CLIMATE RISK COUNTRY PROFILE

FIJI

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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).

This profile was written by Alex Chapman (Consultant, NEF Consulting), William Davies (Consultant, NEF Consulting), Ciaran Downey (Consultant, NEF Consulting), and MacKenzie Dove (Senior Climate Change Consultant, WBG). Technical review of the profiles was undertaken by Robert L. Wilby (Loughborough University). Additional support was provided by Megumi Sato (Junior Professional Officer, WBG), Jason Johnston (Operations Analyst, WBG) and Yunziyi Lang (Climate Change Analyst, WBG). This profile also benefitted from inputs of WBG regional staff and country teams.

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 latest 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.

CONTENTS

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

- Long-term warming is expected to be below the global average in Fiji, ranging between 0.6°C and 2.6°C by the 2090s when compared with the 1986–2005 baseline. The range of possible temperature rises highlights the significant differences between 21st century emissions pathways, while uncertainty remains high.
- Fiji has a high degree of vulnerability to climate extremes such as drought and extreme rainfall and any increases in the frequency and intensity of such events could represent a major threat to livelihoods, infrastructure, and human wellbeing.
- Considerable uncertainty surrounds projections of future precipitation trends and extreme climate events; further research is required to constrain the wide range of current estimates.
- The frequency of tropical cyclones affecting Fiji is projected to decrease, though the magnitude of the decrease remains uncertain and the intensity (wind speed) of cyclones may increase.
- Sea-level rise will have a range of impacts on Fiji's islands, including potential inundation, coastal erosion, and saline intrusion, the risks of storm surges and king tides may also be exacerbated.
- Fiji has significant assets and infrastructure with high exposure to climate-related damage.
- Degradation of key natural resources is inevitable, coral reefs and associated fisheries are under significant threat, with declines in soil and water quality are likely.
- The various projected impacts of climate change are likely to affect Fiji's poor, marginalized, and remote communities most significantly.

COUNTRY OVERVIEW

Fiji is an Island nation of the Melanesia region of the South Pacific. Fiji consists of 332 islands, around 110 of which are inhabited; the territory also includes a large number of smaller islets. Fiji's population of around 900,000 people has been experiencing consistent growth despite proportionately high rates of net outmigration. Fiji's economy is predominantly service-based (71.5% as of 2017) with a notably high dependence on tourism, and receives significant remittance income from workers abroad (**Table 1**). As of 2013 the national poverty rate remained high, at 28% of the population.

Fiji has extremely high exposure to tropical cyclones. Fijian islands experience the direct or indirect effects of cyclones on an annual basis, including frequent occurrences of multiple strikes in one year. Cyclones usually occur during the November-April wet season, and are less common during El Niño periods. Cyclones frequently result in loss of life and cause significant economic damage, which has hindered economic growth. Also particularly exposed to rising sea levels, floods, and landslides Fiji is one of the world's most vulnerable nations to climate change and climate-related disasters.

Fiji has ratified the Paris Climate Agreement, and submitted its Updated Nationally Determined Contribution (2020), which emphasizes the nation's need for external support to meet the high economic costs of mitigation and adaptation. Fiji submitted its Third National Communication to the UNFCCC (TNC) in 2020, extensively documenting the risks climate change presents to its communities and economy. Key vulnerabilities include its subsistence agriculture sector, its coastal and marine resources, including coral reefs, its freshwater resources, and its land management and uses. In 2017 The Government of Fiji, World Bank Group, and the Global Facility for Disaster Reduction and Recovery (GFDRR) completed an extensive assessment of Fiji's vulnerability to climate change. Among a number of key findings this work identified the need for an investment of $9.3 billion by 2027 (nearly 100% of GDP) to strengthen Fiji's resilience to climate change and natural hazards.[1]

TABLE 1. Key indicators

Indicator	Value	Source
Population Undernourished[2]	3.9% (2017–2019)	FAO, 2020
National Poverty Rate[3]	24.2% (2020)	United Nations Pacific, 2020
Share of Income Held by Bottom 20%[4]	7.5% (2013)	World Bank, 2021
Net Annual Migration Rate[5]	–0.7% (2015–2020)	UNDESA, 2019
Infant Mortality Rate (Between Age 0 and 1)[6]	2.0% (2015–2020)	UNDESA, 2019
Average Annual Change in Urban Population[7]	1.62% (2015–2020)	UNDESA, 2018
Dependents per 100 Independent Adults[8]	53.4 (2020)	UNDESA, 2019
Urban Population as % of Total Population[9]	57.2% (2020)	CIA, 2020
External Debt Ratio to GNI[10]	16.7% (2018)	ADB, 2020
Government Expenditure Ratio to GDP[11]	31.4% (2018)	ADB, 2020

[1] WBG (2017). Climate vulnerability assessment — making Fiji climate resilient. Global Facility for Disaster Risk Reduction, World Bank, Washington DC. URL: http://documents.worldbank.org/curated/en/163081509454340771/pdf/120756-WP-PUBLIC-nov-9-12p-WB-Report-FA01-SP.pdf

[2] FAO, IFAD, UNICEF, WFP, WHO (2020). The state of food security and nutrition in the world. Transforming food systems for affordable healthy diets. FAO. Rome. URL: http://www.fao.org/documents/card/en/c/ca9692en/

[3] United Nations Pacific (2020). Socio-economic impact assessment of Covid-19 in Fiji. URL: https://www.pacific.undp.org/content/pacific/en/home/library/socio-economic-impact-assessment-of-covid-19-in-fiji.html [accessed 14/01/2021]

[4] World Bank (2021). Income share held by lowest 20%. URL: https://data.worldbank.org/ [accessed 25/10/2021]

[5] UNDESA (2019). World Population Prospects 2019: MIGR/1. URL: https://population.un.org/wpp/Download/Standard/Population/ [accessed 17/12/20]

[6] UNDESA (2019). World Population Prospects 2019: MORT/1-1. URL: https://population.un.org/wpp/Download/Standard/Population/ [accessed 17/12/20]

[7] UNDESA (2019). World Urbanization Prospects 2018: File 6. URL: https://population.un.org/wup/Download/ [accessed 17/12/20]

[8] UNDESA (2019). World Population Prospects 2019: POP/11-A. URL: https://population.un.org/wpp/Download/Standard/Population/ [accessed 17/12/20]

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

[10] ADB (2020). Key Indicators for Asia and the Pacific 2020. Asian Development Bank. URL: https://www.adb.org/publications/key-indicators-asia-and-pacific-2020

[11] ADB (2020). Key Indicators for Asia and the Pacific 2020. Asian Development Bank. URL: https://www.adb.org/publications/key-indicators-asia-and-pacific-2020

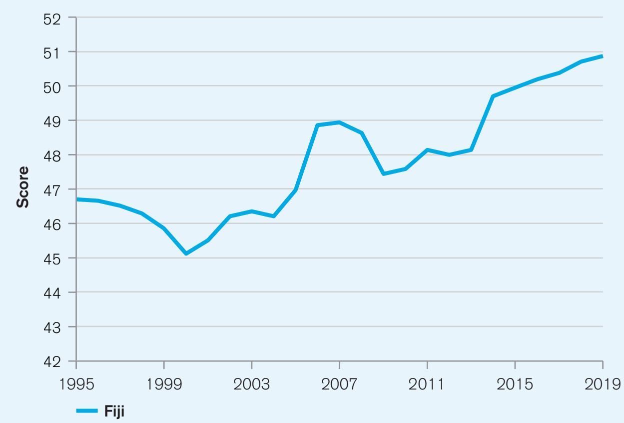
Green, Inclusive and Resilient Recovery

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 Fiji. 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 Fiji, therefore potentially excluding some international influences and localized impacts. The core data presented is sourced from the database sitting behind 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 and to direct them to many useful sources of secondary data and research.

Due to a combination of political, geographic, and social factors, Fiji is recognized as vulnerable to climate change impacts, ranked 77th out of 182 countries in the 2020 ND-GAIN Index[12] The ND-GAIN Index ranks 182 countries using a score which calculates a country's vulnerability to climate change and other global challenges as well as their readiness to improve resilience. The more vulnerable a country is the lower their score, while the more ready a country is to improve its resilience the higher it will be. Norway has the highest score and is ranked 1st. **Figure 1** is a time-series plot of the ND-GAIN Index showing Fiji's progress

FIGURE 1. The ND-GAIN Index (Score 0–100) summarizes a country's vulnerability to climate change and other global challenges in combination with its readiness to improve resilience. It aims to help businesses and the public sector better prioritize investments for a more efficient response to the immediate global challenges ahead.



[12] University of Notre Dame (2020). Notre Dame Global Adaptation Initiative. URL: https://gain.nd.edu/our-work/country-index/

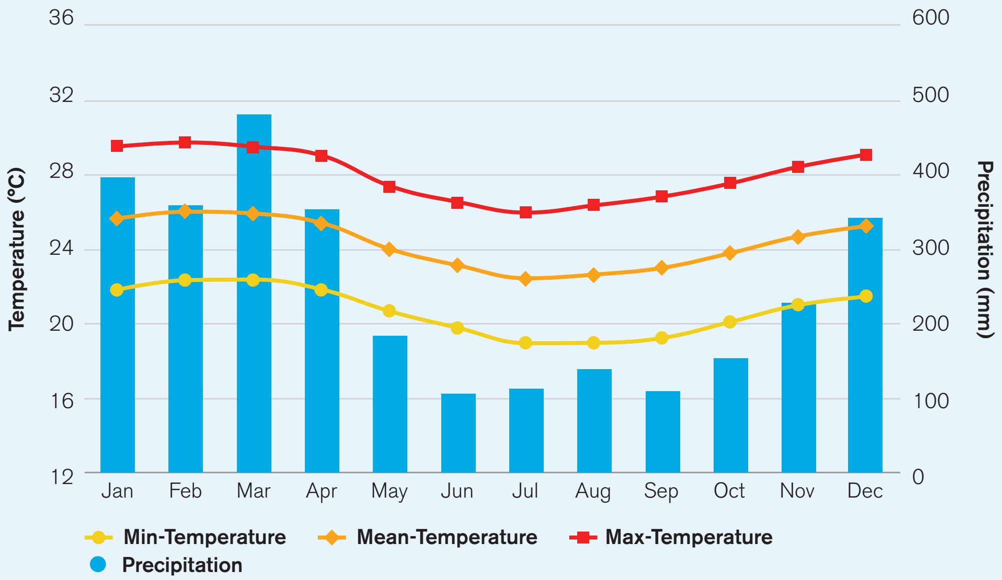
Climate Baseline

Overview

Temperatures in Fiji remain relatively constant throughout the year, averaging around 23°C–25°C in the dry season (May-October) and 26°C–27°C in the wet season (November-April), for the latest climatology, 1991–2020 (**Figure 2**). Greater seasonal variation is seen in the precipitation regime, with an average of around 250–400 millimeters (mm) of rainfall per month in the wet season and 80–150 mm per month in the dry. Periods of drought are known to occur during El Niño periods. Annual precipitation shows some spatial variation, Fiji's most populous island, Viti Levu, sees much stronger precipitation on its east side (3,000–5,000 mm) compared to its west (2,000–2,000 mm). Tropical cyclones are a major feature of climate in the Fijian region and are another variable influenced both in terms of intensity and location by El Niño Southern Oscillation (ENSO).[13]

Annual Cycle

FIGURE 2. Average monthly mean, max, and min temperatures and rainfall in Fiji (1991–2020)[14]



[13] Chand, S.S. and Walsh, K.J. (2011). Influence of ENSO on tropical cyclone intensity in the Fiji region. Journal of Climate, 24, 4096–4108. URL: https://journals.ametsoc.org/doi/full/10.1175/2011JCLI4178.1

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

Key Trends

Temperature

The Berkeley Earth dataset suggests temperatures in the vicinity of Fiji's capital, Suva, rose approximately 0.8°C over the 20th century (change between 1900–1917 and 2000–2017). This estimate is similar to that presented in Fiji's Second National Communication (NC2), which suggests increases of around 0.1°C per decade over the last half century. Warming has been strongest in daily maximum temperatures (around 0.2°C per decade) and similar in daily minimum temperatures (around 0.1°C per decade). Temperature rises have been strongest in the warm/wet season.

Precipitation

There is substantial year-to-year variation in precipitation in Fiji. From the available data a very slight increasing trend in annual precipitation is suggested in Fiji's Second National Communication to the UNFCCC. The Australian Bureau of Meteorology and CSIRO (2014) suggest there has been no significant historical change in precipitation. Similarly, uncertainty surrounds projections of change in cyclone activity, as year-to-year variation is great, and the timescales over which analysis is being conducted are short. A slight decreasing trend in the frequency of cyclones at hurricane intensity affecting Fiji between 1970–2010 is reported in the NC2.

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.[15] Climate change projections associated with the highest emissions pathway (RCP8.5) are presented here to facilitate decision making which is robust to these risks.

Climate Future

Overview

The main data source for the World Banks' Climate Change Knowledge Portal (CCKP) is the Coupled Model Inter-comparison Project Phase 5 (CMIP5) models, which are utilized within the Fifth Assessment Report (AR5) of the Intergovernmental Panel on Climate Change (IPCC), providing estimates of future temperature and precipitation. Four Representative Concentration Pathways (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 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 more information, please refer to the RCP Database.

[15] 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?proof=trueMay.

For Fiji, these models show a trend of consistent warming that varies by emissions scenario. However, the projections in rainfall are less certain with a high degree of variability. Projected precipitation trends indicate that average annual rainfall may remain the same, increase in the intensity for extreme rainfall events. **Tables 2** and **3** below, provide information on temperature projections and anomalies for the four RCPs over two distinct time horizons; presented against the reference period of 1986–2005.

TABLE 2. Projected anomaly (changes °C) for maximum, minimum, and average daily temperatures in Fiji for 2040–2059 and 2080–2099, from the reference period of 1986–2005 for all RCPs. The table is showing the median of the CCKP model ensemble and the 10–90th percentiles in brackets.[16]

	Average Daily Maximum Temperature		Average Daily Temperature		Average Daily Minimum Temperature	
	2040–2059	2080–2099	2040–2059	2080–2099	2040–2059	2080–2099
RCP2.6	0.7 (0.3, 1.2)	0.7 (0.1, 1.3)	0.7 (0.3, 1.2)	0.6 (0.1, 1.3)	0.7 (0.2, 1.2)	0.7 (0.1, 1.3)
RCP4.5	0.9 (0.3, 1.5)	1.3 (0.7, 2.0)	0.9 (0.4, 1.5)	1.3 (0.8, 1.9)	0.9 (0.4, 1.4)	1.3 (0.8, 1.9)
RCP6.0	0.9 (0.4, 1.4)	1.7 (1.0, 2.5)	0.9 (0.3, 1.4)	1.7 (0.9, 2.5)	0.9 (0.3, 0.9)	1.7 (0.9, 2.5)
RCP8.5	0.1.3 (0.7, 1.9)	2.7 (2.0, 3.7)	1.3 (0.7, 1.8)	2.8 (2.0, 3.6)	1.3 (0.7, 1.8)	2.8 (2.0, 3.7)

TABLE 3. Projections of average temperature anomaly (°C) in Fiji for different seasons (3-monthly time slices) over different time horizons and emissions pathways, showing the median estimates of the full CCKP model ensemble and the 10th and 90th percentiles in brackets[13]

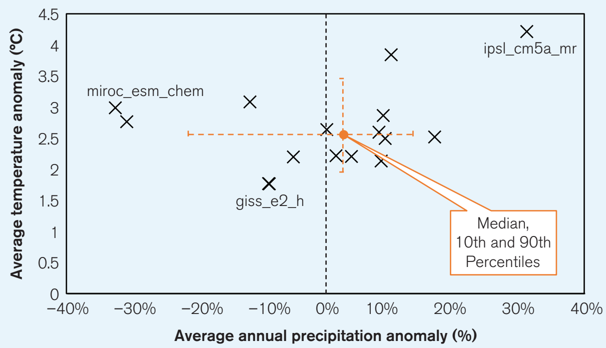
	2040–2059		2080–2099	
	Jun–Aug	Dec–Feb	Jun–Aug	Dec–Feb
RCP2.6	0.7 (0.1, 1.2)	0.7 (0.3, 1.3)	0.6 (0.0, 1.3)	0.7 (0.2, 1.2)
RCP4.5	0.9 (0.3, 1.4)	0.9 (0.4, 1.5)	1.3 (0.7, 1.9)	1.3 (0.8, 1.9)
RCP6.0	0.8 (0.2, 1.3)	0.9 (0.4, 1.4)	1.7 (0.7, 2.3)	1.7 (1.0, 2.6)
RCP8.5	1.3 (0.7, 1.8)	1.3 (0.8, 1.8)	2.6 (1.9, 3.5)	2.8 (2.1, 3.8)

[16] WBG Climate Change Knowledge Portal (CCKP, 2021). Fiji. Climate Data: Projections. URL: https://climateknowledgeportal.worldbank.org/country/fiji/climate-data-projections

Model Ensemble

Climate projections presented in this document are derived from datasets available through the CCKP, unless otherwise stated. These datasets are processed outputs of simulations performed by multiple General Circulation Models (GCM) (for further information see Flato et al., 2013).[17] Collectively, these different GCM simulations are referred to as the 'model ensemble'. Due to the differences in the way 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 national and local scales. The range of projections from 16 GCMs for annual average temperature change and annual precipitation change in Fiji under RCP8.5 is shown in **Figure 3**.

FIGURE 3. 'Projected average temperature anomaly' and 'projected annual rainfall anomaly' in Fiji. 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.[13] Three models are labelled.



Temperature

Projections of future temperature change are presented in three primary formats. Shown in **Table 2** are the changes (anomalies) in daily maximum and daily minimum temperatures over the given time period, as well as changes in the average temperature. **Figures 4** and **5** display the annual and monthly 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. Projected temperature rises in Fiji are similar to the global average, with a 2.7°C average rise projected for the end of the century under the highest emissions pathway (RCP8.5) for Fiji, and 3.7°C projected globally. Increases in the annual maximum and minimum temperatures are slightly higher, but still significantly below the global estimates. There is some seasonality in projected temperature rises, with the warmest months January to April (the wet season).

[17] Flato, G., Marotzke, J., Abiodun, B., Braconnot, P., Chou, S. C., Collins, W., . . . Rummukainen, M. (2013). Evaluation of Climate Models. Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, 741–866. URL: http://www.climatechange2013.org/images/report/WG1AR5_ALL_FINAL.pdf

FIGURE 4. Projected average annual temperature in Fiji under RCP2.6 (blue) and RCP8.5 (red) estimated by the model ensemble. Shading represents the standard deviation of the model ensemble.[18]

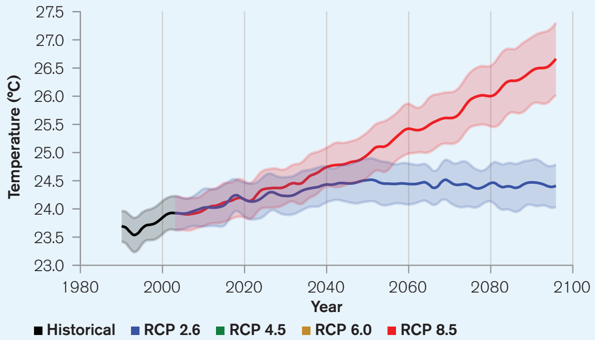
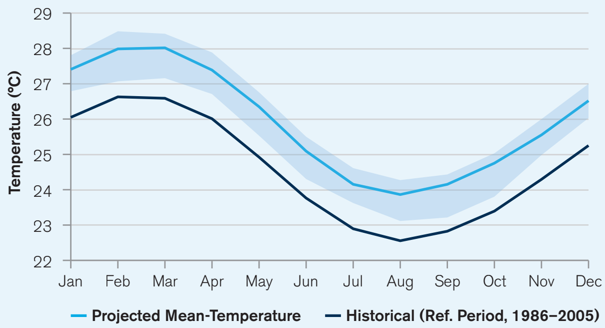


FIGURE 5. Projected monthly temperature, in relation to the Historical Reference Period, 1986-2005, for Fiji for the period 2040–2059 under RCP8.5. The value shown represents the median of the model ensemble with the shaded areas showing the 10th–90th percentiles.[19]

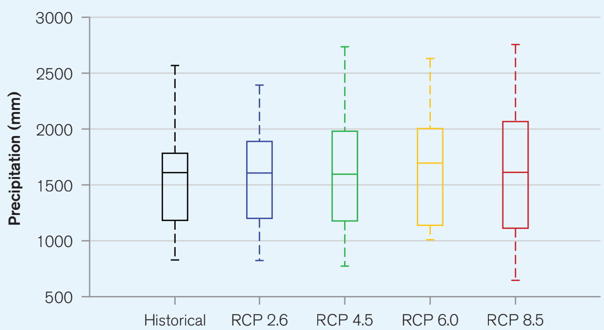


Precipitation

Considerable uncertainty impacts the projections of future precipitation in Fiji. No statistically significant changes are projected by the full model ensemble from the CCKP (**Figure 6**) and this also applies to both long-term changes and extreme events. There is a strong need for further research and downscaled modelling as, at present, there is very considerable disparity between model outputs. As shown in **Figure 3**, there are models projecting reasonably large changes in both the positive and negative direction. Future precipitation changes will depend to some extent on potential changes to the El Niño system. As reported by the Australian Bureau of Meteorology and CSIRO (2014) the potential climate change impacts on El Niño are not well understood.

Separate modelling by the Australian Bureau of Meteorology and CSIRO (2014) does, however, suggest increases in the frequency and intensity of extreme rainfall events (to which they ascribe 'high confidence'). This analysis is based on a subset of climate models. The changes projected are relatively small, suggesting the rainfall associated with a 1 in 20-year event will increase by 6 mm under RCP2.6

FIGURE 6. Boxplots showing the projected average annual precipitation for Fiji in the period 2080–2099.



[18] WBG Climate Change Knowledge Portal (CCKP, 2021). Fiji Agriculture Interactive Climate Indicator Dashboard. URL: https://climatedata.worldbank.org/CRMePortal/web/agriculture/crops-and-land-management?country=FJI&period=2080-2099

[19] WBG Climate Change Knowledge Portal (CCKP, 2021). Fiji. Agriculture Interactive Climate Indicator Dashboard. URL: https://climatedata.worldbank.org/CRMePortal/web/agriculture/crops-and-land-management?country=FJI&period=2080-2099

and 36 mm under RCP8.5 by the 2090s, but low confidence is ascribed to these specific estimates. This analysis sits in line with global projections, which suggest the intensity of sub-daily extreme rainfall events appears to be increasing with temperature.[20]

CLIMATE RELATED NATURAL HAZARDS

Fiji faces significant disaster risk levels and is ranked 124th out of 191 countries by the 2019 Inform Risk Index[21] (**Table 4**). This ranking is driven strongly by the exposure component of risk. Fiji has a high exposure to flooding including, specifically coastal, and very high exposure to tropical storms and their associated hazards. Drought exposure is also significant. Disaster risk in Fiji is increased due to its high levels of social vulnerability and low degree of coping capacity. The section that follows, analyzes climate change influences on the exposure component of risk in Fiji. As seen in **Figure 1**, the ND-GAIN Index presents an overall picture of a country's vulnerability and capacity to improve its resilience. In contrast, the Inform Risk Index identifies specific risks across a country to support decisions on prevention, preparedness, response and a country's overall risk management.

TABLE 4. Selected indicators from the INFORM 2019 Index for Risk Management for Fiji. For the sub-categories of risk (e.g. "Flood") higher scores represent greater risks. Conversely the most at-risk country is ranked 1st.

Flood (0–10)	Tropical Cyclone (0–10)	Drought (0–10)	Vulnerability (0–10)	Lack of Coping Capacity (0–10)	Overall Inform Risk Level (0–10)	Rank (1–191)
0.1	3.1	2.5	3.4	3.1	2.9	124

Heat Waves

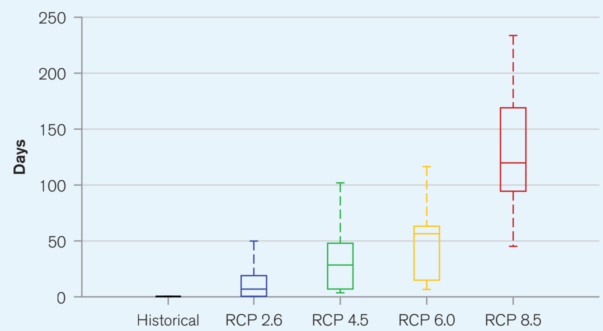
Fiji regularly experiences high maximum temperatures, with an average monthly maximum of around 28°C and an average February maximum of 29°C. The current median probability of a heat wave (defined as a period of 3 or more days where the daily temperature is above the long-term 95th percentile of daily mean temperature) is around 3%.[11] The model ensemble projects statistically significant increases in the annual probability of heat wave under all emissions pathways. The projected changes highlight the relative benefits of lower emissions pathways,

[20] Westra, S., Fowler, H. J., Evans, J. P., Alexander, L. V., Berg, P., Johnson, F., Kendon, E. J., Lenderink, G., Roberts, N. (2014). Future changes to the intensity and frequency of short-duration extreme rainfall. Reviews of Geophysics, 52, 522–555. URL: https://agupubs.onlinelibrary.wiley.com/doi/10.1002/2014RG000464

[21] European Commission (2020). INFORM Index for Risk Management. Fiji Country Profile. URL: https://drmkc.jrc.ec.europa.eu/inform-index/Countries/Country-Profile-Map

with the future probability peaking at 10% under RCP2.6, but almost 50% under RCP8.5 by the 2090s (**Figure 7**). Low confidence can be attributed to these estimates with regard to their accuracy over Fiji's land surface and further research and downscaled modelling is required. These estimates should be seen in the context of a static baseline (1986–2005) and constantly rising temperatures. Further research is required to better understand whether these rises also point to an increase in the volatility of temperatures.

FIGURE 7. Box plots showing historical (1986–2005) and projected (2080–2099) average annual frequency of days with Heat Index >35°C.[13]

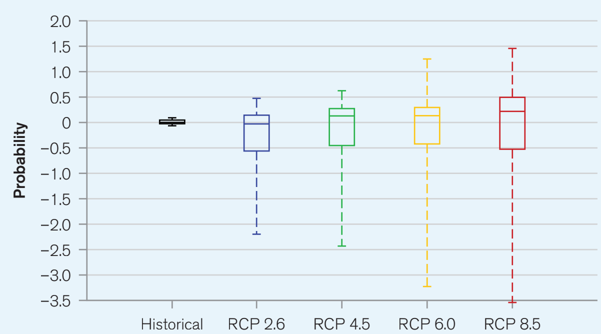


Drought

Two primary types of drought may affect Fiji, meteorological (usually associated with a precipitation deficit) and hydrological (usually associated with a deficit in surface and subsurface water flow, potentially originating in the region's wider river basins). At present Fiji faces an annual median probability of severe meteorological drought of around 5%, as defined by a standardized precipitation evaporation index (SPEI) of less than –2.[11]

The model ensemble presents a highly uncertain picture regarding future drought frequency in Fiji. There is little variation between emissions pathways, and under all scenarios a future drought probability is projected to increase to around 10% (**Figure 8**). However, the model range is very large, highlighting the need for further research and particularly for downscaled projection. Work by the Australian Bureau of Meteorology and CSIRO (2014) conversely suggests a slight decrease in the time Fiji will spend under drought conditions, but also recognizes great uncertainty.

FIGURE 8. Boxplots showing the annual probability of experiencing a 'severe drought' in Fiji (–2 SPEI Index) in 2080–2099 under four emissions pathways.[23]



Drought is likely to remain tightly linked to El Niño but given its historical impact it is important to constrain the range in future changes. Cause for concern is flagged by the work of Naumann et al. (2018) who looked at drought probability on regional scales and suggested very high increases in the frequency of severe droughts in the Oceania region.[22] On a regional scale 1 in 100-year events are expected to increase in frequency to at least 1 in 40-years, and under higher emissions pathways to 1 in 20-year events.

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[22] Naumann, G., Alfieri, L., Wyser, K., Mentaschi, L., Betts, R. A., Carrao, H., . . . Feyen, L. (2018). Global Changes in Drought Conditions Under Different Levels of Warming. Geophysical Research Letters, 45(7), 3285–3296. URL: https://agupubs.onlinelibrary.wiley.com/doi/full/10.1002/2017GL076521

[23] WBG Climate Change Knowledge Portal (CCKP 2021). Fiji. Water Sector Interactive Dashboard. URL: https://climatedata.worldbank.org/CRMePortal/web/water/land-use-/-watershed-management?country=CHN&period=2080-2099

Floods, Cyclones and Storm Surge

The Government of Fiji suggests that the scale of flood risk in the country is generally underreported due to the number of smaller scale events that go unreported.[1] The accounting of floods conducted by The Government of Fiji suggest significant losses are caused by both fluvial (2.6% of GDP per year) and pluvial (1.6% of GDP per year). Uncertainty around future precipitation changes and extremes leaves considerable uncertainty also on future flooding, as does the lack of knowledge about how climate change will affect the El Niño phenomenon.

Historical flooding is strongly correlated with La Niña periods, and usually driven by heavy and prolonged precipitation associated with cyclones that causes both surface (pluvial) and river (fluvial) flooding. Flooding is also driven by coastal dynamics, particularly storm surges associated with cyclones, but also swells driven by deep depressions and high-pressure systems in the neighboring seas.

A very large number of tropical cyclones pass through the Melanesia region of the Pacific Ocean every year. Tropical cyclones are also of major economic significance in Fiji, costing around 5% of GDP every year.[1] Climate change is expected to interact with the cyclone hazard in complex ways that are currently poorly understood. Known risks include the effect that sea-level rises have on enhancing 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.[24] Work by the Australian Bureau of Meteorology and CSIRO (2014) suggests this trend will extend to Fiji, and a decline in the frequency of tropical cyclones will be seen. The report cites 'high confidence' in this finding (the direction of change) but low confidence in the precise size of the decline, potentially in the range of 5%–50%.

Given the uncertainty around future average and extreme precipitation trends the Government of Fiji et al. (2017) conducted sensitivity testing to highlight the potential damage associated with the model ensemble's upper (90th percentile) estimates under RCP8.5.[1] This process highlights possible growth in the area experiencing fluvial and pluvial flooding for floods of different return rates. For example, a 1 in 10-year fluvial flood could increase in extent by 13% by the 2050s and 19% by 2100.

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[24] 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/full/10.1002/wcc.371

Natural Resources

Water

The majority of Fiji's population (around 70%) and industry depend on surface water resources. Rainwater harvesting systems are also common. As identified in Fiji's NC2, these resources are highly vulnerable to climate variability, particularly changes in the frequency and intensity of extreme events. For this reason, the uncertainty in climate projections represents a challenge for planning and management. A need has been identified for greater storage capacities for periods of water scarcity, improved robustness to storm damage and extreme rainfall events, and stronger systems for dealing with pollution and water quality issues. Key areas of focus will include the management and upgrade of storm water drainage systems. The Government of Fiji identifies soil erosion and landslides during extreme climate-events as a particular risk to key water infrastructure.[1] Flooding is also a key issue, with more than 20% of water resource assets (intake stations, boreholes, pumping stations, and water treatment plants) lacking any waterproofing.

Addressing flooding issues also means addressing aspects of human development in Fiji that have exacerbated flood disaster risk, including alterations to upstream catchment areas, particularly deforestation. Some of Fiji's more marginalized communities living on its outer islands have high dependence on groundwater resources and coastal aquifers. These resources have particular vulnerability to salt water intrusion and over-exploitation and monitoring of their status is absent.

Coastal Zones

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 meter (m) —0.74 m by the end of the 21st century by the IPCC's Fifth Assessment Report[25] but some studies published more recently have highlighted the potential for more significant rises (**Table 5**).

TABLE 5. 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.[26]

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)

[25] 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

[26] 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 represents a major threat to communities and livelihoods in Fiji. Many of Fiji's islands are low-lying and threatened with inundation and the nation's extensive coastline is vulnerable to erosion and saltwater intrusion. Human development processes have exacerbated vulnerability to sea-level rise. The clearing of mangroves has removed a natural barrier to erosion and inundation, and unplanned development in the immediate coastal zone has altered the natural coastal erosion and accretion processes. The Government of Fiji et al. (2017) note that Fiji has vulnerability to flooding generated by seismic activity (tsunami) and that sea-level rise will exacerbate the relative risk of such events.[1]

Coral Reefs and Fisheries

Coral reefs in Fiji are expected to decline in health and extent under all emissions pathways except the lowest, RCP2.6. Primarily, this decline will be associated with the ongoing acidification of the oceans as a result of increased atmospheric CO_2 concentrations, this is being compounded by temperature rises and other human activities. Work by the Australian Bureau of Meteorology and CSIRO (2014) suggests that under moderate emissions pathways (RCP4.5 and 6.0) the conditions around Fiji will transition to only 'marginal' suitability for coral, and under the highest pathway (RCP8.5) conditions will transition to a state believed to be unsuitable for coral reefs to survive. Decline in the health and extent of coral reefs will not only have significant negative impacts for biodiversity, but for the livelihoods that depend upon the ecosystem services provided. These services include support of key sectors of the economy such as fisheries and tourism, as well as cultural services important to local communities.

Research has assessed the outlook for fisheries in Fiji under climate change and increasing human development pressure[27] and suggests some oceanic species, such as varieties of tuna, may increase in availability due to range shifts linked to climate change. However, overall, this suggests there is a challenging outlook for fisheries in Fiji, significant reductions in coastal fisheries due to climate change impacts threaten food security, particularly for poorer households fishing for subsistence.

Economic Sectors

Agriculture

Climate change will influence food production via direct and indirect effects on crop growth processes. Direct effects include alterations to carbon dioxide availability, precipitation and temperatures. Indirect effects include through impacts on water resource availability and seasonality, soil organic matter transformation, soil erosion, changes in pest and disease profiles, the arrival of invasive species, and decline in arable areas due to the submergence of coastal lands and desertification. In Fiji, crop losses to storm damage (including wind, extreme rainfall, and king tides) also represent a major potential impact of any future increase in storm intensity or frequency; climate dynamics which remains uncertain. On an international level, these impacts are expected to damage key staple crop yields, even

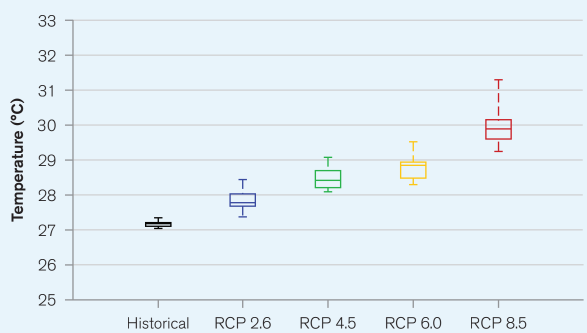
[27] ADB (2017a). Food security in the coral triangle of the Pacific Countries: Prospects of fisheries development strategies. Asian Development Bank Briefs No. 84. URL: https://www.adb.org/sites/default/files/publication/372111/food-security-coral-triangle-fisheries.pdf

on lower emissions pathways. Tebaldi and Lobell (2018) estimate 5% and 6% declines in global wheat and maize yields respectively even if the Paris Climate Agreement is met and warming is limited to 1.5°C.[28] Shifts in the optimal and viable spatial ranges of certain crops are also inevitable, though the extent and speed of those shifts remains dependent on the emissions pathway.

A further, and perhaps less appreciated influence of climate change on agricultural production is through its impact on the health and productivity of the labor force. Work by Dunne et al. (2013) suggests 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 2050 under the highest emissions pathway (RCP8.5).[29] In combination, it is highly likely that the above processes will have a considerable impact on national food consumption patterns both through direct impacts on internal agricultural operations, and through impacts on the global supply chain. Climate impacts on the international food supply are of particular relevance to Fiji, where dependence on food imports can be high, particularly during and after disaster events.

Agricultural operations in Fiji have been transitioning away from subsistence operations and towards large-scale/high-intensity farming. However, smaller farming operations remain on Fiji's islands and are likely to be the least resilient to potential climate changes due to their limited adaptive capacity. Key crops include coconut, sugarcane, vegetables and root crops, alongside livestock rearing. Fiji's NC2 reports a negative outlook for some key crops, notably sugarcane, but the cited research is based on outdated climate projections. While some yield gains are projected as a result of increased atmospheric CO_2 levels those gains are threatened by potential increases in the frequency and intensity of extreme events, particularly heat waves, and potentially drought and extreme rainfall. At a crop specific level, the projected increase in average daily maximum temperatures may cause heat stress which impacts on yields, particularly when temperatures exceed optimal levels during growing seasons (**Figure 9**). Other concerns identified by the CCCPIR program relate to soil quality.[30] Rising sea-levels are expected to increase the incidence of saline-intrusion into soils and groundwater, and more intense precipitation events may exacerbate soil erosion and associated nutrient losses.

FIGURE 9. Average daily maximum temperature in Fiji in 2080–2099 under different emissions pathways.



[28] Tebaldi, C., & Lobell, D. (2018). Differences, or lack thereof, in wheat and maize yields under three low-warming scenarios. Environmental Research Letters: 13: 065001. URL: https://iopscience.iop.org/article/10.1088/1748-9326/aaba48

[29] Dunne, J. P., Stouffer, R. J., & John, J. G. (2013). Reductions in labor 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

[30] SPC/GIZ (2016). Impacts of climate change on agriculture in Fiji. Coping with climate change in the Pacific Islands Region (CCCPIR) programme. SPC/GIZ. URL: https://www.pacificclimatechange.net/sites/default/files/documents/CCCPIR-Fiji_Impacts%20of%20Climate%20Change%20on%20Agriculture%20Brochure.pdf

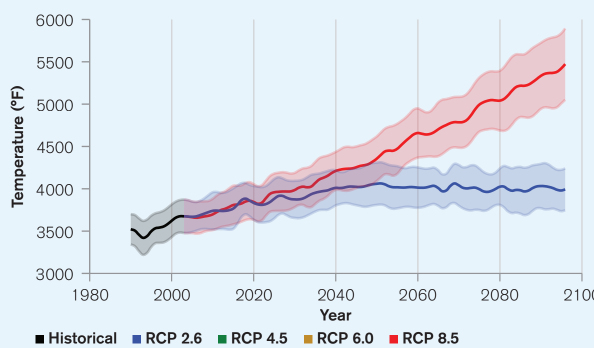
Urban

Research has established a reasonably well constrained relationship between heat stress and labor productivity, household consumption patterns, and (by proxy) household living standards (Mani et al., 2018). In general terms the impact of an increase in temperature on these indicators depends on whether the temperature rise moves the ambient temperature closer to, or further away from, the optimum temperature range. The optimum range can vary depending on local conditions and adaptations.

The effects of temperature rise and heat stress in urban areas are increasingly compounded by the phenomenon of Urban Heat Island (UHI). Dark surfaces, residential and industrial sources of heat, an absence of vegetation, and air pollution (Cao et al., 2016) can push temperatures higher than those of the rural surroundings, commonly anywhere in the range of 0.1°C–3°C in global mega-cities (Zhou et al., 2014). As well as impacting on human health (see Communities) the temperature peaks that will result from combined UHI and climate change, as well as future urban expansion, are likely to damage the productivity of the service sector economy, both through direct impacts on labor productivity, but also through the additional costs of adaptation. Fiji continues to experience rapid urbanization, often involving unplanned settlement without proper infrastructure and located in hazard exposed areas. As well as intensification of heat stress issues, these areas are particularly vulnerable to extreme climate events and sea-level rise impacts.

Research suggests that on average a one degree increase in ambient temperature can result in a 0.5–8.5% increase in electricity demand (Santamouris et al., 2015). Notably this serves business and residential air-cooling systems. Fiji faces a very large potential increase in the cooling requirement, particularly under higher emissions pathways, as shown in **Figure 10**. This increase in demand places strain on energy generation systems which is compounded by the heat stress on the energy generation system itself, commonly due to its own cooling requirements, which can reduce its efficiency.[31] Fiji's energy infrastructure is also vulnerable to flood damage, with 16–18% of grid and transformer assets identified by The Government of Fiji et al. (2017) as immediately vulnerable to a 1-in-5 year flood, and a further 18–20% with potential vulnerability to localized flooding.[1]

FIGURE 10. Historic and projected annual cooling degree days in Fiji (cumulative degrees above 65°F) under RCP2.6 (blue) and RCP8.5 (red). The values shown represent the median of multi-model ensemble with the shaded areas showing the 10–90th percentiles.



[31] ADB (2017b). Climate Change Profile of Pakistan. Asian Development Bank. URL: https://www.adb.org/sites/default/files/publication/357876/climate-change-profile-pakistan.pdf

Tourism

Tourism is incredibly important to the Fijian economy. The sector is thought to have contributed to 40.3% of overall GDP in 2017, as well as supporting 36.5% of jobs within the country, both directly and indirectly.[32] In 2016 there were 792,000 tourists from outside of Fiji who came to the country; the vast majority of these (83%) were from East Asia and the Pacific region.[33]

In one critical review of the literature examining the dynamics between climate change and tourism, there appeared to be multiple indications that the tourism sectors of small island states, such as Fiji, are particularly vulnerable to climate change.[34] In the long-term, the dual combination of rising sea levels and of coastal erosion will 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. One study by Bigano et al. (2007) which is relatively dated and used a very simple model, estimated that temperature rises could reduce tourism revenue in Fiji by 18% by 2030.[35] The increased intensity of extreme weather events could also severely impact the infrastructure needed to support tourism and deter potential visitors.

In addition to direct physical impacts, climate change may affect the tourism sector in Fiji 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 (estimated at $11 when averaging across every global trip but potentially higher on a long-haul destination such as Fiji) may reduce Fiji's attractiveness as a tourist destination.[36] Further research is required to better constrain the suite of potential climate change impacts on the sector.

Communities

Poverty and Inequality

Climate-related disasters are a recurring challenge faced by Fiji's communities. Loss of life and personal possessions, as well as injury and the spread of disease are all common occurrences when high intensity cyclones strike. River flooding has also had major recent impacts and the Government of Fiji et al. (2018) estimates that a 1 in 100-year river flood pushes 12.5% of the population into poverty. In economic terms the UNISDR estimates Fiji's average annual loss at around $130 million, almost all of which is attributable to storm surges damages and damage associated with high wind speeds.[1] The annual loss amounts to around 2.5% of GDP,[37] however, work by the Government of Fiji et al. (2017) suggests this value is in fact much higher, over 4.2% of GDP, due to the large

32 WTTC (2018). Travel and Tourism Economic Impact 2018. World Travel and Tourism Council. URL: https://www.wttc.org/-/media/files/reports/economic-impact-research/regions-2019/world2019.pdf

33 UNWTO (2018). Fiji: Country-Specific: Basic Indicators. United Nations World Tourism Organization. URL: https://www.e-unwto.org/doi/abs/10.5555/unwtotfb0242010020142018201912

34 Scott, D., Gössling, S., & Hall, C. M. (2012). International tourism and climate change. Wiley Interdisciplinary Reviews: Climate Change, 3(3), 213–232. URL: https://onlinelibrary.wiley.com/doi/full/10.1002/wcc.165

35 Bigano, A., Hamilton, J. M., & Tol, R. S. J. (2007). The impact of climate change on domestic and international tourism: A simulation study. The Integrated Assessment Journal, 7(1), 25–49. URL: http://journals.sfu.ca/int_assess/index.php/iaj/article/viewFile/248/229

36 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. URL: https://www.tandfonline.com/doi/abs/10.1080/09669582.2015.1107080

37 ADB (2018c). Building resiliency in the Pacific: How ADB is addressing climate change and disaster risks. Asian Development Bank. URL: https://www.adb.org/sites/default/files/publication/372696/building-resilience-pacific.pdf

number of smaller events which are not recorded in international disaster databases. The Government of Fiji et al. (2017) highlight that disaster risk and losses are growing in Fiji particularly as a result of the increased exposure of the population. The number of people living in unplanned developments grew by 24% between 2007 and 2015 and a considerable amount of new development is taking place in low-elevation coastal zones and hazard exposed areas.

The national poverty rate remains high in Fiji (28%), and undernourishment levels have persisted at around 4.5% between 2007 and 2017 in part as a result of the impact of climate-related disasters. Examples of cyclones that caused loss of life and major economic and infrastructural damage include Cyclone Evan in 2012, Cyclone Winston in 2016, and Cyclone Josie in 2018, which resulted in particularly severe flooding. Cyclone Winston highlighted Fiji's extreme vulnerability, affecting approximately 62% of Fiji's population, killing 44 people, and destroying or damaging over 30,000 homes. Given the large degree of uncertainty around future climate changes in Fiji a focus on disaster risk reduction to present-day risks, including minimizing social vulnerability, and building adaptive capacity, represents a no-regrets approach to tackling climate change.

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.[38] Poorer businesses are least able to afford air conditioning, an increasing need given the projected increase in cooling days. Poorer farmers and communities are least able to afford local water storage, irrigation infrastructure, and technologies for adaptation. In Fiji there is particular concern for poorer communities living in remote areas, many of whom live with precarious water security and dependence on subsistence fishing, both areas which will come under further pressure from climate change. While uncertainty remains great around future changes in extreme climate events, it is well established that Fiji's poorer and more remote populations are disproportionately affected[39] and will suffer the most from any increases in event frequency and intensity. **Table 6** from the Government of Fiji et al. (2018) highlight both the existing proportion of people falling into poverty every year as a result of natural hazards, and the potential future proportion under climate change.[1] By the end of the century it is estimated that natural hazards may drive over 4% of the population into poverty every year.

TABLE 6. Effect of climate change on natural disasters' impact on poverty.[1]

	Average Number of People Falling Into Poverty Every Year (and percent of total population)			People Falling Into Poverty for the 100-Year Event (and percent of total population)		
Hazard	**2017**	**2050**	**2100**	**2017**	**2050**	**2100**
Tropical Cyclones	7,300 (0.9%)	7,300 (0.9%)	7,300 (0.9%)	48,000 (5.7%)	48,000 (5.7%)	48,000 (5.7%)
Fluvial Floods	11,400 (1.4%)	16,000 (1.9%)	17,900 (2.1%)	105,000 (12.5%)	125,000 (14.8%)	132,300 (15.7%)
Pluvial Floods	7,000 (0.8%)	9,100 (1.1%)	11,000 (1.3%)	66,000 (7.8%)	89,500 (10.6%)	107,500 (12.8%)
Total	**25,700 (3.1%)**	**32,400 (3.8%)**	**36,200 (4.3%)**			

[38] 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.ncbi.nlm.nih.gov/pubmed/26989826

[39] Lal, P.N., Singh, R., Holland, P. (2009). Relationship between natural disasters and poverty: A Fiji case study. International Strategy for Disaster Reduction/SOPAC. URL: https://www.preventionweb.net/files/11851_11851R25PovertyAFijiCaseStudylowres.pdf

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.[40]

Human Health

Nutrition

The World Food Program estimate that without adaptation action the risk of hunger and child malnutrition on a global scale will increase by 20% respectively by 2050. Fiji has faced challenges eradicating malnourishment, in part as a result of climate-related disaster, and may face further challenges as conditions for agricultural production change and global supply chains are impacted by projected yield reductions in staple crops. Fiji may also be particularly vulnerable to malnutrition due to loss of coastal fisheries that provided subsistence protein to poorer households.

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.[41] Temperatures significantly lower than the 35°C threshold of 'survivability' can still represent a major threat to human health. Climate change will push global temperatures closer to this temperature 'danger zone' both through slow-onset warming and intensified heat waves. Work by Honda et al. (2014), which utilized the A1B emissions scenario from CMIP3 (most comparable to RCP6.0), estimates that without adaptation, annual heat-related deaths in the Australasia will increase 211% by 2030 and 437% by 2050, this provides an indication of the potential risk to Fiji's Melanesia region, where data is lacking.[42]

Disease

Fiji has past experience of the increases in the transmission of disease that can result from climate-related disaster events, particularly flooding and drought. Risks are therefore associated with any potential increase in the intensity and frequency of such events. The WHO's (2015) profile of Fiji also suggests that under all emissions pathways the potential for dengue fever transmission (vectoral capacity) in Fiji will increase by around 30–40%.[43]

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40 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

41 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

42 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. URL: https://www.ncbi.nlm.nih.gov/pubmed/23928946

43 WHO (2015). Climate and health country profile — 2015: Fiji. World Health Organization. URL: https://apps.who.int/iris/bitstream/handle/10665/246138/WHO-FWC-PHE-EPE-15.35-eng.pdf?sequence=1

POLICIES AND PROGRAMS

National Adaptation Policies and Strategies

- Updated Nationally Determined Contribution (2020)
- Third National Communication (2020)
- National Adaptation Plan (2018)
- Intended Nationally Determined Contribution (2016)
- Second National Communication (2014)
- First National Communication (2005)
- Natural Disaster Management Act (1998)

Climate Change Priorities of the WBG

WBG — Country Partnership Framework

The WBG and Fiji have committed to a new Country Partnership Strategy (2020–2024), which established the management of climate change and natural hazards risks as a key focus area. Key areas of support included on infrastructure development and social protection schemes, specifically to ensure that climate and disaster resilience are incorporated into the designs for roads and bridges to be rehabilitated. These actions will increase the reliability and safety of these key assets. Efforts are also ongoing to determine the potential to expand coverage of its social protection scheme, including the extent to which it can incorporate natural disaster and climate change considerations.

CLIMATE RISK COUNTRY PROFILE

FIJI

WORLD BANK GROUP