on Pearl Harbor, Japan began aerial bombardment of Guam, and two days later, a force of over 5,500 Japanese troops landed at five sites around Guam, where they overwhelmed the small U.S. defensive force. After U.S. forces recaptured the island in 1944, it was used as the command post for the U.S. Western Pacific; U.S. Navy control was re-established in 1946.[5] The Guam Organic Act of 1950 conferred U.S. citizenship on Guamanians and established the territory's government. The Act also transferred federal jurisdiction over Guam to the Department of the Interior. The territory held its first elections in 1970. The island is administered by a gubernatorial administration and sends one non-voting delegate to the U.S. House of Representatives.[6] Guam residents mostly live in "villages," which may be relatively large and populous and of which there are officially 19. Each is run by a Mayor who has executive responsibility for a village (District); via the Mayors' Council, Mayors and the Governor's Office can collaborate and coordinate policies and actions.[7]



Figure 22: Map of Guam

Guam is the most populous of the islands of the Mariana Archipelago; it has a population of approximately 153,000.[8] Since the 1960s, there has been significant migration to Guam from surrounding countries, and indigenous Chamorros now make up about 37% of the population; Filipinos make up 26%, other Pacific Islanders 11%, and various ethnic groups make up the remaining 26%.[9] English and Chamorro are the official languages, and an estimated 85% of Guamanians follow the Roman Catholic Church.[10]

Hazards and Climate Change

Guam is exposed to drought, earthquake, epidemics, flood, land- and mudslides,

cyclones, tsunamis, and wildfires.

The most common hazard Guam confronts is typhoon or tropical storm. Associated flooding is a frequent occurrence. The island also deals with occasional drought, often driven by El Niño Southern Oscillation (ENSO) cycles, and dry periods can exacerbate wildfire risk. Under climate change scenarios, Guam is expected to confront damage to its coral reefs, increased storm damage on land, reduced water availability during the dry season, and heat stress. Table 9 details some of the key impacts of climate change and projections of future trends for Guam.[11]

Guam experiences warm weather year-round with less humidity from November through March. The mean annual temperature is about 27.2°C (81°F) with minimal variation. There are two seasons: a dry season from January to May and a rainy season from July to November. The mean annual rainfall varies from about 2,000 mm (80 inches) in the central and coastal lowlands up to 2,800 mm (110 inches) on the uplands in southern Guam. There is considerable inter-annual variation in rainfall.[12] Temperature and precipitation are affected by ENSO cycles as well as by tropical cyclones. Guam's climate tends to be dry during El Niño years and wet during La Niña years, and scientists generally expect the differences between El Niño and La Niña years to become greater.[13]

An average of three tropical storms and one typhoon pass within 180 nautical miles of Guam every year.[14] Heavy rains occasionally overwhelm Guam's rivers, streams, and urban storm drains, and they can lead to damaging floods. Flooding is most common in the southern part of the islands, where the local bedrock is less permeable than the limestone in the north. Thus, rainfall in the south runs off into rivers and streams instead of filtering into the ground.

Phenomenon	Trend	Projections	Impacts
Air temperature	Average air temperature has risen; increase in number of "hot" days (over 31.1°C; 88°F) from 5/year in 1950 to 36/year in the 1990s	Average daily temperatures expected to rise by 1.5-2.0°C (2.7-3.6°F) under lowest emissions scenarios and by 3.0-3.5°C (5.4-6.3°F) under high emissions scenarios by 2100; number of "hot" days (32°C; 90°F) to increase to 257/year by 2100 under high emissions scenarios	Heat stress and shifting vector-borne disease profile
Rainfall	High inter-annual and seasonal variability	No significant change under low emissions scenarios; decrease of approximately 7% under high emissions scenarios by 2100; increased number of extreme rainfall events under all warming scenarios	Increased runoff, flooding, and erosion
Drought	1.6 of every 10 years under drought conditions	Increased incidence of drought to 4 of every 10 years by 2100 under high emissions scenarios	Water stress for crops; More frequent wildfire
Typhoons / Storms	Consistent number of storms over 40 years; increased risk of storm during El Niño years and decreased risk in La Niña years	Tropical storm intensity to increase while frequency decreases	Increased maximum wind intensity to bring structural and tree damage
Sea level	Average rise of 3.4 mm (0.13 inches) per year since 1993; average number of high water days has risen from 2/year in 1960 to 21/year in 2014; high inter-annual and seasonal shifts	Acceleration in rate of rise; 0.38 m (1.2 feet) of rise by 2100 under low emissions scenarios; 1.2 m (3.9 feet) of rise by 2100 under high emissions scenarios	More frequent and severe coastal flooding; saltwater intrusion into drinking water; under higher emissions scenarios, more than 58% of infrastructure (e.g., electric, water, roads, and bridges) are exposed

Table 9: Climate Change Phenomena, Trends, and Projected Impacts (Guam)

Guam's coral reefs and marine ecosystems provide habitat, food, and protection, and they are a key attraction for the tourism industry. Warming waters are likely to damage much of the coral. Average water temperatures around Guam have risen more than 1°C (1.8°F) over the last century, and rising water temperatures tend to lead to "coral bleaching," which is becoming more common around Guam. Increasing ocean acidity also damages corals as higher acidity decreases the ability of corals to produce calcium carbonate. The Pacific Ocean has become about 25% more acidic in the past three centuries, and acidity is likely to increase another 40-50% by 2100. Other species in Guam's waters will also be impacted as sharks, rays, grouper, snapper, and hundreds of other fish species rely on healthy coral reefs for habitat.

Sea level has risen by about 10 cm (4 inches) relative to Guam's shoreline since 1993. It is projected to rise 0.3-0.9 m (1-3 feet) in the next century. Sea level rise will submerge low-lying areas and erode beaches, both of which can be expected to exacerbate coastal flooding from typhoons, storm surges, and tsunamis. The loss of coral reefs compounds this problem because reefs help protect the shore from waves and storm damage. Groundwater provides 80% of Guam's water supply. During droughts, rising sea levels could make fresh water less available. Most of Guam's freshwater lies in the northern part of the island, which has a "lens" of fresh groundwater floating on top of the heavier, saltier water. Some wells already produce salty water during dry periods when the freshwater lens becomes thinner; prolonged drought could make more of Guam's wells salty. Rising sea level could also cause salt water to infiltrate farther into the island's groundwater.[15]

Government Institutions, Policies, and Plans for Disasters and Climate Change

Guam's emergency management and hazard mitigation plans and policies are rooted in the philosophy that emergency management is a cycle of "phased, coordinated, and mutually supporting activities conducted by each level of government before, during, and after an emergency situation."[16] Thus, it integrates planning, mitigation, preparedness, response, and recovery into its offices and policies for all-hazards preparedness.

The Government of Guam operates most of the services and utilities, to include the Guam Police and Fire Departments, Guam Memorial Hospital Authority, Guam Power Authority, the Guam Waterworks Authority, and the telecoms. Thus, the Government is responsible for providing assistance for any emergency management-related requests coming from the 19 villages. The Office of the Governor maintains overall direction and control for response activities. All policy decisions shall be coordinated through the Governor.

Guam Homeland Security / Office of Civil Defense (GHS/OCD) is a cabinet-level office and, in times of disaster, serves as the primary or alternate Governor's Authorized Representative responsible for executing all necessary documents for disaster assistance following a Presidential Disaster Declaration. The Governor appoints the Administrator of the Office of Civil Defense to serve as the Governor's Agent in the administration and supervision of all response activity operations. During and emergency or disaster event, the Administrator can serve as the Territorial Coordinating Officer (TCO) once a Presidential Disaster Declaration has been granted. Figure 23 illustrates the GHS/OCD place within the Governor's Office and its constituent offices.[17]

GHS/OCD is responsible for the following actions before, during, and after an emergency:

- Advising the Governor and Lt. Governor of disaster threat conditions, obtaining and submitting reports on proposed actions, projects in progress, completed projects, and other information pertinent before, during, and after an emergency/disaster
- Representing the Governor as the TCO when a Presidential Disaster Declaration has been granted
- Coordinating preparedness activities with Government of Guam agencies,

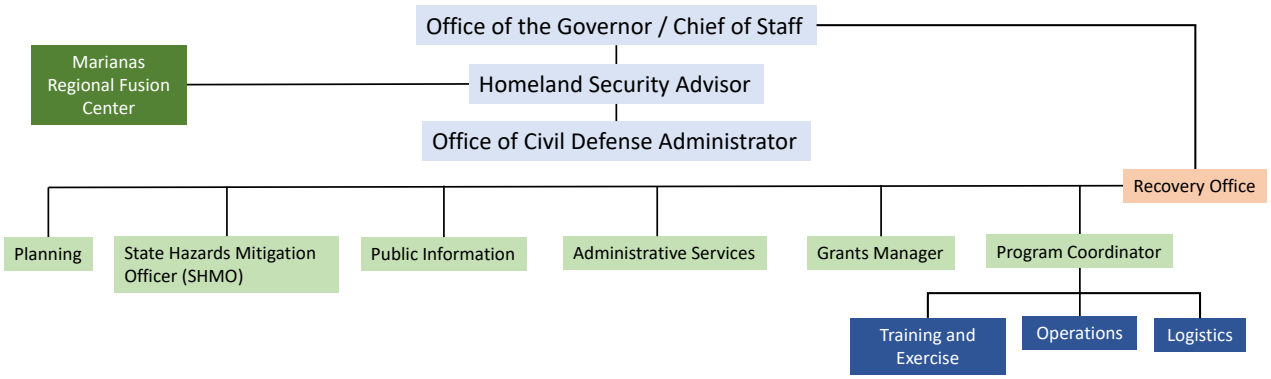


Figure 23: Organigram of Guam Homeland Security / Office of Civil Defense

private, volunteer, and non-governmental organizations, and the public
- Establishing, managing, and maintaining the Marianas Regional Fusion Center for the collection and processing of all threat information relative to Guam and its interests throughout the Pacific region
- Preparing the comprehensive emergency management plan and executing its prescribed activities
- Implementing training programs to improve the ability of Guam's emergency management personnel to prepare and implement emergency management plans and programs
- Establishing guidelines and schedules for annual and periodic exercises that evaluate the ability of Guam to respond to emergencies and disasters and to support local emergency management agencies
- Conducting periodic reviews of policy, plans, programs, and projects related to the emergency/disaster response to ensure compliance, consistency, and cooperation among elements and functions of preparedness and shall submit a report to the Office of the Governor identifying conflicts and deficiencies and shall include, where necessary recommendations for corrective actions
- Assigning lead and support responsibilities to Government of Guam agencies, as well as public and private organizations for Emergency Support Functions and the other activities needed to support the EOC
- Maintaining a preparedness level that meets the needs of persons with special needs or access and functional needs, and developing policies that are consistent with federal policy and guidelines
- As required, maintaining a 24-hour, seven days a week situational awareness of events that may require a response during normal (routine) operations by coordinating situational awareness information with territorial and federal partners, e.g., the U.S. Indo-Pacific Command Joint Operations Center, Joint Region Marianas Regional Operations Center, FEMA Region IX Watch and Public Affairs Officer, CNMI Homeland Security, etc.
- Maintaining a system of communications and warning to ensure that Guam's population and emergency response agencies are warned of developing emergency situations and can exchange emergency related information and decisions
- Managing and maintaining the Incident Management System for use in establishing a common operating picture for an incident or disaster
- Coordinating the release of public information in concert with the Governor of Guam's Communications Director and/or until activation of the Joint Information Center
- Providing standards and requirements for village emergency management plans
- Determining the resource requirements of the territory in the event of an emergency
- Anticipating trends and promoting innovations that will enhance all the resource requirements (personnel, teams, equipment,

heavy equipment, commodities, vehicles, and aircraft) needed to support emergency operations throughout the island of Guam
- Supporting the emergency management needs of all villages and agencies by developing reciprocal mutual aid agreements with other off-island jurisdictions.
- Instituting island-wide public awareness programs that focus on emergency preparedness issues, including, but not limited to, the personal responsibility of individuals to be self-sufficient for at least 72 hours following an emergency or disaster
- Initiating community education and outreach to the public regarding the registry of persons with special needs and special needs shelters
- Preparing and distributing to appropriate Government of Guam and local officials, catalogs of federal, territorial, and private assistance programs
- Activating the EOC and coordinating local, Government of Guam, and federal emergency management activities and taking all other steps, including the partial or full mobilization of emergency management assets and organizations in advance of an emergency, to ensure the availability of adequately trained and equipped emergency management personnel before, during, and after emergencies and disasters
- Reviewing, per an established schedule, emergency operating procedures
- Assisting with the development and maintenance of specialized regional response teams in all disciplines of Operations, Logistics, Plans, Finance, Communications, and Safety
- Creating, implementing, administering, adopting, amending, and rescinding rules, programs, and plans needed in accordance with Section 6 of the Organic Act of Guam, with due consideration for, and in cooperation with, the plans and programs of the federal government.
- Maintaining a program to require that all emergency evacuation shelters are available for use when needed during a disaster and American Red Cross ARC 4496 compliant
- Coordinating Guam's emergency response activities through its 16 Emergency Support Functions
- Assisting the federal government as necessary during a mass displacement of individuals event
- Implementing and providing administrative support for the Accidental Release Prevention Program, and ensuring the timely submission of Risk Management Plans and any subsequent revisions of Risk Management Plans
- Ensuring continuity of government and assisting with the planning of continuity operations for government agencies and services

Mayors and Vice Mayors serve as Civil Defense Wardens during times of crisis. Their offices serve as Command Posts for their respective villages, and from these offices, they acquire and collate information on needs, coordinate assessments, serve as distribution points for emergency/recovery supplies, and assist in coordination of recovery efforts. Mayors act as the conduit for the flow of information from the EOC to the public and in the opposite direction.

The U.S. federal government may provide assistance to Guam upon the request of the Office of the Governor or when primary federal jurisdiction is involved.

The EOC is a permanent underground facility that houses the operations center, a policy room, the Joint Information Center, a separate Operating Facility, and various other support offices and rooms. The alternate EOC – in case the primary EOC building is threatened – is at the National Guard Readiness Center. The Guam EOC Emergency Support Function (ESF) Team is composed of agency representatives and staff from across the government, and it includes NGO representatives. They are grouped into 16 ESFs to coordinate and implement response and recovery. Table 10 lists the primary organization in charge of each ESF.[18]

Emergency Support Function	Primary Agency/Organization
Transportation	Guam Department of Public Works
Communication	Guam Telecom
Public Works and Engineering	Guam Department of Public Works
Firefighting	Guam Fire Department
Emergency Management	GHS / OCD
Mass Care, Housing, and Human Services	Department of Education / Mayor's Council of Guam
Resource Support	Guam Department of Administration / General Services Administration
Public Health and Medical Services	Guam Public Health and Social Services / Guam Memorial Hospital Authority
Urban Search and Rescue	Guam Fire Department
Oil and Hazardous Materials Response	Guam Environmental Protection Agency / Guam Fire Department
Agriculture and Natural Resources	Guam Department of Agriculture
Energy	Guam Power Authority
Public Safety and Security	Guam Police Department
Long-Term Community Recovery	Guam Housing and Urban Renewal Agency / Guam Economic Development Authority
External Affairs	GHS / OCD
Military Support to Civil Authority	Guam National Guard

Table 10: Guam EOC Emergency Support Team

GHS/OCD also oversees Guam's hazard mitigation programming, including FEMA Hazard Mitigation Assistance for the following:

- Hazard Mitigation Grant Program - provides grants to state and local governments to implement long-term hazard mitigation measures after a major disaster declaration to reduce the loss of life and property during the immediate recovery
- Building Resilient Infrastructure and Communities - supports states, local communities, tribes, and territories for hazard mitigation projects to ensure communities have capability and capacity; to encourage and enable innovation; to promote partnerships; to enable large projects; to maintain flexibility; and to provide consistency.[19]

The Guam Hazard Mitigation Officer (GHMO) is the key office for hazard mitigation and leads planning efforts, particularly updating and implementation of the hazards mitigation plan, which includes enumeration of the various hazards confronting Guam, a vulnerability assessment of the island, its people, and its built environment, and a strategy for best use of local and federal capabilities to mitigate hazards.[20]

The Office of the Governor also has the authority to issue executive orders related to climate change, such as setting up working groups or task forces, a power which has been recently used to address climate change issues.

Within the Office of the Governor, the Guam Bureau of Statistics and Plans houses:

- The Guam Coastal Management Program (GCMP), which is responsible for conducting consistency reviews under the federal Coastal Zone Management Act and receives funding from NOAA. GCMP houses the local implementation of the NOAA Coral Reef Conservation Program
- The Land-Use Planning Program, which is responsible for mapping services and providing support to other agencies, a key component in vulnerability assessments

The Guam Environmental Protection Agency (Guam EPA) mandates are specifically related to regulation of air and water pollution, solid and hazardous wastes, pesticides, and drinking water. The agency also has responsibility for regulating water resource development.[21]

The following are several executive orders and

laws underpinning emergency management and climate change action:

The Guam Civil Defense Act of 1951 requires delivery and updating of the Guam Comprehensive Emergency Management Plan, which is the master operations document for the Territory for responding to all emergencies, and all catastrophic, major, and minor disasters.[22]

The Disaster Mitigation Act (2000) authorizes pre-disaster mitigation programming with the expectation that such programming will reduce the costs to the U.S. federal government of disaster assistance. It made other changes to "Stafford Act" grants and programming linked to hazard mitigation funding and increases the amount of funding available to a state, local, or tribal government if a major disaster is declared. In order to access these funds, a government must have a FEMA-approved State Mitigation Plan. Guam's GHS/OCD prepared the Guam Hazard Mitigation Plan and oversees its updating and implementation on behalf of the Governor's Office.[23]

Executive Order 2015-08 (2015) established a CCA policy, directed creation of a Climate Change Task Force, and directed completion of a comprehensive vulnerability assessment. The Order also specified that the Climate Change Task Force shall identify funding sources, such as federal grants, to support strategic planning, adaptation initiatives, and vulnerability assessments.

Executive Order 1997-10 (1997) established the Guam Coral Reef Initiative (GCRI) to promote more comprehensive and effective management of the Territory's coral reef resource. Executive Order 2012-05 (2012) provided further clarification in regard to GCRI by specifying that it shall include a Policy Advisory Committee and Coordinating Committee. The 2012 Order further instructed that the Policy Advisory Committee would be composed of individual representatives from the Guam governor's office (chair), academia, commercial fisheries, recreational fisheries, maritime industry, maritime recreation, the Chamorro community, the environmental NGO sector, and one at-large seat. It specified that the Coordinating Committee would be composed of the Guam governor's office and the heads of various Guam executive branch agencies. Both committees were charged with providing input to the Guam Local Action Strategies developed under the NOAA Coral Reef Conservation Program.

Executive Order 2010-15 (2010) established the Guam Energy Task Force to provide recommendations for reduction of reliance on fossil fuels, development of renewable energy sources, improvement of energy generation infrastructure, and education regarding energy efficiency and conservation.

The Land Management Act (Title 21 GCA Ch. 60) conferred to the Department of Land Management authority over all government real property on Guam. Land classifications are limited to urban, suburban, agricultural, grazing, industrial and commercial, forests, and wasteland. The Act allows the Department to reserve for future use any lands not currently allocated by statute to any other agency, and to transfer lands not otherwise encumbered to the Chamorro Land Trust Commission as deemed appropriate. It also established a 7-member Territorial Land-Use Commission, with administrative rulemaking authority for land-use.

Guam Territorial Seashore Protection Act of 1974 (PL 12-108; Title 21 GCA Ch. 63) established a Guam Territorial Seashore Protection Commission, composed of members of the Guam Land-Use Commission, to manage all property owned by the Territory within a Seashore Reserve zone defined as extending from the shoreline seaward to the 10-fathom contour, and to acquire additional property that may be added to this Reserve by purchase, donation, or exchange.[24]

Plans for emergency management and CCA include:

The Guam Comprehensive Emergency Management Plan (Guam CEMP), most recently published in 2016 covers the philosophy of all-

hazards management, planning, and response. It details the responsibilities of local, Guam, and federal agencies, and it provides a concept of operations that integrates work at the EOC and other facilities and offices. There are five hazard/incident specific annexes: tropical cyclone, tsunami, terrorism, aviation incident, and pandemic. The CEMP is compliant with the U.S. National Incident Management System (NIMS) and incorporates the principles set forth in the Incident Command System (ICS). NIMS is the standard procedure for incident management in the territory, and each employee of GHS/OCD and the EOC ESF Team is required, through the Agency's Training and Exercise Unit, to complete required NIMS training and other training as it relates to their emergency support function.[25]

Guam Hazard Mitigation Plan (2019) was approved by FEMA as Guam's Standard State Mitigation Plan, thereby making Guam eligible to receive certain non-emergency grants and other resources. The Plan includes a complete assessment of the hazards confronting Guam as well as enumeration of the communities and public assets that may be vulnerable to impacts from these hazards. It spells out probable costs of repeated, worsening disaster events, and it lists the government and public capabilities available to address hazards and to mitigate risks.[26]

The Marine Planning and Climate Change Policy (2015) was developed in response to Executive Order 13547 (2010) that recognized the importance of fishery resources, marine planning, and climate change in Hawaii and the U.S.-Affiliated Pacific Islands (USAPI). It was developed specifically for Guam's Western Regional Fishery Management Council to help guide the implementation and management of its Fishery Ecosystem Plans, programs, and other activities.

A complicating factor for Guam is that, during disasters throughout Micronesia, people from atoll islands historically migrate to Guam because it usually has more food and water resources available. With increased future migration from the impacts of climate change, Guam's resource needs may exceed carrying capacity.[27]

Office of the Governor
513 West Marine Corps Drive, Ricardo J. Bordallo Complex, Hagatna, Guam 96910
Tel: 671 472-8931/6

Bureau of Statistics and Plans
Tel: 671 472-4201/2

Homeland Security / Office of Civil Defense
221B Chalan Palasyo, Agana Heights, Guam 96910
Tel: 671 475-9600

Marianas Regional Fusion Center
671 475-0400
Email: *mrcf@ghs.guam.gov*

Guam Environmental Protection Agency (EPA)
17-3304 Mariner Avenue, Tiyan, Guam 96913
Tel: 671 300-4751

Early Warning Systems

The ESF 2, Communications Team, manages all Government of Guam communications systems. Once alerted or warned of an emergency or disaster, the Guam Fire Department 911 Dispatch Center, the Guam Police Department Tactical Communications Center, the U.S.'s NOAA/NWS, Pacific Tsunami Warning Center, the Joint Typhoon Warning Center, and the U.S. Navy's Joint Region Marianas Regional Operations Center notify the GHS/OCD Duty Officer who will notify the Homeland Security Advisor and/or the Office Of Civil Defense Administrator who in turn will notify the Governor's Communications Office. When sufficient basis is established, a warning message is issued through the Emergency Alert System (EAS).[28]

In addition to radio and televised emergency information announcements, some village mayors plan to move through their villages making emergency announcements.[29] Moreover, there are All Hazards Alert Warning System sirens in the following locations:

- GHS/OCD facility, Agana Heights
- Agat Marina
- JFK High School

- Talofofo Elementary School
- Asan Mayor's Office
- Pago Bay A-Frame South End
- Inarajan Elementary School
- Yona Mayor's Office
- Ft. Soledad, Umatac
- GWA Pump Station, Merizo
- Ija Agricultural Station, Inarajan
- Port Authority of Guam
- Agat Senior Citizen's Center
- Hotel Nikko Guam
- Tamuning Mayor's Office[30]

In 2018, FEMA installed the FEMA National Radio System (FNARS) at the Offices of GHS/OCD and trained staff how to use the system. The nationwide High Frequency FNARS radio network provides backup communications when other systems are compromised. The system supports voice, chat, phone patch, and email. The system is considered highly survivable during emergencies and provides back-up capabilities if all other systems fail. FNARS uses 60 frequencies with 1000 Watts of power, providing voice links with other Pacific islands and the West Coast of the U.S.[31]

National Weather Service, Tiyan, GU

3232 Hueneme Rd. Barrigada, GU 96913
Tel: 671 472-0900
https://www.weather.gov/gum/

Infrastructure

The Guam Department of Public Works maintains a roadway network of approximately 1,609 km (1,000 miles) on which there are 36 bridges.

The Port Authority Guam (PAG), a government agency overseen by the public utilities commission, operates the Apra Harbor deep water port, which serves both the U.S. Navy and private commercial interests. PAG also owns and operates a marina in Agat (southern) and another in Hagatna. The 457-m (500-yard) wide, 30-m (100-foot) deep entrance to the harbor faces west into the Philippine Sea.[32] The Port covers more than 1,000 acres of upland, marine, and submerged properties. The upland and marine areas make up about 450 acres and are comprised of cargo handling/breakbulk terminals, upland, cargo storage, general use wharves, fuel and cement import terminals, marinas, upland industrial and natural preserve land, general industrial land, open space, marinas, and water recreation areas. The Port offers four cargo handling berths, 26.5 acres of cargo storage, and repair, maintenance, and storage buildings. Under the 2023 Port Improvement Plan, equipment, building, and berth improvements are planned through 2032.[33]

Guam has two active airports: Antonio B. Won Pat International Airport (GUM / PGUM) and North Field on Andersen Air Force Base.[34] PGUM has two runways – one that measures 3,661 x 45.7 m (12,014 x 150 feet) and a second that measures 3,052 x 45.7 m (10,014 x 150 feet); both sit just above 76 m (250 feet) in elevation.[35]

The 2030 Guam Transportation Plan defines Guam's long-term improvement strategy as overseen by the Department of Public Works. In addition to identifying short and long-range transportation needs and improvement strategies, the Plan lays out ways to address the impacts of the proposed military build-up, establish sustainable financing and project implementation recommendations, and identify policy and institutional improvements to promote better decision making. Significant portions of funds come from U.S. Department of Transportation Federal Highway Administration allocations to plan, design, construct, and maintain Guam's highway system.[36] The most recent action plan for Plan is the Guam Transportation Improvement Program 2024-2027; under this 3-year plan, various key roads will be widened and resurfaced along with safety improvements. Bridge repairs and reconstruction, and drainage projects are also prioritized.[37]

The Guam Power Authority (GPA) operates the electrical grid. It is the provider of electric power to U.S. military installations on the island, and these installations account for 20% of electricity use. Based on its own assessments,

GPA faces challenges in maintaining the condition and operability of its plants, and various on-going projects are moving cables underground and installing emergency back-up power generation capabilities to power micro-grids. Funding for some of these projects come from various U.S. federal agency programming accounts.[38] The Clean Energy Master Plan is a comprehensive plan for transitioning Guam from legacy fossil fuel-fired generation to renewable energy and non-greenhouse electric energy supply as GPA is committed to providing 50% of the island's electric power from renewable or non-greenhouse gas emissions sources by 2030 and 100% by 2040. There are 20 diesel-fired plants across the island, and solar has been introduced although implementation of battery storage systems is lagging.[39]

The Guam Waterworks Authority oversees water treatment and wastewater removal systems, and, like GPA, the Authority requires funding for capital investments.[40] As of 2014, Guam Waterworks serviced 41,000 water and 25,000 wastewater connections. The Water Production/Treatment Division is responsible for operating all deep wells, the Ugum Surface Water Treatment Plant (southern), and the U.S. Department of Defense's Tumon Maui Well Facility, operated under license from the U.S. Navy. The Deep Well Section extracts drinking water from the Northern Guam Lens Aquifer via 120 deep water wells. The Ugum Surface Water Treatment Plant Section operates and maintains the island's only surface water production facility. The Wastewater Treatment Unit operates six treatment plants and two ocean outfalls.[41]

Department of Public Works
542 N. Marine Corps Drive
Tamuning, Guam 96913
Tel: 671 646-3452

Port Authority of Guam
1026 Cabras Highway, Suite 201 Piti, Guam 96915
Tel: 671 477-5931 / 671 472-PORT

Airport Authority
P.O. Box 8770, Tamuning Guam 96931
355 Chalan Pasaheru, Rte. 10A Tamuning, Guam
Tel: 671 646-0300
Email: *info@guamairport.net*

Guam Power Authority
Gloria B. Nelson Public Service Building 688
Route 15, Suite 100, Mangilao, Guam 96913-6203
P. O. Box 21868, GMF, GU 96921
Tel: 671 648-3000

Guam Waterworks Authority
Gloria B. Nelson Public Service Building
Mangilao, Guam 96913
Tel: 671 647-7800

Civil Society Partners

The American Red Cross Guam chapter responds to emergencies ranging from structural fires to flash floods. It maintains a network of volunteers who are trained in disaster preparedness and are present in all 19 villages. Most recently the chapter activated its disaster response capacity after Typhoon Mawar in May 2023. They served more than 27,000 people, including with shelter, meals, supplies, health care, mental health support, and other assistance.[42]

American Red Cross Guam
Route 4, Building 285, Hagatna, GU 96910
Tel: 671 472-6217
Email: *arcguam1@ite.net*

The Guam Voluntary Organizations Active in Disaster (VOAD) is an association of organizations that mitigate and alleviate the impact of disasters, and it provides a forum promoting cooperation, communication, coordination, and collaboration among members, who include both locally-based organizations and local representatives of national organizations.

Guam VOAD
Email: *guvoad@nvoad.org*

The University of Guam is the only institution of higher learning in Guam. It offers a graduate degree in Environmental Science and houses the Water and Environmental Research Institute of the Western Pacific (WERI); it is also a member of the university consortium of the Pacific Islands Climate Science Center. WERI is a research institute that focuses on seeking solutions to issues and problems related to freshwater resources in CNMI, Guam, and Federated States of Micronesia (FSM), through research, teaching, and outreach programs.[43]

Water and Environmental Research Institute of the Western Pacific

UOG Station, 303 University Dr, Mangilao, 96913, Guam
Tel: 671 735-2685

The Pacific Island Health Officers' Association (PIHOA) was established in 1986 by the health officials of the six USAPI - American Samoa, Guam, CNMI, Marshall Islands, FSM, and Palau. PIHOA was intended to provide a regional, collective voice for advocacy and policymaking to address common health concerns to strengthen local and regional health system capabilities, capacities, and community resilience. It supports partnership engagement and provision of technical assistance to USAPI health departments and ministries. PIHOA membership comprises the six USAPI chief health officials, their deputies, Micronesia State directors, chief executive officers of USAPI public hospitals, and 13 Pacific regional professional associations, USAPI academic institutions, and development partners.[44]

Guam Memorial Hospital Authority

850 Gov. Carlos Camacho Road, Tamuning, Guam 96911
https://gmha.org

Disclaimer: This handbook has been prepared in good faith based on resources available at the time of publication. Where possible, a link to the original electronic source is provided in the endnotes. While making every attempt to ensure the information is relevant and accurate, the CFE-DM does not guarantee or warrant the accuracy, reliability, completeness, or currency of the information herein. This information will be updated periodically, and we welcome and appreciate your feedback to improve this document and help fill any gaps to enhance its future utility. For feedback or comments, please email: **cfe.dmha.fct@pacom.mil**.

Guam Notes

1 School of Ocean and Earth Science and Technology (SOEST). Commonwealth of Northern Mariana Islands (CNMI) and Guam. University of Hawaii. Accessed 6 November 2023. https://www.soest.hawaii.edu/pibhmc/cms/data-by-location/cnmi-guam/

2 CIA World Factbook. Guam – Map. https://www.cia.gov/the-world-factbook/static/maps/GQ-map.jpg

3 School of Ocean and Earth Science and Technology (SOEST). Commonwealth of Northern Mariana Islands (CNMI) and Guam. University of Hawaii. Accessed 6 November 2023. https://www.soest.hawaii.edu/pibhmc/cms/data-by-location/cnmi-guam/

4 Zyzanska, Olga M.; Ashfield, Brooke R.; and Eulberg, Kate E. The Effects of Climate Change in Guam. 2023. Student Publications. 1066. https://cupola.gettysburg.edu/student_scholarship/1066

5 School of Ocean and Earth Science and Technology (SOEST). Commonwealth of Northern Mariana Islands (CNMI) and Guam. University of Hawaii. Accessed 6 November 2023. https://www.soest.hawaii.edu/pibhmc/cms/data-by-location/cnmi-guam/

6 Office of Insular Affairs. Guam: Political Status. Accessed 9 November 2023. U.S. Department of the Interior. https://www.doi.gov/oia/islands/guam

7 Mayors' Council of Guam. General Information about MCOG. https://mcog.guam.gov/about-mcog/general-information-about-mcog

8 United States Census Bureau. Census Bureau Releases 2020 Census Demographic and Housing Characteristics Summary File for Guam. 20 July 2023. https://www.census.gov/newsroom/press-releases/2023/2020-dhc-summary-file-guam.html#:~:text=Demographic%20Characteristics%20in%202020,was%20ages%2085%20or%20over.&text=The%20median%20age%20was%2033.7%20years.

9 School of Ocean and Earth Science and Technology (SOEST). Commonwealth of Northern Mariana Islands (CNMI) and Guam. University of Hawaii. Accessed 6 November 2023. https://www.soest.hawaii.edu/pibhmc/cms/data-by-location/cnmi-guam/

10 Pacific RISA. Territory of Guam. https://www.pacificrisa.org/places/territory-of-guam/

11 Grecni, Zena, et al. Climate change in Guam: Indicators and Considerations for Key Sectors. Pacific Island sRegional Climate Assessment (PIRCA). 9 November 2020. https://www.eastwestcenter.org/publications/climate-change-in-guam-indicators-and-considerations-key-sectors

12 Guam Visitors Bureau. Climate. https://www.visitguam.com/planning/traveler-essentials/guam-weather/

13 U.S. Environmental Protection Agency. What Climate Change Means for Guam. August 2016. https://19january2017snapshot.epa.gov/sites/production/files/2016-09/documents/climate-change-gu.pdf

14 Pacific RISA. Territory of Guam. https://www.pacificrisa.org/places/territory-of-guam/

15 U.S. Environmental Protection Agency. What Climate Change Means for Guam. August 2016. https://19january2017snapshot.epa.gov/sites/production/files/2016-09/documents/climate-change-gu.pdf

16 Guam Homeland Security, Office of Civil Defense. Guam Comprehensive Emergency Management Plan. https://ghs.guam.gov/resources/guam-cemp

17 Guam Homeland Security, Office of Civil Defense. Organization Chart. https://ghs.guam.gov/about-us/organization-chart

18 Guam Homeland Security, Office of Civil Defense. Guam Comprehensive Emergency Management Plan. https://ghs.guam.gov/resources/guam-cemp

19 Guam Homeland Security, Office of Civil Defense. Hazard Mitigation Program. https://ghs.guam.gov/programs/hazard-mitigation-program

20 Guam Homeland Security, Office of Civil Defense. 2019 Guam Hazard Mitigation Plan. July 2019. https://ghs.guam.gov/sites/default/files/final_2019_guam_hmp_20190726.pdf

21 Spooner, D., et al. Climate Change Adaptation Planning in the U.S. Affiliated Pacific Islands: Assessment of Current Capacity and Recommendations for Future Opportunities. Pacific Islands Climate Change Cooperative. 2017. http://piccc.net/piccc/wp-content/uploads/2017/05/Climate-Change-Adaptation-Planning-in-the-USAPI-20171.pdf

22 Guam Homeland Security, Office of Civil Defense. Guam Comprehensive Emergency Management Plan. https://ghs.guam.gov/resources/guam-cemp

23 Guam Homeland Security, Office of Civil Defense. 2019 Guam Hazard Mitigation Plan. July 2019. https://ghs.guam.gov/sites/default/files/final_2019_guam_hmp_20190726.pdf

24 Spooner, D., et al. Climate Change Adaptation Planning in the U.S. Affiliated Pacific Islands: Assessment of Current Capacity and Recommendations for Future Opportunities. Pacific Islands Climate Change Cooperative. 2017. http://piccc.net/piccc/wp-content/uploads/2017/05/Climate-Change-Adaptation-Planning-in-the-USAPI-20171.pdf

25 Guam Homeland Security, Office of Civil Defense. Guam Comprehensive Emergency Management Plan. https://ghs.guam.gov/resources/guam-cemp

26 Guam Homeland Security, Office of Civil Defense. 2019 Guam Hazard Mitigation Plan. July 2019. https://ghs.guam.gov/sites/default/files/final_2019_guam_hmp_20190726.pdf

27 Pacific RISA. Territory of Guam. https://www.pacificrisa.org/places/territory-of-guam/

28 Guam Homeland Security, Office of Civil Defense. Guam Comprehensive Emergency Management Plan. https://ghs.guam.gov/resources/guam-cemp

29 University of Guam, Center for Excellence in Developmental Disabilities Education, Research, and Service. EMERGENCY PREPAREDNESS GUIDE FOR PERSONS WITH DISABILITIES. https://www.ghs.guam.gov/sites/default/files/emergency-preparedness-guidebook-pages.pdf

30 Guam Homeland Security, Office of Civil Defense. Tsunami. https://ghs.guam.gov/programs/natural-disasters/tsunamis

31 FEMA. Guam's Emergency Communications Capabilities Expand. 13 March 2018. https://www.fema.gov/press-release/20230425/guams-emergency-communications-capabilities-expand

32 Department of Public Works. 2030 GUAM TRANSPORTATION PLAN. 19 December 2008. https://www.guamtransportationprogram.com/docs/pages/2030-guam-transportation-plan/2030-guam-transportation-plan-chapter-1-7.pdf

33 Port Authority of Guam. 2023 Master Plan. 31 March 2023. https://portofguam.com/sites/default/files/2023_pag_master_plan_report_final2023-03-31.pdf

34 Department of Public Works. 2030 GUAM TRANSPORTATION PLAN. 19 December 2008. https://www.guamtransportationprogram.com/docs/pages/2030-guam-transportation-plan/2030-guam-transportation-plan-chapter-1-7.pdf

35 Federal Aviation Authority. Aerodromes – Guam. https://www.faa.gov/air_traffic/publications/atpubs/aip_html/part3_ad_2.0_guam.html

36 Guam Transportation Program. About the Program. Accessed 13 November 2023. https://www.guamtransportationprogram.com/about-the-program

37 Department of Public Works. Guam Transportation Improvement Plan – 2024-2027. https://www.guamtransportationprogram.com/docs/pages/2030-guam-transportation-plan/guam-transportation-improvement-plan/gtipfy2024-2027-public-meeting-slides-september-25-2023.pdf

38 Congressional Research Service. Guam: Defense Infrastructure and Readiness. 3 August 2023. https://crsreports.congress.gov/product/pdf/R/R47643

39 Guam Power Authority. 2022 INTEGRATED RESOURCE PLAN. https://admin.guampowerauthority.com/uploads/GPA_2022_Integrated_Resource_Plan_b16ef41f9e.pdf?updated_at=2022-09-20T07:24:07.680Z

40 Congressional Research Service. Guam: Defense Infrastructure and Readiness. 3 August 2023. https://crsreports.congress.gov/product/pdf/R/R47643

41 Guam Waterworks Authority. Operations and Maintenance. https://guamwaterworks.org/operations-maintenance/

42 Red Cross – Guam. Typhoon Mawar Response. https://www.redcross.org/local/guam/get-help/typhoon-mawar-response.html

43 Spooner, D., et al. Climate Change Adaptation Planning in the U.S. Affiliated Pacific Islands: Assessment of Current Capacity and Recommendations for Future Opportunities. Pacific Islands Climate Change Cooperative. 2017. http://piccc.net/piccc/wp-content/uploads/2017/05/Climate-Change-Adaptation-Planning-in-the-USAPI-20171.pdf

44 PIHOA. About PIHOA. https://www.pihoa.org/mission-history-strategic-plan/

Header photo by Philip Davis on unsplash.com. Guam. https://unsplash.com/photos/green-grass-field-near-blue-sea-under-blue-sky-during-daytime-fYW1GAndamQ

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The Republic of Kiribati is a central Pacific Island state made up of three island groups – the Gilbert, Phoenix, and Line Islands – comprising 33 islands, 21 of which are permanently inhabited. Overall, the country has 811 km^2 (313 square miles) of land.[1] The majority of the atolls lie no more than 4 m (13 feet) above sea level;[2] they are surrounded by barrier reefs,[3] and most are a few hundred meters wide at their widest point.[4] The country extends nearly 4,000 km (2,500 miles) from east to west and more than 2,000 km (1,250 miles) from north to south.[5] Because of this span, Kiribati's Exclusive Economic Zone (EEZ) covers more than 3 million km^2 (more than 1 million square miles).[6] A map of Kiribati is shown in Figure 24.[7]

The country straddles the Equator and lies within 4° north and south thereof.[8] All of Kiribati's islands are coral atolls except Banaba (Gilbert Islands), a raised limestone island. Kiritimati (also called Christmas Island), one of the Line Islands, occupies 609 km^2 (235 square miles), the largest land area of any atoll in the world. Most of the population is concentrated in the Gilberts; only one of the Phoenix islands (Kanton) is inhabited and three of the Line Islands are permanently inhabited. The capital, Tarawa, is an atoll in the Gilberts, and Bairiki, an islet of Tarawa, serves as the administrative center.[9]

The islands began to be settled by Austronesian seafarers in about 3000 BCE, and successive waves of Micronesian, Polynesian, and Melanesian sailors began to arrive from about 200 CE onward. These arrivals had built a distinct "Gilbertese" culture by the time of sustained European contact from the 1760s onward. Kiribati's present population of 115,300 are nearly all ethnically i-Kiribati, and nearly 60% of them live in urban areas, mostly in/on Tarawa.[10] Indeed, on South Tarawa, the population density is high – i.e., 3,184 people per km^2 (9,552 people per square mile). Other islands where the populations has increased in recent years include Teraina, Tamana, Butaritari, Kiritimati, and North Tarawa, whereas populations in Banaba, Makin, Tabuaeran, Nonouti, and Onotoa have decreased. The population is very young; the mean age is 24.9 years, and nearly 16% of the population is aged five years or younger. The latest Kiribati National Disability Survey identified 3,840 people living with disabilities.[11]

Hazards and Climate Change

The present climate of Kiribati is one that is generally stable and constant year-round with little variability in temperature over time or space although rainfall does vary among the islands with more northerly islands receiving more rain than more southerly ones. Rainfall is most abundant between March and May, and the average monthly temperature sits at 27-28°C (80.6-82.4°F) for every month throughout the year. The El Niño Southern Oscillation (ENSO) has an impact on the country's weather in terms of precipitation with El

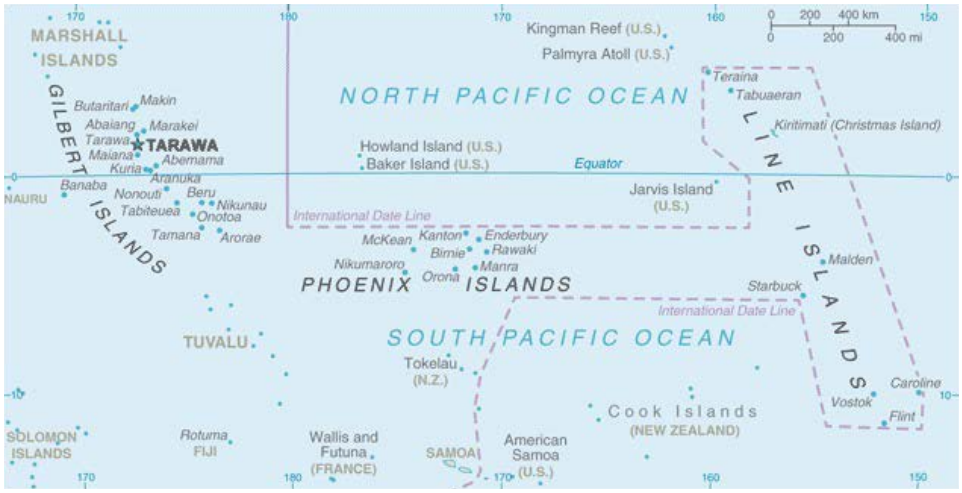


Figure 24: Map of Kiribati

Niño years bringing more rain and La Niña periods presaging drought. Current climactic patterns have tended to shelter Kiribati from direct cyclone hits, but the country's islands do feel impacts when storms pass within a few hundred kilometers. Key impacts are storm surge and winds.[12] Figure 25 shows the climate baseline of average temperature and rainfall for the period 1991-2020.[13]

The hazards Kiribati confronts include drought, epidemics, floods, cyclones, and storm surges, as well as tsunamis and human-made events such as oil spills. The tsunami threat is mostly linked to sea levels; the greatest potential for a seismically-generated tsunami to reach Kiribati is assessed to be in sub-sea subduction zones off Peru and in the South Solomon Trench.[14]

The risk of hazards being exacerbated by climate change effects is high. Potential effects range from rising sea surface temperatures and alterations in weather patterns to rising sea levels that can erode and inundate coastal areas while saltwater intrusion destroys limited freshwater resources, damages food crops, and decreases community health. Rising temperatures will impact both human and livestock health as heat stress reduces productivity, and the impact on overall poverty rates is likely to be negative. Already, villages – and whole islands – have had to undertake managed relocation after their homes were inundated. The country has publicized the potential for more such relocation to be necessary as sea levels rise and coasts and coral reefs erode.

Since 1950, records indicate that Kiribati's islands have experienced rising air and sea surface temperatures. Table 11 shows a collection of trends observed and potential changes as assessed by the Kiribati Meteorological Service (KMS) and by Australia's Bureau of Meteorology and Commonwealth Scientific and Industrial Research Organisation (CSIRO), based on over six decades of data and current models.[15]

Most global models have struggled to home in on potential trends for the country because of limitations on models' spatial (i.e., small islands) specificity. What is more, the potential impacts of rising temperatures on ENSO are poorly understood, and shifts in this phenomenon will affect Kiribati. Even if Kiribati continues to escape frequent direct hits by cyclones, more intense winds, rain, and storm surges will intersect with higher sea levels and could spell worse outcomes for Kiribati as erosion, flooding, and saltwater intrusion become more frequent. These outcomes will lessen Kiribati communities' access to fresh water. The country already relies on rainfall-replenished water sources – either rainwater catchment or groundwater – and the country's exposure to a rainfall regime that is increasing in intensity and decreasing in reliability will put pressure on its ability to collect and store

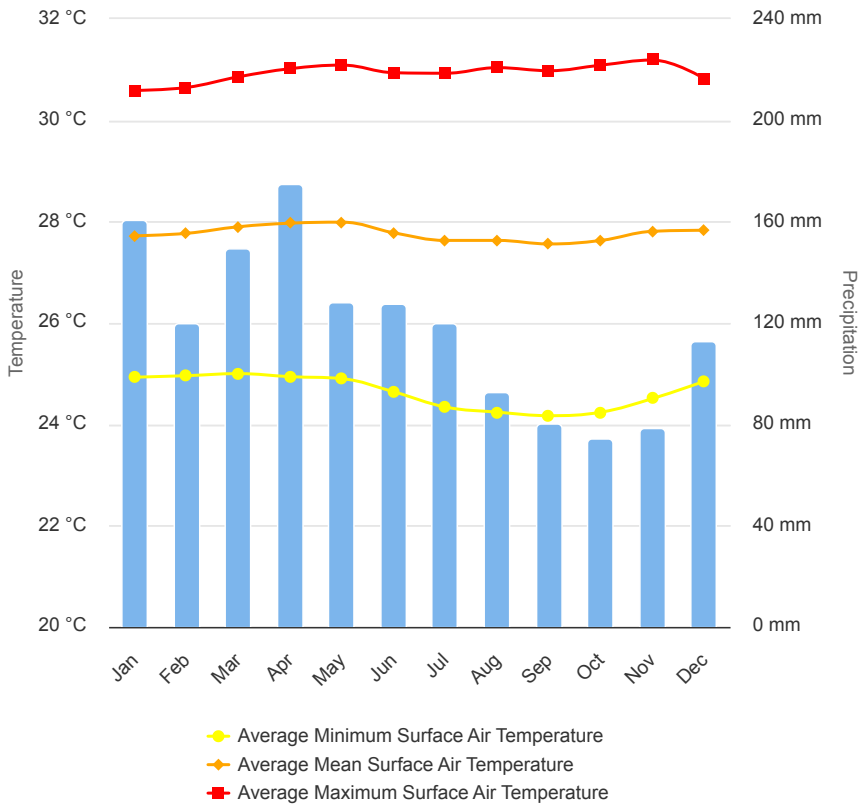


Figure 25: Average Monthly Temperature and Rainfall, Kiribati (1991-2020)

Phenomenon	Trend	Projections	Impacts
Air Temperature	Maximum temperatures have increased at a rate of 0.13°C (0.23°F) per decade; annual and seasonal maximum and minimum temperatures in Tarawa increased	Under a high emission scenario, annual and seasonal mean temperature will increase by 0.6-1.2°C (1.08-2.16°F) for the Gilbert Islands and by 0.5-1.2°C (0.9-2.16°F) for the Phoenix and 0.6-1°C (1.08-1.8°F) in the Line Islands by 2030; annual temperature increases could be greater than 3°C (5.4°F) by 2090	Heat stress on people and crops undermines human health and food security
Sea Surface Temperature	Since the 1970s, the Gilbert Group has felt rises by approximately 0.15°C (0.27°F) per decade, the Line Group by approximately 0.1°C (0.18°F) per decade, and the Phoenix Group by approximately 0.12°C (0.22°F) per decade	Sea surface temperature will continue to increase by 0.6-0.8°C (1.08-1.44°F) by 2035 and by 1.2-2.7°C (2.16-4.9°F) by 2100	
Rainfall	Annual and wet season rainfall has increased for Kiritimati, but there is no trend in the dry season; rainfall varies substantially from year to year	Wet season, dry season, and annual average rainfall will increase in the Gilbert Group and fall in the Line Group; annual and seasonal mean rainfall will increase (>5%) by 2030; the majority of models simulate a large increase (>15%) by 2090	Increase incidence of flooding and infrastructure damage
Drought	The impact of drought, usually associated with La Niña, can be severe	The incidence of drought will decrease; in all islands, mild drought will occur approximately 7-8 times every 20 years by 2030 and decrease to 6-7 times every 20 years by 2090; the frequency of moderate drought is projected to decrease from 2-3 times every 20 years by 2030 to 1-2 times every 20 years by 2090; severe drought will occur approximately 1-2 times every 20 years by 2030, decreasing to once every 20 years by 2055 and 2090	Depleted drinking water resources undermine human health and crop productivity
Cyclone, Severe Storm, and Extreme Sea Level	Tropical cyclones rarely pass between the Kiribati islands; between 1969-1970 and 2009-2010, three cyclones passed within 400 km of Arorae Island in western Kiribati, three cyclones within 400 km (250 miles) of Caroline Island in eastern Kiribati, and one cyclone paired with one depression passed south and north of western Kiribati, respectively	There will be more extreme rainfall and very hot days; the intensity and frequency of days of extreme heat and warm nights will increase and cooler weather will decline; the intensity and frequency of days of extreme rainfall will increase	Strong winds and storm surges cause damage to coasts and coastal infrastructure
Sea Level	Sea level has risen by 1-4 mm (0.04-0.16 inches) per year; sea level rise naturally fluctuates from year to year at levels of about 26 cm (10 inches); decade-to-decade variations also occur	Mean sea level is projected to continue to rise by approximately 7-17 cm (2.8-6.7 inches) by 2030 and 38-87 cm (15-34 inches) by 2090 under the higher emissions scenario	Greater coastal erosion and saltwater intrusion into drinking water
Ocean Acidification	Since the 18th century, the ocean has been slowly becoming more acidic; aragonite saturation has declined from about 4.5 in the late 18th century to an observed value of about 3.9 ± 0.1 in 2000	The acidification of the ocean will continue to increase; recent modelling suggests that under low emissions scenarios, carbon dioxide concentrations are expected to be around 450 parts per million by 2100, where pH will likely be 7.9-8.1, an average decline of 0.07 pH units from present day mean ocean pH in most tropical oceanic waters; for medium to high emission scenarios, ocean acidification poses far more risks to coral reefs, which are projected to degrade progressively	Losses of live coral of 25% by 2035 and 50% by 2050 due to rising sea surface temperatures and more acidic oceans

Table 11: Climate Change Trends Observed in Kiribati (1950-2015)

sufficient water.[16]

South Tarawa, including Betio, home of the main port and key commercial areas, has an extremely high population density. Most people live in single-story accommodations.[17] The damage inflicted by 2015's Cyclone Pam is an illustration of the types of impacts hydrometeorological events can have, but the country's response is also important. Cyclone Pam damaged the Nippon Causeway, flooded a hospital, and caused flooding in many parts of South Tarawa and some islands further south where there were reports of disruptions to livelihoods, basic social services, and economic connections. Since then, large development or re-development projects – e.g., a duplex housing development of approximately 100 dwellings, upgrading and construction of schools around South Tarawa, North Tarawa, and Abaiang, and the Kiribati Hospital – all have elevated floor levels to lessen the risk of coastal flooding and flash floods.[18] In addition, the 2017-2019 reconstruction of the Nippon Causeway that connects Betio to the rest of Tarawa used a "Build back Better" methodology whereby the road surface of the 3.4-km (2.1-mile) causeway was built higher and wider, a sea wall was built along the ocean-facing side to stop wave over-wash, and electric, water, and telephone lines that used to run underground were built, instead, into concrete boxes that run along the road for easier repair access.[19]

Government Institutions, Policies, and Plans for Disasters and Climate Change

The physical and social impacts of hazards and climate change are well understood by the government of Kiribati, and it has promulgated national adaptation policies to address them. However, shortfalls remain in the country's ability to consistently finance collection of quality data on hazards or on key sectors – e.g., health, water, and agriculture. More reliable funding for long-term data collection will help the country produce ever better assessments and plans for mitigation, adaptation, and response.

In November 2022, Kiribati submitted its Enhanced Nationally Determined Contributions (NDC) to the UNFCCC secretariat with the stated goal of leading the way on the global 1.5°C goal.[20]

The enactment of the Disaster Risk Management and Climate Change (DRMCC) Act, 2019 recognized the direct links between climate change and disaster risks. The DRMCC Act and DRMCC Regulations 2022 provide a legal framework for enhancing arrangements and coordination mechanisms to mitigate and adapt to, prepare for, respond to, and recover from, impacts of disasters and climate change. The provision of the Act focus on communities, government structures, and aligning with international obligations and guidelines.

The DRMCC Act provisions include:

- Establishment of a disaster risk management (DRM) and climate change governance-arrangements coordination mechanism at national and sub-national levels to coordinate DRR efforts across government agencies and with international partners;
- Development of a National Disaster Risk Management Plan that outlines the country's strategy for DRR and response;
- Implementation of early warning systems for natural hazards, including droughts, severe storms, flooding, and sea level rise;
- Integration of CCA and DRR into all sectors of the economy and applying the build-back-better principle in all recovery efforts, for improved resilience and reduced vulnerability to future disasters and climate change;
- Establishment of a Disaster and Climate Change Response Fund for vital immediate action (up to 72 hours post-impact) to respond to or mitigate impacts of climate change and emergencies or disaster, and developing a disaster risk finance policy for operationalizing this fund;
- Promotion of public awareness and education about shared responsibility of DRR and CCA; and
- Establishment of an emergency operations center and standard operating procedures and guidelines for disaster preparedness and response.

Under the DRMCC Act, the Office of Te Beretitenti (OB; President) is responsible, acting on the advice of the Cabinet, for the protection of people and places in Kiribati from disasters and climate change; personnel within OB are the disaster risk management team and form the National Disaster Risk Management Office (NDRMO).[21] The OB is the focal point for the UNFCCC and Sendai Frameworks, and it coordinates climate change and DRM action at the national level.[22] Secretaries provide oversight and support to the Kiribati National Expert Group (KNEG) on Climate Change and Disaster Risk Management through the Development Coordinating Committee, which is housed in the Ministry of Finance and Economic Development (MFED) and comprises secretaries and senior officials of government ministries and agencies.[23] MFED's Climate Finance Division is also the central coordinating office for financial arrangements with the Green Climate Fund (GCF), Adaptation Fund, Climate Investment Funds, and other resources.[24] The Ministry of Environment, Lands, and Agriculture Development (MELAD) was established as the focal point for multilateral environment agreements is responsible for technical implementation and scientific aspects of climate change adaptation. The Ministry of Infrastructure and Sustainable Energy (MISE) also has a key role for two reasons: 1) the energy division will be working to implement energy use and GHG emissions targets; and 2) it undertakes water security and coastal protection tasks alongside Ministry of Fisheries and Marine Resources Development (MFMRD), which is responsible for coral reefs, and other coastal and marine resource mapping and development.[25] Other ministries with equities in climate change action may include: Ministry of Internal Affairs (MIA), Ministry of Commerce, Industry, and Cooperatives (MCIC), Ministry of Information, Communications, Transport, and Tourism Development (MICTTD), Ministry of Health and Medical Services (MHMS), Ministry of Employment and Human Resource (MEHR), Ministry of Education (MOE), and Ministry of Women, Youth, Sport, and Social Affairs (MWYSSA).[26]

The KNEG was established as the primary national coordination and technical advisory body for disaster risk management and climate change. The lead ministry for climate change and disaster risk management, currently the OB, is responsible for administering the KNEG. KNEG members are Directors from each government ministry plus the Ministry responsible for the administration of the DRMCC Act - the OB, the Kiribati Meteorological Service, the Kiribati Police Service, the Kiribati Red Cross Society (KRCS), and relevant non-government entities representing vulnerable groups and others as specified in the DRMCC Act and Regulations. KNEG's statutory roles are:

- Ensuring a joint national action plan for climate change and DRM is in place and updated;
- Conducting regular risk and vulnerability analysis, compiled from data from various sectors and through conducting integrated vulnerability assessments and other primary research and community engagement;
- Planning and designing climate change adaptation and mitigation and DRM strategies; and
- Monitoring, reporting, and evaluating progress of implementation of climate change and DRM plans and actions, including reporting to relevant parliamentary committees and international bodies.

Island-level arrangements mirror the national institutional arrangements, with the Island Disaster Committees (IDC) serving as the primary bodies tasked with implementing national DRM law and policy at sub-national and local levels. The NDRMO coordinates DRM activities throughout the islands. At the local level, NGOs, churches, the private sector, and community-based organizations play crucial roles, and in many cases are the frontline disaster managers in times of crisis. Consequently, their participation in DRR and disaster management planning is essential, as is their advice on mainstreaming risk reduction into local development programs at community

level. Each IDC is responsible for developing and maintaining a DRM plan, commensurate with their hazard profile and resource capacity, as well as allocating budgets to ensure national DRM objectives are met and the local disaster plan is activated effectively.[27] The KNEG has laid out a process for line ministries, NGOs, the private sector, churches, and development partners to inform OB and consult with KNEG before taking new climate change or DRR action. Figure 26 shows the institutional arrangements for climate change action and DRM across the Kiribati government.[28]

Management of disasters is guided by Kiribati 20-Year Vision 2016–2036 (KV20), the Kiribati Climate Change Policy (KCCP, launched in 2018), the Kiribati Joint Implementation Plan for Climate Change and Disaster Risk Management (KJIP) 2019-2028, and the Kiribati National Development Plan (KDP). The KJIP further stands as the country's National Adaptation Plan (NAP). Figure 27 illustrates the linkages among Kiribati's national plans and their relationship to international agreements.[29] The KCCP is the overarching strategy for implementing adaptation, mitigation, and disaster risk reduction measures. It includes 10 focus areas, each with a number of objectives, and it includes traditional/indigenous knowledge as a key enabling component for long-term resilience. The 10 focus areas are: 1) coastal protection and infrastructure; 2) food security; 3) water security; 4) energy security; 5) environmental sustainability and resilience; 6) health security; 7) disaster risk management; 8) unavoidable climate change impacts; 9) capacity building and education; and 10) climate finance.[30]

The KCCP implementation plan is the KJIP 2019–2028. The KJIP outlines a holistic approach to integrating climate change and disaster risks into all sectors and coordinating action priorities in accordance with KV20 and KDP. Sector-specific, island-specific, and hazard-specific management strategies include KRCS Disaster Management Plan, Kiribati Meteorological Service Strategic Plan, Kiribati Education Sector Contingency Plan, Public Health Emergency Preparedness and Response Plan, National Tsunami Support Plan 2022, South Tarawa Drought Management Plan 2023, Kiritimati Drought Management Plan 2018, National Marine Oil Spill Plan, National Search and Rescue Plan, and several Island Strategic Plans.[31]

KJIP is also part of the commitments Kiribati made under the Pacific Islands Framework for Action on Climate Change, Regional Framework for Action on Disaster Risk Management, and Pacific Islands Meteorological Strategy. KJIP also reflects the broad objectives of the Framework for Resilient Development in the Pacific (FRDP), endorsed by Pacific Islands Forum (PIF) Leaders in 2016. As a party to the UNFCCC and the Paris Agreement, the government sees the KJIP as its NAP on climate change.[32] It has additionally crafted a National Infrastructure Investment Plan (NIIP) for the period 2022-2032 to screen and prioritize infrastructure projects and investment.[33]

The National Framework for Climate Change and Climate Change Adaptation addresses projected and existing climate-change impacts and provides a broad framework for implementing the country's immediate, medium-term, and long-term strategic goals and objectives. Under the framework, three subheadings describe Kiribati's actions to enhance its capacity to address the challenge of climate change. These include climate change adaptation, population and resettlement, and climate change mitigation.[34]

The 2014 KJIP was created to implement the National Framework for Climate Change and Adaptation to Climate Change. The objective was to increase resilience to climate change and disaster risks and promote a whole-of-nation approach by emphasizing mainstreaming and coordination across sectors and governance levels. The 2019 revised KJIP identifies strategies and 104 associated priority climate change and disaster risk management actions for the period 2019–2028. Revision and updating of the KJIP was funded by the U.S. government and undertaken by through the NAP Global Network's United States In-Country Support Program for Kiribati, implemented by the International Institute for Sustainable

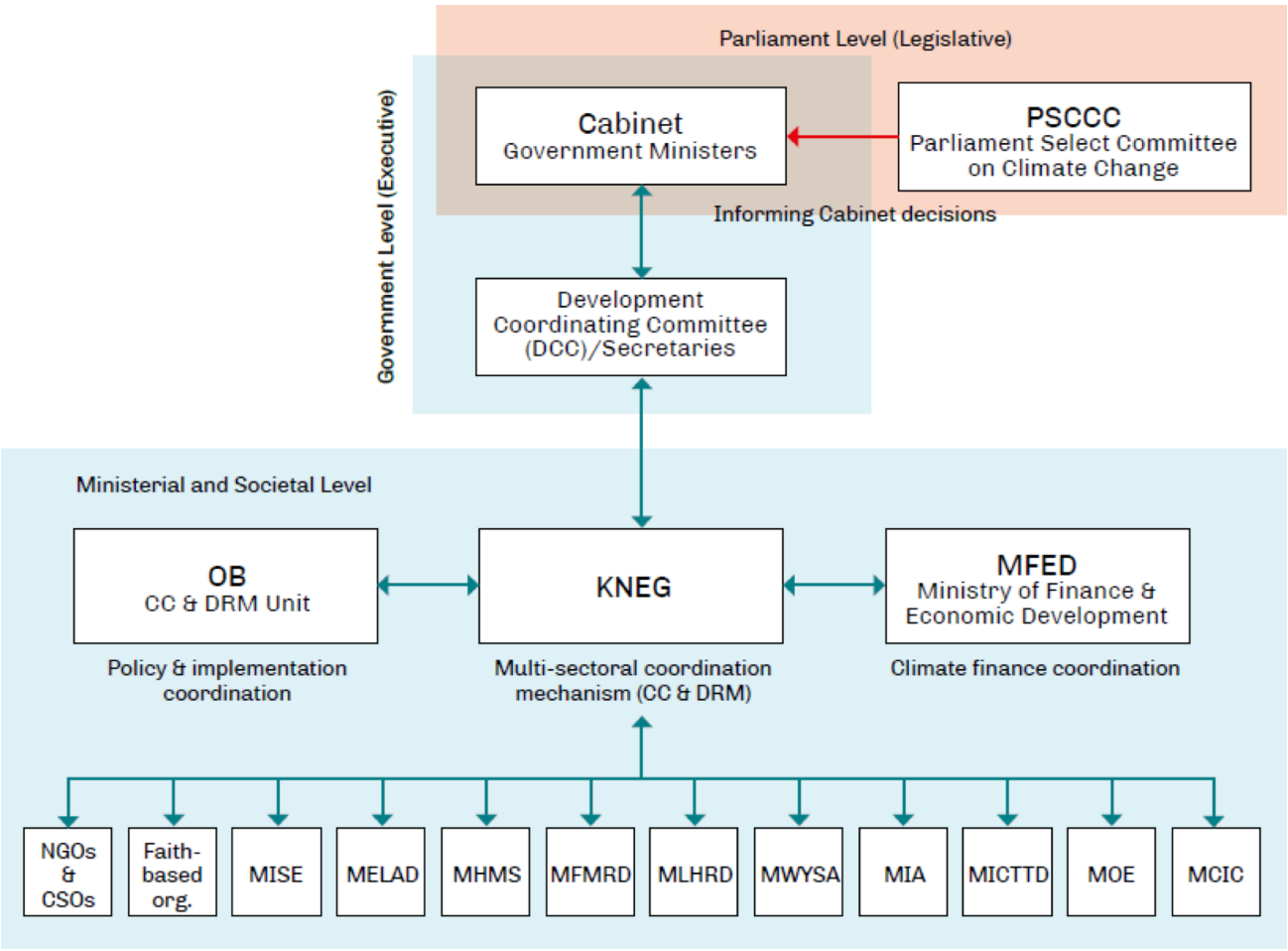


Figure 26: Kiribati Government Institutions for Climate Change and Disaster Risk Management

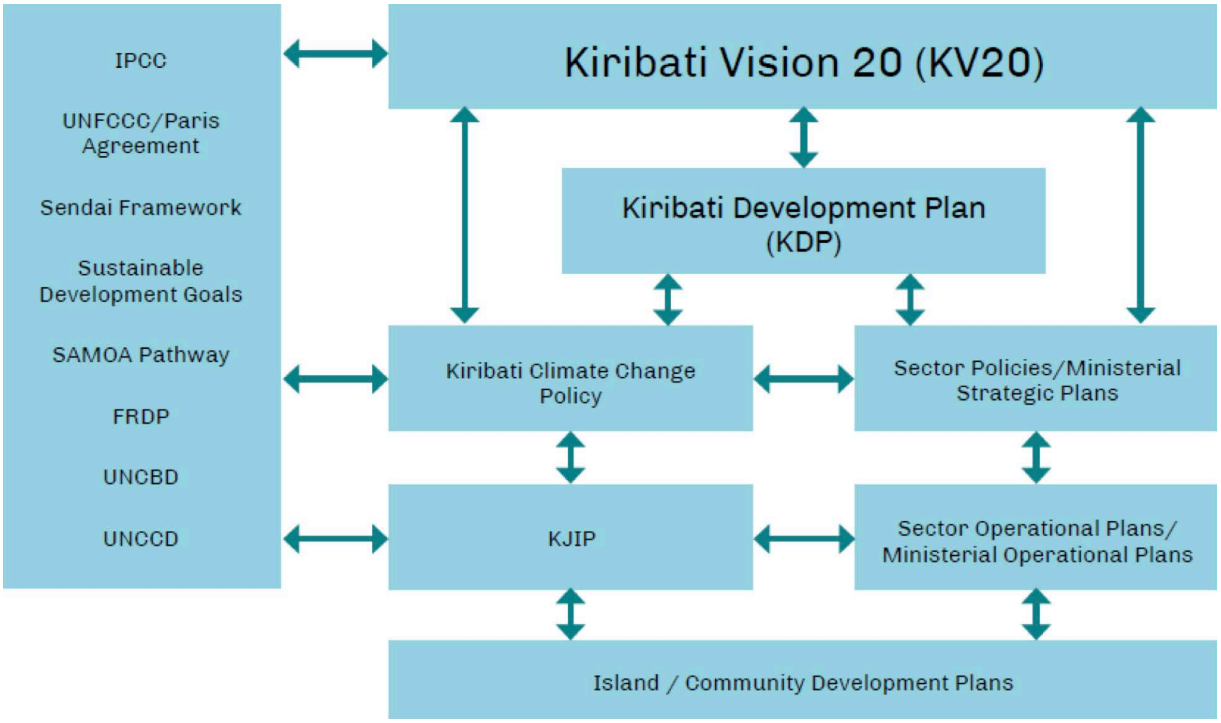


Figure 27: Linkages among National Frameworks and Plans

Development. KJIP was produced through collaborative work by KNEG, NGOs, civil society organizations, and representatives of the private sector. The Plan is aligned to and supportive of KV20 and the KDP.

The 12 major strategies in KJIP are:

- Strengthening good governance, policies, strategies, and legislation
- Improving knowledge and information generation, management, and sharing
- Strengthening and greening the private sector, including small and medium-sized enterprises
- Increasing water and food security with integrated and sector-specific approaches and promoting healthy and resilient ecosystems
- Strengthening health service delivery to address climate change impacts
- Promoting sound and reliable infrastructure development and land management
- Delivering appropriate education, training, and awareness programs
- Increasing effectiveness and efficiency of early warnings and disaster and emergency management
- Promoting the use of sustainable, renewable sources of energy and energy efficiency
- Strengthening capacity to access finance, monitor expenditures, and maintain strong partnerships
- Maintaining the existing sovereignty and unique identity and cultural heritage of Kiribati
- Enhancing resilience through strategic partnerships for community participation and engagement ownership and inclusion of vulnerable groups

KJIP implementation is coordinated and monitored by the KJIP Secretariat and Development Committee in the OB. KJIP explicitly demands that projects and activities under the Plan take into consideration the different impacts of hazards, disasters, and climate change on women and men, and it demands that programs generate sex-disaggregated monitoring data to help ensure equitable access to financial resources and other benefits resulting from investments in adaptation. Moreover, it demands a gender balance in participation and influence in decision-making for all projects' governance, management, and decision-making frameworks.[35]

Additional government ministry contingency and emergency plans include:

- MOE – National- and school-level contingency plans
- MHMS – Public health preparedness and emergency response plan
- MICTTD – National telecommunications plan
- MELAD – Kiribati Integrated Environment Policy and Strategic Environment Plan 2021-2036[36]

Office of the President

P.O. Box 68, Bairiki, Tarawa, Kiribati
Tel: 686 75021183
Email: *infor@ob.gov.ki*
https://www.president.gov.ki/

Early Warning Systems

Kiribati does not have its own methods of tracking tsunamis or tropical cyclones. The Kiribati Meteorological Services (KMS) is linked to the Fiji's FMS and RSMC-Nadi for key atmospheric weather bulletins[37] and to the Pacific Tsunami Warning Center. For drought, KMS adopted the Tarawa Drought Response Plan (2011) to plan and implement drought declarations and methods to raise public awareness of current and projected rainfall as well as information on how to properly conserve water.[38] KJIP's Strategy 8 addresses increasing the effectiveness of early warning systems. It targets community awareness campaigns and training in local languages for community leaders, women, youth, and other groups on hazards, and it promotes development of practical actions to ensure women, children, and persons living with disabilities can access aid, assistance, and shelter in the wake of a disaster.[39]

KMS is responsible for collecting and sharing

weather, climate, and ocean-related information. Tide prediction, satellite imagery, national forecasts, meteorological observations, seasonal climate outlook, and drought monitoring are among KMS services. A National Strategic Plan (2021-2025) for KMS targets provision of enhanced weather, climate, and ocean services. KMS is a member of KNEG[40] and operates five meteorological stations – Tarawa, Kiritimati, Beru, Kanton, and Butaritari.

The country has developed a database linked to the Kiribati Integrated Vulnerability Assessment. With the National Statistics Office as a partner, the database brings together data from all the vulnerability assessments conducted by KNEG across the islands. The database is available to staff from the OB, MFED Climate division, and others with the goal of producing sound policies and programs and for underpinning proposals to multilateral climate funds.[41]

Extending information on hazards and potential disaster events is a challenge due to the far-flung nature of the country's communities. Since 2018, there has been a national television service, but it only reaches South Tarawa. There are three radio stations that are the primary means of mass media distribution. Internet use has increased from 4% of households in 2010[42] to 38% of households in 2020, per World Bank data.[43] 4G telecom services are available in South Tarawa, Abemama, Tabiteuea North, and Onotoa, while 3G services are available on South Tarawa, North Tarawa, Abaiang, Marakei, and Kiritimati. 2G services are also available on Abemama, Tabiteuea North, and Onotoa. Other islands have VSAT systems (very small aperture terminals, small-sized earth stations used to transmit/receive data, voice, and video over a satellite communication network) set up at island council premises that residents can access. A 2015, national statistics office survey found that 45% of households have a radio, while 35% have a mobile telephone.

Due to knowledge, skill, and capacity gaps, translating scientific information on hazards and climate change into messages to which i-Kiribati can relate is a challenge. Guarding traditional knowledge and some religious beliefs may be barriers to some potential actions to address climate change.[44]

Kiribati Meteorological Service
P.O Box 486, Tarawa, Kiribati
Tel: 686 75126459
Email: *registry@met.gov.ki*
https://www.met.gov.ki/

Infrastructure

In its first climate-oriented infrastructure plan, the Kiribati NIIP 2022–2032, the government's key stakeholder, the National Economic and Planning Office (NEPO) of the Ministry of Finance and Economic Development, assisted by the Pacific Region Infrastructure Facility (PRIF), laid out a plan to strengthen the infrastructure planning processes and management of the infrastructure pipeline, and to provide tools to assist with the early-stage screening and prioritization of projects using a process that is both systematic and transparent.[45]

The Ministry of Infrastructure and Sustainable Energy (MISE) is responsible for construction and maintenance of roads and highways and regulating provision of electricity, water, and sanitation services. The Ministry of Communications, and Transport (MICT) has regulatory authority over communications and transport sectors and has oversight over civil aviation, air terminal facilities and services, search and rescue, and the Kiribati Ports Authority.[46] The Civil Aviation Authority of Kiribati, under MICT, is responsible for all aviation activities.[47]

Tarawa has 33 km (20.5 miles) of sealed road and 8 km (5 miles) of feeder roads. It is the only vehicular transport route on the atoll and provides access between the seaport of Betio and the airport on Tarawa. it includes footpaths, improved drainage, speed humps, solar street lighting, and road signage. It is highly exposed to flooding and erosion by the sea. There is no vehicular access to the Northern islands of Tarawa from the south. Christmas Island has

a sealed road that circumnavigates the Island; it is in good condition and allows access to all settlements. Outlying islands have very few crushed coral roads that are generally all weather.[48]

There are 2 international airports: Bonriki International on Tarawa Island, and Cassidy International on Kiritimati. Kiribati has another 22 domestic airports, 18 of which provide scheduled domestic airline services. Bonriki sits at an elevation of 3m (9 feet); it has a single runway that is 2,011 × 45 m (6,598 × 148 feet) and is paved within a 150-m (492-foot) wide runway strip.[49] Cassidy sits at an elevation of 2m (6 feet) and has a single, asphalt runway that is 2,103 × 45 m (6,900 × 148 feet).[50] Butaritari, Abemama, Tabiteuea North, and Nikunau can all accommodate up to Dash 8 aircraft; the remainder are limited to Twin Otter aircraft.[51]

Kiribati Ports Authority (KPA) operates the two main ports, one on Tarawa at the edge of Betio lagoon, and Navy Harbour, at London (Ronton) on Christmas Island. Port capacity is limited by port handling equipment; there are no dock cranes. There is a third port, Banaba (Ocean Island), that was primarily used to facilitate the export of phosphate from the island but is now only used by inter-island shipping to service the resident population. It can only accommodate small boats that transfer goods from larger ships anchored offshore. All the outer islands require larger ships to anchor off and transfer cargo using small boats to beach landings or jetties.[52] Betio has one berth of 200 m (656 feet) length with an 8 m (26 feet) depth alongside.[53] Navy Harbour is limited to 20-foot containers and is not accessible in rough weather conditions. It has berthing for one ship at a time at its 100-m (328-foot), 6-m (20-foot; draft) berth. Christmas Island has a second port, English Harbour, that can only accommodate small inter-island boats with 2 m (6.6 feet) or less draft.[54]

The Public Utilities Board (PUB) oversees electricity, water, and sanitation services on South Tarawa. PUB electricity connections are available from Betio in the southwest of the atoll to Nabeina, in the central part of the northward reaching arm of the atoll. PUB supplies and distributes drinking water to its customers from Betio to Buota, just north of the Bonriki airport; it uses both a piped water system and water tanker trucks. Sewerage exists only in the major villages – i.e., Betio, Bairiki, and Bikenibeu. All other customers having septic tanks, serviced by a vacuum truck.[55]

Ministry of Infrastructure and Sustainable Energy
9W5J+GM6, Kiribati Institute of Technology, Betio
Tel: 686 63030120
Email: *registry@mise.gov.ki*
https://www.mise.gov.ki/

Ministry of Communications, and Transport
Betio Island, Tarawa, Kiribati
Tel: 686 740 26003
https://www.mict.gov.ki/

Kiribati Ports Authority
Tabonteuaabu, Betio, 0000 Tarawa, Kiribati
Tel: 686 75126972
Email: *enquiry@kpa.com.ki*
https://kiribatiportsauthority.online/

Public Utilities Board
Betio Power House
Betio Port, Betio Island, Kiribati
Tel: 686 75125201
Email: *registryadmin@pub.com.ki*

Civil Society Partners

Kiribati has many local NGOs, but most are very small, comprising family groups. Thus, umbrella organizations that bring together women's groups, youth councils, or disabled peoples organizations play an important role in coordinating smaller NGOs, particularly in areas where, as the government has recognized, local and traditional knowledge can promote ways to address the impacts of climate change. The culture of the i-Kiribati has allowed them to survive and thrive in the face of hazards for centuries, and promotion of community cultural

knowledge is considered a key to the country's and communities' future. At present, civil society groupings may be the holders of this knowledge, but they also may exclude some community members – e.g., women, the elderly, persons living with disabilities, etc. – from community fora where local knowledge is integrated into DRR and CCA planning and action. Ensuring that all i-Kiribati can contribute to and benefit from community resilience programming will involve various civil society groups.

Kiribati Red Cross Society (KRCS) conducts community-based DRR activities, including First Aid training and awareness-raising programs, and it provides essential relief supplies to those affected by disasters, as well as blood donation recruitment. The organization is also an advocate for awareness of the importance of DRR investment. KRCS depends on a combination of funding sources. The International Federation of Red Cross and Red Crescent Societies (IFRC) is the primary source of funding, which covers limited financial and technical assistance to organization operations. The Kiribati government also provides some funding for disaster response and relief efforts.[56] The headquarters is in Bikenibeu, Tarawa.[57]

Kiribati Red Cross Society
P.O. Box 213, Bikenibeu, Tarawa
Tel: 686 255 01 / 260 19
Email: *info@krcs.org.ki*

Kiribati Association of Non-Governmental Organizations (KANGO) is an umbrella for 44 national NGOs. Hosted at the USP Kiribati Campus on Tarawa.[58]

KANGO
Lagoon Backroad, Tarawa, Kiribati
Email: *kango-board@googlegroups.com*

The Kiribati Climate Action Network (KiriCAN) is an umbrella for 20 national NGOs and civil society groups, all based in South Tarawa. It is the primary climate change action network and focuses on awareness, adaptation, negotiations, and conferences. It serves members by providing networking and liaising with the government at local, national, and international levels.[59]

KiriCAN Member Organizations:

- Reitan Aine ni Kamatu (RAK) – Kiribati Uniting Church women's fellowship
- Teitoiningaina – Catholic Women's Association
- Ueen Te Makeke (Assemblies of God)
- Youth Alive (Assemblies of God)
- Anrae SDA Youth (Seventh Day Adventists)
- Caritas – Catholic Church
- Climate Change Artists
- Te Waa Mai Kiribati (dance)
- Te Toa Matoa (persons living with disabilities)
- Church of God
- Grassroot Development Group
- Betio Organic Farmers
- YCL
- Community Groups from Tabaonga, Bonriki, Ueen Te Bitati, Tamoa, Bangantebure, An Te Non, Ueen Teroti Community.

KiriCAN
Eita Village, PO Box 110, TARAWA, Kiribati
https://kirican.wordpress.com/

Live and Learn Kiribati (Live and Learn Environmental Education) works on various community projects focused on water and sanitation, livelihoods, health, education, DRR, and women's empowerment. It takes a human rights-based approach to addressing climate change-driven displacement.[60] Live and Learn has launched community preparedness and DRM activities across six islands – Makin, Marakei, North Tarawa, Abemama, Onotoa, and Arorae. The projects under these activities include early warning kits, First Aid training, and community DRR/climate change awareness, participatory community risk analysis, and community-based DRM planning. An additional Live and Learn project focuses on drought response in South Tarawa. It will install seven solar water systems with tanks that will be elevated on bricks, conduct climate-smart water-sanitation education and presentations, and support other

water-sanitation campaigns.[61] Live and Learn Kiribati projects have funding from USAID, the Australian Humanitarian Partnership, Australia's Department of Foreign Affairs and Trade (DFAT), and the Asian Development Bank.[62]

Live and Learn Kiribati
PO Box 202, Bairiki, Tarawa
Email: *enquiries.kiribati@livelearn.org*

The Church of Jesus Christ of Latter-day Saints Solar Desalination Water Security Project is installing 10 solar desalination systems on outer islands, based on a government priority list; an estimated 17,000 people will directly benefit. In partnership with the Ministry of Infrastructure and Sustainable Energy and the NDRMO, the project aims to reduce the vulnerability of communities to water scarcity in the face of climate change-influenced hazards.[63]

Boutokaan Inaomataia ao Mauriia Binabinainae Association (BIMBA) advocates for the rights of the LGBTQIA+ community in Kiribati. Founded in 2016 by a local advocate, it runs awareness and advocacy campaigns to ensure inclusion and protection of the islands' people regardless of sexual orientation, gender identity or expression, or sex characteristics.[64] In 2021, BIMBA was a recipient of a grant from the U.S. Embassy Suva to support the organization's development and publication of advocacy materials.[65]

Kiribati Family Health Association (KFHA) has volunteers throughout the islands; they promote education and information on sexual and reproductive health care and rights. One priority is ensuring that family health care is not deprioritized in the wake of natural disasters, and, given the risks that climate change will create more frequent disasters, they are attempting to shore up the overall health system.[66] KFHA works closely with the government, faith groups, and other NGOs and local councils to ensure health services are continuous and to disseminate sexual and reproductive health information.[67]

Aia Mwaea Ainen Kiribati (AMAK) was initially founded as a government office in 1982 but became fully separate and a registered NGO in 2011. AMAK coordinates the work of some 35 women's groups under the National Council of Women. These groups include: RAK, Relief Society, Reitan Ainen Boretetanti, Kometen Reitakiia Botaki n Aine, Irekenrao, Ueen te Makeke, Ainen Kiribati Iaon Betio, Tetoamatoa, Kiribati Girl Guides Association, Kiribati Women Teachers Network Association, Ministry of Women in Action, Kiribati Women And Violence Elimination, Dorcas, Nei Mom, Ueen Tebike, Aia Botaki Ainen Butaritari, Nikabubutin Makin, Tetokanimarakei, Terunganaine, Ueen Kirabun Eutan Tarawa Ieta, Ueen Benita, Ueen te Toaki, Ueen Abemama, Ueen Aranuka, Marewen Nonouti, Marewen Tabiteuea Meang, Ueen te Ueanikai, Reitan Nanoia Ainen Onotoa, Tanimwarutamu, Ainen Beru, Matangareia Ainen Tamana, Ngareia Ainen Arorae, Nei Baneawa, Nei Tiwiita, Ainen Teeraina, and Ueen te Bitati.[68]

Aia Mwaea Ainen Kiribati (AMAK)
PO Box 280, Bikenibeu, Tarawa
Tel: 686 73047321
Email: *amakwomen@fmail.com*

Te Toa Matoa is Kiribati's disabled peoples' association; it is both an organization run by and for people living with disabilities and the national umbrella organization for disabled peoples' associations. It works to increase public awareness of Kiribati's commitments under international charters for people living with disabilities and government and civil society implementation of charter requirements. It also helps deliver support during development planning and action to ensure disability-inclusive programming, especially on disaster preparedness and response.[69]

Te Toa Matoa
Anderson Causeway
P.O. Box 606, Nanikaai, Kiribati
Tel: 686 22 679
Email: *tetoamatoak@gmail.com*

The Foundation of the Peoples of the South Pacific has a local branch, FSP Kiribati (FSPK), which partners with other local NGOs and international groups to provide education in areas as wide-ranging as health, civic engagement, and sanitation.[70] The group runs a capacity-building projects for its fellow NGOs and faith-based groups to promote civil society participation in community development and good governance. The group specializes in non-formal education and training in health, water and sanitation, agroforestry, home food production and nutrition, environment, distance education, small business development, and good governance. Most work is in urban South Tarawa with some work on rural outer islands.[71]

FSP Kiribati
PO Box 43, Bainki
Tel: 686 2 1297

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Kiribati Notes

1 Foster, Sophie, et al. Kiribati. Encyclopedia Britannica. 23 September 2023. https://www.britannica.com/place/Kiribati

2 Climate Risk Country Profile: Kiribati (2021): The World Bank Group and the Asian Development Bank. 2021. https://www.preventionweb.net/publication/climate-risk-country-profile-kiribati

3 Kiribati National Tourism Office. About Kiribati. Accessed 6 October 2023. https://www.kiribatitourism.gov.ki/kiribati-pacific-ocean-location/

4 UNDRR. Sendai Framework for Disaster Risk Reduction: Midterm Review Report by the Republic of Kiribati. 2023. https://www.preventionweb.net/publication/send-ai-framework-disaster-risk-reduction-midterm-review-report-republic-kiribati

5 BBC. Kiribati Country Profile. 23 August 2023. https://www.bbc.com/news/world-asia-pacific-16431122

6 Kiribati National Tourism Office. About Kiribati. Accessed 6 October 2023. https://www.kiribatitourism.gov.ki/kiribati-pacific-ocean-location/

7 CIA World Factbook. Kiribati. Accessed 6 October 2023. https://www.cia.gov/the-world-factbook/countries/kiribati/

8 Government of Kiribati. Kiribati Joint Implementation Plan for Climate Change and Disaster Risk Management (KJIP). 2019. https://www.preventionweb.net/publication/kiribati-joint-implementation-plan-climate-change-and-disaster-risk-management

9 Kiribati National Tourism Office. About Kiribati. Accessed 6 October 2023. https://www.kiribatitourism.gov.ki/kiribati-pacific-ocean-location/

10 CIA World Factbook. Kiribati. Accessed 6 October 2023. https://www.cia.gov/the-world-factbook/countries/kiribati/

11 Government of Kiribati. Kiribati Joint Implementation Plan for Climate Change and Disaster Risk Management (KJIP). 2019. https://www.preventionweb.net/publication/kiribati-joint-implementation-plan-climate-change-and-disaster-risk-management

12 Climate Risk Country Profile: Kiribati (2021): The World Bank Group and the Asian Development Bank. 2021. https://www.preventionweb.net/publication/climate-risk-country-profile-kiribati

13 World Bank Group Climate Change Knowledge Portal. Climate Data: Historical. 2021. https://climateknowledgeportal.worldbank.org/country/kiribati/climate-data-historical

14 Government of Kiribati. Kiribati Joint Implementation Plan for Climate Change and Disaster Risk Management (KJIP). 2019. https://www.preventionweb.net/publication/kiribati-joint-implementation-plan-climate-change-and-disaster-risk-management

15 Government of Kiribati. Kiribati Joint Implementation Plan for Climate Change and Disaster Risk Management (KJIP). 2019. https://www.preventionweb.net/publication/kiribati-joint-implementation-plan-climate-change-and-disaster-risk-management

16 Climate Risk Country Profile: Kiribati (2021): The World Bank Group and the Asian Development Bank. 2021. https://www.preventionweb.net/publication/climate-risk-country-profile-kiribati

17 Foster, Sophie, et al. Kiribati. Encyclopedia Britannica. 23 September 2023. https://www.britannica.com/place/Kiribati

18 UNDRR. Sendai Framework for Disaster Risk Reduction: Midterm Review Report by the Republic of Kiribati. 2023. https://www.preventionweb.net/publication/send-ai-framework-disaster-risk-reduction-midterm-review-report-republic-kiribati

19 Ministry of Foreign Affairs (Japan). Kiribati – Project for Reconstruction of the Nippon Causeway: Grant Aid (January 2017-April 2019). https://www.mofa.go.jp/mofaj/gaiko/oda/files/100161446.pdf

20 Republic of Kiribati. Nationally Determined Contribution (Revised). October 2022. https://unfccc.int/sites/default/files/NDC/2023-03/221213%20Kiribati%20NDC%20Web%20Quality.pdf

21 UNDRR. Sendai Framework for Disaster Risk Reduction: Midterm Review Report by the Republic of Kiribati. 2023. https://www.preventionweb.net/publication/send-ai-framework-disaster-risk-reduction-midterm-review-report-republic-kiribati

22 Deutsche Gesellschaft fur Internationale Zusammenarbeit (GIZ) GmbH. Kiribati Climate Change and Disaster Risk Finance Assessment. February 2020. https://www.forumsec.org/wp-content/uploads/2020/09/Kiribati-CCDR-Report.pdf

23 UNDRR. Sendai Framework for Disaster Risk Reduction: Midterm Review Report by the Republic of Kiribati. 2023. https://www.preventionweb.net/publication/send-ai-framework-disaster-risk-reduction-midterm-review-report-republic-kiribati

24 Government of Kiribati. Kiribati Joint Implementation Plan for Climate Change and Disaster Risk Management (KJIP). 2019. https://www.preventionweb.net/publication/kiribati-joint-implementation-plan-climate-change-and-disaster-risk-management

25 Deutsche Gesellschaft fur Internationale Zusammenarbeit (GIZ) GmbH. Kiribati Climate Change and Disaster Risk Finance Assessment. February 2020. https://www.forumsec.org/wp-content/uploads/2020/09/Kiribati-CCDR-Report.pdf

26 Government of Kiribati. Kiribati Joint Implementation Plan for Climate Change and Disaster Risk Management (KJIP). 2019. https://www.preventionweb.net/publication/kiribati-joint-implementation-plan-climate-change-and-disaster-risk-management

27 UNDRR. Sendai Framework for Disaster Risk Reduction: Midterm Review Report by the Republic of Kiribati. 2023. https://www.preventionweb.net/publication/send-ai-framework-disaster-risk-reduction-midterm-review-report-republic-kiribati

28 Government of Kiribati. Kiribati Joint Implementation Plan for Climate Change and Disaster Risk Management (KJIP). 2019. https://www.preventionweb.net/publication/

kiribati-joint-implementation-plan-climate-change-and-disaster-risk-management

29 Government of Kiribati. Kiribati Joint Implementation Plan for Climate Change and Disaster Risk Management (KJIP). 2019. https://www.preventionweb.net/publication/kiribati-joint-implementation-plan-climate-change-and-disaster-risk-management

30 Deutsche Gesellschaft fur Internationale Zusammenarbeit (GIZ) GmbH. Kiribati Climate Change and Disaster Risk Finance Assessment. February 2020. https://www.forumsec.org/wp-content/uploads/2020/09/Kiribati-CCDR-Report.pdf

31 UNDRR. Sendai Framework for Disaster Risk Reduction: Midterm Review Report by the Republic of Kiribati. 2023. https://www.preventionweb.net/publication/sendai-framework-disaster-risk-reduction-midterm-review-report-republic-kiribati

32 Government of Kiribati. Kiribati Joint Implementation Plan for Climate Change and Disaster Risk Management (KJIP). 2019. https://www.preventionweb.net/publication/kiribati-joint-implementation-plan-climate-change-and-disaster-risk-management

33 PRIF. Kiribati National Infrastructure Investment Plan 2022-2032. https://www.theprif.org/document/kiribati/national-infrastructure-investment-plans/kiribati-national-infrastructure

34 UNDRR. Sendai Framework for Disaster Risk Reduction: Midterm Review Report by the Republic of Kiribati. 2023. https://www.preventionweb.net/publication/sendai-framework-disaster-risk-reduction-midterm-review-report-republic-kiribati

35 Government of Kiribati. Kiribati Joint Implementation Plan for Climate Change and Disaster Risk Management (KJIP). 2019. https://www.preventionweb.net/publication/kiribati-joint-implementation-plan-climate-change-and-disaster-risk-management

36 UNDRR. Sendai Framework for Disaster Risk Reduction: Midterm Review Report by the Republic of Kiribati. 2023. https://www.preventionweb.net/publication/sendai-framework-disaster-risk-reduction-midterm-review-report-republic-kiribati

37 Fiji Meteorological Service. Mission Vision and Values. https://www.met.gov.fj/index.php?page=missionvision

38 UNDRR. Disaster Risk Reduction in the Republic of Kiribati: Status Report 2019. United Nations Office for Disaster Risk Reduction, Regional Office for Asia and the Pacific. 2020. https://www.preventionweb.net/publication/disaster-risk-reduction-republic-kiribati-1

39 Deutsche Gesellschaft fur Internationale Zusammenarbeit (GIZ) GmbH. Kiribati Climate Change and Disaster Risk Finance Assessment. February 2020. https://www.forumsec.org/wp-content/uploads/2020/09/Kiribati-CCDR-Report.pdf

40 UNDRR. Analysis of DRR inclusion in national climate change commitments. 2021. https://www.preventionweb.net/publication/analysis-drr-inclusion-national-climate-change-commitments

41 Deutsche Gesellschaft fur Internationale Zusammenarbeit (GIZ) GmbH. Kiribati Climate Change and Disaster Risk Finance Assessment. February 2020. https://www.forumsec.org/wp-content/uploads/2020/09/Kiribati-CCDR-Report.pdf

42 Government of Kiribati. Kiribati Joint Implementation Plan for Climate Change and Disaster Risk Management (KJIP). 2019. https://www.preventionweb.net/publication/kiribati-joint-implementation-plan-climate-change-and-disaster-risk-management

43 World Bank. World Development Indicators – Kiribati: Internet Users. 2020. https://datatopics.worldbank.org/world-development-indicators/

44 Government of Kiribati. Kiribati Joint Implementation Plan for Climate Change and Disaster Risk Management (KJIP). 2019. https://www.preventionweb.net/publication/kiribati-joint-implementation-plan-climate-change-and-disaster-risk-management

45 Government of Kiribati. Kiribati National Infrastructure Investment Plan (2022-2032). August 2023. https://www.theprif.org/sites/default/files/documents/Kiribati%20NIIP_web%20publication%20final_0.pdf

46 LogCluster. 1.2 Kiribati Regulatory Departments and Quality Control. May 2018. https://dlca.logcluster.org/12-kiribati-regulatory-departments-and-quality-control

47 LogCluster. 2.2 Kiribati Aviation. May 2018. https://dlca.logcluster.org/22-kiribati-aviation

48 LogCluster. 2.3 Kiribati Road Network. May 2018. https://dlca.logcluster.org/23-kiribati-road-network

49 LogCluster. 2.2.1 Kiribati Bonriki International Airport. May 2018. https://dlca.logcluster.org/221-kiribati-bonriki-international-airport

50 LogCluster. 2.2.2 Kiribati Cassidy International Airport. May 2018. https://dlca.logcluster.org/222-kiribati-cassidy-international-airport

51 LogCluster. 2.2 Kiribati Aviation. May 2018. https://dlca.logcluster.org/22-kiribati-aviation

52 LogCluster. 2.1 Kiribati Port Assessment. May 2018. https://dlca.logcluster.org/21-kiribati-port-assessment

53 LogCluster. 2.1.1 Kiribati Port of Betio. May 2018. https://dlca.logcluster.org/211-kiribati-port-betio

54 LogCluster. 2.1.2 Kiribati Port of Navy Harbour (Christmas Island). May 2018. https://dlca.logcluster.org/212-kiribati-port-navy-harbour-christmas-island

55 Public Utilities Board. Services. Accessed 22 December 2023. http://pub.com.ki/services/#electricity

56 UNDRR. Sendai Framework for Disaster Risk Reduction: Midterm Review Report by the Republic of Kiribati. 2023. https://www.preventionweb.net/publication/sendai-framework-disaster-risk-reduction-midterm-review-report-republic-kiribati

57 IFRC. National Societies Directory. https://www.ifrc.org/national-societies-directory/kiribati-red-cross-society

58 Pacific Islands Association of Non-Governmental Organisations. Kiribati. http://www.piango.org/our-members/member-countries/kiribati/

59 Kiribati Climate Action Network. Team. https://kirican.wordpress.com/team/

60 Unitarian Universalist Service. Live & Learn Environmental Education Kiribati. https://www.uusc.org/initiatives/live-learn-environmental-education-kiribati/

61 UNDRR. Sendai Framework for Disaster Risk Reduction: Midterm Review Report by the Republic of Kiribati. 2023. https://www.preventionweb.net/publication/send-ai-framework-disaster-risk-reduction-midterm-review-report-republic-kiribati

62 Live and Learn. Annual Report 2022. https://livelearn.org/about-us/annual-reports/

63 UNDRR. Sendai Framework for Disaster Risk Reduction: Midterm Review Report by the Republic of Kiribati. 2023. https://www.preventionweb.net/publication/send-ai-framework-disaster-risk-reduction-midterm-review-report-republic-kiribati

64 OHCHR. Universal Period Review: Civil Society Organization Submission on SOGI-Related Matters – BIMBA. https://uprdoc.ohchr.org/uprweb/downloadfile.aspx?filename=7459&file=CoverPage

65 U.S. Embassy in Fiji. U.S. EMBASSY SUVA AWARDS GRANT FOR KIRIBATI LGBT+ ASSOCIATION. 11 March 2021. https://fj.usembassy.gov/u-s-embassy-suva-awards-grant-for-kiribati-lgbt-association/

66 International Planned Parenthood Foundation. Climate crisis, displacement, and sexual health – what are the links?. 6 April 2022. https://www.ippf.org/blogs/climate-crisis-displacement-and-sexual-health-what-are-links

67 International Planned Parenthood Foundation. Kiribati Family Health Association. https://www.ippf.org/about-us/member-associations/kiribati

68 OHCHR. Universal Periodic Review: Joint Stakeholder Submission for the Review of Kiribati. https://uprdoc.ohchr.org/uprweb/downloadfile.aspx?filename=7290&file=EnglishTranslation

69 Disability Rights Fun. Te Toa Matoa. https://disabilityrightsfund.org/grantees/te-toa-matoa/

70 Brinsley, Sarah. HEALTHCARE IN KIRIBATI IS STEADILY IMPROVING. Borgen Project. 6 October 2020. https://borgenproject.org/tag/the-foundation-of-the-peoples-of-the-south-pacific-international/

71 FSPI. FSP Kiribati (FSPK). https://fspiblog.wordpress.com/network/fspk/

Header photo by “KevGuy4101” on flickr.com. Butaritari, Kiribati. https://flic.kr/p/aqu9iQ

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Marshall Islands

Lying just north of the equator, the Republic of Marshall Islands (RMI) is located halfway between Hawaii and Australia. RMI is composed of 29 coral atolls with more than 1,200 islets, and five coral islands. The islands are coral caps on the rims of submerged volcanoes rising from the ocean floor. They form two roughly parallel chains running northwest to southeast. Most of the Marshall Islands are true atolls, consisting of an irregular, oval-shaped coral reef surrounding a lagoon. The largest atoll in the group and in the world is Kwajalein, the land area of which is less than 1% of the size of the lagoon. The entire RMI territory covers more than 2.1 million km^2 (1.3 million square miles) of ocean but only 181 km^2 (70 square miles) of land.[1] Figure 28 shows a map of RMI.[2]

Micronesian seafarers began settling what are the modern Marshall Islands 3,000-4,000 years ago.[3] The early societies on the islands and atolls developed independently from each other although they shared various characteristics in that they were generally matrilineal and were governed by chiefs. First contact with Europeans was made in the 16th century, but economic and cultural contact was not significant until the mid-19th century when Protestant missionaries sought to convert the islanders.[4] In 1878, Kabua Kabua and Letabalin, local chiefs, signed a treaty with Germany,[5] which established a coaling station on Jaluit Atoll and, in 1886, by agreement with Great Britain, established a protectorate over the Marshalls.[6] In 1902, the German government assumed direct administrative control. Japan seized the islands in 1914 and, in 1922, gained the League of Nations mandate to administer them; Japan retained control until late in World War II, during which conflict, Kwajalein was devastated[7] and one in every 10 Marshall Islanders was dead.[8] The U.S. administered the captured islands via the military until 1947 when the whole of the Marshall Islands were made part of the UN Trust Territory of the Pacific Islands (TTPI), which also included what would become the Federated States of Micronesia (FSM) and the Republic of Palau, under jurisdiction of the United States. Between 1946 and 1958, the U.S. conducted 67 atmospheric nuclear bomb tests in the northern Marshalls. Bikini and Rongelap atolls were rendered uninhabitable. After voting to separate from the other entities of the TTPI in 1978, the Marshall Islands drew up a constitution that voters approved in 1979. The republic instituted internal self-government and signed the Compact of Free Association (COFA) with the United States in 1986. The Marshall Islands became a member of the UN.[9]

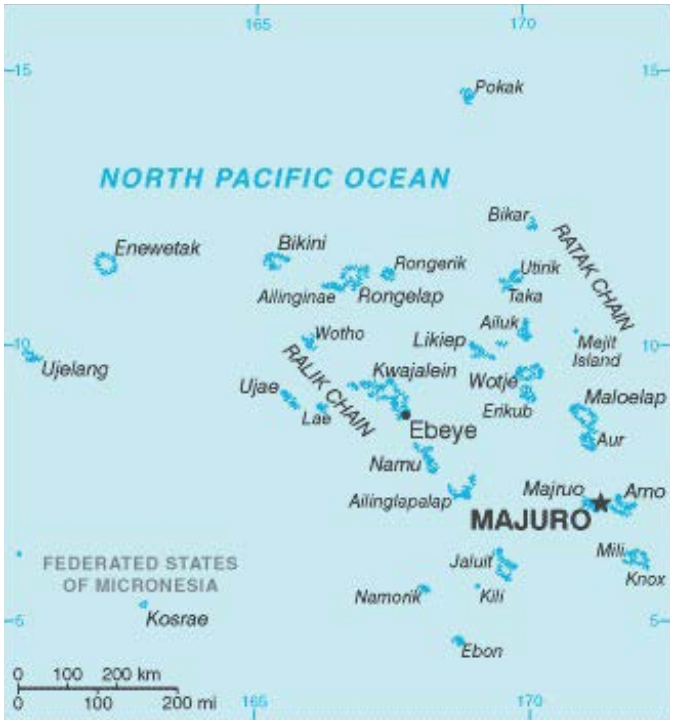


Figure 28: Map of Republic of Marshall Islands

The Marshall Islands' 2021 national census counted 39,262 people.[10] More than 90% of Marshallese are of local Marshallese (Micronesian) origin with another 5-6% being of mixed Marshallese ethnicity (with other Oceanian or other backgrounds). Approximately 2% of Marshallese are from an "other," non-Micronesian background.[11]

RMI is a mixed parliamentary-presidential republic in which the president is both the

chief of state and head of government. The parliament, Nitijela, is unicameral; it consists of 33 members (senators), all of whom sit for 4-year terms. Of senators, 19 are directly elected in single-member districts, and 14 are elected from five multi-member districts (2-5 seats each). The president is elected by the legislature from among sitting Nitijela members, and the presidential term also runs for four years.[12] The relationship between the national government and local governments is governed by the Local Government Act of 1980[13] that lays out requirements for district or municipalities, of which there are 24.[14]

Hazards and Climate Change

RMI experiences the following hazards: cyclone, drought, flooding, heatwave, and tsunami. Although it is in the Pacific "Ring of Fire," the country is at relatively low risk of volcanic or seismic activity.

The weather is tropical. It is hot and humid year-round, but the heat is tempered by trade winds most of the year. The trade winds are frequently interrupted during the summer by the movement of the ITCZ,[15] which circles the Earth, near the equator, and is the zone where the trade winds of the Northern and Southern Hemispheres come together buoying the air and stimulating almost perpetual thunderstorms. The Zone shifts seasonally, thereby driving the wet and dry seasons of the tropics.[16] The recorded annual temperature averages since 1948 show hardly any fluctuation from about 28°C (82°F). As the country is broad (north to south), rainfall varies greatly. In the wet, southern atolls, rainfall is heavy and can average as much as 1,524 mm (160 inches) per year, while the dry, northern atolls may only average 508 mm (20 inches). The wettest months are between May and November. Pacific typhoons generally develop east of the Marshall Islands, but the RMI is only occasionally subjected to the full force of a typhoon with the northern atolls more exposed than the southern atolls. Historically, a major storm impacts the atolls approximately once every 4-7 years and corresponds with El Niño events that warm the ocean waters and provide conditions that promote typhoon formation.[17] Figure 29 shows a graph of the average monthly temperatures and precipitation for RMI.[18]

Climate change is expected to affect the country's coastal resources through increased ocean acidification, sea level rise, and coral bleaching. According to its Second National Communication to the UNFCCC, RMI is one of four countries that consist entirely of low-lying atolls and islands and that face urgent climate change impacts, among which the most immediate is flooding from sea level rise in combination with storm surges. Increased wave height and increased intensity of storm

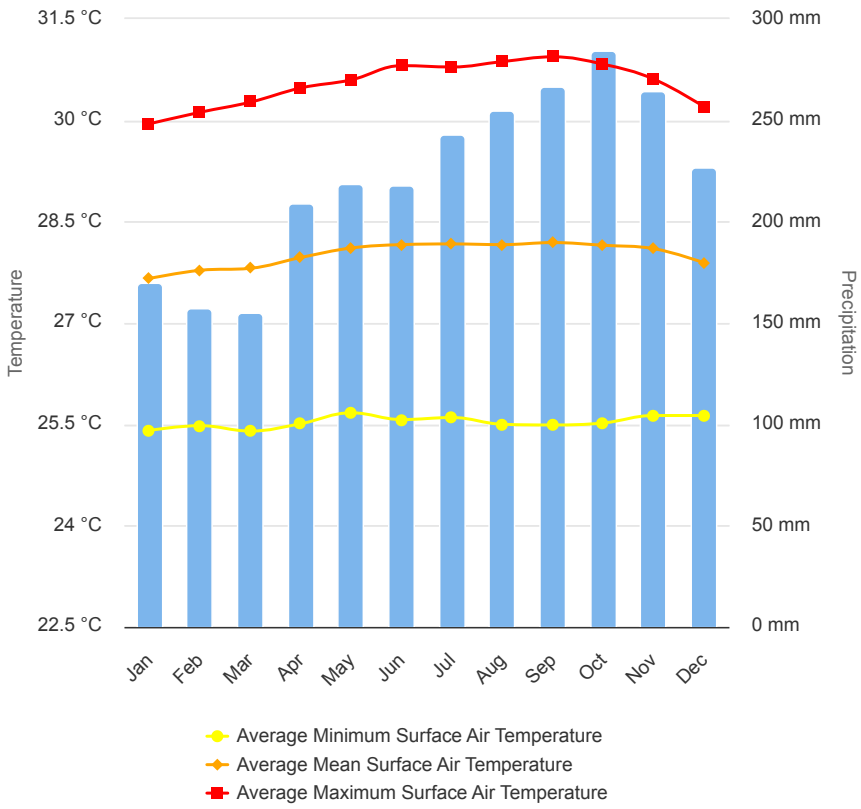


Figure 29: Average Monthly Temperature and Precipitation, RMI (1992-2022)

surges are both likely to cause erosion of RMI coastlines. Some islands enjoy greater coastline stability than do others; those islands with extensive fringe sand or conglomerate rock and natural beach rock accumulations are better protected than those without as these deposits offer temporary resistance to erosion. Yet even this resistance is expected to succumb over time. Indeed, shoreline erosion caused by sea level rise is already a significant problem on some islands. Erosion of the coastline of Majuro is occurring at a considerable rate as coconut trees and coastal vegetation fall over as soils are washed away from underneath them. This situation is not helped by the amount of dredging and sand mining that is happening, especially around the capital's airport area.[19]

Table 12 details some of the projections and potential impacts of various climate change-influenced phenomena.[20]

Government Institutions, Policies, and Plans for Disasters and Climate Change

In its National Strategic Plan 2020-2030, RMI recognized the threat sea level poses to Islanders. The Plan frankly confronts the reality that

Phenomenon	Trend	Projections	Impacts
Temperature	Annual mean air temperatures have increased by 1-2°C (°F) in since the 1950s	Air temperatures to rise by 1.0-1.3°C (°F) by 2030 and 1.3-2.6°C (°F) by 2080; median increase under low emissions scenarios to be 1.4°C (°F) in 2050 while median rise under higher emissions scenarios is 1.5°C (°F) in 2050	Increasing incidence of heat stress among people working outside; increased energy use for cooling
Precipitation	Rainfall varies greatly spatially and inter-annually	Overall increase in total rainfall with a greater increase under medium to higher emissions scenarios; increase in extreme rain events of 4-8% by 2050	Increased flooding, damage to crops, and run-off/pollutants in coastal waters; increases in vector-borne diseases
Sea Level Rise	The sea level around RMI has risen by an average of 7 mm (0.28 inches) every year since 1993; local sea level varies with ENSO phases	Compared to the year 2000, sea levels will rise by 9-15 cm (inches) by 2030, 19-30 cm (inches) by 2050 and 35-61 cm (inches) by 2080; under more optimistic scenarios, the median rise is 23 cm (inches) in 2050	Greater flooding from high tides and storms; more frequent loss of lives, damage and loss of coastal homes, lands, and infrastructure, contaminated drinking water, and destruction of crops; saltwater intrusion into aquifers and agricultural land
Cyclones	Tropical cyclones mainly strike between June and November but can occur at any time; storms somewhat more frequent in El Niño years	The frequency of tropical cyclones is likely to either decrease or remain unchanged, while the intensity of future tropical cyclones is very likely to increase	Increased flooding and coastal change resulting in damage and loss of lives, coastal homes, land, and infrastructure
Drought	More common in the year after an El Niño phase	Frequency of mild drought will remain stable; a decrease in moderate, severe, and extreme droughts; drought duration expected to remain at current levels	Impacts to food security as crop productivity and access to clean water sources decrease
Coastal Flooding	Significant spatial and seasonal variation in incidences linked to wind and waves	Likely decrease in flooding during the winter season; increase in wave-driven flooding with increased coastal erosion, with a significant increase in magnitude, duration, and frequency of flooding from 2050 onwards	High probability of damage to coastal infrastructure and buildings; coastal erosion

Table 12: Climate Change-Influenced Phenomena and Impacts for RMI

RMI faces a stark choice: relocate or find other adaptation options. RMI is considering whether to relocate all citizens or to accelerate DRR and CCA processes. RMI's people and governments are attempting to understand risks atoll by atoll to allow adaptation measures to be established with local atoll and village groups.[21]

The Chief Secretary's Office (CSO) within the President's office is the Disaster Controller, the key official with overall responsibility for disaster management.[22] The Chief Secretary oversees the National Disaster Committee (NDC), which is the principal body for endorsing disaster policy and setting strategy, as well as the National Disaster Management Office (NDMO), which has primary responsibility for disaster management activities.[23] The NDC is the designated lead for implementing the 2019 National Disaster Risk Management Arrangement (NDRMA), the guiding document for disaster management. The NDC is also responsible for ensuring that an adequate and reliable disaster control and coordination mechanism is in place to carry out humanitarian response.[24] The NDMO is the primary office accountable for disaster management and risk management activities.[25] NDMO plays a pivotal role in ensuring the aims and objectives of national disaster risk management strategy are achieved.

NDMO's three objectives are:

- Establish an NDMO governance framework through reporting, planning, resourcing, legislation, policy, and procedures
- Improve coordination and communication arrangements with all stakeholders at all levels; and
- Improve operations through prevention, preparedness, response, and recovery phases.

The NDMO also represents RMI at regional and international disaster related fora, coordinates implementation of the NDRMA, functions as the liaison point for all disaster related activities with regional and international agencies, develops and maintains relationships with relevant regional bodies to ensure synergies between national, regional, and international disaster risk management programs, coordinates with offices within the Ministry of Environment on disaster and climate change strategies, provides technical support in the development of public awareness information and programs, and maintains the National Emergency Operations Center (NEOC) in a state of operational readiness, including the facilitation of training and exercises and post-disaster and post-exercise debriefs.[26]

The key documents for disaster management are the NDMO Strategic Plan and National Disaster Risk Management Arrangement. The NDMO Strategic Plan 2020-2023 lays out the path to strengthening resilience in neighboring atolls, organizing disaster preparedness, response, and recovery, and improving coordination at local, national, and international levels.[27] The 2019 NDRMA is a guiding overview document regarding how RMI organizes its disaster management structure.[28]

The Joint National Action Plan for Climate Adaptation and Disaster Risk Management 2014-2018 (JNAP) was an effort to better represent and manage the impacts of climate change and disaster events on national development priorities. It anchored RMI's development efforts regarding the interrelated risks and opportunities that need to be considered as part of a system-wide approach to risk reduction. Progress against JNAP goals was limited due to existing constraints and challenges, but the Plan did help guide new policies and the alignment of donor funding with national priorities.[29]

Established by the Ministry of Environment Act, 2018, the Ministry of Environment is composed of the RMI Environmental Protection Agency, Climate Change Directorate, National Energy Office Director, and National Council on the Environment. The Climate Change Directorate ensures that consideration of vulnerability to climate change impacts and reduction of GHG emissions is an integral part of all government planning and decision-making and to assist in facilitating such

considerations across society. The Director of this office is the formal National Operational Focal Point of contact to the UNFCCC and its associated protocols, agreements, and climate change finance mechanisms, including the Green Climate Fund (GCF) and Global Environment Facility (GEF). The Directorate advises all agencies of the RMI government on projections of future climate impacts and on policy or legislative options to address climate and sustainable development. It develops, revises, and implements CCA and mitigation policies and strategies, and cooperates with the National Council on the Environment and others to develop research, dialogue, and policy tools to address the risks of climate change. The National Council itself produces the National Environmental Policy.[30]

RMI continues to call for strong and decisive global action on climate change. Recognizing the significant existential threat posed by climate change, RMI is a vocal member of international fora. RMI spearheaded the 2013 Majuro Declaration for Climate Leadership, which sought to demonstrate the Pacific's adoption of some of the world's most ambitious greenhouse gas emissions reduction targets,[31] and it was the first country, in 2015, to submit its Nationally Determined Contributions (NDC) under the UNFCCC to help mitigate the adverse impacts of climate change and, in 2018, the first to submit an enhanced NDC. This enhanced NDC set a more ambitious target to reduce emissions to at least 32% below 2010 levels by 2025 and to at least 45% below 2010 levels by 2030, and it committed to a gender-responsive and human rights-based approach in planning, programming, and implementation. A further enhancement in 2020 specified a commitment to reduce emissions from domestic shipping to 40% below 2010 levels by 2030 and fully decarbonize the sector by 2050.[32] As an action plan under the NDC, RMI submitted its National Adaptation Plan (NAP) to the World Bank in 2023. The NAP integrates scientific and traditional, local knowledge in an inclusive strategy to allow island communities to make CCA decisions for themselves in collaboration with national and international partners. The NAP implementation strategy focuses on building adaptive resilience, strengthening the enabling environment for NAP activities, and adopting a self-determined approach.[33]

In 2018, the Marshall Islands launched its Tile Til Eo 2050 Climate Strategy, which envisions net-zero emissions and 100% renewable energy use by 2050, and the country committed to developing a national action plan for climate change adaptation and resilience.[34]

National Disaster Management Office (NDMO)
Tel: 692 625 6366 / 5236
Email: *ndmoinfo@gmail.com*

Ministry of Environment - Climate Change Directorate
P.O. Box 2, Majuro, Marshall Islands
Tel: 692 625 7944

Early Warning Systems

The Marshall Islands Weather Service Office (WSO) delivers risk monitoring and early warning. The WSO is tasked with providing weather forecasts, early warnings on hazardous weather, and other weather-related products to the government for the purposes of protection, safety, and general information. Based in Majuro, the program is administered by the Pacific Region of the U.S. National Weather Service, which falls under NOAA.[35] WSO activities include:

- Delivering scientific assessment and analytical services
- Undertaking manual surface aviation, synoptic, and upper-air observations, and transmitting data to the Global Telecommunication System/Integrated WMO Information System
- Receiving data from outer island focal points (mayors, disaster committees, etc.) using standardized drought monitoring forms
- Receiving and interpreting daily data from partner scientific agencies (especially NOAA) on hazards to generate adaptive weather forecasts and warnings for local constituents
- Advising the NDMO and Chief Secretary on

key threats to inform and for consideration of further action (e.g., activation of the NDC or other actions)
- Communicating alerts and warnings to RMI authorities and communities, including advising precautionary action that could be taken; and
- Working with the NDMO to share warnings and alerts as well as designate focal points (particularly the mayors) to receive information on the state of weather on the outer islands.[36]

The WSO collection of local data on climate change and sea level rise contributes to the South Pacific Sea Level and Climate Monitoring Project.[37] Remote islands in RMI use "Chatty Beetles" – portable iridium satellite terminals that permit text-based alerts and messaging in remote locations – as back-up communication tools.[38] RMI outer island focal points most commonly use HF radio as well as the "Chatty Beetle" for information exchange with the WSO or other government agencies.[39]

Weather Services Office, Majuro
Long Island Rd, Rairok, P.O Box 78, Majuro, 96960-0078, Marshall Islands
Tel: 692 247 3214 or 247 5705

Infrastructure

Inter-islands or -atoll logistics and transport rely on sea and air. The RMI Port Authority (RMIPA) is state-owned enterprise responsible for the development, maintenance, and operations of all seaports and the sole international airport, Amata Kabua International in Majuro. RMIPA is governed by a seven-member Board of Directors appointed by the Cabinet.[40]

Amata Kabua International airport facilities include a 700 m^2 (7,530 square foot) terminal building built in 1975, Aircraft Rescue and Fire Fighting facility, Air Marshall Islands Hangar, and fuel delivery system. The runway was lengthened between 2010 and 2016 to meet international standards. Emergency services were recently upgraded to be U.S. Federal Aviation Administration certified, and this upgrade included the construction of an emergency services operations center and two fire-fighting tankers.[41] Kwajalein International Airport is 3 km (1.8 miles) from Ebeye; it is under the jurisdiction of the U.S. military (Bucholz Army Airfield) and restricted to use by authorized persons. There are a few dozen small airfields located throughout the islands.[42]

There are two international civilian seaports and one military seaport (Kwajalein). Beyond the ports of Majuro and Ebeye, some islands have beach landings available.[43] The Port of Majuro is the country's main international cargo port. The main area of the port is Delap Dock, southeast of Majuro lagoon. The dock is approximately 300 m (984 ft) long and handles an estimated 2,500 TEUs of cargo annually.[44] The Port of Ebeye is a secondary international port in Kwajalein Atoll, and it handles 400 TEUs of cargo annually via its "L-shaped" jetty. One kilometer (0.62 miles) from Ebeye Dock is a roll-on/roll-off (RORO) landing that enables landing craft and RORO vessels to load and unload, and it is primarily used for heavy equipment.[45]

The sealed road network exists only on the main islands of Majuro, Kwajalein, and Ebeye. Of the country's 65 km (40.3 miles) of sealed road, over 50 km (31 miles) are on Majuro. Although sealed roads are in generally average condition, drainage can be poorly maintained, and large puddles of water appear after rain. Most roads across the island nation are unpaved and made up of coral laterite. Transport around the outer islands is usually by walking track with goods being moved by wheelbarrows or push carts on the smaller atolls with larger atolls having pickup trucks.[46]

RMI is vulnerable to disruptions of both water and energy supplies. The energy sector is led by the Ministry of Resources and Development. Two state-owned utilities are responsible for and provide electricity. The Marshalls Energy Company supplies Majuro, Jaluit, and Wotje, and the Kwajalein Atoll Joint Utilities Resources, a water and electricity utility, services the Kwajalein atoll, including Ebeye.[47] More than 96% of the population has electrical power.[48]

A U.S. Department of Energy survey of the country in 2020 found that RMI had a total installed electricity generation capacity of 30 MW with a generation mix of diesel (97.3%) and solar (2.7%).[49] The country's dispersed islands have a variety of electric grid arrangements. The main grids on Majuro and Ebeye are relatively sophisticated and represent the majority of electricity generation and diesel use. Jabor on Jaluit, as well as Wotje and Kili are home to several hundred residents and a school each, and the compact communities on these atolls have small diesel mini-grids. Most other islands' households are supplied with electricity from small stand-alone solar systems.[50] The country's sole 22.7-million-liter (6-million-gallon) capacity fuel tank farm on Majuro was constructed in 1981. It supplies Majuro, Kwajalein Atoll, and fishing and shipping fleets. Located 30 m (98 ft) from the ocean, the facility is in critical need of repair after decades of saltwater and atmospheric corrosion. The facility's condition poses health, safety, economic, and environmental risks due to the potential for leaks or all-out failure.[51]

There is a chronic shortage of drinking water. All of RMI's atolls and islands are low-lying and have limited freshwater resources.[52] RMI has the highest percentage of water sourced from rainwater of any Pacific nation, and this reliance makes it particularly vulnerable to changing rainfall patterns.[53] Drinking water supply is covered by rainwater for 79% of all households while groundwater is used by 9% of all households.[54] Rainwater is typically captured by a household's roof catchment and funneled to a tank of approximately 5,600 liters (1,500 gallons). Reliance on rainwater harvesting for drinking water, cooking, and other activities means that prolonged drought seriously threatens the population's water security.[55]

Transition to groundwater is a focus in order to ensure clean and safe drinking water. In November 2020, a US$5.2 million Managing Coastal Aquifers Project (MCAP) was brought to RMI, Palau, and Tuvalu. MCAP was implemented by the Pacific Community in partnership with UNDP and GEF to increase awareness, development, and management of groundwater as a water source. Pacific Small Island Developing States like RMI rely on small coastal aquifers for their water supply needs; they are at higher risk of impact to water quality deterioration from threats including saltwater contamination from sea level rise, wave overtopping, loss of aquifer area through coastal erosion, and land-use activities. Taking too much water, or over abstraction, can also lead to surface rivers drying up, and lead to degradation in water quality. The components of the MCAP include: 1) identifying development potential of groundwater resources and threats; 2) increasing awareness of groundwater as a water security supply source; 3) providing options for improved access to groundwater; and 4) and improving aquifer protection and management.[56]

Republic of the Marshall Islands Port Authority (RMIPA)

P.O. Box 109 Majuro, MH 96960
Tel: 692 625 8269 or 455 0777

Ministry of Resources and Development

P.O. Box 1727 Majuro, Marshall Islands, MH96960
Tel: 692 625 3035 or 692 625 5203

Civil Society Partners

The Marshall Islands Red Cross Society (MIRCS) is a volunteer-based organization whose role was enshrined in national law in 2013. The National Society supports public services and is an auxiliary of the RMI Government. MIRCS implements its Disaster Risk Reduction Program, offering neighboring island communities Emergency Response Training. For disaster response, including typhoons, floods, and fires, MIRCS staff and volunteers are trained and equipped to conduct rapid assessments and provide emergency relief to affected families.

The Marshall Islands Red Cross Society

PO Box 2014, Majuro, MH, 96960
Tel: 692 625-0340
Email: *info@rmiredcross.org*

Women United Together Marshall Islands (WUTMI) has a large presence in RMI's civil society. It is a registered NGO dedicated to promoting gender equality and the empowerment of women. Disaster management-relevant work by WUTMI includes addressing increasing awareness of gender in relation to climate and disaster risk management. WUTMI implements a wide range of programs such as strengthening parenting and outcomes for children, addressing substance and alcohol misuse, reducing domestic and gender-based violence including through police-targeted trainings, and other activities. WUTMI has 22 member chapters throughout the outer islands and enjoys strong relationships with traditional and elected leaders.

Women United Together Marshall Islands (WUTMI)
PO Box 195 Majuro, MH 96960
Tel: 692 625-5290

The Pacific Island Health Officers' Association (PIHOA) was established in 1986 by the health officials of the six U.S.-Affiliated Pacific Islands (USAPI) - American Samoa, Guam, the Northern Marianas, FSM, Marshall Islands, and Palau. PIHOA was intended to provide a regional, collective voice for advocacy and policymaking to address common health concerns to strengthen local and regional health system capabilities, capacities, and community resilience. It supports partnership engagement and provision of technical assistance to USAPI health departments and ministries. PIHOA membership comprises the six USAPI chief health officials, their deputies, Micronesia State directors, chief executive officers of USAPI public hospitals, and 13 Pacific regional professional associations, USAPI academic institutions, and development partners.[57]

RMI Ministry of Health and Human Services
P.O. Box 16 Majuro, Marshall Islands 96960

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Marshall Islands Notes

1 Pacific RISA. MARSHALL ISLANDS. National Oceanic and Atmospheric Administration. Accessed 13 September 2022. https://www.pacificrisa.org/places/republic-of-the-marshall-islands

2 CIA World Factbook. Marshall Islands – map. https://www.cia.gov/the-world-factbook/static/maps/RM-map.jpg

3 Gessas, Jeff. Indigenous Knowledge on the Marshall Islands: A Case for Recognition Justice. Master of Art (Philosophy), December 2015 (Thesis). https://digital.library.unt.edu/ark:/67531/metadc822739/m2/1/high_res_d/thesis.pdf

4 Kiste, Robert C. Marshall Islands – History. Encyclopedia Britannica. Accessed 12 September 2022. https://www.britannica.com/place/Marshall-Islands/History

5 Runeborg, Ruth E. The Marshall Islands: History, Culture, and Communication. East-West Communication Institute. 1980. https://scholarspace.manoa.hawaii.edu/server/api/core/bitstreams/9b4f1c52-40be-4703-908e7f-73d0c287a3/content

6 Kiste, Robert C. Marshall Islands – History. Encyclopedia Britannica. Accessed 12 September 2022. https://www.britannica.com/place/Marshall-Islands/History

7 History Channel. U.S. troops capture the Marshall Islands. 2 February 2021. https://www.history.com/this-day-in-history/u-s-troops-capture-the-marshall-island

8 RNZ. Marshall Islands - a brief history. Accessed 12 September 2022. https://www.rnz.co.nz/collections/nff-marshall/about-marshall-islands

9 Kiste, Robert C. Marshall Islands – History. Encyclopedia Britannica. Accessed 12 September 2022. https://www.britannica.com/place/Marshall-Islands/History

10 Johnson, Giff. Marshall Islands census numbers show heavy out-migration. RNZ. 26 November 2021. https://www.rnz.co.nz/international/pacific-news/456630/marshall-islands-census-numbers-show-heavy-out-mi

11 CIA World Factbook. Marshall Islands – People and Society. Accessed 14 September 2022. https://www.cia.gov/the-world-factbook/countries/marshall-islands/#people-and-society

12 Freedom House. Freedom in the World 2021. https://freedomhouse.org/country/marshall-islands/freedom-world/202

13 Government of Marshall Islands. Local Government Act 1980. http://rmiparliament.org/cms/images/LEGISLATION/PRINCIPAL/1975/1975-0004/LocalGovernmentAct1980_1.pdf

14 CIA World Factbook. Marshall Islands – Government. Accessed 26 September 2022. https://www.cia.gov/the-world-factbook/countries/marshall-islands/#government

15 Pacific RISA. MARSHALL ISLANDS. National Oceanic and Atmospheric Administration. Accessed 13 September 2022. https://www.pacificrisa.org/places/republic-of-the-marshall-islands/

16 Earth Observatory. The Intertropical Convergence Zone. NASA. 12 July 2000. https://earthobservatory.nasa.gov/images/703/the-intertropical-convergence-zone

17 Pacific RISA. MARSHALL ISLANDS. National Oceanic and Atmospheric Administration. Accessed 13 September 2022. https://www.pacificrisa.org/places/republic-of-the-marshall-islands/

18 World Bank Climate Change Knowledge Portal. Marshall Islands – Country Summary. https://climateknowledgeportal.worldbank.org/country/marshall-islands

19 World Bank Group. Climate Risk Country Profile: Marshall Islands. 2021. https://climateknowledgeportal.worldbank.org/sites/default/files/2021-06/15817-WB_Marshall%20Islands%20Country%20Profile-WEB.pdf

20 Internal Displacement Monitoring Centre. Risk Profile: Sudden-Onset Hazards and the Risk of Future Displacement in the Marshall Islands. 2022. https://www.internal-displacement.org/sites/default/files/publications/documents/220224_IDMC_RiskProfile_TheMarshallIslands.pdf; Adelphi. REPUBLIC OF THE MARSHALL ISLANDS CLIMATE SECURITY RISK ASSESSMENT PROFILE. https://environmentalmigration.iom.int/sites/g/files/tmzbdl1411/files/documents/Republic%20of%20The%20Marshal%20Islands%20-%20Climate%20Security%20Risk%20Assessment%20Profile.pdf; Nature Conservancy. Climate Projections and Impacts for the Republic of the Marshall Islands (RMI). https://reefresilience.org/wp-content/uploads/ClimateSummary_RMI.pdf

21 Republic of the Marshall Islands. National Strategic Plan 2020-2030. https://www.rmiocit.org/national-strategic-plan-2020-2030

22 Pacific Humanitarian Team & Government of RMI. Republic of the Marshall Islands Country Preparedness Package, 2017. https://www.cfe-dmha.org/LinkClick.aspx-?fileticket=WhICKbvfYBA%3d&portalid=0

23 RMI National Disaster Risk Management Arrangements (Reviewed June 2017). https://www.preventionweb.net/files/68522_rmidisasterrickmanagementforweb.pdf

24 OCHA. Republic of the Marshall Islands: Humanitarian Coordination Structure (As of 12 October 2022). https://reliefweb.int/report/marshall-islands/republic-marshall-islands-humanitarian-coordination-structure-12-october-2022

25 RMI OEPPC. http://biormi.org/oeppc/

26 Devex. National Disaster Management Office (NDMO - Marshall Islands). https://www.devex.com/organizations/national-disaster-management-office-ndmo-marshall-islands-150648

27 ADPC & UNDRR. Disaster Risk Reduction in the Republic of the Marshall Islands: Status Report. 2022. pp. 11-12, 18. https://www.undrr.org/publication/disaster-risk-reduction-republic-marshall-islands-status-report-2022

28 OCHA. Republic of the Marshall Islands: Humanitarian Coordination Structure (As of 12 October 2022). https://reliefweb.int/report/marshall-islands/republic-marshall-islands-humanitarian-coordination-structure-12-october-2022

29 Pacific Islands Forum. Increasing Foresight, Building Resilience - A CASE STUDY: The Implementation Progress Review of the Republic of the Marshall Islands Joint National Action Plan on Climate Change Adaptation and Disaster Risk Management (2014-2018). 2021. https://www.forumsec.org/wp-content/uploads/2021/07/Report_web.pdf

30 Nitijela of the Republic of the Marshall Islands. Ministry of Environment Act, 2018. https://rmicourts.org/wp-content/uploads/2019/11/P.L.2019-108-MINISTRY-OF-ENVIRONMENT-ACT-2018.pdf

31 Republic of the Marshall Islands. Tile Til Eo: 2050 Climate Strategy "Lighting the Way." September 2018. https://unfccc.int/sites/default/files/resource/180924%20rmi%202050%20climate%20strategy%20final_0.pdf

32 Patagan, Remrick, Rommel Rabanal, and Cara Tinio. "Assessing the North Pacific's preparedness for sustainable investing." Pacific Economic Monitor, August 2022. Asian Development Bank. https://www.adb.org/sites/default/files/publication/814231/pem-august-2022.pdf

33 Climate Change Directorate, Ministry of the Environment. National Adaptation Plan of the Republic of the Marshall Islands. 10 October 2023. https://unfccc.int/sites/default/files/resource/NAP-RMI-2023.pdf

34 Patagan, Remrick, Rommel Rabanal, and Cara Tinio. "Assessing the North Pacific's preparedness for sustainable investing." Pacific Economic Monitor, August 2022. Asian Development Bank. https://www.adb.org/sites/default/files/publication/814231/pem-august-2022.pdf

35 National Weather Service. WSO Majuro. https://www.weather.gov/gum/WSOMajuro

36 Pacific Humanitarian Team & Government of RMI. Republic of the Marshall Islands Country Preparedness Package, 2017. https://www.cfe-dmha.org/LinkClick.aspx?fileticket=WhICKbvfYBA%3d&portalid=0

37 UNFCCC. National Coordination – The Republic of the Marshall Islands Climate Change Website. https://unfccc.int/resource/ccsites/marshall/coord/index.htm

38 D'Unienville, Yvette. "Chatty Beetles to Reach Weather and Climate Messages to the 'Last Mile'," SPREP, 15 August 2017. https://www.sprep.org/news/chatty-beetles-reach-weather-and-climate-messages-last

39 Pacific Humanitarian Team & Government of RMI. Republic of the Marshall Islands Country Preparedness Package, 2017. https://www.cfe-dmha.org

40 Logistics Cluster. "Port Assessment," Logistics Capacity Assessment: Marshall Islands. October 2017. https://dlca.logcluster.org/display/public/DLCA/2.1.1+++++Marshall+Islands+%28RMI%29+Port+of+Delap+Doc

41 Logistics Cluster. Logistics Capacity Assessment: Marshall Islands. https://dlca.logcluster.org/pages/releaseview.action?pageId=1236

42 Logistics Cluster. "Aviation," Logistics Capacity Assessment: Marshall Islands. https://dlca.logcluster.org/display/public/DLCA/2.2

43 Logistics Cluster. Logistics Capacity Assessment: Marshall Islands. https://dlca.logcluster.org/display/public/DLCA/2.4+Marshall+Islands+%28RMI%29+Waterways+Assessment+-Inter-Island+Shipping

44 Logistics Cluster. "Uliga Dock," Logistics Capacity Assessment: Marshall Islands. https://dlca.logcluster.org/display/public/DLCA/2.1.3+++++Marshall+Islands+%28RMI%29+Port+of+Majuro+Uliga+Domestic+Dock

45 Logistics Cluster. "Port of Ebeye," Logistics Capacity Assessment: Marshall Islands. https://dlca.logcluster.org/display/public/DLCA/2.1.2+++++Marshall+Islands+%28RMI%29+Port+of+Ebeye

46 Logistics Cluster. Logistics Capacity Assessment: Marshall Islands, 2.3 Marshall Islands (RMI) Road Network. https://dlca.logcluster.org/display/public/DLCA/2.3+Marshall+Islands+%28RMI%29+Road+Netw

47 Cagurangan, Mar-Vic. 3050: Net zero emissions for Marshall Islands. Pacific Island Times. 8 January 2019. https://pacificislandtimes.com/post/2019/01/09/2050-net-zero-emissions-for-marshall-islands

48 CIA World Factbook. Marshall Islands: Energy. Page last updated 20 October 2022. https://www.cia.gov/the-world-factbook/countries/marshall-islands/#energy

49

50 National Energy Office. Navigating our energy future: Marshall Islands Electricity Roadmap. December 2018. https://unfccc.int/sites/default/files/NDC/2022-06/RMI%20Electricity%20Roadmap.pdf

51 Asian Development Bank. Pacific Energy Update 2020. 2021. https://www.adb.org/sites/default/files/institutional-document/671701/pacific-energy-update-2020.pdf

52 Republic of the Marshall Islands Environment Data Portal. Website accessed 28 October 2022. https://rmi-data.sprep.org/dataset/rmi-national-water-and-sanitation-policy-action-plan-2014

53 ADB Technical Assistance Consultant's Report. Republic of the Marshall Islands Case Study Assessment of RMI's Anticipatory Action Potential with a Focus on the WASH Sector. November 2021. https://www.adb.org/projects/documents/rmi-50028-001-t

54 ReliefWeb. Access to clean, safe and resilient water to be boosted for Pacific communities. 6 November 2020. https://reliefweb.int/report/marshall-islands/access-clean-safe-and-resilient-water-be-boosted-pacific-communities

55 ADB Technical Assistance Consultant's Report. Republic of the Marshall Islands Case Study Assessment of RMI's Anticipatory Action Potential with a Focus on the WASH Sector. November 2021. https://www.adb.org/projects/documents/rmi-50028-001-t

56 ReliefWeb. Access to clean, safe and resilient water to be boosted for Pacific communities. 6 November 2020. https://reliefweb.int/report/marshall-islands/access-clean-safe-and-resilient-water-be-boosted-pacific-communities

57 PIHOA. About PIHOA. https://www.pihoa.org/mission-history-strategic-plan/

Header photo by Kurt Cotoaga on Unsplash.com. Bikini Atol, Marshall Islands. https://unsplash.com/photos/beach-under-white-and-blue-cloudy-sky-during-daytime--5t71h3ldJI

Micronesia (Federated States of)

The Federated States of Micronesia (FSM) is comprised of four states - from west to east, Yap, Chuuk, Pohnpei, and Kosrae. It consists of over 600 small islands and atolls in the Caroline Islands archipelago (Western Pacific), approximately 5,633 km (3,500 miles) southwest of Hawaii. With the exception of Kosrae, all states have inhabited outer-island atolls. The country's land area is small at 710 km^2 (274 square miles). Individually, the states' land areas are Yap 124 km^2 (48 square miles), Chuuk 127 km^2 (49 square miles), Pohnpei 344 km^2 (133 square miles), and Kosrae 111 km^2 (43 square miles). However, the country as a whole occupies more than 2.5 million km^2 (1 million square miles) of the Pacific Ocean. Figure 30 is a map of the FSM.[1]

People are believed to have first settled the islands that today make up FSM between 3,500 and 2,000 years ago.[2] These islands underwent centuries of semi-isolation although they were never entirely cut off as there remained sail-borne interaction among them. There is no evidence of a centralizing force covering all of FSM until recent centuries. The Spanish named the entire archipelago for King Charles II (thus, the Carolines) in the 16th century. The succeeding centuries saw the islands being used by outside powers to gain military influence.[3] In 1886, the Spanish formally colonized the Carolines, but that arrangement ended in 1899 when the islands were sold to Germany at the conclusion of the Spanish-American War. With the outbreak of World War I, Germany yielded the islands to Japan, which gained formal title to them in 1920 as a League of Nations mandate.[4] Following World War II, the UN awarded Micronesia, along with Palau, the Marshall Islands, and the Northern Mariana Islands, to the U.S. as part of the Trust Territory of the Pacific. By the late 1970s, the Marianas, Marshalls, and Palau had voted to separate from the trust territory, and the "inner states" of Yap, Chuuk, Pohnpei, and Kosrae undertook a Constitutional Convention in 1978. They formed a republic in 1979, and a 1983 plebiscite approved a Compact of Free Association (COFA), which came into effect in 1986 and allowed FSM internal self-government while the U.S. retained authority over defense and security policy.[5]

The population of FSM is approximately 105,000 people. Palikir, on Pohnpei Island, is the national capital and has a population of 7,000.[6] Approximately half of the total population resides in Chuuk State. Approximately one-third lives on Pohnpei and one-tenth live on each of Yap and Kosrae.[7] Almost 100% of the FSM population is composed of Pacific Islanders and Asians. The largest ethnic group is the Chuukese, who make up nearly half of the total population.[8]

The federal level of government, under the 1979 constitution, consists of executive, legislative, and judicial branches. The majority of government functions – beyond defense and foreign affairs – are carried out at the state rather than the national level. Each of the four state governments (Yap, Chuuk, Pohnpei, and Kosrae) has an elected governor and

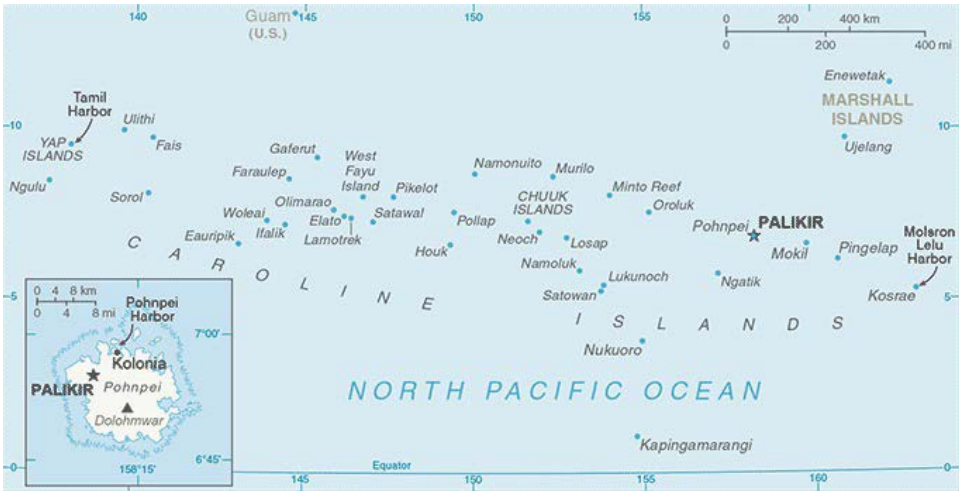


Figure 30: Map of Federated States of Micronesia

a unicameral legislature; there are no political parties.[9] The FSM government conducts its own foreign relations, consistent with the terms of the Amended COFA; the U.S. has full authority and responsibility for defense and security matters. Eligible FSM citizens can travel to the U.S. without visas to live, work, study, and serve in the U.S. Armed Forces.[10]

Hazards and Climate Change

The most common hazards that FSM experiences are typhoons, landslides, and drought, and it confronts earthquakes and sea level rise, but it is also vulnerable to disease outbreaks, fire, food insecurity, and tsunami. El Niño Southern Oscillation (ENSO) influences the formation of typhoons, the distribution of rainfall, and the height of sea level in the western Pacific.[11]

FSM has a tropical climate with relatively even, warm temperatures throughout the year. The average temperature is 28 °C (80°F) year-round, with highs in the low 30s °C (high 80s °F) and lows in the high 20s °C (high 70s °F). The rainfall on each island varies during the dry and wet seasons but is heaviest during the summer months. Trade winds come mainly from the northeast from December through June. Pohnpei is one of the wettest places on Earth, receiving up to 838 cm (330 inches) of rain per year.[12] Figure 31 shows the monthly average minimum, mean, and maximum temperatures and average precipitation for FSM for 1991-2022.[13]

Rising temperatures and sea levels are the primary concerns for FSM under the climate change rubric. Some model projections and climate science findings indicate that El Niño and La Niña events will most likely continue to occur through the end of the 21st century. In FSM, annual average temperature and extremely high daily temperatures will continue to rise while the yearly average rainfall is expected to increase and to result in more extreme rain events. The sea level will continue to rise.[14] Table 13 includes trend and projection information on various climate change-related phenomena.[15]

Broadly, increases in temperature and intensified extreme weather events have the potential to lower agricultural output, increase vulnerability of critical infrastructure that threatens loss of access to basic services, depress labor productivity, and affect human health. Continued sea level rises will impact coastal infrastructure and settlements located on or near the coast. More specifically, the International Monetary Fund (IMF) assesses that tropical countries like FSM can expect adverse macroeconomic consequences due to disruptions to critical agricultural sectors and to overall labor, thereby impacting capital accumulation and undermining GDP growth.[16]

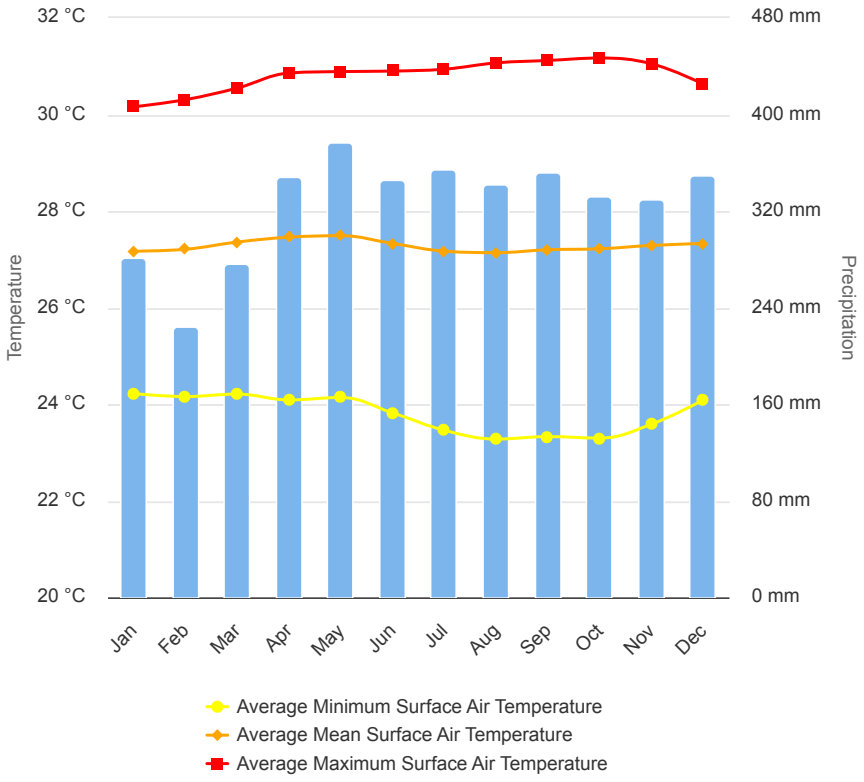


Figure 31: Monthly Temperature and Precipitation Averages for FSM (1991-2022)

Phenomenon	Trend	Projections	Impacts
Temperature	Generally warmer temperatures since the 1950s; annual maximum air temperatures have risen 0.10–0.14°C (0.18-0.25°F) per decade; seasonal and annual mean air temperatures have increased by up to 0.24°C (0.43°F) per decade, and the warming accelerated from 1980 through 2017, with temperatures around 0.7°C (1.26°F) above the long-term historical average	Relative to the 1986–2005 baseline, projected warming by 2090 of 0.5°C–1.2°C (0.9-2.16°F) for low emissions scenarios, and 2.1°C–4.1°C (3.78-7.38°F) for high emissions scenarios; an average temperature increase of 1.4°C (2.52°F) by the 2050s and 3.0°C (5.4°F)by the 2090s across all models for high-emissions scenarios and an average temperature increase of around 0.78°C (1.4°F) by the 2050s and a marginal reduction of this temperature increase by the 2090s to 0.76°C (1.37°F) across all models under all low-emissions scenarios	Further decrease in human and agricultural productivity encourages more food imports and exacerbates rates of non-communicable disease morbidity and mortality; increase in rates of vector- and water-borne diseases
Rainfall	Declining annual rainfall since the 1950s at Yap (declines of 7.9 mm / 0.31 inches per decade), Pohnpei (-88 mm / −3.46 inches per decade), and Chuuk (-48.9 mm − 1.93 inches per decade); ENSO-associated inter-annual rainfall variability	Uncertainty surrounding future changes in average annual precipitation as no model ensemble predictions are statistically significant	Less reliable water for communities relying on precipitation-fed agriculture or drinking water
Extreme Heat	Regular mean annual temperature of around 27.1°C (80.78°F) and highest temperatures March-May; for Pohnpei, the number of warm days and warm nights has been increasing	Temperatures on extremely hot days likely to increase; increase of 1-in-20-year hot days by the 2090s; expected decrease in the frequency and intensity of cool days; mean annual temperature anomalies projected to reach up to 3°C (5.4°F) by 2100 with a projected mean change in the maximum daily temperature of 3.1°C (5.58°F) by 2100	Damaged crops and ocean temperature rises impact food security
Drought	Drought conditions typically felt during the El Niño phase of ENSO	Percent of time spent in drought may decrease (generally shown across all emissions scenarios) General projection for a decrease in cyclone genesis frequency	Damaged crops and contaminated freshwater supplies may force communities to rely more on imported food and water
Cyclone	Historic data shows cyclones impacting FSM mainly between June and November; between 1977 and 2011, the average is 71 cyclones per decade with high inter-annual variability; since 1981, 37 Category 3 or stronger storms have made landfall; there is a higher frequency of storms during El Niño and neutral years, and lower frequency during La Niña years	Frequency of mild drought will remain stable; a decrease in moderate, severe, and extreme droughts; drought duration expected to remain at current levels	Strong winds and rains deposit sea salt on land, damage crops, and lead to power outages; along with sea level rise, storm surges can lead to saltwater intrusion; coastal inundation damages taro beds, soil, agroforestry resources, and critical infrastructure along the coast; strong winds and swells can damage coral reefs, mangroves, and wetlands that protect coastal communities from storms and flooding

Table 13: Climate Change-Influenced Phenomena in FSM

Phenomenon	Trend	Projections	Impacts
Sea Level Rise	Average rise of 10 mm (0.39 inches) per year; high inter-annual variability as mean sea levels are often lower during an El Niño year, but higher during La Niña	Sea level rise will continue to increase; possible increases of 7–18 cm (2.8-7.08 inches) by 2030, with a range of 41–90 cm (16.1–35.4 inches) by 2090 under high-emissions scenarios; FSM already faces about a 10% chance of a damaging tsunami in the next 50 years, and sea level rise could cause tsunami waves to be higher	Coastal flooding damages groundwater resources with effects on drinking water and food supplies; displacement disrupts cultural norms, traditions, and languages; loss of ancestral lands

Table 13: Climate Change-Influenced Phenomena in FSM (cont.)

Government Institutions, Policies, and Plans for Disasters and Climate Change

Department of Environment, Climate Change, and Emergency Management (DECEM) is tasked with monitoring, guiding, supervising, and providing policy direction, logistics, and administrative support to the government. It serves as a technical arm of the Presidency on emergencies, the environment, sustainable development, and climate change. Key strategic goals are to reduce vulnerabilities to disaster, and to support and advocate for the Nationwide Disaster Risk Management and Climate Change Policy.[17] DECEM has three divisions: Climate Change, Emergency Management, and Environment.[18] It is tasked with coordinating and supporting agencies and partners who are implementing programs that fall under the National Environmental Strategy (NEMS) 2019-2023.[19] In addition to DECEM, which is the technical focal point for climate change and disaster management coordination, the Department of Foreign Affairs is the focal point for regional and bilateral coordination, the Department of Finance and Administration is the focal point for climate change and DRR funding streams, the Office of Overseas Development Assistance is the authorizing office for EU projects, and state governments are implementers who also work closely with non-state actors.[20]

At the federation level, the National Disaster Committee (NDC), chaired by DECEM, provides direction on policy development and coordination in the event of a disaster. Primary decision-making responsibility in both instances lies with the President, usually acting under the advice of the NDC. A state of disaster is declared by the President upon request by a state Governor and with the advice of the NDC. The President's role is mirrored at the state level, where each Governor holds the primary decision-making power for both preparedness and response. Within each of the four states, the organization varies. Where they exist, the State Disaster Committee (SDC) is responsible for planning for disasters and providing overall management of disaster response under the direction of the Governor. State Committees are chaired by the state-appointed Disaster Management Officer (DMO) and comprised of relevant state Secretaries and other agency heads. National and state coordination teams operate alongside the SDCs to manage the provision of disaster relief under the direction of the national or state Disaster Coordination Officers (DCO). Beneath the state level, local Disaster Management Committees may operate.[21] The Joint Resource Management Network has provided a technical coordinating body at both the state and national level for disaster risk management work. This network incorporates all stakeholders involved in disaster response and management to include NGOs, national and state government agencies, and the private sector, with the Assistant Secretary for Emergency Management at DECEM coordinating at the national level.[22]

During disasters, operations are handled through National and State Emergency Operations Centers (NEOC and SEOC).[23] The National Disaster Coordination Team (NDCT) and the NEOC are activated for operational

management during emergencies.[24] The NEOC is managed by DECEM's Emergency Management Division.[25] Access to international and regional support is the purview of NDC, whereas control of relief assets rests with the NDCT. Figure 32 shows the levels of national, state, and local authority for disaster management.[26]

Based on the National Disaster Response Plan (NDRP, 2016), the NDC has responsibility for oversight of arrangements for all hazards through six lead agencies:

- DECEM Division of Emergency Management – all hazards (excluding those listed below)
- Department of Health and Social Affairs – pandemics and health incidents
- Department of Resources and Development– agriculture incidents
- DECEM Division of Environment and Sustainable Development – environmental incidents
- Department of Transportation, Communications, and Infrastructure – aircraft and ship incidents
- Department of Justice Division of National Police – search and rescue at sea[27]

The Disaster Relief Assistance Act of 1989 and the NDRP provide a national framework for disaster management. However, as states retain much of the responsibility and rely on federal agencies for facilitation. Each state has a Joint State Action Plan on Disaster Risk Management and Climate Change (JSAP) that lays out the agencies and processes to be followed for that state's emergency management under the National Integrated Disaster Risk Management and Climate Change Policy (2013).

The Disaster Relief Assistance Act of 1989 formally lays out federal roles and responsibilities. It vests in the President the power to request aid from the U.S. Government

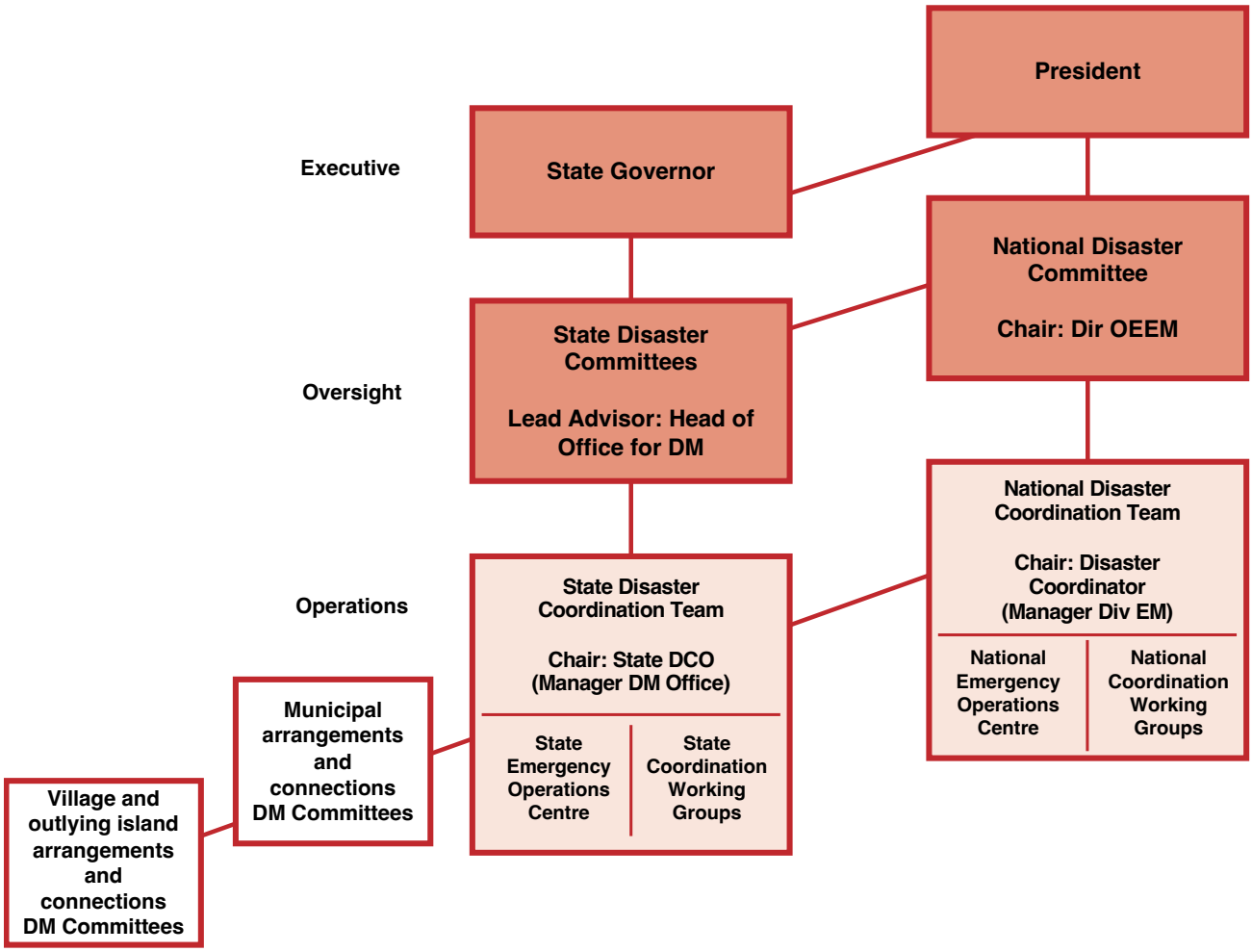


Figure 32: FSM Government Arrangements for Disaster Management

and other overseas public and private entities. In addition, it names the President as the agent who will coordinate foreign aid with national and local action. The Act states that in the event of a threatened or existing disaster, the President may provide immediate assistance from the Disaster Relief Fund in order to save lives, preserve property, and protect public health and safety. Under the Act, the NDC is responsible to the President for policy development and for the strategic management of planning and arrangements for disaster preparedness and response. It is also responsible for the overview of disaster events and for accessing international, regional, and bi-lateral support arrangements. The Act also stipulates that the national authorities should maintain a register of people with specific disaster management skills and expertise that can be shared with the States.[28]

The Strategic Development Plan (2004-2023) centers national development action on four pillars: Stability and Security, Improved Enabling Environment for Economic Growth, Improved Education and Health Status, and Assured Self-Reliance and Sustainability. In addition to laying out ways to maintain funding and resources to provide basic necessities, it looks to maintain economic assistance at levels that support macroeconomic stability and continue the national commitment to economic reform and to open, outward-oriented, and private sector-led development.[29]

The National Integrated Disaster Risk Management and Climate Change Policy (2013) was an attempt to develop a multi-hazard approach to integrate risk management, CCA, and GHG emissions reductions. It explicitly seeks a "ridge to reef" approach to ensure that DRR or CCA measures that are implemented are socially and ecologically sound and take into consideration the advice and participation of marginalized groups (e.g., women, small atoll communities, persons with disabilities, and the elderly). The Policy is designed to parallel the national Strategic Development Plan (2004-2023) to support economic resilience, food, water, and energy security, safe settlements, waste management, health and social protection, and education. Key elements under the Policy are that FSM intends to prevent climate change-induced migration but also to ensure that environmental migration is managed in a humane way when it is absolutely necessary. At the national level, DECEM has the responsibility to promote and coordinate implementation of the Policy and to provide updates on implementation to the President and national Congress. However, responsibility for implementation lies with the states, and the Policy encourages the states to prepare DRR and CCA State Action Plans.[30]

Following the publication of the Policy, Congress passed a law to codify the obligations of the national government in furtherance of the Policy. It added the "Climate Change Act" as part of the national legal code under which DECEM, the Department of Resources and Development, Department of Transportation, Communications, and Infrastructure, Department of Health and Social Affairs, Department of Education, Department of Finance and Administration, Office of Statistics, Budget, and Economic Managements, and Department of Foreign Affairs all were required to prepare climate change plans and policies.[31] In March 2017, a Climate Change and Sustainable Development Council was established to ensure implementation of the Climate Change Act. The Council provides leadership and institutional coordination on mainstreaming climate change into policies and actions across all sectors and initiatives.[32] Members of the Council include department heads of all national government departments and the FSM Association of the Chamber of Commerce. Working across national and state levels is the Climate Change Country Team. The Climate Change Country Team has previously acted as the steering committee for large national climate change-related projects, such as the Global Climate Change Alliance and, currently, the Pacific Regional Environment Programme- (SPREP) implemented Adaptation Fund project. Its members include state government focal points and focal points within national agencies.[33]

The NDRP aims to establish the national institutional arrangements to respond to emergency and disaster events. It includes arrangements for preparedness, monitoring of potential events, national response, and local support. It guides states to make disaster response plans and includes provisions for access to international aid.[34] Under the NDRP, the President receives advice from the NDC and makes decisions in relation to priorities, committing resources, and accessing international assistance during disasters.[35]

Beyond addressing disaster risk and response, these laws, policies, and plans form part of FSM's long-term efforts to confront climate change. FSM is a signatory of the UNFCCC, ratified the Paris Agreement, and is an advocate for more countries setting and meeting climate goals.[36] FSM views national climate change policy as a means to build credibility in international dialogue in the expectation that this credibility and engagement will allow it to leverage external finance, to mobilize domestic revenues, and to reduce dependence on expensive imports from volatile international oil markets. It has advanced its process of documenting climate-related risks, developing relevant policies and plans, and establishing and strengthening national and state institutions responsible for managing climate related risks under the umbrella of the 2004–2023 Strategic Development Plan, supplemented by the 2013 Nation-Wide Integrated Disaster Risk Management and Climate Change Policy and the 2014 FSM Climate Change Act.

Within this context, FSM developed its Nationally Determined Contribution (NDC) under the Paris Agreement and submitted an updated NDC to the UNFCC secretariat in 2022.[37] The 2018 establishment of DECEM also signaled heightened commitment to CCA. DECEM is responsible for developing and mainstreaming CCA as well as disaster management policies. It oversaw the development of a Green Climate Fund (GCF) country work program, which refined and built on the projects in federal infrastructure plans,[38] and in April 2023, DECEM submitted an additional proposal to GCF for work to develop and publish FSM's National Adaptation Plan.[39]

The Climate Change Act 2013 outlines legal obligations for implementing the provisions of the Nation-Wide Integrated Policy across agencies, including the role of the mandated coordinating body, DECEM. The Act mandates mainstreaming of climate change, key to ensuring consistent cross-sectoral recognition and action to address climate change and its impacts. DECEM is mandated to report on the progress of this sectoral mainstreaming on an annual basis, and the first sectors to achieve mainstreaming were agriculture, energy, communications, and health.[40]

The NEMS (2019-2023) guides coordination and collaboration in implementation of policies, programs, and actions to promote sustainable development and conservation of the environment. It provides a roadmap for environmental actions and stewardship and promotes establishment of good governance and policies. NEMS was developed by the Nature Conservancy's Micronesia Program in partnership with DECEM and SPREP, based on the FSM 2018 State of the Environment report. It suggests programming and stakeholders across the seven thematic areas of: atmosphere and climate, terrestrial resource management, marine resource management, conservation and biodiversity, built environment, culture and heritage, and environmental governance mainstreaming and capacity development.[41]

Despite negligible emissions, FSM, in its NDC, committed reducing further its GHG emissions as part of its advocacy to promote all Paris Agreement parties to do the same. The NDC details adaptation and mitigation targets across economic and policy areas: energy security, short-lived climate pollutants, food security, water security, ecosystems management, resilient transport systems, public health, and emergency management and response.[42]

Department of Environment, Climate Change, and Emergency Management (DECEM)
Palikir Station, Pohnpei State, FM 96941
Tel: 691 320 8815
Email: *fsmdecem@fsmdecem.fm*

Early Warning Systems

The U.S.-FSM COFA, Section 221: Article II (Program Assistance) allows for the U.S. National Weather Service (NWS) to deliver products to FSM; these products include weather information and tsunami warnings.[43] The Pacific Region of the NWS administers programs and facilities throughout the Pacific, including on the islands of FSM.[44] NWS' Weather Forecast Office (WFO) Guam communicates information to Weather Service Offices (WSO) in each state except Kosrae.[45] The NWS Pacific Region also administers the Honolulu-based Pacific Tsunami Warning Center,[46] which issues warnings to WFO Guam. WFO Guam then notifies the WSOs in Chuuk, Pohnpei, and Yap States, which in turn notify their relevant disaster offices. WFO Guam directly notifies the Kosrae State disaster office. Pohnpei WSO also notifies the Governors of any tsunami warnings as the Governor's office is the authorizing body for warning dissemination and evacuations. All WSOs are operated 24-hours daily, year-round. They are connected to Guam and receive notifications via automated systems with telephone and internet backup.

State disaster committee officers and local police also back each other up if, for some reason, one person does not receive communications. The disaster committee officers also rely on DECEM to further disseminate warnings. In major population centers, police sirens and public address systems are the primary means to notify the public, and on Pohnpei, FM and AM radio stations are available to deliver warnings. However, in remote areas, including outer islands, high frequency radio and "Chatty Beetles" – portable iridium satellite terminals that permit text-based alerts and messaging in remote locations – are the primary means to disseminate warnings although the commercial telephone system allows telephone calls and text messages, and improvements in that network in recent years have allowed swifter message delivery.[47] "Chatty Beetle" satellite terminals facilitate text messaging in remote areas with limited connectivity to disseminate hydrometeorological alerts and other important information. The messaging system connects emergency managers and authorities to provide hazard notifications to communities.[48] The "Chatty Beetle" is a 2-way Iridium satellite-based system packed in a ruggedized case and with ruggedized internal components for remote, high salt, high heat, high humidity areas.[49]

Weather Service Office, Yap
P.O Box 10, Yap State, Federated States of Micronesia 96943
Tel: 691 350 2194

Weather Service Office, Chuuk
P.O Box A, Weno, Chuuk, Federated States of Micronesia 96942
Tel: 691 330 2548

Weather Service Office, Pohnpei
P.O Box 69, Pohnpei, Federated States of Micronesia 96941
Tel: 691 320 2248

Infrastructure

The national Department of Transportation, Communications, and Infrastructure is tasked with development and administration of policies and regulations to ensure reliable transport and communications and to ensure that capital projects meet construction safety standards and are cost effective.[50] Similar agencies to the national Department deliver infrastructure at the state level.[51]

Each of the four states has a small international airport, and there are fewer than one dozen airfields on outer islands.[52] Generally, facilities are inadequate for accommodating cargo, and interface with public transportation is poor. Several airports are at risk of inundation from sea level rise and storm water surge.

FSM depends heavily upon maritime transportation. There are four international seaports, one in each state. In Pohnpei and Kosrae, Port Authorities manage the ports while in Chuuk and Yap, the Departments of Transport and Public Works or of Infrastructure operate

the port. All four ports are in protected lagoon environments. They are all general cargo ports, and almost all in-bound and out-bound freight is containerized. However, there are no wharf unloading container facilities, and all vessels visiting FSM ports must have gantry cranes for loading and unloading.[53]

FSM has around 240 km (149 miles) of highways. The road network is government-owned and -maintained, and in general, there is only one circumferential route on the main island of each of the four states. Road conditions are mostly good to fair although some sections of the network can be in poor or very poor condition due to poor drainage, weather, and shortfalls in maintenance.[54]

Each state has its own state-owned and -run public utility commission that has responsibility for electric power and water and sanitation for those areas connected to a public system. Water catchment and self-sustaining septic tanks are the most common water and sanitation arrangements, and in many places, piped water is not potable. While electric power access has expanded, particularly on main islands, costs are high and use of diesel for generation is common.[55] A 2016 survey found that electricity is available in 75% of households nationally.[56] A key challenge for the entirety of FSM is that typhoons and other storms bring saltwater inundation that corrodes electricity infrastructure.[57]

The Vital Group (sometimes called Vital or FSM PetroCorp) is a state-owned corporation under which the Vital FSM Petroleum Corporation operates in all four states. Vital is the largest supplier of energy products and services in FSM.[58] The company is involved in some electricity generation. It has a 1.065-MW continuous power diesel plant at Nanpohnmal in Pohnpei; the plant consists of 4×355 kilowatt (kW) engines connecting directly to the Pohnpei Utilities Corporation (PUC), but the plant is used only during peak periods to provide the utility additional power on demand.[59]

The Chuuk Public Utilities Corporation (CPUC) is a government-owned corporation that provides power. CPUC's commercial operations are restricted to Weno Island although there are plans to expand CPUC electricity coverage to Tonoas after a private generating facility there becomes operational. At that point, CPUC will purchase the power and be responsible for distribution and operations and maintenance of the network. Elsewhere, CPUC undertakes operations and maintenance for electric power facilities through service agreements, principally with Chuuk's Education and Health Departments.[60]

Kosrae has its own state-owned power utility authority, the Kosrae Utility Authority (KUA). Kosrae has the highest rate of access to electricity in FSM, at 98% coverage.[61] KUA primarily uses diesel generators for power generation. Six diesel generators are located at the Tofol power plant, on the island's northeast, to meet electric power demand.

The PUC is a unit of the state government and has responsibility for providing electrical power for Pohnpei.[62] Access to electricity is limited, with not all people on Pohnpei's main island having household electricity. On outlying islands, the primary energy source is biomass, with wood and coconut husks used for cooking. Kerosene is also used for lighting; however, high costs (which can be double the cost on the main island) and low household incomes mean that its use is limited. The state is reliant primarily on imported diesel for electricity generation; this diesel is mixed with locally produced coconut oil at approximately a 9:1 ratio. The Nanpil Hydropower station was originally built in 1986 and operated until 2003 when major repairs were needed. The European Union funded rehabilitation that allowed the plant to resume operations, and its capacity represents 11% of peak demand. Gas also forms an important source of energy, with liquified petroleum gas bottles primarily used in restaurants in towns.[63]

Electric power in Yap is provided by Yap State Public Service Corporation (YSPSC) with a focus on the main island group although support is also provided to outer island electric power facilities.[64] Yap is highly dependent on imported diesel. Half of the imported fuel is used for power

generation. Approximately 50% of the population has access to the electricity supply. Yap State has had village electrification projects using solar power, including a project for 50 homes on Satawal and two solar micro-grids in Fadarai and Assor in Ulithi Atoll in 2006. Some private solar installations exist.[65]

The primary sources of freshwater in most states are underground, surface water, and rainwater. Surface water accounts for 60% of exploited water resources and groundwater accounts for 40%. The small, low-lying islands in each state are fully dependent on rainwater and shallow wells. The adverse impacts of climate change, especially salinization and saltwater intrusion due to rising sea levels, increased flooding, and droughts are threatening the availability and quality of fresh water across FSM.[66]

Chuuk reports that just over 18% of its population does not access adequate drinking water and some 43.5% do not access adequate toilet facilities. The Weno central water system, supplied by the Pou River, is the major water system in the state and provides piped water to 10,000 persons and most of the state's commercial and tourism enterprises. Most areas on Weno have access to a continuous supply. The exception is the sparsely populated southern side of the island.[67] Water supply services on Weno are provided by CPUC. In almost all cases the water in Chuuk is undrinkable. The urban areas on Weno are also connected to a sewer system run by CPUC. Outside urban centers, the population relies on water catchment or wells and different forms of septic tank systems. Standard water and dry composting toilets are used, particularly in remote villages and outer islands.[68]

Water and wastewater systems on Kosrae are the responsibility of the State Department of Transportation and Infrastructure, but part of KUA's mandate is to deliver water and wastewater utility services on a self-funding basis.[69] Around three-quarters of Kosrae households use water catchment tanks or drums as their primary water source. Around 99% use the public water system for non-potable uses such as laundry, washing, crops, and animal feeding since the public water system is not fit for drinking. Threats to Kosrae's water resources include climate change, deforestation of the watersheds, and sanitary controls on the watershed activities related to human and animal interference. Most households (93%) have flush toilets and private septic tanks.[70] The single wastewater scheme is limited but includes key government facilities, including the hospital, and covers the populations in Tofol and Lelu. The scheme incorporates settling ponds, and the resulting effluent discharges directly to the sea with several components requiring rehabilitation.[71]

On Pohnpei Island, the main source of water is the Napil River. The PUC provides water to 53% of the main island's population. Across the state, according to a 2010 census, 8.8% of households lacked access to improved drinking water, while 38.1% lacked access to improved toilet facilities.[72] Over the last few years, the potable water system has been extended to include all of Kolonia and most areas within the other main island municipalities. Water supply is achieved by river diversion and multiple wells. Wastewater management, collection, and treatment are limited to the population center of Kolonia and the surrounding areas.[73]

Reliable treated and filtered potable water is accessible to most people in Yap. The YSPSC Water System, the Gagil/Tomil Water Authority, and Southern Yap Water Authority maintain these water systems. There are four water tanks and catchments on the main islands, and there is one dam with an associated reservoir.[74] About 75% of the population of Yap Island has piped water. Potable water is available in the main islands, except for Maap and Rumung.[75] Still, approximately 86% of Yap State residents do not have plumbing, and the most common source of drinking water is water catchment tanks or drums, as well as public and community water systems. Sewerage connections are not common for households.[76]

Department of Transportation, Communications, and Infrastructure
P.O. Box PS-2, Palikir, Pohnpei, FM 96941
Tel: 691 320 2865
Email: *tci@tci.gov.fm*

Chuuk Public Utilities Corporation
P.O. Box 910, Weno Chuuk, Micronesia
Tel: 691 330 2400

Kosrae Utility Authority
KUA Plaza, Tofol, Kosrae, FM 96944, Micronesia
Tel: 691 370 3344
Email: *kua.billing@gmail.com*

Pohnpei Utilities Corporation
Tel: 691 320 2374 or 691 320 5021
Email: *info@mypuc.fm*

Yap State Public Service Corporation
P.O. Box 667 Colonia, Yap FM 96943
Tel: 691 350 4427 / 7515
Email: *info@yspsc.org*

Vital Energy
P.O. Box 1762 Kolonia, Pohnpei, FM 96941
Tel: 691 320 6364 / 6419
Email: *info@fsmpc.com*

Civil Society Partners

Among key partners that fall under the NDRP framework are the national Red Cross Society, FSM Alliance of NGOs, various women's councils, and the Micronesian Conservation Trust (MCT).

The MCT, established in 2002, is the first conservation trust fund in the region. It focuses on grant-making and serves as a potential regional model for channeling funds to local-level organizations. MCT also focuses on capacity building by supporting financial and project management capacity of NGOs throughout the region. As an accredited entity to both the Adaptation Fund (for projects up to US$1 million) and the GCF, MCT continues to focus on institutional strengthening for local organizations.[77]

Micronesia Conservation Trust
P.O. Box 2177 Pohnpei, FM 96941
Tel: 691 320 5670
Email: *info@ourmicronesia.org*

The Micronesia Red Cross Society (MRCS) officially launched with its articles of incorporation in 1998, and it eventually became a recognized National Society in 2003.[78] MRCS is an auxiliary to the national government and a member of the National Emergency Task Force as well as State Emergency Committees.[79] The Society has a membership from throughout the four states with its headquarters in Pohnpei. There is a Chapter office in each of Chuuk, Kosrae, and Yap. MRCS undertakes disaster preparedness and response activities, teaches First Aid, promotes public health, and maintains FSM's voluntary blood donation system. As part of the national disaster management structure, MRCS coordinates with the government and other actors, performs portions of post-disaster assessments, and distributes relief items to affected communities.[80] MRCS keeps five disaster containers prepositioned across the four states with enough emergency aid to help a total of 6,000 people at any one time. The containers are used to store jerry cans, buckets, tarpaulins, shelter toolkits, blankets, and hygiene kits, and the containers are sent as a whole package to affected states or islands after a disaster. MRCS' Disaster Management Officer is responsible for regular checks on the stockpiles.[81]

Micronesia Red Cross Society
Kaselehlie Main St., Pohnpei State, FM 96941
Tel: 691 320 7077
Email: *mrcs@mail.fm*

The Pacific Island Health Officers' Association (PIHOA) was established in 1986 by the health officials of the six U.S.-Affiliated Pacific Islands (USAPI) - American Samoa, Guam, the Northern Marianas, FSM, Marshall Islands, and Palau. PIHOA was intended to provide a regional, collective voice for advocacy and policymaking to address common health

concerns to strengthen local and regional health system capabilities, capacities, and community resilience. It supports partnership engagement and provision of technical assistance to USAPI health departments and ministries. PIHOA membership comprises the six USAPI chief health officials, their deputies, Micronesia State directors, chief executive officers of USAPI public hospitals, and 13 Pacific regional professional associations, USAPI academic institutions, and development partners.[82]

FSM – Pohnpei State Department of Health Services
P.O. Box 189, Nett, Pohnpei, FSM 96941
https://www.psdhs.fm

FSM – Kosrae State Department of Health Services
P.O. Box 127. Kosrae, FSM 96944

FSM – Yap State Department of Health Services
P.O. Box 148, Colonia, Yap, FSM 96943

FSM – Chuuk State Department of Health Services
P.O. Box 400, Weno, Chuuk, FSM 96942

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Micronesia (Federated States of) Notes

1 CIA World Factbook. Micronesia, Federated States of – map. https://www.cia.gov/the-world-factbook/static/maps/FM-map.jpg

2 Encyclopedia Britannica. Accessed 15 September 2022. https://www.britannica.com/place/Micronesia-republic-Pacific-Ocean/Government-and-society

3 Harvard International Review. Micronesia: The Next US-China Battleground. Pranay Varada. 6 December 2019. https://hir.harvard.edu/micronesia-the-next-us-china-battleground-2/

4 Encyclopedia Britannica. Accessed 15 September 2022. https://www.britannica.com/place/Micronesia-republic-Pacific-Ocean/Government-and-society

5 Harvard International Review. Micronesia: The Next US-China Battleground. Pranay Varada. 6 December 2019. https://hir.harvard.edu/micronesia-the-next-us-china-battleground-2/

6 World Population Review. Micronesia. Accessed 16 September 2022. https://worldpopulationreview.com/countries/micronesia-population

7 Encyclopedia Britannica. Micronesia. Website last updated 31 August 2022. https://www.britannica.com/place/Micronesia-republic-Pacific-Ocean

8 World Population Review. Micronesia. Accessed 16 September 2022. https://worldpopulationreview.com/countries/micronesia-population

9 Encyclopedia Britannica. Micronesia. Last updated 31 August 2022. https://www.britannica.com/place/Micronesia-republic-Pacific-Ocean

10 U.S. Department of State. U.S. Relations with the Federated States of Micronesia. 19 October 2021. https://www.state.gov/u-s-relations-with-the-federated-states-of-micronesia/

11 World Bank Climate Change Knowledge Portal. Federated States of Micronesia: Vulnerability. Accessed 19 August 2022. https://climateknowledgeportal.worldbank.org/country/micronesia-fed-sts/vulnerability

12 Tourism FSM. About Federated States of Micronesia. Climate. Website accessed 15 September 2022. https://visit-micronesia.fm/about-fsm/

13 World Bank Climate Change Knowledge Portal. Micronesia – Federated States of. https://climateknowledgeportal.worldbank.org/country/micronesia-fed-sts

14 Government of FSM. Yap Joint State Action Plan for Disaster Risk Management and Climate Change. 2016. http://www.yapstategov.org/uploads/2/9/6/5/29657975/fsm_yap_jsap.pdf

15 World Bank Group. Climate Risk Country Profile: Micronesia. 2021. https://climateknowledgeportal.worldbank.org/sites/default/files/country-profiles/15818-WB_Micronesia%20Country%20Profile-WEB.pdf

16 International Monetary Fund. Federated States of Micronesia: Climate Change Policy Assessment. September 2019. IMF Country Report No. 19/292. https://www.imf.org%2F-%2Fmedia%2FFiles%2FPublications%2FCR%2F2019%2F1FSMEA2019002.ashx&usg=AOvVaw-0cpRLzcA1Yplx543Pxcky2

17 Development Aid. Department of Environment, Climate Change and Emergency Management, Government of the Federated States of Micronesia. https://www.developmentaid.org/donors/view/180616/department-of-environment-climate-change-and-emergency-management-government-of-the-federated-states

18 SPREP. FSM Climate Change and Disaster Risk Finance Assessment – 2019. https://fsm-data.sprep.org/dataset/fsm-climate-change-and-disaster-risk-finance-assessment-2019

19 DECEM. National Environment Management Strategy 2019-2023. Government of FSM. 9 July 2021. https://fsm-data.sprep.org/dataset/national-environment-management-strategy-2019-2023

20 SPREP. FSM Climate Change and Disaster Risk Finance Assessment – 2019. https://fsm-data.sprep.org/dataset/fsm-climate-change-and-disaster-risk-finance-assessment-2019

21 IFRC Resilience Library, Southeast Asia Resources. Federated States of Micronesia – Overview. Accessed 15 August 2022. https://www.rcrc-resilience-southeastasia.org/disaster-law/international-disaster-response-law-in-the-pacific/country-profiles/federated-states-of-micronesia/federated-states-of-micronesia-overview/

22 SPREP. FSM Climate Change and Disaster Risk Finance Assessment – 2019. https://fsm-data.sprep.org/dataset/fsm-climate-change-and-disaster-risk-finance-assessment-2019

23 IFRC Resilience Library, Southeast Asia Resources. Federated States of Micronesia – Overview. Accessed 15 August 2022. https://www.rcrc-resilience-southeastasia.org/disaster-law/international-disaster-response-law-in-the-pacific/country-profiles/federated-states-of-micronesia/federated-states-of-micronesia-overview/

24 UNDRR and ADPC. Disaster Risk Reduction in the Federated States of Micronesia: Status Report. 2022. https://www.undrr.org/media/81878/download

25 SPREP. FSM Climate Change and Disaster Risk Finance Assessment – 2019. https://fsm-data.sprep.org/dataset/fsm-climate-change-and-disaster-risk-finance-assessment-2019

26 UNDRR and ADPC. Disaster Risk Reduction in the Federated States of Micronesia: Status Report. 2022. https://www.undrr.org/media/81878/download

27 Office of Environment and Emergency Management. Federated States of Micronesia National Disaster Response Plan 2016. April 2017. https://fsm-data.sprep.org/dataset/fsm-national-disaster-response-plan-2016

28 IFRC Resilience Library, Southeast Asia Resources. Federated States of Micronesia – Legal Preparedness For International Assistance Assessment. Accessed 15 August 2022. https://www.rcrc-resilience-southeastasia.org/disaster-law/international-disaster-response-law-in-the-pa-

cific/country-profiles/federated-states-of-micronesia/#1513155220850-33b65e36-3930

29 UNDRR and ADPC. Disaster Risk Reduction in the Federated States of Micronesia: Status Report. 2022. https://www.undrr.org/media/81878/download

30 Government of FSM. Nation Wide Integrated Disaster Risk Management and Climate Change Policy. June 2013. https://fsm-data.sprep.org/system/files/Climate%20Change%20Disaster%20Risk%20Reduction%20Policy%5B824%5D.pdf

31 Congress of FSM. Congressional Bill No. 18-72, Public Law No. 18-34. 3 January 2013. https://www.rcrc-resilience-southeastasia.org/wp-content/uploads/2020/04/Climate-Change-Act-2013.pdf

32 Green Climate Fund. Federated States of Micronesia Country Programme. 30 September 2017. https://www.greenclimate.fund/document/federated-states-micronesia-country-programme

33 SPREP. FSM Climate Change and Disaster Risk Finance Assessment – 2019. https://fsm-data.sprep.org/dataset/fsm-climate-change-and-disaster-risk-finance-assessment-2019

34 UNDRR and ADPC. Disaster Risk Reduction in the Federated States of Micronesia: Status Report. 2022. https://www.undrr.org/media/81878/download

35 IFRC Resilience Library, Southeast Asia Resources. Federated States of Micronesia – Legal Preparedness For International Assistance Assessment. Accessed 15 August 2022. https://www.rcrc-resilience-southeastasia.org/disaster-law/international-disaster-response-law-in-the-pacific/country-profiles/federated-states-of-micronesia/#1513155220850-33b65e36-3930

36 SPREP. FSM Climate Change and Disaster Risk Finance Assessment – 2019. https://fsm-data.sprep.org/dataset/fsm-climate-change-and-disaster-risk-finance-assessment-2019

37 UNFCCC. NDC Registry. https://unfccc.int/NDCREG

38 International Monetary Fund. Federated States of Micronesia: Climate Change Policy Assessment. September 2019. IMF Country Report No. 19/292. https://www.imf.org%2F-%2Fmedia%2FFiles%2FPublications%2FCR%2F2019%2F1FSMEA2019002.ashx&usg=AOvVaw0cpRLzcA1Yplx543Pxcky2

39 Green Climate Fund. Readiness Proposal with the Secretariat of the Pacific Regional Environment Programme (SPREP) for the Federated States of Micronesia: National Adaptation Planning. 3 May 2023. https://www.greenclimate.fund/sites/default/files/document/20230503-fsm.pdf

40 SPREP. FSM Climate Change and Disaster Risk Finance Assessment – 2019. https://fsm-data.sprep.org/dataset/fsm-climate-change-and-disaster-risk-finance-assessment-2019

41 DECEM. National Environment Management Strategy 2019-2023. Government of FSM. 9 July 2021. https://fsm-data.sprep.org/dataset/national-environment-management-strategy-2019-2023

42 Government of FSM. UPDATED NATIONALLY DETERMINED CONTRIBUTION OF THE FEDERATED STATES OF MICRONESIA for the period through 2030. https://unfccc.int/sites/default/files/NDC/2022-10/Updated%20NDC%20of%20the%20MICRONESIA.pdf

43 Australian Bureau of Meteorology. SOPAC Member Countries National Capacity Assessments: Tsunami Warning and Mitigation Systems. Federated States of Micronesia. Volume 3, September 2010. http://www.bom.gov.au/tsunami/assessments/pdf/FSM_Status_of_Key_System_Components.pdf

44 National Weather Service. WSO Pohnpei. Accessed 29 August 2022. https://www.weather.gov/gum/WSOPohnpei

45 Australian Bureau of Meteorology. SOPAC Member Countries National Capacity Assessments: Tsunami Warning and Mitigation Systems. Federated States of Micronesia. Volume 3, September 2010. http://www.bom.gov.au/tsunami/assessments/pdf/FSM_Status_of_Key_System_Components.pdf

46 National Weather Service. WSO Pohnpei. Accessed 29 August 2022. https://www.weather.gov/gum/WSOPohnpei

47 Australian Bureau of Meteorology. SOPAC Member Countries National Capacity Assessments: Tsunami Warning and Mitigation Systems. Federated States of Micronesia. Volume 3, September 2010. http://www.bom.gov.au/tsunami/assessments/pdf/FSM_Status_of_Key_System_Components.pdf

48 USAID/BHA. Pacific Islands Assistance Overview. March 2022. https://www.usaid.gov/sites/default/files/documents/USAID-BHA_Pacific_Islands_Assistance_Overview-March_2022.pdf

49 RANET Pacific Communications. Agenda Item 17.3 RANET. 4th Meeting Of The Pacific Meteorological Council. 14-17 August 2017. https://www.pacificmet.net/sites/default/files/inline-files/documents/Slides_Agenda_17.3.pdf

50 Department of Transportation, Communications, and Infrastructure. Home page. Accessed 29 August 2022. https://tci.gov.fm/

51 World Bank. Federated States of Micronesia Prioritized Road Investment and Management Enhancements Project. 21 April 2021. https://documents1.worldbank.org/curated/en/163991621908128304/pdf/Micronesia-Prioritized-Road-Investment-and-Management-Enhancements-Project.pdf

52 LogCluster. Micronesia Aviation. Accessed 29 August 2022. https://dlca.logcluster.org/display/public/DLCA/2.2+Micronesia+Aviation

53 LogCluster. Micronesia Port Assessment. Accessed 29 August 2022. https://dlca.logcluster.org/display/public/DLCA/2.1+Micronesia+Port+Assessment

54 UNDRR and ADPC. Disaster Risk Reduction in the Federated States of Micronesia: Status Report. 2022. https://www.undrr.org/media/81878/download

55 International Monetary Fund. Federated States of Micronesia: Climate Change Policy Assessment. September 2019. IMF Country Report No. 19/292. https://www.imf.org%2F-%2Fmedia%2FFiles%2FPublications%2FCR%2F2019%2F1FSMEA2019002.ashx&usg=AOvVaw0cpRLzcA1Yplx543Pxcky2

56 UNDRR and ADPC. Disaster Risk Reduction in the Fed-

erated States of Micronesia: Status Report. 2022.https://www.undrr.org/media/81878/download

57 Green Climate Fund. Funding Proposal: FP169: Climate change adaptation solutions for Local Authorities in the Federated States of Micronesia. 23 November 2021. https://www.greenclimate.fund/sites/default/files/document/funding-proposal-fp169.pdf

58 Vital Group. About Us. Accessed 31 August 2022. https://www.vitalenergy.fm/about-us-3/

59 Vital Group. Power Generation. Accessed 31 August 2022. https://www.vitalenergy.fm/services-2/power-generation/

60 Government of FSM. Federated States of Micronesia INFRASTRUCTURE DEVELOPMENT PLAN FY2016-FY2025: Volume 3: Chuuk State Infrastructure Development Plan FY2016-FY2025. https://tci.gov.fm/documents/infrastructure/IDP/FSM%20IDP%20FY2016-FY2025%20-%20Chuuk%20State%20(version%20151202).pdf

61 Government of FSM. Kosrae State Joint State Action Plan for Disaster Risk Management and Climate Change (JSAP). 2016. https://bsrp.gsd.spc.int/wp-content/uploads/Publications/Kosrae_JSAP.pdf

62 Department of Transportation, Communication and Infrastructure. Kosrae International Airport: Final Master Plan. June 2012. https://tci.gov.fm/documents/infrastructure/pmu/aip/kosrae-international-airport-master-plan-final.pdf

63 Government of FSM. Pohnpei Joint State Action Plan for Disaster Risk Management and Climate Change. 2017. https://bsrp.gsd.spc.int/wp-content/uploads/2017/08/JSAP-report_web-1.pdf

64 Government of FSM. Federated States of Micronesia INFRASTRUCTURE DEVELOPMENT PLAN FY2016-FY2025: Volume 6: Yap State Infrastructure Development Plan FY2016-FY2025. https://tci.gov.fm/documents/infrastructure/IDP/FSM%20IDP%20FY2016-FY2025%20-%20Yap%20State%20(version%20151202).pdf

65 Government of FSM. Yap Joint State Action Plan for Disaster Risk Management and Climate Change. 2016. http://www.yapstategov.org/uploads/2/9/6/5/29657975/fsm_yap_jsap.pdf

66 Permanent Mission of the Federated States of Micronesia to the UN. Views on the Possible Security Implications of Climate Change to be included in the report of the Secretary-General to the 64th Session of the United Nations General Assembly; Submitted pursuant to UN General Assembly Resolution A/RES/63/281 (2009). https://www.un.org/esa/dsd/resources/res_pdfs/ga-64/cc-inputs/Micronesia_CCIS.pdf

67 Government of FSM. Chuuk State Joint State Action Plan for Disaster Risk Management and Climate Change (JSAP). August 2017. https://spccfpstore1.blob.core.windows.net/digitallibrary-docs/files/f7/f76ba2b8b610481cbb71a1ae3cee24da.pdf

68 Department of Transportation, Communication and Infrastructure. Chuuk International Airport: Final Master Plan. June 2012. https://tci.gov.fm/documents/infrastructure/pmu/aip/chuuk-international-airport-master-plan-final.pdf

69 Government of FSM. Federated States of Micronesia INFRASTRUCTURE DEVELOPMENT PLAN FY2016-FY2025: Volume 4: Kosrae State Infrastructure Development Plan FY2016-FY2025. https://tci.gov.fm/documents/infrastructure/IDP/FSM%20IDP%20FY2016-FY2025%20-%20Kosrae%20State%20(version%20151202).pdf

70 Government of FSM. Kosrae State Joint State Action Plan for Disaster Risk Management and Climate Change (JSAP). 2016. https://bsrp.gsd.spc.int/wp-content/uploads/Publications/Kosrae_JSAP.pdf

71 Government of FSM. Federated States of Micronesia INFRASTRUCTURE DEVELOPMENT PLAN FY2016-FY2025: Volume 4: Kosrae State Infrastructure Development Plan FY2016-FY2025. https://tci.gov.fm/documents/infrastructure/IDP/FSM%20IDP%20FY2016-FY2025%20-%20Kosrae%20State%20(version%20151202).pdf

72 Government of FSM. Pohnpei Joint State Action Plan for Disaster Risk Management and Climate Change. 2017. https://bsrp.gsd.spc.int/wp-content/uploads/2017/08/JSAP-report_web-1.pdf

73 Department of Transportation, Communication and Infrastructure. Pohnpei International Airport: Final Master Plan. June 2012. https://tci.gov.fm/documents/infrastructure/pmu/aip/pohnpei-international-airport-master-plan-final.pdf

74 Government of FSM. Yap Joint State Action Plan for Disaster Risk Management and Climate Change. 2016. http://www.yapstategov.org/uploads/2/9/6/5/29657975/fsm_yap_jsap.pdf

75 Department of Transportation, Communication and Infrastructure. Yap International Airport: Final Master Plan. June 2012. https://tci.gov.fm/documents/infrastructure/pmu/aip/yap-international-airport-master-plan-final.pdf

76 Government of FSM. Yap Joint State Action Plan for Disaster Risk Management and Climate Change. 2016. http://www.yapstategov.org/uploads/2/9/6/5/29657975/fsm_yap_jsap.pdf

77 SPREP. FSM Climate Change and Disaster Risk Finance Assessment – 2019. https://fsm-data.sprep.org/dataset/fsm-climate-change-and-disaster-risk-finance-assessment-2019

78 Micronesia Red Cross Society. Strategic Plan 2021-2025. https://data-api.ifrc.org/documents/FM/SP_MicronesiaFederatedStatesof_2021-2025.pdf

79 IFRC. DREF Final Report Federated States of Micronesia: Typhoon Maysak. 26 February 2016. https://reliefweb.int/report/micronesia-federated-states/federated-states-micronesia-typhoon-maysak-dref-no-mdrfm001-final

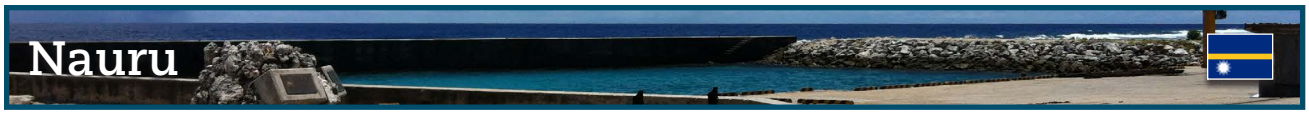
80 Micronesia Red Cross Society. Strategic Plan 2021-2025. https://data-api.ifrc.org/documents/FM/SP_MicronesiaFederatedStatesof_2021-2025.pdf

81 IFRC. Preparing for typhoon season in Micronesia. 10 Jan 2017. https://reliefweb.int/report/micronesia-federated-states/preparing-typhoon-season-micronesia

82 PIHOA. About PIHOA. https://www.pihoa.org/mission-history-strategic-plan/

Header photo by Mark Okon on unsplash.com. Moen, Chuuk, Federated States of Micronesia, Weno. https://unsplash.com/photos/green-trees-and-mountains-g18M-sEMgdNY

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Nauru lies approximately 1,300 km (800 miles) northeast of Solomon Islands. Its closest neighbor is Kiribati's Banaba islands, some 300 km (200 miles) to the east. The country sits just south of the Equator (0° 32' S) and consists of one, 21-km^2 (8.1-square miles) raised coral island where the highest point sits at just 65 m (213 feet).[1] The country's Exclusive Economic Zone (EEZ) is 310,000 km^2 (120,000 square miles).[2] Figure 33 is a map of the southwestern Pacific, showing Nauru.[3]

Settled initially by Micronesian and Polynesian seafarers circa 1000 BCE,[4] the island was largely isolated until the early 18th century CE, after which it became a key port of call for whaling vessels. Eventually, a civil war in the 1880s threatened outsiders' interests, and Germany established a protectorate over the island. German administration gave way to a League of Nations mandate after World War I, and Australia dominated the mandate administration. Japan occupied the island during World War II, but Australia would regain possession and remain the dominant power in the subsequent United Nations trust that ended with Nauruan independence in 1968.[5]



Figure 33: Nauru's Location in the Southwestern Pacific

Nauru is home to 10,800 people.[6] There are 12 Nauruan tribes based on matrilineal descent; the largest tribe has approximately 2,000 members.[7] Nearly 95% of the population are indigenous Nauruan with the remainder of the population made up of i-Kiribati, Fijians, Solomon Islanders, and some others from farther away. There are no large settlements, and people live scattered around the entire coast with a notable village on the shore of Buada Lagoon.[8] The inland areas are uninhabitable due to decades of extensive phosphate mining.[9] With the phosphate mines exhausted, Nauru applied for an won an AUS$135 million (US$90.9 million) settlement from Australia for restitution of phosphate lands so that Nauru could remove materials, scrap, and structures from the mining land and rehabilitate inland areas in hopes of restoring some traditional medicinal, agricultural, and cultural uses of those lands.[10]

A republic with a presidential system, the unicameral parliament elects the President from among members of Parliament; the President is both head of state and head of government. The President forms the cabinet by appointing other members of Parliament to ministry portfolios. Parliamentary elections occur every three years.[11]

Hazards and Climate Change

Nauru is not exposed to cyclones, nor is it especially low-lying. However, its isolation, small size, and socio-economic precarity make it vulnerable to shocks and climate change-influenced hazards, especially reductions in the rainfall regime, ocean acidification, and sea level rise. The island's climate is significantly influenced by El Niño Southern Oscillation (ENSO), and the potential impacts of climate change on ENSO are poorly understood at present.

Drought is the most common hazard that affects Nauru. In extreme cases, if desalination plants are not producing sufficient water,

water has to be brought in by boat from the Marshall Islands, Solomon Islands, and Kosrae (Federated States of Micronesia).[12] Heavy rainfall events are also common and can cause flooding and trigger vector-borne disease outbreaks as mosquitos breed in standing water after flooding. Moreover, a shift in rainfall patterns toward ever more short, infrequent, and intense events will challenge catchment systems, which may be damaged and will lack replenishment.

Nauru has a tropical climate with steady temperatures (28°C; 82°F) and winds but highly variable rainfall; the wet season runs December through April and averages 200 mm (7.9 inches) monthly while the rest of the year can see less than 100 mm (3.9 inches) of rainfall each month. Inter-annual variation appears to be closely correlated with ENSO with rainfall peaking in El Niño years and falling off in La Niña years.[13] Figure 34 charts the average monthly temperatures and rainfall for the period 1991-2020.[14] The country experiences regular, extended drought periods. Phosphate mining in the interior has left some 80% of the island uninhabitable, and run-off from degraded environments has impacts on the marine environment. The entire island is surrounded by a fringing coral reef.

Various models for how climate change will impact temperature, rainfall, and sea level around Nauru disagree, and, in part, uncertainty stems from most models' inability to deliver specific predictions for such a small geographical space. There is relatively good agreement that Nauru will see overall air temperature warming of slightly less than the global average. As of the 2020s, extreme rainfall events appear to be becoming more common, delivering some extra rainfall in short, damaging bursts. There is significant disagreement among models regarding the potential future incidence of drought as La Niña tends to drive drought in Nauru and climate change influences on ENSO are poorly understood. Moreover, there is little agreement on the potential for climate change to see cyclones impacting Nauru although there is a high potential for some cyclone-driven storm surge and winds to affect the island. So far, Nauru appears to be experiencing and will continue to experience sea level rise in line with predictions for the western Pacific.[15] Among the key issues over the long term will be extreme heat. With an already frequent experience of days reaching 31°C (87.8°F), the country can expect regular days topping 33°C (91.4°F) on top of the 80% humidity that is normal, and the impact on human health and economic productivity could be dire.[16] Table 14 summarizes the potential impacts of climate change-influenced phenomena on Nauru.[17]

Government Institutions, Policies, and Plans for Disasters and Climate Change

Nauru's policies and frameworks include

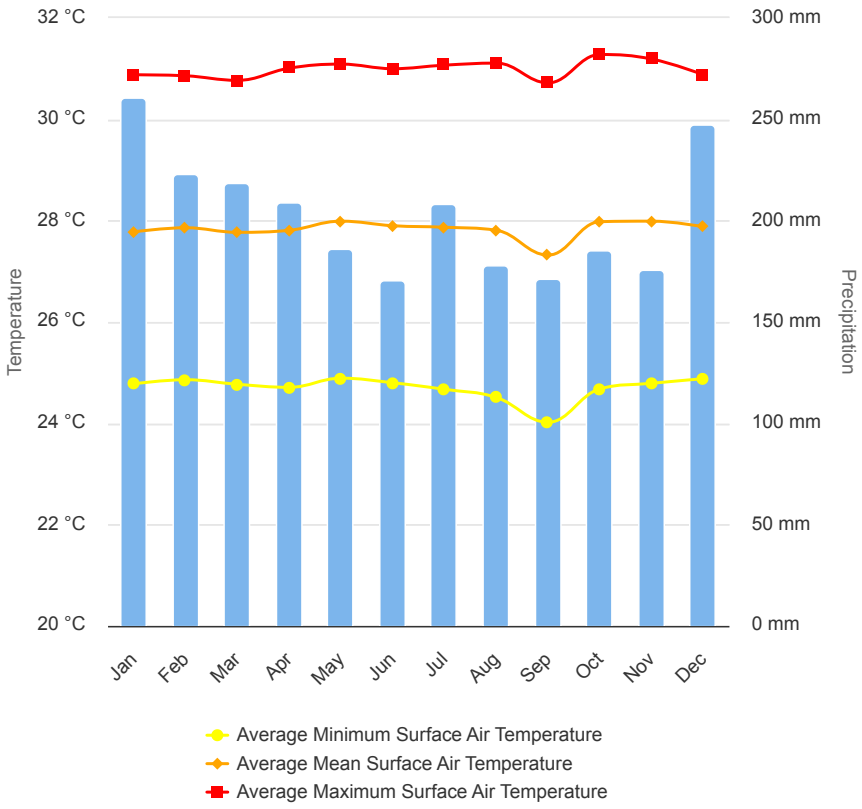


Figure 34: Average Monthly Temperature and Precipitation, Nauru (1991-2020)

Phenomenon	Trend	Projections	Impacts
Temperature	Consistent monthly and annual temperatures; average temperatures may have increased by 0.15-0.25°C (0.27-0.45°F) per decade since 1950	Annual mean and extremely high daily temperatures will continue to rise; under very high emissions scenarios, average temperature could be 0.5-1.2°C (0.9-2.16°F) higher by 2030 and 3°C (5.4°F) by 2090	Human health and agricultural productivity worsen; greater incidence of vector- and water-borne diseases
Rainfall	High inter-annual variability due to ENSO and West Pacific Monsoon variation; wet season usually runs November through April; precipitation is affected by the South Pacific and Intertropical Convergence Zones that bring thunderstorms	Mean rainfall projected to increase, along with more extreme rain events; 20-40% increase in total rainfall by 2090 under high emissions scenario	Coastal and nuisance flooding more frequently damages buildings, roads, and crops
Drought	Usually occur during La Niña phases and can last up to 36 months	Droughts projected to decline in frequency	Reduction in fresh water disrupts ecosystems
Sea Level Rise	Satellite measurements indicate a rise of 5mm (0.2 inches) per year since 1993; variation also linked to ENSO	Sea level will continue to rise; wave height and period projected to decrease in the December–March season; under very high emissions scenario, rises may reach 10-11 cm (3.9-4.3 inches) by 2030, 23-35 cm (9-13.7 inches) by 2060, and 45-97 cm (17.7-18.2 inches) by the end of the century	Coastal erosion and flooding hampers transport and coastal livelihoods

Table 14: Climate Change-Influenced Phenomena in Nauru

linkages between climate change and development and show a determination towards addressing climate risk and challenges. Nauru was one of the first countries to ratify the Paris Climate Agreement, and it committed to contributing to lowering carbon emissions levels. The main national strategy that promotes climate change action and DRR is the Revised National Sustainable Development Strategy 2019-2030. Nonetheless, there are two streams of management with disaster management activities coordinated by entities under the National Emergency Services, while climate change-related activities are implemented by the Ministry of Climate Change.

Nauru submitted its initial Nationally Determined Contribution (NDC) to the UNFCCC secretariat in 2015 and updated that submission for the period 2021-2030. It focuses on the country's land and people with an emphasis on water, food, and energy security and adds a category of "loss and damage" to address climate change impacts that exceed Nauru's adaptive capacity.[18] In January 2022, the Department of Climate Change and National Resilience and SPREP submitted a proposal to the Green Climate Fund (GCF) for support to develop the country's first National Adaptation Plan,[19] and the country's Economic Infrastructure Strategy and Investment Plan sets the direction for infrastructure investments and management from 2019 through 2024/2029 to ensure restoration and maintenance of existing infrastructure and ensure that infrastructure development meets the objectives of the Government.[20]

The National Disaster Risk Management Act (NDRMA) 2016 is the principal legislation for addressing disaster-related issues. It lays out the roles and responsibilities for mitigating, preparing for, and responding to disasters at the community level, provides procedures for effective coordination of international disaster relief assistance, and supports implementation of disaster management practices. The NDRMA Act created the National Disaster Risk Management Council (NDRMC) to implement disaster management activities and make

policy. The Disaster Risk Reduction Committee supports the NDRMC, which is chaired by the President. The Council is also responsible for providing advice to the President of the country on the announcement and termination of "State of Emergency." NDRMC comprises the National Disaster Risk Management Office (NDRMO), National Emergency Operations Centre, Rescue and Fire Services, Ambulance Services, Lifeguard Services, and Meteorology Services to provide coordination of response and recovery activities. Figure 35 shows the disaster management structure of Nauru.[21]

The Environmental Management and Climate Change Act (2020) laid out the institutions and duties for coordination of Government and public roles in relation to all environmental management and protection decision-making processes. It seeks to conserve the environment by applying principles of sustainable use and development of natural resources and promotes meaningful public and civil society involvement in relation to environmental management and protection.[22] The Act also included the establishment of the Climate Change and Environmental Protection Fund for:

- Protection and conservation of the reef and foreshore
- Preservation and protection of flora and fauna
- Prevention of coastal erosion and maintenance of high-water mark
- Food security
- Health
- Soil conservation
- Critical environmental restoration activities
- Management of sensitive and fragile ecosystems
- Protection from pollution of and removal of pollution from land, water, and air
- Other purposes consistent with the provisions of the Act and as prescribed by regulations

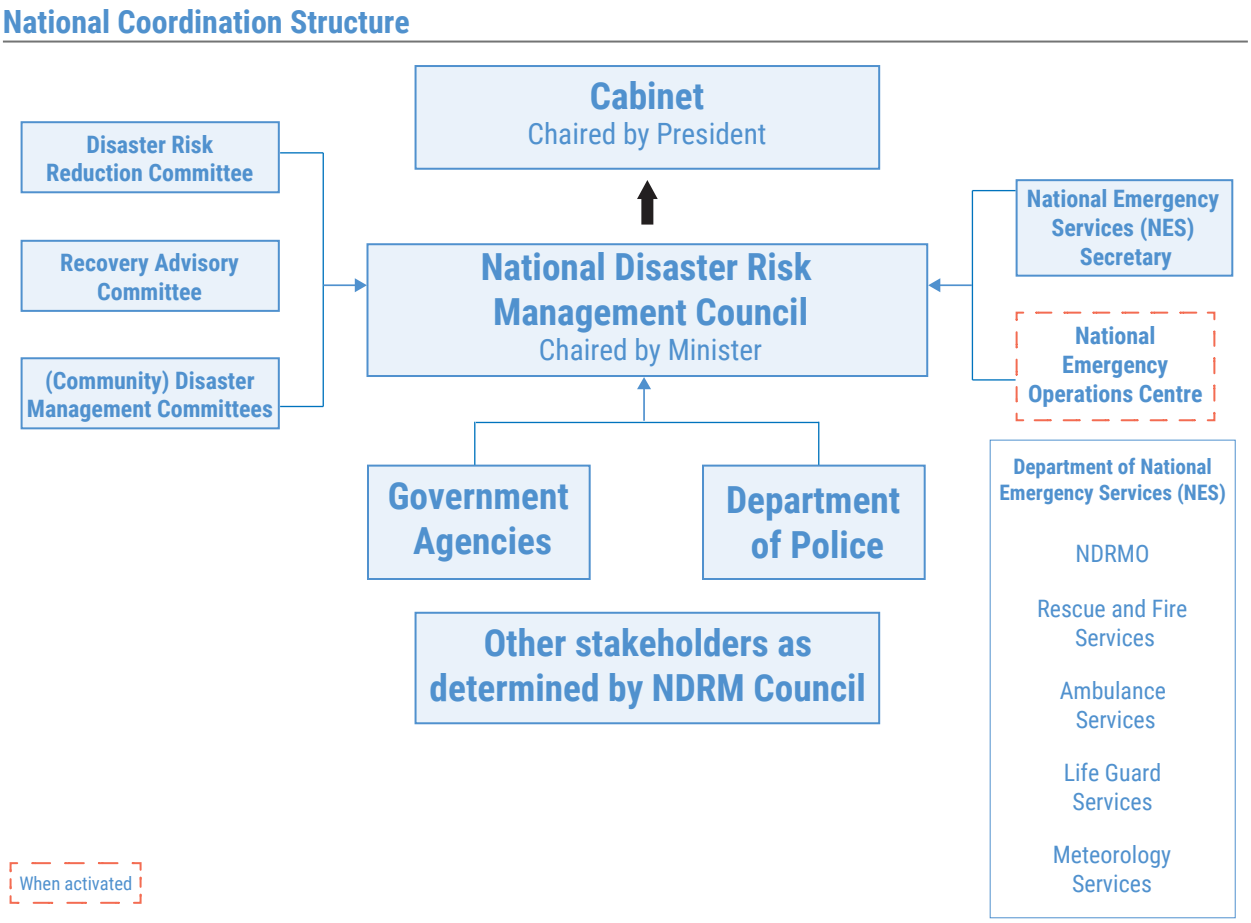


Figure 35: Nauru Disaster Management Coordination Structure

The Fund also manages grants, donations, and contributions from international organizations.[23]

This Act came at the same time as the Ministry of Climate Change was formed and the Nauru Climate Change Policy was finalized. The Policy served to bring together the Republic of Nauru Framework for Climate Change Adaptation and Disaster Risk Reduction (RONAdapt, 2015), National Sustainable Development Strategy, National Energy Policy Framework, Nauru's Energy Road Map 2018-2020, and the Nauru Integrated Environment Policy, and to describe long-term mitigation and adaptation goals and strategies. Figure 36 lays out the relationships among the overarching policy and other plans and strategies.[24]

The Department of Climate Change and National Resilience (DCCNR), under the Ministry of Climate Change, is responsible for overall Climate Change Policy implementation and for coordinating the work of stakeholders from other ministries, public utilities, community organizations, and the private sector.[25] DCCNR has four divisions: Energy, Climate Action, Water, and the Higher Ground Initiative.[26] The Climate Action division has the following specific tasks:

- Planning, policy advice, and development
- Access to climate finance
- Coordinate knowledge about climate change-related activities, so that they can be reported to higher level coordination bodies and the Cabinet, as needed
- Implement climate change-related projects in cases where they are within the mandate of DCCNR (e.g., some water actions, agriculture, disaster management)
- Compile information about ongoing climate change-related activities in Nauru and share information across government and with the community, using robust information and knowledge management processes.[27]

Although it was integrated into the Climate Change Policy, the RONAdapt still forms the backbone of climate action by laying out priorities to supports progress towards environmental sustainability by ensuring a focus on reducing vulnerabilities and risks is incorporated into national and sectoral planning.[28] RONAdapt does the following two things:

- Describe a series of CCA and DRR priority actions, a combination of specific activities "on the ground" and cross-sector actions along with policy and institutional strengthening activities. These priorities provide a basis for development partners to engage with the Government on CCA and DRR activities, and in so doing to ensure greater coherence with Nauru's own priorities.
- Provides guidance for longer-term planning by establishing a general guiding framework for considering climate and disaster risks in national and sectoral planning processes, clarifying principles upon which planning should be based, and articulating responsibilities across government for mainstreaming CCA and DRR into sectoral activities.[29]

RONAdapt also describes gender disparities, climate change and natural hazard impacts on people with disabilities and other vulnerable groups, and other socio-economic factors.[30]

Office of the President / National Emergency Services

Tel: 674 557 3133 ext. 307

Department of Climate Change and National Resilience

Government Offices, Yaren District, Republic of Nauru
Tel: 674 557 3180

Early Warning Systems

The Nauru Meteorological Service is overseen by the Ministry of National Emergency Services; it is mandated to deliver weather alerts and forecasts and provide updates to the government, media, and weather-sensitive sectors, including aviation, marine, fisheries, and agriculture.[31] When an event with disastrous potential – high tides, storm surges, etc. – does emerge, the

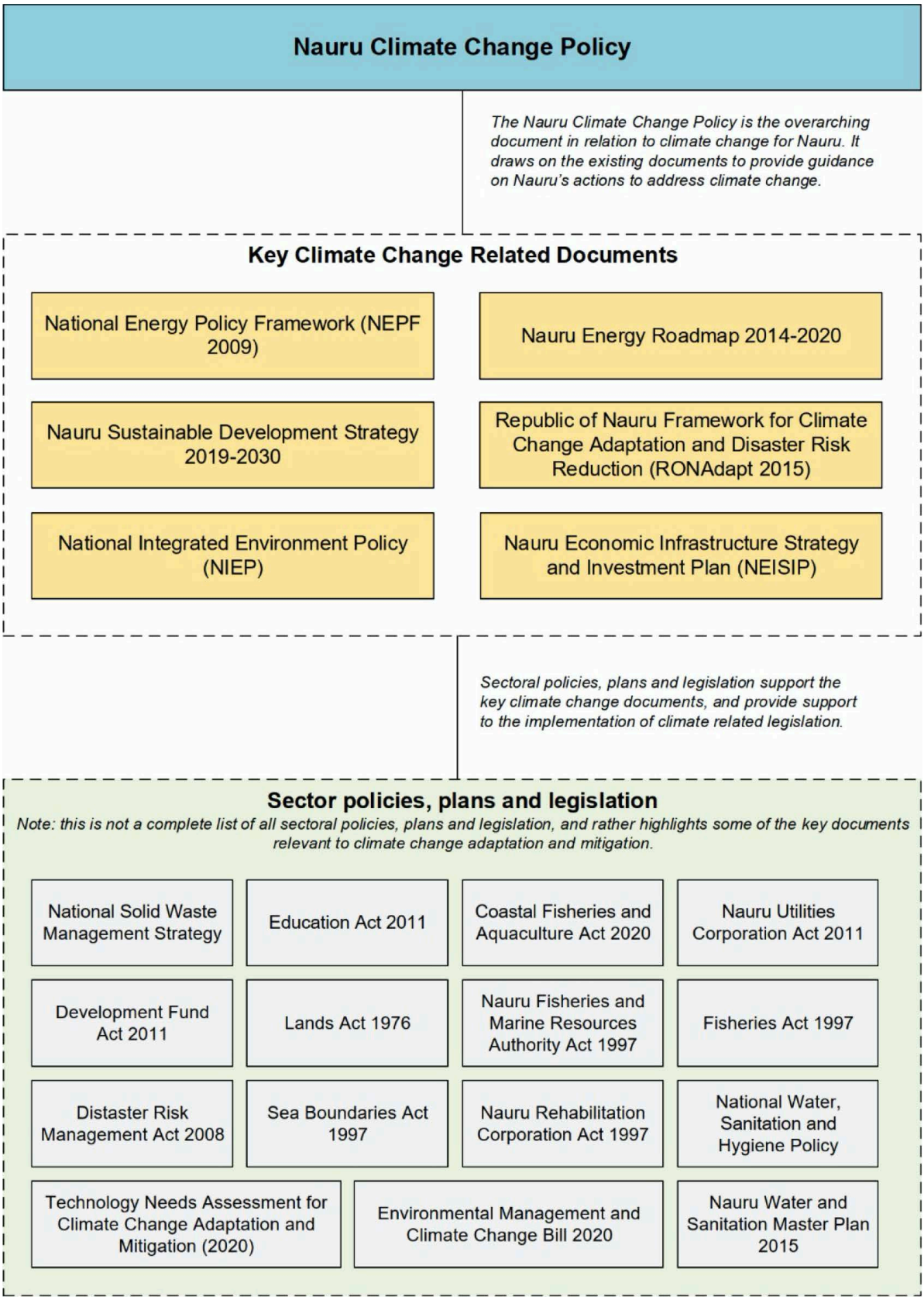


Figure 36: Relationship among Nauru's Climate Change and Sector Policies

National Emergency Services can utilize the country's mobile telephone network to send SMS/text messages to communities-at-risk.[32]

Nauru is a stakeholder in the WMO's Community-based Early Warning System Pacific Small Islands Developing States (CREWS Pacific SIDS), implemented by SPREP, and that focuses on strengthening the Regional Specialised Meteorological Centre (RSMC), located within the Fiji Meteorological Services in Nadi, Fiji. The project aims to integrate traditional knowledge into DRR and sustainable development programs to enhance the capacity of Pacific Island countries' hydro-meteorological services to predict extreme and high impact events and associated risks to alert exposed populations.[33]

Office of the National Meteorological and Hydrological Service, National Emergency Services

Yaren District
Tel: 674 557 2952

Infrastructure

There is no central government owner or manager for infrastructure. The Ministry of Finance oversees project investment proposals from the various government departments that do manage these assets.[34] An estimated 95% of goods are imported to the country via Nauru Port in the Aiwo harbor. Cargo brought in by air comes from Australia and Solomon Islands.[35]

On-island transport relies on roads. There are an estimated 24 km (15 miles) of paved road,[36] most of which make up the Island Ring that circles the country.[37] Unsealed roads generally exist in the "topside" mining areas; a May 2019 infrastructure inventory estimated that there were some 9 km (5.6 miles) of unsealed roads.[38] There is one airport, in Yaren, that is served by regional airlines.[39] The paved (asphalt) runway at INU / ANYN sits 7 m (23 feet) above sea level and is 2,150 m (7,054 feet) long and 45 m (148 feet) wide.[40]

Nauru Port is located at Latitude 00° 31.73' S and Longitude 166° 54.58' E. The port can handle vessels up to 45,000 gross weight tonnage with overall length of 170 m (558 feet).[41] General cargo unloading is conducted at sea by the transfer of individual containers by ship's gear into small barges, which are then unloaded by crane in the small harbor. Fuel imports and phosphate exports are handled at a separate facility comprising two cantilevered loading arms. A system of anchored buoys and mooring chains enables vessels to be held off the reef during transfer. In rough weather, the transfer of cargo is suspended.[42] Under an ongoing sustainability and climate resiliency project funded by GCF and Australia and backed by the Asian Development Bank, the port will see a new wharf and breakwater along with new container storage and security facilities. Additional funding from the Japan International Cooperation Agency (JICA) will see delivery of port operations equipment.[43] Work on the upgrades was continuing as of latter 2023.

The Nauru Utilities Corporation (NUC) delivers electricity and water services. It is tasked with all aspects of electricity generation, transport, distribution, and marketing, and it operates and maintains all electricity facilities and equipment. In addition, it has responsibility for acquiring, storing, treating, and distributing water as well as operating and maintaining associated facilities and equipment. NUC is state-owned[44] and serves 3,809 electricity customers and 2,055 water customers, dominated by residential connections. In its 2021 annual report, NUC reported generating a total of 38,758,708 kWh of electricity, 10% of which was generated using NUC's ground-mounted solar photovoltaic array with the remainder generated by NUC's 19MW of installed high- and medium-speed diesel generators. The same year, NUC reported producing 289.8 million liters (76.6 million gallons) of water, holding 4.5 million liters (1.2 million gallons) in storage, and delivering 247.4 million liters (65.4 million gallons) with a peak deliver rate of 1.5 million liters (400,000 gallons) per day.[45] All water is provided by rainwater catchment or desalination.[46] In 2021, NUC managed four reverse osmosis plants supplied with sea water by two pumps; plans for the new port include additional pumps. The maximum

reported daily capacity of desalination in 2021 was 2.3 million liters (608,000 gallons).[47]

Nauru Maritime Port Authority
Aiwo District, PO Box 5. Aiwo, Republic of Nauru
Email: *contact@nauruport.com*

Nauru Utilities Corporation
Aiwo District Power House Nauru
Tel: 674 5574038

Civil Society Partners

Community groups are small and tend to be limited to district councils, youth and women's groups, and church groups, any or all of which may participate in the Nauru Island Association for NGOs (NIANGO), which has, in the past, participated in climate awareness campaigns particularly by engaging women's and youth groups.[48] The Red Cross, NGOs, and civil society regularly undertake disaster risk management activities, including the provision of relief and recovery support during and after a disaster event. The National Community-Based Organisations (NCBO) elected leaders are the focal point for development partner communications.[49] However, NIANGO reports that overall consultations with communities regarding climate change projects have frequently excluded women and women's groups.[50]

EcoNauru manages and administers Global Environment Facility Small Grants Projects in the country. Established in 2016 to provide specialized guidance for community-based sustainable development and environmental projects that can be delivered through the Small Grants Program, EcoNauru has submitted projects on marine training, sustainable agriculture, and small-scale livestock production.

EcoNauru Foundation
FW66+7FF, Old Aiwo Primary, Boe, Nauru
Tel: 674 556 7997
https://econauru.org/

Nauru Island Association of Non-government Organisations (NIANGO) was established in 1992 as an umbrella organization for NGOs and other civil society and community groups. Its objectives are to provide a platform for NGO advocacy and common representation, to deliver information to members, to network with regional and international NGOs, to build links with organizations for capacity building, and to assist members in institutional strengthening.[51]

Nauru Island Association of NGOs
PO Box 443, Nauru
Tel: 674 556 8348
Email: *nauruislandngo@hotmail.com*

Nauru Community Based Organisation (NCBO) is a plenary grouping of district-level councils and organizations. The elected leaders of each district sit on the NCBO, which partners with the national government for development projects that require community buy-in and ownership.[52]

The Nauru Persons with Disability Organisation works with government agencies and other NGOs and civil society to ensure the inclusion of all Nauruans living with disabilities – male or female and regardless of age or location – in society.[53] It has organized various awareness and advocacy workshops to reach community members living with disabilities.[54]

The Nauru National Women's Council is formed to assist Nauruan women on issues of socio-economic development by providing assistance in domestic, religious, health, and financial realms.[55]

The Nauru Young Women's National Council was formed by young women (16-35 years) in 2009. It works under the Women's Affairs Office of the Ministry of Home Affairs and cooperates closely with various other community groups and government agencies, such as the Women's Affairs Office, Nauru Police Force, and the Department of Health in order to combat violence against women. It also works with the SPC gender offices to create and conduct awareness campaigns and workshops about combatting violence against women.[56]

Disclaimer: This handbook has been prepared in good faith based on resources available at the time of publication. Where possible, a link to the original electronic source is provided in the endnotes. While making every attempt to ensure the information is relevant and accurate, the CFE-DM does not guarantee or warrant the accuracy, reliability, completeness, or currency of the information herein. This information will be updated periodically, and we welcome and appreciate your feedback to improve this document and help fill any gaps to enhance its future utility. For feedback or comments, please email: **cfe.dmha.fct@pacom.mil**.

Nauru Notes

1 Foster, Sophie; Kiste, Robert, et al. Nauru. Encyclopedia Brittanica. 11 October 2023. https://www.britannica.com/place/Nauru

2 UNDRR. Disaster Risk Reduction in the Republic of Nauru: Status Report 2022. United Nations Office for Disaster Risk

Reduction, Sub-Regional Office for the Pacific. 2022. https://www.preventionweb.net/publication/disaster-risk-reduction-republic-nauru-status-report-2022

3 Encyclopedia Brittanica. Nauru. https://www.britannica.com/place/Nauru

4 CIA World Factbook. Nauru. https://www.cia.gov/the-world-factbook/countries/nauru/

5 Foster, Sophie; Kiste, Robert, et al. Nauru. Encyclopedia Brittanica. 11 October 2023. https://www.britannica.com/place/Nauru

6 BBC. Nauru Country Profile. 10 July 2023. https://www.bbc.com/news/world-asia-pacific-15433616

7 United Nations Children's Fund (UNICEF). Situation Analysis of Children in Nauru. 2017. https://www.unicef.org/pacificislands/media/1161/file/Situation-Analysis-of-Children-Nauru.pdf.%20Accessed%2014%20Mar.%202022

8 Foster, Sophie; Kiste, Robert, et al. Nauru. Encyclopedia Brittanica. 11 October 2023. https://www.britannica.com/place/Nauru

9 CIA World Factbook. Nauru. https://www.cia.gov/the-world-factbook/countries/nauru/

10 Green Climate Fund. Readiness Proposal with SPREP for the Republic of Nauru. 28 January 2022. https://www.greenclimate.fund/sites/default/files/document/nauru-sprep-nap-nru-rs-002.pdf

11 Department of Foreign Affairs and Trade. Nauru country brief. Australian Government. Accessed 3 January 2024. https://www.dfat.gov.au/geo/nauru/nauru-country-brief

12 UNDRR. Disaster Risk Reduction in the Republic of Nauru: Status Report 2022. United Nations Office for Disaster Risk

Reduction, Sub-Regional Office for the Pacific. 2022. https://www.preventionweb.net/publication/disaster-risk-reduction-republic-nauru-status-report-2022

13 World Bank Group. Climate Risk Country Profile: Nauru. 2021. https://www.preventionweb.net/publication/climate-risk-country-profile-nauru

14 World Bank Group Climate Change Knowledge Portal. Climate Data: Nauru Historical. 2021. https://climateknowledgeportal.

worldbank.org/country/nauru/climate-data-historical

15 World Bank Group. Climate Risk Country Profile: Nauru. 2021. https://www.preventionweb.net/publication/climate-risk-country-profile-nauru

16 World Bank Group. Climate Risk Country Profile: Nauru. 2021. https://www.preventionweb.net/publication/climate-risk-country-profile-nauru

17 World Bank Group. Climate Risk Country Profile: Nauru. 2021. https://www.preventionweb.net/publication/climate-risk-country-profile-nauru; UNDRR. Disaster Risk Reduction in the Republic of Nauru: Status Report 2022. United Nations Office for Disaster Risk Reduction, Sub-Regional Office for the Pacific. 2022. https://www.preventionweb.net/publication/disaster-risk-reduction-republic-nauru-status-report-2022; Pacific-Australia Climate Change Science and Adaptation Planning Program. Current and future climate of Nauru. Australian Government. 2013. https://www.pacificclimatechangescience.org/wp-content/uploads/2013/06/6_PACCSAP-Nauru-9pp_WEB.pdf

18 Republic of Nauru. Updated Nationally Determined Contribution. https://unfccc.int/sites/default/files/NDC/2022-06/Nauru%20Updated%20NDC%20pdf.pdf

19 Green Climate Fund. Readiness Proposal with SPREP for the Republic of Nauru. 28 January 2022. https://www.greenclimate.fund/sites/default/files/document/nauru-sprep-nap-nru-rs-002.pdf

20 PRIF. Nauru Economic Infrastructure Strategy and Investment Plan 2019. https://www.theprif.org/document/nauru/nauru-economic-infrastructure-strategy-and-investment-plan-2019

21 UN OCHA. Nauru Humanitarian Coordination Structure. 5 January 2023. https://reliefweb.int/report/nauru/nauru-humanitarian-coordination-structure-5-january-2023

22 UNDRR. Disaster Risk Reduction in the Republic of Nauru: Status Report 2022. United Nations Office for Disaster Risk

Reduction, Sub-Regional Office for the Pacific. 2022. https://www.preventionweb.net/publication/disaster-risk-reduction-republic-nauru-status-report-2022

23 Republic of Nauru. Updated Nationally Determined Contribution. https://unfccc.int/sites/default/files/NDC/2022-06/Nauru%20Updated%20NDC%20pdf.pdf

24 Nauru Climate Change Policy. https://nauru-data.sprep.org/system/files/Nauru%20Climate%20Change%20Policy%20%28Final%29.pdf

25 Nauru Climate Change Policy. https://nauru-data.sprep.org/system/files/Nauru%20Climate%20Change%20Policy%20%28Final%29.pdf

26 DCCNR. Homepage. https://www.climatechangenauru.nr/

27 Nauru Climate Change Policy. https://nauru-data.sprep.org/system/files/Nauru%20Climate%20Change%20Policy%20%28Final%29.pdf

28 UNDRR. Disaster Risk Reduction in the Republic of Nauru: Status Report 2022. United Nations Office for Disaster Risk

Reduction, Sub-Regional Office for the Pacific. 2022. https://www.preventionweb.net/publication/disaster-risk-reduction-republic-nauru-status-report-2022

29 Government of the Republic of Nauru. Republic of Nauru Framework for Climate Change Adaptation and Disaster Risk Reduction (RONAdapt). 2015. https://www.refworld.org/pdfid/5b3f74384.pdf

30 UNDRR. Disaster Risk Reduction in the Republic of Nauru: Status Report 2022. United Nations Office for Disaster Risk

Reduction, Sub-Regional Office for the Pacific. 2022. https://www.preventionweb.net/publication/disaster-risk-reduction-republic-nauru-status-report-2022

31 UNDRR. Disaster Risk Reduction in the Republic of Nauru: Status Report 2022. United Nations Office for Disaster Risk

Reduction, Sub-Regional Office for the Pacific. 2022. https://www.preventionweb.net/publication/disaster-risk-reduction-republic-nauru-status-report-2022

32 United Nations. Annex - 2018 ECOSOC Integration Segment: "Innovative communities: leveraging technology and innovation to build sustainable and resilient societies." 1 – 3 May 2018. https://www.un.org/ecosoc/sites/www.un.org.ecosoc/files/files/en/2018doc/2018-integration-segment-nauru.pdf

33 SPREP. Community Based Early Warning Systems introduced through CREWS project. 16 November 2020. https://www.sprep.org/news/community-based-early-warning-systems-introduced-through-crews-project

34 Government of Nauru. Nauru Integrated Infrastructure Strategic Plan. November 2019. https://www.theprif.org/sites/default/files/documents/Nauru%20NIISP%202019_0.pdf

35 Cardno Consulting. Final Report (Feasibility Report) TA-9009 NAU: Sustainability and Climate Resilience in Nauru – Project Preparatory Technical Assistance (PPTA) Consultants. Asian Development Bank. 15 December 2017. https://www.adb.org/sites/default/files/project-documents/48480/48480-001-tacr-en.pdf

36 Climate Technology Centre and Network. Technical Assistance Response Plan – Terms of Reference. https://www.ctc-n.org/system/files/response_plans/final_singed_response_plan.pdf

37 Ledesma, Dario. INFRASTRUCTURE IN NAURU IS INSUFFICIENT BUT IMPROVING. Borgen Project. 23 November 2017. https://borgenproject.org/infrastructure-in-nauru/

38 Government of Nauru. Nauru Integrated Infrastructure Strategic Plan. November 2019. https://www.theprif.org/sites/default/files/documents/Nauru%20NIISP%202019_0.pdf

39 Ledesma, Dario. INFRASTRUCTURE IN NAURU IS INSUFFICIENT BUT IMPROVING. Borgen Project. 23 November 2017. https://borgenproject.org/infrastructure-in-nauru/

40 ch-aviation. Nauru International. Accessed 4 January 2024. https://www.ch-aviation.com/portal/airports/INU

41 Port Authority of Nauru. Nauru Port Information. 1 April 2019. https://www.nauruport.com/wp-content/uploads/2019/11/NAURU-PORT-INFORMATION-2019-4-1-2.pdf

42 Cardno Consulting. Final Report (Feasibility Report) TA-9009 NAU: Sustainability and Climate Resilience in Nauru – Project Preparatory Technical Assistance (PPTA) Consultants. Asian Development Bank. 15 December 2017. https://www.adb.org/sites/default/files/project-documents/48480/48480-001-tacr-en.pdf

43 Nauru Maritime and Port Authority. Port Development Project. https://www.nauruport.com/port-nauru-information/port-development-project/

44 Nauru Utilities Corporation. Company Information. https://www.nuc.com.nr/copy-of-minister-for-utilities-stat

45 NUC. Annual Report 2021. https://www.nuc.com.nr/_files/ugd/dcd2cb_7c631ee58dbb427fa7714c39de9c972c.pdf

46 Ledesma, Dario. INFRASTRUCTURE IN NAURU IS INSUFFICIENT BUT IMPROVING. Borgen Project. 23 November 2017. https://borgenproject.org/infrastructure-in-nauru/

47 NUC. Annual Report 2021. https://www.nuc.com.nr/_files/ugd/dcd2cb_7c631ee58dbb427fa7714c39de9c972c.pdf

48 Republic of Nauru. Second National Communication to the UNFCCC. 2014. https://unfccc.int/sites/default/files/resource/Final_Nauru_SNC_Report_revised.pdf

49 UNDRR. Disaster Risk Reduction in the Republic of Nauru: Status Report 2022. United Nations Office for Disaster Risk

Reduction, Sub-Regional Office for the Pacific. 2022. https://www.preventionweb.net/publication/disaster-risk-reduction-republic-nauru-status-report-2022

50 UN Women. In Brief: Gender Equality Brief for Nauru. 2022. https://asiapacific.unwomen.org/sites/default/files/2022-12/UN_WOMEN_NAURU.pdf

51 OHCHR. Universal Periodic Review of the Republic of Nauru 2011. July 2010. https://www.ohchr.org/sites/default/files/lib-docs/HRBodies/UPR/Documents/Session10/NR/JS1_JointSubmission1_eng.pdf

52 GEF Pacific IWRM Demonstration Project: Enhancing Water Security for Nauru through Better Water Management and Reduced Contamination of Groundwater. June 2014. https://www.pacific-r2r.org/sites/default/files/2020-03/GEF-Pacific-IWRM-Final%20Report-Nauru.pdf

53 Pacific Community. Stocktake of the gender mainstreaming capacity of Pacific Island governments - Nauru. 2016. https://hrsd.spc.int/sites/default/files/2021-07/Nauru_Stocktake_Report_whole.pdf

54 Disability Rights Forum. Nauru Persons with Disability Organisation. https://disabilityrightsfund.org/grantees/nauru-persons-with-disability-organisation/

55 Universal Periodic Review of the Republic Of Nauru, 2015. 2015. https://www.upr-info.org/sites/default/files/documents/2015-10/ncw_upr23_nru_e_main.pdf

56 Nauru Young Women's National Council (NYWNC) Submission Report for UPR. 2010. https://www.ohchr.org/sites/default/files/lib-docs/HRBodies/UPR/Documents/Session10/NR/NYWNC_NauruYoungWomen%27sNationalCouncil_eng.pdf

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New Zealand

New Zealand is a country of long, mountainous islands in the southwest Pacific Ocean. The two main islands, North Island and South Island, are located between 33° and 47° south latitude, though there are also several smaller islands. The country has an estimated 17,200 km (10,688 miles) of coastline and a combined land area of around 270,000 km^2 (104,248 square miles). With a population of about 5.1 million in 2020, the country has a relatively low population density. The majority of total land use (55%) is comprised of grassland for agriculture, natural forest, and plantation forestry. Agriculture, horticulture, forestry, mining, and fishing industries play a fundamental role in the export sector and in employment.[1] Figure 37 is a map of New Zealand.[2]

According to the people of the Māori Ngāpuhi tribe of the far north, the first explorer to reach what is today New Zealand was Kupe who, some 1,000 years ago, navigated by the stars and ocean currents across the Pacific from the Polynesian homeland of "Hawaiki" and made landfall at Hokianga Harbour in Northland. Over the next few hundred years, more voyagers landed in various parts of the islands, many canoes made multiple round-trip journeys between the islands and Hawaiki. The descendants of this migration, the Māori, form iwi (tribes), which are groups of people who have a common ancestor and are associated with a certain region or area. The first European to sight the islands that today make up New Zealand was Dutch explorer Abel Tasman in 1642; he annexed the country for Holland and made first contact with Māori at the top of the South Island although Tasman never set foot on New Zealand. In 1769, Captain Cook successfully circumnavigated and mapped the country, and led two more expeditions to New Zealand. Cook was followed by whalers, sealers, and missionaries who traded extensively with the Māori whose numbers plummeted in the succeeding decades due to firearm-fueled intertribal warfare and European diseases.

In 1840, Te Tiriti o Waitangi (the Treaty of Waitangi) was signed; it is widely accepted as a constitutional document that establishes and guides the relationship between the Crown in New Zealand and Māori. For more than a



Figure 37: Map of New Zealand

century, many of the rights guaranteed to Māori in the Treaty of Waitangi were ignored. The Waitangi Tribunal of 1975 began to redress these abuses.[3]

New Zealand remains a constitutional monarchy with a parliamentary system of government. The head of state is the monarch of England who is represented by a Governor-General. The head of government is the Prime Minister who oversees the executive branch, which sets policy and makes day-to-day decisions. The government is made up of Ministers of the Crown and supporting government agencies. The Prime Minister generally is the leader of the party in the legislature with the greatest number of votes, and the electoral system generally means that the largest party must recruit smaller parties to form a coalition government. Ministers must be elected members of the House of Representatives, which is the national legislature with oversight powers over the executive.[4] At the local level, city, district, and regional councils are governed by representatives elected by the community. They have planning and spending responsibility for roads, water and wastewater, local planning, property issues, environmental protection, and other topics.[5]

Hazards and Climate Change

New Zealand faces many natural hazards, including earthquakes, floods, landslides, tsunami, volcanic activity, and severe weather including storms.

There are frequent earthquakes in most parts of the country, as New Zealand straddles the boundary of the Pacific and Australian tectonic plates. While quakes happening daily are usually too weak, too deep, or too far offshore to be noticed, a strong, damaging, earthquake can happen at any time and can be followed by strong aftershocks.[6]

Floods are New Zealand's number one hazard in terms of frequency, losses, and declared civil defense emergencies. Floods are usually caused by heavy or prolonged rainfall but can also occur due to landslides triggered by heavy rainfall or earthquakes, failure of dams, high sea levels at river mouths, coastal storm inundation, and tsunami. River flooding occurs when rivers overflow their banks into the floodplain, typically during heavy rain. Surface flooding happens when heavy rain falls faster than it can drain away, usually either in a small area or in an urban area, where numerous hard surfaces prevent rainwater from soaking into the ground. Surface flooding does not usually last very long but can occur very rapidly. Groundwater flooding occurs when periods of unusually high rainfall cause water to rise out of the ground, as the water table rises. Groundwater flooding can bubble up outside and start flowing along the surface and can also rise up directly into homes. Flooding from storm surges happen when a storm's high winds push water onshore, an occurrence most common along the coast but possible at large lakes.[7]

Storms pose a significant risk for New Zealand as they occur frequently, often bringing floods, and can lead to deaths, injuries, and damaged buildings and infrastructure, including transport, power, telephone lines, gas, sewerage, and internet networks. Storms and floods are becoming a more frequent occurrence due to the effects of climate change.[8] Cyclone Gabrielle struck in February 2023 and killed at least 11 people, displaced around 10,000 people,[9] and caused billions of dollars in damages.[10] It was the worst storm to hit the country this century and only the third time in New Zealand's history that a national state of emergency had been declared.[11]

New Zealand also has a zone of volcanic and geothermal activity in the central North Island. Volcanic hazards can include ashfall, gases, lahars, ballistics, lava flows, pyroclastic flows, and debris avalanches. Most volcanism in the last 1.6 million years has occurred in the Taupō Volcanic Zone which extends from Whakaari/White Island to Ruapehu. Whakaari/White Island is New Zealand's most active cone volcano, located 48 km (30 miles) offshore. It erupted in December 2019 when 47 people were touring the uninhabited island and resulted in the deaths of 22 people and injuries to numerous others.[12] Raoul Island is the northernmost Kermadec

island, around 1,000 km (620 miles) north-north-east of New Zealand; it is one of its most explosive and potentially destructive volcanoes, recently erupting in 2006. The Auckland Volcanic Field has 53 volcanic centers scattered across the country's largest city, though many of Auckland's existing volcanoes are unlikely to become active again. The Okataina Volcanic Centre extends from Lake Rotoma in the north to Waiotapu in the south, and includes Tarawera, which last erupted in 1886. Lake Taupō is a large caldera volcano, which last erupted about 1,800 years ago. Taranaki, which last erupted about 150 years ago, is the country's largest mainland volcanic cone by volume and the second highest peak (2,518 m; 8,261 feet) in the North Island after Ruapehu. Tongariro is a massive complex of volcanic cones and craters, with its largest, youngest, and most active cone being Ngauruhoe, which last erupted in 1975. Ruapehu stands at 2797 m (9,177 feet) as the highest mountain in the North Island, and is the largest active volcano in New Zealand, last erupting in 2007.[13]

The climate of New Zealand varies widely with latitude and elevation. Areas of the north are sub-tropical while the far south is temperate with alpine conditions in mountain areas. Moreover, areas west of mountain ranges tend to be significantly wetter than areas east of those mountains. Most areas receive 600-1600 mm (23.6-63 inches) of rainfall throughout the year, and summers tend to be drier periods except in some southern areas. Mean annual temperatures range from 10°C (50°F) in the south to 16°C (61°F) in the north; the coldest month is usually July and the warmest month is usually January or February, but there are generally only small variations between summer and winter temperatures.[14] Figure 38 graphs the monthly average minimum, mean, and maximum air temperatures and precipitation for the period 1991-2020 for New Zealand.[15]

New Zealand is already experiencing impacts of climate change and is vulnerable to additional impacts. The Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report found that New Zealand land areas have warmed and that as temperatures continue to rise the country will experience differing weather extremes – i.e., flooding in western and southern areas and drought in eastern and northern areas. Sea level rise is expected to place public and private property at risk of more frequent and extreme flooding and erosion.[16] Many of New Zealand's cities and housing areas are in coastal areas. One in seven New Zealanders, or 675,000 people, live in areas already prone to flooding, exposing additional residential buildings to risk.[17] Table 15 details some of the phenomena that climate change will influence and how these phenomena will impact New Zealand.[18]

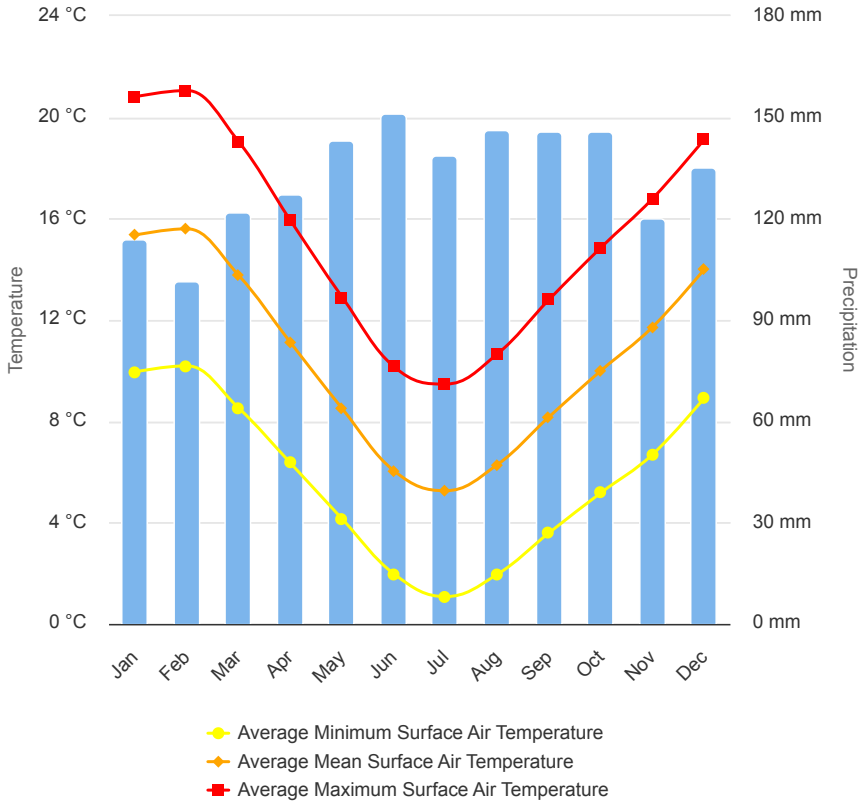


Figure 38: Monthly Average Temperatures and Precipitation, New Zealand (1991-2020)

Phenomenon	Trend	Projections	Impacts
Temperature	Warming of +1.1°C (1.98°F) from 1910 to 2020; the five warmest years on record have been 2016 (+0.8°C/1.4°F), 2018 and 1998 (+0.8°C/1.4°F), 1999 (+0.7°C/1.26°F), and 2013 (+0.7°C/1.26°F) (with temperatures relative to the 1981-2010 average as a baseline)	More extreme temperatures across eastern and northern areas; higher elevations to see greatest rise; with high emissions scenarios, an average rise of 1.0°C (1.8°F) is expected by 2040 and of 3.0°C (5.4°F) by 2090	More frequent drought and fire weather; human health and agricultural productivity suffers under heat stress
Precipitation	Annual rainfall patterns have already changed; decrease of 4.3% per decade in Whangārei, and 3.2% per decade in Tauranga, relative to the average for 1960-2019; increase of 2.8% per decade in Whanganui, 2.1% per decade in Milford Sound, and 1.3% per decade in Hokitika, also relative to 1960-2019 averages	Increases across western and southern areas; less consistency with more frequent extreme events; 5% increase in dry days on average by 2090 under high emissions scenarios	Drought-prone areas see more intense and prolonged drought; flooding-prone areas experience more frequent floods; water sources and infrastructure damaged
Sea level	Between 1961 and 2018, a mean rate of sea level rise of 2.44 mm (0.1 inches) per year, a rate more than double the mean rate of 1.22 mm (0.05 inches) per year between the start of records and 1960	Continued but variable rise	Destruction of coastal infrastructure, buildings, and cultural assets

Table 15: Climate Change-Influenced Phenomena and Potential Impacts, New Zealand

Government Institutions, Policies, and Plans for Disasters and Climate Change

Domestic

The National Emergency Management Agency (NEMA) is New Zealand's government lead for emergency management. NEMA is an autonomous departmental agency, hosted by the Department of the Prime Minister and Cabinet. It works with central and local government, communities, iwi (indigenous Māori tribes), and business to make for more effective and integrated emergency responses and recoveries. Depending on the emergency, the agency leads or supports the response and recovery. NEMA was established on 1 December 2019, replacing the Ministry of Civil Defence and Emergency Management as part of the Government's response to a Ministerial review into better responses to natural disasters and other emergencies, commissioned after the November 2016 earthquake and tsunami and the 2017 Port Hills fire. NEMA has greater autonomy than its predecessor and has been given an important stewardship role requiring it to lead and coordinate across the emergency management system, including central and local government, for all hazards and all risks.[19] Figure 39 shows a high-level organization chart dated 7 October 2022 for NEMA.[20]

At the local level, local civil defense groups and authorities are responsible for emergency management in their area. There are local Civil Defense Emergency Management (CDEM) Groups for Northland; Auckland; Waikato; Bay of Plenty; Tairāwhiti, or Gisborne district; Taranaki; Manawatū-Whanganui; Hawke's Bay; the nine Wellington councils, which are coordinated by the Wellington Region Emergency Management Office; Nelson-Tasman; Marlborough; West Coast; Canterbury; Otago; all the Southland councils, which are in partnership with Emergency Management Southland; and the Chatham Islands Council.[21]

The New Zealand Emergency Management Assistance Team (EMAT) is a deployable capability that was established following recommendations to create a 'fly-in team' to

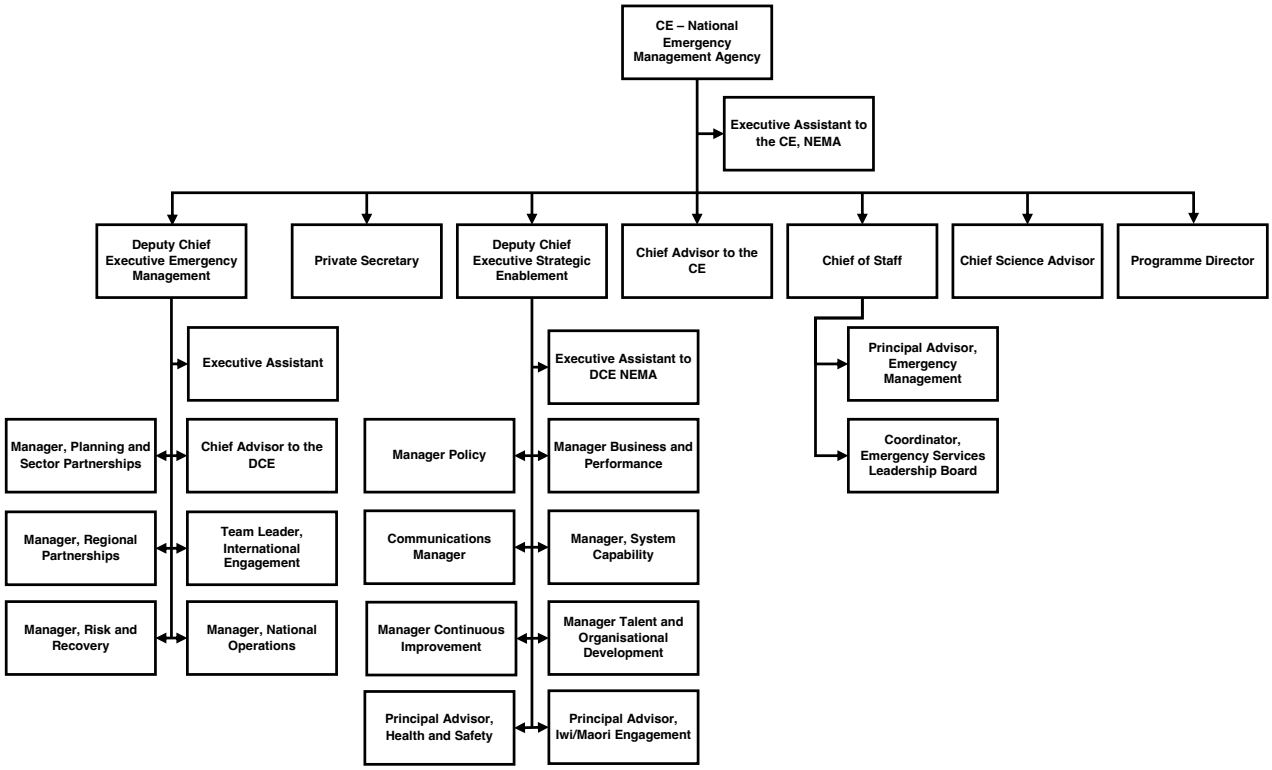


Figure 39: NEMA Organization Chart, 7 OCT 2022

enhance responses to natural disasters and other emergencies. The purpose of EMAT is to provide specialist capability enhancement to assist and support affected regions and their Incident Management Teams to manage an emergency. EMAT consists of 46 specialist Emergency Managers with a mix of skills and experience who are able to deploy where required without delay and operate self-sufficiently during deployment. EMAT members work with and support local, regional, or national teams as they manage emergencies.

The EMAT or Deployable Coordination Centre is deployed by the NEMA Duty Manager, NEMA National Coordination Centre Controller, or National Crisis Management Centre National Controller, depending on the level of NEMA activation. A request for EMAT deployment made by a local CDEM Group is done via the Regional Emergency Management Advisor before the formal request is provided to the NEMA Duty Manager. Other Lead Agencies can request deployment directly to the NEMA Duty Manager.[22]

Overseas

Disaster response and other humanitarian aid provided outside of New Zealand is managed by the Ministry of Foreign Affairs and Trade (MFAT). The country focuses most of its direct foreign humanitarian assistance toward Pacific islands countries and Southeast Asia. Indirectly, New Zealand also provides humanitarian aid to other parts of the world by supporting the efforts of other international humanitarian responders including other donors, the United Nations, the International Red Cross and Red Crescent Movement, and international NGOs. New Zealand's foreign disaster relief includes supplies, medical assistance, Urban Search and Rescue, other technical or logistical assistance, or funding.[23]

Under the FRANZ Arrangement signed on 22 December 1992, France, Australia, and New Zealand agree to coordinate disaster reconnaissance and relief assistance in the Pacific when requested by partner countries. FRANZ is a civilian-led arrangement supported by defense forces. New Zealand's FRANZ lead,

MFAT, coordinates through the respective High Commission or Embassy in the affected country with France's FRANZ lead, the French Ministry of Foreign Affairs and International Development, and Australia's FRANZ lead, the Department of Foreign Affairs and Trade, when coordinating international disaster response in support of Pacific Island countries. The FRANZ signatories, respecting the sovereignty and lead role of affected countries in disaster response, coordinate closely with the affected countries and the Pacific Humanitarian Team, including humanitarian and development partners from the UN, the Red Cross movement, NGOs, and civil society organizations.[24]

New Zealand's humanitarian action is underpinned by the humanitarian principles of humanity, impartiality, neutrality, and independence, as stated in their Humanitarian and Disaster Management Four Year Plan. New Zealand's international humanitarian strategic goals, followed by key indicators of progress and intended outcomes, are:

- GOAL 1: Partner governments and other humanitarian actors in the Pacific lead effective and inclusive humanitarian responses
  Key indicators of progress:
  - Number of humanitarian preparedness interventions in the Pacific
  - Percentage of the total humanitarian allocation spent on humanitarian preparedness activities
  - Percentage of the total spend on humanitarian preparedness activities which is targeted to inclusion

  Intended Outcomes:
  - Partner governments are better prepared to respond effectively to disasters in the Pacific
  - Partner governments and key humanitarian organizations in the Pacific embedding inclusion policies and practices in their response management systems
  - New Zealand supports Pacific partner governments to improve disaster risk management systems and information covering disaster preparedness, rapid response and recovery
  - New Zealand's humanitarian preparedness investments support effective, locally led, and inclusive humanitarian action in the Pacific

- GOAL 2: Crisis affected countries and communities are accessing the assistance and protection they need
  Key indicators of progress:
  - New Zealand's All of Government responses are well coordinated, effective and efficient (as assessed by relevant response partners, Posts and Bilateral teams)
  - Number of responses launched within mandated timeframes
  - Number of humanitarian crises responded to in the Pacific
  - Number of humanitarian crises responded to in the rest of the world
  - Number of people reached through New Zealand Disaster Response Partnership Activities

  Intended Outcomes:
  - New Zealand's response capabilities are trusted by partner governments, remain fit-for-purpose, well-coordinated, and deployed within mandated timeframes
  - New Zealand's humanitarian responses are timely, well-coordinated, empower local actors and targeted to the essential needs of affected populations
  - New Zealand's offshore humanitarian capabilities are maintained to the highest standard and remain ready to provide timely and effective assistance
  - Aotearoa New Zealand provides efficient, relevant, and partner-led humanitarian assistance when responding to disasters in the Pacific
  - The New Zealand Disaster Response

Partnership provides targeted, effective, and timely community-level response and early recovery support
    - New Zealand responds to global humanitarian crises with timely and flexible funding to multilateral partners

- GOAL 3: New Zealand's humanitarian advocacy promotes a principled, effective, efficient, and inclusive humanitarian system
  Key indicators of progress:
    - Number of humanitarian resolutions Aotearoa New Zealand has engaged on
    - The extent of New Zealand's engagement with international humanitarian partners and fora (evidenced by way of qualitative data presentation)

  Intended Outcomes:
    - New Zealand is a valued and influential humanitarian voice that advocates for Pacific priorities, an effective and innovative humanitarian system, and principles-driven humanitarian action
    - New Zealand has advocated for effective and principled humanitarian action in line with Grand Bargain and other international commitments[25]

The Ministry of the Environment is the government lead on advice, regulation, and international partnerships on the climate. It has oversight over the national Climate Change Commission and the Environmental Protection Agency.[26] The Climate Change Commission advises the government based on research and monitors the country's progress on climate change goals.[27] New Zealand's Nationally Determined Contributions (NDC) was updated with the UNFCCC secretariat on 31 October 2021. It set a headline target of a 50% reduction of net emissions below gross 2005 level by 2030. The NDC target is economy-wide, covering all sectors and all greenhouse gases.[28] The government declared a climate change emergency in 2020, joining 32 other countries at the time who had formally acknowledged the global crisis.[29] In August 2022, New Zealand released its National Adaptation Plan for climate change, covering a six-year period through 2028.[30] The plan set out four priorities for action: 1) Enabling better risk-informed decisions, 2) Ensuring our planning and infrastructure investment decisions drive climate-resilient development in the right locations, 3) Adaptation options including managed retreat, and 4) Embedding climate resilience in all government strategies and policies. The plan aims targeted action across the five outcome areas of the natural environment; homes, buildings, and places; infrastructure; communities; and the economy and financial system.[31]

National Emergency Management Agency
147 Lambton Quay, PO Box 5010, Wellington 6140
Tel: 04 830 5100
Email: *emergency.management@nema.govt.nz*
https://www.civildefence.govt.nz/

Climate Change Commission
Level 21, 1 Willis Street, Wellington 6011
Email: *enquiries@climatecommission.govt.nz*
https://www.climatecommission.govt.nz/

Early Warning Systems

NEMA is responsible for providing national warnings and alerts about natural hazards to local CDEM Groups, central government authorities, local authorities, emergency services, lifeline utilities, and broadcasters, the last of which includes a formal agreement with national broadcast media. NEMA uses the National Warning System, an online tool, to issue hazard alerts and warnings that are picked up by other agencies and relayed through a variety of channels. CDEM uses multiple channels to send warnings and alerts before and during emergencies, including radio, television, websites, social media, apps, and sirens.[32]

Emergency mobile alerts are broadcast to all capable phones from targeted cell towers for areas affected by serious hazards, which can include tsunami, wildfire, armed offenders at large, and seriously contaminated drinking water. These alerts can only be sent by authorized

emergency agencies – New Zealand Police, Fire and Emergency New Zealand, Ministry of Health, Ministry for Primary Industries, NEMA, and Local CDEM Groups.[33]

NEMA operates a Monitoring, Alerting, and Reporting (MAR) Centre that is staffed 24 hours per day, seven days per week. During emergencies, the center provides situational awareness so that NEMA or other agencies can respond and alerts the public about threats to life or property. When facing earthquake, tsunami, or volcanic activity events, the center works closely with GNS Science's (formerly known as the Institute of Geological and Nuclear Sciences Limited)[34] National Geohazards Monitoring Centre, which monitors and measures seismic and other activity to produce assessments which are fed through to the MAR Centre. Monitoring of ocean pressure changes is done via strategically placed Deep-ocean Assessment and Reporting of Tsunami (DART) stations, depicted in Figure 40.[35]

DART buoys detect tsunami threats by measuring associated changes in water pressure via sea floor sensors and are capable of measuring sea level changes of less than a millimeter in the deep ocean. DART buoys alerting New Zealand play a critical role in detecting earthquakes originating from the Kermadec trench.[36]

The MAR Centre also works closely with the Meteorological Service of New Zealand (MetService) on severe weather events and with Fire and Emergency, who provide an emergency messaging back up.

Volcano risk and status information are officially conveyed through Volcano Activity Bulletins, which are issued as needed to summarize volcano status and recent events, and can indicate if activity is increasing, decreasing, or in a steady state. Bulletins include information on the Volcanic Alert Level, with six levels used to describe the current status of each active volcano. Level 0 indicates no volcanic unrest, 1 is minor volcanic unrest, 2 is moderate to heightened volcanic unrest, 3 is minor volcanic eruption, 4 is moderate volcanic eruption, 5 is major volcanic eruption.[37]

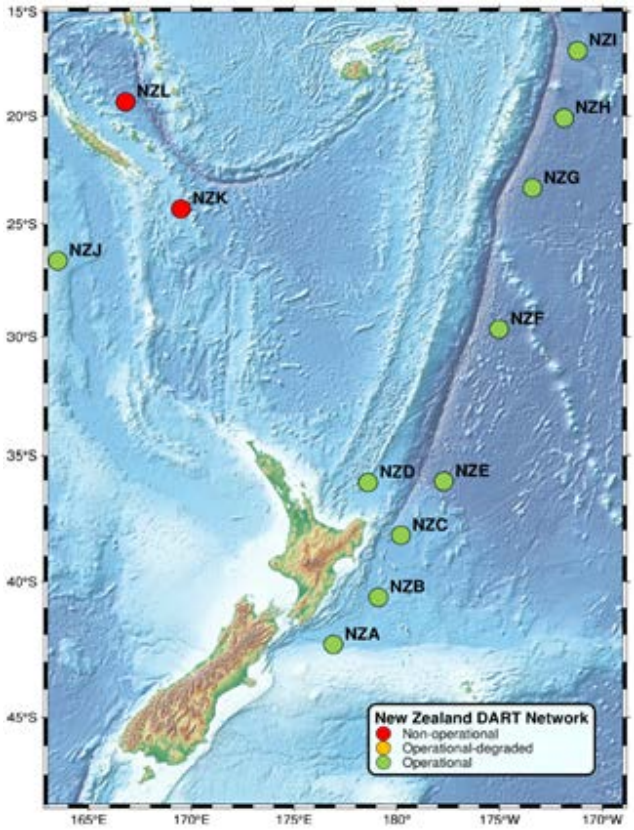


Figure 40: New Zealand DART Network, 19 JAN 2023

New Zealand does not have an earthquake early warning system like other quake-prone countries such as Japan, Mexico, and parts of the U.S., although a 2020 study indicated that 97% of the public would find it at least somewhat useful.[38] In April 2021, New Zealand got access to a Google trial of earthquake alerts for Android smartphones using the phones' built-in accelerometers.[39] Some Android phone users reported receiving an alert several seconds before the magnitude-5.3 earthquake that struck on 12 October 2021. The system is separate from the NEMA system.[40] Earthquakes cannot be predicted, thus any earthquake warning system could only alert the public several seconds or possibly up to a minute before they feel shaking, depending on their distance from the epicenter and the type of seismic activity.[41]

Monitoring, Alerting, and Reporting (MAR) Centre

NEMA Offices, TSB House on Lambton Quay in Wellington

Meteorological Service of New Zealand
Seabridge House, Level 2, 110 Featherston Street, Wellington 6012
Tel: 64 4 4700 700
Email: *metcomms@metservice.com*
https://www.metservice.com/

Infrastructure

The Ministry of Transport is responsible for overall policy and advising ministers on performance of the transport system. It monitors Waka Kotahi – the New Zealand Transport Agency, the Civil Aviation Authority, Maritime New Zealand, and the Transport Accident Investigation Commission. Three state-owned enterprises own and operate segments of the transport infrastructure, including fleets; they are KiwiRail, Airways, and MetService. Local councils are responsible for funding, planning, regulating, and delivering transport infrastructure at the local level. They contribute to Regional Land Transport Plans, which are approved by regional councils and which Waka Kotahi considers when preparing the national plan. Airports are mixed in terms of ownership between town councils and the Crown. Beyond these responsible agents, most operations and planning for services are done by the private sector.

Road transport accounts for more than 80% of passenger travel and 93% of cargo for movement within the country. Rail accounts for much of the remainder of freight with some coastal shipping for bulk freight. For external trade and travel, seaports account for more than 80% of trade while air accounts for nearly all passenger movement. The Port of Tauranga handles the greatest single amount of cargo, followed by Auckland airport.

New Zealand has approximately 10,855 km (6,745 miles) of state highways and 84,150 km (52,288 miles) of local roads. The rail network measures 3,700 km (2,300 miles) from Northland to Southland and is connected across Cook Strait by rail ferry, operated by KiwiRail. There are spurs to Northland, Bay of Plenty, Taranaki, Hawke's Bay, and the West Coast. The rail network has 1,344 bridges and 1,500 public road level crossings, and includes overhead power supply, signals, and platforms. Local governments are responsible for light, metro-rail.

The country has 35 airports, eight of which serve international flights.

There are 13 cargo ports; 10 ports handle both containers and bulk, and the other three handle only bulk. In order of gross tonnage of cargo handled, the ports are Tauranga, Northport, Auckland, Lyttleton, Taranaki, Napier, South Port, Centreport, Eastland, Otago, Primeport, Nelson, and Marlborough. The ports at Westport, Greymouth, Whanganui, Stewart Island, and the Chatham Islands handle domestic freight only.[42]

The World Bank notes that 100% of New Zealanders have access to electricity. About 40% of primary energy was supplied by renewable resources in 2019, and for electricity, 82% was generated from renewable sources in 2019. Hydro-power is a key resource. The electricity sector is dominated by five major owners of generation and retailing assets, and there are numerous smaller generation businesses and more than 40 retail electricity businesses operating across the country. Generation assets are largely owned by Contact Energy (21%), Genesis (15%), Mercury (13%), Meridien (31%), and TrustPower (8%). There is one owner of transmission assets (the national grid); Transpower is state-owned and regulated by the Commerce Commission and Electricity Authority. There are 29 electricity distribution businesses, often owned by consumer or community trusts or local bodies. All are regulated by the Commerce Commission and Electricity Authority. The North and South Island transmission systems are connected by a high voltage direct current cable from Benmore in South Canterbury, across the Cook Strait, to Haywards just north of Wellington City.[43]

The Department of Health has registered nearly 500 drinking-water suppliers serving populations of more than 100 people. Collectively these suppliers provide the drinking water for more than 4 million people while nearly 1 million New Zealanders receive

drinking from rainwater catchment or boreholes. There are upwards of 350 water treatment plants, 44,500 km (27,650 miles) of pipes, and 800 pump stations. There are 321 wastewater treatment plants, all owned and operated by local councils.[44]

Ministry of Transport
3 Queens Wharf, Wellington 6011
Tel: 64 4 439 9000
Email: *info@transport.govt.nz*

Department of Health
133 Molesworth Street, Thorndon, Wellington 6011
Tel: 0800 400 569
Email: *info@health.govt.nz*

Civil Society Partners

The New Zealand Red Cross, or Rīpeka Whero Aotearoa, is a humanitarian network of more than 10,000 members, volunteers and staff that works both in New Zealand and overseas. First established in 1915 as the New Zealand Branch of the British Red Cross, in 1931 the New Zealand Red Cross became an independent national society and in 1932 was officially recognized by the Government.[45] Domestically, its work is focused on preparing for and responding to disasters and emergencies, supporting refugees as they rebuild their lives, and providing community services such as delivering Meals on Wheels. It also offers First Aid training and runs 50 Red Cross Shops, both of which help fund its humanitarian work. There are 20 Disaster Welfare and Support Teams (DWST) around the country, comprised of around 300 trained volunteers. Teams may be called up during a disaster to support the response in partnership with other agencies. DWSTs assess what is needed, help provide shelter and other basic needs, and may assist in a Civil Defence Centre. The national society helps former refugees settle into New Zealand through Pathways to Settlement, a program that operates in eight towns and cities to help people set up homes, connect with their community, and navigate life in New Zealand.[46] Overseas, the New Zealand Red Cross deploys international delegates to work in humanitarian and development roles. The organization often supports disaster relief in the Pacific by sending relief items, providing personnel with expertise, and through raising funds. They work with 12 Red Cross National Societies across the Pacific to train emergency response teams in first aid, disaster preparedness and communications technology. MFAT has an ongoing partnership with the New Zealand Red Cross for foreign humanitarian assistance.

New Zealand Red Cross
69 Molesworth Street, Thorndon, Wellington 6011
Tel: 0800 733 27677
https://www.redcross.org.nz/

MFAT also has an ongoing partnership with the Council for International Development (CID), including its Humanitarian Network, for providing humanitarian assistance overseas.[47] The CID, formed in 1985, is the national umbrella agency for New Zealand organizations working in international development. CID represents over 85 organizations, from small community-based organizations to international NGOs, business, academic institutions, research organizations, consultants, and social enterprises. CID works to strengthen the network among NGOs, ensure professional standards, promote learning, and influence policymakers.[48]

Council for International Development
Level 2, 50 The Terrace, Wellington 6011
Email: *office@cid.org.nz*

Domestically focused civil society organizations include residents' groups, associations, or councils. They are usually focused on community and neighborhood matters, to include community governance. Many such organizations can be found in the National Residents' Associations Database, which lists over 1,000 groups.[49]

Disclaimer: This handbook has been prepared in good faith based on resources available at the time of publication. Where possible, a link to the original electronic source is provided in the endnotes. While making every attempt to ensure the information is relevant and accurate, the CFE-DM does not guarantee or warrant the accuracy, reliability, completeness, or currency of the information herein. This information will be updated periodically, and we welcome and appreciate your feedback to improve this document and help fill any gaps to enhance its future utility. For feedback or comments, please email: **cfe.dmha.fct@pacom.mil**.

New Zealand Notes

1 World Bank Group. New Zealand – Country Summary, Climate Change Knowledge Portal. https://climateknowledgeportal.worldbank.org/country/new-zealand

2 CIA World Factbook. New Zealand – Map Details. https://www.cia.gov/the-world-factbook/countries/new-zealand/map

3 100% Pure New Zealand. History. https://www.newzealand.com/int/history/

4 New Zealand Government. How government works. https://www.govt.nz/browse/engaging-with-government/government-in-new-zealand/

5 Local Government New Zealand. Local Government Explained. https://www.lgnz.co.nz/local-government-in-nz/local-government-explained/

6 NEMA. Get Ready — Earthquakes. https://getready.govt.nz/en/emergency/earthquakes/

7 NEMA. Floods. https://getready.govt.nz/en/emergency/floods/

8 Government of New Zealand. Natural Hazards Portal: Storms and floods, https://www.naturalhazardsportal.govt.nz/s/natural-hazard-risk/about-natural-hazard-risk/storms-and-floods

9 Fouché, Alexandra. Cyclone Gabrielle: Thousands yet to be contacted after New Zealand storm, BBC, 17 February 2023. https://www.bbc.com/news/world-asia-64674195

10 Tandon, Ayesha. Heavy rainfall from New Zealand's Cyclone Gabrielle 'more common on warmer planet', Carbon Brief, 14 March 2023. https://www.carbonbrief.org/heavy-rainfall-from-new-zealands-cyclone-gabrielle-more-common-on-warmer-planet/

11 McClure, Tess. Cyclone Gabrielle worst storm to hit New Zealand this century, says PM, The Guardian, 14 February 2023. https://www.theguardian.com/world/2023/feb/13/cyclone-gabrielle-new-zealand-declares-national-state-of-emergency

12 Encyclopedia Britannica. White Island volcanic eruption of 2019, 1 September 2023. https://www.britannica.com/event/White-Island-volcanic-eruption-of-2019

13 GNS Science. New Zealand's volcanoes. https://www.gns.cri.nz/our-science/natural-hazards-and-risks/volcanoes/new-zealands-volcanoes/

14 NIWA. Overview of New Zealand's Climate. https://niwa.co.nz/education-and-training/schools/resources/climate/overview

15 World Bank Climate Change Knowledge Portal. New Zealand – Climatology. https://climateknowledgeportal.worldbank.org/country/new-zealand/climate-data-historical#:~:text=New%20Zealand%20has%20climate%20zones,systems%20as%20they%20sweep%20eastward.

16 Corlett, Eva. A land divided by climate extremes: what the IPCC report says about New Zealand, The Guardian, 9 August 2021. https://www.theguardian.com/world/2021/aug/10/a-land-divided-by-extremes-what-the-ipcc-report-says-about-new-zealand-climate-change

17 McClure, Tess. New Zealand unveils plan to tackle climate crisis by adapting cities to survive rising seas, The Guardian, 27 April 2022. https://www.theguardian.com/world/2022/apr/27/new-zealand-unveils-plan-to-tackle-climate-crisis-by-adapting-cities-to-survive-rising-seas

18 Ministry for the Environment. Our atmosphere and climate 2020: Chapter 3 – Changes in our climate and environment are being observed. Government of New Zealand. 2020. https://environment.govt.nz/publications/our-atmosphere-and-climate-2020/chapter-3-changes-in-our-climate-and-environment-are-being-observed/; Ministry for the Environment. National Climate Change Risk Assessment for Aotearoa New Zealand: Main report – Arotakenga Tūraru mō te Huringa Āhuarangi o Āotearoa: Pūrongo whakatōpū. Government of New Zealand. 2020. https://environment.govt.nz/assets/Publications/Files/national-climate-change-risk-assessment-main-report.pdf

19 Government of New Zealand, National Emergency Management Agency, https://www.civildefence.govt.nz/about/about-nema/

20 New Zealand NEMA. NEMA Organization Chart, High-level structure, 7 October 2022. https://www.civildefence.govt.nz/assets/Uploads/About/NEMA-High-Level-Structure-Oct2022.pdf

21 NEMA. Local civil defence groups. https://www.civildefence.govt.nz/find-your-civil-defence-group/

22 NEMA. New Zealand Emergency Management Assistance Team (EMAT). https://www.civildefence.govt.nz/cdem-sector/new-zealand-emergency-management-assistance-team/

23 New Zealand Ministry of Foreign Affairs and Trade. Humanitarian action. https://www.mfat.govt.nz/en/aid-and-development/humanitarian-action/

24 New Zealand MFAT. The FRANZ Arrangement, 20 October 2014. https://www.mfat.govt.nz/assets/Aid-Prog-docs/NZDRP-docs/Franz-Arrangement-Brochure.pdf

25 New Zealand MFAP. Humanitarian and Disaster Management: Four Year Plan, January 2022. https://www.mfat.govt.nz/assets/Aid/4YPs-2021-24/Humanitarian-4-year-plan.pdf

26 Ministry for the Environment. About the Ministry for the Environment. https://environment.govt.nz/about-us/ministry-for-the-environment/

27 Climate Change Commission. Who we are. Govern-

ment of New Zealand. https://www.climatecommission.govt.nz/who-we-are/our-purpose/

28 Ministry for the Environment. National Determined Contribution. https://environment.govt.nz/what-government-is-doing/areas-of-work/climate-change/nationally-determined-contribution/

29 Taylor, Phil. New Zealand declares a climate change emergency, The Guardian, 1 December 2020. https://www.theguardian.com/world/2020/dec/02/new-zealand-declares-a-climate-change-emergency

30 Government of New Zealand. National Adaptation Plan for climate change released, 4 August 2022. https://www.building.govt.nz/about-building-performance/all-news-and-updates/national-adaptation-plan-released-by-government/

31 Ministry for the Environment. 2022. Aotearoa New Zealand's first national adaptation plan. Wellington. Ministry for the Environment. https://environment.govt.nz/assets/publications/climate-change/MFE-AoG-20664-GF-National-Adaptation-Plan-2022-WEB.pdf

32 NEMA. Civil Defence Emergency Management Alerts and Warnings. https://www.civildefence.govt.nz/get-ready/civil-defence-emergency-management-alerts-and-warnings/

33 NEMA. Get Ready – Emergency Mobile Alert frequently asked questions (FAQ), 2023. https://getready.govt.nz/en/prepared/stay-informed/emergency-mobile-alert/ema-faqs/

34 GNS Science. Our History | Tō Mātau Hītori. https://www.gns.cri.nz/about-us/our-history/

35 NEMA. 24-7 Monitoring, Alerting and Reporting Centre, Accessed 16 October 2023. https://www.civildefence.govt.nz/cdem-sector/monitoring-alerting-and-reporting-mar-centre/

36 NEMA. Get Ready – Tsunami monitoring and detection network. https://www.civildefence.govt.nz/get-ready/get-tsunami-ready/tsunami-monitoring-and-detection-network/

37 GeoNet. About Volcanic Alert Levels. https://www.geonet.org.nz/about/volcano/val

38 Becker, Julia S., Sally H. Potter, Raj Prasanna, Marion L. Tan, Benjamin A. Payne, Caroline Holden, Nick Horspool, Ryan Smith, and David M. Johnston. Scoping the potential for earthquake early warning in Aotearoa New Zealand: A sectoral analysis of perceived benefits and challenges, International Journal of Disaster Risk Reduction, Volume 51, 2020, 101765, ISSN 2212-4209. https://doi.org/10.1016/j.ijdrr.2020.101765

39 Kilpatrick, Mike. New Zealand Android users getting trial Google earthquake alerts, Newshub, 29 April 2021. https://www.newshub.co.nz/home/technology/2021/04/new-zealand-android-users-getting-trial-google-earthquake-alerts.html

40 Kilpatrick, Mike. Android earthquake early warning system alerted Kiwis ahead of 5.3 magnitude shake, Newshub, 12 October 2021. https://www.newshub.co.nz/home/technology/2021/10/android-earthquake-early-warning-system-alerted-kiwis-ahead-of-5-3-magnitude-shake.html

41 RNZ. The warning you might get before the next big quake, 20 June 2022. https://www.rnz.co.nz/programmes/the-detail/story/2018846258/the-warning-you-might-get-before-the-next-big-quake

42 New Zealand Infrastructure Commission. Sector State of Play: Transport. Discussion Document. 30 April 2021. https://media.umbraco.io/te-waihanga-30-year-strategy/q33dg5m5/sector-state-of-play-transport.pdf

43 New Zealand Infrastructure Commission. Sector State of Play: Energy. Discussion Document. 31 January 2021. https://media.umbraco.io/te-waihanga-30-year-strategy/yxcbdafs/sector-state-of-play-energy.pdf

44 New Zealand Infrastructure Commission. Sector State of Play: Water. Discussion Document. 21 February 2021. https://media.umbraco.io/te-waihanga-30-year-strategy/hgwddiao/sector-state-of-play-water.pdf

45 New Zealand Red Cross. Our history. https://www.redcross.org.nz/about-us/who-we-are/our-history/

46 New Zealand Red Cross. What we do in New Zealand. https://www.redcross.org.nz/about-us/what-we-do/in-new-zealand/

47 New Zealand MFAP. Humanitarian and Disaster Management: Four Year Plan, January 2022, page 13. https://www.mfat.govt.nz/assets/Aid/4YPs-2021-24/Humanitarian-4-year-plan.pdf

48 Council for International Development. Our Story. https://www.cid.org.nz/about-us/our-story/

49 Civil Society in New Zealand. About the National Residents' Associations Database (NRAD). http://www.civilsociety.org.nz/

Header photo by Tobias Keller on unsplash.com. Lake Tekapo, New Zealand. https://unsplash.com/photos/landscape-photography-of-lake-and-mountain-73F4pKoUkM0

Niue

Niue is a self-governing island state in free association with New Zealand, which is responsible for Niue's defense and foreign policy, as well as administrative and economic assistance as necessary. All Niueans have New Zealand citizenship.[1] Known as "the Rock of Polynesia" (or "the Rock"), Niue is located in the southwestern Pacific Ocean approximately 2,160 km (1,340 miles) northeast of Auckland, New Zealand, and 385 km (240 miles) east of Tonga's Vava'u Island Group.[2] The largest settlement is Alofi, the capital. The total land area is approximately 260 km^2 (100 square miles). Niue's estimated population as of 2022 is 2,000 people.[3] Many Niueans migrated for economic reasons, primarily to New Zealand, where 30,867 ethnic Niueans resided as of 2018 – more than 15 times as many people in Niue. A reported 4,958 ethnic Niueans also lived in Australia as of 2016,[4] and Niueans have also immigrated to other Pacific states. In 2003, Niue became the world's first country to offer free wireless internet to all residents. In 2022, the U.S. recognized Niue, along with the Cook Islands, as sovereign states.[5] Figure 41 shows a map of Niue.[6]

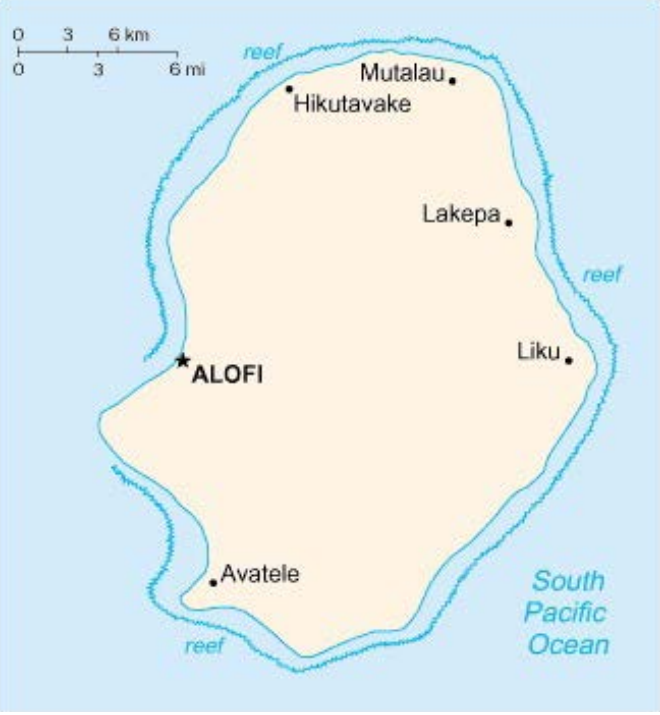


Figure 41: Map of Niue

There is archaeological evidence that Niue was settled in about 900 CE by Samoans. Tradition tells of a second group, a war party from Tonga, arriving in the 16th century. Captain Cook landed on Niue in 1774 and was followed in the 1930s by London Missionary Society members who had converted most of the islanders to Christianity by the 1850s. In 1900, Great Britain established a protectorate over Niue, and the following year, the island was annexed to New Zealand. The first Niuean Legislative Assembly was elected in 1960, and in 1966 the resident commissioner's authority was partly delegated to the Assembly and a Niuean leader of government was installed. In 1974, the people voted for a new constitution and chose self-government in association with New Zealand.[7]

The Constitution of Niue came into force in 1974. As part of the realm of New Zealand, Niue's head of state is the English monarch, who is represented by the Governor-General of New Zealand. Executive authority is exercised on behalf of the monarch by the Cabinet of Ministers, which comprises the Premier and three other members. The Premier is elected by the Niue Assembly at its first meeting after a general election. The Premier nominates three members of the Assembly for appointment as Ministers and allocates portfolios among them. The Assembly consists of 20 members, 14 of whom represent each village, and six of whom are elected from the Common Roll that comprises the rolls of all the village constituencies.[8]

Hazards and Climate Change

Niue is vulnerable to climate risks such as tropical cyclones and droughts, geological risks such as earthquakes and tsunami; and human-caused risks including disease outbreaks and contamination of its only fresh water supply. Tsunamis are a greater risk than being directly

impacted by earthquakes, as Niue is located approximately 345 km (214 miles) away from an active earthquake zone known as the Tonga Trench, which lies between Tonga and Niue.[9]

Niue has no surface water and relies upon rain catchments and groundwater, which is recharged via rainfall infiltration. Niue's porous soil renders underground fresh water vulnerable to contamination, from both human causes (e.g., agricultural chemicals) and natural sources (e.g., sea water).[10]

Tropical cyclones affect Niue between November and April. During the cyclone seasons between 1969 and 2010, 41 tropical cyclones developed or crossed into Niue's Exclusive Economic Zone (EEZ). The number of cyclones in any given year varies widely, with none in some seasons but up to four in others. Cyclone Tino in January 2020 produced damaging swells, destroying some temporary coastal structures and damaging some sea tracks. One of the most damaging cyclones in recent decades was Tropical Cyclone Heta, a Category 5 storm that brought high winds, storm surge, and intense rainfall on 4 January 2004. The cyclone took two lives – that of a woman and her 19-month-old son – and caused over NZ$37.7 million (approximately US$25 million) in damage, three times Niue's annual GDP.[11] It particularly devastated the capital, Alofi.[12]

Niue for more than half a century has already experienced the effects of climate change, which are anticipated to continue in the future. Temperatures in Niue have increased since 1940 as measured at Alofi-Hanan Airport, with maximum wet season temperatures having increased at a rate of 0.06°C (0.11°F) per decade and minimum wet season temperatures having increased at 0.12°C (0.13°F) per decade. The annual total number of warm days at Alofi-Hanan Airport has more than doubled since 1940, as depicted in Figure 42, where the solid black line shows the trend, and light blue, dark blue and grey bars indicate El Niño, La Niña, and neutral years, respectively.[13]

Sea levels have already risen around Niue and are expected to continue rising. Satellite data indicate the sea level has risen near Niue by about 5 mm (0.2 inches) per year since 1993, which is significantly larger than the global average of 2.8-3.6 mm (0.11-0.14 inches) per year. The higher rate of sea level rise may be partially related to natural fluctuations that take place due to phenomena such as the El Niño Southern Oscillation (ENSO) By 2030, under a very high emissions scenario, sea level rise is projected to be in the range of 8–18 cm (3.15-7 inches). Sea level rise will contribute toward increased impact from storm surges and coastal flooding. Figure 43 shows observed and projected relative sea level change near Niue – tide-gauge records of relative sea level (since 1974) are indicated in purple; the satellite record (since 1993) is in green; the reconstructed sea level data at Niue (since 1950) is in black; multi-model mean projections from 1995–2100 are given for the very high (red solid line) and very low emissions scenarios (blue solid line), with the 5–95% uncertainty range shown by the red and blue shaded regions; the ranges of projections for the four emissions scenarios by 2100 are also shown by the bars on the right; and the dashed lines are an estimate of year-to-year variability in sea level (5–95% uncertainty range about the projections) and indicate that individual monthly averages of sea level can be above or below longer-term averages.[14]

Ocean acidification has occurred around Niue and is projected to continue. Data show that since the 18th century the level of ocean acidification has been slowly increasing in Niue's waters. Under all four emissions scenarios the acidity level of sea waters in the Niue region will continue to increase over the 21st century; the very high emissions scenario would bring the greatest change. The impact of increased acidification on the health of reef ecosystems is likely to be compounded by other stressors including coral bleaching, storm damage, and fishing pressure. About one-quarter of the carbon dioxide emitted from human activities is absorbed by the oceans, which causes the ocean to become more acidic. This impacts the growth of corals and organisms that construct their skeletons from carbonate minerals; such species are critical to the balance of tropical reef

ecosystems.

Government Institutions, Policies, and Plans for Disasters and Climate Change

Niue's National Disaster Plan (2010) is the main legislative reference for disaster management. In times of disasters and other emergencies, the Cabinet maintains overall responsibility for disaster management. On a daily basis, the National Disaster Council (NDC) is the designated authority as the central coordinator for all hazards, while the Police undertake much of the required work. Village Councils, Government departments, and the Police have additional responsibilities for risk reduction and awareness raising. The National Emergency Operations Centre (NEOC) acts at the hub of the national response, relief, and recovery efforts. The Disaster Controller, typically the Chief of Police, is responsible for identifying all national agencies that will be required for response and recovery. The National Disaster Plan outlines general responsibilities of each agency, which are depicted in Figure 44, UN OCHA's framing of Niue's national structure for humanitarian coordination.[15]

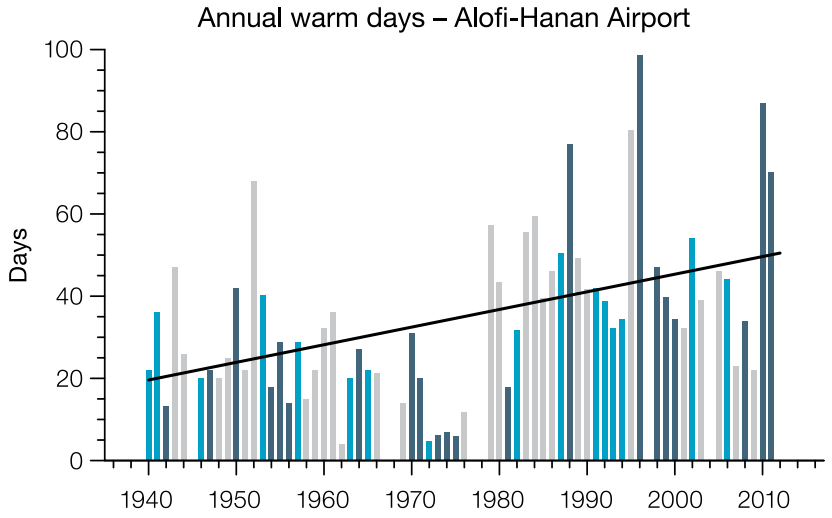


Figure 42: Annual Number of Warm Days, Niue (1940-2010)

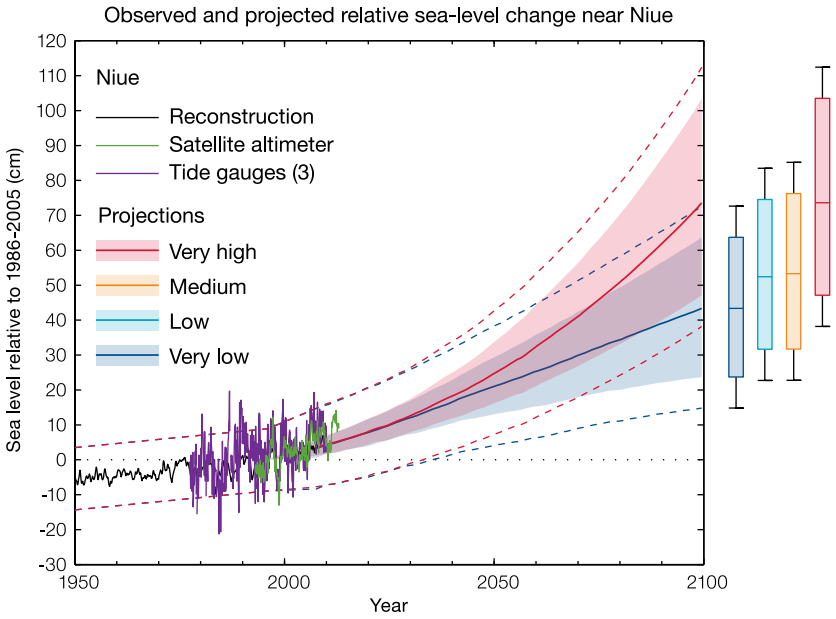


Figure 43: Observed and Projected Sea Level Rise around Niue

The disaster risk management framework in Niue includes the 1979 Public Emergency Act, the 2004 Public Emergency Regulations, the 1980 National Disaster Relief Act and the 2010 Disaster Management Plan.[16] The 1979 Act provides extensive powers to the Cabinet, once a Proclamation of Emergency has been declared, to create regulations that have the immediate force of law but must gain agreement by the Assembly within 14 days to be extended beyond that period. The 2004 Regulations confirm the Cabinet as the ultimate authority for disaster risk management and provides a more detailed framework. In practice, disaster risk management is conducted by the NDC, which comprises key directors of public service departments and ministries under the chairmanship of the secretary of government. In a disaster event, the Emergency Executive Group (a subset of the NDC) coordinates the response. In the event of a Disaster, the Disaster Controller has the primary responsibility for disaster risk management leadership under the Act. Under the 2010 plan,

National Coordination Structure

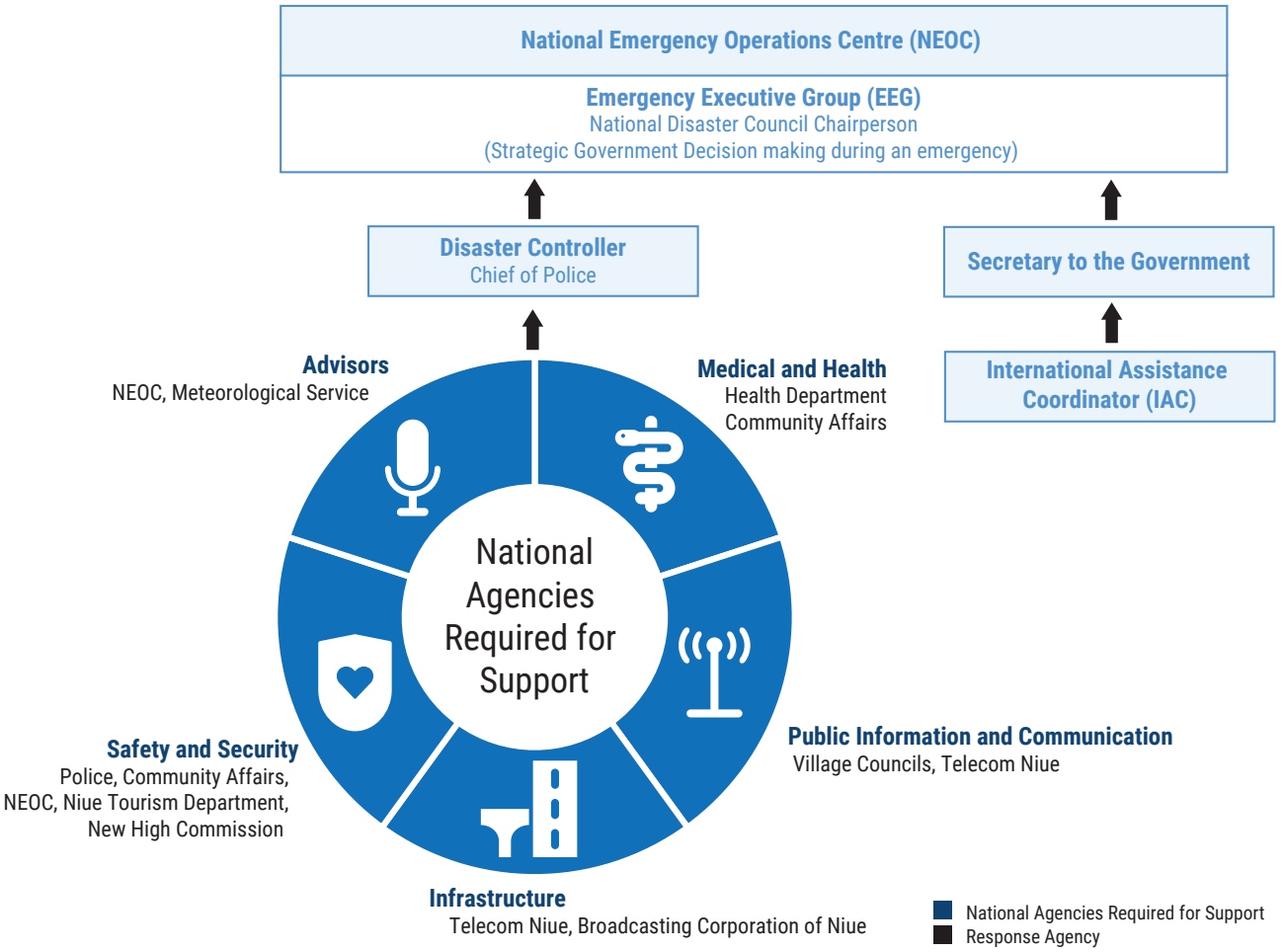


Figure 44: Niue's National Coordination Structure for Disaster Management

the Chief of Police is expected to take on this role. In 2013, Niue created a National Disaster Management Office (NDMO).[17]

Niue's NEOC officially opened on 16 October 2019. The building houses both the Niue Police and NDMO and is used as a base to coordinate responses to disasters.[18] The EU, under the Building Safety and Resilience in the Pacific project implemented by the Pacific Community (SPC), invested NZ$1.1 million (US$691,682) in the construction of the NEOC, while the New Zealand Government contributed NZ$250,000 (US$157,201) towards the structural engineering work and fit out of the facility.[19] During a disaster event, the NEOC operates as the hub of national response efforts and initial recovery efforts. It comprises the Disaster Controller, the Emergency Executive Group and key coordinators of operations, logistics, international assistance, and communications. The new joint emergency operations center includes Niue's Rescue Coordination Centre, a staging area for emergency vehicles and equipment, and relief and rehabilitation supplies, as well as a backup Activation Centre for the Niue Tsunami Early Warning System. The new joint NEOC was included in Niue's 2015 Strategic Roadmap for Emergency Management.[20]

The Strategic Roadmap for Emergency Management in Niue 2015 – 2019 was published in 2015, making Niue the first Pacific nation to develop a strategic roadmap for emergencies. The goals of the strategic roadmap, based on targeted group discussion, included shared responsibility and a whole-of-nation approach to emergency management, strengthened national

resilience, and increased value of the emergency management sector to Niue. In shifting from a reactive emergency service to a proactive integrated emergency management sector, the strategic roadmap focused on the key result areas of:

- integrated, interoperable emergency management agencies
- streamlined governance and structure
- increased capability
- stronger engagement[21]

The Niue National Strategic Plan 2016-2026 sets out to achieve a vision of a prosperous Niue as underpinned by seven national development pillars:

- Finance and economic development
  - Sufficient financial resources are secured, and responsible fiscal management is prudent, sustainable, and in support of development strategies
- Governance
  - Good governance is practiced at all levels of society
- Infrastructure
  - Sustainable use and management of key infrastructure that is climate-proof and resilient
- Social services
  - Harmonious and healthy lifestyle in a thriving, educated, and safe community that has access to a wide range of quality social services
- Environment and climate change
  - Sustainable use and management of Niue's natural resources and environment for present and future generations
- Tāoga Niue
  - Promote, strengthen, and integrate Tāoga Niue cultural heritage, language, values, and identity
- Private sector
  - A prosperous and skilled island nation, underpinned by a thriving and entrepreneurial private sector[22]

Niue deposed its intended Nationally Determined Contribution (NDC) with the UNFCCC secretariat in 2016. It expressed Niue's belief that loss and damage must be addressed in a sustainable and consistent manner as Niue has insufficient national capacity to address loss and damage alone. Nonetheless, Niue has also established its Niue Strategic Energy Road Map (NiSERM) 2015-2025 in which it outlines an aspiration to meet 80% of electricity needs from renewable energy sources by 2025.[23] The country has also developed its Niue Infrastructure Investment Plan 2023-2033 where it sets out priorities to support economic and social development objectives.[24]

In 2022, Niue moved to protect 100% of its EEZ, an increase from the marine protection it granted in 2020 to 40% of its EEZ. In April 2020, Niue's parliament legally established the Moana Mahu Marine Protected Area, which was 127,000 km^2 (49,035 square miles), constituting 40% of Niue's EEZ. The reserve included a special management space area around the partially submerged Beveridge Reef, known as "Beveridge Reef Nukutulueatama Special Management Area" and important for its biodiversity.[25] In May 2022, Niue announced that it will protect 100% of the ocean in its EEZ. It designated the entire 317,500 km^2 (122,000 square miles), roughly the size of Vietnam, as a multiple-use marine park called Niue Nukutuluea. The Moana Mahu Marine Protected Area, 40% of the park, is a no-take zone, and a smaller slice is managed by local villages. About 56% of the park is a general-use zone where commercial fishing and other activities could take place. Seabed mining is not ruled out in the general-use zone, but it's unclear if this will be an issue as most of the cobalt and manganese on its seafloor is in Moana Mahu where mining is prohibited and is extremely deep and not as abundant as elsewhere in the Pacific. Illegal fishing is an issue for Niue and many other Pacific islands. Niue has no navy and partners with others to police their waters. The New Zealand air force flies over the protected zone twice a year to look for signs of illegal fishing.[26] Tonga, Samoa, and the Cook Islands carry out annual surveillance operations through

the Pacific Islands Forum Fisheries Agency and the Western and Central Pacific Fisheries Commission. Niue collaborates with Global Fishing Watch, a nonprofit that uses satellites and machine learning to document human activity at sea, on a pilot project called the Marine Manager Portal that helps countries track fishing and shipping vessel activities in their waters, as well as shifts in temperature and productivity.[27]

In September 2023, Niue launched a novel plan to get sponsors to pay for marine protection. Individuals or companies can pay NZ$148 (US$92), which represents the cost to manage and protect 1 km^2 (about 250 acres) of ocean from threats such as illegal fishing and plastic waste for up to 20 years. Niue hopes to raise more than NZ$18 million (US$11.2 million) from the plan by selling 127,000-km^2 units in the Moana Mahu Marine Protected Area, the 40% of its waters that are a no-take zone. The sponsorship money, called Ocean Conservation Commitments, will be administered by the newly formed Niue and Ocean Wide Trust, a charitable trust established to support Niue's ambitious conservation goals and foster a sustainable blue economy. The proceeds will fund conservation, resilience, and sustainable development efforts that reinforce durable ocean conservation and sustainably manage the EEZ, including enhanced community engagement and monitoring, compliance, and enforcement.[28] While conventional ocean conservation funding often requires a constant search for new funding on a project-by-project basis, Niue's sponsorship plan aims to mitigate against that by acquiring sufficient funding to allow for decades of future planning.[29]

The Huvalu Forest Conservation Area was established in 1992 as a protected area that contains some of the most threatened flora and fauna in the world. The rainforest is located in one of the world's 36 biodiversity hotspots established and funded by the Food and Agriculture Organizations of the United Nations (FAO). The protected rainforest covers about 5,400 hectares (3,707 acres), or about 20% of the island, and provides important habitat for uga (coconut crabs), peka (flying foxes), and an array of birdlife including the kulukulu (crimson-crowned fruit done) and miti (Polynesian starling).[30] Management authorities include the Department of the Environment and Liku and Hakupu Village Councils.[31] In 2017, an ecotourism initiative funded by FAO provided educational signage throughout the forest, an interactive display in the visitor's center, and informational self-tour brochures.[32]

Niue also provides environmental protection for its sky from light pollution. Niue was the first whole country to become an International Dark Sky Place when it received formal accreditation from the International Dark-Sky Association as an International Dark Sky Sanctuary and International Dark Sky Community in 2020. Niue took significant steps, including replacing all streetlights and upgrading domestic private lighting. Niue Tourism championed the initiative, which was also supported by the government and community.[33]

Office of the Secretary to Government / Premier's Office

Tel: 683 4308
Email: *niue.secgov@mail.gov.nu*

National Disaster Management Office

Fonuakula, Niue
Tel: 683 4349
Email: *ndmo@mail.gov.nu*

Early Warning Systems

Niue Meteorological Services, under the Ministry of Natural Resources, provides meteorological and climatological services to Niue.[34] It is located at Hanan International Airport in the capital, Alofi.[35] The weather in Niue is also monitored by the Fiji Meteorological Service, whose regional weather information covers Niue, Tonga, Kiribati, Nauru, Tokelau, Tuvalu, and the Cook Islands.[36]

The cyclone season in Niue and the South Pacific is from November to April. The months with the highest cyclone risk are usually December, January, and February. There is

also a higher risk of cyclone activity during an El Niño year. A cyclone meeting is conducted twice a year, once during April or May in the post-cyclone period and once in October or November in the pre-cyclone period. NDMO's Pre-Cyclone Season Meetings may be attended by all village council members, NGOs, and private sector businesses.[37] Early warnings for tropical cyclones are categorized into the following alerts:

- Blue Alert (Tropical Cyclone Warning Phase 1): A cyclone is nearby and may start to affect Niue within the next 24 to 48 hours. While it is not certain that the cyclone will affect the island, precautionary measures must be taken. Heavy rain may start to impact Niue before heavy winds start.
- Yellow Alert (Tropical Cyclone Warning Phase 2): The cyclone threat to the island has increased and strong winds are likely to occur within the next 12 hours.
- Red Alert (Tropical Cyclone Warning Phase 3): Cyclone impact is imminent; people are required to stay indoors and continue to monitor the radio for instructions.[38]

Niue's National Tsunami Sirens were repaired and made operable again in 2023, following five years of being inoperable due to various factors, including the COVID-19 pandemic. A contractor from the New Zealand-based company SALCOM was able to repair the sirens within two weeks with the help from a prior scoping visit earlier in 2023. The sirens were successfully tested on 6 November and observed at all 12 locations during testing by the Niue Police, Rescue Fire Services, Niue Meteorological Services, Niue Health Ambulance services, Niue Power, and the NDMO team. The tsunami siren testing was part of a preparedness exercise timed in commemoration of World Tsunami Awareness Day.[39]

In 2016 an automated weather station was installed in the Niue Meteorological Service to assist with improving the safety standards of Niue's aviation and the quality of weather and climate data for development planning and early warning services in Niue. Funded by the Finnish-Pacific Project, the iSTAR Automated Weather Station (AWS) aimed to reduce the vulnerability of the livelihoods of Pacific islanders to the impacts of climate change through strengthening the Meteorological Services. The AWS supplies information required for national purposes, and much of the data recorded by the iSTAR AWS will also help fill gaps in information from the Pacific shared through the Regional Basic Synoptic Network, a core global weather and climate observations system.[40]

During 2019-2020, the CREWS Pacific SIDS Project was implemented. The US$5 million regional project includes the Community-based Early Warning Systems as a sub-component, with a budget close to US$900,000 and spanning Niue and three other Pacific islands. The project helped strengthen three different areas relevant to early warning systems – the Community-based Early Warning Systems and traditional knowledge; Pacific Meteorological Council Panels' support to community-based early warning system and disaster risk reduction; and the information technology capacity of the National Meteorological and Hydrological Services.[41]

SPREP worked with Niue and other member states to develop their traditional climate knowledge monitoring systems as an important tool adding value to scientific predication models. The ufi (yam) tropical cyclone monitoring program – so named after traditional observations that ufi would grow differently preceding cyclones – started in Niue in 2019 under the Climate and Ocean Support Programme in the Pacific (COSPPac) and continued under the WMO's CREWS Pacific SIDS project. The Niue Meteorological Service was able to use their observations of ufi plants to support observations by scientific forecasting models, which aligned. The documentation and collection of traditional knowledge around the ufi is including women who rarely participate in the ufi planting process and bringing together more youth in planting ufi through the involvement of the Niue Boys' and Girls' Brigades.[42]

Niue Meteorological Service
Hanan Airport
Email: *Metoffice.staff@mail.gov.nu*

Infrastructure

The Ministry of Infrastructure has two departments: Transport and Utilities. Most of the transport, energy, and water systems are government-owned.

Hanan International Airport recently underwent runway resurfacing and other repairs. The airport sits at an elevation of 64 m (209 feet), and its runway measures 2,335 × 45 m (7,661 × 148 feet) and can accommodate up to the Airbus 320 or Boeing 737-300.

Sir Robert's Wharf in Alofi is the only freight-handling facility, serving a single container vessel that makes the round-trip transit between Alofi and Auckland, New Zealand, approximately monthly. All fuel for electricity generation, transportation, cooking, and aviation is imported through the wharf, as are many foodstuffs, equipment, and vehicles, as well as building materials. The wharf consists of a concrete breastwork, approximately 65 × 35 m (213 × 115 feet). It is served by a shipping channel on the south side of the wharf; the channel is approximately 20 m (66 feet) wide and 5 m (15.4 feet) deep, allowing smaller vessels to access the wharf directly. During bad weather, the wharf is often damaged and requires frequent repairs that further limit operations. All containers are moved from a moored ship via on-board cranes and an unpowered barge that requires propulsion from a government-owned workboat. Wharf equipment includes a 55-ton crane, container forklift, truck and trailer, loader crane, and workboat. In addition to Sir Robert's Wharf, there are slipways at the villages of Avatele and Namukulu; they are both suitable for small vessels. Avatele is equipped with a small winch, suitable for launching and landing small fishing vessels.

There is a network of coastal and cross-island roads that are the backbone of the on-island transport system that links major settlements. The majority of the 117-km (72.7-mile) network is bitumen-sealed and requires regular re-sealing due to weather.[43]

An estimated 100% of the population has access to electricity, and the Niue Power Corporation oversees more than 1,500 electricity meters.[44] More than 80% of the total energy usage (including electricity and transport) is covered by imported oil, while 16% is covered by renewables, all solar.[45] The total installed diesel generation capacity is 2 MW, consisting of four 508kW generators.[46]

An estimated 100% of the population has access to a clean, reticulated water system. Niue's water supply comes from a freshwater lens and rainwater catchment. Each village on the island had a borehole that feeds the local reticulated village network.[47]

Ministry of Infrastructure
Fonuakula, Alofi, Niue, Niue
Tel: 683 4297
Email: *info.utilities@mail.gov.nu*

Civil Society Partners

The Niue Youth Council is an NGO that was established in 1982 and incorporated in 1983.[48] It has 14 youth groups representing each village as well as five youth groups representing other denominations on the island. It was identified in the 2009 National Youth Policy as a key partner for the Department of Community Affairs. It is a member of the Pacific Youth Council, which is a member of the Commonwealth Youth Council.[49] The Niue Youth Council's guiding principles are:

- Youth Participation – Engaging young people in planning, implementation and monitoring of community and national programs.
- Youth Voice – Recognition and act on youth views and concerns in decision-making processes
- Nurture and foster a spirit of partnership between young people and youth stakeholders to build youth confidence.
- Leadership – Motivate and encourage youth to take leadership roles and responsibilities.
- Respect and acceptance of individual cultures, religious faiths in agreement with

human rights and the rule of law.
- Equality – Each young person has equal opportunity to access services and other opportunities despite their, sex, creed, ethnicity, and ability.[50]

Niue Youth Council

Fonuakula, Alofi, Alofi, Niue, Niue
http://www.niueyouthcouncil.nu/

The Niue Boys' and Girls' Brigades are active youth organizations in the island nation. The Boys' Brigade is an international, inter-denominational Christian youth organization started in 1883 in Glasgow, Scotland, and introduced to Niue in 1946.[51] The Girls' Brigade is also an international, inter-denominational Christian youth organization, founded in 1893 in Dublin, Ireland. Recent activities include the Boys' and Girls' Brigades in Niue being approached by the Niue Meteorological Services to implement the community-based early warning systems component of the CREWS Pacific SIDS project. Through the partnership, youth members of the Niue Girls' Brigade were invited to attend the inaugural Asia-Pacific Ministerial Conference on Disaster Risk Reduction in September 2022 in Brisbane, Australia, which provided them exposure to the global disaster risk reduction forum to share the knowledge see the importance of the work they are doing in community-based early warning systems in Niue.[52] The Niue Boys' and Girls' Brigades also worked with the Niue Meteorological Office to launch billboards in the community hall to inform the public about climate information, including the effects of ENSO, and particularly to raise awareness around tropical cyclones.[53] The Niue Boys' and Girls' Brigades were involved in another CREWS Pacific SIDS project that started in 2019 to incorporate traditional knowledge in tropical cyclone monitoring to strengthen resilience, disaster preparedness, and cultural knowledge. As SPREP reported in 2022, the Boys' and Girls' Brigades participated in projects to learn how traditional knowledge identified different growth patterns as predictive of a tropical cyclone that season.[54]

Tofia Niue is a non-profit organization started in 2015 that works to "sustainably and holistically manage and develop Niue's ocean resources for current and future generations."[55] The public-private partnership, in collaboration with the Niue government, created the Niue Ocean Wide Project, which drove the creation of Niue's marine protected area and works with Conservation International to sustain future funding via soliciting sponsorship of each square kilometer.[56]

Disclaimer: This handbook has been prepared in good faith based on resources available at the time of publication. Where possible, a link to the original electronic source is provided in the endnotes. While making every attempt to ensure the information is relevant and accurate, the CFE-DM does not guarantee or warrant the accuracy, reliability, completeness, or currency of the information herein. This information will be updated periodically, and we welcome and appreciate your feedback to improve this document and help fill any gaps to enhance its future utility. For feedback or comments, please email: **cfe.dmha.fct@pacom.mil**.

Niue Notes

1 BBC News. Niue country profile, 23 August 2023. https://www.bbc.com/news/world-asia-pacific-16536890

2 Foster, Sophie. Niue, Encyclopaedia Britannica, 25 September 2023. https://www.britannica.com/place/Niue

3 The World Factbook. Niue, 6 November 2023. https://www.cia.gov/the-world-factbook/countries/niue/#people-and-society

4 New Zealand MFAT. About Niu, accessed 14 November 2023. https://www.mfat.govt.nz/en/countries-and-regions/australia-and-pacific/niue/new-zealand-high-commission-to-niue/about-niue/

5 BBC News. Niue country profile, 23 August 2023. https://www.bbc.com/news/world-asia-pacific-16536890

6 The World Factbook. Niue – Country Map, CIA. https://www.cia.gov/the-world-factbook/countries/niue/map

7 Foster Sophie. Niue – History. Encyclopedia Britannica. 29 December 2023. https://www.britannica.com/place/Niue

8 Government of Niue. Government and Political System. https://www.gov.nu/government-and-political-system/

9 The Guide to Earthquakes & Tsunamis in Niue, Niue Pocket Guide. https://niuepocketguide.com/earthquakes-tsunamis-in-niue/

10 Niue Intended Nationally Determined Contributions, UNFCC, 2022. https://unfccc.int/sites/default/files/NDC/2022-06/Niue%20INDC%20Final.pdf

11 Governments of Niue and Australia. Current and Future Climate of Niue, Pacific-Australia Climate Change Science and Adaptation Planning Program, 2015. https://www.pacificclimatechangescience.org/wp-content/uploads/2013/06/12_PACCSAP-Niue-11pp_WEB.pdf

12 Pavihi, Esther. Niue remembers Cyclone Heta 17 years ago today, Television Niue, 4 January 2021. https://tvniue.com/2021/01/niue-remembers-cyclone-heta-17-years-ago-today/

13 Governments of Niue and Australia. Current and Future Climate of Niue, Pacific-Australia Climate Change Science and Adaptation Planning Program, 2015, page 5. https://www.pacificclimatechangescience.org/wp-content/uploads/2013/06/12_PACCSAP-Niue-11pp_WEB.pdf

14 Governments of Niue and Australia. Current and Future Climate of Niue, Pacific-Australia Climate Change Science and Adaptation Planning Program, 2015, page 9. https://www.pacificclimatechangescience.org/wp-content/uploads/2013/06/12_PACCSAP-Niue-11pp_WEB.pdf

15 OCHA. Niue: Humanitarian Coordination Structure (As of 30 March 2023), ReliefWeb. https://reliefweb.int/report/niue-new-zealand/niue-humanitarian-coordination-structure-30-march-2023

16 Niue National Disaster Plan 2010, UNISDR. https://www.unisdr.org/preventionweb/files/28164_disasterplan2010.pdf

17 IFRC. Niue – Overview, Resilience Library. https://www.rcrc-resilience-southeastasia.org/disaster-law/international-disaster-response-law-in-the-pacific/country-profiles/niue/niue-overview/

18 RNZ News. Emergency Operation Centre opened in Niue, 19 October 2019. https://www.rnz.co.nz/international/pacific-news/401334/emergency-operation-centre-opened-in-niue

19 SPC. National Emergency Operations Centre opens in Niue, 18 October 2019. https://www.spc.int/updates/news/2019/10/national-emergency-operations-centre-opens-in-niue

20 SPC. Ready to face emergencies in Niue, 27 March 2017. https://www.spc.int/updates/blog/2017/03/ready-to-face-emergencies-in-niue

21 Strategic Roadmap for Emergency Management in Niue: 2015-2019, SPC, 2015. https://piema.gem.spc.int/sites/default/files/publications_doc/Strategic_Roadmap_NIUE_2015_FINAL%5B4261%5D.pdf

22 Government of Niue. Niue National Strategic Plan 2016-2026. http://www.gov.nu/wb/media/NNSP%202016-2026/Ko%20e%20Tohi%20Fakatokatoka%20Gahua%20ha%20Niue%202016%20-%202026.pdf

23 Government of Niue. Intended Nationally Determined Contributions. 2016. https://unfccc.int/sites/default/files/NDC/2022-06/Niue%20INDC%20Final.pdf

24 PRIF. Niue Infrastructure Investment Plan 2023-2033. https://www.theprif.org/document/niue/national-infrastructure-investment-plans/niue-infrastructure-investment-plan-2023-0

25 RNZ News. Niue formalises one of largest marine reserves in world, 30 April 2020. https://www.rnz.co.nz/international/pacific-news/415484/niue-formalises-one-of-largest-marine-reserves-in-world

26 Turrell, Claire. Tiny Pacific island nation declares bold plan to protect 100% of its ocean, The Guardian, 30 May 2022. https://www.theguardian.com/environment/2022/may/30/the-ocean-is-everything-pacific-state-of-niue-declares-all-of-its-waters-protected

27 Evans, Monica. Small island, big ocean: Niue makes its entire EEZ a marine park, Mongabay, 3 November 2022. https://news.mongabay.com/2022/11/small-island-big-ocean-niue-makes-its-entire-eez-a-marine-park/

28 Government of Niue. Media Release: Niue Announces New Initiative to Fund Ocean Protection, 19 September 2023. https://www.gov.nu/wp-content/uploads/2023/09/media-release-niue-announces-new-initiative-to-fund-ocean-protection-1.pdf

29 Perry, Nick. Sponsor an ocean? Tiny island nation of Niue has a novel plan to protect its slice of the Pacific, AP News, 19 September 2023. https://apnews.com/article/niue-ocean-conservation-pacific-tagelagi-larsen-4efba10dfd8c5705c625cab150fae95f

30 Niue Pocket Guide. A Guide to the Huvalu Forest. https://niuepocketguide.com/how-to-experience-the-huvalu-forest-conservation-area/

31 Huvalu Conservation Area. Protected Planet, 2019. https://www.protectedplanet.net/61918

32 FAO. Niue Showcases its Biodiversity, 5 July 2017. https://www.fao.org/asiapacific/news/detail-events/en/c/903096/

33 Niue is World's First Country to Become a Dark Sky Place, DarkSky International, 7 March 2020. https://dark-sky.org/news/niue-is-worlds-first-country-to-become-a-dark-sky-place/

34 Niue Meteorology, Facebook, https://www.facebook.com/people/Niue-Meteorology/100090179132669/

35 Niue's End of Tropical Cyclone Season 2021/2022, Niue Meteorological Service, May 2022. https://www.gov.nu/wp-content/uploads/2022/05/media-release-end-of-tropical-cyclone-season.pdf

36 Fiji Meteorological Service. Regional Weather – Niue. https://www.met.gov.fj/index.php?page=niue

37 Niue Disaster Management Office - Faahi Gahua Lekua Tupu Fakaofo ha Niue, Facebook, 8 November 2023. https://www.facebook.com/NDMONiue

38 Cyclone Safety in Niue: How to Prepare for a Cyclone in Niue, Niue Pocket Guide. https://niuepocketguide.com/how-to-prepare-for-a-cyclone-in-niue/

39 Niue Disaster Management Office - Faahi Gahua Lekua Tupu Fakaofo ha Niue, Facebook, 7 November 2023. https://www.facebook.com/NDMONiue

40 SPREP. Niue Met Service installs new Automated Weather System, another milestone for the Pacific, ReliefWeb, 21 July 2016. https://reliefweb.int/report/niue-new-zealand/niue-met-service-installs-new-automated-weather-system-another-milestone

41 SPC. Enhancing resilience in Niue through access to weather and climate information, ReliefWeb, 15 May 2019. https://reliefweb.int/report/niue-new-zealand/enhancing-resilience-niue-through-access-weather-and-climate-information

42 SPREP, Incorporating Traditional Knowledge In Tropical Cyclone Monitoring For A Resilient Niue, ReliefWeb, 22 September 2022. https://reliefweb.int/report/niue-new-zealand/incorporating-traditional-knowledge-tropical-cyclone-monitoring-resilient-niue

43 Government of Niue. National Transport Strategy and short term Action Plan 2017-2026. https://theprif.org/sites/default/files/documents/Niue%20Report%20WEB_0.pdf

44 Government of Niue. Niue Strategic Energy Road Map 2015-2025. https://prdrse4all.spc.int/system/files/niue_strategic_energy_road_map_2015-2025_updated_3.pdf

45 IRENA. Energy Profile – Niue. https://www.irena.org/-/media/Files/IRENA/Agency/Statistics/Statistical_Profiles/Oceania/Niue_Oceania_RE_SP.pdf

46 Government of Niue. Niue Strategic Energy Road Map 2015-2025. https://prdrse4all.spc.int/system/files/niue_strategic_energy_road_map_2015-2025_updated_3.pdf

47 Government of Niue. Niue Drinking Water Safety Plan. April 2009. https://www.adaptation-undp.org/sites/default/files/downloads/niue_wsp_april_2009.pdf

48 Niue Youth Council Inc, Facebook. https://www.facebook.com/NiueYouthCouncil

49 Niue Factsheet, Youthpolicy.org, 24 October 2014. https://www.youthpolicy.org/factsheets/country/niue/

50 Niue Youth Council, Facebook. https://www.facebook.com/groups/136110809751839/

51 Boys' Brigade Niue - 75 Years, NZ Post, 2021. https://collectables.nzpost.co.nz/boys-brigade-niue-75-years/

52 SPREP. Niue youth empowered by CREWS Pacific SIDS project, 22 September 2022. https://www.sprep.org/news/niue-youth-empowered-by-crews-pacific-sids-project

53 Pavihi, Esther. The Niue Girls Brigade and Niue Met Office join efforts to improve public awareness using billboards, Television Niue, September 2020. https://tvniue.com/2020/11/the-niue-girls-brigade-and-niue-met-office-join-efforts-to-improve-public-awareness-using-billboards/

54 SPREP, Incorporating Traditional Knowledge In Tropical Cyclone Monitoring For A Resilient Niue, ReliefWeb, 22 September 2022. https://reliefweb.int/report/niue-new-zealand/incorporating-traditional-knowledge-tropical-cyclone-monitoring-resilient-niue

55 Niue's Fight to Sustain Itself. National Geographic – Education. https://education.nationalgeographic.org/resource/niues-fight-sustain-itself/

56 Niue Ocean Wide NOW. https://niueoceanwide.com/

Header photo by "sandwich" on flickr.com. Limu pools, Niue. https://flic.kr/p/gWKqpp

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Northern Mariana Islands (Commonwealth of the)

The islands of the U.S. Commonwealth of the Northern Mariana Islands (CNMI) are part of the Mariana Archipelago that also includes Guam and numerous offshore banks.[1] The islands' nearest neighbors are Japan's Bonin Island and the Federated States of Micronesia (FSM),[2] and the commonwealth lies 1,609 km (1,000 miles) south of Japan and 5,955 km (3,700 miles) west of Hawaii.[3] The Marianas are comprised of two geological groups: the older southern island arc (Rota, Tinian, Saipan and Marpi Bank, Farallon de Mendinilla, and Aguijan) and the younger, volcanic northern islands (Anatahan, Sarigan, Guguan, Alamagan, Pagan, Agrihan, Asuncion, Maug with Supply Reef, and Farallon de Pajaros). Though the southern islands are volcanic in origin, they are nearly all covered with uplifted limestone from ancient coral reefs. The northern islands from Anatahan to Farallon de Pajaros are all stratovolcanoes, composed of both lava flows and pyroclastic material that result from their location along a subduction zone.[4]

The islands stretch over 603 km (375 miles) north to south, with a land area of 468 km^2 (181 square miles). There are six inhabited islands.[5] Saipan (120 km^2; 46.5 square miles), Tinian (101 km^2; 39 square miles), and Rota (85 km^2; 33 square miles) are the largest islands. Along with these three, Anatahan, Alamagan, and Agrihan are also inhabited. Saipan is home to an estimated 90% of the population.[6] The nine far northern islands are very sparsely inhabited with few year-round inhabitants and no infrastructure services.[7] Results from the 2020 census found that CNMI had a population of 47,329.[8] The indigenous people, Chamorros, are Micronesians and make up only about one-fourth of the total population. About one-third of the people are Filipino, and there are smaller proportions of Chinese, Koreans, and other Pacific Islanders.[9] The official languages are Chamorro, English, and Carolinian (from other Micronesian islands).[10] Figure 45 shows a map of the Marianas.[11]

The islands were settled by Chamorro Austronesian people in approximately 3000 BCE.[12] These people were joined by later migrations, including of Micronesians in the first century CE, and island Southeast Asians in around 900 CE. Spain colonized the islands with their colonial administration based in Guam. A combination of brutal colonial repression, new diseases, and intermittent warfare reduced the population of indigenous Chamorro people by about 90% in the 1700s. Spain forced the Marianas Chamorro to resettle on Guam, and by the time they returned, many other Micronesians had already settled there. In 1898, Spain sold the Northern Marianas to Germany. Following World War I, Japan administered the islands and brought in thousands of Japanese laborers, who quickly outnumbered the Chamorro. During World War II, the U.S. captured the islands and administered them on behalf of the UN post-World War II as part of the Trust Territory of the Pacific Islands.[13] The Federal law ("the Covenant") making the CNMI



Figure 45: Map of the Marianas (CNMI)

a U.S. territory passed in 1975. The CNMI adopted its constitution in 1977, and its first constitutional government took office in 1978. While the U.S. President is the head of state, CNMI is administered by a governor and sends one non-voting delegate to the U.S. House of Representatives.[14]

The United States government leases over 16,000 acres of land on Tinian, primarily for military use. Military activities are a significant source of income in Saipan and Tinian. Tourism and the garment industry in Saipan have also been primary income sources.[15]

Hazards and Climate Change

The islands confront various hazards: drought, earthquake, flooding, tsunami, typhoon, volcanic eruption, wildfire, and climate change. More specifically, fueled by climate change, sea level rise and more extreme storms will contribute to coastal erosion and put key infrastructure and communities at risk of inundation. Typhoons and their associated flooding are the most common extreme event that disrupts lives and livelihoods.[16]

The Northern Mariana Islands have a tropical marine climate moderated by seasonal northeast trade winds from November to March and easterly winds from May to October. Average year-round temperature is 28.9°C (84°F) with an average humidity of 79%. There is little seasonal temperature variation.[17] Average annual rainfall is 2,130 mm (83.8 inches) with high interannual variation.[18] The dry season runs from December to June, and the rainy season from July to November. Sometimes the dry season brings drought, and strong El Niño Southern Oscillation (ENSO) events also tend to result in drought. The CNMI is situated some 966 km (600 miles) east of an area in the western Pacific where cyclonic disturbances originate. Thus, CNMI is always in "weather condition four," which means that 64 km per hour (40 mile per hour) winds are possible within 72 hours. These disturbances can quickly and sometimes unexpectedly develop into typhoon force winds of up to 193 km per hour (120 miles per hour) or greater.[19] Tropical disturbances generally emerge between August and mid-December.[20] Figure 46 graphs the average monthly temperatures and precipitation for CNMI for the period 1991-2022.[21]

Processes such as coastal erosion, storm surge flooding, and river runoff exacerbate the threat from sea level rise. Intense typhoons and extreme flooding have the potential to devastate both human communities and fish and wildlife habitat.[22] An estimated 90% of human loss during storms comes from coastal storm surge flooding.[23] In the past decade, CNMI has experienced numerous consecutive super typhoon events that caused loss of vegetation cover and left communities exposed to severe and devastating coastal flooding. The National Fish and Wildlife Foundation and NOAA published a series of maps assessing exposure of communities and natural assets to coastal

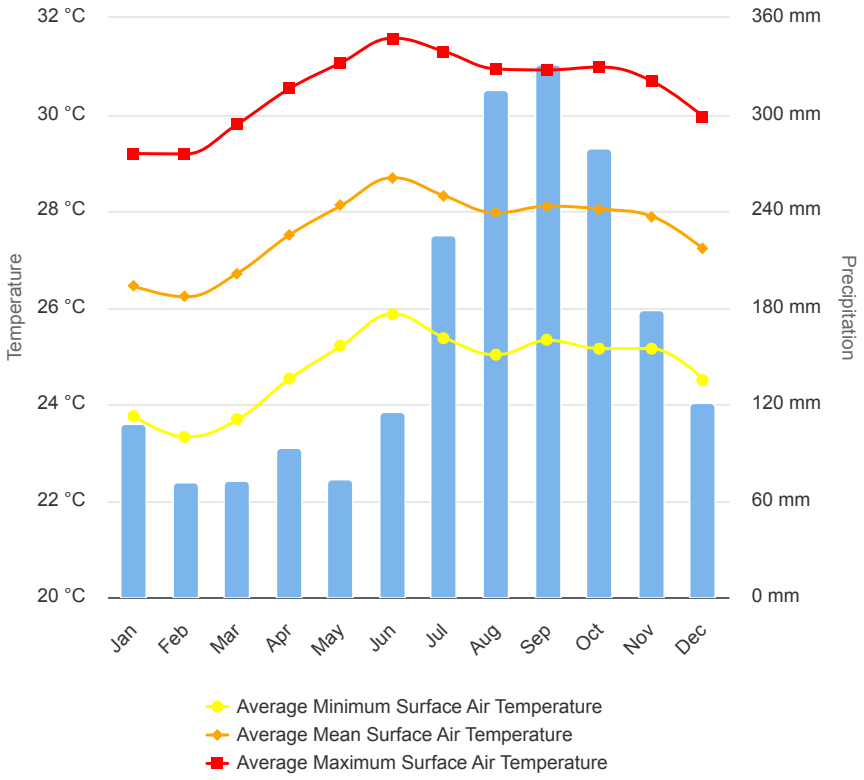


Figure 46: Average Monthly Temperature and Precipitation, CNMI (1991-2022)

flooding; Figure 47 shows the findings of these assessments for Rota, Tinian, and Saipan with darker coloring indicating greater exposure of community assets as of 2020.[24]

Based on the most recent climate models and projections, the CNMI is expected to see climate change implications related to economy, infrastructure, and natural heritage. Climate variables such as temperature, precipitation, sea level, and ocean acidity, among others, are projected to change.[25] In the 2021 Pacific Islands Regional Climate Assessment, the following climate-change related impacts were identified and assessed,[26] and Table 16 combines these assessments with detailed potential impacts drawn from CNMI's Guidance Manual for Smart, Safe Growth.[27]

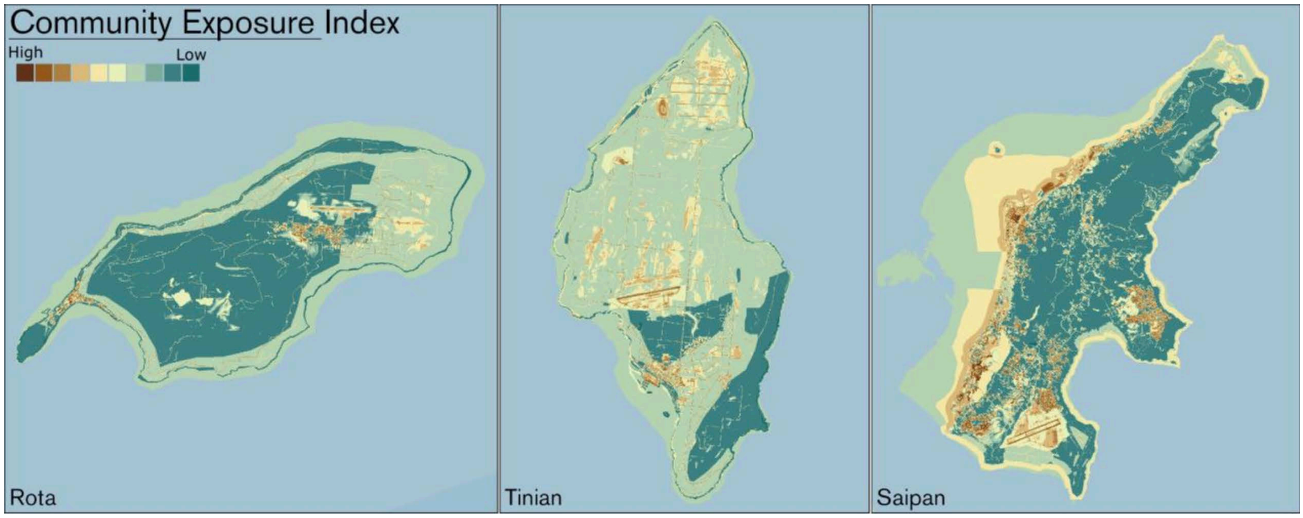


Figure 47: Community Exposure to Coastal Flooding (Rota, Tinian, and Saipan)

Phenomenon	Trend	Projections	Impacts
Air temperature	Rise in average air temperature; increase in annual number of hot days (32°C / 90°F)	1.5-2.0°C (2.7-3.6°F) under low emissions and 3.0-3.5°C (5.4-6.3°F) under high emissions by 2100	Stress on habitat and public health; increase of potential storm energy in atmosphere and ocean
Rainfall	High inter-annual variability; greatest deficits in El Niño years	0-10% increase in average annual precipitation under low emissions and 10-20% increase in annual average precipitation under high emissions by 2100	Impact on overall freshwater supply uncertain; potential for increased short-term flooding in rainy season
Extreme rainfall	High inter-annual variability	More frequent and intense rainfall events	Nuisance flooding and damage to built environment and crops
Typhoons / storms	Little change; more storm formation in El Niño years; less storm formation in La Niña years	Decrease in storm frequency and increase in storm intensity	Exacerbated impacts from storm surge; short-term flooding and erosion
Sea level	Average rise of 1.7mm (0.07 inches) per year since 1978; lower sea levels occur during El Niño years	0.36m (1.2 feet) of rise under low emissions scenarios by 2100; 1.17m (3.8 feet) of rise under high emissions scenarios by 2100	Possible inundation of low-lying areas over extended periods of time, with increased flooding impact of short-term events; damage to infrastructure, property, tourism
High ocean heat	Four years in the past 10 when CNMI experienced coral bleaching Alert Level 1 (significant likelihood of bleaching)	Annual severe bleaching before 2045	Reduced productivity in fisheries

Table 16: Climate Change Trends and Projections for CNMI

Government Institutions, Policies, and Plans for Disasters and Climate Change

The Office of the Governor has the authority to declare a state of emergency in case of a natural disaster or to issue executive orders related to climate change matters, such as setting up working groups or task forces. The following bodies focus on DRR and disaster management.

- CNMI Homeland Security and Emergency Management (HSEM) - primary state agency for coordination of responses to emergencies within CNMI; it is the lead coordinating agency in the Emergency Operations Plan (EOP), activates the Emergency Operations Center (EOC), and may recall Response Activities Coordinators (RAC) Team ahead of deployment
- State Hazard Mitigation Officer (SHMO) – appointee who implements hazard mitigation activities; provides expertise and advice to local governments and communities or private sector entities; coordinates implementation by helping to identify, coordinate, and obtain technical and financial resources; SHMO chairs the Hazard Mitigation Planning Committee
- RAC Team – body of agency representatives responsible for implementing EOP and providing input and guidance on development and updating of State Mitigation Plan; advises on policy related to mobilizing, requesting, and coordinating disaster assistance.[28]

A new EOC was completed in 2010; it was funded by a grant from the U.S. FEMA. It entered full operation in 2012. There are alternate EOC sites available in the Governor's Office and the Ports Authority Conference Room (airport). The Saipan EOC has backup generators and a 950,000-liter (250,000-gallon) water tank. The Tinian EOC is at the Mayor's Office; there is no backup generator or water tank, but both can be acquired from Tinian Public Works. The Rota EOC is in the Office of Aging; the Mayor's Office has a backup generator and Rota Public Works can deliver water with an 30,000-liter (8,000-gallon) truck. EOCs serve as a central location for command and control of all emergency operations at State and local levels. In a response, additional offices and agencies will be involved in the following ways:

- Division of Fire and Emergency Medical Services – firefighting (structural fires and wildfires)
- Public School System – emergency shelter during typhoon, flooding, or tsunami; transport coordination
- Division of Community and Cultural Affairs – additional emergency shelter[29]

The Office of the Governor also oversees the following offices with equities in hazard mitigation and climate change issues:

- The Office of Planning and Development was created by the CNMI Planning and Development Act (2017); it resides within the Governor's Office and is mandated to:
  - Improve planning to increase the effectiveness of government and private actions as well as coordination among different agencies and levels of government to guide growth in cooperation with the Planning and Development Advisory Council and other partners
  - Establish a CNMI Comprehensive Sustainable Development Plan to guide future long-range development using and improving on existing plans, maps, and other resources
  - Serve as a clearinghouse for all information related to development, planning, and resource use in CNMI
  - Provide a basis for determining priorities and allocating resources
  - Establish a system for plan formulation and program coordination to provide for an integration of all major CNMI and individual island activities.[30]
- The 7-member Commonwealth Zoning Board is responsible for regulating land-use and development on Saipan and immediately proximal small islands. A representative

of the Board sits on climate change and resilience working groups.[31]

- The Bureau of Environmental and Coastal Quality was established in 2013 and houses the Division of Environmental Quality and the Division of Coastal Resources Management Office.[32] In addition to other tasks, the Bureau develops, updates, and maintains coastal flooding hazard maps at: *https://dcrm.maps.arcgis.com/apps/webappviewer/index.html?id=8981814f5914421380b9158427853b44*[33]
- The Department of Public Lands serves as the trustee for public lands, with responsibility for developing, updating, and implementing the strategic land-use plan, which has been influenced by climate change considerations, particularly vulnerability of coastal areas to future inundation from rising sea levels.[34] The 2019 Public Land Use Plan was the first update of the plan since 1989. In the revised plan, one of the key goals is to identify and reserve lands that contain resources critical to the Commonwealth, such as but not limited to, springs suitable for producing potable water, groundwater aquifers that need protection, potential sites of municipal quarries, current and future sites for government buildings, habitat mitigation areas, wetlands, prime public recreation areas, potential school sites, potential hospital sites, and potential transportation corridors. The Plan is to be updated in 2024.[35]
- The Department of Lands and Natural Resources has oversight of natural resources in the public domain. Specifically, it is charged with protection and enhancement of natural resources, conservation of forests, and administering agricultural programs, among other duties.
- The Department of Community and Cultural Affairs contains the Division of Historic Preservation, which is charged with identifying, protecting, and appropriately developing cultural and historic resources and educating the public concerning their value. Among other duties, the Division of Historic Preservation is mandated to "protect, preserve, and regulate access to places, artifacts and things of historical significance," which would appear to give it authority to assess and address climate-mediated threats to cultural resources, particularly sites that might lie in the coastal zones and be threatened by rising sea levels.[36]

The following directives and laws describe some of the authorities to bodies within CNMI surrounding DRR and CCA.

The Disaster Mitigation Act (DMA, 2000) authorizes pre-disaster mitigation programming with the expectation that such programming will reduce the costs to the U.S. federal government of disaster assistance. The Act made other changes to grants and programming linked to hazard mitigation funding under the Robert T. Stafford Disaster Relief and Emergency Assistance Act (PL 100-707) of 1988, which constitutes the statutory authority for most U.S. federal disaster response activities. In order to access these funds, a government must have a FEMA-approved State Mitigation Plan. CNMI's HSEM is the government entity responsible under the DMA for maintaining the State Mitigation Plan.[37]

Governor's Directive No. 2014-01 (2014) acknowledged the threat posed by climate change to the CNMI, and it instructed all executive branch divisions, offices, government corporations, boards, and commissions to participate in meetings of the Climate Change Working Group.

The Saipan Zoning Law of 2013 regulates land development undertaken on Saipan and immediately proximal small islands, with its provisions implemented by the Zoning Boards, directed to recognize "Areas of Particular Concern" as designated under the CNMI Coastal Resources Management Act as overlay zones, and it delegated authority to determine appropriate shoreline setbacks for new construction within 45 m (150 feet) of the shoreline, with these restrictions apparently binding. The law also

gave the Zoning Board regulatory powers over the siting and design of wind power facilities on Saipan.

Executive Directive 235 established a CNMI Coral Reef Initiative Program (CRIP) to coordinate interagency activities regarding coral reef issues. The CRIP was specifically tasked with protecting coral reefs and implementing activities related to the Local Action Strategies under the NOAA Coral Program.

In the past decade, CNMI has conducted comprehensive coral reef resource assessments and coastal resource and infrastructure assessments, and it has developed historical climate and ocean data resources that have fed, among other plans, state flood hazard mitigation plans and the Garapan Conservation Area Plan for the commercial hub of Saipan. The creation of the Climate Change Working Group in 2012 was intended to lead to a full assessment of climate vulnerability in the CNMI, with representation from 33 agencies, NGOs, and community groups. It had technical subgroups dealing with ecological data, socio-economic data, and infrastructure.[38] The working group transitioned into the Resilience Working Group and held several workshops in 2016 and 2017 to increase agency coordination for climate-related issues. The U.S. Department of the Interior Office of Insular Affairs funding that had supported the position of Climate Change Project Coordinator expired in 2018 and was not extended.[39]

The CNMI Standard State Mitigation Plan (SSMP) identifies policies to reduce risk and future loss. It provides a set of actions for reducing the loss of human life and property, economic disruption, degradation of ecosystems, and destruction of cultural resources during natural disasters.[40] The SSMP is essential for CNMI to access pre- and post-disaster hazard mitigation funds to implement "smart, safe growth" actions via FEMA funding programs. A review of the 2014 iteration called for a more thorough integration of the vulnerability assessments for Saipan, Rota, and Tinian.[41] In response to this review, the 2018 SSMP added climate change data, described mitigation actions, updated facilities assessments, and included other information on new bodies or changes to data.[42]

Finalized in 2021, the CNMI All-Hazards Emergency Operations Plan (EOP) lays out response procedures and capabilities.[43] As of publication of this handbook, a public copy was not available.

The Climate Change Vulnerability Assessments for Saipan (2014) and Rota and Tinian (2015) provide a foundation to develop long-term CCA strategies. The assessments identify levels of potential impact, assess vulnerabilities of natural and built environments, and evaluate capacity to respond to the threats. These assessments also serve as the basis for CCA planning and implementation. Data gaps were identified in the 2014 Saipan Vulnerability Assessment, which focused primarily on vulnerability to sea level rise and coastal flooding, as well as from the 2015 Tinian and Rota Vulnerability Assessment, which used a "climate analog" narrative approach to contextualizing potential impacts to present opportunities for continued information collection and analysis. For example, lacking Lidar mapping of Tinian and Rota, inundation models were not created for these islands.[44]

The Office of Planning and Development was tasked by law to support the preparation of a comprehensive sustainable development plan to provide short and long-range guidance for economic, infrastructure, and physical development. It was required to contain "a statement of development objectives, standards, and principles with respect to the most desirable use of land for residential, recreational, agricultural, commercial, industrial, and other uses completely serviced by an access and circulation network and infrastructure consistent with proper protection to enhance the quality of the environment and preserve the CNMI's natural beauty and historical heritage." The plan comprises various regulations, designs, hazards, and policies, including for socio-economic and human resource development, natural resource

development, environmental protection, historical and cultural preservation, public safety, housing, community development, education, land use and population growth, the visitor industry, and other areas deemed appropriate by the Planning and Development Advisory Council.[45] The Comprehensive Sustainable Development Plan was transmitted, reviewed, and approved by CNMI Governor Ralph Torres on 26 October 2021.[46]

The Guidance Manual for Smart, Safe Growth was developed in 2018 to provide a set of development strategies focused on improving the resilience of the built environment with the overall goal being to move CNMI away from disaster-recovery reactions and toward building in resilience and proactive management. Through smart, safe growth, Pacific Islands governments can develop communities that maximize public health and safety, that provide economic opportunity and life-style choices, and that can withstand changes in climate and extreme weather events to reduce societal and economic burdens of recovery. The intent is to contribute to the development of a sustainable approach to natural disaster preparation, response, and recovery for Pacific Island countries and territories. Figure 48 illustrates CNMI's conception of "smart, safe growth" within the comprehensive planning process.[47]

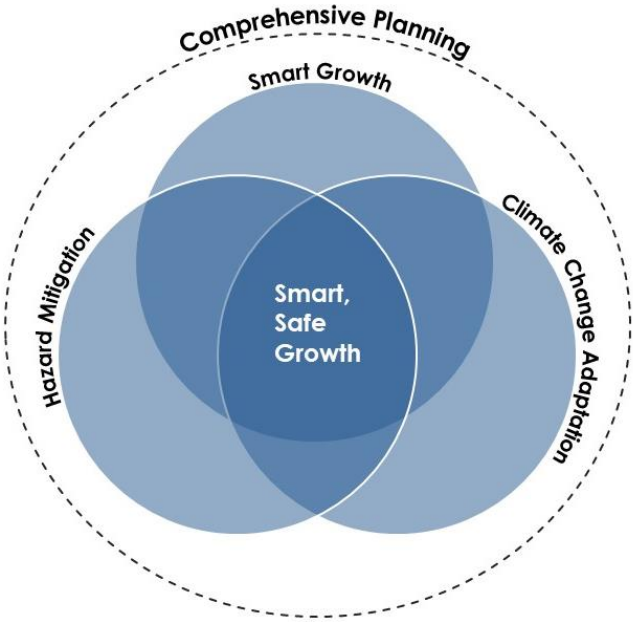


Figure 48: Smart, Safe Growth Strategic Concept, CNMI

Under the Manual, the following links are found between adaptation strategies and public benefits:

- Evacuate or shelter in response to event – Critical facilities, such as shelters and hospitals, in safe locations maximize public safety and community recovery
- Manage development and redevelopment – Managed development and redevelopment decisions can reduce community vulnerability to natural hazards and lower the impacts of climate change
- Improve structural resistance – Increases resilience of existing structures and reduces damage and recovery cost
- Promote natural protective features – Key natural resources and protective features buffer and protect the built environment from weather impacts (e.g., barrier reefs reduce wave energy and help buffer impacts of wave run-up)[48]

Office of Homeland Security and Emergency Management

6Q83+446, Capitol Hill, Saipan 96950
Tel: 670 664-2216
Emergency Management: 670 322-8000 (24 hours a day)

Office of Planning and Development

Juan A. Sablan Memorial Building, Pagan Loop, Capitol Hill, Saipan
Tel: 670 233-2673
Email: *planning@opd.gov.mp*

Early Warning Systems

The U.S. NWS under NOAA provides weather reporting and severe weather information for CNMI via the Guam NWS.[49]

Two sections within HSEM – Response and Recovery Section and Monitoring Section – share responsibility for surf and seismic data collection and analysis. Surf data is collected and distributed to water- and aircraft in the surrounding maritime and aerial zones, to the Guam NWS, to NOAA, and to the Federal Aviation Administration-authorized control tower. This data comes from four stations – Sugar

Dock Beach, Agingan Point, Tank Beach, and Wing Beach. The U.S. Pacific Tsunami Warning System covers CNMI. It sends HSEM all watches and warnings, and HSEM decides upon further public dissemination on a case-by-case basis, generally through local mass media. In 2007, NOAA donated AM radios to 26 schools on Saipan and to each mayor's office for the purpose of enhancing the tsunami early warning system.[50]

The NOAA-managed U.S. Drought Portal (*https://www.drought.gov/about/us-drought-portal*) also covers CNMI with data, resources, and information regarding drought, including monitoring, predication, planning, and preparedness support services.[51]

National Weather Service Tiyan, Guam
3232 Hueneme Rd, Barrigada, GU 96913
Tel: 671 472-0900

Infrastructure

There are some 420 miles of road across Saipan, Tinian, and Rota. Some roads remain gravel or coral, and they can generate dust or suffer washouts during extreme weather.

The Commonwealth Ports Authority (CPA) manages and operates all airports and seaports throughout the commonwealth. It is governed by a Board of Directors appointed by the Governor and appoints the Executive Director to oversee its day-to-day operations and management.[52] Saipan International Airport lies on Saipan's southern side. It can accommodate aircraft up to a Boeing 747. The West Tinian Airport on Tinian's western side has international status; it can accommodate a C-130 and up to the Boeing 747. Rota International Airport on the island's northern side can accommodate up to a Boeing 727. All airports have direct connections to electric power and have main and back-up generators.

The Port of Saipan is located on the island's northwest side; it has a 305-m (1,000-foot) dock and capacity for three cargo ships to dock simultaneously. There is one 89,000-m^2 (22-acre) container yard, water line, and underground fuel and sewage systems. Assessments have found that no berths at the port would be safe in case a typhoon passes nearby. Despite recent upgrades, the port has been identified as vulnerable to rising sea levels and storm surges or strong waves; both the facility and access routes occupy the lowest-lying areas of the island's transport system. Tinian's seaport on the west side of the island has 1,417 m (4,650 feet) of berthing space; this port has been assessed as quite well protected against natural hazards. Rota's West Dock is on the island's southwestern side; it has two 30-45-m (100-150-foot) docks and has suffered damage in past typhoons.

The Commonwealth Utilities Corporation Power Division oversees a primarily diesel-fueled generation system with fuel import tank deports on Saipan, Tinian, and Rota. Three thermal generation plants on Saipan have an installed capacity of 106.8 MW; Tinian has three thermal plans with a total capacity of 20 MW; Rota has one plant, adjacent to West Dock in the port with just over 4 MW of total installed generation capacity.

For water, Saipan's communities primarily rely on more than 200 wells scattered across the island and operated by Commonwealth Utilities and some 65 retailers who also manage distribution of drinking water. Commonwealth Utilities maintains 14 water tank service areas on Saipan that have gravity-fed distribution systems for various villages within their geographic area. Commonwealth Utilities' Saipan water tends to be too salty for drinking, and people rely on bottled water, produced by the private water retailers. Tinian has one Commonwealth Utilities-operated source from which water is pumped for distribution, and treatment of this water makes it suitable for drinking although private water retailers also sell bottled water on Tinian. Rota has one Commonwealth Utilities-managed spring with water distributed by a gravity-fed system; it is potable.

For sewerage, Commonwealth Utilities is the operator of wastewater systems. On Saipan, wastewater treatment is located at Agingan point and Sadog Tasi. Tinian residents rely on septic systems. Rota has one wastewater facility that serves some 2,600 people with the remainder of island residents relying on individual septic systems.

As identified in the 2014 and 2018 SSMPs, the Commonwealth Health Center Corporation hospital on Saipan confronts critical weaknesses in case of emergency. This 74-bed facility with approximately 200 medical staff is located very near flood-prone areas in Garapan and Middle Road, and access can be limited or even blocked as both entrances require passage through low-lying areas of Middle Road. In past typhoons, power has been knocked out, and the facility has relied on diesel generators. Five smaller, private health centers on Saipan have small staffs, and Rota houses a 10-bed facility. All but one of the private facilities on Saipan have emergency back-up generators and water sources.[53]

Commonwealth Ports Authority
P.O. Box 501055, Saipan, MP 96950
Saipan International Airport: 670 237-6500/6501
Port of Saipan: 670 664-3550
Tinian International Airport: 670 433-9294
Port of Tinian: 670 433-9296
Rota International Airport: 670 532-9497
Port of Rota: 670 532-9489
https://www.cnmiports.com/

Commonwealth Utilities Corporation
Customer Center, Joeten Dandan Building
Tel: 670 664-4282
https://www.cucgov.org/

Civil Society Partners

Voluntary Organizations Active in Disasters (VOAD) is a network of public agencies, NGOs, and civil service groups that organizes to coordinate provision of social services in times of a disaster. Participants range from Catholic Social Service-Karidat to Chambers of Commerce on each island.[54]

The American Red Cross Northern Marianas Chapter was chartered in 1978. It maintains an emergency shelter adjacent to the main office, just north of the airport on Saipan; the shelter has an underground fuel storage facility and a Disaster Services supply warehouse.[55] In emergencies, it can use four satellite phones, one satellite broadband unit, and single side bank radio. It also has five "Chatty Beetles" – portable iridium satellite terminals that permit text-based alerts and messaging in remote locations – that either can be or have been deployed to key locations across the three main islands and two radios tied directly into the HSEM network.[56]

American Red Cross Northern Mariana Islands Chapter
P.O. Box 500814, Saipan, MP 96950
Tel: 670 234-3459
Email: *nmichapter@redcross.org*

The Pacific Island Health Officers' Association (PIHOA) was established in 1986 by the health officials of the six U.S.-Affiliated Pacific Islands (USAPI) - American Samoa, Guam, CNMI, FSM, Marshall Islands, and Palau. PIHOA was intended to provide a regional, collective voice for advocacy and policymaking to address common health concerns to strengthen local and regional health system capabilities, capacities, and community resilience. It supports partnership engagement and provision of technical assistance to USAPI health departments and ministries. PIHOA membership comprises the six USAPI chief health officials, their deputies, Micronesia State directors, chief executive officers of USAPI public hospitals, and 13 Pacific regional professional associations, USAPI academic institutions, and development partners.[57]

CNMI Commonwealth Healthcare Corporation
P.O. Box 500409, Saipan, MP 96950
https://chcc.health

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Northern Mariana Islands (Commonwealth of the) Notes

1 School of Ocean and Earth Science and Technology (SOEST). Commonwealth of Northern Mariana Islands (CNMI) and Guam. University of Hawaii. Accessed 6 November 2023. https://www.soest.hawaii.edu/pibhmc/cms/data-by-location/cnmi-guam/

2 Ballendorf, Dirk Anthony, and Foster, Sophie. Northern Mariana Islands. Encyclopedia Britannica. 3 November 2023. https://www.britannica.com/place/Northern-Mariana-Islands

3 National Association of State Foresters. NORTHERN MARIANA ISLANDS - FOREST ACTION PLAN. Accessed 6 November 2023. https://www.stateforesters.org/districts/northern-mariana-islands/

4 School of Ocean and Earth Science and Technology (SOEST). Commonwealth of Northern Mariana Islands (CNMI) and Guam. University of Hawaii. Accessed 6 November 2023. https://www.soest.hawaii.edu/pibhmc/cms/data-by-location/cnmi-guam/

5 National Weather Service. Background Information on Commonwealth of the Northern Marianas Islands. https://www.weather.gov/peac/cnmi

6 Ballendorf, Dirk Anthony, and Foster, Sophie. Northern Mariana Islands. Encyclopedia Britannica. 3 November 2023. https://www.britannica.com/place/Northern-Mariana-Islands

7 HRSA Maternal and Child Health. III.B. Overview of the State - Northern Mariana Islands – 2020. U.S. Department of Health and Human Services. https://mchb.tvisdata.hrsa.gov/Narratives/Overview/ad48c169-b39e-4883-84a0-ea7e5bcf9695

8 United States Census Bureau. Census Bureau Releases 2020 Census Demographic and Housing Characteristics Summary File for the Commonwealth of the Northern Mariana Islands. 20 July 2023. https://www.census.gov/newsroom/press-releases/2023/2020-dhc-summary-file-cnmi.html

9 Ballendorf, Dirk Anthony, and Foster, Sophie. Northern Mariana Islands. Encyclopedia Britannica. 3 November 2023. https://www.britannica.com/place/Northern-Mariana-Islands

10 CIA World Factbook. Northern Mariana Islands. Accessed 6 November 2023. https://www.cia.gov/the-world-factbook/countries/northern-mariana-islands/

11 CIA World Factbook. Northern Mariana Islands - Maps. https://www.cia.gov/the-world-factbook/static/maps/CQ-map.jpg

12 Commonwealth of the Northern Mariana Islands. Standard State Mitigation Plan. August 2018. https://opd.gov.mp/library/agency/homeland-security-and-emergency-management.html

13 CIA World Factbook. Northern Mariana Islands. Accessed 6 November 2023. https://www.cia.gov/the-world-factbook/countries/northern-mariana-islands/

14 Office of Insular Affairs. Commonwealth of the Northern Mariana Islands. U.S. Department of the Interior. Accessed 6 November 2023. https://www.doi.gov/oia/islands/cnmi

15 School of Ocean and Earth Science and Technology (SOEST). Commonwealth of Northern Mariana Islands (CNMI) and Guam. University of Hawaii. Accessed 6 November 2023. https://www.soest.hawaii.edu/pibhmc/cms/data-by-location/cnmi-guam/

16 FEMA. REGION 9 - THE COMMONWEALTH OF THE NORTHERN MARIANA ISLANDS DISCOVERY ENGAGEMENT REPORT. January 2021. https://opd.gov.mp/library/reports/region-9-cnmi-discovery-report-risk-map-january-2021/region-9-cnmi-discovery-report-risk-map-january-2021.pdf

17 Pacific RISA. NORTHERN MARIANA ISLANDS. https://www.pacificrisa.org/places/commonwealth-of-the-northern-mariana-islands/

18 Commonwealth of the Northern Mariana Islands. Standard State Mitigation Plan. August 2018. https://opd.gov.mp/library/agency/homeland-security-and-emergency-management.html

19 Pacific RISA. NORTHERN MARIANA ISLANDS. https://www.pacificrisa.org/places/commonwealth-of-the-northern-mariana-islands/

20 Commonwealth of the Northern Mariana Islands. Standard State Mitigation Plan. August 2018. https://opd.gov.mp/library/agency/homeland-security-and-emergency-management.html

21 World Bank Climate Change Knowledge Portal. Northern Mariana Islands. Accessed 6 November 2023. https://climateknowledgeportal.worldbank.org/country/northern-mariana-islands

22 Dobson, J.G., Johnson, I.P., et al. Commonwealth of the Northern Mariana Islands Coastal Resilience Assessment. UNC Asheville National Environmental Modeling and Analysis Center, Asheville, NC. 2020. Prepared for the National Fish and Wildlife Foundation. Available online: https://www.nfwf.org/programs/national-coastal-resilience-fund/regional-coastal-resilience-assessment.

23 Commonwealth of the Northern Mariana Islands. Standard State Mitigation Plan. August 2018. https://opd.gov.mp/library/agency/homeland-security-and-emergency-management.html

24 Dobson, J.G., Johnson, I.P., et al. Commonwealth of the Northern Mariana Islands Coastal Resilience Assessment. UNC Asheville National Environmental Modeling and Analysis Center, Asheville, NC. 2020. Prepared for the National Fish and Wildlife Foundation. Available online: https://www.nfwf.org/programs/national-coastal-resilience-fund/regional-coastal-resilience-assessment.

25 FEMA. REGION 9 - THE COMMONWEALTH OF THE NORTHERN MARIANA ISLANDS DISCOVERY ENGAGEMENT REPORT. January 2021. https://opd.gov.mp/library/reports/region-9-cnmi-discovery-report-risk-map-january-2021/region-9-cnmi-discovery-report-risk-map-january-2021.pdf

26 Grecni, Z., E.M. Darrington, et al. Climate Change in the Commonwealth of the Northern Mariana Islands: Indicators and Considerations for Key Sectors. Pacific Islands Regional Climate Assessment. East-West Center. 26 January 2021. https://www.eastwestcenter.org/publications/climate-change-in-the-commonwealth-the-northern-mariana-islands-indicators-and

27 Commonwealth Northern Mariana Islands. Guidance Manual for Smart, Safe Growth. 2018. https://opd.gov.mp/assets/cnmi-ssg-guidance-manual-final-2018-11-14.pdf

28 Commonwealth of the Northern Mariana Islands. Standard State Mitigation Plan. August 2018. https://opd.gov.mp/library/agency/homeland-security-and-emergency-management.html

29 Commonwealth of the Northern Mariana Islands. Standard State Mitigation Plan. August 2018. https://opd.gov.mp/library/agency/homeland-security-and-emergency-management.html

30 Office of Planning and Development. About Us. Accessed 7 November 2023. https://opd.gov.mp/about-us.html

31 Commonwealth Northern Mariana Islands. Guidance Manual for Smart, Safe Growth. 2018. https://opd.gov.mp/assets/cnmi-ssg-guidance-manual-final-2018-11-14.pdf

32 Spooner, D., et al. Climate Change Adaptation Planning in the U.S. Affiliated Pacific Islands: Assessment of Current Capacity and Recommendations for Future Opportunities. Pacific Islands Climate Change Cooperative. 2017. http://piccc.net/piccc/wp-content/uploads/2017/05/Climate-Change-Adaptation-Planning-in-the-USAPI-20171.pdf

33 Commonwealth Northern Mariana Islands. Guidance Manual for Smart, Safe Growth. 2018. https://opd.gov.mp/assets/cnmi-ssg-guidance-manual-final-2018-11-14.pdf

34 Spooner, D., et al. Climate Change Adaptation Planning in the U.S. Affiliated Pacific Islands: Assessment of Current Capacity and Recommendations for Future Opportunities. Pacific Islands Climate Change Cooperative. 2017. http://piccc.net/piccc/wp-content/uploads/2017/05/Climate-Change-Adaptation-Planning-in-the-USAPI-20171.pdf

35 Department of Public Lands. CNMI Comprehensive Public Land Use Plan Update for Rota, Tinian, Saipan, and the Northern

Islands. 2019. https://www.dpl.gov.mp/wp-content/uploads/2019/03/DPL-Plan-3.13.2019.pdf

36 Spooner, D., et al. Climate Change Adaptation Planning in the U.S. Affiliated Pacific Islands: Assessment of Current Capacity and Recommendations for Future Opportunities. Pacific Islands Climate Change Cooperative. 2017. http://piccc.net/piccc/wp-content/uploads/2017/05/Climate-Change-Adaptation-Planning-in-the-USAPI-20171.pdf

37 Commonwealth of the Northern Mariana Islands. Standard State Mitigation Plan. August 2018. https://opd.gov.mp/library/agency/homeland-security-and-emergency-management.html

38 Spooner, D., et al. Climate Change Adaptation Planning in the U.S. Affiliated Pacific Islands: Assessment of Current Capacity and Recommendations for Future Opportunities. Pacific Islands Climate Change Cooperative. 2017. http://piccc.net/piccc/wp-content/uploads/2017/05/Climate-Change-Adaptation-Planning-in-the-USAPI-20171.pdf

39 Commonwealth Northern Mariana Islands. Guidance Manual for Smart, Safe Growth. 2018. https://opd.gov.mp/assets/cnmi-ssg-guidance-manual-final-2018-11-14.pdf

40 Commonwealth of the Northern Mariana Islands. Standard State Mitigation Plan. August 2018. https://opd.gov.mp/library/agency/homeland-security-and-emergency-management.html

41 Commonwealth Northern Mariana Islands. Guidance Manual for Smart, Safe Growth. 2018. https://opd.gov.mp/assets/cnmi-ssg-guidance-manual-final-2018-11-14.pdf

42 Commonwealth of the Northern Mariana Islands. Standard State Mitigation Plan. August 2018. https://opd.gov.mp/library/agency/homeland-security-and-emergency-management.html

43 CNMI Homeland Security and Emergency Management (HSEM). Citizen-Centric Report FY2021. https://cnmileg.net/resources/files/Notices/2021%20CCR/2021%20CNMI%20HSEM%20Citizen%20Centric%20Report.pdf

44 Commonwealth Northern Mariana Islands. Guidance Manual for Smart, Safe Growth. 2018. https://opd.gov.mp/assets/cnmi-ssg-guidance-manual-final-2018-11-14.pdf

45 Office of Planning and Development. Comprehensive Sustainable Development Plan. Accessed 7 November 2023. https://opd.gov.mp/comsusdev-plan.html

46 Office of Planning and Development. CNMI's Comprehensive Sustainable Development Plan. Accessed 7 November 2023. https://opd.gov.mp/csdp.html#:~:text=The%20CSDP%20is%20the%20overall,term%20and%20long%2Dterm%20progress.

47 Commonwealth Northern Mariana Islands. Guidance Manual for Smart, Safe Growth. 2018. https://opd.gov.mp/assets/cnmi-ssg-guidance-manual-final-2018-11-14.pdf

48 Commonwealth Northern Mariana Islands. Guidance Manual for Smart, Safe Growth. 2018. https://opd.gov.mp/assets/cnmi-ssg-guidance-manual-final-2018-11-14.pdf

49 National Weather Service. NWS Forecast Office – Tiyan, Guam. https://www.weather.gov/gum/

50 Commonwealth of the Northern Mariana Islands. Standard State Mitigation Plan. August 2018. https://opd.gov.mp/library/agency/homeland-security-and-emergency-management.html

51 National Integrated Drought Information System. State Drought Information. NOAA. https://www.drought.gov/states

52 Commonwealth Ports Authority. Homepage. https://www.cnmiports.com/

53 Commonwealth of the Northern Mariana Islands. Standard State Mitigation Plan. August 2018. https://opd.gov.mp/library/agency/homeland-security-and-emergency-management.html

54 Commonwealth of the Northern Mariana Islands. Standard State Mitigation Plan. August 2018. https://opd.gov.mp/library/agency/homeland-security-and-emergency-management.html

55 American Red Cross of Northern Mariana Islands. About us. https://www.redcross.org/local/northern-mariana-islands/about-us.html

56 Commonwealth of the Northern Mariana Islands. Standard State Mitigation Plan. August 2018. https://opd.gov.mp/library/agency/homeland-security-and-emergency-management.html

57 PIHOA. About PIHOA. https://www.pihoa.org/mission-history-strategic-plan/

Header photo by Sung Shin on unsplash.com. Saipan, Northern Mariana Islands. https://unsplash.com/photos/wide-angle-photography-of-buildings-beside-seashore-during-daytime-Cwn3tyv8iqo



Palau is made up of 586 volcanic and limestone islands in the Western Pacific. The main archipelago covers a 200-km (124-mile) range from Kayangel atoll in the north to Angaur atoll in the south.[1] A barrier reef system, continuous on the west and broken on the east, encircles most of the archipelago. All but six of the islands lie within an expansive lagoon, enclosed by the barrier reef.[2] The total land area of all of the islands of Palau is 459 km^2 (177 square miles).[3] Figure 49 is a map of Palau.[4]

While the exact date of the arrival of people in the islands that make up modern Palau remains unknown, it is thought that they first arrived as long ago as 2500 BCE.[5] The islands were inhabited by successive waves of Malays from Indonesia, Melanesians from New Guinea, Philippine natives, and some Polynesians from outlying Polynesian islands in Micronesia. These waves resulted in Palau having a diverse population that, from the late 18th century, was augmented by the arrivals of Europeans, Japanese, and U.S. citizens.[6] Foreign governance of the islands formally began in 1885 when Pope Leo XIII asserted Spain's rights over the "Caroline Islands," which included the islands of both modern Palau and the Federated States of Micronesia (FSM).[7] In 1899, Spain sold the Carolines to Germany.[8] Although the Japanese navy expelled German authorities at the beginning of World War I,[9] the islands were not formally ceded to Japan until 1919, and in 1922, Koror became the administrative center for Japan's South Pacific possessions. Following World War II, in 1947, the Carolines, Marianas, and Marshall Islands became the UN Trust Territory of the Pacific Islands (TTPI) under U.S. administration.[10] In 1979, the TTPI began to splinter, and Palau opted not to become part of a larger, federated state.[11] In 1981, islanders adopted a constitution and participated in elections. The country became internally self-governing that year. Subsequently, Palau signed a Compact of Free Association (COFA) with the United States.[12]

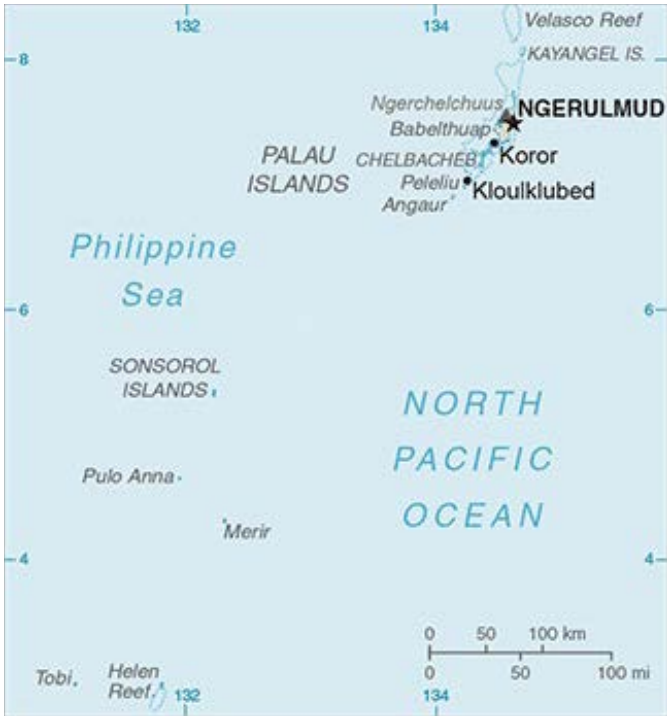


Figure 49: Map of Palau

Palau conducted its most recent census in 2020, and it counted 17,614 people.[13] The ethnic composition is Palauan (Micronesian with Malayan and Melanesian admixtures) 73%, Carolinian 2%, Asian 21.7%, Caucasian 1.2%, and other 2.1%.[14]

Each of the 16 states of Palau has its own constitution, which governs governmental operations and arrangements. There are also traditional systems within each state and within hamlets that govern matters of tradition and customs. There are traditional leadership and clan systems, and they have representatives in state legislatures.[15] At the national level, the President is both the head of state and the head of government.[16] The Olbiil Era Kelulau (National Congress), the legislature, includes the Senate and the House of Delegates. Palau has no armed forces as the U.S. is responsible for national defense.[17]

Hazards and Climate Change

Palau faces relatively moderate natural

disaster risk and mainly experiences tropical storms, drought, and tidal surges. However, the country is particularly vulnerable to the impacts of climate change, including severe weather events and rising sea levels.

The climate is hot and humid. Average relative humidity is 82% with the mean daily air temperature averaging 28°C (82°F). There is little seasonal variability in temperature, with a difference of only 0.8°C (1.4°F) between Palau's hottest and coldest months. The main wet season is between May and October.[18] Figure 50 graphs the average monthly temperature as well as rainfall in Palau during the period 1991-2020.[19]

Palau is outside the main Pacific tropical cyclone tracks, but occasional strong storms with high winds cross the islands between July and November. El Niño events tend to extend the dry season from its usual 1.5 months to 2-3 months. From November to April, rainfall during an El Niño year tends to be lower than average. After August, the monthly rainfall begins to rapidly drop, sinking to well below average in four months' time. Very intense El Niño events caused severe droughts in 1982 and 1997. On the contrary, La Niña events tend to bring greater than average rainfall along with more intense and more frequent storms.[20]

Palau is already feeling acute impacts of climate change. Table 17 provides some details of climate change-related trends, projections, and impacts.[21]

Government Institutions, Policies, and Plans for Disasters and Climate Change

The Disaster Executive Council (DEC) provides strategic direction and oversight. Below DEC is the National Emergency Committee (NEC), responsible for operational oversight, coordination, and management of disaster risk management activities.[22] The NEC consists of the National Emergency Management Office (NEMO) and the Central Control Group (CCG). During an emergency, overall guidance is provided by the DEC, and management and coordination is carried out by NEC, with support from NEMO.[23]

NEC is responsible for DRR policy and takes responsibility for the coordination of emergency response including providing advice to the DEC. The NEC also requests and coordinates external assistance. Chaired by the Vice-President,[24] the NEC is composed of representatives from 38 organizations including ministries, agencies, and NGOs.[25] During a disaster event, the NEC will operate from the National Emergency Operations Center (NEOC). The lead agency in response is NEMO, the head of whom takes the role of the Executive Director for Coordination in the event of a disaster. NEMO ensures implementation of the National Disaster Plan and provides support to national and state agencies in developing agency support plans. The CCG is flexible with members chosen by the NEMO Coordinator (as the Executive Director for Coordination) during the response phase of a disaster.[26] Figure 51 shows the flow of authority, advice, and

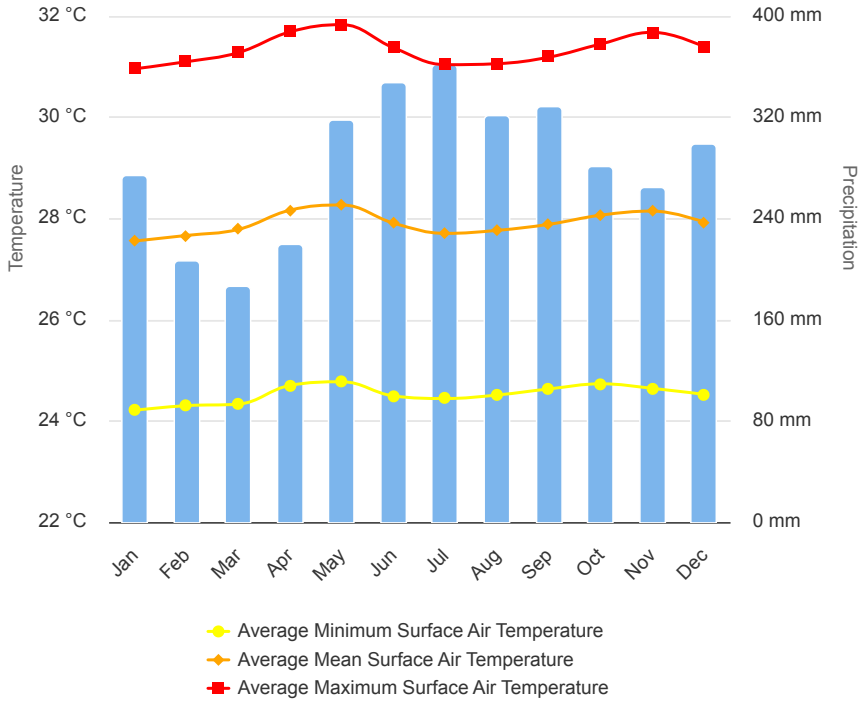


Figure 50: Average Monthly Temperature and Precipitation, Palau (1991-2020)

Phenomenon	Trend	Projections	Impacts
Temperatures / Extreme Heat	Average number of hot days per year has risen from 46 (1952-1961) to 100 (2009-2018) while the average number of cool nights has fallen from 40 (1952-1961) to 13 (2009-2018)	Expected increase through 2100 under high emissions scenario; rise of 0.6-1.0°C (1.1-1.8°F) by 2030, 1.0-1.9°C (1.8-3.4°F) by 2050, and 2.1-4.0°C (3.8-7.2°F) by 2090	Health impacts, including heat stress and vector- and water-borne disease; less human and agricultural productivity
Rainfall	No significant trends	Increase in intensity of West Pacific Monsoon and ITCZ expected to drive increase in intense, extreme rainfall events (1-in-20-year events become 1-in-8-year events under more optimistic scenarios and 1-in-4-year events under more pessimistic scenarios	Increased incidence of flash flooding and land slips; impacts on infrastructure
Drought	Linked to ENSO; drought conditions develop during El Niño phases	Less frequent drought overall and moderate or severe droughts that last less time	Water system effects
Cyclones	At least one major storm passes close enough to cause damage each year	Fewer total storms but greater intensity in the storms that do form	Wind damage to structures and trees; increased flooding and coastal erosion
Sea Level	High sea level variability (0.5-0.6 m; 1.6-2.0 feet); two high tides per day with a range between peak high and low tides of 2 m (6.5 feet); rise of 19 mm (0.75 inches) between 1970 and 2000 at Malakal	Total mean sea level rise of 1.8-2.0 m (5.9-6.6 feet) over year 2000 by 2100	More frequent tidal flooding and more significant coastal erosion

Table 17: Climate Change-Related Trends and Impacts, Palau

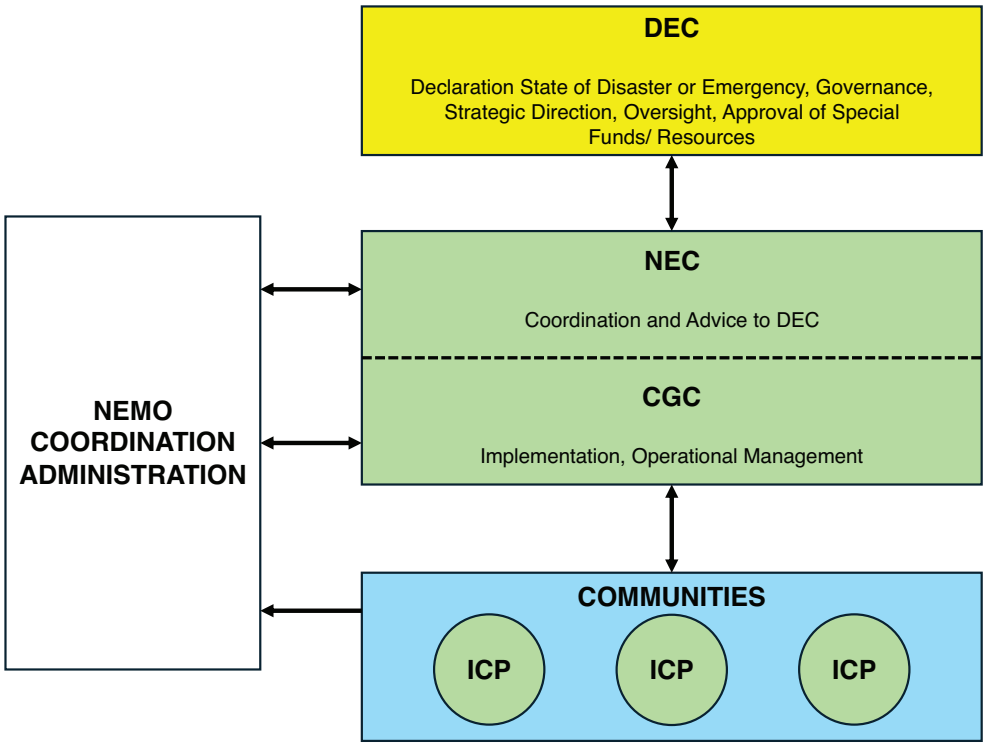


Figure 51: Palau's Disaster Management Hierarchy

coordination in times of emergency.[27]

The NEC can recommend to the President, through the DEC, that a state of emergency be declared in all or part of affected or potentially affected areas. The declaration must be confirmed by the Palau National Congress within 10 days if it is to continue beyond the initial 10-day period. State governors can declare a state of emergency covering only their state. In the event of an emergency, NEMO coordinates disaster response and recovery and acts under the oversight of the NEC.[28] At the national level, the NEC convenes the NEOC, located at the NEMO office, for declared multisectoral, multi-hazard emergencies. Individual agencies, including the Ministries of Health and Human Services, of Public Infrastructure, Industries, and Commerce (Airport), and others also maintain their own EOCs that can take lead or supporting roles under the NEOC. The national point of contact (the NEMO executive director) is available 24-hours-a-day for coverage of emergency operations.

In the case of a disaster that is limited to a single state, the National Coordinator will consult the governor of that state and, if necessary, designate the governor as a State Coordinator. In such instances, the State Coordinator will liaise with the NEOC and the National Coordinator for national-level support. The NEMO Coordinator, as the designated National Disaster Coordinator, assumes overall control and coordination responsibilities for the duration of any declared national disaster in support of the NEC. Whenever necessary, the National Disaster Coordinator may co-opt additional support through a CCG for the implementation and management of disaster response operations. Membership of the CCG depends on the nature of the disaster event.

The Palau government has integrated an incident command system into disaster management. An Incident Commander will manage a disaster or emergency on-site. The first responding agency representative to arrive, regardless of whether that individual is the most qualified, shall create a command post, and this official serves as the Incident Commander and has operational control of the site until replaced by an official from the relevant agency suited to a given event. The Incident Commander immediately establishes communication with the NEMO Coordinator and NEOC. The command post shall be formed as near as practical to the site of the disaster.[29]

The National Disaster Risk Management Framework (NDRMF) outlines the national risk profile in detail, explains the roles and responsibilities of each member of the NEC, and lists response agencies with lead or supporting roles during declared emergencies and disasters.[30] NEMO acts as the secretariat for the NEC and is involved in all aspects of NDRMF implementation. The key objectives of the NDRMF are to:

- Establish organizational arrangements that maximize the use of available resources to strengthen mitigation, preparedness, response, and relief and recovery planning for natural hazards
- Promote integrated planning and collaboration for risk management across all levels of government, departments, sectors, and communities
- Integrate CCA and disaster management into national and sectoral planning and strategy.[31]

The Community Based Disaster Risk Reduction (CBDRR) toolkit provides Palau's communities with a common platform for coordinating and addressing risk management. It describes mitigation roles across the whole community with an emphasis on the participation of the most vulnerable – e.g., persons with disabilities, impoverished people, women, the elderly, and youth – and it addresses how to lessen the impact of disasters by employing tools such as identifying hazards, vulnerabilities, and capacities and developing and applying risk reduction measures to reduce loss of life and protect property and social and economic structures. The Toolkit encourages the formation of hamlet-level emergency committees that take advantage of the formal and informal organizations found in these communities and to offer local expertise that can be brought to bear

in the absence of or before the arrival of national- or state-level training or assistance.[32]

The Ministry of Finance is the national designated authority and focal point for Green Climate Fund (GCF) projects and communications.[33] The Ministry's Bureau of Budget and Planning holds responsibility for programming economic, social, and environmental initiatives and funds. The Ministry's Energy and Water Administration is the focal point for the Nationally Determined Contributions (NDC) under the UNFCCC. Formerly housed in the Ministry of Finance, the national Office of Climate Change sits within the Office of the President.[34] The Office's primary roles are:

- To mainstream climate change in national government plans and strategies
- To coordinate and report on the implementation of the Climate Change Policy Framework.[35]

Finalized in 2015, the Palau Climate Change Policy outlines strategic priorities for adapting to the impacts of climate change, preparing for and responding to disasters, and reducing the country's GHG emissions. The policy reflects on the principles laid out in the NDRMF and builds on commitments to increase contributions to renewable energy and decrease energy consumption. There is a detailed list of strategies for various sectors including the disaster preparedness and DRR crosscutting sphere.[36] The Policy was informed by input from communities, civil society, and other stakeholders, and it established the National Appropriate Mitigation Actions and National Adaptation Plan as well as the institutional and policy frameworks for climate change mitigation, CCA, and risk reduction and management.[37] The policy was slated for revision in 2020, but no new policy had been constructed as of 2023.

To meet its Paris Agreement obligations under the UNFCCC, Palau submitted its NDC in April 2016 with the following key commitments:

- 22% energy sector emissions reductions below 2005 levels by 2025
- 45% renewable energy target by 2025
- 35% energy efficiency target by 2025.[38]

Palau has also published its National Infrastructure Investment Plan (NIIP) for the period 2021-2030; the plan outlines policies, priorities, and plans for major infrastructure investments that will help recover and develop the economy and society in the wake of the COVID-19 pandemic. The NIIP guides a review of investments across sectors of the economy from agriculture and education to utilities and all forms of transportation.[39]

National Emergency Management Office (NEMO)
P.O. Box 100, Koror, Palau
Tel: 680 587-6366/6367
Email: *nemo@palaugov.org*

Office of Climate Change
Tel: 680 767-8681
Email: *erbai.oerc@palaugov.org*

Early Warning Systems

The U.S. NWS, through its office on Koror and with oversight from the NWS office in Guam, has responsibility for overall meteorological observations, predictions, and announcements for Palau.[40] Through the NWS Pacific Region, Palau is also covered by the Pacific Tsunami Warning Center and International Tsunami Information Center, which delivers information and education to build preparedness.[41]

The country has no comprehensive natural disaster early warning system. The national radio stations, including private media, serve as important communication links with the community at large. Outlying states and remote areas are warned and or alerted through designated HF radios.[42] Palau also has "Chatty Beetles," which are portable iridium satellite terminals that allow text-based alerts and messages about potential weather hazards in remote locations. The devices are built to withstand harsh, humid conditions, and they run on a wide variety of batteries for ease of use.[43] Since 2009, USAID has supported NOAA's deployment of Chatty Beetles for emergency managers throughout the region, including in

Palau.[44]

The National Disaster Coordinator is tasked with ensuring that all messages are screened, and only urgent or essential service messages are broadcast throughout the stages of the emergency activation process. All broadcast requests related to operations are expected to be channeled through the NEC for authorization. To ensure only accurate and relevant information is broadcast and the public is not confused, the preparation of messages is the responsibility of the Public Information Officer provided by the Office of the President. Tropical Cyclone warning messages issued by the NWS are excluded from these procedures and may be broadcast as and when received through appropriate protocols.[45]

The WMO Climate Risk and Early Warning Systems (CREWS) Pilot Project has installed a low-cost, low-tech early warning system that consists mainly of bells placed around Ngaraard, Ngiwal, and Kayangel. The Palau NWS has the lead for implementation in partnership with NEMO and the Palau Red Cross, the latter of which is partnering with the Palau Meteorological Service to conduct table-top exercises and drills to familiarize host communities with the system.[46]

Weather Service Office, Palau

P.O Box 520, Koror, Republic of Palau 96940-0520
Tel: 680 587-1033
Recorded Forecast: 680 587-1103 (English) or 680 587-1104 (Palauan)

Infrastructure

The Ministry of Public Infrastructure, Industries, and Commerce oversees most areas of transport infrastructure and regulation. State authorities generally maintain control over airfields, ports, and roads within their jurisdiction. The Bureau of Aviation operates the main international airport.

The main airport, Roman Tmetuchl International Airport, is operated under the U.S. Federal Aviation Administration and U.S. air traffic control. The small airfields on Peleliu and Angaur are managed and operated by their respective states.[47] The international airport sits at 54 m (175 feet) of elevation and has two runways - #9: 2,195 × 60 m (7,201 × 197 feet); and #27: 2,195 × 60 m (7,201 × 197 feet). It has a total aircraft parking area of 25,000 m^2 (269,000 square feet) and four hard stands on the North Apron.[48] There is no record of the strips on Peleliu or Angaur having been resealed, and their pavements were in extremely poor condition as of 2021.[49]

Palau has dozens of docks and marinas throughout the country with 30 being regularly maintained and served. Ten of these docks and marinas are located in the main commercial district of Koror while the others are found throughout the other states. With the exception of the main port of Malakal (Koror), the facilities are used by small boats. There are upwards of 600 small (up to 20 m or 65 feet long) passenger and cargo boats that ply the islands.[50]

Palau has approximately 85 km (52 miles) of highways and approximately 36 km (22 miles) of unsealed roads, and most have been assessed as being in good condition. U.S. Army engineers undertake some of the road construction and maintenance, and one of their roads is the Babeldaob main loop, which is mainly inland and significantly above sea level except in the eastern sector near Karaeru, where the road crosses a low lagoon area by causeway. Peleliu and Angaur each have a small road network. Peleliu has approximately 4 km (2.5 miles) of sealed road from the port to the main town; the rest is unsealed. Causeways between Koror, Meyuns, and Malakal are the only road connections among the southern Babeldaob islands. Access from the main island of Babeldaob to Koror is by way of a suspension bridge,[51] completed in 2002 by Japan's Kajima Corporation.[52]

The Palau Energy Administration (PEA), a department within the Ministry of Public Infrastructure, Industries and Commerce, in collaboration with the Palau Public Utilities Corporation (PPUC), a public corporation owned by the government, is responsible for management, implementation, and maintenance of new energy projects and infrastructure. PEA is

the regulatory authority for energy production, purchase, and sale. PPUC is responsible for all remaining aspects of electricity generation, transmission, and distribution. PPUC is also responsible for water and wastewater systems.

There are upwards of 8,000 PPUC electricity meters throughout the country.[53] The country's total installed electric generation capacity stands at 28 MW to meet a peak demand of 14 MW. The country reports that 100% of the population has access to the electric grid with generation dominated by diesel (97.5%).[54] There are five main conventional power plants supplying electricity. The two largest are the Malakal (15.5 MW) and Aimeliik (10 MW) stations on Koror and Babeldaob, respectively. The other three (Angaur, Peleliu, and Kayangel) have a combined capacity of 2.8 MW.[55] PPUC's transmission system includes an 80-km (50-mile) 34.5-kilovolt (kV) tie link between the Malakal and Aimeliik generating stations. It is a single circuit line, supported on concrete poles. Transmission lines also connect to twelve 34.5/13.8-kV step-down stations.

As of 2021, the water system serviced about 98.9% of the urban population and 86.2% of the rural population, or 96% of the total population.[56] There are 15 public water supply systems that rely on surface water intakes and four that rely on groundwater. The Koror/Airai Water Treatment Plant, the country's largest water treatment plant, is in Ngeruobel, Airai State; it delivers clean (drinking) water to the states of Koror and Airai.[57] Ngarchelong State at the very north of Babeldaob island has two treatment plants and a pumping facility, the latter at Ollei. Ngaraard, also in northern Babeldaob, has a treatment plant and pumping station at Olema and another plant at Ngeklau. In Babeldaob's northwest, Ngardmau's treatment plants are fed by dam intakes with treatment plants at Ngardmau and Imeong. Additional treatment plants are located at Ngerengel, Ibobang, Ngatpang, Ngchesar, Melekeok, Aimeliik, and Mongami.[58] Regardless of access to piped or treated water, almost every household has some type of rainwater catchment system, ranging from plastic-lined steel barrels to aluminum tanks to constructed cement tanks.[59]

In 2015, more than 42% of homes in Koror and Melekeok were connected to the public sewer system while 43% used on-site septic systems. Koror has a centralized sewerage system servicing more than 80% of the Koror population. The network comprises 40 km (25 miles) of gravity mains, 13 km (8 miles) of force (pumped) mains, 46 pump stations, and a sewage tertiary treatment plant on Malakal, which, along with Ngerekebesang (Meyuns town), is fully served by the Koror network, built in the mid-1970's and in poor condition as of 2021.[60] The Melekeok sewage treatment plant services the Capital Building and the surrounding village.[61]

Bureau of Aviation
P.O. Box 1471, Koror, Republic of Palau 96940
Tel: 680 587-3539
Email: *mpiicoffice@gmail.com*

Palau Public Utilities Corporation
Oldiais Building, PO Box 1372, Koror, Palau 96940
Tel: 680 488-3870

Civil Society Partners

The Palau Red Cross, NGOs, and community organizations that may be in a position to augment government efforts toward DRR and CCA coordinate with NEC.[62] Nearly every state has a youth, men's, or women's group that provides a structure to community work – e.g., coastal maintenance or constructions, community clean-up, farm-to-market facilitation, educational advocacy, and observance of rituals. Many of them promote nature-based solutions to climate change-influenced challenges and participate in conservation and remediation activities.[63]

The Belau Association of Non-Governmental Organization (BANGO) is an umbrella that collects and maintains information on NGOs operating in the country, and it serves as a facilitator or bridge between local and international organizations. Founded in 2018, it coordinates activities and provides networking opportunities so that NGOs, civil society, and

the public and private sectors can work on various development projects and build capacity nationally. It can serve as a hub for information sharing and provide a common voice for Palau's NGO community at regional venues. Given the challenges of many of Palau's small, local NGOs in accessing information and connectivity, BANGO tries to serve as a trusted resource for both local communities and external partners.[64]

Belau Association of Non-Governmental Organization

PO Box 3090, Koror, Palau 97940
Tel: 680 775-3214
Email: *bango.palau@gmail.com*

A resolution within the Palau Congress founded the Palau Red Cross Society (PRCS) in 1997, and the organization became a recognized member of International Committee of the Red Cross (ICRC) and IFRC later that year. An auxiliary of the government, PRCS' mandate is to serve the most vulnerable, alleviate human suffering, and contribute to the promotion of human dignity and peace. The main office is in Koror, and there are PRCS volunteers throughout the islands.[65] In addition to the standard Red Cross activities of operating the blood bank and providing FirstAid and CPR training, PRCS responds to disasters with volunteers who are trained and equipped to undertake rapid assessments and deliver relief items to affected people.[66] PRCS can activate its EOC in times of emergency, and it uses this hub for communications and coordination. PRCS has stood up response teams in each of the 16 states, and volunteers maintain a storage space with a truck, telephones and hand-held radios, Automated External Defibrillators (AED), and other materials. PRCS facilities are located at the NEMO office and at Palau Community College and are maintained in partnership with the U.S. armed forces' Civic Action Team.[67]

Palau Red Cross Society

First Floor of the OEK Building, Across Ernguul Park
P.0. Box 6043, Koror, Republic of Palau 96940
Tel: 680 488-5780 / 5781
Mobile: 680 775-PRCS (7727)
Email: *info@palauredcross.org*

The Pacific Island Health Officers' Association (PIHOA) was established in 1986 by the health officials of the six U.S.-Affiliated Pacific Islands (USAPI) - American Samoa, Guam, the Northern Marianas, FSM, Marshall Islands, and Palau. PIHOA was intended to provide a regional, collective voice for advocacy and policymaking to address common health concerns to strengthen local and regional health system capabilities, capacities, and community resilience. It supports partnership engagement and provision of technical assistance to USAPI health departments and ministries. PIHOA membership comprises the six USAPI chief health officials, their deputies, Micronesia State directors, chief executive officers of USAPI public hospitals, and 13 Pacific regional professional associations, USAPI academic institutions, and development partners.[68]

Palau Ministry of Health

P.O. Box 6027, Koror, Palau 96940
www.palauhealth.org

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Palau Notes

1 World Bank Group. Asian Development Bank. Climate Risk Country Profile. Palau. 2021. https://climateknowledgeportal.worldbank.org/sites/default/files/2021-06/15820-WB_Palau%20Country%20Profile-WEB.pdf

2 Foster, Sophie, et al. Palau. Encyclopedia Britannica. 18 November 2023. https://www.britannica.com/place/Palau

3 CIA World Factbook. Palau – Geography. https://www.cia.gov/the-world-factbook/countries/palau/#geography

4 CIA World Factbook. Palau – map. https://www.cia.gov/the-world-factbook/static/maps/PS-map.jpg

5 Radio New Zealand. Palau – a brief history. Accessed 7 December 2022. https://www.rnz.co.nz/collections/nff-palau/about-palau

6 Shuster, Donald Raymond, and Sophie Foster. Palau -History. Encyclopedia Britannica. Last updated 21 October 2022. https://www.britannica.com/place/Palau

7 Honorary Consulate-General of Palau in Belgium. History of Palau. Accessed 7 December 2022. https://www.palauconsulate.be/index.php/en/about-palau/history-of-palau

8 BBC. Palau Profile – timeline. 11 June 2018. https://www.bbc.com/news/world-middle-east-15446663

9 Shuster, Donald Raymond, and Sophie Foster. Palau - History. Encyclopedia Britannica. Last updated 21 October 2022. https://www.britannica.com/place/Palau

10 Honorary Consulate-General of Palau in Belgium. History of Palau. Accessed 7 December 2022. https://www.palauconsulate.be/index.php/en/about-palau/history-of-palau

11 BBC. Palau Profile – timeline. 11 June 2018. https://www.bbc.com/news/world-middle-east-15446663

12 Shuster, Donald Raymond, and Sophie Foster. Palau - History. Encyclopedia Britannica. Last updated 21 October 2022. https://www.britannica.com/place/Palau

13 Office of Planning and Statistics Republic of Palau. 2020 Census of Population and Housing of the Republic of Palau Volume 1: Basic Tables. August 2022. https://www.palaugov.pw/executive-branch/ministries/finance/budget-andplanning/census-of-population-and-housing/

14 CIA World Factbook. Palau. Page last updated 2 December 2022. https://www.cia.gov/the-world-factbook/countries/palau/#people-and-society

15 Government of Palau. Palau Community Based Disaster Risk Reduction Toolkit. September 2016. https://spccfpstore1.blob.core.windows.net/digitallibrary-docs/files/0a/0aae3a2b9dd243092356f8c2f1c5fbf8.pdf?sv=2015-12-11&sr=b&sig=ZbZUx%2BDb1cxXu-aiK- 7PYq91FxNjyECzleaA6cIwGNmpw%3D&se=2023-05-05T12%3A18%3A11Z&sp=r&rscc=public%2C%20max-age%3D864000%2C%20max-stale%3D86400&rsct=application%2Fpdf&rscd=inline%3B%20filename%3D%2221_Palau_Community_Based_DRR_Toolkit.pdf%22

16 United Nations Human Rights Office of the High Commissioner and the Pacific Community. Human Rights in the Pacific: A Situational Analysis. 2020. https://spccfpstore1.blob.core.windows.net/digitallibrary-docs/files/d7/d7971c6266aa416a94f62b68a704ca97.pdf?sv=2015-12-11&sr=b&sig=9cwx351hu%2BKlORJMCIr-J4M6ytx5Iw%2B5GvZup33dNOpM%3D&se=2023-05-01T20%3A30%3A38Z&sp=r&rscc=public%2C%20max-age%3D864000%2C%20max-stale%3D86400&rsct=application%2Fpdf&rscd=inline%3B%20filename%3D%22Human_rights_in_the_Pacific_a_situational_analysis_2020.pdf%22

17 Shuster, Donald Raymond, and Sophie Foster. Palau - History. Encyclopedia Britannica. Last updated 21 October 2022. https://www.britannica.com/place/Palau

18 NOAA. El Niño and its impacts on the Republic of Palau. 19 November 2015. https://reliefweb.int/report/palau/el-ni-o-and-its-impacts-republic-palau

19 World Bank Climate Change Knowledge Portal. Palau – Country Summary. https://climateknowledgeportal.worldbank.org/country/palau

20 NOAA. El Niño and its impacts on the Republic of Palau. 19 November 2015. https://reliefweb.int/report/palau/el-ni-o-and-its-impacts-republic-palau

21 Michael P and Jaensch R. 2014. Directory of Wetlands of Palau - 2014. Report to the Secretariat of the Pacific Regional Environment Program (SPREP). https://www.sprep.org/attachments/Publications/BEM/Directory_Wetlands_Palau_2014.pdf; NOAA. Global Historical Climate Network Daily. NOAA National Centers for Environmental Information. 2020. https://www.ncdc.noaa.gov/ghcn-daily-description; Miles, W.Z., et al. Climate Change in Palau: Indicators and Considerations for Key Sectors. Report for the Pacific Islands Regional Climate Assessment. East-West Center, Honolulu, HI. 28 October 2020. https://reliefweb.int/report/palau/climate-change-palau-indicators-and-considerations-key-sectors

22 Asian Development Bank. Report and Recommendation of the President to the Board of Directors: Proposed Policy-Based Loan Republic of Palau: Disaster Resilience Program. September 2018. https://www.adb.org/sites/default/files/project-documents/52018/52018-001-rrpen.pdf

23 UN OCHA. Palau: Humanitarian Coordination Structure. 18 October 2022. https://reliefweb.int/report/palau/palau-humanitarian-coordination-structure-03-october-2022

24 IFRC. Resilience Library – Palau – Overview: Constitutional/Political Framework. Accessed 18 November 2022. https://www.rcrc-resilience-southeastasia.org/disaster-law/international-disaster-response-law-in-the-pacific/country-profiles/palau/palau-overview/

25 WHO. Joint external evaluation of IHR core capacities of the Republic of Palau: mission report, 29 July-2 August 2019. Geneva: World Health Organization; 2020. Licence: CC BY-NC-SA 3.0 IGO. https://www.who.int/palau/our-work

26 IFRC. Resilience Library – Palau – Overview: Constitutional/Political Framework. Accessed 18 November 2022. https://www.rcrc-resilience-southeastasia.org/disaster-law/international-disaster-response-law-in-the-pacific/country-profiles/palau/palau-overview/

27 Republic of Palau. NATIONAL DISASTER RISK MANAGEMENT FRAMEWORK 2010 (Amended 2016). August 2017. https://www.palaugov.pw/wp-content/uploads/2017/08/FINALIZED-NDRMF_2016.pdf

28 Asian Development Bank. Report and Recommendation of the President to the Board of Directors: Proposed Policy-Based Loan Republic of Palau: Disaster Resilience Program. September 2018. https://www.adb.org/sites/default/files/project-documents/52018/52018-001-rrpen.pdf

29 Republic of Palau. NATIONAL DISASTER RISK MANAGEMENT FRAMEWORK 2010 (Amended 2016). August 2017. https://www.palaugov.pw/wp-content/uploads/2017/08/FINALIZED-NDRMF_2016.pdf

30 WHO. Joint external evaluation of IHR core capacities of the Republic of Palau: mission report, 29 July-2 August 2019. Geneva: World Health Organization; 2020. Licence: CC BY-NC-SA 3.0 IGO. https://www.who.int/palau/our-work

31 Asian Development Bank. Report and Recommendation of the President to the Board of Directors: Proposed Policy-Based Loan Republic of Palau: Disaster Resilience Program. September 2018. https://www.adb.org/sites/default/files/project-documents/52018/52018-001-rrpen.pdf

32 Government of Palau. Palau Community Based Disaster Risk Reduction Toolkit. September 2016. https://spccfpstore1.blob.core.windows.net/digitallibrary-docs/files/0a/0aae3a2b9dd243092356f8c2f1c5fbf8.pdf?sv=2015-12-11&sr=b&sig=ZbZUx%2BDb1cxXuaiK-7PYq91FxNjyECzleaA6cIwGNmpw%3D&se=2023-05-05T12%3A18%3A11Z&sp=r&rscc=public%2C%20max-age%3D864000%2C%20max-stale%3D86400&rsct=application%2Fpdf&rscd=inline%3B%20filename%3D%2221_Palau_Community_Based_DRR_Toolkit.pdf%22

33 Green Climate Fund. Republic of Palau. https://www.greenclimate.fund/countries/palau

34 Green Climate Fund. Readiness Proposal with the Pacific Community (SPC) for the Republic of Palau. 23 June 2023. https://www.greenclimate.fund/sites/default/files/document/20230623-plw004-ap.pdf

35 Government of Palau. Bureau of Budget and Planning. Accessed 20 November 2023. https://www.palaugov.pw/executive-branch/ministries/finance/budgetandplanning/

36 UNDRR (2022). Disaster Risk Reduction in the Republic of Palau: Status Report 2022, United Nations Office for Disaster Risk Reduction (UNDRR), Sub-Regional Office for the Pacific. https://www.undrr.org/publication/disaster-risk-reduction-republic-palau-status-report-2022

37 Republic of Palau. Intended Nationally Determined Contribution. November 2015. https://unfccc.int/sites/default/files/NDC/2022-06/Palau_INDC.Final%20Copy.pdf

38 Pacific Environment Data Portal. Nationally Determined Contribution (NDC) – Palau. SPREP. 6 April 2020. https://pacific-data.sprep.org/dataset/nationally-determined-contribution-ndc-palau

39 PRIF. Palau National Infrastructure Investment Plan 2021-2030. https://www.theprif.org/document/palau/national-infrastructure-investment-plans/palau-national-infrastructure-investment

40 National Weather Service. Palau. U.S. Department of Commerce. https://www.weather.gov/gum/Palau

41 National Weather Service. WSO Palau. https://www.weather.gov/gum/WSOPalau

42 Republic of Palau. NATIONAL DISASTER RISK MANAGEMENT FRAMEWORK 2010 (Amended 2016). August 2017. https://www.palaugov.pw/wp-content/uploads/2017/08/FINALIZED-NDRMF_2016.pd

43 Red Cross Red Crescent Climate Centre. Community-based Early Warning Early Action (EWEA) in the Pacific: Findings from Palau. 31 July 2022. https://www.climatecentre.org/wp-content/uploads/RCCC-Pacific-Palau-report-Final.pdf

44 USAID/BHA. Pacific Islands Assistance Overview. March 2022. https://www.usaid.gov/sites/default/files/documents/USAID-BHA_Pacific_Islands_Assistance_Overview-March_2022.p

45 Republic of Palau. NATIONAL DISASTER RISK MANAGEMENT FRAMEWORK 2010 (Amended 2016). August 2017. https://www.palaugov.pw/wp-content/uploads/2017/08/FINALIZED-NDRMF_2016.pdf

46 SPREP. Building Resilience In Palau Through Early Warning Systems. 22 September 2022. https://reliefweb.int/report/palau/building-resilience-palau-through-early-warning-systems

47 Unusual Traveler. How to Get to Palau Island & Everything You Need to Know. 7 March 2022. https://www.unusualtraveler.com/everything-you-need-to-know-before-going-to-palau/#How_To_Travel_Around

48 LogCluster. Palau International Airport – Roman Tmetuchl International Airport. April 2018. https://dlca.logcluster.org/pages/releaseview.action?pageId=15139172

49 Pacific Region Infrastructure Facility. Palau National Infrastructure Investment Plan 2021-2030; Appendix 5 – Infrastructure Condition Assessment Results. June 2021. https://www.theprif.org/document/palau/national-infrastructure-investment-plans/palau-national-infrastructure-investment

50 UNESCAP. Strengthening Inter-Island Shipping and Logistics in the Pacific Island Countries; Palau Country Report. https://www.unescap.org/sites/default/files/0.Palau_.pdf

51 LogCluster, Palau Road Network. April 2018. https://dlca.logcluster.org/display/public/DLCA/2.3+Palau+Road+-Network

52 Dywidag Formties. New 411 m long extradosed stay cable bridge in the Republic of Palau. https://www.dywidag-formties.com/projects/2003-info-11/new-411-m-long

53 Pacific Region Infrastructure Facility. Palau National Infrastructure Investment Plan 2021-2030; Appendix 5 – Infrastructure Condition Assessment Results. June 2021. https://www.theprif.org/document/palau/national-infrastructure-investment-plans/palau-national-infrastructure-investment

54 Energy Transitions Initiative. Palau Energy Snapshot. U.S. Department of Energy. 18 May 2020. https://www.energy.gov/sites/default/files/2020/09/f79/ETI-Energy-Snapshot-Palau_FY20.pd

55 IRENA, Republic of Palau: Renewable energy roadmap 2022-2050, International Renewable Energy Agency, Abu Dhabi. 2020. https://www.irena.org/publications/2022/Jun/Republic-of-Palau-Renewable-Energy-Roadmap

56 Pacific Region Infrastructure Facility. Palau National Infrastructure Investment Plan 2021-2030; Appendix 5 – Infrastructure Condition Assessment Results. June 2021. https://www.theprif.org/document/palau/national-infrastructure-investment-plans/palau-national-infrastructure-investment

57 Secretariat of the Pacific Islands Applied Science Commission. National Integrated Water Resource Management Diagnostic Report: Republic of Palau. November 2007. https://www.sprep.org/att/IRC/eCOPIES/Countries/Palau/25.pdf

58 Pacific Region Infrastructure Facility. Palau National Infrastructure Investment Plan 2021-2030; Appendix 5 – Infrastructure Condition Assessment Results. June 2021. https://www.theprif.org/document/palau/national-infrastructure-investment-plans/palau-national-infrastructure-investment

59 Pacific Community. Water, Sanitation Program: Republic of Palau. 2007. http://www.pacificwater.org/pages.cfm/country-information/republic-of-palau.html

60 Pacific Region Infrastructure Facility. Palau National Infrastructure Investment Plan 2021-2030; Appendix 5 – Infrastructure Condition Assessment Results. June 2021. https://www.theprif.org/document/palau/national-infrastructure-investment-plans/palau-national-infrastructure-investment

61 Secretariat of the Pacific Islands Applied Science Commission. National Integrated Water Resource Management Diagnostic Report: Republic of Palau. November 2007. https://www.sprep.org/att/IRC/eCOPIES/Countries/Palau/25.pdf

62 Republic of Palau. NATIONAL DISASTER RISK MANAGEMENT FRAMEWORK 2010 (Amended 2016). August 2017. https://www.palaugov.pw/wp-content/uploads/2017/08/FINALIZED-NDRMF_2

63 JICA. Introduction of Palauan NGO/NPO/CBOs. https://www.jica.go.jp/palau/english/office/others/ngo_npo_cbos.html

64 JICA. BANGO. https://www.jica.go.jp/palau/english/office/others/j1v953000000r42x-att/ngo_npo_cbos_01.pdf

65 Palau Red Cross Society. About Us. Accessed 21 November 2022. https://palauredcross.org/about

66 Palau Red Cross Society. Disaster Preparedness and Response. Accessed 21 November 2022. https://palauredcross.org/disaster-preparedness.html

67 Palau Red Cross Society. 2020 Annual Report. https://palauredcross.org/pdf/PRCS-Annual-Report-2020.pdf

68 PIHOA. About PIHOA. https://www.pihoa.org/mission-history-strategic-plan/

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Papua New Guinea

Papua New Guinea (PNG) is an island country in the southwestern Pacific Ocean. It encompasses the eastern half of New Guinea, the Bismarck Archipelago (New Britain, New Ireland, the Admiralty Islands, and several others), Bougainville and Buka (part of the Solomon Islands chain), and small offshore islands and atolls. PNG has a total land area of 462,840 km^2 (178,703 square miles).[1] Figure 52 shows the map of PNG.[2]

There are thought to have been people settling on the island of New Guinea as early as 50,000 years ago, and by 7000 BCE, agricultural societies had developed. The island was well known to regional seafarers for centuries before it came to the attention of Europeans.[3] In 1884, Germany declared a protectorate - and eventually a colony - over the northern part of what would become PNG and named it "German New Guinea." Britain followed suit on the southern part of the island and on nearby islands and called this colony "Papua." Britain placed Papua under Australian administration formally in 1906. Australian forces displaced the German authorities early in World War I, and Australian rule continued after the war under a mandate from the League of Nations. During World War II, Japan invaded. Allied victories during the New Guinea campaign pushed out the Japanese, and after the end of the war, Australia combined the two territories into the Territory of Papua and New Guinea, administered from Canberra via Port Moresby.[4] A Territorial House of Assembly was formed; self-government was achieved on 1 December 1973 and full independence from Australia on 16 September 1975. From 1973, secessionist movements emerged, and the Bougainville secessionist movement eventually erupted in conflict in 1988. In subsequent years, it escalated, and the resulting civil war saw up to 20,000 deaths.[5] A peace agreement signed in 2001 granted Bougainville autonomy, and regional peace monitors were withdrawn in 2003.[6] Although there has been no further open conflict, there is a lack of consensus between Port Moresby and Bougainville on the path forward.[7]



Figure 52: Map of Papua New Guinea

PNG has a population of 9.3 million, according to United Nations Population Fund (UNFPA) estimates for 2022.[8] The last Census was conducted in 2011 and counted 7,275,324 people.[9] PNG's ethnic makeup is diverse and complex, although most people are classified as Melanesian. Very small minorities of Micronesian and Polynesian societies can be found on some of the outlying islands and atolls.[10]

PNG is a constitutional, federal, multiparty, parliamentary democracy.[11] As a constitutional monarchy, PNG's Head of State is the British Monarch, represented by the Governor General Grand Chief who is nominated by Parliament for a term of six years. The Head of Government is the Prime Minister.[12] Administratively, the country is divided into four regions and 22 provincial-level divisions. Below the provincial level are 96 districts, 326 local-level governments, and 6,118 wards.[13]

Significant political authority resides with the Council of Elders, an official local governing authority.[14]

Hazards and Climate Change

PNG faces earthquakes, tsunamis, volcanic activity, cyclones, flooding, landslides, and droughts. External drivers such as climate change and internal pressures such as rapid population growth, unregulated and destructive land use practices, and infrastructure development are exacerbating natural hazard risks. Additionally, the impact of hydrometeorological hazards is projected to grow more severe as a result of climate change. Several low-lying small islands of PNG are experiencing more frequent storm surges due to sea level rise, and about one-fifth of the land in PNG is subject to inundation.[15]

PNG's climate is one of hot tropical humidity year-round with slight seasonal temperature variation. The country experiences two distinctive seasons: wet (December to March) and dry (June to September). PNG's average monthly rainfall ranges 250–350 mm (9.8–13.7 inches), with average temperatures ranging 26–28°C (78.8-82.4°F).[16] Figure 53 graphs the monthly average minimum, mean, and maximum temperatures and average monthly precipitation for PNG for the period 1991-2022.[17]

PNG is among a grouping of small island developing states that are particularly vulnerable to the effects of marine climate change due to their proximity to the ocean and reliance on it for resources and transportation. Climate-related hazards faced by small island countries include temperature changes, tropical cyclone and storm surges, ocean acidification, sea level rise, and extreme sea level inundation and erosion.[18] In PNG, climate change is intensifying natural hazards such as flash floods, landslides, and coastal flooding. Extreme heat events are likely to increase as temperatures move closer to unsafe levels even under lower projected emission pathways. Minimum and maximum temperatures are expected to rise considerably faster than average temperatures, increasing the risks to human health and ecosystems. Moreover, the population in PNG affected by river flooding and its economic impact is projected to double by 2030.[19]

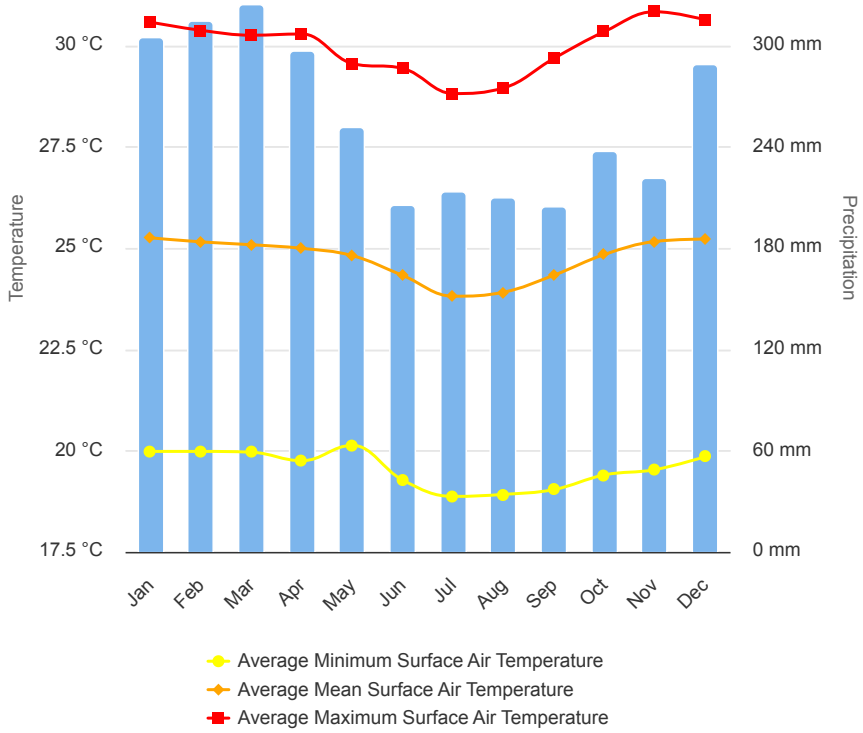


Figure 53: Monthly Average Temperatures and Precipitation for PNG (1991-2022)

Sea level rise is a pronounced climate change-induced risk for PNG, which faces more than double the global average annual sea level rise. Since 1994, the islanders of the seven atolls of the Carteret Islands have lost 50% of their land. The disappearance of traditional food sources has regularly placed the islanders in situations of near famine. The community additionally faces severe water shortages due to prolonged droughts and sea level rises that affect freshwater supply.

The World Bank's multi-model predictive analysis for PNG's climate future projects a trend of consistent warming that will be more pronounced

in the inland regions as compared to coastal areas. PNG's projected rates of warming are typically 20–30% lower than the global average. However, the World Bank analysis advises extreme caution in treatment of this prediction as maximum and minimum temperatures are projected to rise notably faster than average temperatures, suggesting a climate future that is less stable and more frequently heat stressed.[20] The World Bank's analysis of future precipitation has yielded uncertain results. The analysis did suggest the intensity of sub-daily extreme rainfall events might increase with temperature, consistent with evidence from other parts of the Asia-Pacific region.[21]

The impact of climate change in PNG will be significant given that over 85% of the population lives in rural areas and relies primarily on subsistence agriculture for survival.[22] Women are particularly vulnerable to the impact of climate change due to a lack of access to land, income, credit, and other resources, which impedes their ability to cope with climate stresses and disasters. PNG's population also lives in rugged mountainous terrain with limited access to basic infrastructure such as roads and bridges, which has hindered access to health care, education, and broader opportunities.[23] These challenges will become more pronounced with climate change-induced natural disasters. Infrastructure, fisheries, forestry, and agriculture sectors are projected to be the economic sectors most affected by climate change. PNG's unique biodiversity is also at risk with forest and reef losses. Moreover, the prevalence of vector-borne diseases, including malaria and dengue fever, will increase in hot and humid conditions, which allow mosquitos to thrive and breed for longer periods of time.[24] Table 18 details some of the phenomena that will be influenced by climate change and the potential impacts of changes.[25]

Government Institutions, Policies, and Plans for Disasters and Climate Change

PNG's disaster management framework is set out in the Disaster Management Act (DM Act) 1984 (revised 1987). The DM Act establishes the key institutional bodies for disaster management, including the National Disaster Committee, Provincial Disaster Committees, and the National Disaster Centre (NDC). The NDC is the lead agency responsible for disaster

Phenomenon	Trend	Projections	Impacts
Temperature	Annual mean temperature rise of 0.22°C (0.39°F) per decade (1943-2013); 0.13°C (0.23°F) increased maximum annual temperature per decade;	Annual mean temperature and extremely high daily temperatures will continue to rise; by 2030,	Impacts on vector- and water-borne disease incidence rates; overall reduction in human and agricultural productivity
Rainfall	Increase in number of warm days	under a very high emissions scenario, increase projected to be in the range of 0.5–1.1°C (0.9-1.98°F)	More frequent flooding and landslides
Sea level	Substantial years-on-year variation; little change in extreme daily rainfall	Average rainfall will increase in most areas, along with more extreme rain events; droughts projected to decline in frequency	Increase incidence of coral bleaching; higher wave heights impact coastal ecosystems
Cyclone	Rise of 7 mm (0.28 inches) per year since 1993	Sea level will continue to rise; no changes are expected in waves along the Coral Sea coast are projected, but on the northern coasts, December–March wave heights and periods are projected to decrease; by 2030, under a very high emissions scenario, rise projected in the range of 8–17 cm (3.15-6.69 inches)	Storm damage to reef systems allows stronger waves to reach shore; more wind damage, nuisance flooding, and coastal erosion

Table 18: Climate Change-Influenced Phenomena and Impacts in PNG

risk management and response. According to the DM Act, in the event of a disaster, the NDC as the executive of the National Disaster Committee is responsible for advising the National Executive Council (NEC) - i.e., the Cabinet[26] - on declarations of emergency and international relief requirements.[27] However, in practice the Government has utilized a separate mechanism during disasters, appointing an Emergency Controller to lead a disaster response pursuant to the emergency powers provisions of the Constitution.[28]

In August 2020, the Government announced the transfer of the NDC to the portfolio of the Minister of Defence, alongside the PNG Fire Service (PNGFS) and National Volunteer Service (NVS).[29] The PNG Defense Forces (PNGDF) provides assistance to civil disasters pursuant to the Constitution.[30] The NEC may require the PNGDF to assist as Emergency Controller during a National Emergency.[31]

At the national level, the National Disaster Committee and NDC are the lead government agencies in disaster response pursuant to the DM Act. At the provincial level, each province has at least a provincial disaster coordinator or an established provincial disaster center (PDC). For example, Madang province has an active PDC, which is responsive to the many hazards faced in the province including earthquake, tsunami, volcanic eruptions, and floods hazards.[32] At the district and local levels, if there is a mechanism dedicated to disaster management, it is likely a single person who is also charged with other administrative responsibilities. The NDC has no administrative authority over or connection with sub-national disaster management committees or disaster offices. Figure 54 demonstrates an ideal national disaster management structure for PNG.[33]

The NEC makes final decisions for any disaster policy matters. The NEC is guided by the National Disaster Committee, which is comprised of heads of key national government agencies who are vested with additional responsibility for disaster management pursuant to the DM Act.[34] The National Disaster Committee is comprised of the Secretary to the Department of the Prime Minister and NEC, Commander of the Defence Force, Commissioner of Police, and heads of various government departments including Defence, Police, Finance, Works, Health, Foreign Affairs, and Provincial and Local Governments. The Secretary of Defence has chaired the Committee since it was transferred to the defense portfolio

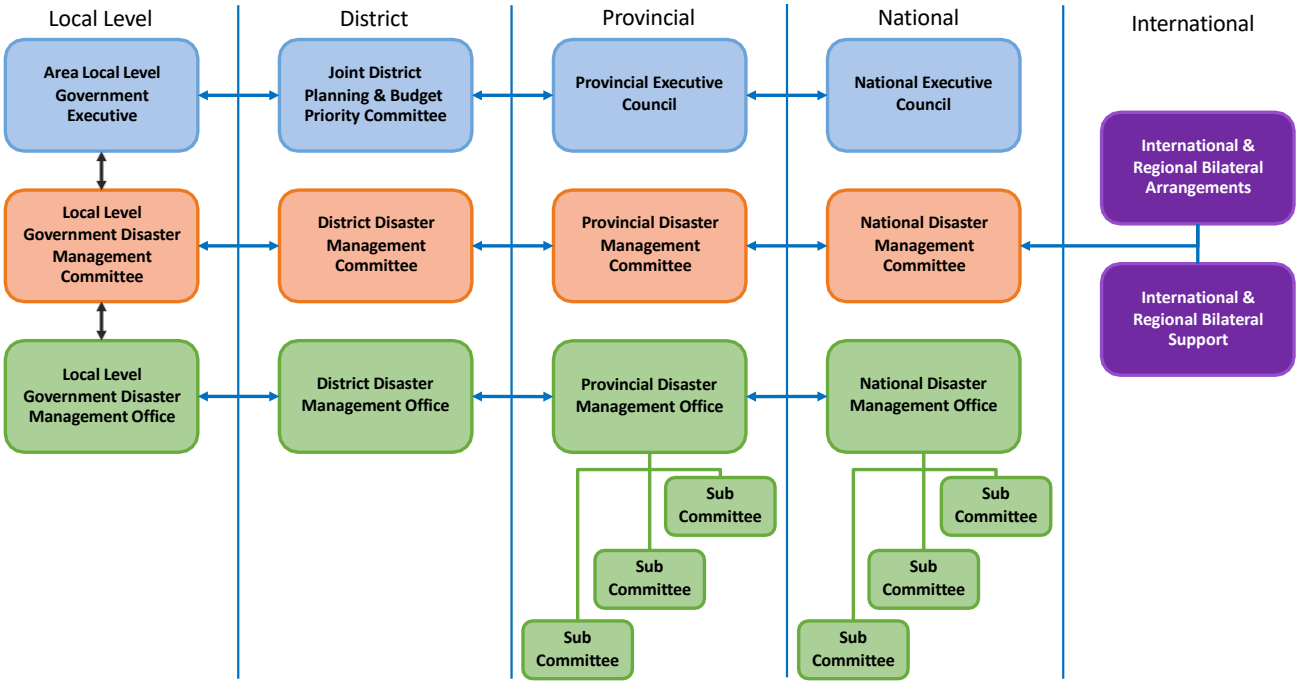


Figure 54: PNG National Disaster Management Structure

in late 2020. The Committee's responsibilities as stipulated in the DM Act are to:

- Supervise the national state of preparedness for emergencies and disasters and report on it to the NEC
- Maintain the National Emergency Plan
- Assign responsibilities for disaster-related activities to departments and other bodies
- Advise the NEC if assistance is required
- Lay down guidelines for the preparation and format of provincial disaster plans
- Approve grants
- Foster public awareness of the effects of natural hazards and measures which can be taken to reduce disaster effects
- Supervise establishment of stockpiles of relief supplies
- Advise the NEC of all the circumstances and on the advisability of declaring a National Emergency.[35]

There are two divisions at the NDC – Risk Management and Community Government Liaison. The Risk Management Division deals with proactive matters through research, analysis, awareness raising, education, and training, and the Community Government Liaison handles rapid response and operations. The NEC appoints the Director. The NDC has about ten staff at its highest level. It has the following mandate:

- To supervise the national state of preparedness for emergencies and disasters and to report on it to the NEC
- To maintain the National Disaster Management Plan of the NEC
- To assign responsibilities for disaster-related activities to departments and other bodies
- To coordinate departmental relief actions and collate national relief requirements
- To advise the NEC if appeal for international assistance is required
- To lay down guidelines for the preparation and format of provincial disaster plans
- To examine and, where necessary, approve all grants from national funds for emergency relief
- To foster public awareness of the effects of natural hazards and measures which can be taken to reduce disaster effects
- To supervise the establishment of stockpiles of relief supplies
- In the case of disaster, to advise the NEC of all the circumstances and on the advisability of declaring a National Emergency.[36]

The DM Act provides for the creation of Provincial Disaster Committees and their executive PDCs. Most provinces have at least a disaster coordinator and others have established PDCs. The membership of the Provincial Disaster Committees mirrors that of the National Disaster Committee and includes the Head of the Provincial Administration (Governor) as Chairman, the Provincial Police Commander, the Provincial Works Manager (or City Engineer), the Provincial Health Officer, the Officer-In-Charge of Provincial Affairs, the Officer-In-Charge of Delegated Functions, and the provincial Disaster Coordinator. The roles and functions of the Provincial Disaster Committees include:

- To provide and render advice to the Provincial Executive Council through the Governor to ensure that development plans for the province take into account hazards to which the province is prone
- To make assessments on particular hazards common in the province
- To prepare contingency plans for respective hazards and supervise the state of preparedness for emergencies in the province
- To foster public awareness on natural phenomena and mitigation measures
- To organize training of relief workers in the province.[37]

The National Disaster Risk Reduction Framework 2017-2030 (NDRRF) is the most up-to-date DM plan. The NDRRF was produced as a joint initiative between the NDC and UNDP to ensure that immediate and long-term disaster risk management challenges are addressed and planned action is aligned with the Sendai

Framework for Disaster Risk Reduction 2015-2030. The NDRRF outlines four priority areas: 1) understanding disaster risk, 2) strengthening disaster risk governance to manage disaster risk, 3) investing in disaster risk reduction for resilience, 4) enhancing disaster preparedness for effective response, and to "Build Back Better" in recovery, rehabilitation, and reconstruction. The NDRRF also sets the following seven targets to be achieved by 2030:

- lower average mortality rate per 100,000 between 2020-2030, compared to 2005-2015
- lower the average number of people affected by disasters per 100,000 between 2020-2030, compared to 2005-2015
- reduce direct disaster economic loss in relation to GDP by 2030
- reduce disaster damage to critical infrastructure and disruption of basic services between 2020-2030, compared to 2005-2015
- increase the number of provincial and local disaster risk reduction strategies
- enhance international cooperation
- increase the availability of and access to multi-hazard early warning systems.[38]

PNG ratified the UNFCCC in 1993. In 2016, PNG ratified the Paris Agreement. PNG also aligns itself with the Alliance of Small Island States in the context of the UNFCCC.[39] PNG submitted its Nationally Determined Contribution (NDC) to the UNFCCC in 2016 and 2020 and its first Biennial Update Report to the UNFCCC in 2019. These submissions outline PNG's climate change action towards meeting nationally determined emissions targets including mitigation and adaptation. PNG also pushed for greater commitments to protect rainforests at the 2021 COP26 held in Glasgow. Meanwhile, a variety of infrastructure investment plans seek to help the country move toward climate-resilient development; they include the Laitim Hauslain project for electrification, the Ports Infrastructure Investment Plan, and highways and solar plant plans in partnership with the Australian Infrastructure Financing Facility for the Pacific.[40]

In 2015, PNG enacted the Climate Change Management Act (CCMA) and established the Climate Change and Development Authority (CCDA). The CCDA is the coordinating entity for all climate change-related policies and actions in the country. Additionally, it is the designated national authority under the UNFCCC.[41] The Government has further mainstreamed addressing climate change into its development priorities, as captured in the national long-term political vision, plans, and strategies of PNG Vision 2050, the National Development Strategic Plan 2010-2030, and the Medium-Term Development Plan III. Most recently, the CCDA supported the government to develop PNG's Sustainable Development Goal 13 Climate Action Roadmap and the National Reducing Emissions from Deforestation and Forest Degradation (REDD)+ Strategy (NRS).[42]

PNG's commitment to adaptation for 2020-2030 will focus on the four priority development sectors of agriculture, health, transport, and infrastructure. The NDC 2020 identifies nine priority adaption areas: 1) coastal flooding and sea level rise, 2) inland flooding, 3) food insecurity, 4) cities and climate change, 5) climate-induced migration, 6) damage to coral reef, 7) malaria and vector-borne disease, 8) water and sanitation, and 9) landslides. A National Adaptation Plan is in development with the support of UNDP and its partner, Climate Law & Policy, an independent advisory organization.[43] However, national-level policy, financing, and governance mechanisms for DRR and climate change in PNG are not integrated. The Humanitarian Advisory Group published a case study of PNG in March 2022, which identified a lack of coordination between the CCDA as the lead on climate change and the NDC as the lead on DRR. The study found "that policies, frameworks and plans continue to remain separate and implementing agencies must work through separate coordination mechanisms, funding streams and government regulations."[44]

National Disaster Centre
P.O. Box 4970, BOROKO, National Capital District, Papua New Guinea
Tel: 675 3014700
Email: *info@pngndc.gov.pg*

Climate Change and Development Authority
P.O. Box 4017, BOROKO, 111 National Capital District, Papua New Guinea
Tel: 675 3414287
Email: *info@ccda.gov.pg*

Early Warning Systems

The Government recognizes that the country's vulnerability to disaster is increased by incomplete hazard information and shortcomings of the early warning arrangements and communication system. One of the seven targets under the NDRRF 2017-2030 is to increase the availability of and access to multi-hazard early warning systems and disaster risk information and assessments by 2030.[45]

PNG does not currently have a nationwide multi-hazard early warning system. The PNG National Weather Service (PNGNWS) undertakes hydro-meteorological monitoring and forecasting. The Geohazards Management Division under the Department of Mineral Policy and Geohazards Management (DMPGM) is responsible for monitoring geological hazards, including earthquakes, tsunamis, volcanic eruptions, landslides, and mass erosion events. The NDC receives hazard information from the PNGNWS and DMPGM and disseminates warnings through the radio. The NDC has a nationwide high-frequency radio communication network that links all 19 PDCs with the NDC Office. The network is integrated into the Department of Health national radio network, which covers the entire country down to the village level.[46] Alternate means of communication between the NDC and the PDCs include email and WhatsApp messaging.[47]

In 2015, the Government approved the country's hosting of the Regional Integrated Multi-Hazard Early Warning System (RIMES) Sub-Regional Hub for the Pacific and committed resources to establish the hub. The sub-regional hub was envisioned as a national integrated multi-hazard early warning system that also serves the region as RIMES Sub-Regional Hub. On 13 October 2016, six national institutions that have key roles in early warning in PNG signed a Memorandum of Agreement to collaborate for the establishment, capacity building, and sustainable operation of a National Multi-Hazard Early Warning System. These institutions were the DMPGM, PNGNWS, Conservation Environment Protection Authority, Department of Agriculture and Livestock, CCDA, and the NDC.[48]

The PNGNWS is a government institution and is the sole mandatory body in the country responsible for providing meteorological and climate information to the Government and people of PNG. PNGNWS is a member of the WMO. The PNGNWS monitors aviation weather and marine weather and provides hydrometeorological weather warnings.[49] The PNGNWS climate division is also developing a drought monitoring system through collaboration with the Australian Bureau of Meteorology and the WMO under the CREWS initiative.[50]

The Geohazards Management Division provides early warning of earthquakes, tsunamis, volcanic eruptions, landslides and mass erosion events and advice on mitigation to the NDC, other relevant authorities, and potentially affected communities, where possible. The Division has close links with other similar institutions, including the National Earthquake Information Service of the United States Geological Survey, Geoscience Australia, the Harvard University Seismological Group, the Comprehensive Nuclear Test-Ban Treaty Organization, and the Pacific Tsunami Warning Center. Three functional groups exist within this Division; the Engineering Geology group is responsible for the following:

- Monitoring of landside and mass erosion events
- Provision of advice to relevant authorities

on public safety issues following significant landslides and mass erosion events
- Field assessments of significant landslides and mass erosion events
- Strategic mapping and assessments of the potential hazards of landslides and mass erosion events
- Maintenance of databases holding information on landslides and mass erosion events
- Research into slope stability and mass erosion processes with the aim of improving monitoring and assessment capabilities
- Awareness programs concerning landslides and mass erosion hazards
- Provision of geotechnical advice to relevant authorities on major infrastructure development.[51]

National Weather Service

Located at Jackson's Airport, P.O Box 1240, Boroko, NCD, Papua New Guinea
Tel: 675 324 4588 or 325 5544
Email: *climate@pngmet.gov.pg*

Geohazards Management Division – Engineering Geology

Engineering Geology Branch
Tel: 675 321 4315
Email: *EG@mineral.gov.pg*

Infrastructure

The Department of Works (DOW) oversees infrastructure. It is the biggest government organization and the only government department with an office in every province.[52] PNG has 30,000 km (18,641 miles) of roads, 8,738 km (5,430 miles) of which are 'national' roads and the responsibility of DOW. All other roads are the responsibility of lower levels of government.[53] The most extensive road networks are in Central Western Highlands, Eastern Highlands, East Sepik, Madang, and West New Britain.[54]

National Airports Corporation, a state-owned enterprise, owns and operates 22[55] of PNG's 26 major airports serving its ordinary provinces as well as Buka Airport serving the Autonomous Region of Bougainville. The Port Moresby Jacksons International Airport is the largest airport.[56] The airport has four runways, two measuring 2,750 m (9,022 feet) in length each and two measuring 2,065 m (6,777 feet) in length each.[57] Cargo facilities have a capacity of 162,000 tons (357 million pounds) with a 600-m^2 (6,458-square foot) warehouse. It sits at an elevation of 45 m (146 feet).[58] Other airports and runways include:
- Nadzab (Morobe Province) – 73 m (239 feet) in elevation; runway is 2,440 x 30 m (8,005 x 98 feet)
- Tokua (East New Britain Province) – 8.5 m (28 feet) in elevation; runway is 1,720 x 28 m (5,643 x 92 feet)
- Wewak (East Sepik Province) – 6 m (19 feet) in elevation; runway is 1,595 x 6 m (5,234 x 19 feet)
- Mount Hagen (Western Highlands) – 1,642 m (5,388 feet) in elevation; runway is 2,190 x 30 m (7,185 x 98 feet)
- Madang (Madang Province – 6 m (20 feet) in elevation; runway is 1,577 x 32 m (5,174 x 105 feet)[59]

The state-owned PNG Ports Corporation Limited operates 16 large ports, 14 of which support both foreign and coastal shipping. Lae (Morobe Province) is the largest port, followed by Port Moresby.[60]

PNG Power Limited, a state-owned enterprise, supplies power to most urban centers and some adjacent rural areas. Hydropower stations generate much of the country's electricity, with the balance generated by thermal stations.[61] PNG's electricity access remains extremely low, with only an estimated 13% of PNG's population having access to grid-connected electricity.[62]

Water PNG is a state-owned enterprise with responsibility for the provision and management of water supply and sewage services throughout the country, with the exception of the National Capital District (NCD). Water PNG has 20 service reservoirs into which treatment plants feed before distribution through a reticulated

system. It also operates seven wastewater systems that range from septic tanks through treatment ponds and filters.[63] The NCD Commission Act of 1996 created NCD Water and Sewerage (trading as Eda Ranu) to take on the responsibility of supplying fresh water and sewage treatment within the NCD. In PNG, only 40% of people have access to safe drinking water. Families have to collect water from catchments and water sources that are far away, with the burden often falling on women and girls to collect water. Limited access to water has a significant impact on the operations of health care facilities.[64]

Department of Works
P.O. Box 1108, BOROKO 111, National Capital District, Papua New Guinea
Tel: 675 322 2500
https://www.works.gov.pg/

National Airports Corporation
Domestic Terminal, Jacksons, 1st Floor, Port Moresby
P.O. Box 684, Boroko, NCD, Papua New Guinea
Tel: 675 3244 700
Email: *nac_corporate_communications@nac.com.png*

PNG Ports Corporation Ltd.
P.O. Box 671, Port Moresby, Papua New Guinea
Tel: 675 308 4200

PNG Power Limited
Tel: 675 324 3200
Email: *info@pngpower.com.pg*

Water PNG
Marand Haus, PO Box 2779, Boroko, Port Moresby, National Capital District 111
Tel: 675 303 1600 or 675 7500 1600
Email: *enquiries@waterpng.com.pg*

Civil Society Partners

Churches are the largest and most prominent components of PNG civil society. They are service-delivery bodies, particularly in health and education, as well as religious centers. Under Papua New Guinea Vision 2050, the Government recognizes the central role of churches in remote areas, and external donors tend also to partner with PNG's faith-based organizations for development and humanitarian action.

The Papua New Guinea CSO Forum serves as the country's National Liaison Unit for PIANGO.

Papua New Guinea CSO Forum
PO Box 7973, Boroko, National Capital District, Papua New Guinea
72104545
Email: *phsaf@hotmail.com*

Adventist Development and Relief Agency - PNG is the national humanitarian organizational arm of the Seventh-day Adventist Church in Papua New Guinea. It is an implementing partner in delivering relief and development assistance.

ADRA PNG
Abel Tasman Street, Lae, Morobe Province , Papua New Guinea
Tel: 675 472 7088

Caritas Papua New Guinea is a commission of the Catholic Bishop's Conference of PNG and Solomon Islands. It serves as the relief, justice, peace, and development agency of the Catholic Church in PNG. Coverage spans 22 provinces with one coordinator in each. Through Church Partnership Program DRR funding, Caritas PNG carries out advocacy and risk management work. Its He Oranga Taurikura (HOT / A Thriving Life) program in Kundiawa, Wewak, and Kerema delivers climate resilient interventions for communities in need.

Caritas PNG
Sec 100, Lot 28, Godwit Road, Gordons
P.O. Box 398, Waigani, National Capital District, Papua New Guinea
Tel: 675 325 9577
Email: *caritaspng@catholic.org.pg*

The Papua New Guinea Red Cross Society was established by an Act of Parliament in 1976 as an auxiliary to the government. Today, the Red Cross Society has over 1,000 active members and volunteers in 14 provinces.[65] PNG Red Cross' "Red Cross Ready" program encourages the public to understand what natural hazards they confront, to plan in case of an emergency, to prepare a disaster kit, and to help others in their communities prepare.[66]

PNG Red Cross Society
Peturu Street 3 Mile, Taurama Road, Port Moresby, NCD, Papua New Guinea
Tel: 675 325 7016 / 675 8220 4385
Email: *info@redcross.org.pg*

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Papua New Guinea Notes

1 Encyclopedia Britannica. Papua New Guinea. Accessed 19 May 2022. https://www.britannica.com/place/Papua-NewGuinea

2 CIA World Factbook. Papua New Guinea – Map. https://www.cia.gov/the-world-factbook/countries/papua-new-guinea/

3 Encyclopedia Britannica. New Guinea. Last Updated 16 November 2023. https://www.britannica.com/place/New-Guinea

4 CIA World Factbook. PNG – Background. Accessed 19 May 2022, https://www.cia.gov/the-world-factbook/countries/papua-new-guinea/

5 Encyclopedia Britannica. Papua New Guinea. Accessed 19 May 2022, https://www.britannica.com/place/Papua-NewGuinea

6 "Regional Peacekeeping Force: Bougainville Peace Agreement." University of Notre Dame, Peace Accords. Accessed 19 May 2022. https://peaceaccords.nd.edu/provision/regional-peacekeeping-force-bougainville-peace-agreement

7 McDonald, Joshua. Bougainville Inches Closer to Independence. The Diplomat. 19 July 2021. https://the-diplomat.com/2021/07/bougainville-inches-closer-toindependence/

8 UNFPA. World Population Dashboard. Accessed 19 May 2022, https://www.unfpa.org/data/worldpopulation/PG

9 National Statistics Office. National Population Housing Census. Accessed 19 May 2022, https://www.nso.gov.pg/census-surveys/national-population-housingcensus/

10 Encyclopedia Britannica. Papua New Guinea: Ethnic groups. Accessed 7 June 2022. https://www.britannica.com/place/Papua-New-Guinea/Climate#ref53945

11 U.S. Department of State, Bureau of Democracy Human Rights and Labor. 2021 Country Reports on Human Rights Practices: Papua New Guinea. 2021. https://www.state.gov/reports/2021-country-reports-on-human-rightspractices/papua-new-guinea/

12 Commonwealth Governance. Accessed 20 May 2022. https://www.commonwealthgovernance.org/countries/pacific/papua_new_guinea/constitution/

13 PNG 2011 National Population and Housing Census Report. Accessed via OCHA HDX on 20 May 2022. https://data.humdata.org/dataset/cod-ps-png; Commonwealth Local Government Forum. Country Profile 2019: Papua New Guinea. http://www.clgf.org.uk/default/assets/File/Country_profiles/Papua_New_Guinea.pdf

14 The Conversation. Understanding the human side of climate change relocation. 5 June 2019. https://theconversation.com/understanding-the-human-side-ofclimate-change-relocation-115887

15 International Organization for Migration. Indigenous Knowledge for Risk Reduction: Documenting Community Practice in Papua New Guinea. 2015. https://reliefweb.int/sites/reliefweb.int/files/resources/PNG%20indigenous%20knowledge%20report%20print.pdf

16 CIA World Factbook. Papua New Guinea – geography. Accessed 20 May 2022. https://www.cia.gov/theworld-factbook/countries/papua-new-guinea/#geography

17 World Bank Climate Change Knowledge Portal. Papua New Guinea. https://climateknowledgeportal.worldbank.org/country/papua-new-guinea

18 Howes, Ella L., et al, Effects of Climate Change Relevant to the Pacific Islands. Centre for Environment, Fisheries and Aquaculture, Pacific Marine Climate Change Report Card, Science Review 2018: pp 1-19. https://pngdata.sprep.org/resource/climate-change-overview-pacific

19 World Bank Group. Climate Risk Profile: Papua New Guinea. 2021. https://climateknowledgeportal.worldbank.org/sites/default/files/country-profiles/15871-WB_Papua%20New%20Guinea%20Country%20ProfileWEB.pdf

20 World Bank Group. Climate Risk Profile: Papua New Guinea. 2021. https://climateknowledgeportal.worldbank.org/sites/default/files/country-profiles/15871-WB_Papua%20New%20Guinea%20Country%20ProfileWEB.pdf

21 Papua New Guinea Climate Change and Development Authority. Papua New Guinea's Enhance Nationally Determined Contribution. 2020. https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Papua%20New%20Guinea%20Second/PNG%20Second%20NDC.pdf

22 Papua New Guinea, Climate Change and Development Authority. PNG National REDD+ Strategy. https://redd.unfccc.int/files/4838_1_papua_new_guinea_national_redd_2b_strategy.pdf

23 Papua New Guinea Climate Change and Development Authority. Papua New Guinea's Enhance Nationally Determined Contribution. 2020. https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Papua%20New%20Guinea%20Second/PNG%20Second%20NDC.pdf

24 United Nations Office for Disaster Risk Reduction (UNDRR), Regional Office for Asia and the Pacific. Disaster Risk Reduction in Papua New Guinea: Status Report 2019. https://www.preventionweb.net/files/68266_682309pngdrmstatusreport.pdf

25 Pacific-Australia Climate change Science and Adaptation Planning Program. Pacific-Australia Climate Change Science

and Adaptation Planning Program. 2015. https://www.pacificclimatechangescience.org/wp-content/uploads/2013/06/14_PACCSAP-PNG-11pp_WEB.pdf

26 Australian Government Department of Foreign Affairs and Trade. Papua New Guinea Country Brief. https://www.dfat.gov.au/geo/papua-new-guinea/papuanew-guinea-country-brief

27 Disaster Management Act 1984 Part II Section 6, http://www.paclii.org/pg/legis/consol_act/dma1984191.pdf

28 Part X of the Constitution of the Independent State of Papua New Guinea, http://www.paclii.org/pg/legis/consol_act/cotisopng534/

29 The National. Disaster roles transferred to Defence Ministry. 19 August 2020. https://www.thenational.com.pg/disaster-roles-transferred-todefence-ministry/

30 Section 202 of the Constitution of the Independent State of Papua New Guinea, http://www.paclii.org/pg/legis/consol_act/cotisopng534/

31 IFRC Resilience Library. PNG Overview. Accessed 23 May 2022. https://www.rcrc-resilience-southeastasia.org/disaster-law/international-disaster-response-law-inthe-pacific/country-profiles/papua-new-guinea/papuanew-guinea-overview/

32 ReliefWeb. Madang Province embraces plans to reduce disaster risks. 27 September 2017. https://reliefweb.int/report/papua-new-guinea/madangprovince-embraces-plans-reduce-disaster-risks

33 APEC-EPWG. APEC 13th Emergency Preparedness Working Group Meeting, Port Moresby, Papua New Guinea, 24-25 February 2018. Accessed 12 May 2022, https://www.apec-epwg.org/media/2232/7d7a8b-74c005d96238782be53913d4e8.pdf; Goina, Rose Godana, et al. Beyond Barriers: Papua New Guinea Case Study. Humanitarian Advisory Group. March 2022. https://humanitarianadvisorygroup.org/insight/httpshumanitarianadvisorygroup-org-insight-beyond-barrierspapua-new-guinea-case-study/

34 PNG National Disaster Management Plan 1987. https://www.rcrc-resiliencesoutheastasia.org/wp-content/uploads/2020/04/PNGNational-Disaster-Management-Plan-1987.pdf

35 DM Act, Part II, Division 1, Section 3. http://www.paclii.org/pg/legis/consol_act/dma1984191.pdf

36 PNG National Disaster Centre. About Us. Accessed 10 May 2022, https://pngndc.gov.pg/?page_id=45

37 PNG National Disaster Centre. Provincial Disaster Centres. Accessed 10 May 2022. https://pngndc.gov.pg/?page_id=100

38 NDRRF. Accessed 13 May 2022. https://www.preventionweb.net/publication/papua-new-guineanational-disaster-risk-reduction-framework-2017-2030

39 Papua New Guinea Climate Change and Development Authority. Papua New Guinea's Enhance Nationally Determined Contribution. 2020. https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Papua%20New%20Guinea%20Second/PNG%20Second%20NDC.pdf

40 Australian Infrastructure Financing Facility for the Pacific. Papua New Guinea. https://www.aiffp.gov.au/investments/country-profiles/papua-new-guinea

41 CCDA. About Us. Accessed 3 May 2022. https://www.ccda.gov.pg/policies

42 Papua New Guinea Climate Change and Development Authority. Papua New Guinea's Enhance Nationally Determined Contribution. 2020. https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Papua%20New%20Guinea%20Second/PNG%20Second%20NDC.pdf

43 Climate Law & Policy. Development of Papua New Guinea's National Adaptation Plan for Climate Change. Accessed 4 May 2022. https://www.climatelawandpolicy.com/en/projects-items/301-development-of-papua-new-guinea-s-national-adaptationplan-for-climate-change.html

44 Humanitarian Advisory Group. Beyond Barriers: Papua New Guinea Case Study. March 2022. https://humanitarianadvisorygroup.org/wp-content/uploads/2022/03/HAG_WV_Case-Study_PNG-1.pdf

45 NDRRF. Accessed 13 May 2022. https://www.preventionweb.net/publication/papua-new-guineanational-disaster-risk-reduction-framework-2017-2030

46 NDC. Emergency & Disaster Management and Disaster Risk Reduction in Papua New Guinea. 2014. https://www.humanitarianlibrary.org/sites/default/files/2014/02/dm_country_report.pdf

47 Email from Richard Higgins, Disaster Management Team Secretariat, on 29 May 2022.

48 UNESCAP. Project Terms of Reference. Accessed 7 June 2022. https://www.unescap.org/sites/default/files/TTF-27-RIMES-Project-Terms-of-Reference.pdf

49 PNGNWS. Accessed 16 May 2022. http://www.pngmet.gov.pg/warnings/smartalert/

50 Kuleshov, Yuriy et al. Climate Risk and Early Warning Systems (CREWS) for Papua New Guinea. 2019. 10.5772/intechopen.85962. Accessed 16 May 2022, https://www.researchgate.net/publication/333701562_Climate_Risk_

and_Early_Warning_Systems_CREWS_for_Papua_New_Guinea/citation/download

51 DMPGM. EG. Accessed 16 May 2022. http://dmpgm.webdev.datec.net.pg/about-us/engineering-geology/

52 DOW, via DevEx. 17 May 2022. https://www.devex.com/organizations/department-of-worksand-implementation-papua-new-guinea-130368

53 Australian Government Department of Foreign Affairs and Trade. Road Management in Papua New Guinea: An Evaluation of a Decade of Australian Support. February 2018. https://www.oecd.org/derec/australia/australia-ode-evaluation-road-management-in-papuanew-guinea-brief.pdf

54 LogCluster. 2.3 Papua New Guinea Road Assessment. Accessed 17 May 2022. https://dlca.logcluster.org/display/public/DLCA/2.3+Papua+New+Guinea+Road+Assessment

55 National Airports Corporation. Our History. https://www.nac.com.pg/aboutus-our-history/

56 World Data Info. The 26 biggest airports in Papua New Guinea. Accessed 16 May 2022. https://www.worlddata.info/oceania/papua-new-guinea/airports.php

57 Airport Technology. Port Moresby Jacksons International Airport. https://www.airport-technology.com/projects/port-moresby-jacksons-international-airport/?cf-view

58 LogCluster. Port Moresby Jacksons International Airport. https://dlca.logcluster.org/221-papua-new-guinea-jackson-international-airport

59 LogCluster. Papua New Guinea Aviation. https://dlca.logcluster.org/22-papua-new-guinea-aviation

60 LogCluster. Papua New Guinea Port Assessment. https://dlca.logcluster.org/21-papua-new-guinea-port-assessment

61 Commonwealth Governance. Utilities of Papua New Guinea. Accessed 18 May 2022. https://www.commonwealthgovernance.org/countries/pacific/papua_new_guinea/utilities/

62 World Bank. Papua New Guinea: Improved access to reliable, affordable energy. Press Release. 6 April 2021. https://www.worldbank.org/en/news/pressrelease/2021/04/06/papua-new-guinea-improved-access-to-reliable-affordable-energy

63 Water PNG. https://www.waterpng.com.pg/

64 World Bank. Papua New Guinea: Clean Water Access to End the Walk for Water for Women and Girls. 20 March 2018. https://www.worldbank.org/en/news/feature/2018/03/20/papua-new-guineaclean-water-access-to-end-the-walk-for-water-for-womenand-girls

65 PNG Red Cross. Accessed 13 May 2022. http://www.redcross.org.pg/

66 PNG Red Cross. Be Red Cross Ready. https://redcross.org.pg/be-red-cross-ready/

Header photo by Ganda Lukman on unsplash.com. Papua New Guinea. https://unsplash.com/photos/green-trees-on-island-surrounded-by-sea-under-blue-and-white-cloudy-sky-during-daytime-H23hvjgZo8I

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Samoa is comprised of nine islands, located in the south-central Pacific Ocean approximately 130 km (80 miles) west of American Samoa and 4,200 km (2,600 miles) southwest of Hawaii. Four of the country's nine islands are inhabited; they are the two large islands of Savai'i and Upolu, as well as Manono and Apolima Islands. Samoa's uninhabited islands are Fanuatapu, Namu'a, Nu'utele, Nu'ulua, and Nu'usafee. The capital, Apia, is located on Upolu Island and is the country's main port and only city, home to approximately 19% of the population.[1] Samoa has a total land area of 2,840 km^2 (1,097 square miles), of which 43% is arable, and an Exclusive Economic Zone (EEZ) of 98,500 km^2 (38,031 square miles), the smallest in the Pacific.[2] Figure 55 is a map of Samoa.[3]

Polynesian voyagers arrived in the Samoan archipelago about 1000 BCE, and Samoans developed their own system of villages ruled by councils of matai (chiefs) with extended kinship networks linking villages. European contact from 1722 onward saw the arrival of goods and people, the latter of which included members of the London Missionary Society who successfully converted key elites, and the rest of the population soon also converted. More settlers began arriving from the mid-19th century, and they all sought to persuade their respective governments – of the United States, Great Britain, and Germany – to annex Samoa. Rival matai played these foreign powers against each other as part of ongoing chiefly warfare, and these foreign governments frustrated attempts by the Samoans to establish a national government. In 1878, the United States signed a treaty allowing it to establish a naval station in Pago Pago (now in American Samoa), and it would eventually annex eastern Samoa in 1899. Great Britain and Germany also signed treaties with various leaders, and Germany would annex the western islands. The Samoan people had no say in these divisions and did not support them. The push for independence from Germany began in 1908, but it had had little effect by World War I when New Zealand occupied the islands. Although Samoans were united against foreign rule, the League of Nations granted New Zealand a mandate over Western Samoa in 1920. In response, the Mau ("Strongly Held View") emerged as a political movement. Initial repression of the movement was occasionally violent, but after 1935, the Mau became a legal political organization. After New Zealand allowed a Western Samoan council of state and a legislative assembly in the late 1940s, the latter 1950s saw greater Samoan agitation for independence, which was achieved in 1962 under Susuga Malietoa Tanumafili II, who was monarch and head of state until his death in 2007.



Figure 55: Map of Samoa

Samoa has a parliamentary government. Since 2007, after the death of Susuga Malietoa Tanumafili II, heads of state have been elected by the Legislative Assembly (Fono Aoao Faitulafono) to five-year terms. The prime minister is elected by the assembly and

appoints a cabinet from among its members. The Legislative Assembly has 51 members, all of whom are directly elected and must be Samoan matai. Local government covers more than 360 villages in 11 administrative districts. Each of Samoa's several thousand aiga (extended families) designates at least one matai to lead and represent it; the matai, in turn, form village councils to administer local affairs.[4]

Hazards and Climate Change

Samoa is highly vulnerable to recurring extreme weather events and natural hazards, including cyclones, tsunami, earthquake, drought, and wildfire. Samoa is also vulnerable to climate change, which will cause sea level rise and increase the frequency and intensity of hydrometeorological events.[5]

The climate is characterized by high rainfall and humidity with constant temperatures year-round. Winds are dominated by the south-easterly trade winds associated with the South Pacific Convergence Zone. Most tropical cyclones occur during the southern hemisphere summer. There are two seasons; the wet season lasts from November to April, and the dry season starts in May and ends in October. Annual rainfall totals vary from 2,500 mm (98.4 inches) in the northwest to over 6,000 mm (236.2 inches) in the highlands of Savai'i. Because of the prevailing winds, the mountain ranges determine the distribution of rainfall with wet areas generally located in the southeast and drier areas in the northwest. Dry spells tend to coincide with El Niño Southern Oscillation (ENSO) phases. The temperature ranges 24-32°C (75-90°F) daily. The highest mean temperature occurs between December and March, while the lowest occurs between July and September.[6] Figure 56 shows the average monthly mean, maximum, and minimum temperatures and average monthly precipitation for Samoa for the period 1991-2022.[7]

Samoa experienced 15 devastating disasters during the period 1940-2020, with storms accounting for 73% of those disasters and affecting 391,707 people. In the future, Samoa is projected to incur an average of US$10 million per year in losses due to earthquakes and tropical cyclones. Over the next four decades, Samoa has a 50% chance of experiencing a disaster-related loss exceeding US$110 million, and a 10% chance of experiencing a disaster-related loss exceeding US$350 million. Tropical cyclones form between November and April and usually result in heavy rainfall, flash flooding, coastal and riverine flooding, storm surge, flooding in coastal and low-lying areas, strong winds and landslides. Samoa was severely affected in 2012 by Tropical Cyclone Evan, which killed more than 10 people and displaced thousands, and the country was also significantly affected in 2018 by Tropical Cyclone Gita, which caused flooding and damaged infrastructure and houses.

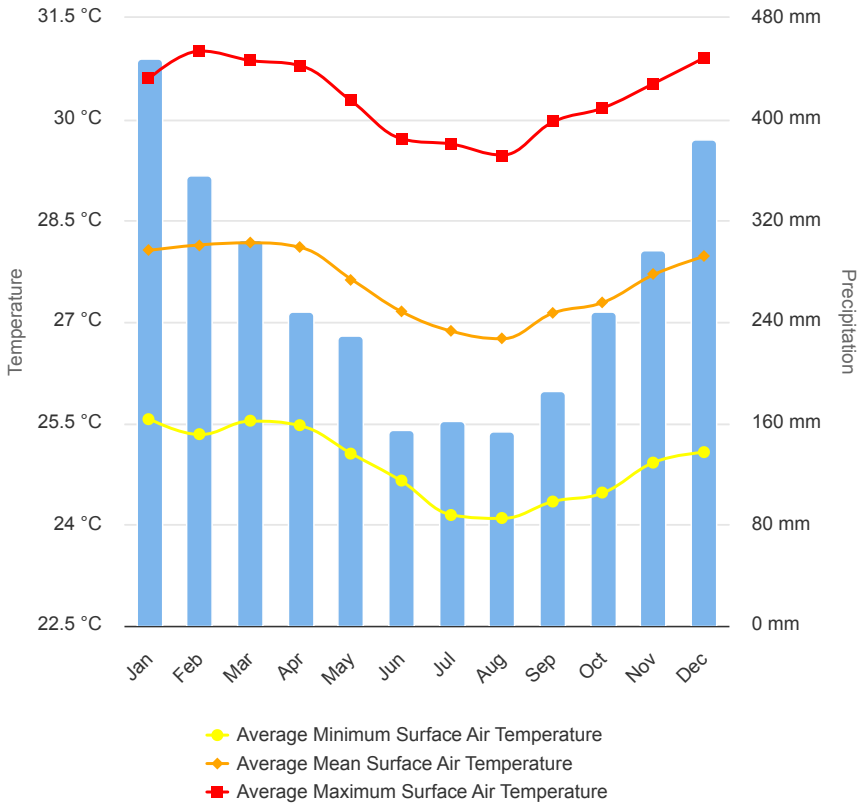


Figure 56: Average Monthly Temperature and Precipitation, Samoa (1991-2022)

Droughts and floods have frequently impacted Samoa, often in association with ENSO. Droughts in 1982-83, 1997-98, 2001-02, and 2002-03 caused major forest fires and water shortages. Floods following La Niña events and tropical cyclones have severely damaged critical infrastructure on several occasions. Days with extreme rainfall are projected to occur more often with more intensity in the future.[8]

Samoa is also exposed to climate change impacts. Table 19 details some of the climate change-influence phenomena to which Samoa is exposed and the potential impacts of these phenomena is a climate change-inflected future.[9]

Government Institutions, Policies, and Plans for Disasters and Climate Change

The Disaster Management Office (DMO) is a division within the Ministry of Natural Resources & Environment (MNRE). The DMO is responsible for ensuring the ongoing coordination, development, and implementation of DM programs and activities. The main office is in Apia in the Tui Atua Tupua Tamasese Efi Building, the Disaster Management team is situated at the National Emergency Operations Centre (NEOC) in Tuana'imato on the western outskirts of Apia, and the DRR team is at the Meteorology Compound in Mulinu'u; all are located on Upolu Island.[10] The DMO consists of a Disaster Risk Reduction Section, Disaster Management Section, and Community Disaster Preparedness section. A "Climate Change and the Global Environment Facility" division was recently established under MNRE to coordinate and implement climate change-related projects in the country.

The Disaster and Emergency Management Act of 2007 provides a national framework and establishes the National Disaster Council (NDC) chaired by the Prime Minister at the strategic level, with the Disaster Advisory Committee (DAC) under the NDC. The Act authorizes the National Disaster Management Plan, which outlines a sector approach where responding government agencies, civil society, the private sector, and development partners are coordinated by a dedicated sector coordination unit. The DMO works with each sector coordination unit to implement DM objectives and support them in executing the functions and responsibilities articulated in each sector plan. Sectors are

Phenomenon	Trend	Projections	Impacts
Temperature	No clear trends	By 2030, under very high emissions scenarios, increase of 0.5–1.1°C (1.08-1.98°F) projected; more very hot days	Heat stress effects on human health and crops; more frequent outbreaks of water- and vector-borne diseases
Rainfall	High inter-annual variability; annual and dry season rainfall has increased in the past century; La Niña events are correlated with wetter than normal conditions	More frequent extreme rainfall events	Extreme events bring floods that damage infrastructure and water supplies
Cyclones	The number of cyclones varies greatly from year to year	Less frequent but more intense storms	Higher wind speeds cause more damage to trees, buildings, and infrastructure; higher waves inundate coastal areas and cause erosion
Drought	El Niño events are correlated with drier than normal wet seasons	Incidence projected to stay approximately the same or decrease	Increased risk of forest fire
Sea Level	4 mm (0.16 inches) of rise per year recorded since 1993	Projected to continue to rise by 29-43 cm (11.4-16.9 inches) by 2060 and by 55-110 cm (21.7-43.3 inches) by the end of the century under all emissions scenarios	Increased risk of coastal erosion and inundation by storm surges; higher base level means higher waves if/when a tsunami arrives

Table 19: Climate Change-Influenced Phenomena and Potential Impacts on Samoa

supported by aligned clusters in the global cluster system when receiving international disaster assistance. Each sector is led by a national government ministry or authority, as shown in Figure 57, which depicts Samoa's humanitarian coordination structure.[11]

The Samoa National Action Plan (NAP) for Disaster Risk Management is an operational document that should be read in conjunction with the National Disaster Management Plan (NDMP) 2017-2020.[12] The NAP highlights the imperative to mainstream risk management across 14 sectors: Education; Health; Community; Law and Justice; Public Sector; Finance; Trade and Commerce; Tourism; Agriculture; Transport; Communications; Water; Energy; and Environment.

The NAP articulates outcomes aligned with the National Strategy for the Development of Samoa, the National Environment Sector Plan, and Samoa's Disaster and Emergency Management Act (2007), and it reflects global and regional priorities in the Sendai Framework, Small Island Developing States Accelerated Modalities of Action (SAMOA) Pathway Agreement, and the UN Sustainable Development Goals.

Figure 58 shows the institutional arrangements for disaster risk management in Samoa and Figure 59 depicts the country's national disaster response structure.[13]

MNRE's Climate Change and Global Environment Facility (CCGEF) division coordinates and facilitates programs relating to biodiversity, international waters, land degradation, the ozone layer, persistent organic pollution, and national climate change actions and efforts. CCGEF also focusses on policy,

National Coordination Structure

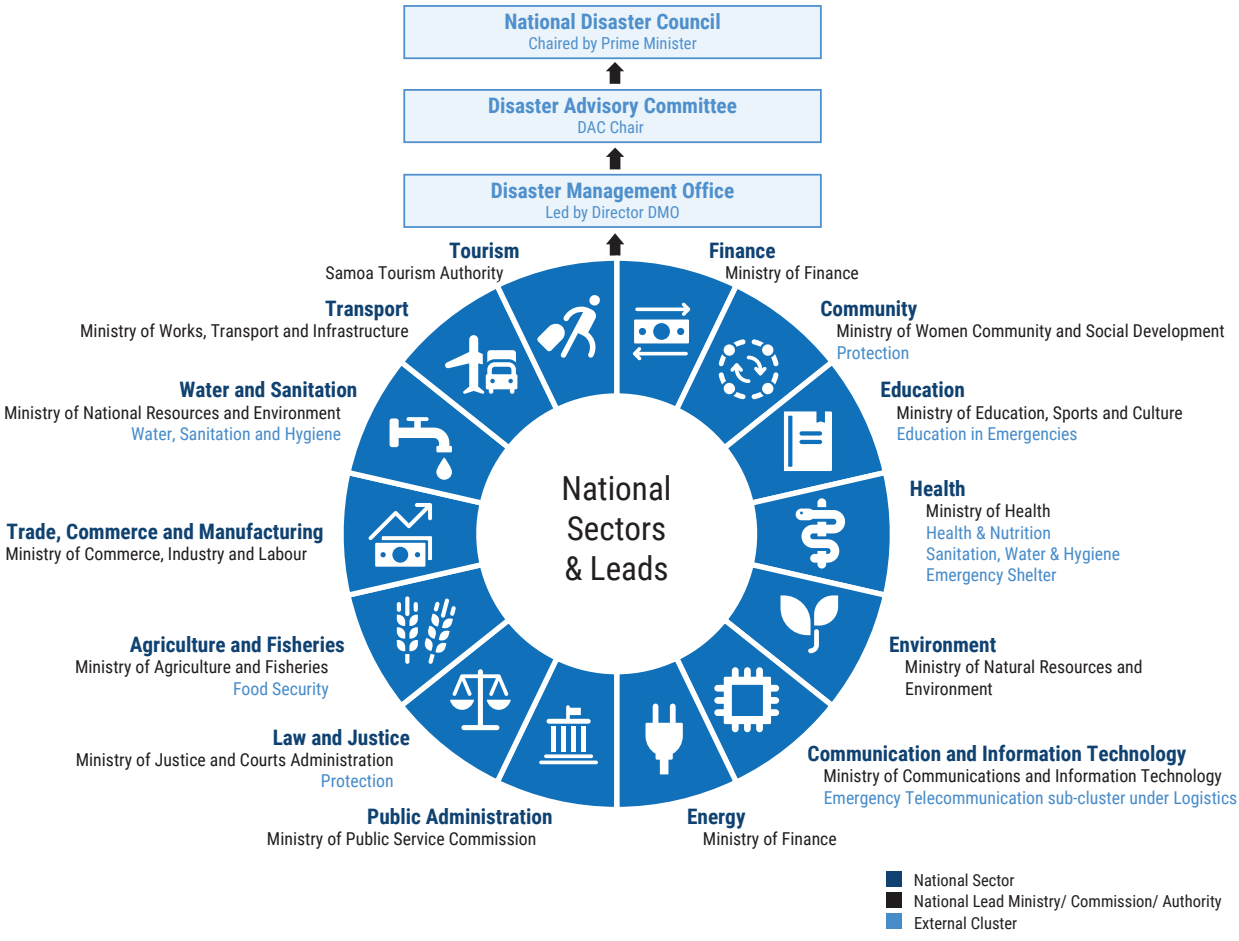


Figure 57: Samoa's Humanitarian Coordination Structure with Sector Leads

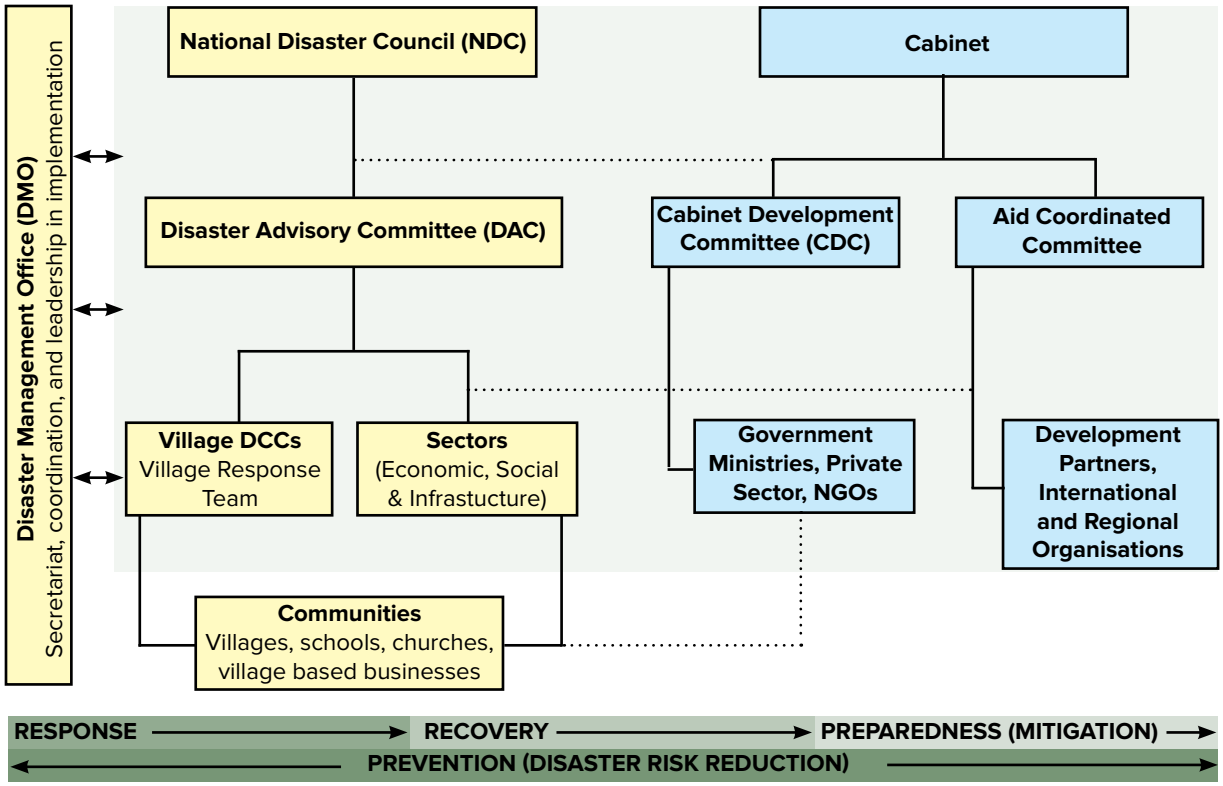


Figure 58: Disaster Risk Management Institutional Arrangements

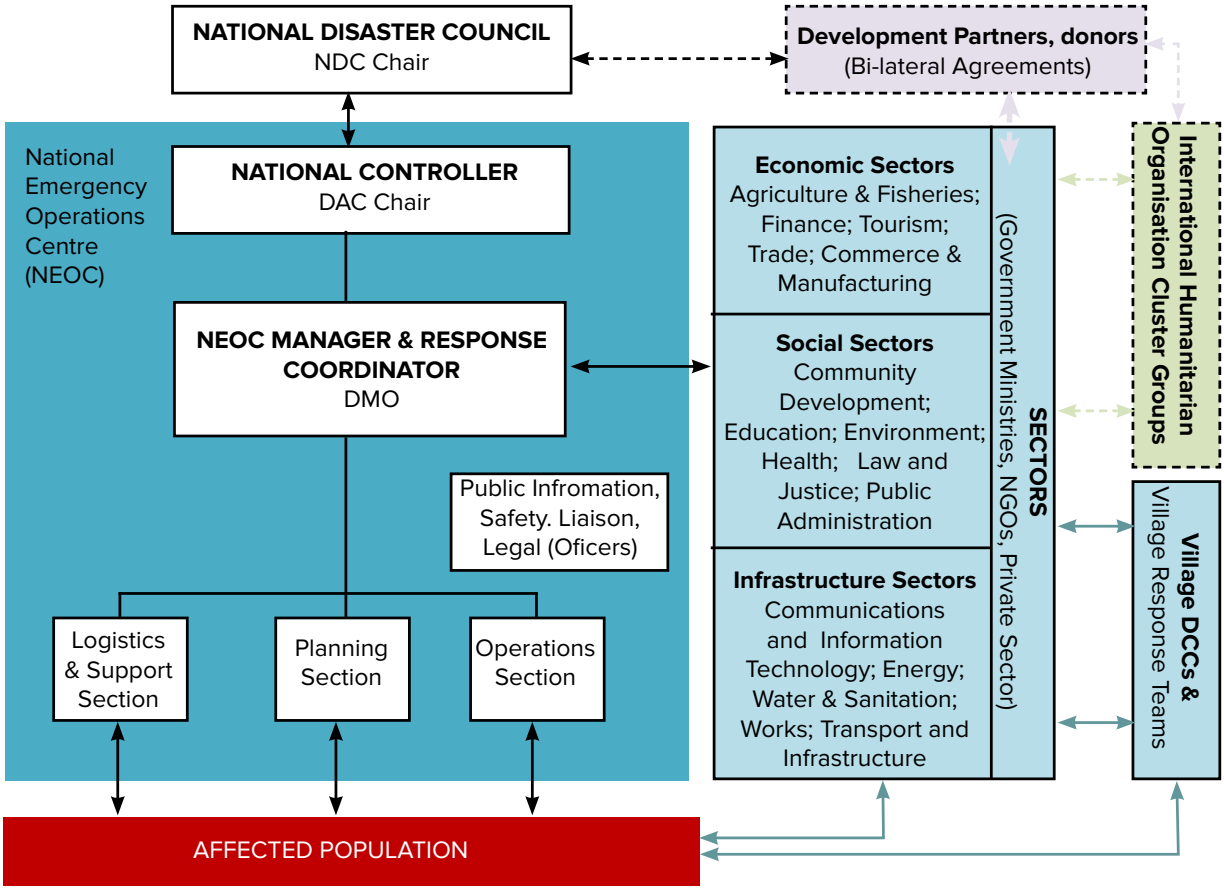


Figure 59: National Disaster Response Structure

technical and scientific coordination of various programs, reporting on climate change action, implementation and promoting adaptation and mitigation measures, providing assistance on proposed climate change projects, and ensuring effective reporting and advice is available and delivered to all players.[14]

Under the updated Samoa Climate Change Policy (2020), adaptation is the key action the country is taking at home while also promoting mitigation – in the form of GHG emissions reductions – globally as well as within the islands.[15] As a Party to the UNFCCC, Samoa has submitted its second Nationally Determined Contribution (NDC) in 2021;[16] it committed to the target of 100% renewable electricity by 2025.[17] Samoa's National Adaptation Programme of Action (NAPA) dates to 2005; it identified urgent and immediate needs in terms of water resources, reforestation, and education and awareness programs for CCA. The main priority criteria for implementation were that they should be country-driven, local and community-based.[18] In addition, the Samoa National Infrastructure Strategic Plan 2011 presented government priorities for major initiatives in transport, energy, and telecommunications that would allow the country to implement development programming without sacrificing resilience.[19]

MNRE - Disaster Management Office and Climate Change/GEF Division

Main Office, Tui Atua Tupua Tamasese Efi (TATTE) Building - Level 3, Sogi, Apia
Tel: 685 67200
NEOC: 685 27307
Facebook: DMOSamoa
Email: *environment@mnre.gov.ws*, *dmo@gmail.com*, *dmosamoa@gmail.com*

Early Warning Systems

The Samoa Meteorology Division (SMD) has the responsibility to provide warnings and alerts for several hazards, including tropical cyclones, earthquakes, tsunamis, and climate trends. It is responsible for the National Tropical Cyclone Warning Center, which provides forecasts and warnings for cyclone and other severe weather events and sends alerts via SMS to selected community representatives and response agencies. SMD operates a network of seismographs, which provide continuous, real-time monitoring of earthquakes. The collected seismic information streams into Samoa's National Tsunami Warning System. The SMD provides tsunami warnings and alerts for Samoa. Samoa's Tsunami Early Warning System has the capability to send SMS to selected community representatives and agencies. SMD is also responsible for the National Climate Early Warning System (CLEWS), which provides tailored alerts, climate forecasts, ENSO updates, climate summaries, climate trends, and climate data for sectoral planning and to manage climate risks. CLEWS products cover agrometeorology, forest fire weather, sea surface temperature outlook, coral bleaching warning system, sea level prediction, and drought warning.[20]

Samoa launched Flood Alert Sirens in November 2022 to integrate flood warning into the National Early Warning System. Five alert sirens aim to reduce the vulnerability of flood-related risks for tens of thousands of people residing in the Vaisigano River Catchment Area, which is in the north central part of Upolu Island and includes Apia. The sirens are part of the national Emergency Siren Network and are designed to provide timely warnings to the public when severe floods are expected. The first of its kind in Samoa, the Flood Alert Sirens stand 15-m (49-feet) high and connect to the existing Emergency Radio Network, which is managed and operated by MNRE, through its DMO. The five sirens were installed at the Electric Power Corporation's Tanugamanono Power Station; Apia Park; Ministry of Education, Sports and Culture compound; Magiagi; and Lalovaea. The government procured and installed the sirens with funding from the Green Climate Fund (GCF) Vaisigano Catchment Project (GCF- VCP), under oversight of the UNDP as the GCF-Accredited Entity. This initiative and GCF-VCP activity 'Extension of the Early Warning System for the Greater Apia Catchment' was led and implemented by the MNRE under

its core operating agencies, the DMO, the Water Resources Division, and the SMD. Sub-activities include the supply and installation of three rainfall gauges and three water level gauges as well as the development of a flood warning and decision support system for the Vaisigano River Catchment Area. The six monitoring gauges are configured to telemeter data via the existing MNRE operated NEON IP telemetry management system, in real time to MNRE base stations (i.e., operations headquarters of Water Resources Division, SMD, DMO, and the NEOC) and directly to the flood warning and decision support system. The meteorological forecast, real time and pre-computed information is integrated into a flood warning and decision support system web portal that is accessible by authorized MNRE flood operations officers and provides an integrated decision-support platform enabling flood officers to monitor, predict, forecast, and alert relevant NEOC authorities of imminent flood events and their likely impacts. When a larger flood event is predicted, MNRE activates the three key parts of the sirens – the warning tone, warning voice, and warning lights – to inform the public to prepare and evacuate.[21]

The Flood Alert Sirens enhances the flood early warning decision support system, which had previously proved adequate in alerting duty officers of imminent flooding during three distinct extreme rainfall and flood events over the 2020-2021 tropical cyclone season,[22] and expands warning communication to the public.

Ocean observation buoys were deployed in Apia harbor, according to SPC on 7 October 2022, to strengthen early warning capability of the SMD and technical agencies including the DMO and the Water Resources Division. The buoys provide valuable data related to ocean currents and waves to help customize Samoa's existing multi-hazard early warning system, including impact-based warning products. This impact-based early warning system is customized for Samoa, does not require high computing power, and provides actionable information to decision makers for planning and quick analysis of a developing system. The ocean buoys and related support were deployed and implemented by the Pacific Community (SPC), through the World Bank-funded Pacific Resilience Programme (PREP).[23]

In November 2020, Community Based Early Warning Systems (CbEWS) training was provided to representatives of the government, private sector, NGOs, and the community. CbEWS is a component of the WMO CREWS Pacific SIDS, which is implemented regionally by SPREP. Participants from the SMD, DMO, Fire and Emergency Services Authority, and other organizations participated in the training, which discussed early warning systems and existing institutional mechanisms and policies and plans on disaster risk, with a focus on including traditional knowledge into early warning systems and risk reduction measures.[24]

Samoa has made continuing investments in early warning in the last decade, particularly since Cyclone Evan struck in 2012 and caused immense damage and losses estimated at US$103.3 million. Research estimated that stronger early warning services could have prevented 81% of losses and damages caused by Cyclone Evan.[25]

Samoa Meteorology Division
Mulinu'u Peninsula, Mulinuu, Samoa
685 20855 or 20856
Facebook: SamoaMeteorologicalServices
Email: *luteru.tauvale@mnre.gov.ws*

Infrastructure

The Ministry of Works, Transport, and Infrastructure (MWTI) has oversight over all transport sectors and electric power. MNRE oversees the water and sanitation sectors. MWTI's Civil Aviation Division serves as the regulator and advises on issues of policy and compliance with international obligations. The Division has responsibility for the safety oversight of operations and maintenance. MWTI's Maritime Division deals with Maritime Policies and regulations and oversees maritime transportation.[26]

The Samoa Ports Authority is responsible for management of the main port.[27] There are six ports, four on Upolo and two on Savai'i. Apia's

Matauta is the primary international port; it provides facilities for international freight and some inter-island ferry services.[28] Neighboring islands are served with container and Ro-Ro ships, and other irregular services are provided by small cargo vessel and oil tankers. At Matauta, the channel draft is 12m (39.4 feet), but maximum draft at the wharf is 10.5m (34.4 feet). The main limiting factor is the port's exposure to swells from the open sea at certain times of the year and that can disrupt loading and unloading and berthing. It can also result in vessels having to leave the port until swells subside. The one berth is 305m (1,000 feet) in length. There are two mobile cranes and two forklifts for cargo handling, and there are two warehouse facilities within the port area, approximately 2,000 m^2 (21,528 square feet) each.[29] Salelologa wharf on the eastern end of Savai'i is the island's main port of entry and is the only ferry terminal on Savai'i. The one berth is 45m (484 feet) in length with a maximum draft of 6m (64.6 feet). There is no handling equipment.[30]

Faleolo International Airport The runway is tarmac and sits at 17m (58 feet) of elevation; its dimensions are 3,000 × 45 m (32,292 × 484 feet).[31] Salelologa/Maota Airport is the main airport on Savai'i. It sits at the east end of the island at 29 m (94 feet) of elevation, and its runway is 700 × 15m (2,297 × 49 feet).[32]

The Samoa road network faces a range of challenges, including exposure to sea level rise, storm surges, extreme weather events, landslips, and accelerated pavement deterioration due to extreme weather and rising water tables. Locations are often rendered impassable due to flooding, debris, and damage to culverts, bridges, and pavements.[33] There are an estimated 1,150 km (715 miles) of roads on Upolu and Savai'i.[34]

An estimated 99% of the population is connected to the electricity grid. The Electric Power Corporation (EPC) has more than 39,000 customers. EPC is managed by a board of directors under oversight of MIWT. It is responsible for all transmission, distribution, and retail while generation is handled by a combination of public and private generators, including solar, which contributes about 11% of total generation capacity. EPC operates nine hydro plants (one in Savai'i), various solar farms at Apolima, Tuanaimato, Vaitele, Tanugamanono, and Salelologa (Savai'i), a wind farm at Vailoa Aleipata, and diesel plants at Fiaga Upolu and Salelologa Savaii. Total generation capacity stands at 130.8 MW.[35]

Surface water provides approximately 65% of the water supply. Piped water access is estimated at between 90-95% of the population.[36] There are 10 implementing agencies for water and sanitation development, including four government agencies, including MNRE. Sector coordination is facilitated through a reporting structure that integrates ministries, the private sector, and NGOs. Sub-sectors include supply, resources, drinking water, and sanitation.[37]

Ministry of Words, Transport, and Infrastructure
Tatte Building Level 4, Apia, Samoa
Tel: 685 21611

Samoa Airport Authority
Main West Coast Rd, Faleolo, Samoa
Tel: 685 23201

Samoa Ports Authority
Port of Apia
Tel: 685 64400
Email: *info@spasamoa.ws*

Electric Power Corporation
Ground Floor, Tui Atua Tupua Tamasese Efi Building, Sogi, Samoa
Tel: 685 65500
Email: *epc.info@epc.ws*

MNRE – Water Resources
Main Office, Tui Atua Tupua Tamasese Efi (TATTE) Building - Level 3, Sogi, Apia
Tel: 685 67200
Email: *environment@mnre.gov.ws*

Civil Society Partners

The Samoa Red Cross Society (SRCS) is a humanitarian organization, established and recognized by the Government of Samoa through an Act of Parliament. It first emerged as a branch of the New Zealand Red Cross in 1952

and has been an Independent National Society since 1984. SRCS was admitted to the IFRC in 1985. SRCS focuses on disaster management, health and care in the community, promoting human dignity and humanitarian values, and organizational development and strengthening the National Society. Its 2021-2025 Strategic Plan states the following strategic goals and core areas:

- Strategic Goal 1: People anticipate, respond to and quickly recover from crises
  - Core Area 1: Disaster Management
- Strategic Goal 2: People lead safe, healthy, and dignified lives and opportunities to thrive
  - Core Area 2: Health and Care in the Community
- Strategic Goal 3: People mobilize for Inclusive and Peaceful Communities
  - Core Area 3: Promotion of the Movement's Fundamental Principles and its Humanitarian Values
- Strategic Goal 4: Strengthening the SRCS position as a leading humanitarian organization and well-functioning National Society
  - Core Area 4: Organizational Development and Strengthening the National Society

SRCS pursues these strategic goals through the enabling actions of building a well-functioning National Society and building partnerships and strengthening cooperation.[38] As of 2022, SRCS had 5,698 volunteers, 64% male and 36% female.[39]

Samoa Red Cross
564P+GFF, Ififi St, Apia, Samoa
Tel: 685 23686
Email: *samoaredcross@yahoo.com*, *samoaredcross.org.ws*

The Samoa Umbrella for Non-Governmental Organisations (SUNGO) is a widely recognized coalition body of NGOs. SUNGO was founded in 1997 to provide alternative development options and assistance to vulnerable groups and provide input into government policies from NGOs and other community-based organizations on issues concerning them. Its vision is for a competent and confident civil society sector that promotes sustainable development and quality of life for the people of Samoa. Its work includes capacity building, advocacy, and training for its member NGOs in network management and sustainable collaboration.[40] SUNGO has become a recognized development partner of the government with a membership of more than 200 organizations, including village-based organizations, sporting bodies, and church organizations. It was key to the establishment of a harmonized funding mechanism for civil society, the Samoa Civil Society Support Program. SUNGO works with a range of partners. Nationally, this includes the Ministry for Women, Community and Social Development; MNRE; and Ministry of Finance. Internationally, partners include donor agencies such as USAID, the EU, NZAID, DFAT/Australian Aid, UNDP, Oxfam, Canada Fund, and the JICA. SUNGO is an active member of PIANGO and other regional organizations. The goals stated in the SUNGO Strategic Plan for 2020-2024 are:

- Goal 1: Governance and Management – SUNGO is recognized as a well governed and managed umbrella organization leading the civil society sector through best practice.
- Goal 2: Communications – SUNGO fosters a well-informed civil society sector through providing effective communications and services.
- Goal 3: Institutional Strengthening – SUNGO member organizations are supported through capacity building to effectively manage their organizations and services to their communities.
- Goal 4: Policy and advocacy – The needs and concerns of civil society are adequately addressed, contributing to achievement of National Development Priorities through genuine partnerships. The thematic groups are: 1) Economic, 2) Social, 3) Infrastructure, and 4) Environment.
- Goal 5: Research – SUNGO facilitates effective research, investigation, and data

collection to better inform civil society initiatives and support advocacy.[41]

SUNGO's organizational structure is depicted in Figure 60.[42]

SUNGO receives support from the Civil Society Support Programme, with the overall objective of strengthening the capacity of Samoa's civil society organizations to conduct research-based advocacy and engage with national policy and oversight mechanisms. As part of Programme efforts, funded by the EU, SUNGO has undertaken research courses and training programs for its member organizations to develop skills and knowledge in research-based advocacy, data collection, and analysis to improve accountability of public functions.[43] The Programme operated from 2010 through 2021. The first five years were largely funded by the Australian Government and the EU and sought to deliver tangible benefits to vulnerable groups through small grants to one-off projects carried out by community organizations. In 2018, Programme expanded in collaboration with the Ministry of Women Community and Social Development to undertake additional DFAT-supported activities through AU$400,000 (US$290,235) of gender-focused funds allocated to women economic empowerment projects through community-based organizations. Civil society organization stakeholders are listed in Table 20.[44]

Samoa Umbrella for Non-Governmental Organisations (SUNGO)
Maota Street, Vaitele Tai, Apia
685 752 4322
communications@sungo.ws

Other organizations that have implemented Civil Society Support Programme-funded initiatives include Samoa Federated Farmers

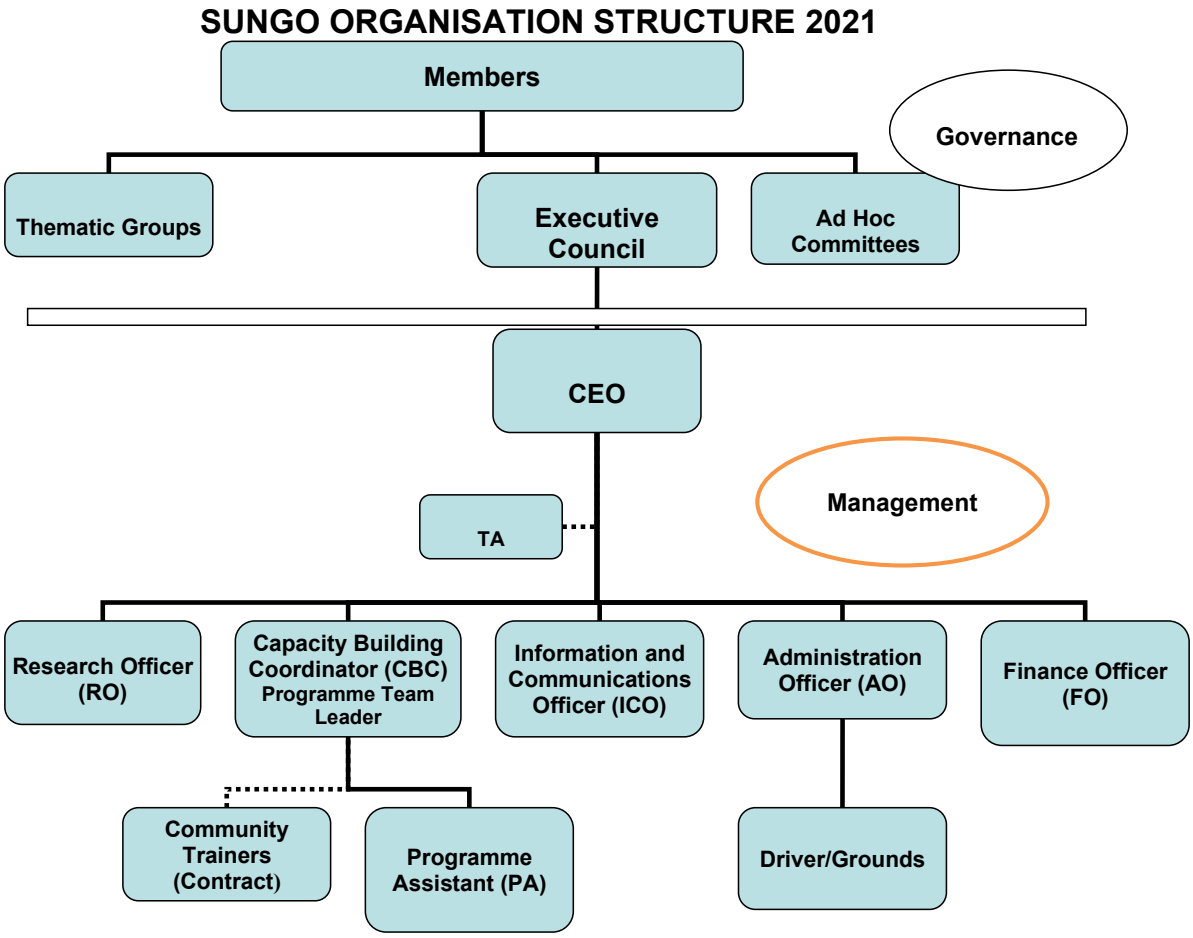


Figure 60: Samoa Umbrella for Non-Governmental Organizations (SUNGO) Organizational Structure

Organization Name (Island)	Sector	SUNGO membership
Alii and Faipule of FATUVALU (SAVAII)	Sewing and Elei (traditional fabric design)	No
Alii ma Faipule of LALOVI, MULIFANUA (UPOLU)	Agriculture	No
Auuso Fealofani Metotisi SATAUA (SAVAII)	Sewing and Elei	No
Beekeepers Association – VAISALA & SAFUNE (SAVAII)	Agriculture	Yes
Faataua le Ola	Mental Health	Yes
Goshen Trust	Mental Health	Yes
Komiti a Tina – VAILAVEA, SAMATAU (UPOLU)	Sewing and Elei	No
Komiti Tina ASAGA (SAVAII)	Sewing and Elei	No
Komiti a Tina ma Tamaitai – SALEAULA (SAVAII)	Sewing and Elei	No
Komiti Tina Itumalo ALATAUA I SISIFO (SAVAII)	Sewing and Elei	No
Mafutaga a Tina Katoliko – TIAVEA (UPOLU)	Sewing and Elei	No
MafutagaAualofa – VAVAU (UPOLU)	Sewing and Elei	No
MafutagaTamaEkalesiaPenetekoso – FAGALII (UPOLU)	Agriculture	No
Mafutaga Tina EFKS / Komiti a Tina ma Tamaitai FALELAUVAO (FALEVAO) (UPOLU)	Disposal and waste	Yes
Mixed Farming Cooperative Society Group Ltd - FALEASIU UTA (UPOLU)	Agriculture	Yes
NOLA	Capacity building, disability	Yes
Samoa Cancer Society	Health	Yes
SENESE	Inclusive Education	Yes
SUNGO	Umbrella organization	Yes
Tupua ma le Aumaga FALEVAO (UPOLU)	Agriculture	No

Table 20: Civil Society Organization Stakeholders

Incorporated and O le Siosiomaga Society Incorporated (National Environment Society).

Organizations that have implemented the gender equality component of Programme include Matuaileoo Environment Trust Incorporated (METI Samoa), Samoa Victim Support Group (SVSG Samoa), and Special Olympics Samoa. Their activities have included educating and raising awareness on challenging gender stereotypes, domestic or gender-based violence, economic empowerment, and promoting the rights of women and girls.[45]

The Samoa Gender Partnership Program was launched in June 2022, with implementing partners including the SVSG Samoa, Samoa Family Health Association, Samoa Women Association of Growers, and Women In Business Development Inc. The Samoa Gender Partnership Program is the first initiative under Tautua – Human Development for All, a new eight-year partnership between the Governments of Samoa and Australia. Tautua supports collective action across sectors to address complex challenges in health, education, gender, disability, and social protection.[46]

Mapusaga o Aiga, a women and children's human rights body, raises public awareness of domestic violence issues and provides counselling services and other support to survivors of violence and abuse.[47]

Disclaimer: This handbook has been prepared in good faith based on resources available at the time of publication. Where possible, a link to the original electronic source is provided in the endnotes. While making every attempt to ensure the information is relevant and accurate, the CFE-DM does not guarantee or warrant the accuracy, reliability, completeness, or currency of the information herein. This information will be updated periodically, and we welcome and appreciate your feedback to improve this document and help fill any gaps to enhance its future utility. For feedback or comments, please email: **cfe.dmha.fct@pacom.mil**.

Samoa Notes

1 Foster, Sophie. Samoa. Encyclopedia Britannica. 9 October 2023. https://www.britannica.com/place/Samoa-island-nation-Pacific-Ocean

2 Government of Samoa. National Disaster Management Plan 2017-2020. https://www.mnre.gov.ws/wp-content/uploads/2017/08/Samoa-national-disaster-management-plan-2017-2020-final-web.pdf

3 CIA World Factbook. Samoa – Map. https://www.cia.gov/the-world-factbook/static/maps/WS-map.jpg

4 Foster, Sophie. Samoa. Encyclopedia Britannica. 5 January 2024. https://www.britannica.com/place/Samoa-island-nation-Pacific-Ocean

5 USAID. Samoa Country Profile. 2023. https://www.usaid.gov/pacific-islands/samoa

6 World Bank Climate Change Knowledge Portal. Samoa – Climatology. https://climateknowledgeportal.worldbank.org/country/samoa/climate-data-historical#:~:text=The%20temperature%20in%20Samoa%20is,to%20Samoa's%20near%2Dequatorial%20location.

7 World Bank Climate Change Knowledge Portal. Samoa – Country Summary. https://climateknowledgeportal.worldbank.org/country/samoa

8 ADPC & UNDRR. Disaster Risk Reduction in Samoa: Status report, 2022. https://www.undrr.org/publication/disaster-risk-reduction-samoa-status-report-2022

9 Pacific-Australia Climate Change Science and Adaptation Planning Program. Current and future climate of Samoa. 2013. https://www.pacificclimatechangescience.org/wp-content/uploads/2013/06/3_PACCSAP-Samoa-10pp_WEB.pdf

10 Samoa Ministry of Natural Resources and Environment. Disaster Management Office. Accessed 11 October 2023. https://www.mnre.gov.ws/about-us/divisions/disaster-management-office/

11 OCHA. Samoa: Humanitarian Coordination Structure. 28 June 2022. https://reliefweb.int/report/samoa/samoa-humanitarian-coordination-structure-28-june-2022

12 Government of Samoa. Samoa National Action Plan for Disaster Risk Management 2017-2021. https://www.mnre.gov.ws/wp-content/uploads/2017/08/Samoa-national-action-plan-for-DRM-2017-2021-final-web.pdf

13 Government of Samoa. National Disaster Management Plan 2017–2020. https://www.mnre.gov.ws/wp-content/uploads/2017/08/Samoa-national-disaster-management-plan-2017-2020-final-web.pdf

14 Ministry of National Resources and Environment. Climate Change and GEF. https://www.mnre.gov.ws/about-us/divisions/global-environment-facility/

15 Ministry of Natural Resources and Environment. Samoa Climate Change Policy. Government of Samoa. 2020. https://www.pacificclimatechange.net/sites/default/files/documents/Samoa-Climate-Change-Policy-2020-2030.pdf

16 UNFCCC. NDC Registry. https://unfccc.int/NDCREG

17 Ministry of Natural Resources and Environment. Samoa Climate Change Policy. Government of Samoa. 2020. https://www.pacificclimatechange.net/sites/default/files/documents/Samoa-Climate-Change-Policy-2020-2030.pdf

18 UNDP Climate Change Adaptation. Samoa National Adaptation Programme of Action (NAPA). https://www.adaptation-undp.org/projects/samoa-national-adaptation-programme-action-napa

19 PRIF. Samoa National Infrastructure Strategic Plan 2011. https://www.theprif.org/document/samoa/national-infrastructure-investment-plans/samoa-national-infrastructure-strategic

20 Samoa Meteorology Division. Mandate and Services. Accessed 13 October 2023. http://www.samet.gov.ws/index.php/services

21 Government of Samoa. OFFICIAL PRESS RELEASE: Launching of the Flood Alert Sirens (a first of its kind in Samoa) within the vicinity of the Vaisigano River Catchment Area. 29 November 2022. https://www.samoagovt.ws/2022/11/official-press-release-launching-of-the-flood-alert-sirens-a-first-of-its-kind-in-samoa-within-the-vicinity-of-the-vaisigano-river-catchment-area/

22 Williams, Shaun; Griffiths, James, et al. An Impacts-Based Flood Decision Support System for a Tropical Pacific Island Catchment with Short Warnings Lead Time. Water 13, no. 23: 3371. 2021. https://doi.org/10.3390/w13233371

23 Pacific Community. Strengthening Multi-Hazard Early Warning Systems in Samoa. 7 October 2022. https://www.spc.int/updates/blog/2022/10/strengthening-multi-hazard-early-warning-systems-in-samoa

24 SPREP. Community Based Early Warning Systems introduced through CREWS project. 16 November 2020. https://www.sprep.org/news/community-based-early-warning-systems-introduced-through-crews-project

25 Bapon S.H.M. Fakhruddin, Lauren Schick. Benefits of economic assessment of cyclone early warning systems - A case study on Cyclone Evan in Samoa, Progress in Disaster Science, Volume 2, 2019, 100034, ISSN 2590-0617. https://doi.org/10.1016/j.pdisas.2019.100034

26 LogCluster. Samoa National Regulatory Departments. September 2018. https://dlca.logcluster.org/12-samoa-national-regulatory-departments

27 LogCluster. Samoa Port of Apia. September 2018. https://dlca.logcluster.org/211-samoa-port-apia

28 LogCluster. Samoa Port Assessment. September 2018. https://dlca.logcluster.org/21-samoa-port-assessment

29 LogCluster. Samoa Port of Apia. September 2018. https://dlca.logcluster.org/211-samoa-port-apia

30 LogCluster. Samoa Port of Salaologa. September 2018. https://dlca.logcluster.org/212-samoa-port-saleologa

31 LogCluster. 2.2.1 Samoa Faleolo International Airport. September 2018. https://dlca.logcluster.org/221-samoa-faleolo-international-airport

32 LogCluster. 2.2.2 Samoa Salelologa (Maota) Airport. September 2018. https://dlca.logcluster.org/222-samoa-salelologa-maota-airport

33 SMEC. Vulnerability Assessment of Samoa Road Network. https://www.smec.com/project/vulnerability-assessment-of-samoa-road-network/

34 World Bank Group. Supporting Road Network Vulnerability Assessments in Pacific Island Countries. Transport Knowledge Note. April 2018. https://www.gfdrr.org/sites/default/files/publication/ACP-EU%20NDRR%20-%20transport%20knowledge%20note%20-%20supporting%20road%20network%20vulnerability%20assessments%20in%20PICspdf.pdf

35 Electric Power Corporation. About Us. https://www.epc.ws/about-us/

36 Pacific Community. Water, Sanitation Program – Samoa. http://www.pacificwater.org/pages.cfm/country-information/samoa.html

37 Ministry of Natural Resources and Environment. Water and Sanitation Sector. https://www.mnre.gov.ws/about-us/divisions/water-sector/

38 Samoa Red Cross Society. Strategic Plan 2021-2025: Act Today, Shape Tomorrow. https://data-api.ifrc.org/documents/WS/SP_Samoa_2021-2025.pdf

39 IFRC. Samoa Red Cross Society. Accessed 13 October 2023. https://data.ifrc.org/FDRS/national-society/DWS001

40 Devex. The Samoa Umbrella for Non-Governmental Organisations Inc. (SUNGO). https://www.devex.com/organizations/the-samoa-umbrella-for-non-governmental-organisations-inc-sungo-133747

41 SUNGO. Strategic Plan 2020-24. https://www.sungo.ws/wp-content/uploads/2021/06/SUNGOStrategicPlan-20202024Final15052021.pdf

42 SUNGO. Strategic Plan 2020-24. https://www.sungo.ws/wp-content/uploads/2021/06/SUNGOStrategicPlan-20202024Final15052021.pdf

43 Government of Samoa. Official Press Release: SUNGO to host the Civil Society Organizations' Forum funded by the European Union. 28 September 2022. https://www.samoagovt.ws/2022/09/official-press-release/

44 DFAT Australia. Review of the Civil Society Support Program (CSSP II) in Samoa 2016 – 2021: Review Report. December 2021. https://www.dfat.gov.au/sites/default/files/cssp-2016-2021-independent-review-report.pdf

45 Government of Samoa. JOINT PRESS RELEASE: European Union reaffirms support to civil society in Samoa. https://www.samoagovt.ws/2020/04/joint-press-release-european-union-reaffirms-support-to-civil-society-in-samoa/

46 Government of Samoa. JOINT PRESS RELEASE: Launch of the Samoa Gender Partnership Program – an initiative of Tautua: Supporting Human Development for All. 16 June 2022. https://www.samoagovt.ws/2022/06/joint-press-release-launch-of-the-samoa-gender-partnership-program-an-initiative-of-tautua-supporting-human-development-for-all/

47 Commonwealth Network. Find Civil Society expertise in Samoa. 2020. https://www.commonwealthofnations.org/sectors-samoa/civil_society/

Header photo by Fine Fifita on unsplash.com. Saletoga Sands Resort & Spa, Samoa. https://unsplash.com/photos/a-beach-with-rocks-and-palm-trees-on-a-sunny-day-xS6eQTs7GL8

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Solomon Islands

The Solomon Islands archipelago extends 1,448 km (900 miles) from northwest to southeast in the southwest Pacific Ocean. The country is comprised of a double chain of 992 volcanic islands and coral atolls, with a land area of 27,986 km^2 (10,805 square miles)[1] within an Exclusive Economic Zone (EEZ) of 1.34 million km^2 (517,376 square miles).[2] There are six main islands, which are Choiseul, Guadalcanal, Malaita, New Georgia, San Cristobal, and Santa Isabel. The island terrain is heavily forested and mountainous.[3] The highest point is Mount Popomanaseu, which peaks at 2,335 m (7,661 feet) on Guadalcanal.[4] The country also has a number of volcanos. Tinakula, in the Santa Cruz group, and Kavachi, a submarine volcano near New Georgia, have erupted regularly every few years. Simbo Island has a solfatara, a volcanic area or vent that emits only hot vapors and sulfurous gases. Savo Island has hot springs, but the volcano there last erupted in the 1840s.[5] Figure 61 is a map of the Solomon Islands.[6]

Human history in Solomon Islands is believed to extend back as much as 30,000 years when the first Papuan settlers arrived from New Guinea.[7] Around 4000 BCE, Austronesian settlers started arriving and intermixing with Papuan settlers; Polynesians started settling in the islands between 1200 and 1600 CE primarily in the outer islands, including Rennell, Bellona, and Ontong Java.[8] Today, Solomon Islands has a population of approximately 721,455 people.[9] The population is primarily indigenous Melanesian, with approximately 95.3% of the population Melanesian, 3.1% Polynesian, 1.2% Micronesian, and 0.4% other ethnicities.[10] An estimated 26% of the population live in urban areas. Honiara, the capital and commercial hub of the country, accounts for more than two-thirds of all urban residents, excluding residents in the adjoining urban areas of Guadalcanal.[11]

A Spanish explorer was the first European to reach the islands in 1568, but further European contact did not occur until 1767. By the mid-1800s, the islands were regularly visited by European explorers, British and American whalers, missionaries, and sandalwood traders.[12] In 1885, Germany declared a protectorate over the northern Solomon Islands, and in 1893 the UK established a protectorate over the southern islands. Germany transferred its Solomon Islands claim to the UK in 1899 in exchange for the UK relinquishing its claims in Samoa.[13] Nationalism emerged in the islands after World War II, and in 1946, the Marching Rule independence movement was established.[14] In 1976, Solomon Islands became fully self-governing and, in 1978, obtained independence within the British Commonwealth. However, more than a decade of ethnic conflict, known as "The Tensions," rocked the country from 1998 to 2003.[15] A Government-requested regional military force, Regional Assistance Mission to Solomon Islands (RAMSI) operated in the country from 2003 to 2017.[16] Since the end of the mandate, political instability has continued with occasional violent outbreaks.[17]



Figure 61: Map of Solomon Islands

Solomon Islands is a parliamentary democracy under a constitutional monarchy. As

a Commonwealth realm, the head of state is Britain's King Charles III, represented by the Governor-General of the Solomon Islands. The head of government is the Prime Minister.[18] The National Parliament comprises 50 seats filled by direct election in the country's 50 single-seat constituencies.[19]

Hazards and Climate Change

Solomon Islands has a tropical monsoon climate. It is hot and humid but with cool winds and abundant, year-round rainfall. Temperatures are stable throughout the year, not usually exceeding 32°C (90°F). Rainfall is abundant, generally averaging 3,000–3,500 mm (120–140 inches) a year.[20] Precipitation occurs throughout the year. It peaks from January to March and decreases slightly from May to November, but even then, it remains around 200-250 mm (8-10 inches) per month.[21] Figure 62 graphs the monthly mean temperatures and precipitation amounts for the country for the period 1991-2020.[22]

Solomon Islands faces a range of frequently occurring natural hazards, including tropical storms and cyclones, flooding, landslides, earthquakes, tsunamis, volcanic eruptions, and sea level rise. Its natural disaster risk is already being exacerbated by climate change, a trend that is projected to continue and particularly affects food security and livelihoods as the majority of the population engages in subsistence agriculture and fishing in rural locations.

The country is already experiencing warming temperatures, a trend expected to continue throughout the century. Future rates of warming for Solomon Islands are likely to be in the range of an increase of 0.7°C–2.8°C (1.3°F –5.0°F), depending on the 21st century rate of global emissions.[23] Sea levels are rising an estimated three times faster in Solomon Islands than the global average with the country noting a rise of 7-10 mm (0.28-0.40 inches) annually since 1993. Submergence of the country's lowest-lying islands has already begun to threaten coastal communities. A 2016 study using satellite imagery dating from 1947 through 2014 and focusing on 33 islands showed that five vegetated reef islands within the country's waters had already disappeared under rising seas and that an additional six similar islands were eroding to the point that they were soon to be lost. A World Bank assessment in March 2023 reported that 26,000 Solomon Islanders had already been forced to relocate from 2008 to present,[24] and it is projected that up to 47,000 people in Solomon Islands will be directly exposed to sea level rise by 2050, based on modelling of the worst-case emissions scenario.[25]

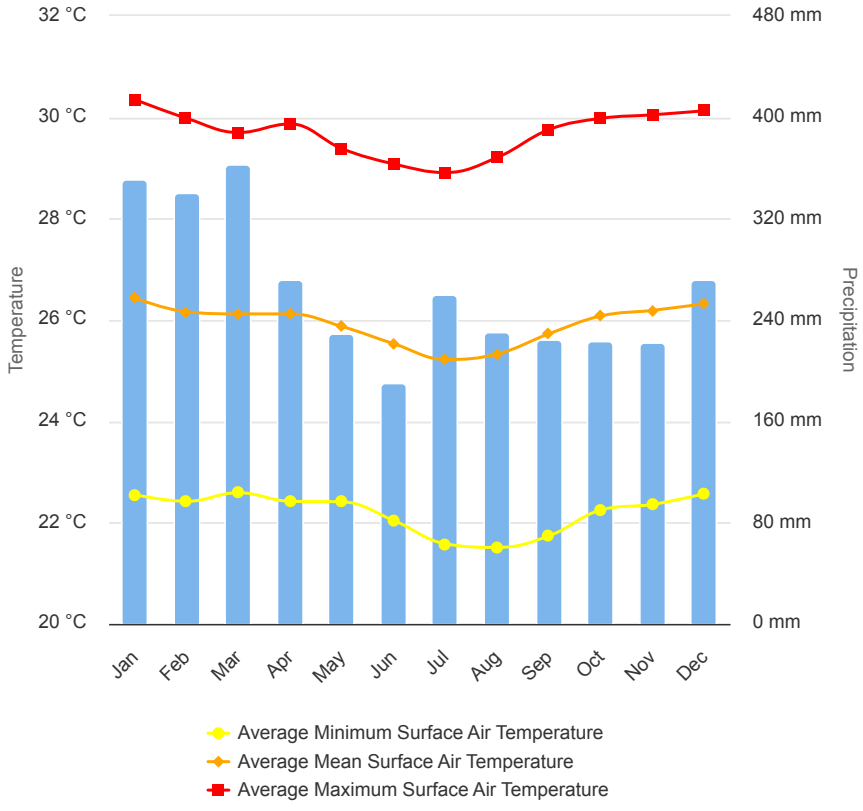


Figure 62: Average Monthly Temperature and Precipitation, Solomon Islands (1992-2022)

Short and medium-term rainfall changes are difficult to project; however, extreme precipitation is anticipated to increase in the coming decades. The country is significantly vulnerable to extreme rainfall

events, for which DRR measures can be especially critical. Figure 63 depicts a projection that the number of people in Solomon Islands exposed to extreme precipitation will increase from 100,000 people in 2000 to 513,000 people by the year 2050, based on the worst-case emission scenario.[26]

In the Climate Change Policy (2023-2032), the Government relies on the Pacific Climate Change Science Programme from Australia's Bureau of Meteorology and Commonwealth Scientific and Industrial Research Organisation (CSIRO) for a snapshot of Solomon Islands' future under climate change. Table 21 details the expectations for Solomon Islands for the years 2030 and 2055 under high emissions scenarios.[27]

Solomon Islands' vulnerability to climate change impacts is worsened by socio-economic conditions. The country has a small but developing economy that relies on forestry, agriculture, fishing, and tourism sectors; they are highly vulnerable to natural hazards, which

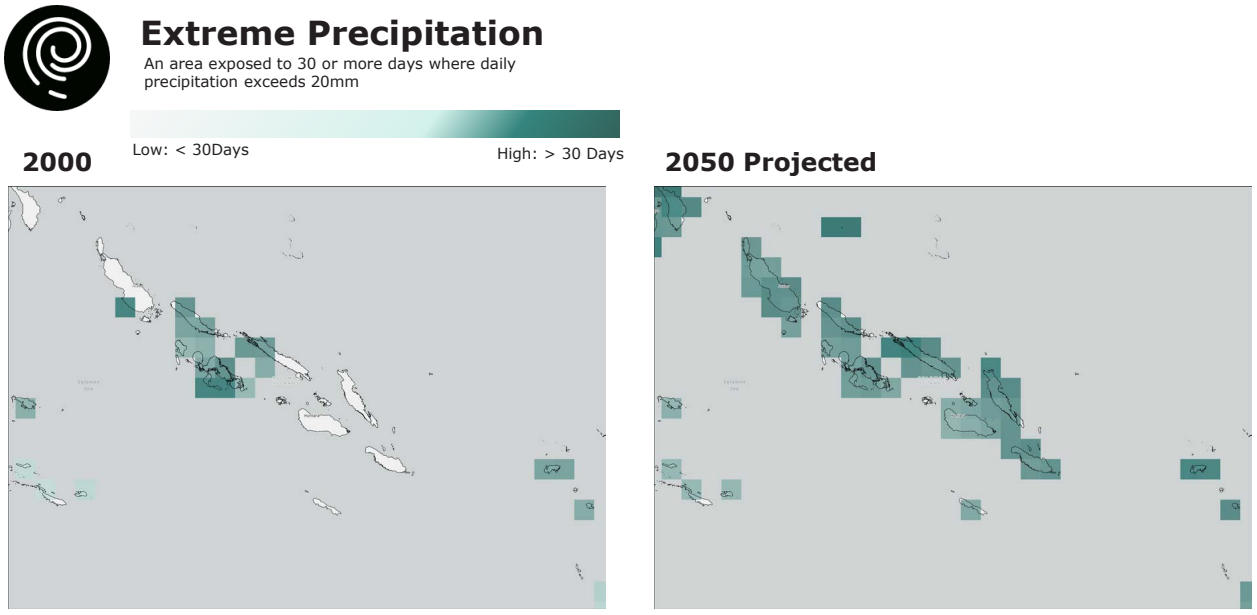


Figure 63: Projected Population Exposed to Extreme Precipitation (2000 and 2050)

Variable	Expected Change	Projected 2030	Projected 2055
Annual surface temperature	Average air temperature will increase	+0.4–1.0°C (0.72-1.8°F)	+1.0-+1.8°C (1.8-3.24°F)
Maximum temperature (1-in-20-year event)	More very hot days	n/a	+1.0-1.5°C (1.8-2.7°F)
Minimum temperature (1-in-20-year event)	Temperatures will continue to increase	n/a	+1.2-1.7°C (2.16-3.06°F)
Annual total rainfall	Annual rainfall will increase	+1.0-2.0%	+4.0-13%
Wet season rainfall	Wet season will increase	+2.0-2.7%	+5.0-11%
Dry season rainfall	Dry season will increase	+2.0-9.0%	+3.0-5.0%
Sea surface temperature	Sea surface temperature will increase	+0.6-1.1°C (1.08-1.98°F)	+0.9-1.3°C (1.62-2-34°F)
Annual maximum acidification (aragonite saturation)	Ocean acidification will continue to increase	+3.6	+3.1-3.5
Mean sea level	Sea level will increase	+9.0-12 cm (3.5-4.72 inches)	+18.0-21.0 cm (7.1-8.26 inches)

Table 21: Climate Change Projections for Solomon Islands for 2030 and 2055 under High Emissions

are exacerbated by climate change.[28] Among Solomon Islanders projected to be exposed to five key climate change-influenced phenomena – sea level rise, consecutive dry days, extreme heat, tropical cyclones, and extreme precipitation – a majority is made up of those projected to be exposed to extreme precipitation in 2050. Of those residents expected to confront intensifies hazard exposure due to climate change, more than 72,000 are expected to come from more vulnerable communities – e.g., youth, elders, and people living with disabilities.[29]

Government Institutions, Policies, and Plans for Disasters and Climate Change

The National Disaster Management Plan (NDMP) 2018 is a comprehensive plan that sets out arrangements for disaster management, with an emphasis on a whole-of-government, national-, provincial-, and local-level approach to disaster planning, preparedness, response, and recovery.

The government lead for disaster management in Solomon Islands is the Ministry of Environment, Climate Change, Disaster Management, and Meteorology (MECDM).[30] MECDM is organized into four technical divisions, each of which is responsible for a technical area – i.e., environment and conservation, climate change, disaster risk management, and meteorology. There is a separate division that is responsible for corporate services.[31]

The governance framework for disaster management is established under the National Disaster Council (NDC) Act 1989 and the NDMP 2018, which set out the key institutional frameworks for disaster management. The NDC Act established the NDC, which advises the government on issues related to DRR, disaster management, preparedness, and response.[32] The National Disaster Management Office (NDMO) is the Secretariat of the NDC. Below the national level are provincial disaster committees which oversee Provincial Disaster Operations Committees, and local-level disaster committees. Figure 64 depicts the disaster management institutional framework in Solomon Islands.[33]

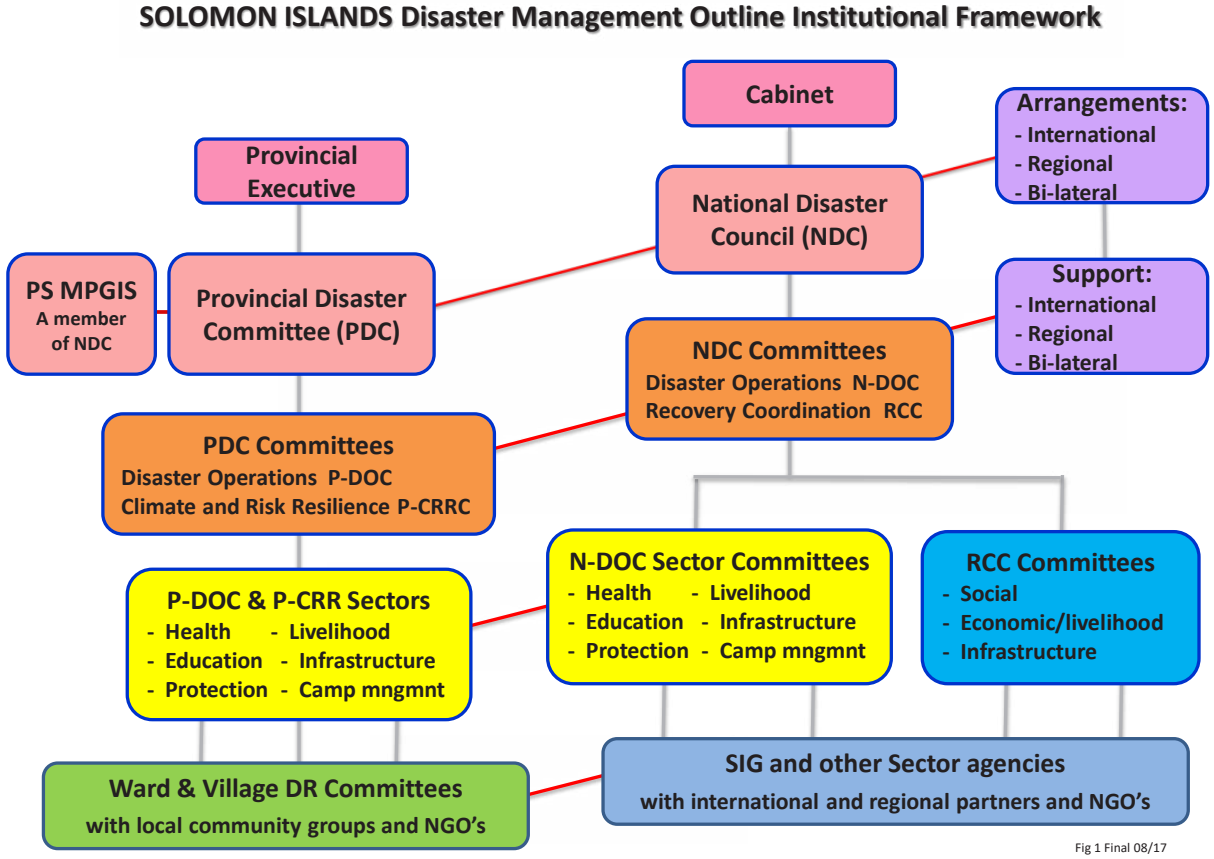


Figure 64: Disaster Management Institutional Framework, Solomon Islands

The NDC is chaired by the Permanent Secretary for MECDM. The NDC is responsible to the Cabinet for policy development and for the strategic management of planning and arrangements for disaster management. The NDC is also responsible for overseeing disaster response and the coordination of international, regional, and bilateral support during disasters. Per the NDMP of 2018, the NDC is responsible for overseeing disaster response through three agencies:

- NDMO (all hazards except pandemics and pest and disease)
- Ministry of Health and Medical Services (pandemics)
- Ministry of Agriculture and Livestock (pests and diseases)

There are three committees under the NDC:

- National Disaster Operations Committee (N-DOC)
- Recovery Coordination Committee (RCC)
- Climate and Risk Resilience (CRR) Committee

The N-DOC is chaired by the director of the NDMO and is responsible for establishing disaster management arrangements for preparedness and response and for planning at the national, sector, provincial, and local levels. It is also responsible for managing the coordination of disaster events and providing support to the provincial and local levels. Further responsibilities include public awareness and training, early warning arrangements, and assessment and response structures for managing disaster events and coordinating available resources to support affected communities.[34]

The National Climate Change Policy (2023-2032) is intended to guide anticipatory and response measures to deal with the impacts of climate change and to capitalize on opportunities to strengthen the Solomon Islands' low emission status and transition to a resilient development path. The Policy has six intended outcomes: 1) enabling legislative and institutional frameworks; 2) addressing vulnerabilities with adaptation and mitigation in mind; 3) driving mitigation by strengthening net zero emissions while economic growth and resilience are enhanced; 4) addressing "loss and damage;" 5) meeting national reporting obligations; and 6) enhancing technical capacities for assessment, technology, and finance mobilization, and mainstreaming climate change actions. Figure 65 illustrates where the Policy sits within the country's overall development and climate change programming.[35]

MECDM is the national designated authority for global climate finance and the focal point for the Green Climate Fund (GCF).[36] MECDM's Climate Change Division places high importance on ensuring that the national public, the global community, and donor partners support the Government's policies and actions on climate change. The Division's tasks include monitoring Solomon Islands' vulnerability to the effects of climate change, mobilizing resources for adaptation and mitigation initiatives, conducting research and information dissemination, seeking resources to support national programs, and fulfilling the role of lead agency in addressing Solomon Islands' obligations as a Party to the UNFCCC and Pacific Islands Climate Change Framework.[37]

MECDM also developed the National Adaptation Programmes of Action (NAPA), which sets out priority areas for climate change adaptation. Many projects and plans with roots in the NAPA process are national or provincial, but the program also encourages local adaptation plans, especially those that can be based in how communities have been adapting to changes in their environment for centuries.[38] The Ministry of National Planning has also elaborated the Solomon Islands Priority Infrastructure Investment Pipeline 2021 as a follow-up to the Solomon Islands National Infrastructure Investment Plan of 2013. Both documents include economic, social, and productive infrastructure in their prioritization to support the national development strategy of sustained, inclusive growth, poverty alleviation, health care and education access, national unity, and a resilient and environmentally stable country.[39]

The NDC's CRR Committee is responsible for addressing hazards and the reduction of disaster

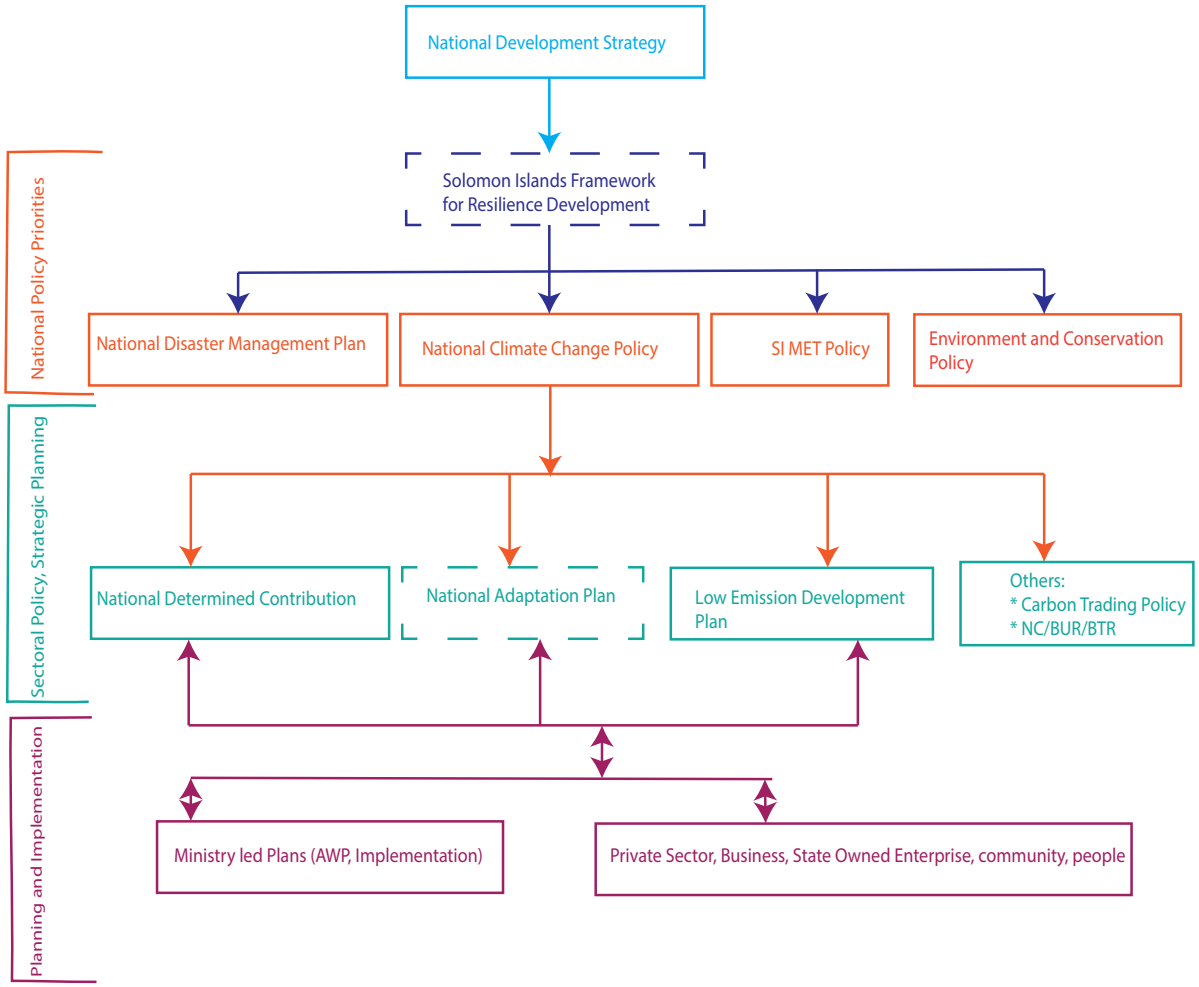


Figure 65: Solomon Islands Climate Change Policy Linkages

and climate risk within social and development planning processes and practices. The CRR Committee has a working relationship with the other NDC committees and at the provincial level.[40]

Ministry of Environment, Climate Change, Disaster Management, and Meteorology (MECDM)

P.O. Box 21, Vavaya Ridge, Honiara, Solomon Islands
Tel: 677 23031 / 23032

National Disaster Management Office

Tel: 677 23031 / 23032

Early Warning Systems

In Solomon Islands, the Solomon Islands Meteorological Service (SIMS) of MECDM provides early warning of hydrological hazards. The Geological Survey Division of the Ministry of Mines, Energy and Rural Electrification monitors seismicity and volcanic activities. SIMS is responsible for the following early warning system components – monitoring of precursors, forecasting of probable events, and issuance of a warning or an alert when an event of catastrophic proportions takes place.[41] Currently, SIMS operates seven manned Meteorological Stations, six automated weather stations (AWS), and seven Automatic Rainfall Gauge stations.[42] The National Weather Forecasting Office provides weather and marine weather forecasting information with regard to cyclones, floods, earthquakes, tsunamis, and other severe weather.[43]

SIMS has established Marine Early Warning Systems in Tulagi, Central Province, and in

Western Province with support from the UNDP Integrated Disaster Risk Management and the Australian government. The warning system uses a flag to notify small craft skippers of current weather conditions to allow them to make decisions before they travel to another island or on the open ocean. SIMS aims to translate early warning messages and distribute them in simple, understandable, and usable forms.[44]

There are SIMS offices in Auki, Honiara, Lata, Munda, Taro, and Tinggoa, as well as at Henderson airport and the NDMO main office.[45]

Solomon Islands Meteorological Service
Vavaya Ridge, Honiara
Tel: 677 27658
Email: *forecast@met.gov.sb*

Infrastructure

Due to the country's geography, transport of people and cargo is a challenge even in normal times. The population relies heavily on multimodal transport for access to essential goods, services, and livelihood opportunities, and the economy is dependent on interisland transfers to support domestic trade and commodity exports.

The Ministry of Communications and Aviation is responsible for developing air transport policy and for managing services, assets, and security in the aviation subsector. The Ministry of Infrastructure Development is responsible for constructing, rehabilitating, and maintaining publicly owned ports and roads.[46] The National Transport Plan 2011-2030 establishes a policy framework to maintain and develop infrastructure, services, and capacities of government agencies and the private sector, and the National Transport Fund is a mechanism to fund the transport sector.[47] There are 28 airports and airfields; Honiara, Munda, and Gizo are the only airports with paved runways. The other airports have unpaved, mainly coral rock, runways. Most runways remain operational after heavy rains as the coral rock provides a solid landing base.[48] Solomon Islands' two international ports are Honiara and Noro. There are 91 community jetties and boat ramps.[49] Provincial authorities manage Gizo, Ringi Cove, Tulagi, and Yandina, the largest of the domestic-only ports. They are suitable only for inter-island vessels and have no handling and storage facilities or security.[50] The road network comprises about 1,523 km (946 miles) of roads, of which 184 km (114 miles or 12%) are sealed. Guadalcanal and Malaita provinces account for 65% of the total network.[51] Most outlying islands have few or no roads, with overland transportation infrastructure consisting of walking trails. Maintenance and construction of roads and associated infrastructure is challenging due to heavy rainfall and steep terrain.[52]

The Ministry of Mines, Energy, and Rural Electrification manages policy for both the electric power and water and sanitation systems. Both Solomon Power and Solomon Water are overseen by boards that report directly to the Ministry. Due to its oversight of energy and water resources and services, it is also a focal point for mitigation of geological and hydrological hazards as well as for mitigating GHG emissions. The Ministry's Energy Division and Water Resources Division are the implementing partners for national energy and water and sanitation projects in coordination with other agencies and donor partners.[53]

Solomon Power generates and supplies grid-connected electricity in Honiara and eight key settlements (Auki, Buala, Gizo, Kirakira, Lata, Malu'u, Noro-Munda, and Tulagi). Installed capacity in Honiara is 34 MW; combined installed generation capacity in the provincial centers is 2.3 MW.[54] The Lungga power station (diesel) in Honiara is the main power station with a generation capacity of 27MW; it was joined in 2016 by the Henderson Solar Plant (1MW). Meanwhile, since 2016, upgrades have been completed to the diesel generators in Gizo (1.5 MW), Noro (1.5 MW), Munda (250 kilowatts; kW), Auki (1MW), and Tulagi (500 kW). In May 2016, the refurbished Buala Mini Hydro plan was completed, returning 150 kW of clean energy to the grid, and in July 2017, two mini-hybrid stations (solar panels, battery

storage, and back-up diesel) were brought on-grid in Western and Choiseul Provinces to serve 400 new customers.[55]

Surface water sources like rivers, lakes, or streams are used as the main source of supply for major towns on the larger, high islands of Solomon Islands, while small, low-lying islands rely exclusively on groundwater and rainwater collection.[56] About one-third of the country's urban population lives in informal settlements. They get their drinking water from public water supply schemes, rainwater tanks, public wells, springs, streams, and other sources, such as bottled water.[57] As of 2020, open defecation remained the norm across the country at 44% of the total population.[58] Solomon Water provides consolidated water and sanitation services in Honiara, Auki, Noro, and Tulagi. Supply is divided into nine zones with limited cross-connection, and there is a large proportion of small diameter reticulation pipes.[59] Sewerage is limited to the main urban area of Honiara around the National Referral Hospital. Greater Honiara's sewer network is about 36 km (22 miles) long, with 15 discrete gravity collection systems. Thirteen of these discharge to the ocean while two discharge to the Mataniko River.[60]

Ministry of Communications and Aviation
P.O. Box 1850, Henderson Airport, Honiara
Tel: 677 36720

Ministry of Infrastructure Development
P.O. Box G8, Honiara
Tel: 677 21141 / 23428

Ministry of Mines, Energy, and Rural Electrification (MMERE)
Lengakiki Road, West Honiara
P.O. Box G37, Honiara
Tel: 677 21522

MMERE Energy Division
Tel: 677 21522

Water Resources Division
Tel: 677 21522

Solomon Power
PO Box 6, Head Office Ranadi, Honiara
677 166, 167

Solomon Water
P.O. Box 1407, Honiara
677 23985

Civil Society Partners

The Solomon Islands Red Cross Society (SIRC) was established by an Act of Parliament in 1983. It is a voluntary aid society auxiliary to the national government. In 2017, SIRC launched a strategic plan to reach 30% of the population by 2020 and to decentralize its operations, and it opened new branches in in Makira-Ulawa, Isabel, and Choiseul Provinces.[61]

Solomon Islands Red Cross Society
P.O Box 187, Lombi Crescent Street, New Chinatown, Honiara
Tel: 677 22682
Email: *secgen@redcross.org.sb*

The Development Services Exchange (DSE) was formed in 1984 and is the umbrella coordinating body for civil society. Its mission is to strengthen effective NGO coordination, and it plays a role in coordination, facilitation, and networking, and in building collaboration and cooperation between NGOs, the government, and donors. DSE has 75 registered members throughout Solomon Islands. It provides various services for its members including advocacy, capacity building, collecting, and sharing information. It is also the National Liaison Unit for Solomon Islands with the PIANGO.[62]

Development Services Exchange
P.O. Box 556, Lombi Cresent Street, New Chinatown, Honiara, Solomon Islands
Tel: 677 23760
Email: *generalsecretary@dse.org.sb*

Established in 1982, Solomon Islands Development Trust focuses on village empowerment and community development.[63] The organization's vision is that every village has a good standard of living, with sustainable use of resources, good access to services, and good leaders who ensure that villagers work together for the good of their community. It works on projects that build capacity in existing village governance structures, collecting, creating, and sharing multi-media information resources useful and appropriate for villages, contributing to the research and analysis of issues affecting the people of the Solomon Islands, and networking and advocacy.

Solomon Islands Development Trust
P O Box 147, Lombi Crescent, New China Town, Guadalcanal
Tel: 677 23409
Email: *admin@sidt.org.sb*

Vois Blong Mere is a women's NGO that works to advance the status women through information dissemination, linking, and networking. It was established in 2002. It discusses its projects and shares information via a 15-minute radio show aired on Solomon Islands Broadcasting Corporation.[64]

Vois Blong Mere
Tel: 677 28738
Email: *vbms@solomon.com.sb*

Disclaimer: This handbook has been prepared in good faith based on resources available at the time of publication. Where possible, a link to the original electronic source is provided in the endnotes. While making every attempt to ensure the information is relevant and accurate, the CFE-DM does not guarantee or warrant the accuracy, reliability, completeness, or currency of the information herein. This information will be updated periodically, and we welcome and appreciate your feedback to improve this document and help fill any gaps to enhance its future utility. For feedback or comments, please email: **cfe.dmha.fct@pacom.mil**.

Solomon Islands Notes

1 World Atlas. Maps of Solomon Islands. 25 February 2021. https://www.worldatlas.com/maps/solomon-islands

2 SOLOMON ISLANDS 2021: NATIONALLY DETERMINED CONTRIBUTION (NDC). https://unfccc.int/sites/default/files/NDC/2022-06/NDC%20Report%202021%20Final%20Solomon%20Islands%20%281%29.pdf

3 World Atlas. Maps of Solomon Islands. 25 February 2021. https://www.worldatlas.com/maps/solomon-islands

4 CIA World Factbook. Solomon Islands. Accessed 21 August 2023. https://www.cia.gov/the-world-factbook/countries/solomon-islands/

5 Encyclopedia Brittanica. Solomon Islands: Land. https://www.britannica.com/place/Solomon-Islands#ref53966

6 CIA World Factbook. Solomon Islands – Map. https://www.cia.gov/the-world-factbook/static/maps/BP-map.jpg

7 CIA World Factbook. Solomon Islands. 24 August 2023. https://www.cia.gov/the-world-factbook/countries/solomon-islands/

8 Brown, Lindsay, Jean-Bernard Carillet, and Anna Kaminski. Papua New Guinea and Solomon Islands. Lonely Planet. 2016. p. 203.

9 Ministry for Finance and Treasury, Government of Solomon Islands. Solomon Islands Population Count hits 721 thousand. My SIG Services Portal. 17 November 2020. https://solomons.gov.sb/solomon-islands-population-count-hits-721-thousand/

10 Encyclopedia Britannica. Solomon Islands: People – Ethnic Composition. 1 June 2016. https://www.britannica.com/place/Solomon-Islands#ref53967

11 Bündnis Entwicklung Hilft. World Risk Report 2022 – Focus: Digitalization. https://weltrisikobericht.de/weltrisikobericht-2022-e/#

12 Encyclopedia Britannica. Solomon Islands: History. 13 December 2021. https://www.britannica.com/place/Solomon-Islands#ref53967

13 Burt, Ben; Bolton, Lissant; Akin, David; Gege, Jackson; Guo, Pei-yi. The Things We Value: Culture and History in Solomon Islands, Sean Kingston Publishing, 2014, p. 2.

14 BBC News. Solomon Islands profile – Timeline. 30 November 2017. https://www.bbc.com/news/world-asia-15897585

15 The Regional Assistance Mission to Solomon Islands (RAMSI). The Tensions. https://www.ramsi.org/the-tensions/

16 RAMSI. About RAMSI. https://www.ramsi.org/about/

17 O'Brien, Patricia. The Deep Roots of the Solomon Islands' Ongoing Political Crisis. CSIS. 10 December 2021. https://www.csis.org/analysis/deep-roots-solomon-islands-ongoing-political-crisis

18 CIA World Factbook. Solomon Islands. 25 July 2023. https://www.cia.gov/the-world-factbook/countries/solomon-islands/

19 National Parliament of Solomon Islands. About Parliament. 2023. https://www.parliament.gov.sb/page/about-us

20 Encyclopedia Brittanica. Solomon Islands: Land. https://www.britannica.com/place/Solomon-Islands#ref53966

21 Climates to Travel. Climate - Solomon Islands. Accessed 21 August 2023. https://www.climatestotravel.com/climate/solomon-islands

22 World Bank. Monthly Climatology of Average Minimum Surface Air Temperature, Average Mean Surface Air Temperature, Average Maximum Surface Air Temperature & Precipitation 1991-2020; Solomon Islands. World Bank Climate Change Knowledge Portal. Accessed 27 September 2023. Creative Commons Attribution 4.0 International License (CC BY 4.0). https://climateknowledgeportal.worldbank.org/country/solomon-islands/climate-data-historical

23 World Bank Group. Climate Risk Country Profile: Solomon Islands. 2021. https://climateknowledgeportal.worldbank.org/sites/default/files/country-profiles/15822-WB_Solomon%20Islands%20Country%20Profile-WEB.pdf

24 Smith, Nicola. These islands are being slowly swallowed by the sea – it's a warning to the world. The Telegraph. 11 May 2023. https://www.telegraph.co.uk/global-health/climate-and-people/climate-change-solomon-islands-rising-sea-levels/#:~:text=One%20landmark%20peer%2Dreviewed%20study,10mm%20per%20year%2C%20since%201993.

25 PDC | Global. Solomon Islands 2000-2050 Climate Change Impact Analysis, 2022. https://www.cfe-dmha.org/LinkClick.aspx?fileticket=pcDPCXw0hjk%3d&portalid=0

26 PDC | Global. Solomon Islands 2000-2050 Climate Change Impact Analysis, 2022. https://www.cfe-dmha.org/LinkClick.aspx?fileticket=pcDPCXw0hjk%3d&portalid=0

27 Ministry of Environment, Climate Change, Disaster Management and Meteorology (MECDM). SOLOMON ISLANDS NATIONAL CLIMATE CHANGE POLICY 2023 – 2032. September 2023. https://sigfiles.sig.gov.sb/d/76d19491cde34a3bac7d/files/?p=/Solomon%20Islands%20National%20Climate%20Change%20Policy%20%202023%20-2032.pdf

28 UNDRR and ADPC. Disaster Risk Reduction in the Solomon Islands: Status Report, United Nations Office for Disaster Risk Reduction, 2023. https://www.preventionweb.net/publication/disaster-risk-reduction-solomon-islands-status-report-2023

29 PDC | Global. Solomon Islands 2000-2050 Climate Change Impact Analysis, 2022. https://www.cfe-dmha.org/LinkClick.aspx?fileticket=pcDPCXw0hjk%3d&portalid=0

30 UN Office for Disaster Risks Reduction (UNDRR) and Asian Disaster Preparedness Center (ADPC). Disaster Risk Reduction in the Solomon Islands: Status Report. 2023, https://www.preventionweb.net/media/86899/download?startDownload=true

31 Ministry of Environment, Climate Change, Disaster Management and Meteorology (MECDM). About the Ministry. 2023. https://solomons.gov.sb/ministry-of-environment-climate-change-disaster-management-and-meteorology/#:~:text=About%20the%20Ministry,services%20for%20the%20Solomon%20Islands

32 UN Office for Disaster Risks Reduction (UNDRR) and Asian Disaster Preparedness Center (ADPC). Disaster Risk Reduction in the Solomon Islands: Status Report. 2023, https://www.preventionweb.net/media/86899/download?startDownload=true

33 National Disaster Council. National Disaster Management Plan 2018. February 2018. https://www.rcrc-resilience-southeastasia.org/wp-content/uploads/2020/04/National-Disaster-Management-Plan-2018.pdf

34 National Disaster Council. National Disaster Management Plan 2018. February 2018. https://www.rcrc-resilience-southeastasia.org/wp-content/uploads/2020/04/National-Disaster-Management-Plan-2018.pdf

35 Ministry of Environment, Climate Change, Disaster Management and Meteorology (MECDM). SOLOMON ISLANDS NATIONAL CLIMATE CHANGE POLICY 2023 – 2032. September 2023. https://sigfiles.sig.gov.sb/d/76d19491cde34a3bac7d/files/?p=/Solomon%20Islands%20National%20Climate%20Change%20Policy%20%202023%20-2032.pdf

36 Green Climate Fund. Solomon Islands. Accessed 3 November 2023. https://www.greenclimate.fund/countries/solomon-islands

37 Ministry of Environment, Climate Change, Disaster Management and Meteorology. Divisions – Climate Change. Accessed 6 November 2023. http://www.mecdm.gov.sb/about-us/divisions/climate-change.html

38 Ministry of Environment, Climate Change, Disaster Management and Meteorology. Adapting to Climate Change. Accessed 6 November 2023. http://www.mecdm.gov.sb/climate-change/adaptation.html

39 Ministry of National Planning and Development Coordination. Solomon Islands Priority Infrastructure Investment Pipeline. Government of Solomon Islands. February 2021. https://www.theprif.org/sites/default/files/documents/SI%20Priority%20Pipeline%20Aug21_0.pdf

40 National Disaster Council. National Disaster Management Plan 2018. February 2018. https://www.rcrc-resilience-southeastasia.org/wp-content/uploads/2020/04/National-Disaster-Management-Plan-2018.pdf

41 MECDM. Early Warning Systems. Accessed 28 August 2023. http://www.mecdm.gov.sb/weather/early-warning-systems.html

42 SIMS. Accessed 28 August 2023. https://solomons.gov.sb/ministry-of-environment-climate-change-disaster-management-and-meteorology/#:~:text=About%20the%20Ministry,services%20for%20the%20Solomon%20Islands.

43 UNDP. A New SIMS Centre to enhance early warning system in Solomon Islands. 29 November 2022. https://www.undp.org/pacific/press-releases/new-sims-centre-enhance-early-warning-system-solomon-islands

44 Solomon Islands Government. Flag Based Early Warning System extended to Western Province. Accessed 8 July 2022. https://solomons.gov.sb/flag-based-earlywarning-system-extended-to-western-province/

45 Ministry of Environment, Climate Change, Disaster Management and Meteorology. Provincial Offices. Accessed 6 November 2023. http://www.mecdm.gov.sb/about-us/provincial-offices.html

46 Asian Development Bank. SECTOR ASSESSMENT (SUMMARY): TRANSPORT. Transport Sector Project Development Facility (RRP SOL 51214). August 2018. https://www.adb.org/sites/default/files/linked-documents/51214-001-ssa.pdf

47 USAID. Deliverable 1.2: Transportation Infrastructure Baseline Assessment. Solomon Islands Strengthening Competitiveness, Agriculture, Livelihoods and Environment (SCALE) Architecture and Engineering Support (SCALE-A&E). 28 June 2021. https://pdf.usaid.gov/pdf_docs/PA00Z83H.pdf

48 LogCluster. Solomon Islands Aviation. December 2016. https://dlca.logcluster.org/22-solomon-islands-aviation

49 Asian Development Bank. SECTOR ASSESSMENT (SUMMARY): TRANSPORT. Transport Sector Project Development Facility (RRP SOL 51214). August 2018. https://www.adb.org/sites/default/files/linked-documents/51214-001-ssa.pdf

50 LogCluster. Solomon Islands Port Assessment. December 2016. https://dlca.logcluster.org/21-solomon-islands-port-assessment

51 Asian Development Bank. SECTOR ASSESSMENT (SUMMARY): TRANSPORT. Transport Sector Project Development Facility (RRP SOL 51214). August 2018. https://www.adb.org/sites/default/files/linked-documents/51214-001-ssa.pdf

52 LogCluster. Solomon Islands Road Network. December 2016. https://dlca.logcluster.org/23-solomon-islands-road-network

53 Ministry of Mines, Energy, and Rural Electrification. Organisational Structure. 14 February 2019. https://www.mmere.gov.sb/index.php/alias-about-us/organisational-structure.html

54 Asian Development Bank. SECTOR ASSESSMENT (SUMMARY): ENERGY. Solar Power Development Project (RRP SOL 48346). October 2016. https://www.adb.org/sites/default/files/linked-documents/48346-002-ssa.pdf

55 Solomon Power. Solomon Power Projects and Capital Expansion Program. Accessed 8 August 2023. https://solomonpower.com.sb/projects/projects/

56 UNDP Pacific Office. Making access to clean water a reality. 6 July 2022. https://www.undp.org/pacific/news/making-access-clean-water-reality

57 Asian Development Bank. Turning on the Tap in Solomon Islands. 2021. https://www.adb.org/multimedia/partnership-report2021/stories/turning-on-the-tap-in-solomon-islands/

58 Solomon Islands Government. STATEMENT BY HON. BRADLEY SMOKY TOVOSIA, (MP), MINISTER FOR MINES, ENERGY AND RURAL ELECTRIFICATION DURING THE UNITED NATION 2023 WATER CONFERENCE, FROM 22 TO 24 MARCH 2023, NEW YORK, UNITED STATES OF

AMERICA. March 2023. https://sdgs.un.org/sites/default/files/2023-03/Solomon%20Islands%20%28E%29.pdf

59 Asian Development Bank. Turning on the Tap in Solomon Islands. 2021. https://www.adb.org/multimedia/partnership-report2021/stories/turning-on-the-tap-in-solomon-islands/

60 Asian Development Bank. Turning on the Tap in Solomon Islands. 2021. https://www.adb.org/multimedia/partnership-report2021/stories/turning-on-the-tap-in-solomon-islands/

61 Solomon Islands Red Cross Society. Solomon Islands Red Cross Society Strategic Plan 2017–2020. 22 March 2017. https://reliefweb.int/report/solomon-islands/solomon-islands-red-cross-society-strategic-plan-2017-2020

62 Asian Development Bank. Civil Society Briefs: Solomon Islands. https://www.adb.org/sites/default/files/publication/228836/csb-sol.pdf

63 Asian Development Bank. Civil Society Briefs: Solomon Islands. https://www.adb.org/sites/default/files/publication/228836/csb-sol.pdf

64 Asian Development Bank. Civil Society Briefs: Solomon Islands. https://www.adb.org/sites/default/files/publication/228836/csb-sol.pdf

Header photo by Gilly Tanabose on unsplash.com. Guadalcanal Province, Solomon Islands https://unsplash.com/photos/green-trees-and-body-of-water-during-daytime-o7oV-rGy53Y

Timor-Leste

While Timor-Leste's location abutting Indonesia in the Timor Sea generally means the country is aligned with Southeast Asia, it does participate in various bodies and fora that bring it into close cooperation with the Pacific Island states. It continues to develop its ties to and role in climate change action organizations alongside other small island states.

Timor-Leste occupies the eastern half of the island of Timor as well as two outlying islands, Ataúro and the uninhabited Jaco, and the Oé-Cusse Ambeno enclave within Indonesia's Nusa Tenggara Timur province. It has a total land area of 14,874 km^2 (5,742.88 square miles).[1] The interior of the island is mountainous with a southern coastal plain.[2] Figure 66 shows a map of Timor-Leste.[3]

According to the 2022 Population and Housing Census, Timor-Leste is home to 1,341,737 people.[4] The major ethnic groups are: Austronesian (Malayo-Polynesian) and Melanesian-Papuan. Most of the population is concentrated in the western part of the country, particularly around the capital, Dili. Tetum and Portuguese are the official languages while Indonesian and English are common working languages. There are about 32 indigenous languages.[5]



Figure 66: Map of Timor-Leste

Timor was involved in Southeast Asia's historic trading networks for centuries. A number of local chiefdoms ruled the island in the early 16th century when Portuguese traders arrived.[6] The Portuguese first settled on the island of Timor in 1520, and the Spanish arrived in 1522. The British governed the island in 1812-1815,[7] after which, treaties signed between the Dutch and Portuguese in 1860 and 1893 gave Portugal sovereignty over the eastern half of the island. During World War II, Japan occupied Timor, which reverted to Portuguese possession after the war and until 1975. In November 1975, the Revolutionary Front for an Independent East Timor (Frente Revolucionária do Timor-Leste Independente – Fretilin) gained control of much of the territory and declared its independence as the Democratic Republic of East Timor. A month later, Indonesia invaded and annexed the territory. An estimated 100,000 to 250,000 people in East Timor died resisting Indonesian occupation or as a result of famine and disease. East Timor remained under Indonesian control for 24 years until it voted to restore independence through a referendum on 30 August 1999.[8] Following the independence referendum, UN missions helped the new country launch institutions and public services. In 2006, protest by members of Timor-Leste's defense force, F-FDTL (Forças Armadas da Libertação Nacional de Timor-Leste [(FALINTIL) - Forcas de Defesa de Timor-Leste]) led to a violent armed rebellion that caused a political, humanitarian, and security crisis that triggered a UN peacekeeping operation.[9] Once stability was restored, presidential and parliamentary elections took place in 2007.[10]

Since 2007, despite occasional outbreaks

of protest or political violence, the country has run consecutive successful parliamentary and presidential elections. The Democratic Republic of Timor-Leste is a semi-presidential republic. The President is the Head of State and is directly elected by absolute majority popular vote. The head of the government is the Prime Minister, who is appointed by the President and generally is the leader of the majority party or majority coalition in Parliament. There is a unicameral National Parliament with 65 seats, and members are directly elected in a single nationwide constituency by proportional representation vote.[11] At the sub-national level, Timor-Leste is divided into 13 municipalities (or districts), which are further subdivided into 67 sub-districts – suco or suku (villages).[12]

Hazards and Climate Change

Timor-Leste is exposed to floods, landslides, tropical cyclones, droughts, earthquakes, tsunamis, and epidemics. Floods are the most frequently occurring disaster and have had the most severe impact on lives, livelihoods, and the economy. Climate change is expected to result in more erratic and extreme rainfall and higher temperatures.

Timor-Leste's climate is tropical, hot, and humid. The mean temperature is approximately 24°C (75°F). Average rainfall is approximately 1,500 mm (59 inches) per year, and the country is defined by a wet season from November to May and a dry season from June to October.[13] Figure 67 shows a graph of the monthly average minimum, mean, and maximum temperatures, as well as average monthly precipitations for 1991-2020 in Timor-Leste.[14]

The West Pacific Monsoon, El Niño Southern Oscillation (ENSO), and the Indian Ocean Dipole heavily influence the climate. ENSO, in particular, can cause variations in the inter-annual quantity of rainfall by up to 50% and affect the timing of peak annual rainfall.[15] El Niño events generally bring drier conditions to Dili, and often lead to a late onset and early finish to the wet season. During La Niña events, dry season rainfall tends to be above normal, and the wet season often starts earlier and finishes later. During La Niña years, above-normal rainfall leads to increased flooding and landslides, while El Niño years are associated with droughts, and ground water availability plummets. The Indian Ocean Dipole is a climate pattern that affects weather around the Indian Ocean basin. During a positive phase of the Indian Ocean Dipole dry season rainfall in Dili is lower than normal. Tropical cyclones can affect Timor-Leste between November and April, but, in general, their effect tends to be weak.[16]

In its 2021 National Adaptation Plan (NAP), the Government identified floods, erratic and extreme rainfall, landslides, cyclones, coastal erosion, strong winds, excessive heat (heat

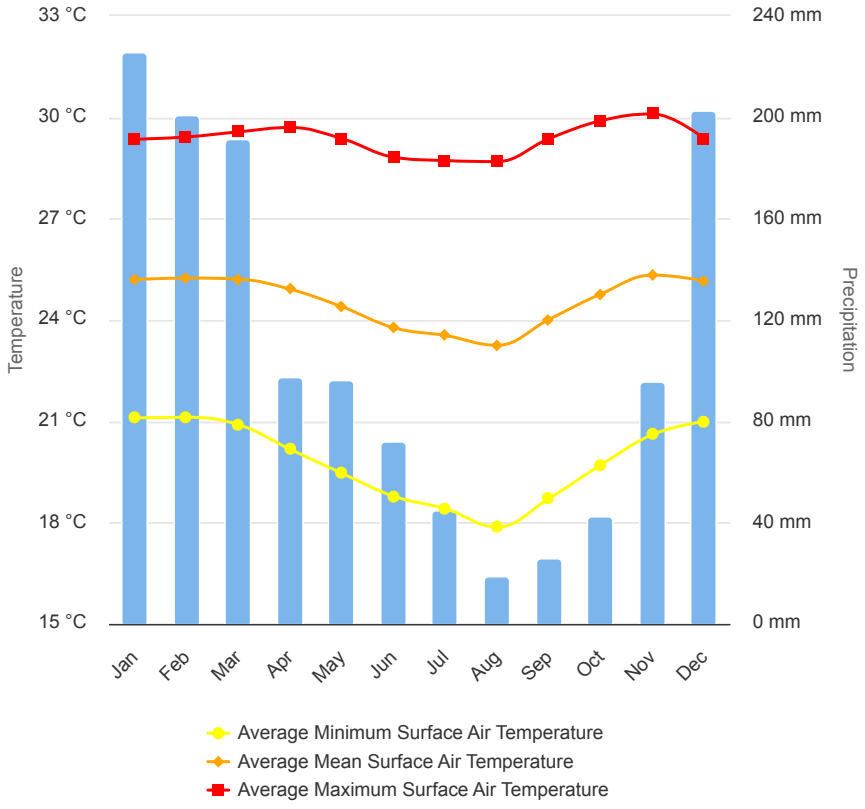


Figure 67: Average Monthly Temperature and Precipitation (1991-2020), Timor-Leste

waves), drought, forest fires, sea level rise, ocean acidification, and water-borne diseases as key climate-related hazards.[17] According to Timor-Leste's Nationally Determined Contributions (NDC) to achieving the objectives of the UNFCCC, one-third of the land in Timor-Leste is at high risk of erosion and approximately one-half of the land is at risk of degradation and fertility decline. Climate projections forecast an increase in rainfall intensity, which will exacerbate soil erosion, landslides, and local flooding,[18] and an increase in the frequency of extreme high temperatures, which will impact agriculture and exacerbate health challenges. Annual mean surface air temperatures in are projected to increase by approximately 2.9°C (5.22°F) by the 2090s under a high emissions pathway, and by 0.9°C (1.62°F) under a low emissions pathway.[19] Table 22 provides some details of how the climate has changed to date and projections for how it will continue to change and what impacts that may have.[20]

Government Institutions, Policies, and Plans for Disasters and Climate Change

The Prime Minister leads disaster response efforts through the Council for Civil Protection and Natural Disaster Management (Conselho Interministerial de Proteção Civil e Gestão de Desastres Naturais - CIGD).[21] The Council of Ministers (Cabinet) is also the highest decision-making authority in addressing the implementation of national priorities as well as mainstreaming climate change issues and considerations into sectoral policies and plans. As delegated by the Council of Ministers, the Ministry for the Environment oversees development and implementation of the climate policies and plans to fulfill the country's international obligations.[22]

In 2019, operational responsibility for disaster response, which until then had been held jointly by the Ministry of Social Solidarity and Inclusion (MSSI) and the Ministry of Interior (MoI), was transferred fully to the MoI's Secretary of State for Civil Protection (Secretário de Estado da Proteção Civil - SEPC).[23] Meanwhile, the Ministry of State Administration has a mandate to coordinate risk management and disaster response at the municipal and local administrative-level.

In December 2020, Timor-Leste enacted a stand-alone Civil Protection Law (Parliamentary Law No. 12/2020).[24] According to the Council of Ministers, the new law sets out "the fundamental principles of civil protection, defines and

Phenomenon	Trend	Projections	Impacts
Temperature Rise	Average rise of 0.16-0.8°C (0.28-1.4°F) per decade since 1950; warming oceans have driven some air temperature warming	Annual mean and occurrence of extremely high daily temperatures will increase; increase in the range of 0.5–1.1°C (0.9-1.98°F) by 2030, under very high emissions scenarios; annual mean to increase by 0.8°C (1.4°F) by 2090 under lower emissions pathways or 3.1°C (5.58°F) by 2090 under high emissions pathway	Falling human and agricultural productivity; shifts in vector-borne disease incidence
Precipitation	Rainfall changes inter-annually linked to ENSO phases	No consensus on overall average amount; more frequent extreme rainfall events	More frequent precipitation-related flooding; more erosion and landslides
Sea Level Rise	Average rise of 9 mm (0.35 inches) per year since 1993	Rise projected to be in the range of 90–180 mm (3.5-7.1 inches) by 2030 and 430-880 mm (16.9-34.6 inches) by 2090, under a very high emissions scenario	Combined with storm surges and wind-driven waves, increased coastal erosion and flooding; salinization of groundwater
Cyclone	Low intensity and few cyclones	Decrease in frequency of storms, greater wind speeds of storms that do strike	Wind damage, coastal erosion, and flooding

Table 22: Climate Change-Related Hazards, Trends and Projected Impacts for Timor-Leste

organizes the bases of civil protection in Timor-Leste, highlights the Civil Protection Authority (CPA) as an authority that will shape the entire civil protection system and defines the structure of the National Civil Protection System at regional and municipal level."[25] The law envisions the establishment of an Integrated Protection and Relief Operations System (Sistema Integrado de Operações de Proteção e Socorro) to ensure a single operational command for all civil protection agents and entities.[26]

CIGD is responsible for the development and approval of the National Civil Protection Policy and for developing legal diplomas and administrative regulations necessary for its work.[27] The CIGD is composed of the Vice-Prime Minister (National Coordinator) and representatives of MSSI, the Ministry of Foreign Affairs, the Ministry of Finance, the Ministry of Justice, the Ministry of Education, and ministries responsible for Infrastructure; Commerce, Industry, and Tourism; Economy and Development; Agriculture and Fisheries; and State Public Works. It also incorporates other government representatives including the Commanders of Timor-Leste's Defence Force; the Police; the Red Cross; representatives of civil society; and the UN.

Since 2019, Civil Protection/SEPC under the MoI has been the notional lead national agency for disaster management. Figure 68 illustrates SEPC and its subordinate bodies.[28]
Civil Protection/SEPC disaster management responsibilities include:

- Design, plan, coordinate, and execute public policy of civil protection
- Prevention of and reaction to accidents and disasters
- Provide relief to affected populations.

The main directorates under the SEPC include:

- Directorate of Bombeiros (fire fighters)
- Directorate of Disaster Risk Management (DNGRD)
- Directorate of Security and Protection of Public Heritage
- Directorate of Prevention of Community Conflict.

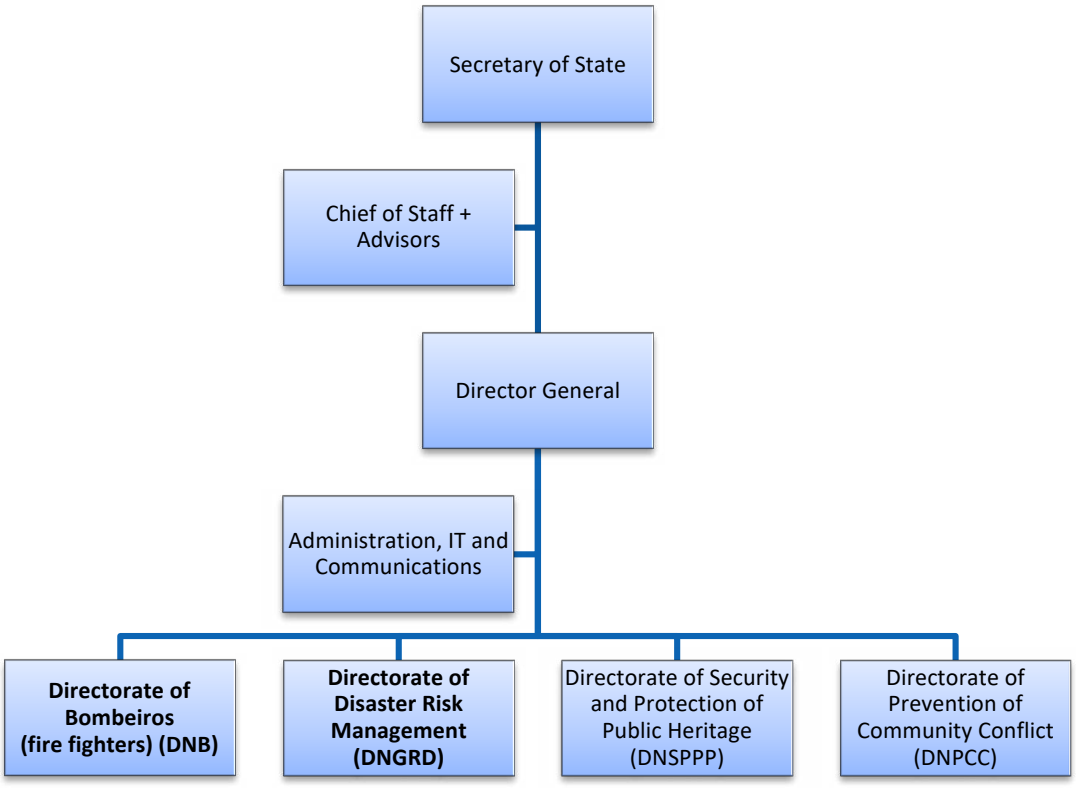


Figure 68: Organizational Structure of Timor-Leste's SEPC

The DNGRD has the following overall responsibilities:

- Formulate public policy relating to disaster risk management
- National coordination of operations performed under the elements of this policy
- Plan emergency food and non-food distributions
- Empower the population to recognize, survey, and analyze natural and non-natural risks
- Develop operational directives related to natural and non-natural risks
- Promote the study, standardization, and application of prevention and relief techniques
- Organize a national early warning system, including creating a national database to allow automatic warnings to be sent out during high risk weather
- Order relocation of destroyed private infrastructure where owners have been compensated with money or materials
- Develop guidelines for planning Civil Protection's Emergency responses
- Promote assessment of natural and technological risks and vulnerabilities
- Coordinate application of Community of Portuguese Language Countries and UN decisions, including International Strategy for Reduction of Disaster Risk
- Prepare studies and technical advice, as well as administration and document control, for national and international agreements
- Coordinate the process of providing support for emergencies, monitor the effectiveness of use of donated materials, and ensure total reconstruction of houses.

The National Disaster Operations Center (NDOC) falls under the DNGRD and is mandated to disseminate early warning information in the 13 municipalities.[29] DNGRD's Department of Preparation, Prevention, and Mitigation of Disasters is tasked with preparing a disaster awareness plan, a disaster prevention and mitigation plan, and guidelines for disaster response, as well as identifying risk areas, developing procedures for and monitoring Early Warning Systems, collecting and organizing data in a central database, creating and applying procedures for Evacuation Centers, and preparing guidelines for housing reconstruction. DNGRD's Department of Emergency Management and Recovery organizes disaster response and coordinates resources available, prepares guides for emergency management and recovery, prepares emergency management plans (national, regional, municipal), manages food and non-food items in national, regional, and municipal warehouses, collects data on affected people and provides support, surveys damage, organizes and coordinates all support, including international, certifies safe places for evacuation, and manages warehouses, shipments, and inventory.[30]

At the local level, District Administrators serve as the District Disaster Coordinator (DDC) and are responsible for disaster response decision-making within districts (municipalities). They coordinate on decision-making with a District Disaster Management Committee (DDMC), comprising district representatives of key government and non-governmental agencies. SEPC is represented in the DDMCs by the Bombeiros (fire fighters), who have a presence in 10 out of 13 municipalities.[31]

Timor-Leste has two government ministries responsible for managing and coordinating national environmental and climate change policies and their implementation - the Ministry of Agriculture and Fisheries and the Ministry of Economic Affairs. Under the Coordinating Minister of Economic Affairs, the State Secretary for the Environment is the coordinating body for climate actions and interactions with the UNFCCC in the country. Their work is supplemented with expertise from the Department for Climate Change and Energy Efficiency.[32] The Ministry of Agriculture tends to focus energies on ensuring that building resilience livelihoods does not conflict with maintaining and promoting biodiversity. The national focal point agency for Green Climate

Fund (GCF) and Adaptation Fund projects is the National Directorate of Climate Change (DNAC) under the State Secretary for the Environment, who is also responsible for overseeing development of the various documents and assessments required by international commitments.

The Director for Climate Change leads the DNAC and is charged with coordinating development and implementation of the National Climate Change Policy as well as leading coordination on climate change-related affairs with international organizations and bilateral partners on environmental affairs, sustainable development, and climate risk management. DNAC works with focal points within line ministries to coordinate and progress climate action within the country. It chairs the Climate Change Working Group (CCWG), established in 2017 to help guide consultations on Timor-Leste's climate change policy and associated plans; working group participants include key ministries, donors, international organizations, universities, and civil society. The CCWG is the primary mechanism for coordination and consultation with stakeholders in implementing the action plan priorities; it is tasked with:

- Coordinating and providing technical guidance for National Action Plan (NAP) implementation with line ministries and other relevant agencies and organizations
- Providing technical inputs for the Decree-Law/Government Decree to legally empower line agencies to incorporate guidance and recommendations from the NAP into their planning and budgeting processes and to implement the priorities described in the NAP
- Undertaking performance review of the status of implementation of the NAP at the technical level
- Providing information on climate finance and facilitate international climate finance and technical support for the implementation of the NAP
- Monitoring and evaluating implementation and activities of all sectors and avoid duplication of efforts
- Spearheading identification of linkages between the NAP and the NDC
- Advancing new initiatives and proposals designed to implement NAP priorities with development partners
- Coordinating with the Ministry of Finance to register, facilitate, and ensure transparency of financial support from outside with respect to CCA.

Timor-Leste's National Climate Change Policy (2021) focuses on improving and increasing platforms for informed and effective participation in decision-making and the design of sustainable development strategies. The Policy creates the basis for improving the enabling environment for evidence-based decision-making, nature-based solutions, long-term capacity building, and integrated risk management, objectives and principles that are reflected in the commitments made within the country's subsequent revision of its NDC. In addition to reaffirming Timor-Leste's key mitigation arrangements and options set out under its first NDC, the 2022-2030 updated NDC included the following:

- Commitment to developing a climate change law that will create a legal framework for Timor-Leste's climate change response and a conditional commitment to passing this law in 2023-24
- Intention to develop a National Climate Change Strategy and Action Plan, to guide the implementation of the National Climate Change Policy utilizing financial support available through an existing GCF Readiness grant
- Commitment to accelerate existing and new land tenure reform efforts over the 2021-2025 period in an effort to improve the enabling environment for nature-based solutions
- Introduction of a new initiative to formulate a low carbon development strategy to guide national mitigation and adaptation commitments, activities, and approaches
- Introduction of a 'Nature-Positive' integrated approach to Timor-Leste's adaptation, mitigation, and socio-economic development

objectives focused on enhancing the integrity, carbon sequestration potential, holistic landscape management, and resilience of the nation's environment and natural capital
- Inclusion of Timor-Leste's NAP, which provides the strategic basis for national adaptation priorities and implementation arrangements
- Commitments to support the integration of CCA and risk management considerations within critical elements of sectoral planning.[33]

In 2021, the Government submitted its first National Adaptation Plan (NAP) to the UNFCCC. The overall vision is "to build a climate resilient development trajectory for the country and its people." It is aligned with other policies and strategies relevant to Timor-Leste's adaptation response to climate change. The NAP also establishes clear linkages with the Strategic Development Plan 2011-2030. Among the NAP chapters are implementation plans for the near term (2020-2022), medium term (2023-2025), and long-term (2026-2030).[34]

The DNAC, with support from the UNDP, led the NAP development process that involved consulting local communities at the suco or village level to inform a vulnerability assessment, holding a national-level consultation workshop with sectoral stakeholders from line ministries (i.e., Public Works, Agriculture and Fisheries, Health, and Finance) and the DNGRD, producing an initial NAP document in June 2020, and holding a validation workshop leading to the government's validated plan in September 2020. Notably, the NAP recognizes Tara Bandu, Timor-Leste's customary law, as an important entry point for engaging communities and conducting bottom-up resilience building activities. Tara Bandu is a traditional law that governs, among other things, the management of natural resources. For example, Tara Bandu prohibits the burning of forests, the cutting of trees, collection of forest products, agricultural harvests, hunting and fishing, and other activities in a forbidden zone for a defined period of time.[35]

Secretariat of State for Civil Protection (Civil Protection/SEPC)
Tel: 670 7729 0998

National Directorate of Climate Change
Fomento Office, Rua Dom Boa Ventura No. 16, Mandarin, Dili, Timor-Leste
Tel: 670 7781 1530

Early Warning Systems

The National Directorate of Meteorology and Geophysics (DNMG) is responsible for multi-hazard warnings and the NDOC is responsible for dissemination of early warning in coordination with municipalities.

DNMG falls under the Ministry of Public Works, Transport, and Communication is responsible for managing a multi-hazard Early Warning System (MHEWS). The DNMG is responsible for providing meteorological, climatological, and seismological information to public entities, businesses, and the public. DNMG provides one-day, three-day, and seven-day weather forecasts. According to policy, in the event of extreme weather events such as tropical cyclones, information is disseminated to the public through social media, TV, and radio. The DNMG works with the NDOC to disseminate information to focal points in 13 municipalities.[36]

Through the GCF, Timor-Leste is working with UNDP to address the need for integrated climate information services and proactive disaster risk management approaches founded on impact-based forecasting and end-to-end MHEWS through four components – strengthened legislation, improved observation, monitoring, analysis, and forecasting, improved communication, and enhanced climate risk management capacity.[37]

National Directorate of Meteorology and Geophysics
Rua Avenida Fransisco Xavier do Amaral, Nº 8. Ex.Telecom Mercado Lama, Dili, Timor-Leste
Tel: 670 333 9355 or 9353

Infrastructure

The road network is the most important transport mode for most Timorese; cargo movement to and from the country tends to be sea-based.

The road network consists of national (1,426 km; 886 miles), district (869 km; 534 miles), and rural (3,025 km; 1,880 miles) roads. There are two major coastal roads (North and South) and five roads that cross the interior to connect the coastal roads; on this network can be found 456 two-lane bridges.[38] The country is mountainous, and most of the road network passes through terrain that requires road-widening work with new embankments or slope cuttings.[39] Timor-Leste's slope instability and frequent landslides also pose a challenge to the provision of road transport.[40]

Government authority over airports is shared between the Civil Aviation Authority of Timor-Leste and the Aerial Navigation and Airports of Timor-Leste under the Ministry of Transport and Communication. The Civil Aviation Authority is responsible for promoting the safety, efficiency, and regulation of aviation services and has responsibility for overall planning, implementation, and operation of aviation services. Aerial Navigation and Airports is responsible for providing basic services for airports and air traffic control.[41]

There is one international airport, Presidente Nicolau Lobato International Airport, located a 10-minute drive from Dili.[42] The runway length at Presidente Nicolau Lobato International Airport does not meet international standards. The runway can accommodate Code C aircraft such as the B737 and A320, but operations of these aircraft are under significant restrictions on payload because the length of the runway is short. The current Air Traffic Control Tower is also in poor condition and does not fully meet the requirements even for the existing runway.[43] Of the six reported domestic airports, only Suai Airport (Covalima Municipality) is operational.[44] The Baucau Airport/Airfield is under rehabilitation with support from the U.S. Department of Defense.[45]

The Autoridade Portuáriu Timor-Leste (APORTIL) under the Ministry of Transport and Communication is responsible for managing the Dili Seaport. The seaport is located in the center of the capital and is currently the only international port in Timor-Leste.[46] The port has no facilities to handle bulk cargos. Thus, shipments are restricted to containerized and conventional cargos. Storage facilities are very limited and the port suffers from congestion. The harbormaster indicates a maximum capacity of 1,000 containers can be stored on the hard standing. One ramp facilitating RO-RO vessels is located past the east end of the jetty, and a second one is present on the west side.[47] A second port, the Tibar Bay Seaport (12 km or 7.4 miles west of Dili) is under construction and is expected to open in 2022.[48] Once completed, the Tibar Bay seaport will be a multipurpose facility, handling all types of cargo, including containers and vehicles, and it will also be home to an access channel and berth 16 m (52 ft.) deep that will enable it to receive large vessels.[49]

In 2019, 95% of the population was estimated to have access to electricity.[50] The rate of access is 100% of the urban population and 92% of the rural population.[51] Electricidade de Timor-Leste is the main generator and distributor of electric power in areas served by its limited grid system and in isolated areas served by its diesel generators. The main power supply is from the 16-MW diesel-fired Comoro power station in Dili, as well as two facilities in Hera (120 MW) and Betano (135 MW) that both run on heavy fuel oil and were installed by Finnish company Wartsila. In many areas not serviced by the electricity grid, small diesel-fired generators are the main source of electric power. Many villages have no electricity, and candles are commonly used.[52]

A large proportion of the population lacks access to sanitation. Rural areas are lagging behind in terms of both water and sanitation services, especially in difficult-to-access mountainous regions where landslides and flooding threaten the services that do exist. In 2022, an estimated 191,232 people do not have

clean water (more than one in ten persons), and 570,006 people do not have a decent toilet (40% of the population).[53] Water and sanitation services are led by the Ministry of Public Works under the Secretary of State for Water and Sanitation and supported by several other ministries, NGOs, and international agencies.[54]

Ministry of Transport and Communication

Rua Avenida Fransisco Xavier do Amaral, No 8,
Ex.Telecom Mercado Lama, Dili, Timor-Leste
Tel: 670 333 9355 or 333 9353
Email: *info@mof.gov.tl*

Civil Society Partners

Cruz Vermelha De Timor-Leste (CVTL – the Timor-Leste Red Cross) was established in 2000 and was recognized by the IFRC on 11 November 2005.[55] It has 2,367 members, 164 staff, 2,858 volunteers, and a network of 13 branches across all 13 municipalities in the country. Its headquarters is located in Dili.[56] As an auxiliary to the Government, CVTL plays a key role as a first responder in saving lives and restoring livelihoods, including via the provision of emergency water and sanitation, hygiene promotion, protection, shelter, non-food items, and livelihoods support. National and branch staff and volunteers conduct needs assessments, distribute relief items, attend coordination meetings with other emergency response actors, and where necessary, assist evacuation of at-risk communities. CVTL participates in national emergency management planning, including developing inter-agency contingency plans and standard operating procedures. The organization carries out contingency planning and awareness raising programs to prepare the public for various scenarios, including via annual district-level simulations as well as other educational initiatives related to health emergencies including disease outbreaks.[57] In April 2019, the Civil Protection/SEPC signed a Memorandum of Understanding with CVTL for cooperation in managing/responding to natural disasters (2019-2024). The goal is to build cooperation between the Civil Protection/SEPC and CVTL and to build the country's human resources for response.[58]

Cruz Vermelha De Timor-Leste

Address: Rua 20 de Maio, No. 79, Formosa, Na'in Feto, P.O. Box 268, Dili, Timor-Leste
670 7317-2613
info@redcross.tl

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Timor-Leste Endnotes

1 CIA World Factbook. Timor-Leste. Accessed 7 January 2022. https://www.cia.gov/the-world-factbook/countries/timor-leste/#geography.

2 Timor-Leste National Adaptation Plan 2021. https://www4.unfccc.int/sites/NAPC/Documents/Parties/Timor%20Leste%20NAP.pdf, 16.

3 CIA World Factbook. Timor-Leste – Map. https://www.cia.gov/the-world-factbook/static/maps/TT-map.jpg

4 Timor-Leste National Institute of Statistics. Timor-Leste Population and Housing Census 2022: Main report. May 2032. https://reliefweb.int/report/timor-leste/timor-leste-population-and-housing-census-2022-main-report

5 CIA World Factbook. Timor-Leste – People and Society. Updated 18 January 2022. https://www.cia.gov/the-worldfactbook/countries/timor-leste/#people-and-society

6 CIA World Factbook. Timor-Leste. Updated 18 January 2022. https://www.cia.gov/the-worldfactbook/countries/timor-leste/#introduction.

7 Farram, Steven. Jacobus Arnoldus Hazaart and the British interregnum in Netherlands Timor, 1812-1816. Bijdragen tot de Taal-, Land- en Volkenkunde, Vol. 163, No. 4 (2007), pp. 455-475 (21 pages), Published By: Brill, accessed online, https://www.jstor.org/stable/27868412

8 Encyclopedia Britannia. East Timor: History. Accessed 31 January 2022, https://www.britannica.com/place/East-Timor#ref326338.

9 UN Peacekeeping. Closure of UNMIT. Accessed 31 January 2022, https://peacekeeping.un.org/mission/past/unmit/

10 CIA World Factbook. Timor-Leste. Updated 18 January 2022. https://www.cia.gov/the-worldfactbook/countries/timor-leste/#introduction.

11 CIA World Factbook. Timor-Leste – Government. Updated 18 January 2022, https://www.cia.gov/the-world-factbook/countries/timor-leste/#government.

12 Government of Timor-Leste. Administrative Divisions: Villages. Accessed 31 January 2022, http://timor-leste.gov.tl/?p=91&lang=en#:~:text=As%20far%20as%20administrative%20division,Ambeno%2C%20the%20enclave%20

in%20Indonesian

13 UNDP Climate Change Adaptation. Timor-Leste. https://www.adaptation-undp.org/explore/south-eastern-asia/timor-leste

14 World Bank Climate Change Knowledge Portal. Timor-Leste. https://climateknowledgeportal.worldbank.org/country/timor-leste/climate-data-historical#:~:text=-Timor%2DLeste%27s%20tropical%20climate%20is,of%20seven%20to%20nine%20months.

15 The World Bank Group and the Asian Development Bank. Climate Risk Country Profile: Timor-Leste (2021). https://climateknowledgeportal.worldbank.org/sites/default/files/country-profiles/15971-WB_Timor-Leste%20Country%20Profile-WEB

16 Pacific-Australia Climate Change Science and Adaptation Planning Program. Current and future climate of Timor-Leste. 2013. https://www.pacificclimatechange-science.org/wp-content/uploads/2013/06/5_PACCSAP-Timor-Leste-9pp_WEB.pdf

17 Secretariat of State for Environment, Coordinating Minister for Economic Affairs. Timor-Leste's National Adaptation Plan: Addressing climate risks and building climate resilience. Democratic Republic of Timor-Leste. 2021. https://www4.unfccc.int/sites/NAPC/Documents/Parties/Timor%20Leste%20NAP.pdf

18 UNDP. Timor-Leste submits its National Adaptation Plan to the UNFCCC. 20 June 2021. https://www.adaptation-undp.org/timor-leste-submits-its-nap-to-the-unfccc

19 The World Bank Group and the Asian Development Bank. Climate Risk Country Profile: Timor-Leste (2021). https://climateknowledgeportal.worldbank.org/sites/default/files/country-profiles/15971-WB_Timor-Leste%20Country%20Profile-WEB

20 The World Bank Group and the Asian Development Bank. Climate Risk Country Profile: Timor-Leste (2021). https://climateknowledgeportal.worldbank.org/sites/default/files/country-profiles/15971-WB_Timor-Leste%20Country%20Profile-WEB; Pacific-Australia Climate Change Science and Adaptation Planning Program. Current and future climate of Timor-Leste. 2013. https://www.pacificclimatechangescience.org/wp-content/uploads/2013/06/5_PACCSAP-Timor-Leste-9pp_WEB.pdf

21 Government of Timor-Leste. Extraordinary Meeting of the Council of Ministers of January 14, 2019. Press Release. 14 January 2019. http://timor-leste.gov.tl/?p=21032&lang=en

22 Government of Timor-Leste. Nationally Determined Contribution Timor-Leste 2022-2030. - https://unfccc.int/sites/default/files/NDC/2022-11/Timor_Leste%20Updated%20NDC%202022_2030.pdf

23 Grochowski, Alexon, et al. Supporting the Government of Timor-Leste: Strengthening Disaster Preparedness and Response Through Effective Training and Coordination Mechanisms. Capstone Workshop Program, Columbia University of International Public Affairs, May 2020 (Unpublished)

24 Miranda Alliance. Legal News: Timor-Leste. December 2020 through January 2021, accessed 3 March 2022. https://www.mirandalawfirm.com/en/insights-knowledge/publications/legal-news?j=&q=Timor-Leste

25 Miranda Alliance. Legal News: Timor-Leste - Law No. 12/2020. December 2020 to February 2021. https://www.mirandalawfirm.com/en/insights-knowledge/publications/legal-news/timor-leste-legal-news-december-2020-

through-february-2021; see also Government of Timor-Leste. Extraordinary Meeting of the Council of Ministers of March 28, 2020. Press Release. 28 March 2020. http://timor-leste.gov.tl/?p=23912&lang=en.

26 Article 44 of the Civil Protection Law 2020.

27 Government of Timor-Leste. Extraordinary Meeting of the Council of Ministers of January 14, 2019. Press Release. 14 January 2019. http://timor-leste.gov.tl/?p=21032&lang=en

28 CFE-DM. Timor-Leste: Disaster Management Reference Handbook. March 2022. https://www.cfe-dmha.org/

Publications/Disaster-Management-Reference-Handbooks

29 UN Resident Office, Alex Tilman. Reflection on the April Flash Flood and Response. 24 August 2021.

30 Working analysis prepared by Carly Learson, Advisor to SEPC. Received by the author on 19 January 2022.

31 World Bank Group and GFDRR. Learning from Tropical Cyclone Seroja: Building Disaster and Climate Resilience in Timor-Leste. December 2021. https://documents1.worldbank.org/curated/en/099245001042214184/pdf/P176988082e2b60f30b4d60866a38e728f7.pdf

32 UNDP-UN Environment National Adaptation Plan Global Support Programme. National Adaptation Plans in focus: Lessons from Timor-Leste. November 2021. https://www.globalsupportprogramme.org/sites/default/files/resources/timor-leste.pdf

33 Government of Timor-Leste. Nationally Determined Contribution Timor-Leste 2022-2030. - https://unfccc.int/sites/default/files/NDC/2022-11/Timor_Leste%20Updated%20NDC%202022_2030.pdf

34 Secretariat of State for Environment, Coordinating Minister for Economic Affairs. Timor-Leste National Adaptation Plan. 2021. https://www4.unfccc.int/sites/NAPC/Documents/Parties/Timor%20Leste%20NAP.pdf.

35 UNDP. Timor-Leste submits its National Adaptation Plan to the UNFCCC. 20 June 2021. https://www.adaptation-undp.org/timor-leste-submits-its-nap-to-the-unfccc

36 World Bank Group and Global Facility for Disaster Reduction and Resilience. Learning from Tropical Cyclone Seroja: Building

Disaster and Climate Resilience in Timor-Leste. December 2021. https://documents1.worldbank.org/curated/en/099245001042214184/pdf/P176988082e2b60f30b4d60866a38e728f7.pdf

37 Government of Timor-Leste. Nationally Determined Contribution Timor-Leste 2022-2030. - https://unfccc.int/sites/default/files/NDC/2022-11/Timor_Leste%20Updated%20NDC%202022_2030.pdf

38 Asian Development Bank. Timor-Leste Strategic Development Plan 2011-2030. https://www.adb.org/sites/default/files/linked-documents/cobp-tim-2014-2016-sd-02.pdf

39 Japan International Cooperation Agency (JICA). Road Maintenance in Timor-Leste. 6 July 2018. https://www.jica.go.jp/easttimor/english/office/topics/180706_en.html

40 World Bank Group. Timor-Leste Branch Roads Project (P155203). 10 June 2019. https://documents1.worldbank.org/curated/en/188051560144449980/pdf/Project-Information-Document-Integrated-Safeguards-Data-Sheet-Timor-Leste-Branch-Roads-Project-P155203.pdf.

41 ATC Network. CAA – Timor-Leste. https://www.atc-network.com/atc-organisations/caa-timor-leste.

42 Ministry of Tourism. Travel to Timor-Leste. Accessed 28 January 2022. https://www.timorleste.tl/plan-your-trip/arriving-in-timor-leste/

43 Asian Development Bank. Timor-Leste: Presidente Nicolau Lobato International Airport Expansion Project. October 2021. https://www.adb.org/projects/52320-002/main

44 Government of Timor-Leste. First international flight at Suai Airport. 28 September 2018. http://timor-leste.gov.tl/?p=20598&lang=en&n=1

45 U.S. Embassy in Timor-Leste. U.S. Embassy and the Government of Timor-Leste Agree on Joint Rehabilitation of Baucau Airfield. 28 June 2021. https://www.pacom.mil/Media/News/News-Article-View/Article/2674146/us-embassy-and-the-government-oftimor-leste-agree-on-joint-rehabilitation-of-b/

46 APORTIL. https://customs.gov.tl/other-gov-agencies/custom-authority-timor-leste/

47 LogCluster. Port Overview – Dili. Accessed 28 January 2022. https://dlca.logcluster.org/display/public/DLCA/2.1+Timor-

Leste+Port+of+Dili#id-2.1TimorLestePortofDili-PortOverview

48 World Bank Group. Timor-Leste: Tibar Bay Port: Gateway to the World. 24 February 2019. https://www.worldbank.org/en/about/partners/brief/timor-lestetibar-bay-port-gateway-to-the-world

49 China-Lusophone Brief. Tibar Port to End 'Economic Bottleneck' in Timor-Leste. 19 April 2021. https://www.clbrief.com/tibar-port-to-end-economic-bottleneck-in-timor-leste/

50 World Bank. Access to electricity (% of the population) – Timor-Leste. Accessed 30 January 2022. https://data.worldbank.org/indicator/EG.ELC.ACCS.ZS?locations=TL

51 World Bank. Access to electricity, urban (% of population) – Timor-Leste. Accessed 30 January 2022. https://data.worldbank.org/indicator/EG.ELC.ACCS.UR.ZS?locations=TL; Access to electricity, rural (% of population) – Timor-Leste. Accessed 30 January 2022, https://data.worldbank.org/indicator/EG.ELC.ACCS.RU.ZS?locations=TL

52 DFDL. The future of hydropower development in Timor Leste. 6 May 2015, https://www.dfdl.com/resources/news/the-future-of-hydropower-development-in-timor-leste/

53 WaterAid. Timor-Leste: In a country rebuilding after conflict, clean water can make lasting change. Accessed 30 January 2022. https://www.wateraid.org/where-wework/timor-leste

54 WHO. Timor-Leste Country Highlights. 2014. https://www.who.int/water_sanitation_health/monitoring/investments/timorleste-11-nov.pdf

55 Decree Law No. 6/2005 of 14 September 2005. http://mj.gov.tl/jornal/lawsTL/RDTL-Law/RDTL-Decree-Laws/Decree-Law%206-2005.pdf

56 CVTL. History. Accessed 25 January 2022. https://www.redcross.tl/page/history

57 CVTL Facebook Post on 13 January 2022. https://www.facebook.com/permalink.php?story_fbid=4755386411241833&id=422556931191491

58 Government of Timor-Leste. Government signs agreement with the Red Cross to support response to natural disasters. 11 April 2019. http://timor-leste.gov.tl/?p=21627&lang=en

Header photo by Trevar Skillicorn-Chilver on unsplash.com. Manatuto, Timor-Leste. https://unsplash.com/photos/green-trees-near-body-of-water-under-blue-sky-during-daytime-rbmwEl8H-Oc

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Tokelau is a non-self-governing territory and part of the Realm of New Zealand.[1] Tokelau consists of three coral atolls in the South Pacific Ocean, located approximately 480 km (300 miles) north of Samoa and 3,900 km (2,400 miles) southwest of Hawaii. In lieu of a central capital, each atoll has its own administrative center.[2] The three atolls are Fakaofo, with a land area of 4 km^2 (1.5 square miles), Nukunonu, with an area of 4.7 km^2 (1.8 square miles), and Atafu, with an area of 3.6 km^2 (1.4 square miles). Tokelauans traditionally and culturally consider Olohega (Swains Island) as a fourth atoll; the island, which is not permanently inhabited, has been administered since 1925 as part of American Samoa.[3] The population count, based on the 2016 census, is 1,499 people living in Tokelau.[4] There are more than 7,000 Tokelauans living in New Zealand, largely due to economic opportunities. There is no airstrip on any of the atolls. The only access to and from the country is a boat trip to Samoa, which takes a minimum 24 hours during good weather.[5] A project is underway to develop an airstrip on Nukunonu, which would take about two years to build, with the bid process initiated in July 2022.[6]



Figure 69: Map of Tokelau

Historically, Tokelau's population plummeted to 85 people by 1872, due to Peruvian slave traders abducting nearly all of the working-age men.[7] The population increased when new Polynesian settlers and American and European migrants intermarried with Tokelauan women. Tokelau became a British protectorate in 1889, a British colony in 1908, and was placed by the UK under New Zealand administration in 1925. The Tokelau Islands Act of 1948 transferred sovereignty from the UK to New Zealand, including granting of New Zealand citizenship to Tokelauans.[8] The Titular Head of Government, the position of Ulu-o-Tokelau, is rotated annually between the leader, or Faipule, of each atoll. The General Fono, the national legislative body, meets three times a year and is comprised of elected representatives from each atoll. The people are Polynesian with cultural and linguistic links to Samoa. The official language is Tokelauan, a Polynesian language, though English is widely used. The population is almost entirely Christian, with about 70% Congregational and 30% Roman Catholic. The low-lying islands range from 2.4 to 4.5 m (8 to 15 feet) above sea level. Due to the porous, sandy soil, rain catchments are a critical source of fresh water. Annual precipitation averages 2,500 mm (100 inches), mostly falling during April to November, which is the trade-wind season when typhoons occasionally strike. Figure 69 shows a map of all three of Tokelau's atolls in relation to each other.[9]

Hazards and Climate Change

Hazards affecting Tokelau include tropical cyclones, other storms that bring heavy rains and flooding, drought, flooding associated with king tides and storm surges, sea level rise, waterspouts, epidemics, bush fires, landslides, and tsunamis. Tokelau is located in an area with

relatively low tropical cyclone activity, though the risk increases during El Niño seasons. Between 1970-2015, five tropical cyclones came within 278 km (173 miles) of Tokelau.[10] Comprised of low-lying coral atolls, Tokelau is vulnerable to extreme changes in rainfall.[11]

Figure 70 shows the impacts of various climate change-related hazards on Tokelau's three atolls, according to the Tokelauan government as put forth in Living with Change (LivC): An Integrated National Strategy for Enhancing the Resilience of Tokelau to Climate Change and Related Hazards, 2017-2030.[12]

Societal Impact by Atoll

HAZARD	Atafu	Nukunonu	Fakaofo
Tropical Cyclone	Extreme	Extreme	Extreme
Severe weather non-tropical cyclone systems	Extreme	Extreme	Extreme
Drought	Extreme	Extreme	Extreme
Flood - Storm Surges and King Tides	Extreme	High	High
Flood Runoff - Heavy Rain	High	Extreme	Extreme
Water Spout	High	High	High
Disease Epidemics	Medium	High	High
Bush Fire	Low	Medium	Low
Landslide	Low	Medium	Low
Tsunami and Coastal Inundation from Run-Up	Low	Low	Low

Figure 70: Expected Severity of Climate Change Impacts on Tokelau

Climate change remains the single greatest threat to Tokelau's future prosperity, security, and well-being. Tokelau's three low-lying atolls have a combined land area of 12 km^2 (4.6 square miles) and a high point of 0.5 m (1.6 feet). The environmental, economic, and humanitarian damage caused by cyclones, droughts and tidal surges is exacerbated by slow-onset disasters like sea level rise, coastal inundation, and rising average temperatures.[13]

Tokelau's first case of community transmission of COVID-19 did not occur until May 2023.[14] Vaccination roll-out began in July 2021, while Tokelau was still COVID-free.[15] By 5 December 2022, a total of 6,342 vaccine doses had been administered, with most of the atolls' approximately 1,500 people having received multiple doses. As of 8 November 2023, Tokelau had 80 confirmed COVID-19 cases but zero deaths.[16]

Government Institutions, Policies, and Plans for Disasters and Climate Change

Disaster risk reduction, readiness, and resilience efforts are coordinated by the Ministry of Climate, Oceans, and Resilience (MiCORE), the National Disaster Management Unit (NDMU), Office of the Council for the Ongoing Government (OCOG), and the National Disaster Committee (NDC) of Senior Management Team (SMT), with the Taupulega (Village Councils) of the three nuku (atolls) – Atafu, Nukunonu, and Fakaofo – the Village Disaster Committees, and the General Managers.

Tokelau, as laid out in the national DRR, response, and resilience plan, is supported upon request for assistance and disaster declaration by the Ulu (titular head of government) in times of disaster and emergency response and recovery by:

- New Zealand
  - Office of the Administrator
  - MFAT
  - Ministry of Civil Defence and Emergency Management
  - Meteorological Service of New Zealand Limited (Met Service)
  - New Zealand Red Cross
- Samoa
  - Samoan Meteorological Division (SMD)
  - Samoa Red Cross
  - UNDP (Samoa)
- Pacific Region
  - Regional Specialised Meteorological Centre, Nadi, (Fiji) (RSMC Nadi/Fiji Meteorological Service)

- UN OCHA (Fiji)
- Pacific Tsunami Warning Center (Hawaii)

New Zealand, through the Office of the Administrator of Tokelau, is to assist Tokelau and partners in maintaining Tokelau's DRR Plan, in consultation with MFAT and the Ministry of Civil Defence and Emergency Management. This is in accordance with the Joint Statement of the Principles of Partnership between Tokelau and New Zealand, which states in clause 6.4.5 that New Zealand will assist Tokelau in the event of emergencies beyond its control.

Coordination with Samoa as critical. Tokelau does not have any airstrips; thus, all travel and shipment of supplies is by ship via Apia, Samoa. The Tokelau Apia Liaison Office (TALO) is located in Apia, including the principal Tokelau customs and border control.

UN OCHA and the International Red Cross and Red Crescent Movement also assist with capacity building and coordination of funding and supplies in the event of a disaster. UNDP, South Pacific Applied Geoscience Commission (SOPAC), and the International Strategy for Disaster Reduction offer technical support.

Due to Tokelau's geography as a large ocean atoll state, the Department of Transport and Support Services is critical in addressing key threats in the ocean, such as transport failure, loss at sea, and search and rescue operations. On-the-ground disaster risks are addressed in the nuku (atoll) plans of Atafu, Nukunonu, and Fakaofo. Each government department has some disaster management responsibilities, including the OCOG; MiCORE; Department of Economic Development, Natural Resources and Environment; Education; Energy; Finance; Fisheries Management Agency; Health; Public Service Commission; Telecommunications (TeleTok), and Transport and Support Services.[17]

As of December 2021, the new Tokelau National Strategic Plan 2021-2026 was in development. The Interim Tokelau National Strategic Plan 2020-2021 focused on good governance, human development, infrastructure development, sustainability, and climate change, as well as included a commitment to protect the unique local language and culture.[18] The Tokelau National Strategic Plan (2016-2020) retained the vision of "healthy and active communities with opportunities for all" from the preceding plan. It focused on five strategic goal areas, which were linked to outcomes in 2020:

- Good Governance
  - Outcome: Strengthened governance institution
  - Outcome: Strengthened public service management systems and processes
- Human Development
  - Outcome: More efficient and effective service delivery (Including core business)
  - Outcome: Improved health and education outcomes and social wellbeing of our communities
  - Outcome: Tokelau is a vibrant society that is grounded in her traditions; socially cohesive with a strong national identity
- Infrastructure Development
  - Outcome: Safe, reliable, and cost-effective total transport solution managed and operated by Tokelau
  - Outcome: Reliable and effective telecommunications
  - Outcome: Infrastructure assets are managed to maximize its useful life, including balancing replacement/ maintenance with repairs costs
  - Outcome: Sufficient capacity to meet appropriate demand
  - Outcome: New fit-for-purpose TALO office is operational
  - Outcome: Village infrastructures that provide climate change protection and address safety standards and meets Relocation requirements
- Sustainability
  - Outcome: Economic sustainability for Tokelau into the future
- Climate Change
  - Outcome: A well maintained and managed Environment for Tokelau
  - Outcome: Resilience to the impacts of climate change and related hazards[19]

Living with Change (LivC): An Integrated National Strategy for Enhancing the Resilience of Tokelau to Climate Change and Related Hazards, 2017-2030, was published by the government of Tokelau in 2017. LivC was developed following extensive planning, discussions, desktop reviews of government reports and documents, and whole-of-community consultations, centered around Tokelau's vision of the future, goals driving climate change and hazards-related strategy, and role of partners.

LivC identifies three inter-related strategic Climate Resilient Investment Pathways (CRIP), and related objectives, that Tokelau and development partners need to pursue:

- CRIP 1 – Mitigation: Decarbonization Development
  - Objective – Reduce carbon intensity of development processes, increase efficiency of end-use energy consumption, increase resilience of energy and related infrastructure on all three villages, and enhance policies and measures to protect and conserve Tokelau's terrestrial and marine ecosystems.
- CRIP 2 – Adaptation: Strengthened integrated risk reduction and adaptation to enhance resilience in the face of climate change and disasters.
  - Objective – Successfully manage climate change and disaster risks in an integrated manner, reduce existing risks, and prevent the creation of new and additional risks.
- CRIP 3 – Human Development: Capacity Building, Education, Training, Public Awareness, and Outreach
  - Objective – Enhance institutional governance and public awareness of climate change and related hazards, disaster preparedness, response, and recovery.[20]

The LivC Implementation Plan (2017-2022) is the companion document to Living with Change: An Integrated National Strategy for Enhancing the Resilience of Tokelau to Climate Change and Related Hazards, 2017-2030. It provides an overview of how LivC implementation should have occurred during the first five years, 1 July 2017 to 30 June 2022. The General Fono was fully responsible for the high-level governance of the LivC's implementation. A Tokelau national advisory board on climate change and related hazards' intelligence services (TCCS) was proposed to oversee the implementation of LivC, with the Tokelau Climate Change, Resilient, Readiness, and Emergency Services' Office of the Council of the Ongoing Government (TCR2O/OCOG) providing administrative support. The TCCS and TR2O/OCOG oversee the LivC's activities, but that is not to preclude participants from designing and implementing other activities that would fill gaps and address priorities. Measuring implementation progress was coordinated, monitored, reviewed, and evaluated through the Taupulega (Village Council), the General Fono (General Assembly legislative body), Council, and the OCOG. The implementation plan expanded on selected concepts aligning with the Climate Resilient Investment Pathways laid out in the LivC Strategy:

- CRIP 1-1: TOKELAU INTENDED NATIONALLY DETERMINED CONTRIBUTION REPORT – Preparing Tokelau's Intended Nationally Determined Contribution Report
- CRIP 1-2: THE TOKELAU RENEWABLE ENERGY PROGRAMME – Reducing the carbon intensity of development processes by increasing the uptake of Renewable Energy Technologies
- CRIP 2-1: REDUCING THE RISKS OF INUNDATION IN TOKELAU – Protecting Tokelau from the impact of rising sea levels and increasing extreme weather and climate events that threaten the islands' viability
- CRIP 2-2: TOKELAU RESTORATION OF CLIMATE, WEATHER, WATER, AND OCEAN SERVICES – Protecting Tokelau

from climate, weather, water, and marine-related disasters by restoring, upgrading, and installing new climate, weather, water, and ocean monitoring and observational networks and related services

- CRIP 3-1: TOKELAU CLIMATE CHANGE, RESILIENCE, READINESS & EMERGENCY SERVICES' OFFICE – Establishing a new TCR2O
- CRIP 3-2: INCREASE RESILIENCE TO CLIMATE CHANGE AND OCEAN ACIDIFICATION – Provide training opportunities to Tokelauans to increase their understanding of the impacts of climate change, the predicted range of changes that will occur, including uncertainties associated with climate outlooks and climate change scenarios, and management strategies that address the impacts of climate change on marine and coastal ecosystems
- CRIP 3-3: TOKELAU INTERGENERATIONAL KNOWLEDGE SYSTEM – Establishing intergenerational and intercultural dialogue on climate change and related hazards among Tokelauan communities in Tokelau, Samoa, and New Zealand
- CRIP 3-4: GENDER-DIFFERENTIATED CLIMATE IMPACTS AND RESILIENCE ANALYSIS – Enhancing understanding of the current and potential impacts of climate change on women and men at different ages.[21]

The Tokelau National Disaster Risk Reduction, Response and Resilience Plan (TDR4) was published in 2019 by the Ministry of Climate, Oceans, and Resilience to "identify and reduce multiple disaster risks to Tokelau and enhance the capability to respond to and recover from multiple types of disasters in order to enhance resilience."[22] It relies on a whole-of-government approach and builds upon the Tokelau National Strategic Plans and the LivC Strategy. It focuses on coordinating not only among the three nuku (atolls), but with the government and organizations of Samoa as the port of entry and liaison, as well as New Zealand and other international partners.

Any international disaster response to Tokelau would be facilitated by an airstrip. Tokelau does not have an airstrip, and the country is only accessible by a 24-hour boat ride from Samoa. Plans are in place to construct an airstrip to facilitate better access into the country, which was proposed through the Tokelau Sustainable Tourism Policy,[23] but would also facilitate disaster and humanitarian logistics. New Zealand agreed in 2019 to fund the airstrip, which will be built on Tokelau's largest atoll, Nukunonu. In July 2022, an invitation was put out for contractors to bid; the provider would be required to work with the Taupulega (Council of Elders that govern the atoll), use local labor, and provide training to develop local knowledge and skills. It would take almost two years to complete an asphalt airstrip and international airport infrastructure at an estimated cost of NZ$20.73 million (US$12.9 million). Feasibility studies in 2010 found that the provision of reliable, frequent air service from Apia would meet the needs of the current population and extended community overseas, possibly 20,000 in total worldwide. A New Zealand MFAT spokesperson said that initial demand analysis indicated a plane with 20 seats would be sufficient, though further demand analysis and consultation would still be required after borders reopened.[24]

The Kāiga Tokelau Wellbeing National Strategic Plan 2022–2026 was informed by a National Summit of conversations among the Tokelau diaspora in New Zealand from 31 October to 9 December 2020, during which time approximately 435 people were engaged across New Zealand's Tokelauan communities and led to delivery of a community-endorsed plan in August 2021. The Tokelau Wellington Leadership Group played a strong role in the strategy's development. The vision is of Tokelau families living in prosperity and happiness. The mission is to provide kāiga-centered (family-centered)

solutions where Tokelau people and their families and communities prosper. Kāiga is considered the heart of Tokelau wellbeing as family and kinship are the cornerstones of Tokelau society and culture. The aim was to develop a five-year strategic outlook to inform regional action plans to achieve thriving, harmonious, and resilient Tokelau families, and provide an opportunity to determine cultural solutions for kāiga wellbeing by ensuring voices of Tokelau Aotearoa-New Zealand were centered. The five key areas and corresponding targets are:

- Family – To prioritize, across all generations, a duty-of care principle for family wellbeing.
- Culture – To urgently revitalize, nurture, and promote Tokelau language, cultural identity, values, and heritage arts.
- Education and Employment – To accelerate and lift educational achievement, employment stability, and upskilling opportunities for Tokelau families.
- Faith – Affirm the importance of faith, spiritual beliefs, and values as essential parts of family wellbeing.
- Health and Housing – Optimize the critical importance of housing and health through a Tokelau cultural lens on the holistic wellbeing of family.[25]

Five key broad action areas identified for implementation in partnership with government agencies were regional community programs of action; growing Tokelau inter-generational leadership; improving engagement and education; sharing Tokelau best practices, resources, and support; and mobilizing Tokelau community collectivism.[26]

New Zealand development funding for Tokelau from 2018-2021 included new wharfs and channels in Atafu, Nukunonu, and Fakaofo for safer shore access, and a new inter-atoll boat that decreased travel time between atolls. Development priorities include improving climate change resilience and mitigation – particularly reducing coastal inundation risks and protecting fisheries; transport and internet connectivity – particularly co-financing an undersea internet cable; core public service governance, management, and service delivery; health; and education.[27]

New Zealand MFAT's Tokelau Four-year Plan (October 2021) focused on the following strategic goals:

- Goal One: Support improved climate change resilience
- Goal Two: Support more effective, inclusive, and resilient self-governance
- Goal Three: Strengthen the health and cultural vibrancy of Tokelau's people to support human development and improved well-being
- Goal Four: Support improved connectivity

The goals are linked to the following outcomes:
Medium-term outcomes:

- Economic, fisheries, and asset development is environmentally and socially sustainable, and resilient to slow- and rapid-onset disasters
- Tokelau effectively responds to climate hazards and environmental challenges
- Critical governance and management performance and service delivery improved, consistent with the values associated with New Zealand citizenship
- Core education and health services on Tokelau are increasingly comparable to that of remote mainland New Zealand and promote Tokelau's language and culture
- Regular safe transport services
- Tokelau has improved internet connectivity

Short-term outcomes (3-5 years):

- Climate change resilience is mainstreamed (Tokelau can access the information it needs for climate-resilient decision making)
- Strengthened capacity for sustainable management of fisheries
- Strengthened financial management policies and capacities
- Tokelau's Language Commission is operating effectively
- Justice reforms are implemented
- Strengthened capacity to implement Tokelau's

Health and Education Plans
- Effective rollout of COVID-19 vaccines
- Improved access to affordable internet
- Options for establishing an air service are scoped and costed for decision-making
- Tokelau develops a range of relationships with New Zealand agencies, and Cook Islands, Niue, Tokelau, and New Zealand engage and partner on shared bilateral, regional, and global priorities[28]

Office of the Council for the Ongoing Government (OCOG)

Apia Liaison Office: Level 1, SNPF Plaza, Beach Road, Apia, Samoa

Early Warning Systems

Weather forecasts are provided by the Tokelau Meteorological Service, under the Department of Economic Development, Natural Resources & Environment.[29] Tokelau's meteorological office was re-establishment as a fully functional office for Tokelau in December 2017, when the Pacific Meteorological Desk Partnership officially handed over meteorological instruments to the newly established office. This was done in response to Tokelau's request for support from SPREP. Equipment handed over included daily manual rain gauges, rain gauge measuring cylinders, Met06 Stevenson Screen instrument shelters, including stand and thermometer mounts and temperature modules, and a 10-year supply of field books to record weather and climatological observations in line with WMO and New Zealand Meteorological Services standards.[30]

New Zealand started building weather stations in Tokelau in 2018, planned for all three atolls, to assist with climate change research. New Zealand's meteorological service will monitor and analyze the collected data. Civil Defence Minister Kris Faafoi arrived on 5 October 2018 in Nukunonu, the first atoll to house a station.[31] The station is part of a broader program on disaster resilience that New Zealand is funding and is a joint project by New Zealand's Ministry of Civil Defence and Emergency Management and MetService. New Zealand is also working with Tokelau to identify coastal hazards and help enhance Tokelau's resilience to existing and future erosion and inundation, which involves village representatives assessing existing coastal defenses and collecting data.[32]

An April 2023 workshop for the seven staff of the Tokelau Ministry of Environment, including the Meteorological Service, to climatology training, which included drought monitoring and seasonal prediction to produce the Early Action Rainfall (EAR) Watch bulletin. The EAR Watch Bulletin provide an early warning of rainfall extremes, which aids the country and its people in their preparations. It provides early warning for periods of prolonged drought brought by less rainfall, as well as warning against prolonged wet periods, which can result in flooding, outbreak of waterborne diseases, and related impacts to other sectors. The workshop output was a national-level EAR Watch bulletin developed by Tokelau Meteorological Services staff with the technical support of the Bureau of Meteorology and SPREP. The workshop in Apia was conducted by the Climate and Oceans Support Programme in the Pacific (COSPPac) Phase 2 Project, which is funded by the Governments of Australia and New Zealand.[33]

Department of Economic Development, Natural Resources and Environment

Tel: 685 20822

Infrastructure

Transport and utilities infrastructure in Tokelau is minimal. There is no airstrip, and transportation to/from the islands is via ship from Samoa. Boats connect the three atolls. The road network is short – as are most overland distances, which can generally be covered by foot.[34] In 2019, New Zealand agreed to fund the construction of an airstrip, and in 2022, the project went out for tender after Tokelau's leadership selected a location on Nukunonu for the project. The earliest expected completion of

the project would be latter 2024 or early 2025.[35]

OCOG's Department of Energy, based in Fakaofo, is responsible for supply and maintenance of power to all three atolls.[36] For over a decade, Tokelau has been entirely reliant on renewable fuels. The energy system comprises solar panels, storage batteries, and generators running on biofuel derived from coconut; together, they generate enough electricity to meet 150% of the islands' electric power demand.[37]

The Department of Economic Development, Natural Resources and Environment oversees policy for water and sanitation, and OCOG oversees each atolls' projects. The country relies on rainwater catchment for nearly all of its water; groundwater tends to be saline and contaminated by sewage. Households generally harvest their own rainwater, and there are emergency desalination units that were provided over a decade ago after a major drought. Sanitation is house-by-house with a combination of water-sealed toilets and septic tanks or cesspits.[38]

Civil Society Partners

Atoll-based organizations include Te Kāiga Fakaofo i Ueligitone Incorporated on the Fakaofo Atoll, Nukunonu Tokelau Wellington Society Incorporated on the Nukunonu Atoll, and the Atafu Tokelau Community Group (ATCG) on the Atafu Atoll. The atoll organizations are involved in a variety of activities, including facilitating the Kāiga Tokelau Wellbeing National Strategic Plan 2022-2026, a project which ATCG led in developing.[39]

The Samoa Red Cross has recently become a civil society partner for Tokelau. In November 2018, the first Polynesian Logistics Cluster preparedness workshop was held in Tonga, building on localization, collaboration, and the cluster approach, and providing a platform to share information, build relationships, and enhance regional coordination. A partnership between the Tokelau NDMU and Samoa Red Cross was enhanced at the workshop. With no Red Cross presence in Tokelau, less than six months later, representatives from the respective organizations were able to successfully initiate and implement the first logistics training between the Samoa Red Cross and the Tokelau NDMU under MiCORE. Tokelau's Village Disaster Committees, government and community members were brought together and learned more about the role of logistics in emergency preparedness and response at the training, which was commissioned by the Government of Tokelau and supported under a partnership with the Government of New Zealand through the Ministry of Civil Defence and Emergency Management and MFAT. Following the training, Tokelau's NDMU worked with Pacific Logistics Cluster partners to implement a logistics preparedness action plan specific to the Tokelau context.[40]

Samoa Red Cross Society
P.O. Box 1616, Apia
Tel: 685 23686
Email: *samoaredcross@samoa.ws*

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Tokelau Notes

1 New Zealand Ministry of Foreign Affairs and Trade. About Tokelau. https://www.mfat.govt.nz/en/countries-and-regions/australia-and-pacific/tokelau/about-tokelau/

2 Foster, Sophie. Tokelau, Encyclopedia Britannica, 3 November 2023. https://www.britannica.com/place/Tokelau

3 Samasoni, Samson. Tokelau's past may help determine Olohega's future, Digital Pasifik, 25 October 2022. https://digitalpasifik.org/blog/tokelaus-past-may-help-determine-olohegas-future

4 OCHA. Tokelau: Population Distribution | Total Population: 1,499 (Census 2016), ReliefWeb, 19 July 2022. https://reliefweb.int/map/tokelau/tokelau-population-distribution-total-population-1499-census-2016

5 Tokelau's resilience journey. Logistics Cluster, 7 May 2019. https://logcluster.org/en/blog/tokelaus-resilience-journey

6 Tokalau, Torika. Project to get Tokelau its first airfield under way after pandemic delays, 17 July 2022. https://www.stuff.co.nz/national/129270339/project-to-get-tokelau-its-first-airfield-under-way-after-pandemic-delays

7 Godfrey, Dominic. Installation tells story of Tokelauans sold into slavery, RNZ News, 1 November 2019. https://www.rnz.co.nz/international/pacific-news/402286/installation-tells-story-of-tokelauans-sold-into-slavery

8 The World Factbook. Tokelau, CIA, updated 1 November 2023. https://www.cia.gov/the-world-factbook/countries/tokelau/

9 CIA World Factbook. Tokelau – Map. https://www.cia.gov/the-world-factbook/countries/tokelau/map

10 Diamond, Howard. Tokelau Tropical Cyclone Climatology, A Report, September 2016. As cited in Living with Change (LivC): An Integrated National Strategy for Enhancing the Resilience of Tokelau to Climate Change and Related Hazards, 2017-2030.

11 SPREP. Early Action Rainfall Watch Bulletin To Aid Tokelau's Preparedness For Extreme Rainfall Events, ReliefWeb, 10 May 2023. https://reliefweb.int/report/tokelau/early-action-rainfall-watch-bulletin-aid-tokelaus-preparedness-extreme-rainfall-events

12 Lefale, P.F., P. Faiva, and C.L. Anderson. 2017. Living with Change (LivC): An Integrated National Strategy for Enhancing the Resilience of Tokelau to Climate Change and Related Hazards, 2017-2030. Wellington, New Zealand: Government of Tokelau and LeA International Consultants, Ltd. ANNEX 1, Page 6. https://www.tokelau.org.nz/site/tokelau/files/ClimateChange/LivCStrategy_web-2.pdf

13 New Zealand MFAT. Tokelau Four Year Plan, October 2021. https://www.mfat.govt.nz/assets/Aid/4YPs-2021-24/Tokelau-4YP.pdf

14 UN Press. Special Committee on Decolonization Approves 3 Draft Resolutions, Hears Officials, Petitioners from Non-Self-Governing Territories, Opening Substantive 2023 Session, 12 June 2023. https://press.un.org/en/2023/gacol3369.doc.htm

15 Pasilio, Elena. Pfizer vaccine roll-out begins in Covid-free Tokelau, RNZ News, 22 July 2021. https://www.rnz.co.nz/international/pacific-news/447286/pfizer-vaccine-roll-out-begins-in-covid-free-tokelau

16 WHO. Tokelau: WHO Coronavirus Disease (COVID-19) Dashboard With Vaccination, 8 November 2023. https://covid19.who.int/region/wpro/country/tk

17 Tokelau Ministry of Climate, Oceans, and Resilience. Tokelau National Disaster Risk Reduction, Response and Resilience Plan (TDR4), 2019. https://www.tokelau.org.nz/site/tokelau/TDR4_English_pdf.pdf

18 UN International Convention on the Elimination of All Forms of Racial Discrimination. CERD/C/NZL/23-24 Combined twenty-third and twenty-fourth periodic reports submitted by New Zealand under article 9 of the Convention, due in 2021. Date received 21 December 2021, Distributed 15 February 2022. https://digitallibrary.un.org/record/3958394 Annex 1: Tokelau appendix-2---draft-annex-to-23rd-24th-reports-under-the-convention-on-the-elimination-of-racial-discrimination.pdf (justice.govt.nz)

19 Government of Tokelau. Tokelau National Strategic Plan: July 1, 2016 – June 30, 2020 https://www.tokelau.org.nz/site/tokelau/files/2016Docs/TNSP%202016-2020%20English.pdf

20 Lefale, P.F., P. Faiva, and C.L. Anderson. 2017. Living with Change (LivC): An Integrated National Strategy for Enhancing the Resilience of Tokelau to Climate Change and Related Hazards, 2017-2030. Wellington, New Zealand: Government of Tokelau and LeA International Consultants, Ltd. https://www.tokelau.org.nz/site/tokelau/files/ClimateChange/LivCStrategy_web-2.pdf

21 Lefale, P.F., P. Faiva, and C.L. Anderson. 2017. Living with Change (LivC): An Integrated National Strategy for Enhancing the Resilience of Tokelau to Climate Change and Related Hazards, 2017-2030 - IMPLEMENTATION PLAN, 2017-2022. Wellington, New Zealand: Government of Tokelau and LeA International Consultants, Ltd. https://www.tokelau.org.nz/site/tokelau/files/ClimateChange/LivCImplementPlan_web-2.pdf

22 Tokelau Ministry of Climate, Oceans, and Resilience. Tokelau National Disaster Risk Reduction, Response and Resilience Plan (TDR4), 2019. https://www.tokelau.org.nz/site/tokelau/TDR4_English_pdf.pdf

23 Pacific Tourism Organisation. Country Feature - Tourism in Tokelau, 13 September 2022. https://southpacificislands.travel/country-feature/

24 Tokalau, Torika. Project to get Tokelau its first airfield under way after pandemic delays, Stuff, 17 July 2022. https://www.stuff.co.nz/national/129270339/project-to-get-tokelau-its-first-airfield-under-way-after-pandemic-delays

25 Pasefika Proud., Kāiga Tokelau Wellbeing National Strategic Plan 2022–2026. https://www.pasefikaproud.co.nz/stories/kaiga-tokelau-wellbeing/

26 Kāiga Tokelau Wellbeing Project Team. Kāiga Tokelau Wellbeing: National Strategic Plan 2022-2026. https://www.matauala.org.nz/_files/ugd/f198ee_64eb52ce79e645f89c53602b789d2cf2.pdf

27 New Zealand MFAT. Our Development Cooperation with Tokelau. https://www.mfat.govt.nz/assets/Aid-Prog-docs/IATI-PDFs/PACPF/Tokelau.pdf

28 New Zealand MFAT. Tokelau Four Year Plan, October 2021. https://www.mfat.govt.nz/assets/Aid/4YPs-2021-24/Tokelau-4YP.pdf

29 Tokelau Meteorological Service EDNRE, Facebook, accessed 7 November 2023. https://www.facebook.com/TokelauMetService/

30 SPC. New Meteorological Office established in Tokelau, ReliefWeb, 5 February 2018. https://reliefweb.int/report/tokelau/new-meteorological-office-established-tokelau

31 RNZ News. NZ plans weather stations for Tokelau, 5 October 2018. https://www.rnz.co.nz/international/pacific-news/368012/nz-plans-weather-stations-for-tokelau

32 Government of New Zealand. Weather station to help protect atoll nation, ReliefWeb, 5 February 2018. https://reliefweb.int/report/tokelau/weather-station-help-protect-atoll-nation

33 SPREP. Early Action Rainfall Watch Bulletin To Aid Tokelau's Preparedness For Extreme Rainfall Events, ReliefWeb, 10 May 2023. https://reliefweb.int/report/tokelau/early-action-rainfall-watch-bulletin-aid-tokelaus-preparedness-extreme-rainfall-events

34 Crisis24. Tokelau Country Report. Garda. 11 September 2023. https://crisis24.garda.com/insights-intelligence/intelligence/country-reports/tokelau

35 Torika Tokelau. Project to get Tokelau its first airfield under way after pandemic delays. Stuff NZ. 17 July 2022. https://www.stuff.co.nz/national/129270339/project-to-get-tokelau-its-first-airfield-under-way-after-pandemic-delays

36 Government of Tokelau. Energy and Telecommunications. https://www.tokelau.org.nz/Tokelau+Government/Government+Departments/Energy+and+Telecommunications.html

37 Government of Tokelau. The world's first truly renewable energy nation. https://www.tokelau.org.nz/Solar+Project.html

38 SPREP. PACC Demonstration Guide: Improving rainwater harvesting infrastructure in Tokelau. 2015. https://www.sprep.org/attachments/Publications/CC/PACCTechRep15.pdf

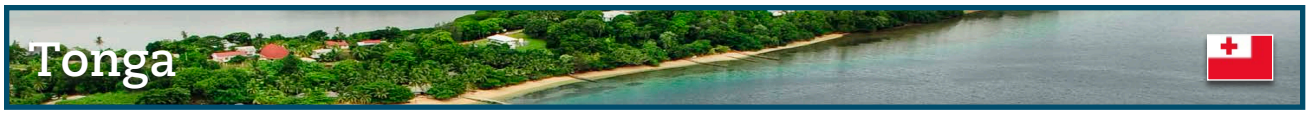
39 Atafu Tokelau Community Group. National Wellbeing Strategy 2022-2026. https://www.matauala.org.nz/national-wellbeing-strategy

40 Logistics Cluster. Tokelau's resilience journey, 7 May 2019. https://logcluster.org/en/blog/tokelaus-resilience-journey

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The 170 islands of Tonga are found in an approximately 800-km (500-mile) north-south archipelago that stretches between latitudes 15° and 23° S and longitudes 173° and 177° W.[1] Although Tonga's ocean territory covers 700,000 km^2 (270,271 square miles),[2] only 750 km^2 (290 square miles) is dry land. The islands are divided into three main island groups: Tongatapu in the south, Haʻapai in the center, and Vavaʻu in the north. The fourth group, the Niuas (sometimes called Niuatoputapu) are isolated in the far north while ʻAta is in the far south. Repeated volcanic activity has raised most of the western islands well above sea level. The highest point in the country is in the Haʻapai Group on Kao, which rises to 1,033 m (3,389 feet). Late, in the Vavaʻu Group rises to 518 m (1,700 feet). The low eastern islands are capped by coral polyps and shelled marine organisms, which build coral rock and limestone reefs that counteract erosion. For example, Tongatapu, the largest of the islands, is a raised atoll with an area of 260.5 km^2 (100.6 square miles); it is surrounded by a protective reef.[3] In its 2021 census, the Tonga Statistics Department found 100,179 people residing in the country.[4] Some 98% of the population (98, 574 people) is of Tongan ethnicity. During the same census, it was found that the island of Tongatapu was home to 74,320 people, or more than 74% of the population.[5] Figure 71 is a map of Tonga.[6]

Tonga was first inhabited between 1500 and 1000 BCE by seafarers thought to have originated in East Asia or modern Taiwan.[7] Later infusions of settlers from Melanesia – particularly Papuan-inhabited islands – arrived up through about 1000 CE and leant supplementary heritage to create the Polynesian people from which today's Tongans descend.[8] The islands underwent a period of civil wars during the 15th and 17th centuries, periods that weakened the traditional governance system just as European explorers, missionaries, and merchants were beginning to reach the islands.[9] The Vavaʻu group was "claimed" by Spanish navigators in 1781, and from that period onward, traders would increasingly visit Tonga. Tensions grew, culminating in the 1806 sacking of a British ship in Lifuka in the Haʻapai group.[10] After a succession of wars, in 1845, a ruling chief, Taufaʻahau, emerged as King George Tupou I (1845–1893),[11] and during his reign, Tonga became a unified and independent country with a modern constitution (1875), legal code, and administrative structure.[12] Nonetheless, Tonga fell under the sway of Western powers. Britain declared Tonga a British protectorate in 1900.[13] In 1970, during the rule of King Taufaʻahau Tupou IV, Tonga regained full control of domestic and foreign affairs and reasserted full independence. Since 2015, the country has been ruled by Tupou VI,[14] and Siaosi Sovaleni has been Prime Minister since 2021.[15]

Tonga remains a constitutional, hereditary monarchy,[16] but the constitution has been amended several times, most recently in 2010, when many of the monarch's powers were

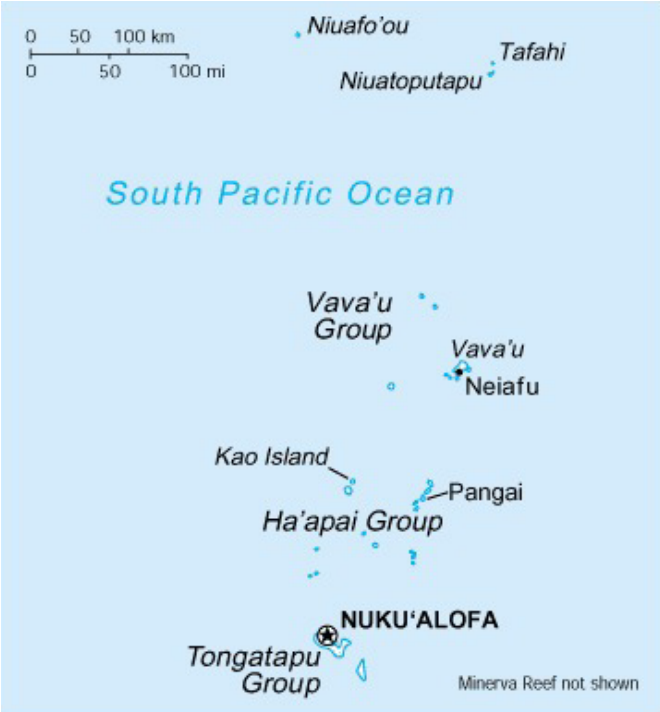


Figure 71: Map of Tonga

devolved to the Cabinet. Since then, the Cabinet has answered to the Legislative Assembly rather than to the monarch.[17] All land in Tonga is the property of the monarch who may grant nobles title to lands as their hereditary estates, but no land may be sold.[18] The unicameral parliament, the Fale Alea, has 26 seats filled by a combination of direct election[19] and of nobles elected by and from among the 33 titled nobles to represent the five island groups of the Kingdom.[20]

Hazards and Climate Change

Tonga confronts the following hazards: drought, earthquakes, epidemic, tropical cyclones, and tsunami.

With the exception of the January 2022 Hunga Tonga-Hunga Ha'apai eruption and tsunami, the country's most costly disaster experiences have been cyclones and droughts, which disrupt water and electric power supplies, transportation, and to health services by damaging infrastructure and sending people into evacuation centers.[21]

Tonga's climate is defined by a wet season from November to April with moderate and variable rainfall, and a dry season from May to October.[22] On average, temperatures range between 16° and 21°C (60° and 70°F) in June and July and reach 27°C (80°F) in December and January. The mean annual precipitation varies from 1,620 mm (64 inches) in the Ha'apai Group to 2,450 mm (97 inches) on Niuafo'ou. The northern islands, closest to the Equator, are particularly vulnerable to typhoons, which generally occur between December and April.[23] Figure 72 illustrates monthly average temperatures and precipitation for Tonga for the period 1991-2020.[24]

Over the course of the 21st century, Tonga's surface air temperature and sea surface temperature are projected to continue to increase; wet season rainfall is projected to increase; the intensity and frequency of days of extreme heat are projected to increase; the intensity and frequency of days of extreme rainfall are projected to increase; and mean sea level rise is projected to continue its upward trend.[25] Daily temperatures have already been increasing at a rate of 0.1°C (0.18°F) per decade since 1950. Future projections indicate that annual average air and sea surface temperatures are most likely to increase 0.3-1.1°C (0.54-1.98°F) by 2030, 1.0-1.8°C (1.8-3.24°F) by 2055, and 1.9-3.3°C (3.42-5.9°F) by 2090.[26] Table 23 summarizes the assessment of the impact of key climate change-related phenomena on the islands as found in Tonga's 2nd Nationally Determined Contributions (NDC).[27]

In 2020, the IMF assessed the expected climate developments and their consequences for Tonga in the following way:

- Extreme Events - Projections show that tropical cyclones will be more intense by the late 21st century, and as the general Southwest Pacific cyclone track shifts

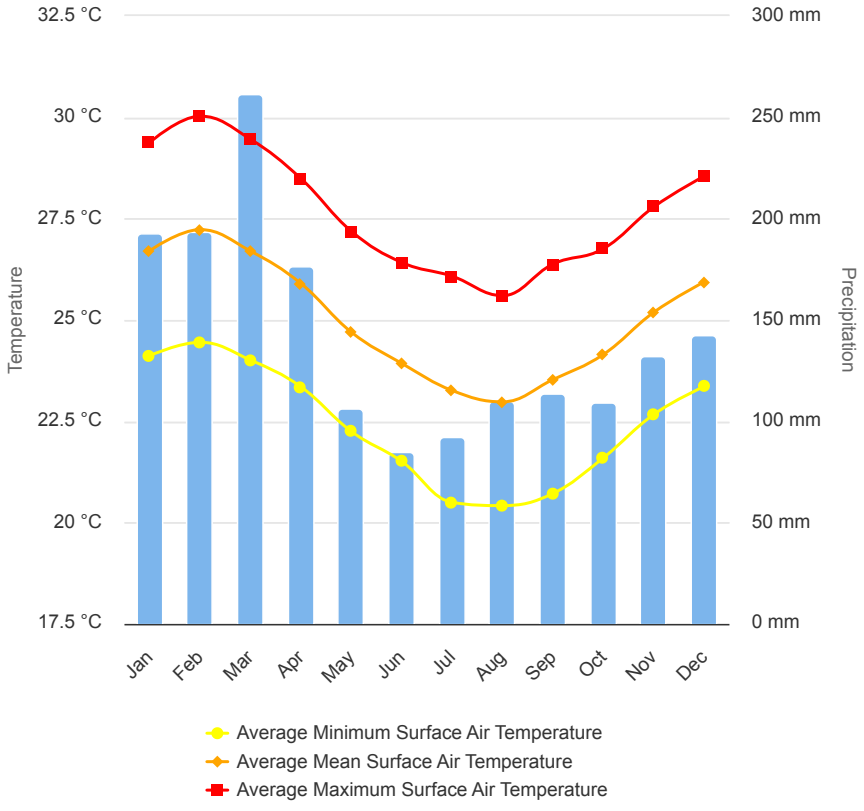


Figure 72: Average Monthly Temperature and Precipitation, Tonga (1991-2020)

Phenomenon	Trend	Projections	Impacts
Temperature	Seasonal variation of a maximum of 5°C (9°F); increase in mean temperatures of 0.15°C (0.27°F) per decade since 1949	Increase by up to 1.0°C (1.8°F) by 2030 and up to 1.8-4.1°C (3.24-7.38°F) by 2090	Decreased yield and quality of crops; reduced fish catch and degradation of corals; increase in vector- and water-borne diseases
Rainfall	El Niño years see drier wet seasons; La Niña years tend to be wetter than average; increase in dry season rainfall since 1947	Little change in annual mean; more extreme events	Increased flooding and damage to infrastructure; decrease in agricultural productivity; degradation of coral reefs due to pollution by sediment and debris; increase in vector- and water-borne diseases
Drought	Higher risk of drought in El Niño years	Slight decrease in frequency	Decrease in agricultural productivity; reduced access to drinking water
Sea Level	Rise of 6mm (0.24 inches) per year since 1993	Rise of 7-18 cm (2.7-7.1 inches) by 2030 and 41-88 cm (16-34.6 inches) by 2090	Coastal erosion; damage to infrastructure and property; salinization of groundwater; degradation of coral reefs
Cyclones	Average of 20 cyclones per decade strike the country; wide inter-annual variability	Decrease in frequency of 6-35%; increase in mean maximum wind speed of 2-11%	Severe damage to perennial tree crops (e.g., coconuts, bananas, and breadfruit); destruction of infrastructure

Table 23: Impacts of Climate-Change Related Phenomena in Tonga

eastward, the number of tropical cyclones that affect Tonga will continue to increase. Pacific Catastrophe Risk Assessment and Financing Initiative (PCRAFI) estimates that Tonga will incur, on average, US$16 million in losses per year due to earthquakes and tropical cyclones.

- Precipitation – Rainfall predominantly occurs from November to April with an overall increasing trend in volume of precipitation in recent years. During El Niño summers, rainfall is likely to be significantly reduced, and severe drought can occur. During La Niña summers, rainfall can increase up to three times the monthly average and create severe flooding.
- Temperatures – Mean annual temperatures show a general increase of 0.2-0.4°C (0.35-0.72°F) annually over the period 1980-2020, and annual mean temperature and extreme daily high temperatures are expected to continue to rise.
- Sea Level Rise and Ocean Acidification – The sea level has risen near Tonga by about 6 mm (0.24 inches) per year since 1993, and projections from Tonga Meteorological Service (TMS) suggest that under high emissions scenarios, the further rise by 2030 could be in the range of 30-170 mm (1.2-6.7 inches). A 2019 Intergovernmental Panel on Climate Change (IPCC) prediction suggested that the median and upper bounds of global sea level rise are likely to be greater than previously expected, and calculations for Tonga suggest that the mean rise for the second half of the 21st century under the most pessimistic model scenarios is 410-880 mm (16-34.6 inches). Meanwhile, ocean acidification is expected to continue, with a higher risk of coral bleaching, which will have adverse effects on fisheries and coastal community livelihoods.[28]

Based on Pacific Disaster Center (PDC) projections, using the pessimistic RCP8.5 modelling scenario, the key climate change-influenced hazard that will pose an increased risk to Tonga is sea level rise. While the number of Tongans exposed to consecutive dry days (drought), extreme heat, cyclones, and extreme precipitation by 2050 is expected to remain the same as in 2000, PDC projections of the land area exposed to the probabilistic inundation from saltwater floods caused by sea level, tides, and

coastal flooding combining to raise the ocean high enough to spread over adjacent land will impact 5,000 more Tongans in 2050 than in 2000. Across all climate change-influenced hazards, PDC estimates that, by 2050, 106,000 residents will be exposed, and some 24,000 of these people will be more vulnerable than average in some way – e.g., children, the elderly, persons with disabilities, etc.[29]

Government Institutions, Policies, and Plans for Disasters and Climate Change

Tonga's disaster management framework is an "all-hazards" or "functional" approach, which focuses on emergency support functions to be performed rather than addressing specific hazards. The Second Joint National Action Plan on Climate Change and Disaster Risk Management (JNAP 2) 2018-2028 provides strategic actions to operationalize and implement the Climate Change Policy (2016) and contributes to achieving outcomes targeted in the Tonga Strategic Development Framework 2015-2025. JNAP 2 has six objectives with sub-objectives, expected outcomes, and prioritized activities that translate into 94 expected actions.

- Objective 1 – Mainstreaming for a Resilient Tonga - Mainstream climate change and disaster risk management approach into government legislation, policies, and plans at all levels.
- Objective 2 – Implement a coordinated approach to research, monitoring, and management of data and information - Adaptations, clean energy, and disaster risk management are informed by information and data based on assessments and lessons learned.
- Objective 3 – Resilience-building response capacity - Develop the capacity for resilience building responses throughout government, the private sector, and civil society.
- Objective 4 – Resilience-building actions - To design and implement on-the-ground adaptation, clean and efficient energy. and disaster risk management actions that focus on building a Resilient Tonga at the national, outer-island, and community levels.
- Objective 5 – Finance - Secure and mobilize the required finances and resources to build a Resilience Tonga by 2035.
- Objective 6 – Regional and international cooperation - Develop and maintain strong regional and international partnerships and contribute fully to all relevant negotiations aimed at the required transformation to a resilient and sustainable future.[30]

Many functions of disaster risk management, DRR, and CCA are consolidated under the Ministry of Meteorology, Energy, Information, Disaster Management, Environment, Climate Change, and Communications (MEIDECC), which includes several institutions responsible for forecasting, early warning, coordinating and implementing emergency response, and promoting climate risk preparedness and adaptation.[31] Figure 73 shows the flow of authority for disaster management under MEIDECC.[32]

The Disaster Risk Management (DRM) Act (2021) was written with the goal of establishing a legal, institutional, and regulatory framework for planning and management of disaster risk reduction and preparedness activities, coordinating emergency response during a disaster, and facilitating recovery work following a disaster.[33] Under the Act, National Emergency Management Office (NEMO) is to become the National DRM Office, which will establish and maintain the National DRM Policy and will be the focal point for all requests and donations of relief supplies from partners, private contributors, and international organizations in times of emergency. The Act calls for the founding of Island DRM Committees on Vava'u, Ha'apai, Niuatoputapu, Niuafo'ou, and 'Eua, and it calls for each village to have a Village DRM Committee, which is to have representation of "women, young people, people with disabilities, and other vulnerable groups."[34]

The National Emergency Management Committee (or National DRM Management Committee) is responsible for policy, coordinating emergency management

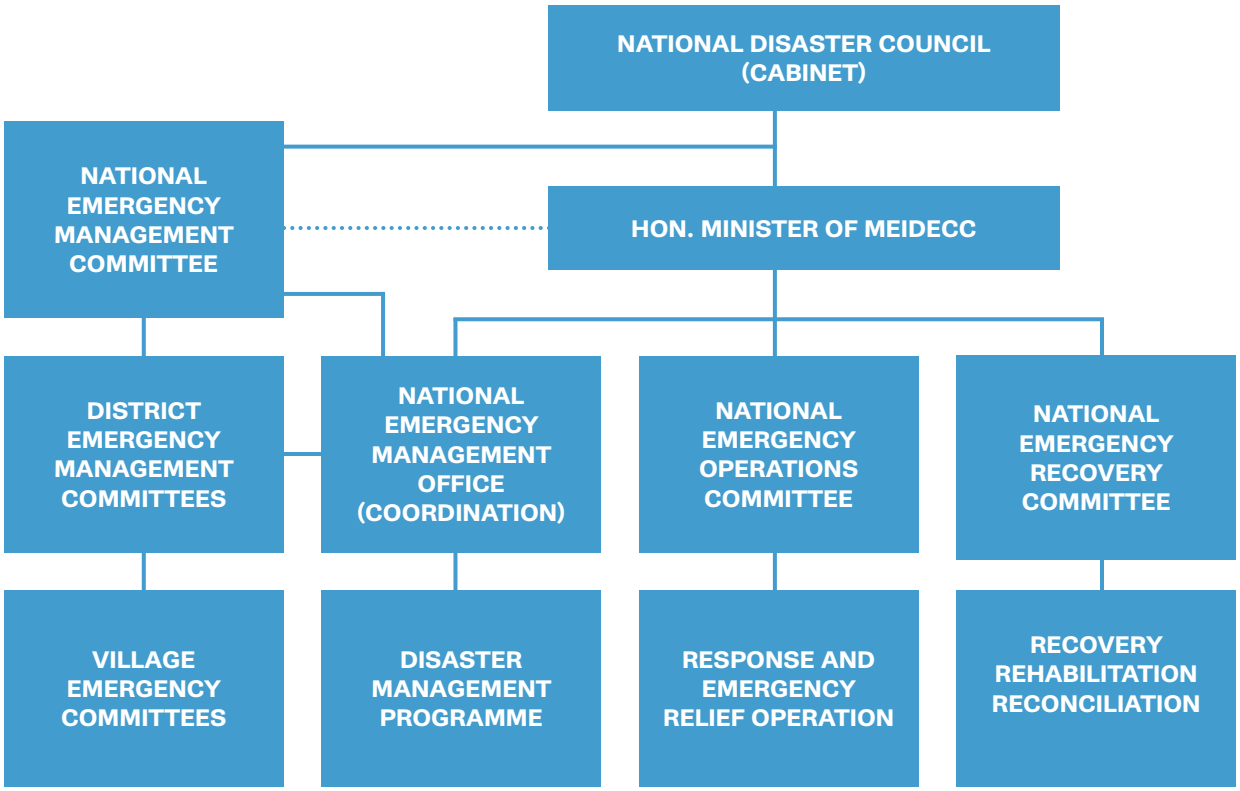


Figure 73: MEIDECC Disaster Management Organization

activities, approving and reviewing the national response plan, and supporting district or island committees. The National Emergency Operations Committee (or National DRM Operations sub-committee) is responsible for activating ministries and organizations during the response phase, coordinating with relevant ministries, NGOs, and community groups, conducting initial damage assessments, and managing disaster relief requirements including collecting, prioritizing, and distributing relief items.[35] The National Emergency Control Centre (NECC) is the nexus of coordination in times of disaster response. It is managed by NEMO, in the Ministry of Works building, in Vaololoa, Nukuʻalofa. NECC facilitates NEOC coordination once the disaster management system is activated. In addition to other activities, NECC issues official information regarding the event and the response to it. NECC takes reports from District Emergency Control Centres, which coordinate all disaster operations in their respective districts under the Governor as District Disaster Controller.[36] A cross-government Emergency Management Committee and ten clusters mobilize to meet disaster needs and benefit from the support of Tonga's armed forces, His Majesty's Armed Forces, and UN bodies.[37]

The National Climate Change Coordinating Committee (NCCCC) under MEIDECC provides high-level oversight, policy guidance, and direction, and coordinates climate change related activities.[38] The Ministry is the National Designated Authority by the Green Climate Fund (GCF) with MEIDECC's Chief Executive Officer as the primary contact and the Director of Climate Change as the secondary contact.[39] MEIDECC's Department of Climate Change is also the focal point in Tonga for the Pacific Resilience Partnership and all development partners, multilateral agencies, and agencies of the Council of Regional Organisations of the Pacific (CROP).[40] MEIDECC's Department of Climate Change has worked with local and international stakeholders to develop the country's long-term low emissions development strategy and an enhanced NDC document that Tongan representatives took to the COP26 in Glasgow, Scotland, in 2021 and that they used

to demonstrate how culturally sensitive and inclusive consultations can produce actionable plans.[41] In November 2021, the Department submitted Tonga's Low Emission Development Strategy (LEDS) 2021-2050 to the UNFCCC Secretariat. The LEDS and Tonga's Second NDC underscore the country's willingness to reduce domestic GHG emissions, supporting the long-term temperature goal of the Paris Agreement despite its own very small baseline contribution to total global emissions.[42] Figure 74 illustrates the institutional arrangement within the government for climate programming.[43]

Ministry of Meteorology, Energy, Information, Disaster Management, Environment, Climate Change, and Communications (MEIDECC)
Level 2 O.G. Sanft Building, Nuku'alofa, Tonga
Tel: 676 28170
Email: *enquiries@mic.gov.to*

National Emergency Management Office (NEMO)
Alaivaha'amama'o Bypass Road, Vaololoa, Nuku'alofa
Tel: 676 26340
Email: *tonganemo@gmail.com*

Department of Climate Change (MEIDECC)
P.O.Box 1380, Level 3 O.G. Sanft Building, Nuku'alofa, Tonga
Tel: 676 26514
Email: *departmentclimatechange@gmail.com*

Early Warning Systems

Under the DRM Act 2021, the country is to develop a multi-hazard early warning system (MHEWS) that uses various local practices and capabilities to deliver warnings – e.g., radios, sirens, etc. The Tonga Meteorological Services (TMS) and the Geological Service are the key stakeholders helping to developing, operate, and

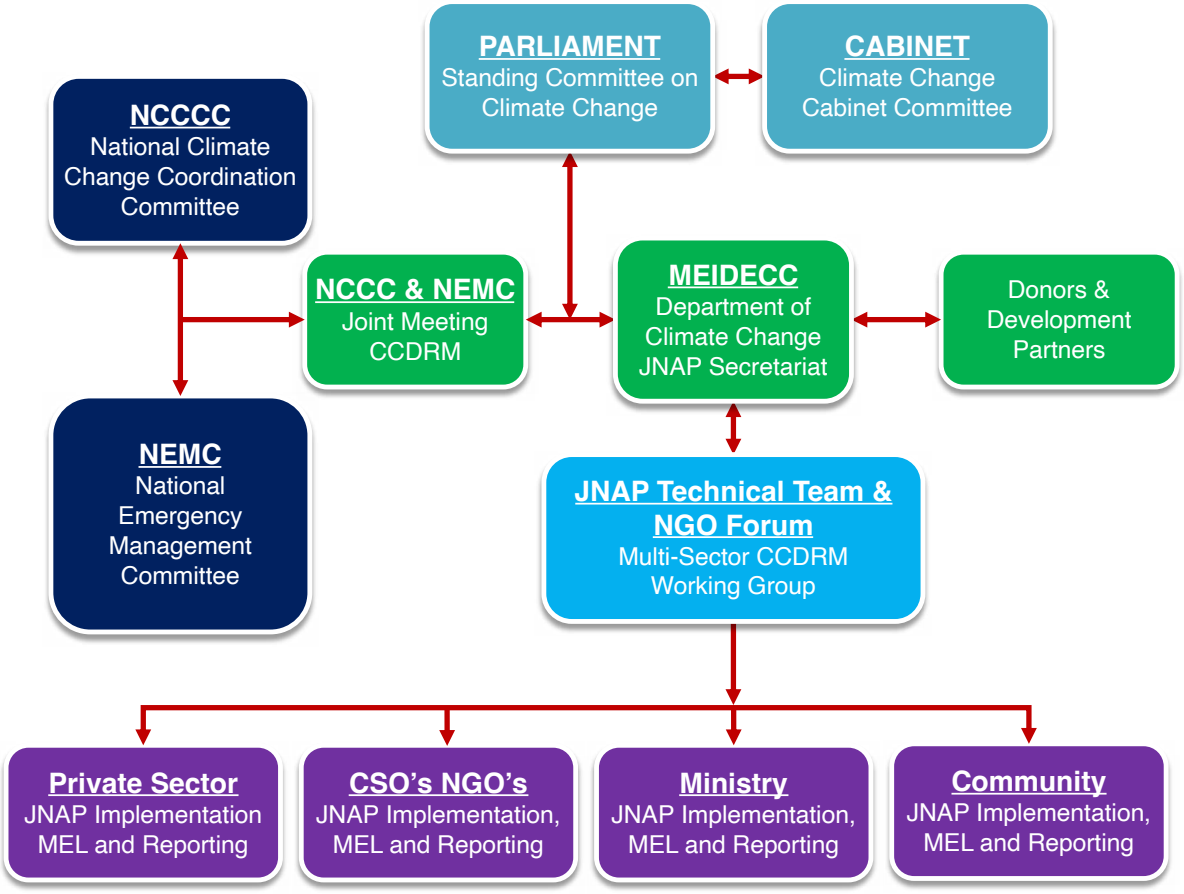


Figure 74: Climate Programming Institutional Arrangements, Tonga

trigger the MHEWS.[44] TMS, under MEIDECC, is the national meteorological service. It provides regional and national services on weather forecasts, climate summaries, and satellite imagery. TMS' six stations are located at all airports.[45]

The Pacific Resilience Program Project on Improving MHEWS, led by MEIDECC and funded by the World Bank, Global Environment Facility, and Global Facility for Disaster Reduction and Recovery (GFDRR) was launched in 2020 to deliver MHEWS and EOCs to all three main island groups. The first phase saw the Haʻapai Multi-Hazard Early Warning and Emergency Operation Centre at Pangai commissioned. The Centre is MEIDECC's main office in the Haʻapai group and is connected directly to the Fuaʻamotu Weather Forecasting Centre and the NEMO Office in Nukuʻalofa through fiberoptic cables and has backup means to share information to offices in Tongatapu in the absence of internet service. Once the offices are established at Vavaʻu and Tongatapu, the country should have a resilient information network base for responding to natural hazards.[46]

Further developments in latter 2022 included the Tonga Mobile Applications Community MHEW and Response System (MACRES) through the CREWS initiative Accelerated Support Window, a WMO financing mechanism dedicated to Least Developed Countries and Small Island Developing States, allocating funds to EWS. MACRES will build on existing platforms to improve capacity to disseminate and share risk information, advisories, and warnings to people regardless of gender, age, or disability status. Moreover, it targets near-real time delivery for all hydro-meteorological and geological hazards. MACRES will be established so that most smartphones can be used without a need for internet data.[47]

Tonga Meteorological Services

Fuaʻamotu International Airport
QV44+5JV, Fuaʻamotu, Tonga
Tel: 676 740 0062
Email: *metstaff@met.gov.to*

Infrastructure

Tonga's infrastructure needs are addressed by the National Infrastructure Investment Plan (NIIP). The NIIP 2013 – 2023 outlines the Government's priorities and plans for major initiatives in economic infrastructure (energy, telecommunications, water, solid waste management, and transport). It responds to a number of challenges:

- to bring together various subsector and agency plans into a single document
- to double the 2015 number of Marine Protected Areas by 2030
- to set and meet sector emission reduction targets for transport, agriculture, environment, Friendly Waste Management, and reforestation
- to build the resilience of public infrastructure, foreshore protection, buildings, and houses.[48]

Tonga's infrastructure is regularly affected during the wet and cyclone seasons (November – April), and days of torrential rain may flood roads and properties. Coastal areas and roads can grow more dangerous as cyclone season wears on and damage accumulates. Furthermore, there is risk of flash floods throughout low-lying areas of the hilly islands, and movement can be hazardous. As a result of these weather hazards, electric power can be affected. If access to villages and small towns are cut, access to water and supplies may be cut.

Although there is an airport on each main island, these serve primarily passenger travel. With the exception of the Nukuʻalofa seaport, Tonga's airports and seaports are at risk of becoming overwhelmed by storm surges. There are good road links to communities in most areas of Tonga; however, there is significant deterioration in some areas due to insufficient maintenance. In the case of storm surge and extremely high tides, there have been major bottlenecks as large numbers of people try to evacuate via main roads from Nukuʻalofa's low-lying Popua district to higher ground.[49]

All electricity is provided through Tonga

Power Limited. Electricity is generated using imported diesel. On Tongatapu, there are 61 GWh of installed energy generation and a 199-km (123-mile) distribution network. On Vava'u, there are 6.5GWh of installed energy generation and a 67-km (41-mile) distribution network. On 'Eua, there are 1.5GWh of installed energy generation and a 12.4-km (7.7-mile) distribution network. On Ha'apai, there are 1.8GWh of installed energy generation and a 14.5-km (9-mile) distribution network.[50]

For water supply, 49% of households have piped water, 34% use their own rainwater catchment tanks, 11% use a community tank, and 5% rely on purchased water. Regarding toilet facilities, 41% of households use flush toilets, 33% use a pit, and 17% use manual toilets. For solid waste disposal, 69% of Tongans rely on public collection, 25% burn their waste, and 4% take it to the dump themselves.[51]

Ministry of Infrastructure
Alaivaha'amama'o Bypass Road, Vaololoa, Nuku'alofa, Tonga
Tel: 676 7401 500
Email: *support@moi.gov.to*

Ports Authority Tonga
Ma'ufanga, Nuku'alofa
Tel: 676 23 168
Email: *csd@tongaports.to*

Tonga Airports Limited
Tel: 676 21888
Email: *info@tongaairports.com*

Tonga Power Limited
Matatoa Taufa'ahau Road, Poutaha, Tonga
Tel: 676 21400
https://www.tongapower.to/

Tonga Water Board
Lakalakaimonū Building, Taufa'ahau Road, Matatoa, Nuku'alofa, Tonga
Tel: 676 23299
http://www.twb.to/

Civil Society Partners

The Tonga Red Cross Society (TRCS) is headquartered on Tongatapu and has three branches (Ha'apai, 'Eua, and Vava'u) with 18 staff and more than 80 volunteers.[52] TRCS is a voluntary aid society, auxiliary to public authorities, and whose independent nature is respected. In emergency management plans, TRCS provides a representative to the National Emergency Management Committee, assists in public awareness and disaster management trainings, may assist in damage assessments and provide relief goods and first aid services to disaster victims in coordination with the National Emergency Management Committee, may seek assistance from IFRC as needed, and assists in tracking missing persons.[53] TRCS maintains stocks of pre-positioned relief supplies at the national headquarters and 14 other locations throughout the islands.[54]

Tonga Red Cross Society
P.O. Box 456, VQ5V+QPW, Nuku'alofa, Tonga
Tel: 676 21-950

The Civil Society Forum of Tonga (CSFT) was established in 2001 and is PIANGO's liaison unit for Tonga. CSFT aims to create a conducive environment for civil society organizations to develop through dialogue, equal participation, partnership, collective decision making, and consensus building. It represents nearly 500 members, including church organizations, community groups, professional associations, and human rights groups. The Government recognizes CSFT as the key umbrella organization for capacity building and coordinating civil society.[55] CSFT has been a partner of international donors and funding organizations to implement various climate change-related projects – e.g., the EU-funded Enhancing the engagement of Tongan Civil Society in the Policy Dialogue and Governance with the Government, the UNDP Disaster Resilience for Pacific Small Islands Developing States project, the Commonwealth Foundation's Enhancing the ability of civil society to monitor

the implementation of the Tonga Strategic Development Framework (2015 – 2025), AusAID's Pacific Community Climate Change Risk Reduction, and USAID's Women of Niuas – Weaving a Sustainable Livelihood in a Changing Climate.[56]

Civil Society Forum of Tonga
P. O. Box 644, Ground Floor, New City Building, Nuku'alofa, Tonga
Tel: 676 28 282
Email: *csft@kalianet.to*

The Mainstreaming of Rural Development Innovation (MORDI) Tonga Trust has worked on programs to address poverty, and they have strong relationships with corporate players to fund and plan programming.[57] A key program is building climate resilient agriculture, particularly in women-led households or among female community organizations.[58]

MORDI Tonga Trust
P.O Box 966, Nuku'alofa, Tongatapu Kingdom of Tonga
Tel: 676 24354
https://www.morditonga.to/

The Tonga National Youth Congress (TNYC) has operated for more than 30 years in communities on six islands with the backing of church and government leaders. Each TNYC island branch has its own leadership and programs to ensure local community buy-in and ownership of activities. The TNYC Environment and Disaster Division has worked on conservation and environmental projects with funding from the Global Environment Facility.[59]

Tonga National Youth Congress
PO Box 2670, Nukualofa, Tonga
Tel: 676 25 474 or 24 422
Email: *tnycinf2010@hotmail.com*

The Tonga Community Development Trust (TCDT) was founded in 1978 and for many years was known as the Foundation for the Peoples of the South Pacific Tonga; it took its current name in 1985.[60] TCDT is an indigenous, non-governmental development organization operating with a focus on capacity building with special attention on the less developed, more disadvantaged communities of Tonga. Projects cover Family and Community Health, Rural Water Supply and Sanitation, Sustainable Development, Environmental Conservation, Disaster Preparedness, Women's in Development, Human Rights, and Good Governance, Civic Education, and Voter Education.[61]

Tonga Community Development Trust
PO Box 107, Nuku'alofa, Tonga
Tel: 676 23478 or 21494
Email: *admin@tcdt.to* or *s.fakaosi@tcdt.to*

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Tonga Notes

1 GISGeography. Map of Tonga. Accessed 15 February 2023; last Updated 7 November 2022. https://gisgeography.com/tonga-map/

2 Schmidt Ocean Institute. TONGA – A KINGDOM OF VOLCANOES. 22 March 2016. https://schmidtocean.org/cruise-log-post/tonga-kingdom-volcanoes/

3 Foster, Sophie and Latukefu, Sione. Tonga – Land. Encyclopedia Britannica. Accessed 14 February 2023. https://www.britannica.com/place/Tonga#ref54082

4 Gee, Eleanor. Tonga's population drops to 100,209. Matangi Tonga Online. 24 December 2021. https://matangitonga.to/2021/12/24/tongas-population-drops-1002

5 Tonga Statistics Department. Tonga Census of Population and Housing 2021. 28 October 2022. https://tongastats.gov.to/census-2/population-census-3/census-report-and-factsheet/

6 CIA World Factbook. Tonga – map. Accessed 2 November 2023. https://www.cia.gov/the-world-factbook/static/maps/TN-map.jpg

7 Burnley, David V. and William R. Dickinson. Origin and significance of a founding settlement in Polynesia. PNAS 98 (20) 11829-11831. 18 September 2001. https://doi.org/10.1073/pnas.18133539. https://www.pnas.org/doi/10.1073/pnas.181335398

8 Weule, Genelle. DNA reveals Lapita ancestors of Pacific Islanders came from Asia. Australian Broadcasting Corporation. 3 October 2016. https://www.abc.net.au/news/science/2016-10-04/dna-reveals-lapita-ancestors-of-pacific-islanders-came-from-asia/7893100

9 Radio New Zealand. Tonga – a brief history. Accessed 2 February 2023. https://www.rnz.co.nz/collections/nff-tonga/about-tonga

10 Kingdom of Tonga. Three Millennia of History. Accessed 2 February 2023. https://thekingdomoftonga.com/three-millennia-of-history/

11 Radio New Zealand. Tonga – a brief history. Accessed 2 February 2023. https://www.rnz.co.nz/collections/nff-tonga/about-tonga

12 Latukefu, Sione and Sophie Foster. Tonga – History. Encyclopedia Britannica. Accessed 1 February 2023. https://www.britannica.com/place/Tonga/History

13 Radio New Zealand. Tonga – a brief history. Accessed 2 February 2023. https://www.rnz.co.nz/collections/nff-tonga/about-tonga

14 Latukefu, Sione and Sophie Foster. Tonga – History. Encyclopedia Britannica. Accessed 1 February 2023. https://www.britannica.com/place/Tonga/History

15 Radio New Zealand. Tonga elects new PM: Siaosi Sovaleni. 15 December 2021. https://www.rnz.co.nz/international/pacific-news/457979/tonga-elects-new-pm-siaosi-sovaleni

16 Pacific Islands Legal Information Institute. Tonga System of Government Information. University of the South Pacific. 2001. http://www.paclii.org/to/government.htm

17 Australian Department of Foreign Affairs and Trade. Tonga Country Brief. Accessed 14 February 2023. https://www.dfat.gov.au/geo/tonga/tonga-country-brief

18 UN Women Global Gender Equality Constitutional Database. Tonga - Constitution of Tonga 1875, as amended to 2013. https://constitutions.unwomen.org/en/countries/oceania/tonga?provisioncategory=682edf00e8e04dd9a47a71db07e258

19 Economist Intelligence Unit. Tonga: Political Structure. 13 January 2021. https://country.eiu.com/article.aspx?articleid=1210652104&Country=Tonga&topic=Summary&-subtopic=Political+structure

20 Commonwealth Local Government Forum. The Local Government System in Tonga. Country Profile 2017-2018. http://www.clgf.org.uk/default/assets/File/Country_profiles/Tonga.pdf

21 ADPC and UNDRR. Disaster Risk Reduction in the Kingdom of Tonga: Status Report. 2022. https://www.undrr.org/media/83687/download

22 World Bank Climate Change Knowledge Portal. Tonga – Current Climate – Climatology. Accessed 27 February 2023. https://climateknowledgeportal.worldbank.org/country/tonga/climate-data-historical

23 Foster, Sophie and Latukefu, Sione. Tonga – Land. Encyclopedia Britannica. Accessed 14 February 2023. https://www.britannica.com/place/Tonga#ref54082

24 World Bank Climate Change Knowledge Portal. Tonga – Current Climate – Climatology. Accessed 27 February 2023. https://climateknowledgeportal.worldbank.org/country/tonga/climate-data-historical

25 Department of Fisheries, Kingdom of Tonga. Tonga Fisheries Sector Plan 2016–2024. https://faolex.fao.org/docs/pdf/ton170089.pdf

26 ADPC and UNDRR. Disaster Risk Reduction in the Kingdom of Tonga: Status Report. 2022. https://www.undrr.org/media/83687/download

27 Kingdom of Tonga. Tonga's Second Nationally Determined Contribution. December 2020. https://climatechange.gov.to/wp-content/uploads/2021/03/Tongas-Second-NDC.pdf

28 International Monetary Fund. TONGA TECHNICAL ASSISTANCE REPORT—CLIMATE CHANGE POLICY ASSESSMENT. June 2020. https://www.imf.org/en/Publications/CR/Issues/2020/06/30/Tonga-Technical-Assistance-Report-Climate-Change-Policy-Assessment-49537

29 Pacific Disaster Center. Tonga – 2000-2050 Climate Change Impact Analysis.

30 Government of Tonga. Tonga – Green Climate Fund Country Programme. 2018. https://climatechange.gov.to/wp-content/uploads/2020/07/Tonga-GCF-Country-Programme.pdf

31 International Monetary Fund. TONGA TECHNICAL ASSISTANCE REPORT—CLIMATE CHANGE POLICY ASSESSMENT. June 2020. https://www.imf.org/en/Publications/CR/Issues/2020/06/30/Tonga-Technical-Assistance-Report-Climate-Change-Policy-Assessment-49537

32 Government of Tonga. POST DISASTER RAPID ASSESSMENT: TROPICAL CYCLONE GITA. https://www.gfdrr.org/sites/default/files/publication/WB_Tonga_Report_FA02_Medium_0.pdf

33 ADPC and UNDRR. Disaster Risk Reduction in the Kingdom of Tonga: Status Report. 2022. https://www.undrr.org/media/83687/download

34 Kingdom of Tonga. DISASTER RISK MANAGEMENT BILL 2021. 4 August 2021. https://www.parliament.gov.to/parliamentary-business/bills-2021/file/499-bill-no-10-2021-disaster-risk-management-bill-2021

35 Government of Tonga. POST DISASTER RAPID ASSESSMENT: TROPICAL CYCLONE GITA. https://www.gfdrr.org/sites/default/files/publication/WB_Tonga_Report_FA02_Medium_0.pdf

36 NEMO. Standard Operating Procedures FOR THE NATIONAL EMERGENCY COORDINATION CENTRE. 17 August 2011. https://www.rcrc-resilience-southeastasia.org/wp-content/uploads/2020/04/Standard-Operating-Procedures-for-the-National-Emergency-Coordination-Centre.pdf

37 International Monetary Fund. TONGA TECHNICAL ASSISTANCE REPORT—CLIMATE CHANGE POLICY ASSESSMENT. June 2020. https://www.imf.org/en/Publications/CR/Issues/2020/06/30/Tonga-Technical-Assistance-Report-Climate-Change-Policy-Assessment-49537

38 ADPC and UNDRR. Disaster Risk Reduction in the Kingdom of Tonga: Status Report. 2022. https://www.undrr.org/media/83687/download

39 Green Climate Fund. Countries – Tonga. Accessed 2 November 2023. https://www.greenclimate.fund/countries/tonga

40 Government of Tonga. Tonga – Green Climate Fund Country Programme. 2018. https://climatechange.gov.to/wp-content/uploads/2020/07/Tonga-GCF-Country-Programme.pdf

41 Robertson, Dani. Tongan culture and technical analysis come together for a stronger long-term low emissions strategy. ClimateWorks. 22 September 2021. https://www.climateworkscentre.org/news/tongan-culture-and-technical-analysis-come-together

42 Robertson, Dani. Tonga fulfils another commitment to the Paris Agreement. ClimateWorks. 16 November 2021. https://www.climateworkscentre.org/news/tonga-fulfils-another-commitment-to-the-paris-agreement/

43 Government of Tonga. Tonga – Green Climate Fund Country Programme. 2018. https://climatechange.gov.to/wp-content/uploads/2020/07/Tonga-GCF-Country-Programme.pdf

44 Kingdom of Tonga. DISASTER RISK MANAGEMENT BILL 2021. 4 August 2021. https://www.parliament.gov.to/parliamentary-business/bills-2021/file/499-bill-no-10-2021-disaster-risk-management-bill-2021

45 ADPC and UNDRR. Disaster Risk Reduction in the Kingdom of Tonga: Status Report. 2022. https://www.undrr.org/media/83687/download

46 Government of Tonga. Prime Minister Commissions the New Ha'apai Multi-Hazard Early Warning & Emergency Operation Centre. 13 November 2020. https://reliefweb.int/report/tonga/prime-minister-commissions-new-ha-apai-multi-hazard-early-warning-emergency-operation

47 World Meteorological Organization. Tonga boosts early warnings through smartphones. 13 October 2022. https://reliefweb.int/report/tonga/tonga-boosts-early-warnings-through-smartphones

48 Government of Tonga. Tonga – Green Climate Fund Country Programme. 2018. https://climatechange.gov.to/wp-content/uploads/2020/07/Tonga-GCF-Country-Programme.pdf

49 WFP and Logistics Cluster. Tonga. Logistics Capacity Assessment. Accessed 19 March 2023. https://dlca.logcluster.org/display/public/DLCA/2.1.1+Tonga+Port+of+-Nuku%27alofa

50 Tonga Power Limited. About Us. https://www.tongapower.to/about-us

51 ReliefWeb Response. Situation dashboards, Demographic and WASH status, Tonga WASH results 2016 Census. https://response.reliefweb.int/group/37180/situation-dashboardd ; https://lookerstudio.google.com/reporting/43e83626-5ed1-49e3-aa28-52433be7df25/page/p_hbnu4ffkxc

52 IFRC. Country Cluster Delegation for the Pacific Islands, 2023 IFRC network multi-country plan. https://www.ifrc.org/media/51671

53 Tonga Red Cross Society and IFRC. International Disaster Response Law (IDRL) in Tonga. 2015. https://www.rcrc-resilience-southeastasia.org/wp-content/uploads/2020/04/International-Disaster-Response-Law-IDRL-in-Tonga.pdf

54 IFRC. Country Cluster Delegation for the Pacific Islands, 2023 IFRC network multi-country plan. https://www.ifrc.org/media/51671

55 Asian Development Bank. Civil Society Briefs: Tonga. 2015. https://www.adb.org/sites/default/files/publication/177184/csb-ton.pdf

56 Green Climate Fund. Readiness Proposal with Ministry of Finance and National Planning for the Kingdom of Tonga. 31 December 2021. https://www.greenclimate.fund/sites/default/files/document/tonga-ministry-finance-and-national-planning-dp-ton-rs-008.pdf

57 Devex. Mainstreaming of Rural Development Innovation Tonga Trust (MORDI). Accessed 2 March 2023. https://www.devex.com/organizations/mainstreaming-of-rural-development-innovation-tonga-trust-mordi-57517

58 Mainstreaming of Rural Development Innovation Tonga Trust. Quarterly Newsletter Issue 02 Apr-Jun 2021. June 2021. https://morditongatrust.files.wordpress.com/2021/07/2021-second-quarter-newsletter_final_1-1.pdf

59 Tonga National Youth Congress. About Us. Accessed 2 March 2023. http://www.tonganationalyouth.org/

60 Asian Development Bank. Civil Society Briefs: Tonga. 2015. https://www.adb.org/sites/default/files/publication/177184/csb-ton.pdf

61 Tonga Community Development Trust. https://www.tcdt.to/index.html

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Tuvalu is the fourth smallest country in the world with a total land area of less than 26 km^2 (10 square miles). The country is comprised of nine small coral islands in a chain spreading approximately 676 km (420 miles) northwest to southeast. Tuvalu has an Exclusive Economic Zone (EEZ) of slightly more than 750,000 km^2 (289,576 square miles).[1] Figure 75 is a map of Tuvalu.[2]

The first settlers to reach Tuvalu are thought to have arrived from Samoa in the 14th century CE and were followed by subsequent settlers from Tonga, the northern Cook Islands, Rotuma (now part of Fiji), and the Gilbert Islands. Tuvalu, or "Cluster of Eight," emerged as the name as eight of the nine islands were settled by the 18th century. First contact with Europeans was in the 16th century, but whalers and traders only regularly began visiting what became known as the Ellice Islands in the 1820s. In 1863, labor recruiters from Peru kidnapped some 400 people, mostly from Nukulaelae and Funafuti, and from then, recruitment to plantations in Queensland, Australia, as well as in Fiji, Samoa, and Hawaii further reduced the population of less than 2,500. Samoan pastors of the London Missionary Society arrived in the 1860s, and by 1900, Protestant Christianity was firmly established. The islands became a British protectorate in 1892 and part of the Gilbert and Ellice Islands Colony (modern Kiribati and Tuvalu) in 1916. During World War II, U.S. forces were based on Nanumea, Nukufetau, and Funafuti, but hostilities did not reach the group. From the 1960s, racial tension and rivalries over employment emerged between Gilbertese and Ellice Islanders, the latter of whom demanded secession. A referendum in 1974 led to a transition to separate colonial status between October 1975 and January 1976, and eventually to Tuvalu's independence in 1978.[3]

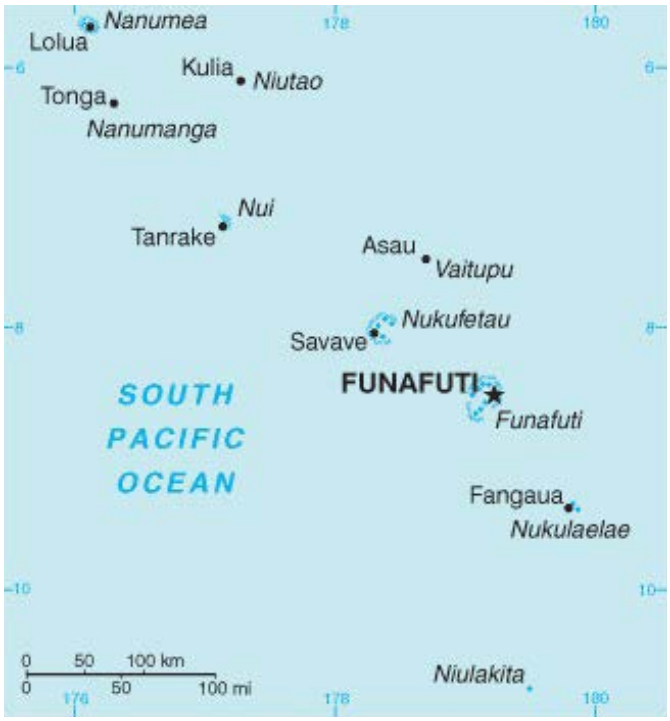


Figure 75: Map of Tuvalu

Most of Tuvalu's 11,000 people live on the largest island, Fongafale, part of Funafuti Atoll, the official capital. The village of Vaiaku on Fongafale is the de facto capital, where the major government offices are located.[4] The country is a constitutional monarchy under the British crown. It has a 16-member unicameral parliament. The Prime Minister is elected by a majority of the members of parliament. The Prime Minister is the head of government, which includes a Cabinet of a few ministers.[5]

Hazards and Climate Change

The islands experience cyclones, droughts, and flooding from high tides and storm waves.

Tuvalu has a tropical climate characterized by a dry season (May to October) and a wet season (November to April), the latter of which corresponds with the generally tropical cyclone season. Mean annual rainfall in Tuvalu's more southerly islands is 3,400 mm (134 inches) while northerly islands receive 2,900 mm (114 inches) on average. The temperature range is 25-30°C (77-86°F) year-round. Figure 76 shows the monthly average minimum, mean, and maximum surface air temperatures and precipitation for Tuvalu for the period 1992-

2022.[6]

The UNDP classifies Tuvalu as "extremely vulnerable" to the effects of climate change. The low-lying islands are at most 4-5 m (13-16 feet) above sea level, though most of the islands barely reach 3 m (9.8 feet) above sea level. Fongafale is just 20 m (65.6 feet) wide at its narrowest point. Sea level has already risen near Tuvalu by more than the global average,[7] and rising oceans have contaminated underwater ground supplies and making the porous soil ever saltier. Thus, Tuvalu is totally reliant on rainwater, and the staple crop of pulaka, a root crop similar to taro, has been nearly destroyed by salty soil. Most food is now imported at great expense. Tuvaluans have long heavily relied on seafood, which is also undergoing challenges related to climate change. Ciguatera poisoning affects reef fish who have ingested micro-algae expelled by bleached coral; the poisoning causes vomiting, fevers, and diarrhea in people who eat the fish. Cases of fish poisoning started increasing a decade ago, with 10 Tuvaluans per week now presenting with ciguatera poisoning. A specialist department was set up in the main hospital to study and manage climate change-related illnesses, and ciguatera poisoning comprises about 10% of the caseload. Other climate-related illnesses that have increased include influenza, fungal diseases, conjunctivitis, and dengue fever.[8] Ocean acidification is also expected to increase over the next century, contributing to more damaging tides, degradation of reef ecosystems like coral and mangroves, and negatively affecting fishing. Tuvaluans are also concerned that sea level rise will endanger their EEZ fishing rights.[9]

Table 24 details some of the climate change-influenced phenomena that Tuvalu confronts.[10]

Government Institutions, Policies, and Plans for Disasters and Climate Change

The National Disaster Management Office (NDMO) / Department of Disaster Management (DDM) was established via the 2007 Disaster Management Act to coordinate disaster mitigation, preparedness, response, and recovery activities. The National Disaster Committee (NDC) is the multi-agency advisory and coordination body established to advise the disaster management authorities while implementing their respective activities. The NDC is the main decision-making body during disasters and provides advice to the Cabinet on strategic decisions, including the need for international assistance. The country does not operate a cluster system in times of disaster, but the NDC may establish ad hoc committees as specific issues arise. As NDC members, ministerial Permanent Secretaries are often appointed as sector focal points during disasters.[11] The National Disaster Preparedness Working Group (NDPWG) is responsible for

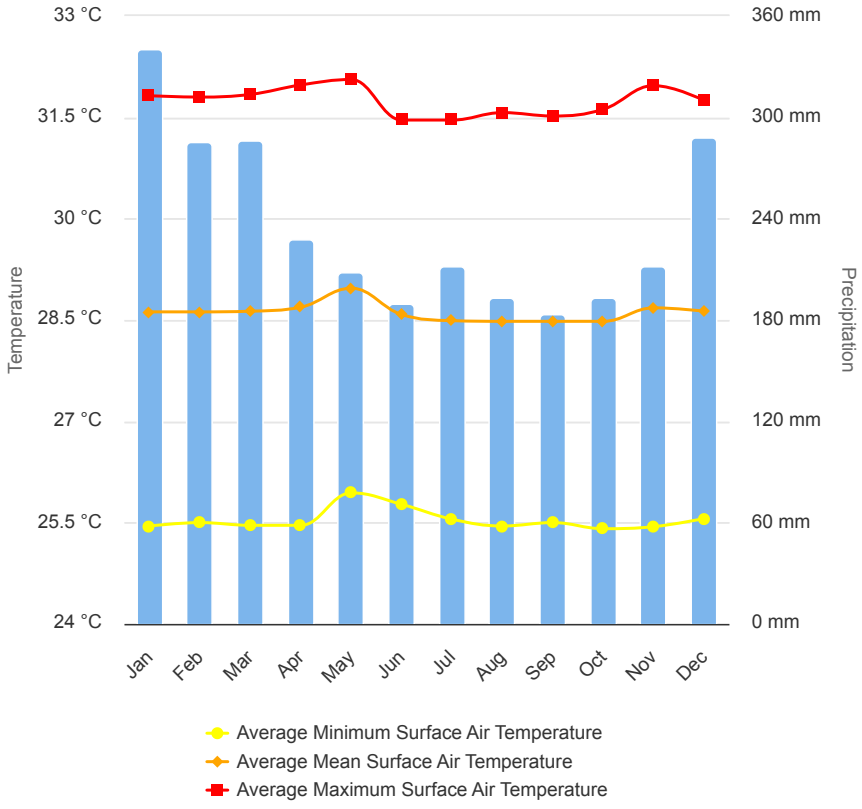


Figure 76: Average Monthly Temperature and Precipitation, Tuvalu (1991-2022)

Phenomenon	Trend	Projections	Impacts
Temperature Rise	Dry season maximum temperatures have increased by 0.11°C (0.2°F) and mean temperatures by 0.1°C (0.18°F) per decade since 1993	Forecast at 25% chance of prolonged extreme heat event every five years; rise of 0.5-1.0°C (0.9-1.8°F) by 2023 under very high emissions scenario	Increased incidence of water- and vector-borne diseases; heat stress decreases human and agricultural productivity; coral bleaching events
Precipitation	High inter-annual and geographic variability; El Niño events bring wetter than usual conditions	More frequent extreme events	Flooding and damaged crops
Drought	Increasingly frequent in coincidence with La Niña events	Slight decrease in incidence; warmer conditions and greater variability in precipitation	Compromised fresh water sources
Sea Level Rise	Rise of 5 mm (0.2 inches) per year since 1993	Rise of 7-18 cm (2.8-7.08 inches) by 2030 under very high emissions scenarios	Saltwater intrusion into groundwater and soil; decreased crop yields; damaged roads; coastal erosion
Cyclone	Average of eight cyclones per decade in the EEZ	Less frequent but more powerful storms	Stronger winds damage coastal infrastructure, and more powerful waves erode coastlines; flooding

Table 24: Climate Change-Influenced Phenomena, Trends, and Potential Impacts, Tuvalu

assisting the NDC during emergency response operations, promoting community awareness, and developing annual training plans for the government and communities. Island Disaster Committees (IDC) are responsible for coordinating and managing island disaster risks and act as a connection between the national government and community in all disaster-related issues.

The Department of Climate Change (DCC) is responsible for implementing climate change adaptation and mitigation activities. The National Advisory Council on Climate Change (NACCC) was established to advise the Prime Minister's Office on implementing necessary activities to tackle the impacts of climate change. Figure 77 depicts Tuvalu's DRM Governance Structure and Relationships.[12]

Disaster and climate risk-related policies include:

- National Action Plan to Combat Land Degradation and Drought (2006) – To have a better understanding of the causes and consequences of land degradation; strategizes and prioritizes sustainable development plans, and describes current project profiles
- National Adaptation Programme of Action (2007) – To identify adaptation needs that are consistent with the National Strategy for Sustainable Development
- National Disaster Management Act (2008) – To create the NDC and NDMO to ensure strategies and policies are implemented to deal with disaster-related affairs
- Environment Protection Act (2008) – To provide a mechanism for the development of environment policy and law by promoting a clean and healthy environment
- National Strategic Action Plan for Climate Change and Disaster Risk Management (2012-2016) – To implement actions of the Tuvalu Climate Change Policy by determining responsible agencies, costs, and monitoring, and to evaluate the policy
- Te Kaniva: Tuvalu Climate Change Policy (2012-2021) – To help identify and shore up current and future vulnerabilities, improve the understanding of climate change data, and plan for effective disaster preparedness, response, and recovery
- Te Kakeega lll: National Strategy for Sustainable Development (2016-2020) – Overarching framework for other policies that focus on good governance, outer island development, private sector, human resources, natural resources, and infrastructure
- Infrastructure Strategy and Investment Plan

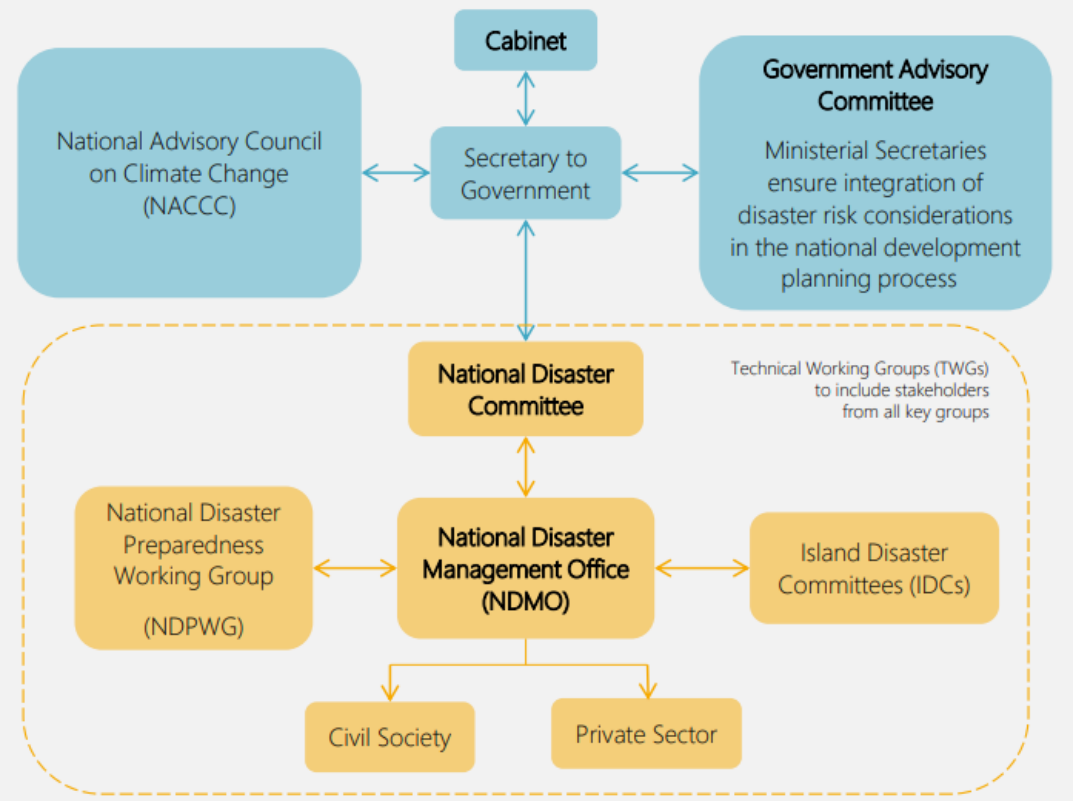


Figure 77: Tuvalu Disaster Risk Management Governance Structure and Relationships

(2017) – To identify investment needs and priorities for economic infrastructure and assess the financial resources essential for implementation

- Te Kete: Tuvalu National Strategy for Sustainable Development 2021-2030 – A high-level planning and results-oriented strategic plan to build a peaceful, resilient, and prosperous country; includes five strategic priority areas: the enabling environment for sustainable development; economic development; social development and inclusion; islands and culture; and infrastructure development.[13]

Tuvalu submitted its intended Nationally Determined Contribution (NDC) to the UNFCCC in 2015 and ratified the Paris Agreement on 22 April 2016. When the Paris Agreement came into force in 2016, the intended NDC became Tuvalu's First NDC. In November 2022, Tuvalu submitted its updated NDC to the UNFCCC secretariat; the updates included a commitment to reduce GHG emissions from electricity to almost zero emissions and to reduce total GHG emissions 60% below 2010 levels by 2030. As of November 2022, Tuvalu was using the Green Climate Fund (GCF) Readiness mechanism to develop its National Adaptation Plan (NAP) for medium- and long-term adaptation planning.[14] Finally, the Tuvalu Priority Infrastructure Plan 2020-2025 guides the government's investment priorities in social and economic infrastructure and prioritizes climate change across projects.[15]

Department of Disaster Management (DDM)
QEII Park, Fongafale, Tuvalu
Tel: 688 20657
Facebook: TuvaluDDM
Email: tuvalu.ddm@gmail.com

Department of Climate Change (Ministry of Finance)
Partnership House, Vaiaku, Funafuti, Tuvalu
Tel: 688 20517
Email: *climatechange@gov.tv*

Early Warning Systems

Tuvalu was the first country in the region to create an infrastructure and early warning system that connects almost the entire country. The 2017 launch of the early warning system better informed residents about oncoming cyclones and other disasters.[16] The main risk monitoring agency in the country is Tuvalu Meteorological Service (TMS). TMS is responsible for observing and recording meteorological observations, providing weather forecasts and climate outlooks for government sectors and the public, and delivering information on ocean behavior. Assessments have observed that more attention is needed in risk-informed early warning systems, hydrological monitoring systems, risk-informed policies and plans, financing, and sustainability, and advanced training of human resources. Research on community-based early warning early action found that Tuvalu households developed different coping strategies to prepare for various climate-related hazards. Most households report cyclones as the most concerning hazard and for which they were most prepared; droughts were the second hazard of concern, and respondents said they were least prepared for them. Drought early warning challenges include information on the onset of droughts not being timely, a situation that contributes to the lack of certainty on when a drought starts and would end, and how much rainfall to expect during the drought period. Household coping strategies include investing in water storage facilities, reducing water consumption, and recycling water.[17]

Tuvalu Meteorological Service

Tel: 688 20736

Email: *tuvmet@tuvalu.tv*

Infrastructure

The Ministry of Transport, Energy and Tourism (MTET) has oversight for policies and regulation of transport and energy infrastructure. Fongafale hosts the main port, the international airport, and power and water utilities.

MTET's Civil Aviation Directorate manages airport operations and is responsible for compliance with national and international civil aviation requirements. The Funafuti airstrip is the only airstrip operational. It was constructed by the United States during World War II. The runway dimensions are 1,535 × 30 m (5,036 × 98 feet). The facility stands at 3 m (9 feet) of elevation. After very high tides damaged the runway, it was resurfaced in 2017. A new terminal building and a Flight Service Tower Building were opened in 2018. The airport can handle aircraft up to the ATR 72-600.[18] There has been some investment in building airstrips on other islands; work is ongoing at Nukulaelae.[19]

Funafuti Port and Funafuti Wharf are managed by the Marine Department of MTET; the port is located on the eastern side of Funafuti and is the international port of entry. The port handles containerized cargo and oil products; it can welcome ships with a maximum draft of 8m (26.25 feet), maximum length of 183 m (600 feet), and a maximum deadweight tonnage of 20,375 tons. There is a deepwater berth in the lagoon at Nukufetau. The one berth is 180m (590.5 feet) in length with two docks. There are two forklifts available for cargo handling.[20]

With Asian Development Bank funding, MTET is implementing an outer islands maritime infrastructure project to build and rehabilitate boat harbors to expedite cargo handling and improve the safety and security of vessel and passenger traffic. At Nukulaelae, as of mid-2022, the new boat ramp, wharf, jetty, breakwaters, passenger terminal, and warehouse had been constructed and the channel dredged. A new boat ramp was installed in Nanumaga in November 2020, and a new boat ramp was completed at Niutao in September 2022. Work on a new harbor at Nui is slated to be complete in early 2025.[21]

The road network includes 15km (9.3 miles) of road. The main road that runs the length of Funafuti is paved; secondary roads are compacted coral and dirt tracks.[22] The low elevation of all roads means that they are regularly strewn with debris from king tides and storms, and they can suffer significant damage in such events.[23]

The Tuvalu Electricity Corporation generates and distributes electricity throughout the islands. It is overseen by a board, which is appointed by the government.[24] As of 2020, total installed electricity generation capacity in Funafuti was 2.55MW, of which 1.8 MW (74%) was diesel. Off-grid generators and solar installations made up the remaining capacity. The outer islands already generate 80-90% of their electricity from renewable sources.[25]

Civil Aviation Directorate
Vaiaku, Funafuti
Tel: 688 20725

Funafuti Port Authority
Tel: 688 20054
Email: *marine@tuvalu.tv*

Tuvalu Electricity Corporation
Tel: 688 20357
Email: *mlotolua@tectuvalu.tv*

Civil Society Partners

The Tuvalu Red Cross Society, civil society organizations, and international partners assist communities in disaster preparedness, response, and recovery activities. Alofa Tuvalu is an environmental NGO, founded in 2005 to devise coping and mitigating mechanisms to climate change and sea level rise. The Tuvalu Association of NGOs (TANGO) is the official umbrella organization for NGOs in the country and encourages and assists NGOs in their developmental work, largely through capacity building and networking. The Tuvalu National Council of Women, established in 1980, is an umbrella organization for women's rights groups. It currently works for gender equality, the inclusion of women in decision making bodies at all levels, to maintain culture and tradition, to improve the livelihood for economic empowerment of women, to provide women with training and opportunities, and increasingly on issues linking women to climate change impacts.[26] The Tuvalu National Youth Council encourages developmental youth projects and advocates for Government and donors to provide resources for youth development projects.[27]

Tuvalu Red Cross Society
P. O. Box 14 Funafuti Tuvalu
Tel: 688 20740
Email: *redcrosstuvalu@gmail.com*

Tuvalu Association of NGOs – TANGO
Tamaga Tahi Building, Seimeana, Funafuti, Tuvalu
Tel: 688 20759
Email: *tango@piango.net*

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Tuvalu Notes

1 UN-OHRLLS. Small Island Developing States in Numbers. 2013. https://wedocs.unep.org/bitstream/handle/20.500.11822/9279/-SIDS%20in%20numbers-2013SIDS_IN_NUMBERS_121813_FA_WEB.pdf

2 CIA World Factbook. Tuvalu – Map. https://www.cia.gov/the-world-factbook/static/maps/TV-map.jpg

3 Macdonald, Barrie K. Tuvalu – History. Encyclopedia Brittanica. 31 December 2023. https://www.britannica.com/place/Tuvalu/History

4 Macdonald, Barrie K. Tuvalu. Encyclopedia Brittanica. 3 October 2023. https://www.britannica.com/place/Tuvalu

5 Department of Foreign Affairs and Trade. Tuvalu Country Brief. Australian Government. https://www.dfat.gov.au/geo/tuvalu/tuvalu-country-brief

6 World Bank Climate Change Knowledge Portal. Tuvalu – Country Summary. https://climateknowledgeportal.worldbank.org/country/tuvalu

7 APDC, UNDRR. Disaster Risk Reduction in Tuvalu: Status Report. 23 August 2022. https://www.preventionweb.net/publication/disaster-risk-reduction-tuvalu-status-report-2022

8 Ainge Roy, Eleanor. 'One day we'll disappear': Tuvalu's sinking islands. The Guardian. 16 May 2019. https://www.theguardian.com/global-development/2019/may/16/one-day-disappear-tuvalu-sinking-islands-rising-seas-climate-change

9 BBC News. Tuvalu Profile – Timeline. 3 October 2022. https://www.bbc.com/news/world-asia-pacific-16340166

10 APDC, UNDRR. Disaster Risk Reduction in Tuvalu: Status Report. 23 August 2022. https://www.preventionweb.net/publication/disaster-risk-reduction-tuvalu-status-report-2022; BBC News. Tuvalu Profile – Timeline. 3 October 2022. https://www.bbc.com/news/world-asia-pacific-16340166; Pacific-Australia Climate Change Science and Adaptation Planning Program. Current and future climate of Tuvalu. June 2013. https://www.pacificclimatechangescience.org/wp-content/uploads/2013/06/4_PACCSAP-Tuvalu-10pp_WEB.pdf

11 Government of Tuvalu Department of Disaster Management and Pacific Humanitarian Team. Tuvalu Country Preparedness Package. October 2020. https://www.undp.org/pacific/publications/tuvalu-country-preparedness-package

12 APDC, UNDRR. Disaster Risk Reduction in Tuvalu: Status Report. 23 August 2022. https://www.preventionweb.net/publication/disaster-risk-reduction-tuvalu-status-report-2022

13 APDC, UNDRR. Disaster Risk Reduction in Tuvalu: Status Report. 23 August 2022. https://www.preventionweb.net/publication/disaster-risk-reduction-tuvalu-status-report-2022

14 Government of Tuvalu. Updated Nationally Determined Contribution (NDC). November 2022. https://unfccc.int/sites/default/files/NDC/2023-02/Tuvalus%20Updated%20NDC%20for%20UNFCCC%20Submission.pdf

15 PRIF. Tuvalu Priority Infrastructure Investment Plan 2020-2025. https://www.theprif.org/document/tuvalu/climate-change/tuvalu-priority-infrastructure-investment-plan-2020-2025

16 UN News. Tuvalu launches first early warning system in Pacific. 24 July 2017. https://news.un.org/en/audio/2017/07/631112

17 Red Cross Red Crescent Climate Centre. Community-based Early Warning Early Action (EWEA) in the Pacific: Findings from Tuvalu. 11 August 2022. https://reliefweb.int/report/tuvalu/community-based-early-warning-early-action-ewea-pacific-findings-tuvalu

18 LogCluster. 2.2 Tuvalu Aviation. December 2022. https://dlca.logcluster.org/22-tuvalu-aviation

19 Ministry of Finance. Tuvalu Development Partners Collaboration. October 2022. https://finance.gov.tv/wp-content/uploads/2022/10/Tuvalu-presentation-at-donor-networking-event.pdf

20 LogCluster. 2.1 Tuvalu Port of Funafuti. December 2022. https://dlca.logcluster.org/21-tuvalu-port-funafuti

21 Asian Development Bank. Environmental and Social Monitoring Report: Tuvalu: Outer Island Maritime Infrastructure Project. Semestral Report (January-June 2023). July 2023. https://www.adb.org/sites/default/files/project-documents/48484/48484-002-esmr-en_7.pdf

22 LogCluster. 2 Tuvalu Logistics Infrastructure. December 2022. https://dlca.logcluster.org/2-tuvalu-logistics-infrastructure

23 LogCluster. 2.3 Tuvalu Road Network. December 2022. https://dlca.logcluster.org/23-tuvalu-road-network

24 Tuvalu Electricity Corporation. About Us. https://www.tectuvalu.tv/about-us/

25 Government of Tuvalu. Updated Nationally Determined Contribution (NDC). November 2022. https://unfccc.int/sites/default/files/NDC/2023-02/Tuvalus%20Updated%20NDC%20for%20UNFCCC%20Submission.pdf

26 Tuvalu Trade Portal. Tuvalu National Council of Women–Background Information. https://tuvalu.tradeportal.org/media/Background%20information.pdf

27 Commonwealth Network. Find Civil Society expertise in Tuvalu. 2020. https://www.commonwealthofnations.org/sectors-tuvalu/civil_society/

Header photo by UNDP Climate on flickr.com. Tuvalu Sea Wall. https://flic.kr/p/2nPhHLn

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United Kingdom

The United Kingdom (UK) has political, economic, human, and security interests in the broader Indo-Pacific region with nearly 2 million citizens residing there, billions of pounds worth of trading relationships, and a desire to see this "zone of maritime connectivity" within the global system remain subject to rules and regulations that Britain favors.[1] In 2020, Westminster published a document entitled "Global Britain in a Competitive Age: the Integrated Review of Security, Defence, Development and Foreign Policy," which outlines foreign and security policy priorities to 2030. This document highlighted a "tilt" towards the Indo-Pacific and demanded that UK foreign policy regarding the Indo-Pacific be calibrated to ensure that Britain is "the European partner with the broadest and most integrated presence in the Indo-Pacific."[2] In an outline of the UK's strategic approach to achieving the "tilt," the Ministry of Defence hailed demonstrations of commitment to the Pacific in 2021 and 2022 by highlighting the work of two Offshore Patrol Vessels that have worked with Fiji's government to combat illegal fishing, delivered COVID-19 vaccines to Pitcairn Island, and provided humanitarian assistance to Tonga following the January 2022 volcanic eruption and tsunami. However, on the strategic scale, Defence groups climate change impacts on human security among several "diverse security challenges."[3] Moreover, the Foreign, Commonwealth and Development Office (FCDO), which nominally oversees Britain's relationship with its overseas territories, regularly fails to take into consideration its own territories in the Pacific that are vulnerable to climate change.[4] And the House of Commons' Foreign Affairs Committee, in 2023, demanded more government engagement on Pacific Island countries with an emphasis on supporting the Pacific Islands Forum through explicit engagement with the tenets of the 2050 Strategy for the Blue Pacific Continent and propelling forward the "Partners in the Blue Pacific" initiative, of which Britain is a founding partner. Of note, on this score, in 2022 and 2023, the UK reached various agreements with Pacific Island countries and territories to cooperate on clean energy, climate change mitigation, and ocean protection.[5]

Pitcairn Islands

The Pitcairn Islands are a British overseas territory consisting of Pitcairn, Henderson, Ducie, and Oeno Islands. The only inhabited island in the territory is Pitcairn Island, a volcanic island located about 2,170 km (1,350 miles) southeast of Tahiti in the south-central Pacific Ocean. The territory has a land area of 35.5 km^2 (13.7 square miles) across all the islands. Pitcairn Island, with a permanent population of approximately 50 people,[6] only has an area of about 5 km^2 (2 square miles) but rises to about 340 m (1,100 feet) as a half-crater surrounded by coastal cliffs. The climate is sub-tropical and the soil is fertile. Henderson Island, almost entirely untouched by humans, was designated a UNESCO World Heritage site in 1988 as the world's best remaining example of an elevated coral atoll. Artifacts indicate that Pitcairn Island had once been inhabited, likely by Polynesians, before Europeans arrived. The current population is descended from mutineers of the British ship HMS Swallow and their Tahitian companions. Some of the islanders were removed to Norfolk Island east of Australia in 1856 due to overpopulation; the mutineers' descendants remain divided between the two places. The diet of residents is comprised of fish, garden produce, and crops, including sweet potatoes, sugarcane, taro, oranges, bananas, and coffee. The chief settlement is Adamstown, on the north coast near Bounty Bay, one of the few places where longboats can land. Without a natural harbor, supplies must be transported by rowed longboat from larger ships stationed offshore. Income is obtained via the sale of postage stamps, coins, and local products such as

honey to visitors and through online shopping sites. The island also receives significant budgetary aid from the British government. The Island Council of the Pitcairn Islands handles some domestic affairs, but decisions are subject to approval by the Governor of the Pitcairn Islands, reporting to Britain's FCDO. The official languages are English and Pitkern, which is a mixture of Tahitian and 18th-century English.[7] Figure 78 shows a map of the Pitcairn Islands.[8]

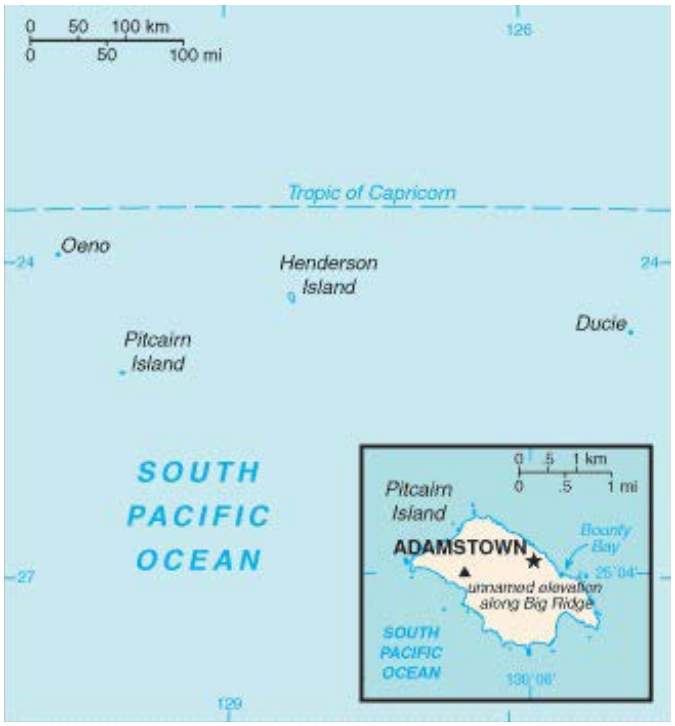


Figure 78: Map of the Pitcairn Islands

Hazards and Climate Change

The main natural hazard that Pitcairn Island is exposed to are storms. It experiences heavy tropical storms and occasionally sees tropical cyclones, especially from November to March, as well as landslides.[9]

The Pitcairn Islands also face future climate risks. Pitcairn is the site of one of the world's largest marine protected areas, where coral reefs are abundant. Coral reefs play a vital role in healthy marine ecosystems by supporting a large proportion of marine biodiversity and providing food and coastal protection. The Pitcairn Islands' coral reefs are unique, growing in deeper, cooler waters compared to most other tropical coral reefs. Additionally, due to their isolation from any other reefs in the tropical Indo-Pacific, they harbor endemic fish species found nowhere else in the world. While the depth of the reefs, stretching in some areas from 30 m (98 feet) to 75 m (246 feet) in depth, have thus far generally protected the coral from the impacts of coral bleaching by being in deeper, cooler-than-average sea temperatures, the coral reefs still face significant climate change threats. These include:

- Decalcification (the softening of their skeleton) due to ongoing ocean acidification. Decalcification is happening faster in this region of the Pacific than other ocean basins.
- Thermal shock from the impact of ocean swells and cold-water intrusions, which can reach these islands following storms that happen far away and spread across the Pacific from as far as the Southern Ocean.
- Sea level rise will likely put at risk not only the reefs, but the islands themselves, especially if the corals begin to decalcify, though scientists are yet to determine the timing and magnitude of future sea level rise in this remote part of the Pacific.
- The geographic isolation of the Pitcairn Islands – located more than 100 km (62 miles) from each other and more than 4,000 km (2,485 miles) from a continent – limits the chances of healthy coral larvae reaching the islands from elsewhere. Therefore, if these corals suffer extensive decline or damage, their recovery is reliant on self-seeding, which makes the full recovery of the reef much more difficult and is likely to result in a less diverse, simpler reef structure in the future.

The Pitcairn Islands, even with their small population, are still exposed to various human-driven risks including illegal fishing, pollution and marine litter, anchor damage, erosion, and invasive non-native species. Potential actions to increase adaptation and resilience to future changes could include effective and sustainable management of fisheries and prevention of marine pollution. There is also a scarcity of scientific data about these islands, with

significant knowledge of climate change risks gained in 2020 when a team of international marine scientists teamed up to assess the risk of climate change to the coral reefs of the Pitcairn Islands. They reviewed some 400 scientific reports over two years.[10] The research was supported by the Blue Belt Programme, which supports the UK government's efforts to enhance marine protection across the UK Overseas Territories as a partnership of the Centre for Environment, Fisheries and Aquaculture Science (Cefas) and the Marine Management Organisation (MMO) working with, and in support of, the UK Overseas Territories.[11]

Government Institutions, Policies, and Plans for Disasters and Climate Change

In October 2021, the Pitcairn Island Council published its first marine protection plan, providing clear guidance for effective administration of the remote islands' near-pristine waters. The Pitcairn Islands Marine Protected Area Management Plan (2021-2026) is a locally driven, science-based marine protection plan.[12] It provides a framework and long-term direction for managing activities, monitoring, compliance, and enforcement of the Pitcairn Islands marine protected area (MPA). The MPA builds on a 2016 decision by the Council and the UK government to designate the entire Pitcairn Islands Exclusive Economic Zone (EEZ), about 830,000 km^2 (320,465 square miles) of Pacific Ocean, as a marine protected area.[13] One of the largest MPAs in the world, it included the development of a whale watching code of conduct and training for local operators to ensure whale watching tours could be delivered without disturbing the animals.[14] MPAs require effective management and can be an important tool to safeguard biodiversity, enhance fisheries, build resilience against the effects of climate change, and sustain healthy coastal communities. After the MPA-designation, the Pitcairn Island Council, with assistance from the UK Blue Belt Programme, consulted members of the local community on their aspirations for the MPA. Their views helped shape strategic priorities and develop the Pitcairn Islands Marine Protected Area Management Plan. The main objective, in line with the community's desires, is to ensure that the "environment and thriving marine life of the Pitcairn Islands are protected, providing benefits to present and future generations." Key aspects of the MPA include:

- All harmful activities that may threaten vulnerable marine ecosystems and endangered species, such as fishing, mining, and dumping waste, are banned within 99.5% of the MPA.
- The MPA is a no-take zone, which is a marine protected area that does not allow any fishing, mining, drilling, or other extractive activities. The MPA has accordingly closed off areas previously exposed to fishing and other extractive activities.
- The remaining part of the MPA – the territorial seas around Pitcairn, Henderson, Ducie, and Oeno Islands, an area known as Adams Seamount and a transit zone between Pitcairn Island and Adams Seamount – only permits activities that are sustainably managed, such as subsistence fishing by local residents.

New Marine Conservation Regulations set out how activities within the territorial seas will be managed to prevent damaging critical habitats for species living there. The plan also identifies strategies to minimize the challenges Pitcairn Islands' marine environment faces through possible increased threat of illegal, unreported, and unregulated fishing, pollution (marine oil spills and plastics), anchor damage, erosion and run-off from land, invasive non-native species, and climate change.

Introducing a research and monitoring program would improve understanding of the marine environment, including humpback whale migrations, allowing the Pitcairn community to better measure progress against the plan's objectives. One research and management priority is the Henderson Island World Heritage Site. Pitcairn's on-island Environmental, Conservation and Natural Resources Division

and its manager is responsible for ensuring the management plan's vision and long-term objectives are achieved over the five-year period (2021-2026), with support from fisheries and MPA officers. Local actions and strategies are supported by the UK Blue Belt Programme and NGOs.

Infrastructure

There is no airstrip in Pitcairn. The port at Adamstown is the sole entry/exit for people and goods. The road network is unpaved and totals about 6.5 km (4 miles). Islanders use 3-wheeled all-terrain vehicles for all vehicular land transport. Electricity is generated by three diesel-fired generators.[15]

Civil Society Partners

The Pew Trusts and the UK's Royal Society for the Protection of Birds have assisted the Government of the Pitcairn Islands in the development of the management plan to ensure daily management and protective measures are enforced across the MPA. The Pew Bertarelli Ocean Legacy Project has worked with the Pitcairn Island community for over a decade.[16]

The Blue Belt, the UK Government's flagship international marine conservation program, is supported by two world leading organizations –Cefas and the MMO on behalf of the UK Government. During the period 2022–2025, the Blue Belt Programme will also be funded directly by the FCDO's International Programme Fund.[17]

Disclaimer: This handbook has been prepared in good faith based on resources available at the time of publication. Where possible, a link to the original electronic source is provided in the endnotes. While making every attempt to ensure the information is relevant and accurate, the CFE-DM does not guarantee or warrant the accuracy, reliability, completeness, or currency of the information herein. This information will be updated periodically, and we welcome and appreciate your feedback to improve this document and help fill any gaps to enhance its future utility. For feedback or comments, please email: **cfe.dmha.fct@pacom.mil**.

United Kingdom Notes

1 House of Commons Defence Committee. UK Defence and the Indo-Pacific: Eleventh Report of Session 2022-23. 17 October 2023. https://www.documentcloud.org/documents/24079917-ukdefenceandtheindopacific

2 CZ Defence. French and British interests in the Indo-Pacific. 2 February 2023. https://www.czdefence.com/article/french-and-british-interests-in-the-indo-pacific

3 UK Ministry of Defence. Defence's response to a more contested and volatile world. 18 July 2023. SBN 978-1-5286-4291-0. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1171269/Defence_Command_Paper_2023_Defence_s_response_to_a_more_contested_and_volatile_world.pdf

4 Question for Foreign, Commonwealth and Development Office UIN 88890, tabled on 16 November 2022, Answered by FCDO Minister Anne-Marie Trevelyan on 24 November 2022. https://committees.parliament.uk/publications/41144/documents/204045/default/

5 House of Commons Foreign Affairs Committee. Tilting Horizons: the Initegrated Review and the Indo-Pacific: Eighth Report of Session 2022-23. 18 July 2023. https://committees.parliament.uk/publications/41144/documents/204045/default/

6 SPC. Pitcairn Islands, SPC Coastal Fisheries and Aquaculture. https://cbfm.spc.int/countries/pitcairn_islands

7 Encyclopedia Britannica. Pitcairn Island, 17 August 2023. https://www.britannica.com/place/Pitcairn-Island

8 CIA World Factbook. Pitcairn Islands – Details - map. https://www.cia.gov/the-world-factbook/countries/pitcairn-islands/map

9 CIA World Factbook. Natural hazards – Pitcairn Islands. https://www.cia.gov/the-world-factbook/field/natural-hazards/

10 BlueBelt Report Card (2021). Climate change impacts on corals in the UK Overseas Territories of BIOT and the Pitcairn Islands. (eds. Lincoln, S., Cowburn, B., Howes, E., Birchenough, S., Pinnegar, J., Dye, S., Buckley, P., Engelhard, G.E., and Townhill, B.). UK Blue Belt Programme. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/977846/CEFAS_Blue_Belt_climate_change_impact_on_corals_report_card_for_BIOT_and_Pitcairn.pdf

11 Bryony Townhill, Susana Lincoln and Colette Wabnitz. In deep water? Understanding the future climate risks to Pitcairn's coral reefs, Marine Science, Government of the UK, 19 December 2022. https://marinescience.blog.gov.uk/2022/12/19/in-deep-water-understanding-the-future-climate-risks-to-pitcairns-coral-reefs/

12 Government of the UK. Pitcairn Islands - Environment. https://www.government.pn/environment

13 SPC ReefLex. Pitcairn Islands - Marine Protected Area Ordinance 2016. https://www.spc.int/CoastalFisheries/Legislation/legaltext/303d5f0f-b9fe-4728-bce4-4cab8021743b

14 Government of the UK. Pitcairn Islands' tiny Pacific community publishes ambitious five-year management plan for its vast Marine Protected Area, 26 October 2021. https://www.gov.uk/government/news/pitcairn-islands-tiny-pacific-community-publishes-ambitious-five-year-management-plan-for-its-vast-marine-protected-area

15 Jurisdiction Project. Islandstudies.ca. Pitcairn. 2016. https://islandstudies.com/files/2016/11/Pitcairn.pdf

16 Johnny Briggs and Katie Gray. Pitcairn Unveils Locally Driven, Science-Based Marine Protection Management Plan, Pew Charitable Trusts, 26 October 2021. https://www.pewtrusts.org/en/research-and-analysis/articles/2021/10/26/pitcairn-unveils-locally-driven-science-based-marine-protection-management-plan

17 Government of the UK. The Blue Belt Programme, published 24 October 2017, updated 28 September 2023. https://www.gov.uk/guidance/the-blue-belt-programme

Header photo by "wileypics" on flickr.com. Pitcairn Islands. https://flic.kr/p/2dbnp7

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Vanuatu

Vanuatu is made up of a chain of more than 80 volcanic islands, of which many sit less than 1 m (3.3 feet) above sea level. The country extends 850 km (530 miles) from north to south. The islands cover 12,199 km^2 (4,710 square miles) of land within 860,000 km^2 (332,000 square miles) of ocean territory. Two islands, Espiritu Santo and Malekula, make up almost 50% of the land mass.[1] Figure 79 is a map of the country, situated north of France's New Caledonia and northeast of Australia.[2]

The earliest settlers of the islands that make up modern Vanuatu are thought to have arrived shortly after 2000 BCE. These Austronesian-speaking people[3] were joined some time before 1000 BCE by Papuan people who eventually became the dominant genetic ancestors of today's Ni-Vanuatu.[4] By 1200 CE, additional waves of migrants brought other genetic and cultural influences.[5] European contact began in 1606 but was not pervasive until European missionaries and sandalwood traders settled on the fringes of islands from the 1840s.[6] Vanuatu was eventually under Franco-British rule that lasted in various forms through independence in 1980.[7] Vanuatu's population today stands at approximately 300,019 people,[8] 80% of whom live on seven islands – Efate, Espiritu Santo, Tanna, Malekula, Pentecost, Ambae, and Ambrym.[9] Ethnic Ni-Vanuatu make up more than 99% of the population.[10]

A parliamentary republic, Vanuatu's 52-seat legislative body[11] incorporates representatives from across the islands and seats multiple party blocs with coalitions often forming the government under the leader of the party with the most seats.[12] Few women have ever won seats in the body and, as of 2023, only one woman is currently seated in Parliament.[13]

Hazards and Climate Change

Vanuatu is exposed to cyclones, volcanic eruptions, earthquakes, tsunamis, urban and coastal flooding, and landslides. The country also regularly experiences high maximum temperatures.

The country has two distinct seasons, a warm wet season from November to April, and a cool dry season from May to October. Surface air temperatures range 23.5–27.5°C (74-81°F) on



Figure 79: Map of Vanuatu

average.[14] Annual precipitation varies from 2,000 mm (80 inches) in the south to 4,000 mm (160 inches) in the northern islands.[15] Figure 80 shows Vanuatu's average temperature and rainfall for the period 1991-2020.[16]

The climate is affected by the South Pacific Convergence Zone and El Niño Southern Oscillation (ENSO). During El Niño events, drier conditions are seen in Port-Vila and Aneityum, the southernmost island. During La Niña events, rainfall during the wet season can be more voluminous than average.[17] In addition, Vanuatu is exposed to 2-3 cyclones in a season (November to April). These storms usually result in heavy rainfall, flash flooding, coastal and riverine flooding, flooding in low-lying areas, storm surge, strong winds, and landslides. Changes to the intensity of storms driven by climate change will have impacts on the natural and built environment. Finally, under all emissions scenarios used in modelling, ocean acidity levels are projected to rise, a factor that will result in worse reef ecosystem health as coral bleaching, storm damage, and fishing pressure contribute.[18] Table 25 details some of climate change-influenced phenomena and their potential impacts on Vanuatu.[19]

Government Institutions, Policies, and Plans for Disasters and Climate Change

In recent years, Vanuatu has undertaken disaster management reforms to deliver stronger risk mitigation and prevention actions, and it has shifted its focus from emergency management and response to a greater emphasis on risk reduction, climate adaptation, and longer-term recovery.

The National Sustainable Development Plan (NSDP) 2016-2030 ("Vanuatu 2030: The People's Plan") targets enhanced resilience to disasters and adaptation to climate change.[20] Alongside the plan is the Vanuatu Climate Change and Disaster Risk Reduction Policy (VCCDRRP) 2016 -2030; it provides a "framework through which risks can be identified, assessed, reduced and managed." The country's strategic goal is "resilient development," which includes activities that enable and strengthen capacities to absorb and quickly bounce back from climate or disaster shocks and stresses. VCCDRRP cites six principles – i.e., accountability, sustainability, equity, community focus, collaboration, and innovation. Strategic priorities include governance, finance, knowledge and information systems, CCA and DRR, low carbon development, and response and recovery.[21]

After these plans and policies were already in action, the Meteorology, Geological Hazards, and Climate Change Act No. 25 (2016) came into force. It set four objectives:

- To ensure high-quality services provided in relation to weather, climate, flood forecasting, and geological hazards
- To promote capacities of governments,

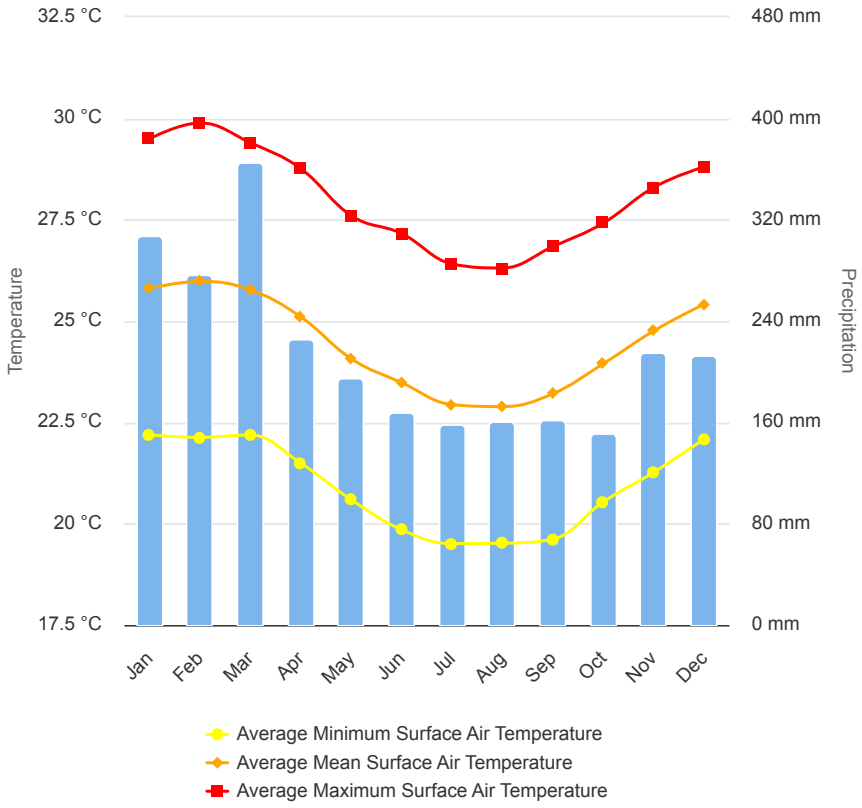


Figure 80: Average Monthly Temperatures and Rainfall, Vanuatu (1991-2020)

Phenomenon	Trend	Projections	Impacts
Temperature Rise	Air temperature tied to ocean temperature; annual mean, maximum, and minimum have increased since 1948; annual mean has risen by 0.14°C (0.25°F) per decade	Temperatures will top 30°C (86°F) on a regular basis; under very high emissions scenarios, increase of 0.5-1.0°C (0.9-1.8°F) by 2030	Heat stress impacts human health and productivity; crop damage
Precipitation	La Niña events deliver more than average rainfall	More common extreme precipitation events	Flash flooding damages built and natural environmental; damage to water sources
Drought	El Niño years tend to bring drier conditions and a late start to the wet season	Incidence of rainfall deficits could double by the 2080s under pessimistic emissions scenarios; lower emissions scenarios likely to have less impact on drought incidence	Lack of clean water for human consumption; crop failures
Sea Level Rise	Rise in sea level of 6 mm (0.24 inches) per year since the 1990s	Under a high emissions scenario, there could be a rise in sea level of 3-17 cm (1.2-6.7 inches) by 2030; continued rise of 21-34 cm (8.3-13.4 inches) by 2060 and 40-96 cm (15.7-37.8 inches) by the end of the century under all emission scenarios	Coastal erosion and flooding; greater damage due to storm surges
Cyclone	Average of 24 cyclones per decade cross the EEZ; high inter-annual variability	Decrease in the number of tropical cyclones; average maximum wind speed to rise by 2-11%; potential 20% increase in rainfall intensity in areas within 100 km (62 miles) of the cyclone	Greater damage to coastal ecosystems and infrastructure; more damaging flooding

Table 25: Climate Change-Influenced Phenomena, Trends, and Potential Impacts, Vanuatu

communities, and organizations to understand and respond to risks arising from weather events, climate change, and geological hazards
- To address the needs of operators of ships and aircrafts and of tourists to access all necessary weather forecasts, bulletins, alerts, warnings, and information concerning geological hazards
- To facilitate the use and application of relevant information, forecasts, bulletins, and warnings generated to and by local, regional, and international bodies.[22]

Subsequently, the National Policy on Climate Change and Disaster-Induced Displacement (2018) stated a vision of "an inclusive and equitable nation in which no one is left behind, and all Ni-Vanuatu people, including all populations affected by displacement (populations at-risk of displacement, displaced populations, internal migrants and host communities) are resilient and have equal opportunities to share in the country's growing security, wealth and prosperity."[23] The country's revised and enhanced First Nationally Determined Contributions (NDC) for 2021-2030, published in 2022, includes 20 mitigation commitments, 116 adaptation commitments, and 12 loss and damage commitments, conditional upon international finance, action, support, technology, and capacity development with an approximate cost of US$1.2 billion. Mitigation actions cover energy, agriculture, forestry, other land use, and waste. Adaptation targets are linked directly to the NDSP, and the NDC commits the country to developing a National Adaptation Plan (NAP) by the end of 2025.[24]

In addition to the past decade's changes in how Vanuatu addresses climate change, it has revamped the institutions and laws surrounding disaster management in general.

The National Disaster Committee (NDC) is chaired by the Director General of the Ministry

of Climate Change and Adaptation, Meteorology and Geo-Hazards, Energy, Environment and National Disaster Management (MOCCA) and has responsibility for the development of strategies and polices. The NDC is overseen by the Council of Ministers, which is chaired by the Prime Minister. The National Disaster Management Office (NDMO) is the government agency responsible for coordination of preparation for and responses to emergencies and disasters. It is the focal point agency in Vanuatu's Disaster Risk Management Law, Act 23 (2019) and falls under MOCCA.[25] The NDMO vision is to ensure resilient communities by integrating the coordination of DRR and CCA into sectoral plans, policies, and budgeting.[26] Figure 81 shows the government structure for disaster management.[27]

On the climate change front, MOCCA focuses on strengthening networks at national, provincial, and local levels; it mainstreams CCA activities across sectors, policies, plans, and budgets. MOCCA's Director-General is the country's primary National Designated Authority for engagement with the Green Climate Fund (GCF). The Ministry's Department of Climate Change (DOCC), under the Meteorology, Geological Hazards, and Climate Change Act, is tasked with the coordination and implementation of all adaptation, DRM, and climate change mitigation throughout the country. As the government focal point for resilient development, the DOCC tasks include:

- Leading in innovation and change in climate change initiatives across the country and the Pacific
- Supporting the functions and work of the National Advisory Board on Climate Change and Disaster Risk Reduction in Vanuatu (NAB)
- Improving sustainability by securing highly trained technical and qualified contracted staffs into permanent government positions in future
- Maintaining momentum and delivery of current projects
- Progressing current and new initiatives in

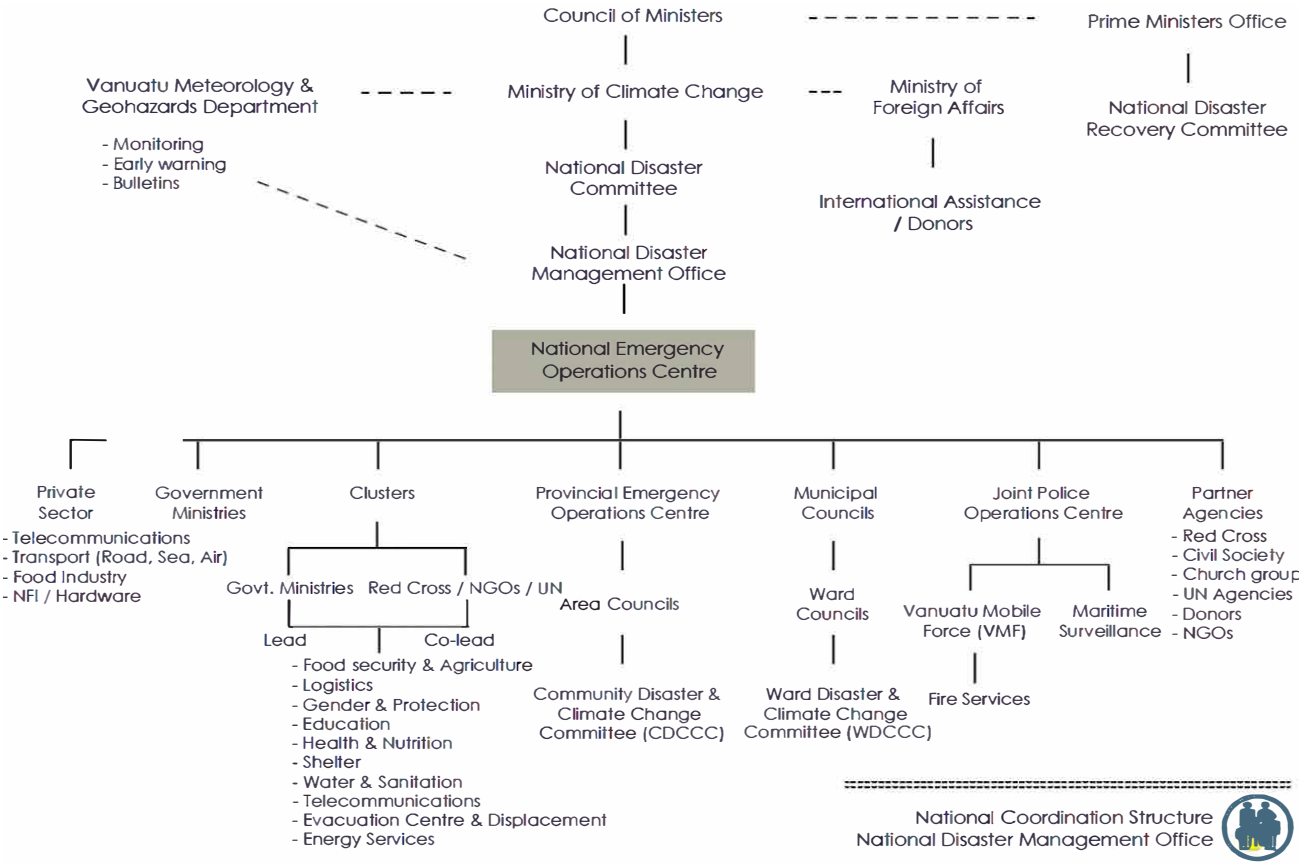


Figure 81: Vanuatu Disaster Response Coordination Structure

climate change and DRR areas in the country
- Progressing compliance to international conventions to which Vanuatu is a signatory
- Mainstreaming climate change action across the Vanuatu government per the NSDP
- Operationalizing the Climate Change and Disaster Risk Reduction Policy
- Coordinating and monitoring all climate change and disaster risk management projects and to secure further climate change and DRR projects and funding[28]

The DOCC organization structure, under the national cabinet, is shown in Figure 82.

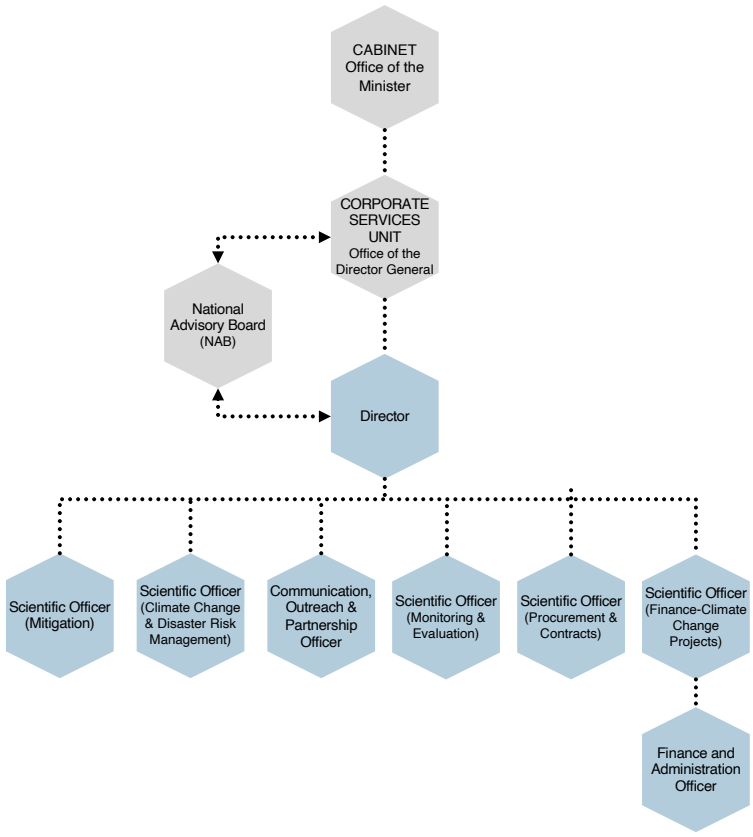


Figure 82: DOCC's Organization Structure

Risk Reduction is the leading institution responsible for policy development and advice for CCA programs, projects, initiatives, and activities. The NAB is the focal point for information sharing and coordination on climate change; it facilitates and endorses climate change programs, and it manages development of national climate finance processes.[29] The NAB also plays a critical role in governing and allocating funds, and it serves as an important model of a high-level advisory body that coordinates the allocation of climate change and DRR funding.[30] Alongside government members, the NAB includes civil society and the private sector as observers.[31]

At the subnational level, Provincial Disaster and Climate Change Committees (PDCCC) coordinate DRR and CCA activities, develop plans, and disseminate information to communities. PDCCCs also conduct training and make decisions on the use of resources. Membership includes representatives of the provincial government, local authorities, and NGOs. The NDMO, in partnership with NGOs and the Red Cross, has supported the establishment of Community Disaster and Climate Change Committees (CDCCC) to further support communities to be actively engaged in recognizing, assessing, and mitigating risks. Members of CDCCCs are mainly volunteers from the community.[32]

Ministry of Climate Change (MOCCA)
Meteo Complex, Nambatu Area, Port-Vila, Vanuatu
Tel: 678 22068
Email: *mocca@vanuatu.gov.vu*

National Disaster Management Office
Private Mail Bag 9107, Port-Vila, Vanuatu
Tel: 678 22699 / 678 33366
Email: *ndmo@vanuatu.gov.vu*

Department of Climate Change
Namba 2 Area, PMB 9054, Port Vila, Vanuatu
Tel: 678 22160
Email: *docc@vanuatu.gov.vu*

Early Warning Systems

Since 2018, Vanuatu has worked to develop a drought modeling and early warning system that, in part, monitors El Niño events that correlate with drought in Vanuatu.[33]

The Vanuatu Klaemet Infomesen blong Redy, Adapt mo Protekt (VanKIRAP, or Climate Information Services for Resilient Development) project and the national broadcaster, Vanuatu Broadcasting and Television Corporation, have a partnership agreement to use radio, television, and social media channels to deliver climate and weather information to the nation. The partnership extends the reach of the Vanuatu Meteorology and Geohazards Department climate and weather information services to the whole archipelago by embedding the Department's meteorology and climatology expertise within the national broadcaster so that science-based information is included in all news reporting on climate, climate change, and extreme weather events.[34]

Vanuatu officially launched its first Ocean Climate Monitoring Network in May 2023 to combat climate change effects as well as develop and enhance its multi-hazard early warning systems. Deployed by VanKIRAP, the Vanuatu Ocean Monitoring Network is underpinned by a partnership among the Meteorology and Geohazards Department, Vanuatu Fisheries Department, SPREP, and Australia's Commonwealth Scientific and Industrial Research Organisation (CSIRO), with funding support provided by the GCF. The Network is a chain of six ocean climate monitoring buoys across the archipelago; they monitor how climate change is affecting the ocean around the country and provide early warning to communities and key agencies of impending climate-related events. The buoys measure sea surface temperature, wave direction, wave height, wave period and spread, and wind speed at each location – Port-Vila on Efate; Million Dollar Point and Lonnoc Beach on Espiritu Santo; Port Resolution on Tanna; Inyeug Island in Aneityum; and Tomman Island in Malekula. In addition to providing near real-time data about the impacts of climate-related events like cyclones and marine heatwaves, the data also allow the Meteorology and Geohazards Department and the Department of Fisheries to issue early warnings to communities for coastal inundation and erosion.[35]

Vanuatu Meteorology and Geohazards Department

Private Mail Bag 9054, Lini Highway, Port-Vila, Vanuatu
Nambatu Area, Port-Vila, Vanuatu
Tel: 678 24686 / 678 33632
Email: *admin@meteo.gov.vu*

Infrastructure

The Ministry of Infrastructure and Public Utilities has a vision of a safe and integrated transport infrastructure network, and a mission to provide high-quality infrastructure and services to support the country's economic and social development.[36] Vanuatu has three international airports – Bauerfield in Port-Vila, Pekoa on Espiritu Santo, and Whitegrass on Tanna – and nine smaller airports with grass or coral runways. The Port of Port-Vila on Efate Island in Shefa Province and the Port of Luganville on Espiritu Santo Island in Sanma Province are the main cargo hubs; both ports are able to handle vessels up to 50,131 deadweight tonnage.[37]

The energy sector falls under MOCCA's Department of Energy, which sets policy, but all electricity is generated by the private sector. Those islands that do have an electricity grid contract with private generators and grid operators through concessions, and the largest concessionaires in the country are UNELCO and Vanuatu Utilities and Infrastructure (VUI).[38] UNELCO is also the concessionaire to produce and distribute drinking water in Port Vila.[39] UNELCO's Efate power stations include: 1) thermal station (Port-Vila); 2) thermal station (Tagabe); 3) three solar farms in Kawene, Tagabe, and Undin Bay; and 4) a pump station. The UNELCO high voltage network runs along the western coast of Efate.[40] VUI operates and

maintains hydro and diesel generation plants, transmission and distribution lines, and sub-stations on Espiritu Santo.[41] For issues of governance of water and sanitation, the Ministry of Health is a policy lead while the Department of Water Resources under the Ministry of Lands and Natural Resources is responsible for most strategy and planning for both drinking water and sanitation.[42]

Ministry of Infrastructure
PMB 9057, Port-Vila, Vanuatu
Tel: 678 22790
Email: *jkalpokas@vanuatu.gov.vu* (secretary of the Director-General)

MOCCA's Department of Energy
Meteo Complex, Nambatu Area, PMB 9067, Port-Vila, Vanuatu
Tel: 678 25201
Email: *doe@vanuatu.gov.vu*

UNELCO Engie
BP 26 Port-Vila, Vanuatu
Tel: 678 26000
Email: *contact.unelco@engie.com*

Vanuatu Utilities and Infrastructure (VUI)
Boulevard de Higginson
PO Box 214, Luganville, Espiritu Santo, Vanuatu
Tel: 678 37140 1 / 2

Department of Water Resources
PMB 9007, George Pompidou Road, Port-Vila, Vanuatu
Tel: 678 33120
Email: *DoWR@Vanuatu.gov.vu*

Civil Society Partners

NDMO works closely with local and international NGOs to help communities to be resilient in the development and strengthening of mitigation, response, relief, and recovery plans. Vanuatu has a very strong presence of international NGOs that have significant remits for action on climate change, resilience building, and inter-related development work at the local and community level. It has so far been a challenge to ensure that funding for readiness programs reaches local NGOs and to ensure that these groups are also better able to manage and absorb climate change financing.[43]

The Vanuatu Red Cross Society (VRCS) was founded on 11 October 1982 as an independent humanitarian organization, auxiliary to the Vanuatu government. It adopts a community-based approach in working with volunteers in disaster preparedness, disaster assessment, emergency response, humanitarian law and fundamental principles, first aid, and health, and CCA falls within its work areas across its six provincial branches.[44]

Vanuatu Red Cross Society
Rue d'Auvergne, Nambatu area, Port-Vila, Vanuatu
PO Box 618, Port-Vila, Vanuatu
Tel: 678 27418
Email: *redcross@vanuatu.com.vu*

The Vanuatu Association of NGOs (VANGO) is the national umbrella body for NGOs and serves as the link between international NGOs and the government. It is a mandated member of the NAB to represent civil society.[45]

VANGO
Tel: 678 26034
Facebook: Vanuatu Association of NGOs

Vanuatu Climate Adaptation Network (VCAN) was established as the product of the Vanuatu NGO Climate Change Adaptation Program (2012-2014), funded by the Australian Government and implemented by a consortium of organizations – Save the Children, CARE International in Vanuatu, VRCS, Vanuatu Rural Development Training Centres Association, and SPC/GIZ; it was coordinated by Oxfam. VCAN facilitates sharing of lessons and good practice approaches with the government and among 20 civil society organizations,[46] including the Farm Support Association, Wan Smolbag, VANGO, and Live & Learn.[47] It sends delegates to COPs and coordinates efforts to link community voices with national and international decisionmakers.[48]

Vanuatu Climate Action Network

Oxfam Office, Nambatri
Tel: 678 25786
Email: *info@vcan.local.vu*

The Live and Learn office in Vanuatu is registered as a national NGO. It participates in public awareness and education campaigns in addition to its dedicated projects in water-sanitation, sustainable management of biodiversity, climate change and energy, natural resource management-based conflict management, environmental governance, waste management and minimization, health and HIV, and other issues.[49]

Live and Learn Vanuatu

Port-Vila, Efate, Vanuatu
International Office: Donkey Wheel House, 2nd Floor 673 Bourke St, Melbourne 3000 Victoria, Australia
Facebook: liveandlearnvanuatu
Tel: 61 3 9650 1291
https://livelearn.org/contact-us/

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Vanuatu Notes

1 UNDRR. Disaster Risk Reduction in Republic Of Vanuatu: STATUS REPORT 2022. https://www.preventionweb.net/publication/disaster-risk-reduction-republic-vanuatu-status-report-2022

2 CIA World Factbook. Vanuatu – Map. https://www.cia.gov/the-world-factbook/countries/vanuatu/map

3 Bedford, Stuart; Spriggs, Matthew; and Regenvanu, Ralph. The Teouma Lapita Site and the Early Human Settlement of the Pacific Islands. Antiquity. 2015. 80. 812-828. 10.1017/S0003598X00094448.

4 Spriggs, Matthew. Where Did We Come From? The Origins Of The Ni-Vanuatu. Daily Post. 17 October 2020. https://www.dailypost.vu/news/where-did-we-comefrom-the-origins-of-the-ni-vanuatu/article_5cf69c84-1192-11eb-a1fb-0b2e615fdb4d.html

5 Parliament of Vanuatu. A Brief History of the Vanuatu Parliament. Section 1, Parliamentary Handbook. https://parliament.gov.vu/images/pdf/about_us/history.pdf

6 Adams, Ron; Foster, Sophia; et al. History of Vanuatu. Encyclopedia Britannica. https://www.britannica.com/place/Vanuatu/History

7 BBC. Vanuatu profile – Timeline. 26 October 2022. https://www.bbc.com/news/world-asia-16426561

8 Hakkert, Ralph and Pontifex, Scott. Vanuatu 2020 national population and housing census: analytical report - volume 2. Pacific Community. October 2022. https://spccfpstore1.blob.core.windows.net/digitallibrary-docs/files/cc/cc03b205d0580fc2a2f727036ae79e58.pdf?sv=2015-12-11&sr=b&sig=f4X82vek8IApU-VTt-BUCv4yTozNYzBM1xDy1ZDJGVWKs%3D&se=2023-07-14T12%3A16%3A51Z&sp=r&rscc=public%2C%20max-age%3D864000%2C%20max-stale%3D86400&rsct=application%

2Fpdf&rscd=inline%3B%20filename%3D%22Vanuatu_2020_Census_Analytical_report_Vol_2.pdf%22

9 UNDRR. Disaster Risk Reduction in Republic Of Vanuatu: STATUS REPORT 2022. https://www.preventionweb.net/publication/disaster-risk-reduction-republic-vanuatu-status-report-2022

10 Adams, Ron; Foster, Sophia; et al. People of Vanuatu. Encyclopedia Britannica. https://www.britannica.com/place/Vanuatu#ref53973

11 Commonwealth Network. Vanuatu – Government. Accessed 8 May 2023. https://www.commonwealthofnations.org/sectors-vanuatu/government/

12 IFES. Election Guide. Republic of Vanuatu. 13 October 2022. https://www.electionguide.org/elections/id/3975/

13 Maykin, Melissa and Srinivasan, Prianka. Alatoi Ishmael Kalsakau becomes Vanuatu's prime minister after country elects first female MP in 14 years. Australian Broadcasting Corporation. 4 November 2022. https://www.abc.net.au/news/2022-11-05/vanuatu-elections-draw

14 UNDRR. Disaster Risk Reduction in Republic Of Vanuatu: STATUS REPORT 2022. https://www.preventionweb.net/publication/disaster-risk-reduction-republic-vanuatu-status-report-2022

15 Adams, Ron; Foster, Sophia; et al. Vanuatu - Land. Encyclopedia Britannica. https://www.britannica.com/place/Vanuatu

16 Climate Risk Country Profile: Vanuatu (2021): The World Bank Group. https://www.preventionweb.net/publication/climate-risk-country-profile-vanuatu

17 UNDRR. Disaster Risk Reduction in Republic Of Vanuatu: STATUS REPORT 2022. https://www.preventionweb.net/publication/disaster-risk-reduction-republic-vanuatu-status-report-2022

18 UNDRR. Disaster Risk Reduction in Republic Of Vanuatu: STATUS REPORT 2022. https://www.preventionweb.net/publication/disaster-risk-reduction-republic-vanuatu-status-report-2022

19 Climate Risk Country Profile: Vanuatu (2021): The World Bank Group. https://www.preventionweb.net/publication/climate-risk-country-profile-vanuatu; UNDRR. Disaster Risk Reduction in Republic Of Vanuatu: STATUS REPORT 2022. https://www.preventionweb.net/publication/disaster-risk-reduction-republic-vanuatu-status-report-2022; Pacific-Australia Climate Change Science and Adaptation Planning Program. Current and future climate of Vanuatu. June 2013. https://www.pacificclimatechangescience.org/wp-content/uploads/2013/06/15_PACCSAP-Vanuatu-11pp_WEB.pdf

20 Government of Vanuatu. Vanuatu 2030: The People's Plan – National Sustainable Development Plan 2016 to 2030. November 2016. https://www.gov.vu/images/publications/Vanuatu2030-EN-FINAL-sf.pdf

21 Government of Vanuatu. Vanuatu Climate Change and Disaster Risk Reduction Policy 2016-2030, https://ndmo.gov.vu/resources/downloads/category/10-strategic-documents?download=36:vanuatu-climate-change-and-disaster-risk-reduction-policy-2016-2030

22 Grantham Research Institute on Climate Change and the Environment. Meteorology, Geological hazards and Climate Change Act no 25/2016. https://climate-laws.org/document/meteorology-geological-hazards-and-climate-change-act-no-25-2016_3613

23 Government of Vanuatu. National Policy on Climate Change and Disaster-Induced Displacement, 2018. https://ndmo.gov.vu/resources/downloads/category/10-strategic-documents?download=259:cc-and-di-displacement-policy

24 Government of Vanuatu. Vanuatu's Revised and Enhanced 1st Nationally Determined Contribution 2021–2030. 2022. https://unfccc.int/sites/default/files/NDC/2022-08/Vanuatu%20NDC%20Revised%20and%20Enhanced.pdf

25 OCHA. Vanuatu: Humanitarian Coordination Structure (As of 12 October 2022). https://reliefweb.int/report/vanuatu/vanuatu-humanitarian-coordination-structure-12-october-2022

26 Vanuatu NDMO. About Us: About NDMO. 30 May 2023. https://ndmo.gov.vu/about-us

27 Government of Vanuatu. Cyclone Support Plan 2020-2021. https://ndmo.gov.vu/resources/downloads/category/103-cyclone-support-plan?download=281:cyclone-support-plan-2020-202

28 Department of Climate Change. The new DoCC in Vanuatu. Government of Vanuatu. https://docc.gov.vu/index.php/about-us/the-new-docc-in-vanuatu

29 UNDRR. Disaster Risk Reduction in Republic Of Vanuatu: STATUS REPORT 2022. https://www.preventionweb.net/publication/disaster-risk-reduction-republic-vanuatu-status-report-2022

30 Humanitarian Advisory Group. Beyond Barriers: Vanuatu Case Study. February 2022. https://www.preventionweb.net/publication/beyond-barriers-vanuatu-case-study

31 National Advisory Board. National Advisory Board Secretariat – Members. 13 October 2023. https://www.nab.vu/national-advisory-board-secretariat-members-0

32 Humanitarian Advisory Group. Beyond Barriers: Vanuatu Case Study. February 2022. https://www.preventionweb.net/publication/beyond-barriers-vanuatu-case-study

33 SPREP. Vanuatu To Benefit From Drought Information. 28 July 2018. https://www.sprep.org/news/vanuatu-benefit-drought-information

34 SPREP. VanKIRAP partners with Vanuatu's national broadcaster to bring climate information to the people. 24 May 2023. https://www.sprep.org/news/vankirap-partners-with-vanuatus-national-broadcaster-to-bring-climate-information-to-the-people

35 Morris, Doddy. Vanuatu launches first Ocean Climate Monitoring Network to combat climate change effects. Vanuatu Daily Post. 20 April 2023. https://www.dailypost.vu/news/vanuatu-launches-first-ocean-climate-monitoring-network-to-combat-climate-change-effects/article_93817728-f140-520a-878a-f1c70fa3fecd.html

36 Government of Vanuatu, Ministry of Infrastructure & Public Utilities. Home page. https://mipu.gov.vu/

37 Marine Traffic. Port Vila Port. Accessed 2 June 2023. https://www.marinetraffic.com/en/ais/details/ports/19812?name=PORT-VILA&country=Vanuatu ; Marine Traffic. Santo Port. Accessed 2 June 2023. https://www.marinetraffic.com/en/ais/details/ports/20298?name=SANTO&country=Vanuatu

38 Asian Development Bank. Sector Assessment (Summary): Energy. Energy Access Project (FFP VAN 49450). https://www.adb.org/sites/default/files/linked-documents/49450-008-ss

39 UNELCO. About UNELCO. Accessed 14 July 2023. https://unelco.engie.com/en/unelco/about-unelco

40 UNELCO. Location. Accessed 2 November 2023. https://unelco.engie.com/en/unelco/location

41 Pernix Group. VUI. Accessed 2 November 2023. https://www.pernixgroup.com/our-company/about-us/subsidiaries/vanuatu-utilities-infrastructure-vui/

42 Department of Water Resources. About Us. Ministry of Lands and Natural Resources. Accessed 14 July 2023. https://mol.gov.vu/index.php/en/about-dptmnt

43 Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH. Vanuatu Climate Change and Disaster Risk Finance Assessment. 2018. https://www.forumsec.org/wp-content/uploads/2018/09/Vanuatu-Climate-Change-2.pdf

44 Vanuatu Red Cross Society. About us. https://vanuaturedcross.squarespace.com/about-us

45 Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH. Vanuatu Climate Change and Disaster Risk Finance Assessment. 2018. https://www.forumsec.org/wp-content/uploads/2018/09/Vanuatu-Climate-Change-2.pdf

46 UN Department of Economic and Social Affairs. Vanuatu NGO Climate Change Adaptation Program. https://sdgs.un.org/partnerships/vanuatu-ngo-climate-change-adaptation-program

47 CARE. Project Brief: Vanuatu Climate Action Network with CARE International in Vanuatu. August 2017. https://careclimatechange.org/wp-content/uploads/2019/03/VCAN-Project-Brief_Aug2017.pdf

48 UN Department of Economic and Social Affairs. Vanuatu NGO Climate Change Adaptation Program. https://sdgs.un.org/partnerships/vanuatu-ngo-climate-change-adaptation-program

49 National Advisory Board. Organizations – Live & Learn. https://www.nab.vu/organisation/live-and-learn-vanuatu

Header photo by Seiji Seiji on unsplash.com. Vanuatu. https://unsplash.com/photos/aerial-view-of-green-trees-and-body-of-water-during-daytime-JxL6t8iVri4

ACRONYMS AND ABBREVIATIONS

°	degree(s) (of temperature - Celsius or Fahrenheit; or latitude/longitude – North, South, East, West)
€	Euro(s)
$	dollar(s) – Australian, New Zealand, or U.S.
ACMC	Australian Civil Military Centre
ACS	Australian Climate Service
ADIE	Association pour le Droit à l'Initiative Economique (Association for the Right to Economic Initiative)
AGCMF	Australian Government Crisis Management Framework
ASDHS	American Samoa Department of Homeland Security
ASEPA	American Samoa Environmental Protection Agency
ATCG	Atafu Tokelau Community Group
AWS	Automated Weather Station
BANGO	Belau Association of Non-Governmental Organization
BCE / CE	Before Common Era / Common Era (formerly BC and AD)
CBDRR	Community Based Disaster Risk Reduction
CbEWS	Community Based Early Warning Systems
CCA	climate change adaptation
CCD	Climate Change Division (of Fiji)
CCDA	Climate Change and Development Authority (of PNG)
CCG	Central Control Group
CCMA	Climate Change Management Act (of PNG)
CCWG	Climate Change Working Group
CDCCC	Community Disaster and Climate Change Committees (of Vanuatu)
CDEM	Civil Defense Emergency Management
CDF	Charles Darwin Foundation for the Galápagos Islands
CEMP	Comprehensive Emergency Management Plan (of Guam)
CID	Council for International Development
CIGD	Council for Civil Protection and Natural Disaster Management (Conselho Interministerial de Proteção Civil e Gestão de Desastres Naturais) (of Timor-Leste)
CLEWS	Climate Early Warning Systems
cm	centimeter(s)
CNMI	Commonwealth of the Northern Mariana Islands
COFA	Compact of Free Association
COMDISPLAN	Commonwealth Government Disaster Response Plan (of Australia)
COP	Conference of Parties (of the UNFCCC)

COVID-19	Coronavirus Disease 2019
CPA	Civil Protection Authority (of Timor-Leste)
CPUC	Chuuk Public Utilities Corporation
CREWS Pacific SIDS	Community-based Early Warning System Pacific Small Islands Developing States
CRIP	Coral Reef Initiative Program or Climate Resilient Investment Pathways
CRR	Climate and Risk Resilience
CSFT	Civil Society Forum of Tonga
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CSO	Chief Secretary's Office (of RMI)
CVTL	Cruz Vermelha De Timor-Leste (Timor-Leste Red Cross)
DAC	Disaster Advisory Committee
DART	Deep-ocean Assessment and Reporting of Tsunami
DCC	Department of Climate Change (of Tuvalu)
DCCEEW	Department of Climate Change, Energy, the Environment and Water (of Australia)
DCCNR	Department of Climate Change and National Resilience (of Nauru)
DCO	Disaster Coordination Officer
DDC	District Disaster Coordinator
DDM	Department of Disaster Management
DDMC	District Disaster Management Committee
DEC	Disaster Executive Council (of Palau)
DECEM	Department of Environment, Climate Change, and Emergency Management (of FSM)
DFAT	Department of Foreign Affairs and Trade (of Australia)
DM	Disaster Management
DMA	Disaster Mitigation Act
DMO	Disaster Management Officer or Office
DMPGM	Department of Mineral Policy and Geohazards Management (of PNG)
DNAC	National Directorate of Climate Change (of Timor-Leste)
DNGRD	Directorate of Disaster Risk Management (of Timor-Leste)
DNMG	Directorate of Meteorology and Geophysics (of Timor-Leste)
DOCC	Department of Climate Change (of Vanuatu)
DOW	Department of Works
DRM	disaster risk management
DRMCC	Disaster Risk Management and Climate Change (law of Kiribati)
DRR	disaster risk reduction
DSE	Development Services Exchange
DWST	Disaster Welfare and Support Teams
EAR	Early Action Rainfall
EAS	Emergency Alert System
EEZ	Exclusive Economic Zone
EFL	Energy Fiji Limited

EMAT	Emergency Management Assistance Team
EMCI	Emergency Management Cook Islands
ENSO	El Niño Southern Oscillation
EOC	Emergency Operations Center
EOP	Emergency Operations Plan
EPA	Environmental Protection Agency (of Guam or the U.S.)
ESF	Emergency Support Function
EU	European Union
EWS	early warning system
FANC	French Armed forces in New Caledonia
FAO	Food and Agriculture Organizations of the United Nations
FAPF	French Armed forces in French Polynesia
FBDRC	Fiji Business Disaster Resilience Council
FCDO	Foreign, Commonwealth and Development Office (of the UK)
FCOSS	Fiji Council of Social Services
FDPF	Fiji Disabled People's Federation
FEMA	Federal Emergency Management Agency
FMS	Fiji Meteorological Service
FNARS	FEMA National Radio System
FRA	Fiji Roads Authority
FRCS	Fiji Red Cross Society
FRDP	Framework for Resilient Development in the Pacific
FSM	Federated States of Micronesia
GCF	Green Climate Fund
GCF-VSF	Green Climate Fund Vaisigano Catchment Project (Samoa)
GCMP	Guam Coastal Management Program
GCRI	Guam Coral Reef Initiative
GDP	gross domestic product
GEF	Global Environment Facility
GFDRR	Global Facility for Disaster Reduction and Recovery
GHMO	Guam Hazard Mitigation Officer
GHS/OCD	Guam Homeland Security / Office of Civil Defense
GPA	Guam Power Authority
GWh	Gigawatt-hour
HSEM	Homeland Security and Emergency Management (of CNMI)
ICRC	International Committee of the Red Cross
ICS	Incident Command System
IDC	Island Disaster Committee (of Kiribati or Tuvalu)
IFRC	International Federation of Red Cross and Red Crescent Societies
IMF	International Monetary Fund

INTEGRE	Pacific Territories' Initiative for Regional Management of the Environment (of SPC)
IPCC	Intergovernmental Panel on Climate Change
ITCZ	Inter-Tropical Convergence Zone
JICA	Japan International Cooperation Agency
JNAP	Joint National Action Plan for Disaster Risk Management and Climate Change Adaptation
JSAP	Joint State Action Plan on Disaster Risk Management and Climate Change
KANGO	Kiribati Association of Non-Governmental Organizations
KCCP	Kiribati Climate Change Policy
KDP	Kiribati National Development Plan
KFHA	Kiribati Family Health Association
KiriCAN	Kiribati Climate Action Network
KJIP	Kiribati Joint Implementation Plan for Climate Change and Disaster Risk Management
km / km2	kilometer(s) / square kilometer(s)
KMS	Kiribati Meteorological Services
KNEG	Kiribati National Expert Group
KRCS	Kiribati Red Cross Society
KUA	Kosrae Utility Authority
KV20	Kiribati 20-Year Vision 2016–2036
kW	kilowatt(s)
LEDS	Low Emission Development Strategy
m / m2	meter(s) / square meter(s)
MAR	Monitoring, Alerting, and Reporting
MCAP	Managing Coastal Aquifers Project
MCT	Micronesian Conservation Trust
MCTTT	Ministry of Commerce, Trade, Tourism, and Transport (of Fiji)
MECDM	Ministry of Environment, Climate Change, Disaster Management, and Meteorology (of Solomon Islands)
MEIDECC	Meteorology, Energy, Information, Disaster Management, Environment, Climate Change, and Communications (of Tonga)
MELAD	Ministry of Environment, Lands, and Agriculture Development (of Kiribati)
MetService	Meteorological Service of New Zealand
MFAT	Ministry of Foreign Affairs and Trade (of New Zealand)
MFED	Ministry of Finance and Economic Development (of Kiribati)
MHEWS	Multi-Hazard Early Warning System
MHMS	Ministry of Health and Medical Services (of Kiribati)
MiCORE	Ministry of Climate, Oceans, and Resilience (of Tokelau)
MICTTD	Ministry of Information, Communications, Transport, and Tourism Development (of Kiribati)
MIRCS	Marshall Islands Red Cross Society
mm	millimeters(s)
MNRE	Ministry of Natural Resources & Environment (of Samoa)

MOCCA	Ministry of Climate Change and Adaptation, Meteorology and Geo-Hazards, Energy, Environment and National Disaster Management (of Vanuatu)
MOE	Ministry of Education (of Kiribati)
MoI	Ministry of Interior (of Timor-Leste)
MPA	marine protected area
MRCS	Micronesia Red Cross Society
MRMDDM	Ministry of Rural and Maritime Development and Disaster Management (of Fiji)
MSSI	Ministry of Social Solidarity and Inclusion (of Timor-Leste)
MW	Megawatts
N-DOC	National Disaster Operations Committee (of Solomon Islands)
NAB	National Advisory Board on Climate Change and Disaster Risk Reduction in Vanuatu
NACCC	National Advisory Council on Climate Change (of Tuvalu)
NAP	National Adaptation Plan or National Action Plan
NAPA	National Adaptation Programmes of Action (of Solomon Islands)
NCBO	National Community-Based Organisations (of Nauru)
NCCCC	National Climate Change Coordinating Committee (of Tonga)
NCCP	National Climate Change Policy (of Fiji)
NCD	National Capital District (of PNG)
NCM	National Coordination Mechanism
NDA	nationally designated authority
NDC	National Determined Contributions or National Disaster Controller or National Disaster Committee or National Disaster Council or National Disaster Centre
NDCT	National Disaster Coordination Team
NDMC	National Disaster Management Council (of Fiji)
NDMO	National Disaster Management Office (of Fiji, Niue, RMI, Solomon Islands, Tuvalu, or Vanuatu)
NDMP	National Disaster Management Plan (of Samoa or Solomon Islands)
NDMU	National Disaster Management Unit (of Tokelau)
NDOC	National Disaster Operations Center (of Timor-Leste)
NDPWG	National Disaster Preparedness Working Group (of Tuvalu)
NDRMA	National Disaster Risk Management Arrangement (of RMI) or National Disaster Risk Management Act (of Nauru)
NDRMC	National Disaster Risk Management Council (of Nauru)
NDRMF	National Disaster Risk Management Framework
NDRMO	National Disaster Risk Management Office (of Kiribati)
NDRP	National Disaster Response Plan
NDRRF	National Disaster Risk Reduction Framework (of PNG)
NEC	National Emergency Committee (of Palau) or National Executive Council (of PNG)
NECC	National Emergency Control Centre (of Tonga)
NEMA	National Emergency Management Agency (of Australia or New Zealand)
NEMO	National Emergency Management Office (of Palau or Tonga)
NEMS	National Environmental Strategy (of FSM)

NEOC	National Emergency Operation Center / Centre
NGO	non-governmental organization
NIANGO	Nauru Island Association for Non-Government Organisations
NIIP	National Infrastructure and Investment Plan
NIMS	National Incident Management System (of the U.S.)
NOAA	National Oceanic and Atmospheric Administration (of the U.S.)
NSDP	National Sustainable Development Plan
NSR	National Situation Room
NVS	National Volunteer Service
NWR	NOAA Weather Radio
NWS	National Weather Service (of the U.S.)
OB	Office of Te Beretitenti (President – of Kiribati)
OCHA	Office for the Coordination of Humanitarian Affairs (of the UN)
OCOG	Office of the Council for the Ongoing Government (of Tokelau)
OPADM	Office of Disaster Assistance and Petroleum Management (of American Samoa)
ORSEC	Organization of Emergency Response; Organisation de la Réponse de Sécurité Civile (of France)
PAG	Port Authority Guam
PDC	Provincial Disaster Center or Pacific Disaster Center
PDCCC	Provincial Disaster and Climate Change Committees (of Vanuatu)
PIA	Palau Energy Administration
PIF	Pacific Islands Forum
PIHOA	Pacific Island Health Officers' Association
PCPF	French Polynesia Climate Plan
PNG	Papua New Guinea
PNGDF	PNG Defense Forces
PNGFS	PNG Fire Service
PNGNWS	PNG National Weather Service
PPR	Plans de Prévention des Risques naturels (Natural Risk Prevention Plans)
PPUC	Palau Public Utilities Corporation
PRCS	Palau Red Cross Society
PUC	Pohnpei Utilities Corporation
RAC	Response Activities Coordinators
RIMES	Regional Integrated Multi-Hazard Early Warning System
RMI	Republic of Marshall Islands
RMIPA	RMI Port Authority
RO-RO	roll-on/roll-off
RONAdapt	Republic of Nauru Framework for Climate Change Adaptation and Disaster Risk Reduction
RSMC	Regional Specialized Meteorological Center
SDC	State Disaster Committee
SEOC	State Emergency Operations Center

SEPC	Secretary of State for Civil Protection (Secretário de Estado da Proteção Civil) (of Timor-Leste)
SHMO	State Hazard Mitigation Officer
SIMS	Solomon Islands Meteorological Service
SIRC	Solomon Islands Red Cross Society
SMD	Samoa Meteorology Division
SMT	Senior Management Team
SPC	Pacific Community
SPREP	Pacific Regional Environment Programme
SRCS	Samoa Red Cross Society
SSMP	Standard State Mitigation Plan
SUNGO	Samoa Umbrella for Non-Governmental Organisations
SWG	Sector Working Group
TCCS	Tokelau national advisory board on climate change and related hazards' intelligence services
TCDT	Tonga Community Development Trust
TCO	Territorial Coordinating Officer
TCR2O	Tokelau Climate Change, Resilient, Readiness, and Emergency Services' Office
TCR4	Tokelau National Disaster Risk Reduction, Response and Resilience Plan
TEMCO	Territorial Emergency Management Coordination Office (of the American Samoa DHS)
TEU	Twenty-foot Equivalent Unit
TMS	Tonga Meteorological Service or Tuvalu Meteorological Service
TNC	Third National Communication
TNYC	Tonga National Youth Congress
TRCS	Tonga Red Cross Society
TTPI	Trust Territory of the Pacific Islands (of the UN)
U.S.	United States
UK	United Kingdom
UN	United Nations
UNDP	United Nations Development Programme
UNDRR	United Nations Office for Disaster Risk Reduction
UNESCAP	United Nations Economic and Social Commission for Asia and the Pacific
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
UNFPA	United Nations Population Fund
UNSDCF	United Nations Pacific Sustainable Development Cooperation Framework
USAID	U.S. Agency for International Development
USAPI	U.S.-Affiliated Pacific Islands
VanKIRAP	Vanuatu Klaemet Infomesen blong Redy, Adapt mo Protekt (Climate Information Services for Resilient Development)
VCCDRRP	Vanuatu Climate Change and Disaster Risk Reduction Policy
VOAD	Voluntary Organizations Active in Disaster

VRCS	Vanuatu Red Cross Society
WAF	Water Authority of Fiji
WERI	Water and Environmental Research Institute of the Western Pacific
WFO	Weather Forecast Office
WFP	World Food Programme
WMO	World Meteorological Organization
WSO	Weather Service Office
WUTMI	Women United Together Marshall Islands
WWW	Women's Weather Watch (of Fiji)
YSPSC	Yap State Public Service Corporation

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Center for Excellence in Disaster Management & Humanitarian Assistance
456 Hornet Avenue, Building 76, Joint Base Pearl Harbor - Hickam, Hawaii 96860-3503
Telephone: 808.472.0518 | DSN: 315.472.0518
https://www.cfe-dmha.org
@cfedmha