CLIMATE RISK COUNTRY PROFILE

PALAU

WORLD BANK GROUP

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ACKNOWLEDGEMENTS

This profile is part of a series of Climate Risk Country Profiles that are developed by the World Bank Group (WBG). These profiles synthesize the most relevant data and information on climate change, disaster risk reduction, and adaptation actions and policies at the country level. The profile is designed as a quick reference source for development practitioners to better integrate climate resilience in development planning and policy making. This effort is co-led by Veronique Morin (Senior Climate Change Specialist, WBG) and Ana E. Bucher (Senior Climate Change Specialist, WBG).

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Climate and climate-related information is largely drawn from the Climate Change Knowledge Portal (CCKP), a WBG online platform with available global climate data and analysis based on the current Intergovernmental Panel on Climate Change (IPCC) reports and datasets. The team is grateful for all comments and suggestions received from the sector, regional, and country development specialists, as well as climate research scientists and institutions for their advice and guidance on use of climate related datasets.

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FOREWORD

Climate change is a major risk to good development outcomes, and the World Bank Group is committed to playing an important role in helping countries integrate climate action into their core development agendas. The World Bank Group is committed to supporting client countries to invest in and build a low-carbon, climate-resilient future, helping them to be better prepared to adapt to current and future climate impacts.

The World Bank Group is investing in incorporating and systematically managing climate risks in development operations through its individual corporate commitments.

A key aspect of the World Bank Group's Action Plan on Adaptation and Resilience (2019) is to help countries shift from addressing adaptation as an incremental cost and isolated investment to systematically incorporating climate risks and opportunities at every phase of policy planning, investment design, implementation and evaluation of development outcomes. For all IDA and IBRD operations, climate and disaster risk screening is one of the mandatory corporate climate commitments. This is supported by the World Bank Group's Climate and Disaster Risk Screening Tool which enables all Bank staff to assess short- and long-term climate and disaster risks in operations and national or sectoral planning processes. This screening tool draws up-to-date and relevant information from the World Bank Group's Climate Change Knowledge Portal, a comprehensive online 'one-stop shop' for global, regional, and country data related to climate change and development.

Recognizing the value of consistent, easy-to-use technical resources for client countries as well as to support respective internal climate risk assessment and adaptation planning processes, the World Bank Group's Climate Change Group has developed this content. Standardizing and pooling expertise facilitates the World Bank Group in conducting initial assessments of climate risks and opportunities across sectors within a country, within institutional portfolios across regions, and acts as a global resource for development practitioners.

For developing countries, the climate risk profiles are intended to serve as public goods to facilitate upstream country diagnostics, policy dialogue, and strategic planning by providing comprehensive overviews of trends and projected changes in key climate parameters, sector-specific implications, relevant policies and programs, adaptation priorities and opportunities for further actions.

It is my hope that these efforts will spur deepening of long-term risk management in developing countries and our engagement in supporting climate change adaptation planning at operational levels.

Bernice Van Bronkhorst
Global Director
Climate Change Group (CCG)
The World Bank Group (WBG)

KEY MESSAGES

- Palau is warming and is expected to warm throughout the 21st century. Future rates of warming are clouded by current models' inability to simulate very localized changes but, warming is likely to be in the range of 0.8°C—3.2°C depending on the 21st century rate of global emissions.
- Natural variability between years, even decades, ensure short- and medium-term rainfall changes are difficult to detect but broadly speaking, it is expected that Palau's climate will become wetter.
- Sea-level rise in Palau is projected to increase throughout the century, with models showing a very high confidence in this trend. While most of Palau is situated nine meters above sea level, sea-level rise still threatens to significantly impact the country's economy and ecology.
- Coral bleaching as a result of climate change is a significant risk to the country's ecology and economy and part of a global picture of coral loss.
- The Government of Palau highlighted the three priority risks for the agriculture and fisheries sectors associated with climate change, these include: salt water intrusion/inundation; changes in fish movement and spawning seasons, including negative impacts on marine species; and changes in water quality impacting agricultural and marine resources and food security.
- Climate change has brought into focus different elements of social and cultural issues found in Pacific islands, around land and wealth equity. Some argue the perception of the vulnerability of Pacific islands like Palau deny the agency of Pacific island inhabitants to define climate change on their own terms and implement their own local solutions.

COUNTRY OVERVIEW

Palau is a microstate consisting of an archipelago of 586 islands located in the Western Pacific Ocean. The main archipelago stretches across a 200 kilometers (km) range in roughly a north-south orientation, starting from the Ngeruangel atoll in the north, down to the Angaur in the south.[1] In 2020, its population was estimated as over 18,000 people,[2] with most of the population are located in the south of the main island of Babelthuap.[3] Palau's economy is based on tourism, subsistence agriculture and fishing, and the country relies heavily on US Aid in the form of the Compact of Free Association.[4] Tourism has seen a boost in recent years, in part due to rise of air travel in the Pacific and increased prosperity in East Asia. The country's GDP is $268 million (2019), with GDP per capita at $14,908 (2019). Palau is a biologically rich island group, home to the largest rainforests in the Micronesia region, as well as mangrove forests, seagrass beds and barrier reefs.[5]

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1 AOSIS (2019). Palau. URL: https://www.aosis.org/member-states/pacific-ocean/palau/

2 World Bank (2021). World Development Indicators. DataBank. [accessed 19 October, 2021]. URL: https://databank.worldbank.org/source/world-development-indicators

3 CIA (2020). *The World Factbook*. Central Intelligence Agency. Washington DC. URL: https://www.cia.gov/the-world-factbook/

4 Australian Bureau of Meteorology and CSIRO (2014). Climate Variability, Extremes and Change in the Western Tropical Pacific: New Science and Updated Country Reports. Pacific-Australia Climate Change Science and Adaptation Planning Program Technical Report, Australian Bureau of Meteorology and Commonwealth Scientific and Industrial Research Organisation, Melbourne, Australia. URL: https://www.pacificclimatechangescience.org/wp-content/uploads/2014/07/PACCSAP_CountryReports2014_WEB_140710.pdf

5 UNDP (2012). PACC Country Brief – Palau. URL: https://www.adaptation-undp.org/explore/micronesia/palau

Climate change poses several threats to the country, including coral bleaching, intense rainfall, sea-level rise, droughts and increased storm activity.[4] Palau submitted its Intended Nationally Determined Contribution in November 2015 and its Second National Communication to the UNFCCC in 2013. Palau committed to a 22% reduction in energy sector emissions below 2005 levels by 2025. Palau estimates that the investment required to achieve its INDC targets in renewable energy and energy efficiency at $5.5 million, with potentially savings of $2.5 million arising by 2025. As shown in **Table 1** data can be very limited for assessment of social and economic vulnerability in Palau, this can act as a barrier to understanding and responding to climate change.

Green, Inclusive and Resilient Recovery

The coronavirus disease (COVID-19) pandemic has led to unprecedented adverse social and economic impacts. Further, the pandemic has demonstrated the compounding impacts of adding yet another shock on top of the multiple challenges that vulnerable populations already face in day-to-day life, with the potential to create devastating health, social, economic and environmental crises that can leave a deep, long-lasting mark. However, as governments take urgent action and lay the foundations for their financial, economic, and social recovery, they have a unique opportunity to create economies that are more sustainable, inclusive and resilient. Short and long-term recovery efforts should prioritize investments that boost jobs and economic activity; have positive impacts on human, social and natural capital; protect biodiversity and ecosystems services; boost resilience; and advance the decarbonization of economies.

This document aims to succinctly summarize the climate risks faced by Palau. This includes rapid onset and long-term changes in key climate parameters, as well as impacts of these changes on communities, livelihoods and economies, many of which are already underway. This is a high-level synthesis of existing research and analyses, focusing on the geographic domain of Palau, therefore potentially excluding some international influences and localized impacts. The core climate projections presented are sourced from the Pacific-Australia Climate Change Science and Adaptation Planning Program[6,7] as well as the World Bank Group's Climate Change Knowledge Portal (CCKP), incorporating climate projections from the Coupled Model Inter-comparison Project Phase 5 (CMIP5). This document is primarily meant for WBG staff to inform their climate actions. The document also aims to direct the reader to many useful sources of secondary data and research.

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6 Australian Bureau of Meteorology and CSIRO (2014) Climate Variability, Extremes and Change in the Western Tropical Pacific: New Science and Updated Country Reports. Pacific-Australia Climate Change Science and Adaptation Planning Program Technical Report, Australian Bureau of Meteorology and CSIRO, Melbourne, Australia. URL: https://www.pacificclimatechangescience.org/wp-content/uploads/2014/07/PACCSAP_CountryReports2014_WEB_140710.pdf

7 The NextGen projections for the Pacific region under CMIP5 are expected to be available from late 2021. These will provide an update on the PACCSAP 2014 projections referenced in this profile. The process for providing the new NextGen CMIP6 projections for the Pacific is still in the planning phase.

TABLE 1. Key indicators

Indicator	Value	Source
Population Undernourished[8]	N/A	FAO, 2020
National Poverty Rate[9]	N/A	ADB, 2020a
Share of Wealth Held by Bottom 20%[10]	N/A	World Bank, 2020
Net Annual Migration Rate[11]	N/A	UNDESA, 2019
Infant Mortality Rate (Between Age 0 and 1)[12]	N/A	UNDESA, 2019
Average Annual Change in Urban Population[13]	1.8% (2015–20)	UNDESA, 2019
Dependents per 100 Independent Adults[14]	N/A	UNDESA, 2019
Urban Population as % of Total Population[15]	81% (2020)	CIA, 2020
External Debt Ratio to GNI[16]	31.1% (2019)	ADB, 2020b
Government Expenditure Ratio to GDP[17]	34.3% (2019)	ADB, 2020b

CLIMATOLOGY

Climate Baseline

Overview

Palau's climate is hot and humid (average relative humidity is 82%), with the mean daily air temperature at around 28°C. There is little season variability in its temperature, with the difference between its hottest and its coldest months as little as 0.8°C. The main wet season is between May and October, with June and August having the largest rainfall. Rainfall can vary between years, the result of an El Nino Southern Oscillation (ENSO): El Nino years are drier, La Nina are on average wetter. **Figure 1** shows the observed temperature and precipitation across the seasonal cycle for Palau, for the latest climatology, 1991–2020.

8 FAO, IFAD, UNICEF, WFP, WHO (2020). The state of food security and nutrition in the world. Building Resilience for peace and food security. FAO. Rome. URL: http://www.fao.org/documents/card/en/c/ca9692en/

9 ADB (2020a). Basic Statistics 2020. Asian Development Bank. Manila. URL: https://www.adb.org/publications/basic-statistics-2020

10 World Bank (2021). Income share held by lowest 20%. URL: https://data.worldbank.org/indicator/SI.DST.FRST.20 [accessed 19/10/2021]

11 UNDESA (2019). World Population Prospects 2019. URL: https://population.un.org/wpp/Download/Standard/Population/ [accessed 15/02/2021]

12 UNDESA (2019). World Population Prospects 2019. URL: https://population.un.org/wpp/Download/Standard/Population/ [accessed 15/02/2021]

13 UNDESA (2019). World Urbanization Prospects 2019. URL: https://population.un.org/wup/Download/ [accessed 15/02/2021]

14 UNDESA (2019). World Population Prospects 2019. URL: https://population.un.org/wpp/Download/Standard/Population/ [accessed 15/02/2021]

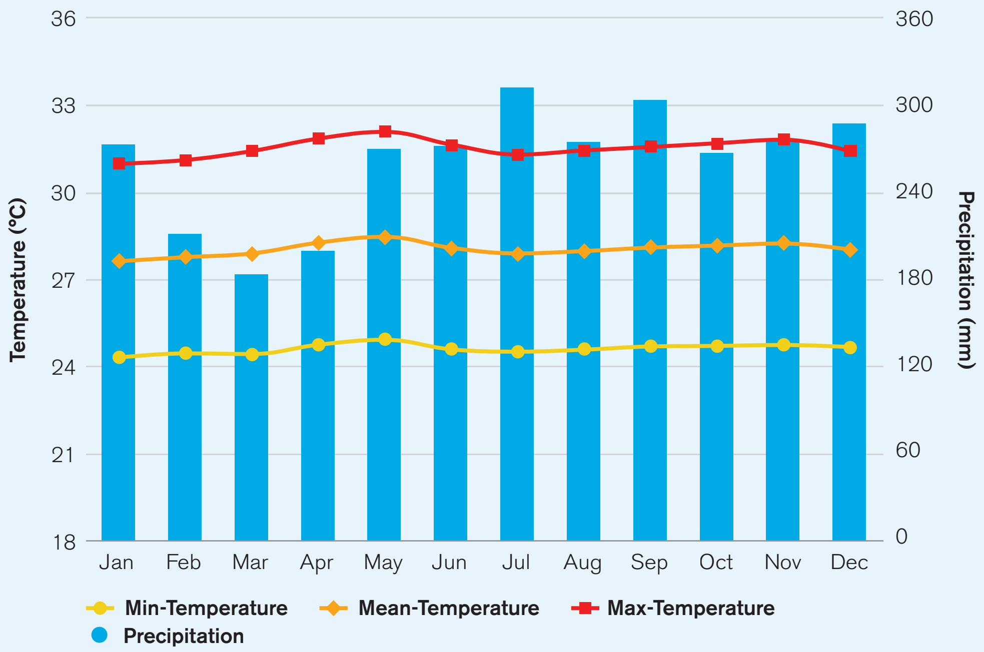
15 CIA (2020). *The World Factbook*. Central Intelligence Agency. Washington DC. URL: https://www.cia.gov/the-world-factbook/

16 ADB (2020b). Key Indicators for Asia and the Pacific 2020, 51st Edition. Asian Development Bank. Manila. URL: https://www.adb.org/sites/default/files/publication/632971/ki2020.pdf

17 ADB (2020b). Key Indicators for Asia and the Pacific 2020, 51st Edition. Asian Development Bank. Manila. URL: https://www.adb.org/sites/default/files/publication/632971/ki2020.pdf

Annual Cycle

FIGURE 1. Average monthly mean, max, and min temperatures and rainfall in Palau, 1991–2020[18]



Key Trends

Temperature

Warming trends are observed in Palau.[3] Since 1953, annual and seasonal maximum temperatures have increased at a rate of 0.11°C (0.2°F) per decade.[19] In the Koror region, the annual number of warm days and warm nights have increased, with the annual number of cool days having decreased.[3]

Precipitation

A study has pointed to significant natural multi-decadal rainfall variability in the South Pacific Convergence Zone (which Palau is situated within). Observation records over 400 years shows that abrupt changes of ~1800 millimeters (mm) can occur between wet seasons, these often link to ENSO atmospheric circulation patterns.[20] However, no changes in rainfall patterns significantly outside the range of normal inter-annual variation have been documented and linked to human-induced climate changes.

[18] WBG Climate Change Knowledge Portal (CCKP, 2021). Climate Data: Historical. URL: https://climateknowledgeportal.worldbank.org/country/palau/climate-data-historical

[19] Government of Palau. (2015). Palau Climate Change Policy: For Climate and Disaster Resilient Low Emissions Development. URL: https://www.pacificclimatechange.net/sites/default/files/documents/PalauCCPolicy_WebVersion-FinanceCorrections_HighQualityUPDATED%2011182015Compressed.pdf

[20] Partin, J.W., Quinn, T.M., Shen, C.C., Emile-Geay, J., Taylor, F.W., Maupin, C.R., Lin, K., Jackson, C.S., Banner, J.L., Sinclair, D.J. and Huh, C.A., 2013. Multidecadal rainfall variability in South Pacific Convergence Zone as revealed by stalagmite geochemistry. *Geology, 41*(11), pp. 1143–1146. DOI: https://doi.org/10.1130/G34718.1

Climate Future

Model Ensemble

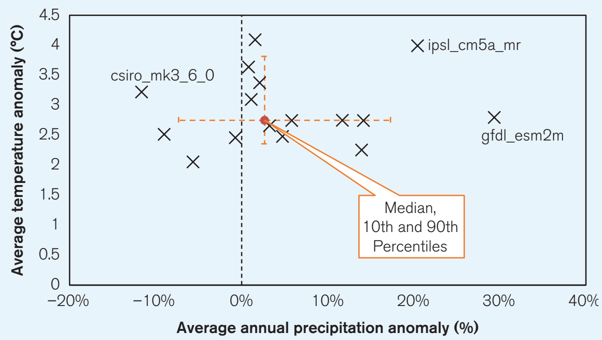
Due to differences in the way global circulation models (GCMs) represent the key physical processes and interactions within the climate system, projections of future climate conditions can vary widely between different GCMs. This is particularly the case for rainfall related variables and at sub-national scales. Exploring the spread of climate model outputs can assist in understanding uncertainties associated with climate models. The range of projections from 16 GCMs on the indicators of average temperature anomaly and annual precipitation anomaly for Palau under RCP8.5 is shown in **Figure 2**.

The majority of the models from which outputs are presented in this report are from the CMIP5 round of standardization and quality assurance. Unfortunately, models of this generation operate at large spatial scales and are not well equipped to simulate the future climate of small islands. Typically, the changes projected will relate more to the expected changes over nearby ocean than the island itself. Caution should therefore be applied in interpreting results. This highlights a major area for future development, a research opportunity, and an urgent need from the perspective of policy makers planning for climate change.

RCPs

The Representative Concentration Pathways (RCPs) represent four plausible futures, based on the rate of emissions reduction achieved at the global level. Four RCPs (i.e. RCP2.6, RCP4.5, RCP6.0, and RCP8.5) were selected and defined by their total radiative forcing (cumulative measure of GHG emissions from all sources) pathway and level by 2100. In this

FIGURE 2. 'Projected average temperature change' and 'projected annual rainfall change' in Palau. Outputs of 16 models within the ensemble simulating RCP8.5 over the period 2080–2099. Models shown represent the subset of models within the ensemble which provide projections across all RCPs and therefore are most robust for comparison.[21] Three models are labelled.



A Precautionary Approach

Studies published since the last iteration of the IPCC's report (AR5), such as Gasser et al. (2018), have presented evidence which suggests a greater probability that earth will experience medium and high-end warming scenarios than previously estimated.[22] Climate change projections associated with the highest emissions pathway (RCP8.5) are presented here to facilitate decision making which is robust to these risks.

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[21] WBG Climate Change Knowledge Portal (CCKP, 2021). Climate Data: Projections. URL: https://climateknowledgeportalworldbank.org/country/palua/climate-data-projections

[22] Gasser, T., Kechiar, M., Ciais, P., Burke, E. J., Kleinen, T., Zhu, D., . . . Obersteiner, M. (2018). Path-dependent reductions in CO2 emission budgets caused by permafrost carbon release. Nature Geoscience, 11, 830–835. URL: https://www.nature.com/articles/s41561-018-0227-0?WT.feed_name=subjects_climate-sciences

analysis, RCP2.6 and RCP8.5, the low and high emissions pathways, are the primary focus; RCP2.6 represents a very strong mitigation scenario, whereas RCP8.5 assumes a high-emissions scenario. For reference, **Table 2** provides information on all four RCPs over two-time horizons. In subsequent analysis RCPs 2.6 and 8.5, the low and high emissions pathways, are the primary focus. RCP2.6 would require rapid and systemic global action, achieving significant emissions reduction throughout the 21st century. RCP8.5 assumes annual global emissions will continue to increase throughout the 21st century. Climate changes under each emissions pathway are presented against a reference period of 1986–2005 for all indicators. For more information, please refer to the RCP Database.

TABLE 2. An overview of Palau's temperature change projections (°C) under four emissions pathways. Projected changes over the 1986–2005 baseline are given for 20-year periods centered on 2050 and 2090 with the 5th and 95th percentiles provided in brackets.

	Mean Surface Air Temp (Annual)		Max Temp (1-in-20 Year Event)		Min Temp (1-in-20 Year Event)	
Scenario	**2050**	**2090**	**2050**	**2090**	**2050**	**2090**
RCP2.6	0.8 (0.6–1.1)	0.8 (0.4–1.2)	0.8 (0.3–1.1)	0.8 (0.1–1.1)	0.7 (0.3–1)	0.7 (0.3–1)
RCP4.5	1 (0.7–1.4)	1.4 (1–2.1)	1 (0.5–1.4)	1.4 (0.9–2)	0.9 (0.6–1.2)	1.3 (0.9–1.7)
RCP6.0	0.9 (0.7–1.4)	1.8 (1.4–2.5)	NA	NA	NA	NA
RCP8.5	1.4 (1–1.9)	3 (2.1–4)	1.5 (0.9–2.2)	3.2 (2–4.4)	1.5 (1.1–2)	3.2 (2.3–4.1)

Temperature

Projections of future temperature change are presented in three primary formats. Shown in **Table 2** are the changes (anomalies) in maximum and minimum temperatures over the given time period, as well as changes in the average temperature. **Figures 2** and **3** display only the average temperature projections. While similar, these three indicators can provide slightly different information. Monthly/annual average temperatures are most commonly used for general estimation of climate change, but the daily maximum and minimum can explain more about how daily life might change in a region, affecting key variables such as the viability of ecosystems, health impacts, productivity of labor, and the yield of crops, which are often disproportionately influenced by temperature extremes.

All RCPs project a warming up to 1°C by 2030 relative to 1995 temperatures. Beyond 2030, the emissions pathway projections differ: by the 2090s, RCP 2.6 projects a warming of between 0.4°C—1.2°C, with RCP8.5 projecting a warming of between 2.1°C—4.0°C. Natural variability in Palau's climate means that relatively warm and cool years (and decades) may occur, but the overall trend is one of increasing temperatures. **Figure 3** presents the projections for all four RCPs.

Precipitation

Most climate models point to a small increase in average rainfall, with the increase greater for the emission scenarios RCP6.0 and RCP8.5. The models point to little change in rainfall between November and April, with the majority of the models project increases in the May—October period. Natural variability between years, even decades, ensure short- and medium-term rainfall changes may not be apparent. But broadly speaking, it is expected that Palau's climate will become wetter. Generally, there is great uncertainty when projecting precipitation changes, as the large error bars in **Figure 4** exemplify. The difficulty in predicting the behavior of ENSO, which has considerable impact on year-to-year rainfall variability, is also a contributing factor to uncertainty in projections.

FIGURE 3. Historical and simulated surface air temperature time series for the region surrounding Palau. The graph shows the anomaly (from the base period 1986–2005) in surface air temperature from observations (the GISS dataset, in purple), and for the CMIP5 models under the very high (RCP8.5, in red) and very low (RCP2.6, in blue) emissions scenarios. The solid red and blue lines show the smoothed (20-year running average) multi-model mean anomaly in surface air temperature, while shading represents the spread of model values (5–95th percentile). The dashed lines show the 5–95th percentile of the observed interannual variability for the observed period (in black) and added to the projections as a visual guide (in red and blue). This indicates that future surface air temperature could be above or below the projected long-term averages due to interannual variability. The ranges of projections for a 20-year period centered on 2090 are shown by the bars on the right for RCP8.5, 6.0, 4.5 and 2.6.[23]

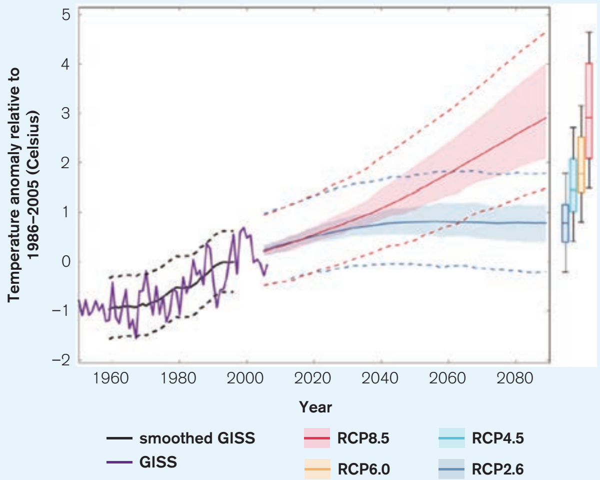
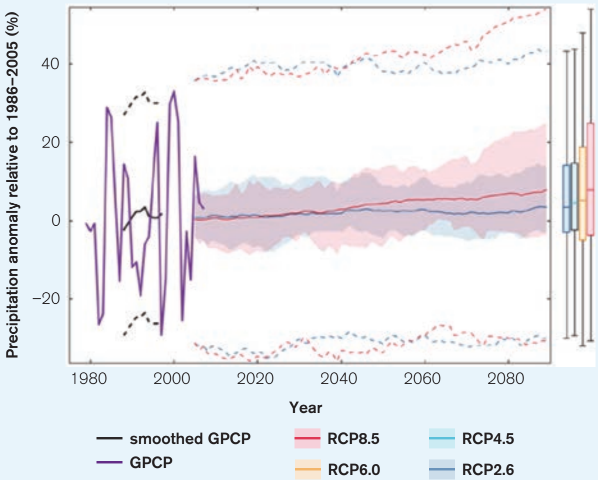


FIGURE 4. Historical and simulated annual average rainfall time series for the region surrounding Palau. The graph shows the anomaly (from the base period 1986–2005) in rainfall from observations (the GPCP dataset, in purple), and for the CMIP5 models under the very high (RCP8.5, in red) and very low (RCP2.6, in blue) emissions scenarios. The solid red and blue lines show the smoothed (20-year running average) multi-model mean anomaly in rainfall, while shading represents the spread of model values (5–95th percentile). The dashed lines show the 5–95th percentile of the observed interannual variability for the observed period (in black) and added to the projections as a visual guide (in red and blue). This indicates that future rainfall could be above or below the projected long-term averages due to interannual variability. The ranges of projections for a 20-year period centered on 2090 are shown by the bars on the right for RCP8.5, 6.0, 4.5 and 2.6. Climate Change and Natural Hazard Risk.



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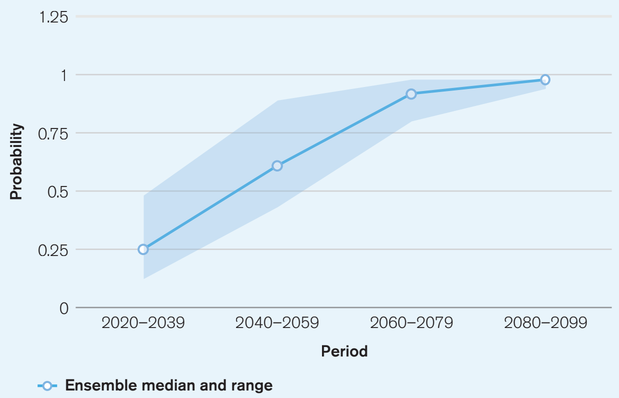
[23] Australian Bureau of Meteorology and CSIRO (2014). Climate Variability, Extremes and Change in the Western Tropical Pacific: New Science and Updated Country Reports. Pacific-Australia Climate Change Science and Adaptation Planning Program Technical Report, Australian Bureau of Meteorology and Commonwealth Scientific and Industrial Research Organization, Melbourne, Australia. URL: https://www.pacificclimatechangescience.org/wp-content/uploads/2014/07/PACCSAP_CountryReports2014_WEB_140710.pdf

Heat Waves

Heat waves are defined as a period of 3 or more days when the daily temperature remains above the 95th percentile.[17] **Figure 5** shows the projected change in heat wave probability under RCP8.5 (compared to 1986–2005), highlighting the daily probability of a sudden heat wave in subsequent time periods. For Palau, this probability from 25% during the 2030s, to close to 100% by the 2070s (92%) and the 2090s (98%). This is held within the global context in which the number of heat waves is expected to increase. It is also important to note that systematic warming is expected to lead to the largest increases in heat wave probability in the tropics, simply because the present day-to-day and month-to-month variability is very small.

FIGURE 5. Projected change in probability of heat waves for Palau (compared to 1986–2005)[17]



An additional factor for consideration is the potential for marine heat waves. Research has identified the Western Tropical Pacific as a global hotspot for climate change impacts on marine heat waves. Marine heat waves are projected to extend their spatial footprint and to grow in duration and intensity.[24] The consequences of this trend may be serious for marine ecosystems in the region (and the livelihoods dependent on them), which are adapted to survive under very stable temperature regimes. See Coral Reef and Fisheries section for more information.

Drought

The available climate projections point to a potential decrease in the time spent in drought under all RCP scenarios in Palau. ABM and CSIRO suggest that under the RCP2.6 pathway, the frequency of mild or moderate droughts will decrease, with severe and extreme droughts remaining stable. For the highest emission pathway, RCP8.5, frequency of all drought conditions are projected to decrease, with duration of moderate to extreme droughts also set to decrease. Duration of mild drought are projected to remain stable.[25] However, further research is urgently required to improve the level of confidence in such projections.

[24] Frölicher, T. L., Fischer, E. M., & Gruber, N. (2018). Marine heatwaves under global warming. Nature, 560(7718), 360–364. URL: https://www.nature.com/articles/s41586-018-0383-9

[25] Australian Bureau of Meteorology and CSIRO (2014). Climate Variability, Extremes and Change in the Western Tropical Pacific: New Science and Updated Country Reports. Pacific-Australia Climate Change Science and Adaptation Planning Program Technical Report, Australian Bureau of Meteorology and Commonwealth Scientific and Industrial Research Organization, Melbourne, Australia. URL: https://www.pacificclimatechangescience.org/wp-content/uploads/2014/07/PACCSAP_CountryReports2014_WEB_140710.pdf

In contrast with the above suggestions, some publications identify increased drought as one of Palau's main vulnerabilities to climate change.[26] A drought in March 2016 highlighted the country's vulnerability to extreme drought: rainfall in Koror in the four months beforehand were the lowest in 65 years, Koror's only dam dried up and the Ngerikiil River was at 19% capacity. As a consequence, 80% of Palau's population experienced decreased water supply, water shortages, poor sanitation, wildfire outbreaks and crop failure. Children had a high risk of being exposed to malnutrition.[27,28]

Flood, Cyclones, and Storm Surge

Climate change is expected to interact with cyclone hazard in complex ways which are currently poorly understood. Known risks include the action of sea-level rise to enhance the damage caused by cyclone-induced storm surges, and the possibility of increased wind speed and precipitation intensity. Modelling of climate change impacts on cyclone intensity and frequency conducted across the globe points to a general trend of reduced cyclone frequency but increased intensity and frequency of the most extreme events.[29] Further research is required to better understand potential changes in cyclone seasonality and routes in the Pacific, and the potential for cyclone hazards to be experienced in unprecedented locations.

While Palau is situated just south of the Pacific Ocean 'typhoon belt' (between 10°N and 40°N), it does experience typhoons. Two recent examples took place in December 2012 and November 2013, which caused significant wind damage to trees, homes and structures, saltwater water intrusion to agriculture, alterations to lagoon patterns and storm surge flooding to coastal areas. Palau's First National Communication to UNFCCC talks of a potential increase in the occurrence of typhoons due to climate change due to large-scale changes to circulation patterns.[30] However, modeling tends to suggest a decrease in typhoon frequency (albeit with a low confidence).[6]

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[26] Center for Excellence in Disaster Management & Humanitarian Assistance. (2016). Palau: Disaster Management Reference Handbook 2016. URL: https://reliefweb.int/report/palau/palau-disaster-management-reference-handbook-2016 [Accessed 19th July 2019].

[27] Government of Palau. (2015). Palau Climate Change Policy For Climate and Disaster Resilient Low Emissions Development. URL: 2015. URL: https://www.pacificclimatechange.net/sites/default/files/documents/PalauCCPolicy_WebVersion-FinanceCorrections_HighQualityUPDATED%2011182015Compressed.pdf [Accessed 19th July 2019].

[28] Leal Filho, W (2018). Climate Change Impacts and Adaptation Strategies for Coastal Communities. Springer, 2018. (Eds 2018). URL: https://www.springer.com/gp/book/9783319707020

[29] Walsh, K., McBride, J., Klotzbach, P., Balachandran, S., Camargo, S., Holland, G., Knutson, T., Kossin, J., Lee, T., Sobel, A., Sugi, M. (2015) Tropical cyclones and climate change. WIREs Climate Change: 7: 65–89. URL: https://onlinelibrary.wiley.com/doi/abs/10.1002/wcc.371

[30] Government of Palau (2013). Second National Communication to UNFCC. URL: https://unfccc.int/sites/default/files/resource/Final_Palau%20National%20Communication.pdf [Accessed 19th July 2019].

Natural Resources

Water

Most Pacific island states are almost entirely dependent upon rainfall to support agricultural production, and thus are highly vulnerable to rainfall variability.[31] Regardless of climate change trends, Palau's water resources are likely to be put under strain from population growth and economic development.[32] Pacific islands like Palau face impacts of climate change such as increased temperatures, sea-level rise and changing precipitation patterns, all of which impacts water security.[33] Palau's First National Communication to the UNFCCC highlights climate change alongside man-made contamination as the main threats to the country's water resources. The Communication cites potential decreases in precipitation having an impact.[27]

The Coastal Zone

Sea-level rise threatens significant physical changes to coastal zones around the world. Global mean sea-level rise was estimated in the range of 0.44 meters (m) –0.74 m by the end of the 21st century by the IPCC's Fifth Assessment Report[34] but some studies published more recently have highlighted the potential for greater rises (**Table 3**). Local sea-levels can show variation and are influenced by ENSO.

TABLE 3. Estimates of global mean sea-level rise by rate and total rise compared to 1986–2005 including likely range shown in brackets, data from Chapter 13 of the IPCC's Fifth Assessment Report with upper-end estimates based on higher levels of Antarctic ice-sheet loss from Le Bars et al. (2017).[35]

Scenario	Rate of Global Mean Sea-Level Rise in 2100	Global Mean Sea-Level Rise in 2100 Compared to 1986–2005
RCP2.6	4.4 mm/yr (2.0–6.8)	0.44 m (0.28–0.61)
RCP4.5	6.1 mm/yr (3.5–8.8)	0.53 m (0.36–0.71)
RCP6.0	7.4 mm/yr (4.7–10.3)	0.55 m (0.38–0.73)
RCP8.5	11.2 mm/yr (7.5–15.7)	0.74 m (0.52–0.98)
Estimate inclusive of high-end Antarctic ice-sheet loss		1.84 m (0.98–2.47)

31 UNEP (2011). Freshwater Under Threat Pacific Islands: Vulnerability Assessment of Freshwater Resources to Environmental Change. URL: https://www.zaragoza.es/contenidos/medioambiente/onu/830_eng.pdf

32 Office of Environmental Response and Coordination. (2001). Republic of Palau: Current and Projected Impacts of Climate Change. URL: https://www.sprep.org/att/IRC/eCOPIES/Countries/Palau/1.pdf [Accessed 19th September 2019].

33 Mcleod, Elizabeth & Bruton-Adams, Mae & Förster, Johannes & Franco, Chiara & Gaines, Graham & Gorong, Berna & James, Robyn & Posing-Kulwaum, Gabriel & Tara, Magdalene & Terk, Elizabeth. (2019). Lessons from the Pacific Islands – Adapting to Climate Change by Supporting Social and Ecological Resilience. *Frontiers in Marine Science.* 6. 10.3389/fmars.2019.00289. DOI: https://doi.org/10.3389/fmars.2019.00289

34 Church, J. a., Clark, P. U., Cazenave, A., Gregory, J. M., Jevrejeva, S., Levermann, A., . . . Unnikrishnan, A. S. (2013). Sea level change. In Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (pp. 1137–1216). Cambridge, United Kingdom and New York, NY, USA: Cambridge University Press. URL: https://www.ipcc.ch/site/assets/uploads/2018/02/WG1AR5_Chapter13_FINAL.pdf

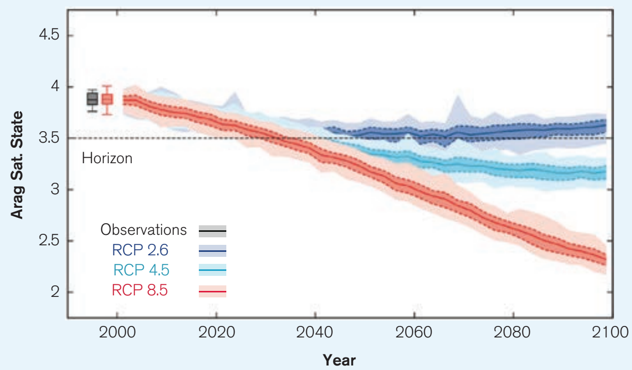
35 Le Bars, D., Drijhout, S., de Vries, H. (2017) A high-end sea level rise probabilistic projection including rapid Antarctic ice sheet mass loss. Environmental Research Letters: 12:4. URL: https://iopscience.iop.org/article/10.1088/1748-9326/aa6512

Sea-level rise in Palau is projected to increase throughout the century,[36] with models showing a very high confidence in this trend. For all RCPs, CMIP5 models estimate a rise of between approximately 8–18 centimeter (cm) by 2030. Under the highest RCP8.5 pathway, the 2090s could witness sea-level rise increases of 41 cm–88 cm.[6] While most of Palau is situated 9 meters above sea level, sea-level rise still threatens to significantly impact the country's economy and ecology.[37] Most of the population inhabits the coastal lowlands and the higher ground is not optimal for agriculture or human settlement due to its hilly, densely-forested nature.[38] One study describes the relatively high costs of coastal protection (as a % of GDP) required by Palau to respond to projected sea-level rise compared with other countries, which reflects the difficulties involved in adapting to sea-level rise.[39]

Coral Reefs

Calcium carbonite is used for the external skeletons of multiple marine organisms – for instance, plankton, coral reefs, and shell-fish. Increases in atmospheric carbon dioxide are understood to lead to reduced levels of calcium carbonite saturation on the ocean's service via an increase in ocean acidification and by decreasing carbonite ion concentrations. As a result, there are serious concerns that if carbonite minerals, such as aragonite, become under saturated, it could undermine current ocean ecosystems.[40] **Figure 6** shows the projected aragonite saturation state under three emission scenarios for Palau. Worryingly under RCP4.5 and 8.5, the saturation state is expected to decrease below the threshold needed to sustain healthy coral reefs.

FIGURE 6. Projected changes in aragonite saturation state in Palau from CMIP5 models under RCP2.6, 4.5 and 8.5. Shown are the median values (solid lines), the interquartile range (dashed lines), and 5% and 95% percentiles (light shading). The horizontal line represents the threshold at which transition to marginal conditions for coral reef health typically occurs.[20]



A 2018 study assessed the extent to which reefs can keep up with projected sea-level rise under different RCPs, concluding that Palau's nearshore reefs are more vulnerable to sea-level rise than other reef habitats. Multiple factors will determine whether coral reefs can naturally adapt, including rate of sea-level rise, ocean warming, local pollution and land-use management.[41] The effects of the 1998 El Niño show the impact extreme marine warming conditions can have

[36] The Nature Conservancy (2018). Climate Projections and Impacts for the Republic of Palau. URL: http://reefresilience.org/wp-content/uploads/ClimateSummary_Palau.pdf [Accessed 19th July 2019].
[37] Van Woesik, Robert & Golbuu, Yimnang & Roff, George. (2015). Keep up or drown: Adjustment of western Pacific coral reefs to sea-level rise in the 21st century. *Royal Society Open Science*. 2. URL: https://royalsocietypublishing.org/doi/10.1098/rsos.150181
[38] UNFCCC (2017). Palau Current Forecast: Palua and a Changing Climate. COP23. URL: https://cop23.com.fj/palau/
[39] Nicholls, Robert & Tol, Richard. (2006). Impacts and responses to sea-level rise: A global analysis of the SRES scenarios over the twenty-first century. Philosophical transactions. Series A, Mathematical, physical, and engineering sciences. 364. DOI: https://doi.org/10.1098/rsta.2006.1754
[40] Orr, J. C., Fabry, V. J., Aumont, O., Bopp, L., Doney, S. C., Feely, R. A., . . . & Key, R. M. (2005). Anthropogenic ocean acidification over the twenty-first century and its impact on calcifying organisms. Nature, 437(7059), 681. URL: https://www.nature.com/articles/nature04095
[41] Van Woesik, Robert & Golbuu, Yimnang & Roff, George. (2015). Keep up or drown: Adjustment of western Pacific coral reefs to sea-level rise in the 21st century. *Royal Society Open Science*. 2. URL: https://royalsocietypublishing.org/doi/10.1098/rsos.150181

on Palau's coral reefs: large-scale coral bleaching took place, nearly 70% of Scleractinia corals bleached at 10-to-12-meter depths, with some coral species declining by as much as 99%.[42]

Economic Sectors

Agriculture and Fisheries

Agriculture in Pacific islands such as Palau is likely to be affected by climate change in numerous ways. Agriculture production, especially when situated near the coast, faces increased erosion, salt water intrusion, storm surges, heat stress and drought, all having implications for food production.[43] Furthermore, climate change might impact infrastructure, through extreme weather events, such as processing and storage equipment and transport links such as roads, affecting both subsistence and commercial agriculture.[40] Palau's Office of Environmental Response and Coordination describe how climate changes exert significant permanent stressors on the country's food supply, citing recent examples where drought and saltwater intrusion have caused damage to Palau's taro patches and other agricultural areas.[29]

In the Government's 2015 climate change policy, they highlighted the top three priority risks associated with agriculture and fisheries: these include salt water intrusion/inundation (particularly taro patches); changes in fish movement and spawning seasons, negative impacts on marine species, and disruption to the food chain; and erosion/sedimentation and changes in water quality impacting agricultural and marine resources and food security.[15]

A further, and perhaps lesser appreciated influence of climate change on agricultural and fisheries production is through its impact on the health and productivity of the labor force. Dunne et al. (2013) suggest that global labor productivity during peak months has already dropped by 10% as a result of warming, and that a decline of up to 20% might be expected by the 2050s under the highest emissions pathway (RCP8.5).[44]

Tourism

Tourism represents a significant sector of Palau's economy, contributing US $67 million a year (47% of its GDP).[45] Tourism activity revolves around diving in Palau's biodiverse and rich marine environment.[35] Since 1992, Palau has developed initiatives to protect this rich marine environment by promoting ecotourism, the use of marine reserves an important tool in this effort. Around 80% of the country's EEZ is now designated National Marine Sanctuary.[46] Ecotourism contributes to almost 75% of GDP growth and 40% of total employment.[43]

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[42] UNFCCC (2005). Climate Change, Small Island Developing States. Issued by the CLIMATE CHANGE SECRETARIAT (UNFCCC), Bonn, Germany. URL: https://unfccc.int/resource/docs/publications/cc_sids.pdf. [Accessed 19th July 2019].

[43] Barnett, Jon. (2011). Dangerous climate change in the Pacific Islands: Food production and food security. Reg Environ Change. 11, 229–237. URL: https://link.springer.com/article/10.1007/s10113-010-0160-2

[44] Dunne, J. P., Stouffer, R. J., & John, J. G. (2013). Reductions in labour capacity from heat stress under climate warming. Nature Climate Change, 3(6), 563–566. URL: http://www.precaution.org/lib/noaa_reductions_in_labour_capacity_2013.pdf

[45] UNDP (2012). PACC County Brief – Palau. URL: https://www.adaptation-undp.org/sites/default/files/downloads/pacc_cb_pal.pdf

[46] Wabnitz, Colette & Cisneros-Montemayor, Andrés & Hanich, Quentin & Ota, Yoshitaka. (2017). Ecotourism, climate change and reef fish consumption in Palau: Benefits, trade-offs and adaptation strategies. Marine Policy. DOI: https://doi.org/10.1016/j.marpol.2017.07.022

In a literature review examining the dynamics between climate change and tourism, there appeared to be multiple indications that the tourism sectors of small island states, such as Palau, are particularly vulnerable to climate change.[47] In the long-term, the dual threats of rising sea levels and coastal erosion could reduce the quantity and quality of available beach space without significant adaptation measures and could therefore reduce the attractiveness of the country as a tourist destination. Furthermore, severe coral bleaching will also greatly reduce tourist demand. However, one study notes that while climate change is likely to have the greatest impact on local ecosystems tourism depends on, the consumption of reef fish also contributes greatly to the decline of these marine resources.[43]

In addition to direct physical impacts, climate change may affect the tourism sector in Palau through global efforts to mitigate climate change. One possible manifestation is in the increased cost of international flights. One study estimated that while the cost of achieving an emissions-target compatible tourism sector may be proportionately low (3.6%) the necessary increase in trip costs may reduce Palau's attractiveness as a tourist destination.[48] Notably the estimated increase in trip costs of $11 is only a global average, and may be considerably higher for a long-haul destination such as Palau. Further research is required to better constrain the suite of potential climate change impacts on the sector.

Communities

Poverty, Inequality and Vulnerability to Climate-Related Disaster

Many of the climate changes projected are likely to disproportionately affect the poorest groups in society. For instance, heavy manual labor jobs are commonly among the lowest paid whilst also being most at risk of productivity losses due to heat stress.[49] Poorer businesses are the least able to afford air conditioning, an increasing need given the projected increase in the need for air conditioning with temperature increases. Poorer farmers and communities are least able to afford local water storage, irrigation infrastructure, and technologies for adaptation.

Like other Pacific island states, Palau's vulnerability is exacerbated by its geographical remoteness and isolation.[50] However, while often characterized as being on the 'frontline of climate change' by their fragility, vulnerability to projected impacts and lack of adaptation options, some argue this perception can deny the agency of Pacific island inhabitants to define climate change on their own terms and implement their own local solutions.[51] This is especially

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[47] Scott, D., Gössling, S., & Hall, C. M. (2012). International tourism and climate change. Wiley Interdisciplinary Reviews: Climate Change, 3(3), 213–232. DOI: https://doi.org/10.1002/wcc.165

[48] Scott, D., Gössling, S., Hall, C. M., & Peeters, P. (2016). Can tourism be part of the decarbonized global economy? The costs and risks of alternate carbon reduction policy pathways. Journal of Sustainable Tourism, 24(1), 52–72. DOI: https://doi.org/10.1080/09669582.2015.1107080

[49] Kjellstrom, T., Briggs, D., Freyberg, C., Lemke, B., Otto, M., Hyatt, O. (2016) Heat, human performance, and occupational health: A key issue for the assessment of global climate change impacts. Annual Review of Public Health: 37: 97–112. URL: https://www.annualreviews.org/doi/abs/10.1146/annurev-publhealth-032315-021740

[50] World Bank (2017). Climate change and disaster management (English). Pacific possible; background paper no. 6. Washington, D.C.: World Bank Group. URL: http://documents.worldbank.org/curated/en/655081503691935252/Climate-change-and-disaster-management

[51] Mcleod, Elizabeth & Arora-Jonsson, Seema & Masuda, Yuta & Bruton-Adams, Mae & Emaurois, Carol & Gorong, Berna & Hudlow, C & James, Robyn & Kuhlken, Heather & Masike-Liri, Barbara & Musrasrik-Carl, Emeliana & Otzelberger, Agnes & Relang, Kathryn & Reyuw, Bertha & Sigrah, Betty & Stinnett, Christina & Tellei, Julita & Whitford, Laura. (2018). Raising the voices of Pacific Island women to inform climate adaptation policies. Marine Policy. 93. DOI: https://doi.org/10.1016/j.marpol.2018.03.011

the case for Pacific island women.[48] Climate change has brought into focus different elements of social and cultural issues found in Pacific islands, such as issues of equity based on location (such as urban/rural and landowners/ squatters) and disparities on the basis of wealth and income, health, gender, education, health and disability and age.[52] What this highlights is the importance of acknowledging climate change in the Pacific islands, 'should not be treated as a matter of science shaped by computer modelers from outside, but as a vital social and cultural issue affecting almost every aspect of future development, which raises many challenges for all our institutions and communities'.[53]

Gender

An increasing body of research has shown that climate-related disasters have impacted human populations in many areas including agricultural production, food security, water management and public health. The level of impacts and coping strategies of populations depends heavily on their socio-economic status, socio-cultural norms, access to resources, poverty as well as gender. Research has also provided more evidence that the effects are not gender neutral, as women and children are among the highest risk groups. Key factors that account for the differences between women's and men's vulnerability to climate change risks include: gender-based differences in time use; access to assets and credit, treatment by formal institutions, which can constrain women's opportunities, limited access to policy discussions and decision making, and a lack of sex-disaggregated data for policy change.[54]

Human Health

The broad human health risks of climate change in Pacific island countries were assessed in a 2016 study and a large suite of issues were identified. Specifically flagged in Palau were the health impacts of extreme weather events, water security and safety, vector-borne diseases, respiratory illnesses, no-communicable diseases, zoonoses, and a variety of other disorders.[55]

Heat-Related Mortality

Research has placed a threshold of 35°C (wet bulb ambient air temperature) on the human body's ability to regulate temperature, beyond which even a very short period of exposure can present risk of serious ill-health and death.[56] Temperatures significantly lower than the 35°C threshold of 'survivability' can still represent a major threat to human health. Climate change is expected to push global temperatures closer to this temperature 'danger zone' both through slow-onset warming and intensified heat waves. Decision makers must also consider the potential for multiple hazards to strike simultaneously (compound hazards), notably the concurrence of heat wave and tropical cyclone.[57]

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[52] Weir, Tony & Dovey, Liz & Orcherton, Dan. (2017). Social and cultural issues raised by climate change in Pacific Island countries: an overview. Regional Environmental Change. URL: https://link.springer.com/article/10.1007/s10113-016-1012-5

[53] Weir, Tony & Dovey, Liz & Orcherton, Dan. (2017). Social and cultural issues raised by climate change in Pacific Island countries: an overview. Regional Environmental Change. URL: https://link.springer.com/article/10.1007/s10113-016-1012-5

[54] World Bank Group (2016). Gender Equality, Poverty Reduction, and Inclusive Growth. URL: http://documents1.worldbank.org/curated/en/820851467992505410/pdf/102114-REVISED-PUBLIC-WBG-Gender-Strategy.pdf

[55] Lachlan, M., Rokho, K., Alistair, W., Simon, H., Jeffery, S., Dianne, K., . . . L., E. K. (2016). Health Impacts of Climate Change in Pacific Island Countries: A Regional Assessment of Vulnerabilities and Adaptation Priorities. Environmental Health Perspectives, 124(11), 1707–1714. DOI: https://doi.org/10.1289/ehp.1509756

[56] Im, E. S., Pal, J. S., & Eltahir, E. A. B. (2017). Deadly heat waves projected in the densely populated agricultural regions of South Asia. Science Advances, 3(8), 1–8. URL: https://advances.sciencemag.org/content/3/8/e1603322

[57] Matthews, T., Wilby, R.L. and Murphy, C. (2019). An emerging tropical cyclone-deadly heat compound hazard. Nature Climate Change. 9, 602–606. URL: https://www.nature.com/articles/s41558-019-0525-6

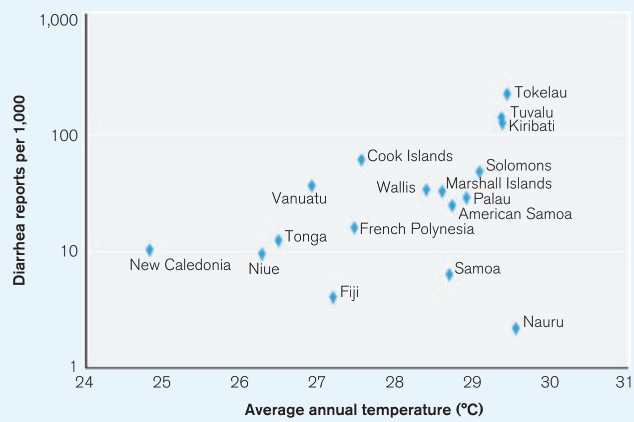
Honda et al. (2014) utilized the A1B emissions scenario from CMIP3 (most comparable to RCP6.0) to estimate that without adaptation, annual heat-related deaths in the Australasian region, could increase by 211% by 2030 and 437% by 2050.[58] The potential reduction in heat-related deaths achievable by pursuing lower emissions pathways is significant, as demonstrated by Mitchell et al. (2018).[59] Further research is required to better understand the implications of extreme heat for Palau's communities given its remote location.

Disease and General Health

Sea-level rises pose a serious threat to the water security of Pacific nations due to potential salinization of potable water sources. Saline intrusion to drinking water sources has been linked to the increased prevalence of hypertension during pregnancy.[60]

Multiple studies have found that increased temperatures, drought, and rainfall are correlated with increases in reported levels of diarrheal disease[61,62,63] including specifically in the Pacific island region.[64] While the interaction between temperature and diarrheal disease is still unclear, one explanation of the association is that rotavirus and other bacteria that cause diarrhea are able to proliferate in warm marine water. Another possible explanation is that higher temperatures can cause food to spoil more rapidly, and thus cause food poisoning.[65] **Figure 7** shows research by Singh et al. (2001),[64] which demonstrated the link between annual average temperature and average reporting rates of diarrheal disease specifically amongst Pacific island states.

FIGURE 7. Annual average temperature and average reporting rates for diarrheal disease, Pacific islands (1986–1994). $r^2 = 0.49$; $p < 0.05$[60]



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[58] Honda, Y., Kondo, M., McGregor, G., Kim, H., Guo, Y-L, Hijioka, Y., Yoshikawa, M., Oka, K., Takano, S., Hales, S., Sari Kovats, R. (2014). Heat-related mortality risk model for climate change impact projection. Environmental Health and Preventive Medicine 19: 56–63. DOI: 10.1007/s12199-013-0354-6

[59] Mitchell, D., Heaviside, C., Schaller, N., Allen, M., Ebi, K. L., Fischer, E. M., . . . Vardoulakis, S. (2018). Extreme heat-related mortality avoided under Paris Agreement goals. Nature Climate Change, 8(7), 551–553. URL: https://pubmed.ncbi.nlm.nih.gov/30319715/

[60] Khan, A. E., Ireson, A., Kovats, S., Mojumder, S. K., Khusru, A., Rahman, A., & Vineis, P. (2011). Drinking water salinity and maternal health in coastal Bangladesh: implications of climate change. Environmental health perspectives, 119(9), 1328–1332. URL: https://pubmed.ncbi.nlm.nih.gov/21486720/

[61] Chou, W. C., Wu, J. L., Wang, Y. C., Huang, H., Sung, F. C., & Chuang, C. Y. (2010). *Science of the Total Environment, 409*(1), 43–51. DOI: 10.1016/j.scitotenv.2010.09.001

[62] Zhou, X., Zhou, Y., Chen, R., Ma, W., Deng, H., & Kan, H. (2013). High temperature as a risk factor for infectious diarrhoea in Shanghai, China. *Journal of epidemiology*, JE20130012. DOI: 10.2188/jea.je20130012

[63] Wu, X., Lu, Y., Zhou, S., Chen, L., & Xu, B. (2016). Impact of climate change on human infectious diseases: Empirical evidence and human adaptation. Environment International, 86, 14–23. DOI: https://doi.org/10.1016/j.envint.2015.09.007

[64] Singh, R. B., Hales, S., De Wet, N., Raj, R., Hearnden, M., & Weinstein, P. (2001). The influence of climate variation and change on diarrheal disease in the Pacific Islands. Environmental health perspectives, 109(2), 155–159. URL: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1240636/

[65] Bentham, G., & Langford, I. H. (2001). Environmental temperatures and the incidence of food poisoning in England and Wales. *International journal of biometeorology, 45*(1), 22–26. DOI: 10.1007/s004840000083

POLICIES AND PROGRAMS

National Adaptation Policies and Strategies

- Intended Nationally Determined Contribution (INDC) (2015)
- Second National Communication (2013)
- First National Communication (2002)

Climate Change Priorities of the WBG

WBG — Regional Partnership Framework

The WBG has agreed a Regional Partnership Framework: Kiribati, Republic of Nauru, Republic of The Marshall Islands, Federated States of Micronesia, Republic of Palau, Independent State of Samoa, Kingdom of Tonga, Tuvalu, and Vanuatu which covers the period 2017–2021. Climate change is one of four key focus areas of the agreement, which states: "Protecting incomes and livelihoods. A key focus will be on strengthened preparedness and resilience to natural disasters and climate change. Interventions will also help countries strengthen health systems and address NCDs."

Under the heading of strengthening resilience to natural disasters and climate change, the Regional Partnership Framework (RPF) aims to continue to support regional and single-country activities that help the PIC9 strengthen their resilience against natural disasters and climate change. PICs combine high exposure to frequent and damaging natural hazards with low capacity to manage the resulting risks. Vulnerability is exacerbated by poor planning, which has increased losses and exposure to natural disasters, and by climate change, which is predicted to amplify the magnitude of cyclones, droughts, and flooding. Sea level rise will worsen coastal erosion and salinization of freshwater resources and increase the severity of storm surges, which will be particularly damaging in atoll islands and low-lying areas. All these impacts adversely affect agriculture, fisheries, coastal zones, water resources, health and ecosystems and the communities that rely upon them. The cost of inaction is substantial. Investments in disaster proofing and climate resilience cost substantially less than rebuilding after a disaster. The WBG will ensure that at least 35 percent of the total portfolio will directly or indirectly support climate-related co-benefits. The RPF further identifies a range of regional and country-specific interventions including vulnerability assessment and disaster risk planning, financing and insurance initiatives for climate risks and natural hazards, as well as support to resilience building interventions in areas such as transport, agriculture and water supply.

CLIMATE RISK COUNTRY PROFILE

PALAU

WORLD BANK GROUP