The Disaster Riskscape across the Pacific Small Island Developing States

KEY TAKEAWAYS FOR STAKEHOLDERS

Asia-Pacific Disaster Report 2019

PATHWAYS FOR RESILIENCE, INCLUSION AND EMPOWERMENT

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About the report

The Disaster Riskscape Across Asia-Pacific: Pathways for Resilience, Inclusion and Empowerment. Asia-Pacific Disaster Report 2019 (APDR 2019) captured a comprehensive picture of the complexity of disaster risk landscape ('riskscape') in the Asia-Pacific region. The full-length publication is available at https://www.unescap.org/publications/asia-pacific-disaster-report-2019.

Following the release of the APDR at the sixth session of the ESCAP inter-governmental Committee on Disaster Risk Reduction in August 2019, the report was customized for each of the five ESCAP sub-regions, namely East and North-East Asia, North and Central Asia, South-East Asia, South and South-West Asia and the Pacific. This sub-regional report presents the key findings for the Pacific Small Island Developing States (SIDS).

Acknowledgements

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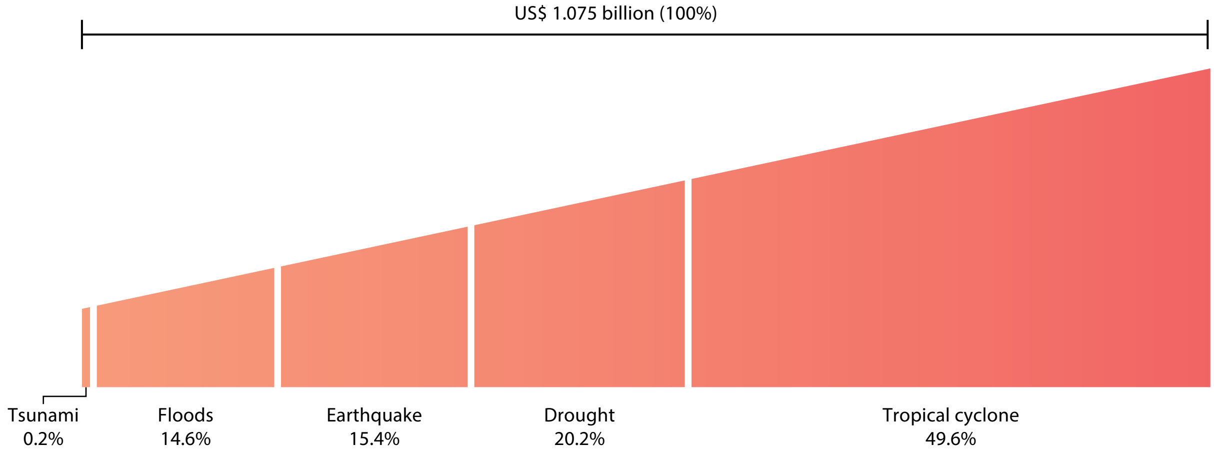
Annual economic losses due to disasters in the Pacific Small Island Development States (SIDS)[1] are more than double the previous estimates, at US$ 1.075 billion or nearly 5 per cent of the combined GDP for the Pacific SIDS.

For the first time, annualized economic losses are presented, which include both losses due to intensive risk and those due to extensive risk, indirect losses and slow-onset disasters.[2] Including these additional sources of risk means that the Average Annual Losses (AAL) reach $1.075 billion which is more than twice as high from the previous estimates given in the 2017 edition of the *Asia-Pacific Disaster Report*.

FIGURE 1 **Pacific SIDS riskscape: Volumetric representation of the average annual losses**

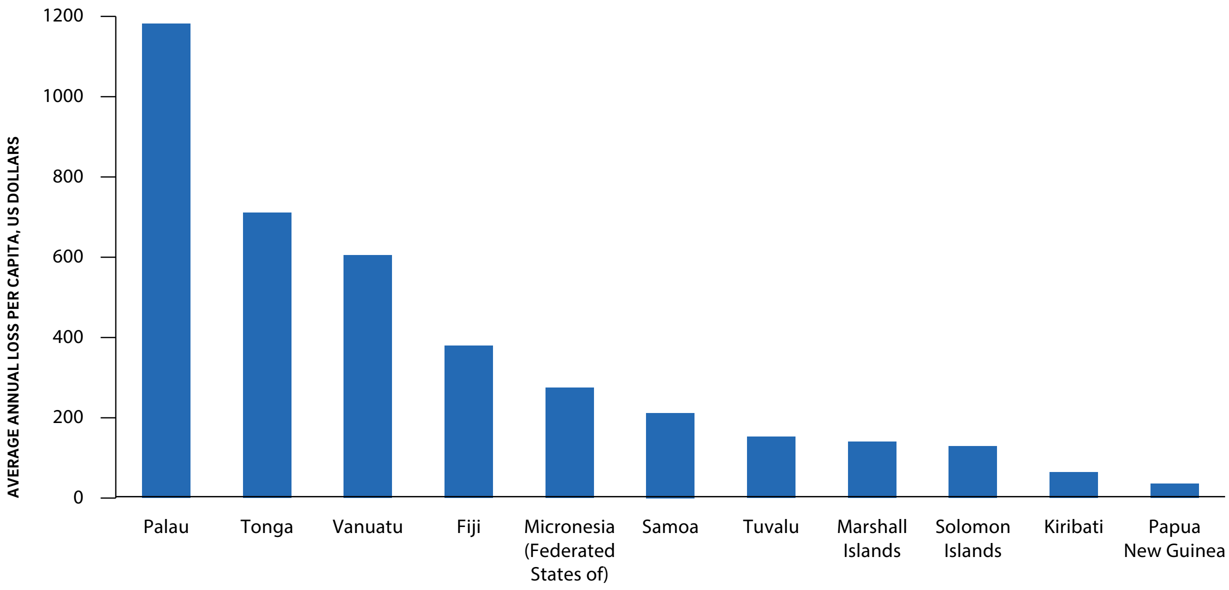


Source: ESCAP based on probabilistic risk assessment.
Note: Volumetric analysis is a measurement by volume (impacted population, geographic area and economic losses)

The AAL as a percentage of GDP and AAL per capita are higher for Pacific SIDS than the Asia-Pacific average.

Figure 2 displays the AAL per capita for the Pacific SIDS. These results are higher for the Pacific SIDS than other countries across the Asia-Pacific region. Compared to other subregions, the average Pacific SIDS have an AAL per capita that is at least three times higher than the average for South-East Asia, South and South-West Asia, and North and Central Asia. The results are even more striking for specific countries; Palau, Tonga, and Vanuatu have AAL per capita of $1,181, $711 and $605, respectively. Palau has the highest AAL per capita for the entire Asia-Pacific region.

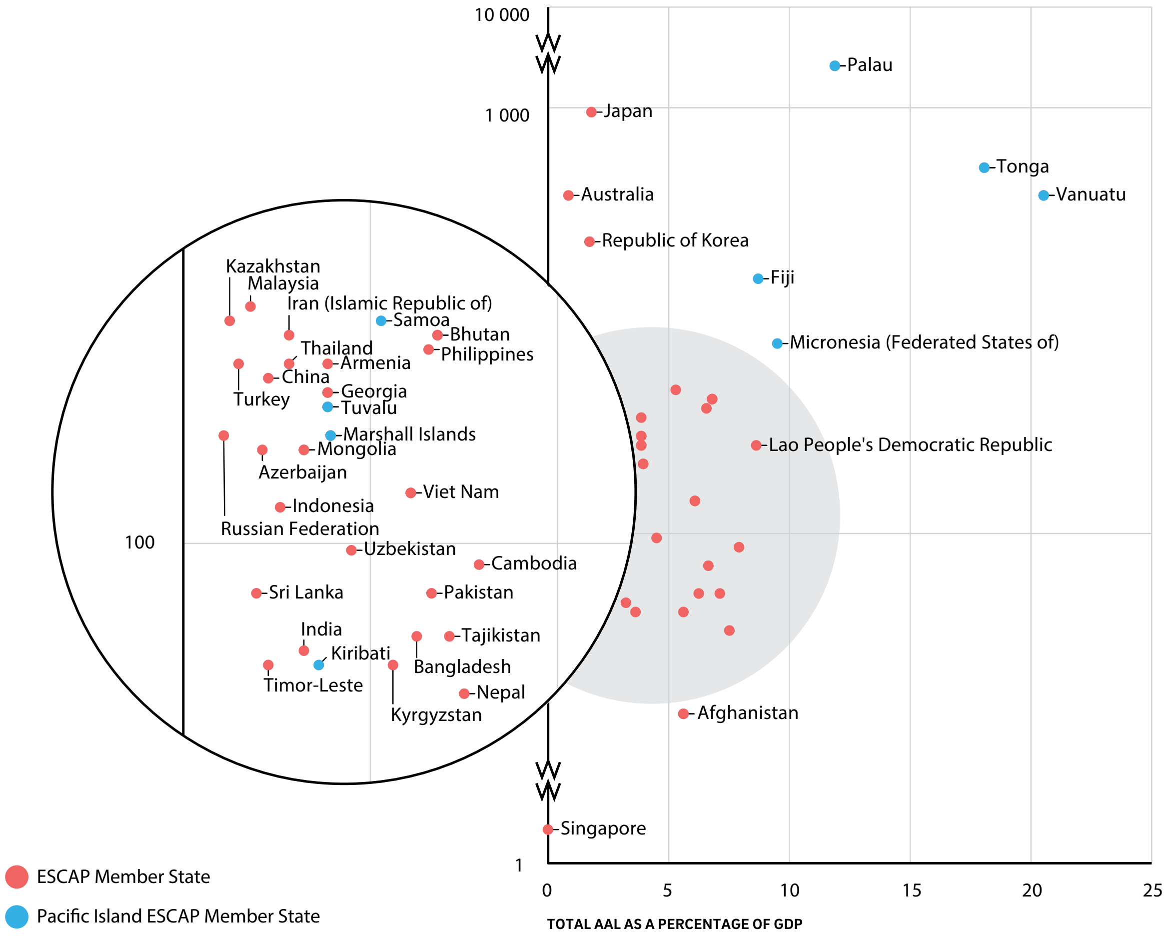
FIGURE 2 Average Annual Loss per capita, US dollars



Source: ESCAP, based on probabilistic risk assessment.
Note: The figures for Papua New Guinea and Solomon Islands do not include losses due to agricultural drought.

Figure 3 displays the AAL per capita and AAL as a percentage of GDP for countries across the Asia-Pacific region. This shows that the Pacific SIDS have high values for both when compared to countries from other subregions.

FIGURE 3 Distribution of AAL per capita and AAL as a percentage of GDP



Some Pacific SIDS are at risk of losing more than 10 per cent of their GDP, annually, due to disasters.

Table 1 compares the AAL for each source of risk with total Gross Domestic Product (GDP) for each country in the subregion. The results are particularly striking for Palau, Tonga and Vanuatu, for which the AAL losses amount to 11.98 per cent, 18.20 per cent and 20.67 per cent of GDP, respectively. Due to data gaps, the AAL estimates of Papua New Guinea and Solomon Islands do not include agricultural drought and are still most likely under-estimated. These recurring losses represent an ongoing erosion of development assets and reduces the potential to invest the dividends of economic growth into human development.

TABLE 1 AAL as percentage of GDP

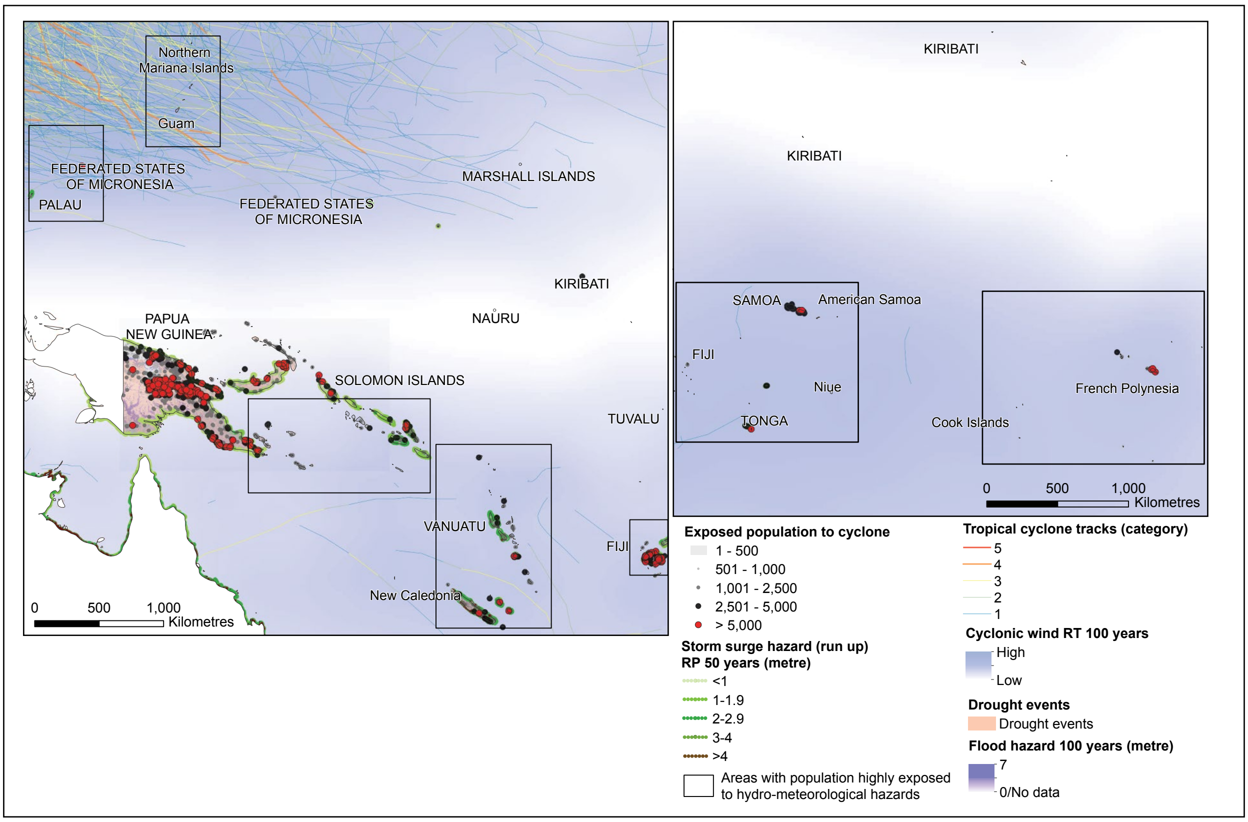
COUNTRY	TOTAL AAL, MILLIONS OF US DOLLARS	GDP, 2017, MILLIONS OF US DOLLARS	TOTAL AAL AS A PERCENTAGE OF GDP
Vanuatu	166.96	807.6	20.67
Tonga	76.81	422.1	18.20
Palau	25.99	216.9	11.98
Micronesia (Federated States of)	29.15	302.2	9.65
Fiji	343.77	3895.5	8.82
Solomon Islands*	79.00	909.3	8.69
Samoa	41.51	768.9	5.40
Marshall Islands	7.45	183.3	4.06
Tuvalu	1.68	42.2	3.98
Kiribati	7.46	197.90	3.77
Papua New Guinea*	295.00	18 373.5	1.61
Total	1074.78	26 119.4	4.11

Source: ESCAP calculations based on probabilistic risk assessment.
*Note: The figures for Papua New Guinea and Solomon Islands do not include losses due to agricultural drought.

Floods and tropical cyclones account for 64 per cent of the total multi-hazard AAL.

Assessing the composition of AAL by hazard type reveals that climate-related hazards produce most of the economic losses due to disaster. Figure 4 demonstrates that these hazards, including tropical cyclones, floods and drought occur throughout the Pacific SIDS. All of the islands are exposed to cyclonic winds and floods, lie in the path of previous tropical cyclone tracks, and many have a history of storm surges. The number of people exposed to multiple hazards varies across the islands, with areas of high exposure in American Samoa, French Polynesia, New Caledonia, Papua New Guinea, Samoa, Solomon Islands, Tonga and Vanuatu.

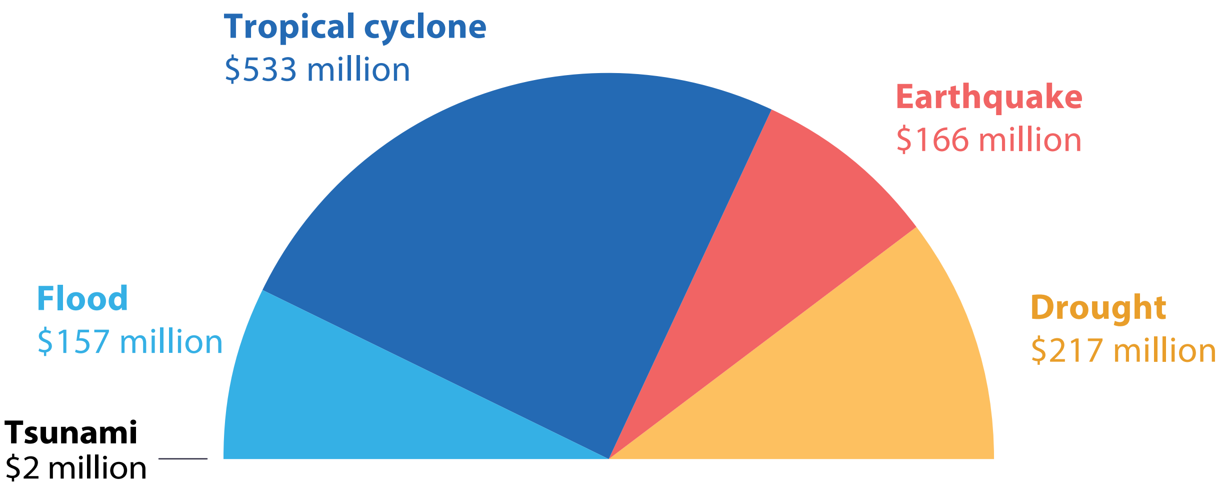
FIGURE 4 Concentration of population exposed to climate-related hazards in the Pacific SIDS



Sources: ESCAP, based on Global Assessment Report on Disaster Risk Reduction (GAR) Risk Atlas, 2015; Global Risk Data Platform, 2013.
Disclaimer: The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations.
Note: Cyclone data consist of all cyclone wind categories with a return period of 100 years and an intensity of 119 km/h to more than 252 km/h.

Floods and tropical cyclones are responsible for particularly high economic losses across the Pacific SIDS. Figure 5 shows that floods account for $157 million, or 14.6 per cent of the total AAL, whilst tropical cyclones account for $533 million, or 49.6 per cent of the total AAL.

FIGURE 5 Composition of AAL by hazard type, millions of US dollars



Drought accounts for 20 per cent of the Pacific SIDS riskscape.

Table 2 demonstrates the distribution of losses across each source of risk. It reveals that agricultural drought-related losses, which are included for the first time, contribute to 20 per cent of the total AAL.

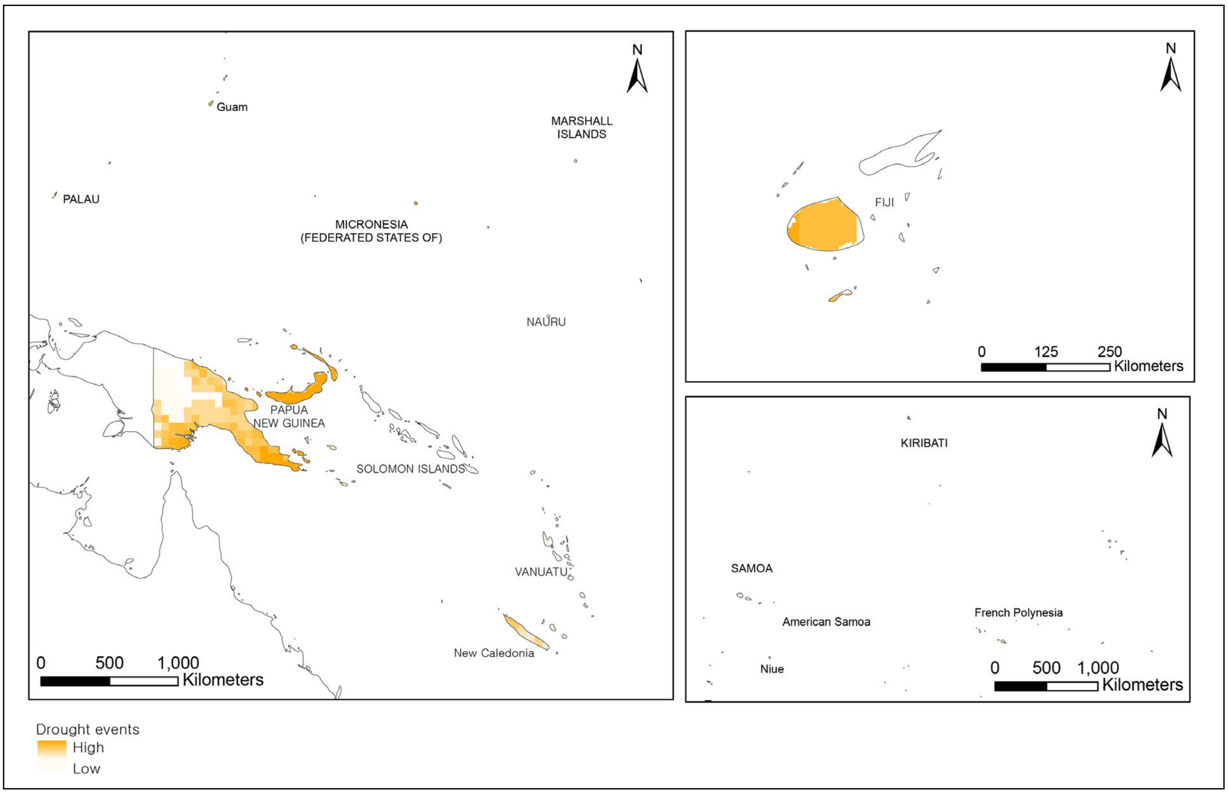
Despite the declining value added to GDP, agriculture still is the essential source of livelihood across the Pacific SIDS. Agriculture contributes to over 30 per cent of total exports in Fiji, Solomon Islands and Papua New Guinea and to more than 60 per cent in Samoa, Tonga and Vanuatu. Considering that there is a lack of data for Papua New Guinea and the Solomon Islands, which are both extremely prone to drought, the current AAL could still be a very conservative estimate. Figure 6 displays drought hazard in Fiji and Papua New Guinea.

TABLE 2 Average Annual Loss in the Pacific SIDS by source of hazard

SOURCE OF RISK	PACIFIC AAL (MILLIONS OF US DOLLARS)	PACIFIC AAL AS A PERCENTAGE OF SUB-REGIONAL GDP
Multi-hazard - intensive risk	471.0	1.80
Multi-hazard - extensive risk	140.7	0.54
Multi-hazard - indirect losses	245.7	0.94
Agricultural drought	217.3	0.83
Total AAL	1 074.7	4.11

Source: ESCAP, based on probabilistic risk assessment and ESCAP, 2019.
Note: No data for American Samoa, Cook Islands, French Polynesia, Guam, Nauru, New Caledonia, Niue, Northern Mariana Islands. No data on agricultural AAL for Papua New Guinea and Solomon Islands.

FIGURE 6 Drought hazard in the Pacific SIDS



Source: ESCAP, based on Global Assessment Report on Disaster Risk Reduction (GAR) Risk Atlas, 2015.
Disclaimer: The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations.
Note: In the map, individual drought events from 1980 to 2001 are indicated by light orange polygons. Darker colours appear where multiple polygons overlap, and therefore indicate areas with a higher frequency of previous drought events, while lighter shades indicate a lower frequency. Data is unavailable for areas shown in white.

The intensification and changing geography of disaster risks are the new normal.

Climate change is amplifying disaster risk and thus, early warning systems need to be upgraded to keep up with the complexity of hazards.

The Intergovernmental Panel on Climate Change (IPCC) has reported that an increase in global temperature of 1.5°C above pre-industrial levels is likely to occur by 2030 and 2052.[3] In the Pacific, this is expected to cause an increase in extreme temperatures and prolonged inter-annual sea level inundations, as well as changes in precipitation patterns and tropical cyclone frequency and intensity. Combined, these changes are expected to exacerbate droughts and coastal flooding and threaten freshwater availability. Furthermore, the frequency of floods and droughts will be influenced by changes in extreme El Niño and La Niña events as the climate warms. The impacts of tropical cyclones and coastal flooding could also increase as the sea level rises and ocean warms, exacerbating coral bleaching and limiting the protection provided by coral reefs.

The worst impacts of climate change are expected to manifest through the shortening of the return period of the El Niño and the expected intensification and variability of tropical cyclones. This is already beginning to materialise, with a series of unprecedented events in the past few years. For example, in February 2016, Tropical Cyclone Winston was the first Category 5 cyclone to directly impact Fiji, and the most intense ever recorded in the Southern Hemisphere.[4] It also occurred too late in the season. Maximum average wind speeds reached 233km per hour and wind gusts peaked at around 306km per hour. The impacts were devastating with 44 deaths and 40,000 people requiring immediate assistance, with losses and damages totalling US$ 1.3 billion, and one in five households across most of the country either suffering total destruction of their houses and most personal belongings, or at least some damage to their houses.[5]

Another unprecedented tropical cyclone struck the region within two years, as Tropical Cyclone Gita brought average wind speeds of 130 km per hour and gusts of up to 195 km per hour, in February 2018. This was the strongest to impact Tonga in its 60-year record. This affected approximately 80,000 people, which is 80 per cent of the entire population. The economic impacts were also significant; at US$ 164.1 million they constituted 37.8 per cent of GDP.[6]

The increasing intensity and frequency of tropical cyclones is combined with worsening droughts due to changes in the El Niño Southern Oscillation (ENSO). Thus, between 2015 and 2016, extremely low precipitation and an especially intense El Niño event resulted in a severe drought. In the Marshall Islands, 21,000 people were affected and estimated economic impacts, for the 2016 financial year, reached US$ 4.9 million. The water supply was significantly disrupted, resulting in additional financial and time burdens to secure potable water for drinking and for household tasks, which disrupted economic activity and school attendance, reduced nutrition rates, and resulted in production losses in agriculture, education and industrial sectors.[7]

Disaster risks are converging with critical socio-economic vulnerabilities, environmental degradation and climate change making the Pacific a disaster hotspot.

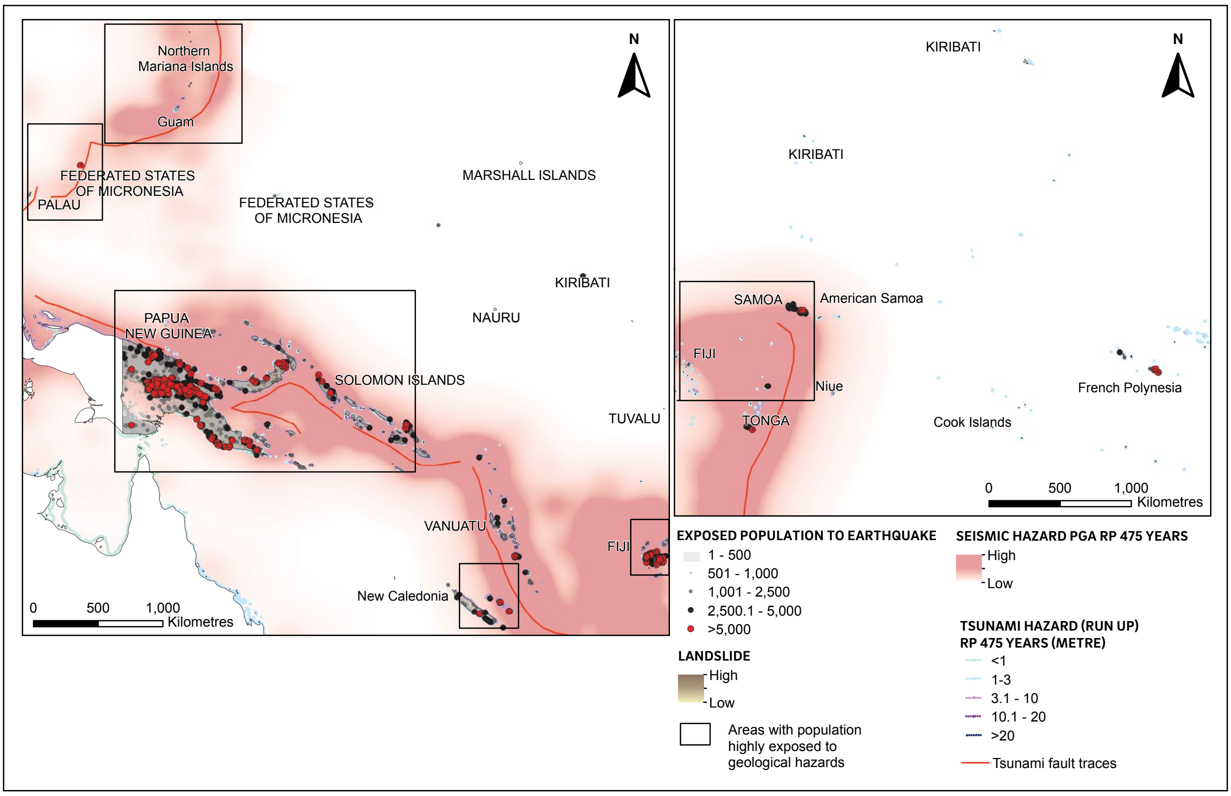
The Pacific SIDS are considered to be one of the four transboundary disaster risk hotspots identified in the APDR 2019. High proportions of the population, as well as high levels of economic stock are exposed to tropical cyclones, El Niño and La Niña events, earthquakes and landslides.

Many Pacific SIDS are also located within a second hotspot surrounding the Pacific Ring of Fire, where transport, ICT infrastructure and poor populations are exposed to typhoons of increasing severity as well as tectonic hazards.

This means that across the Pacific SIDS, there is a high exposure of people and the economy to both climate-related and seismic hazards; 73 per cent of the population and 65 per cent of economic stock are exposed to seismic hazards. Figure 7 shows how the population exposure to seismic hazards is distributed. It reveals that the entire land mass of many countries is exposed to earthquakes, landslides and tsunamis. The exposure to climate-related hazards is also high. For example, 26 per cent of the population and 39 per cent of economic stock are exposed to tropical cyclones.

The extensive multi-hazard exposure also poses a threat to the ports, airports, roads and power plants that many Pacific SIDS rely on for trade and power generation. Power plants that generate 50 per cent of the total power are exposed to earthquakes, and plants that generate 84 per cent of the total power are exposed to tropical cyclones.

FIGURE 7 Population exposed to seismic hazards



Sources: ESCAP, based on Global Assessment Report on Disaster Risk Reduction (GAR) Risk Atlas, 2015; Global Landslide Hazard Distribution v1, 2000.
Disclaimer: The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations.
Note 1: Peak Ground Acceleration (PGA) Return Period (RP) 475 years is the seismic hazard with a return period of 475 years expressed in peak ground acceleration. This means that a level of ground shaking is expected to occur once in 475 years. Tsunami hazard RP 475 years is a tsunami hazard run-up height with a return period of 475 years.
Note 2: The value of PGA 475 years used in this quantification is from 90 to 334 cm/s^2.

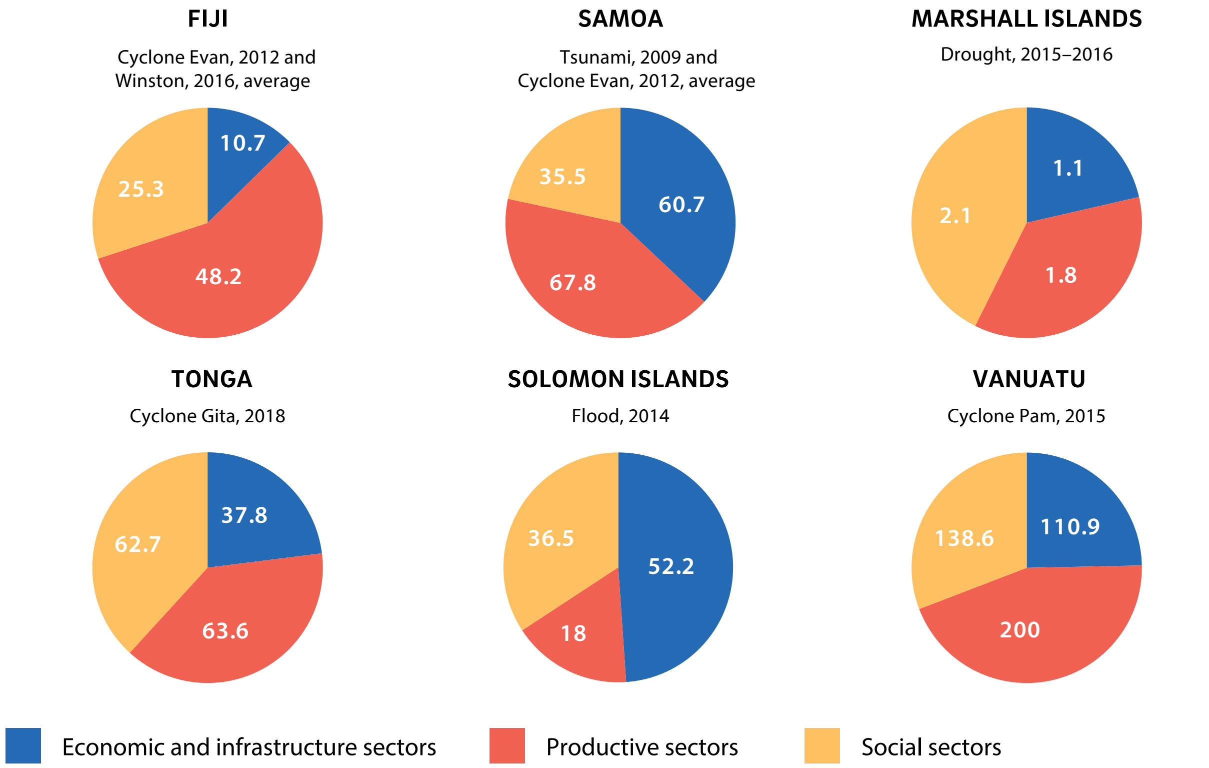
Disaster risk is widening inequalities of opportunity and undermining poverty reduction in the subregion.

Disasters do not only result in short-term devastation, but also threaten long-term development gains. By impacting the social sectors, they exacerbate inequalities of income and opportunity, thereby leaving poor and marginalized people more vulnerable to future disasters and transmitting poverty over generations.

Records of major disasters in the Pacific SIDS show that the social sectors suffer impacts that perpetuate inequalities of opportunity.

Figure 8 demonstrates that the social sectors (education, health, housing and culture) have sustained significant economic losses and damages due to recent disasters in the Pacific.

FIGURE 8 **Sectoral impacts of selected major disasters in the Pacific during the last 10 years (2009–2019), millions of US dollars**



Source: ESCAP, based on Global Facility for Disaster Risk Reduction, 11 Post Disaster Needs Assessment reports available for last 10 years in the Pacific.

Further analysis of these impacts reveals how disruptions to the social sectors is disproportionately impacting poor and vulnerable groups, and perpetuating inequalities of opportunity. There are examples from within different social sectors for each of the three unprecedented climate-related disasters discussed in the previous section.

Following Tropical Cyclone Winston, the housing sector suffered the highest total economic effects, which at US$ 362 million accounted for 39 per cent of the total for the productive, social and infrastructure sectors. The heavy damage and losses disrupted the economic activity and educational access of men, women, boys and girls in different ways. For example, the school attendance of older boys declined so that they could assist with rebuilding homes and re-establishing livelihoods, and the attendance of girls declined so that they could help with domestic activities. Furthermore, as women were more likely to engage in reproductive and informal economy work in the home, their incomes were more disrupted than those of men who were more likely to work outside the home. Female-headed households, households belonging to widows, the elderly, people living with disabilities and single women also struggled to rebuild their homes due to a lack of the resources needed to rebuild quickly.[8]

Tropical Cyclone Gita also had significant impacts on vulnerable and marginalized groups, particularly the agricultural poor and women. About 75 per cent of the population in Tonga live in rural areas, often relying on small-scale agriculture and fisheries for sustenance or as the main source of livelihoods.[9] Damage to traditional production of root crops therefore disrupted food security, incomes and employment for many of the most poor and remote households. Additionally, many female-headed households in 'Eua, living on the outskirts of town or near to gatherings with alcohol consumption, reported that they felt more vulnerable following the disaster, as power outages prevented them from lighting their homes or charging their phones to call for help.

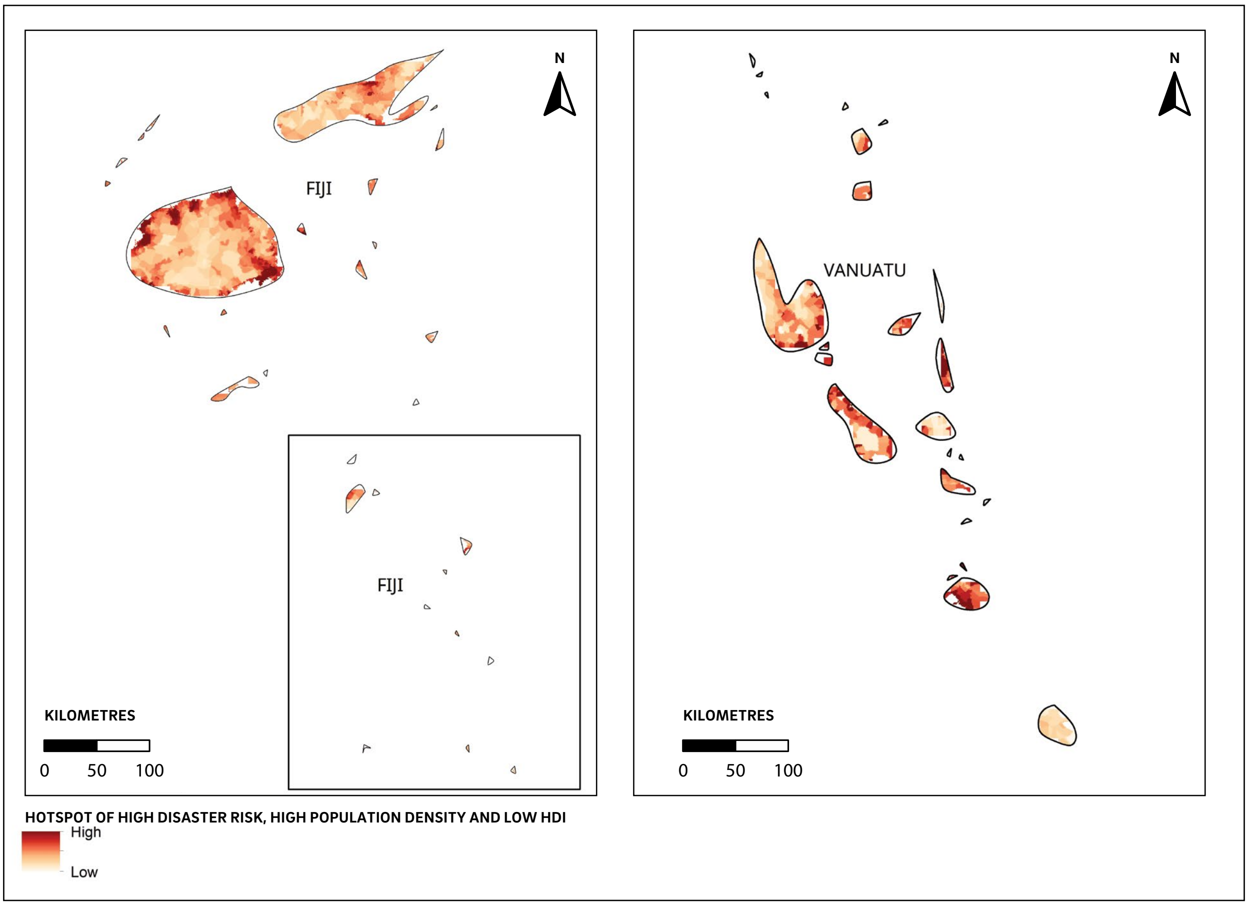
During the 2015–2016 drought in the Marshall Islands, concerns over declining nutrition rates focused mostly on vulnerable groups such as children, pregnant and lactating women, or people with chronic diseases. Children also faced increased danger as women had to accompany men who would normally collect household drinking water, which meant many children either had to join their parents or were left unaccompanied. The lack of water also disrupted educational access, as children had to collect water, could not attend school as they had insufficient water to bathe or wash their uniforms, or schools were closed due to insufficient drinking water.[10]

Many Pacific SIDS see a convergence between high disaster risk and a low human development index (HDI) score.

The impacts of disasters on poverty and inequality are already evident in various measures. Countries at the highest risk are those with a low human development index and either high exposure or vulnerability to drought, or both, such as Kiribati, Papua New Guinea, Solomon Islands and Vanuatu. Both the vulnerability and exposure to drought are determined by the significance of the agricultural sector. For example, the Solomon Islands and Vanuatu have high drought vulnerability as a large proportion of the total employment is in agriculture, at 70 per cent and 65 per cent, respectively. This means that the incomes of 186,900 people in the Solomon Islands and 78,400 people in Vanuatu are vulnerable to disruption during a drought. Across the Pacific SIDS, this number rises to 1.19 million people.[11]

There are many areas within the Pacific SIDS in which low HDI scores, high population density and high disaster risk converge. Figure 9 shows how these areas are distributed within Fiji and Vanuatu. For both countries, there are areas throughout the territory, but the convergence is more pronounced along the coastlines.

FIGURE 9 Overlaps between low HDI and high disaster risk



Sources: Calculations by ESCAP based on (1) sub-national HDI data from UNDP, (2) Population statistics from WorldPop, (3) and hazard data from GAR 2015.
Disclaimer: The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations.

Poverty, inequality and disaster risk are reinforcing each other.

Overall, the evidence indicates a clear message; disaster risk, poverty and inequality of opportunity are reinforcing each other. By impacting the social sectors, disasters prevent access to opportunities such as schooling, prospects for higher paid employment and healthcare. These impacts are disproportionately affecting vulnerable and marginalized groups, and perpetuating inequalities of opportunity. Furthermore, disasters are more likely to occur in areas with more vulnerable populations. As the disaster risk intensifies with climate change, it will be essential to break these links in order to protect development gains.

A range of policy options can effectively break the links between disasters, poverty and inequality.

Governments can shift their strategies from addressing only disaster impacts to addressing the fundamental drivers of vulnerability that make people susceptible to the impacts of disasters and climate change, through a comprehensive portfolio of risk-informed investments and pro-poor disaster risk reduction interventions. As a result, they can prevent disaster risk from undermining poverty reduction efforts.

Investments in social sectors and resilient infrastructure can prevent disasters from undermining development gains.

The APDR 2019 demonstrates that investments in social sectors and infrastructure will support, rather than undermine, development gains during disasters by this using the results of computable general equilibrium modelling (CGE) to quantify the relationship between poverty, inequality and disasters for 26 countries in the Asia-Pacific region.

Whilst data are available for only Papua New Guinea and Fiji, collectively these two countries contain 80 per cent of the population across the Pacific SIDS. Different scenarios were used to explore how the percentages of national populations living in poverty (at the $1.90, $3.20 and $5.50 a day thresholds), and the Gini coefficient, would change over the 2016 to 2030 time period, depending on economic growth, disaster risk and sectoral investments. Growth in each country is assumed to be the average growth rate of the Gross Domestic Product (GDP) for the last five years. Investments in the social sectors are included in line with global averages for public expenditure as a percentage of GDP, at 11 per cent for social protection; 5 per cent for education; and 4 per cent for health, whilst investments in resilient infrastructure are included at 2 per cent of GDP.

The results are striking and are consistent with the model results for other countries. They show that investments in each of the four key sectors can mitigate the impact of disasters on poverty and inequality. Figure 10 and Figure 11 display the reductions in the $1.90, $3.20 and $5.50 poverty rate and Gini coefficient, respectively for Fiji and Papua New Guinea. The highest reductions are achieved from investing in social protection, but other interventions are also effective in mitigating the disaster driven increases in poverty and inequality.

Translating these rates and coefficients into numbers reveals the number of people who are at risk of being left behind in extreme poverty, if disaster risk is not reduced. In Papua New Guinea, in 2016, 2.5 million people were living in extreme poverty. Economic growth is projected to reduce this number to 1.5 million people, by 2030. However, with disaster risk, 2.1 million people are projected to be living in extreme poverty in 2030. Investing in line with global averages in education, health and social protection will bring this number down to 1.7 million people, 1.8 million people and 1.4 million people, respectively. Investing 2 per cent of GDP in infrastructure will bring it down to 1.5 million people.

FIGURE 10 Impact of investments on poverty levels, 2016–2030

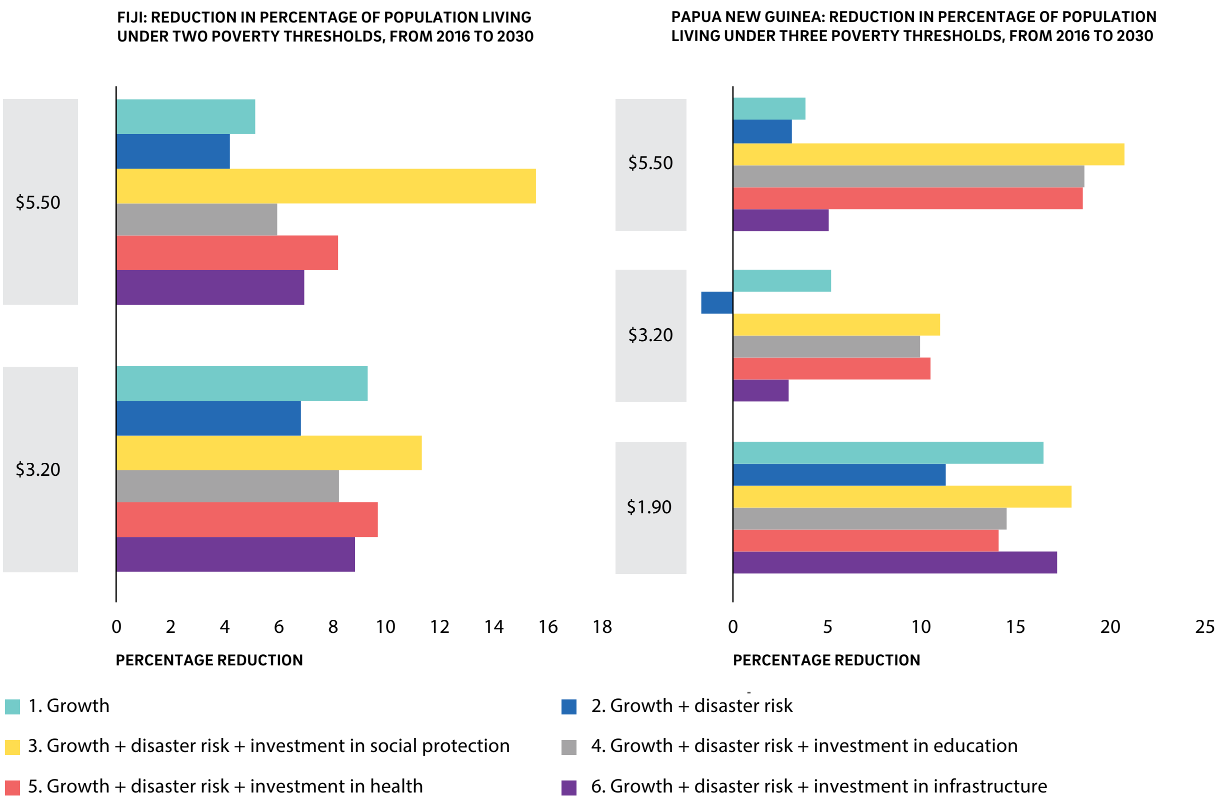
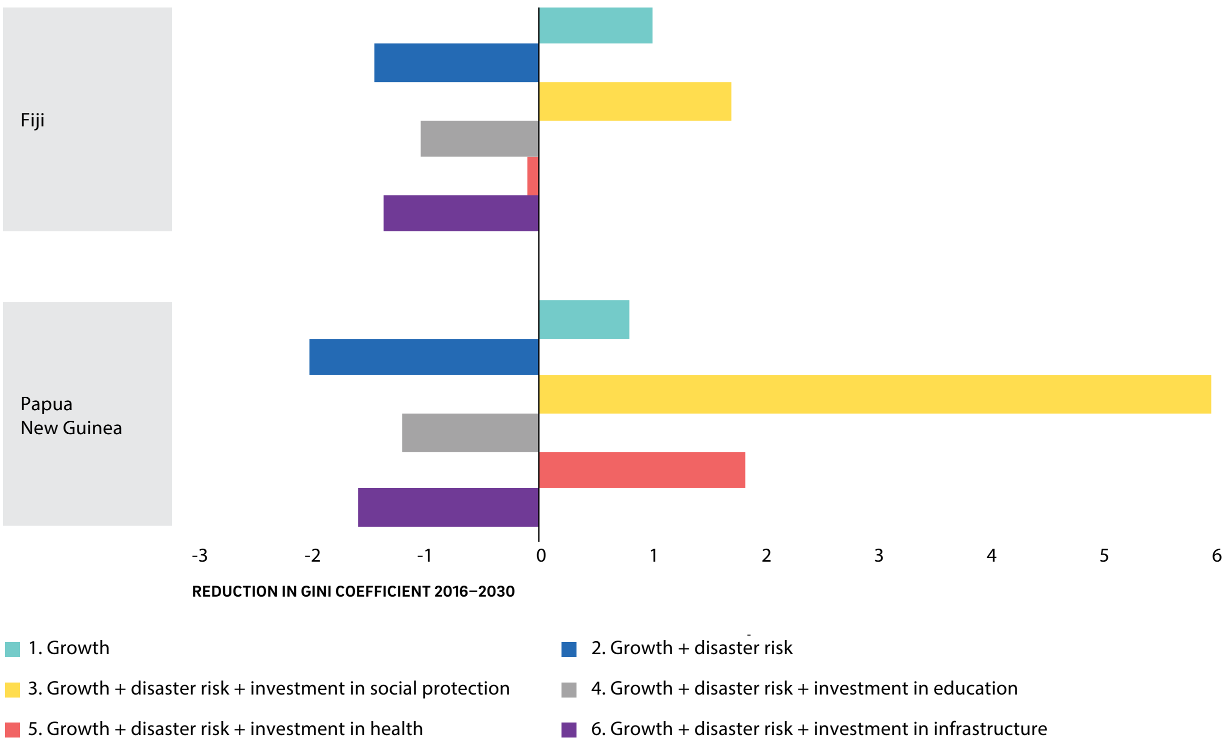


FIGURE 11 Impact of investments on inequality, 2016–2030



Source: ESCAP calculations based on CGE model simulation.
Note: A positive value corresponds to a reduction in the Gini coefficient and therefore a reduction in inequality, whereas the inverse is true for negative values.

Within Fiji, in 2016, 118,000 people were living in moderate poverty (under $3.20 a day). Economic growth is projected to reduce this number to 38,000 people, by 2030. However, with disaster risk, 62,000 people are projected to be living in extreme poverty, in 2030. Investing in line with global averages in education, health and social protection will bring this number down, to 48,000 people, 34,000 people, and 18,000 people, respectively. Investing 2 per cent of GDP in infrastructure will bring it down to 42,000 people.

These results hold across the various poverty thresholds in both countries. A clear message therefore emerges that disaster risk threatens to undermine development gains, but countries can still reduce poverty and inequality despite disaster risk by investing in social protection, health, education and infrastructure.

Increasing investments in the social sectors and infrastructure will require additional finance but are small compared to the damage and losses already sustained by Pacific countries due to disasters.

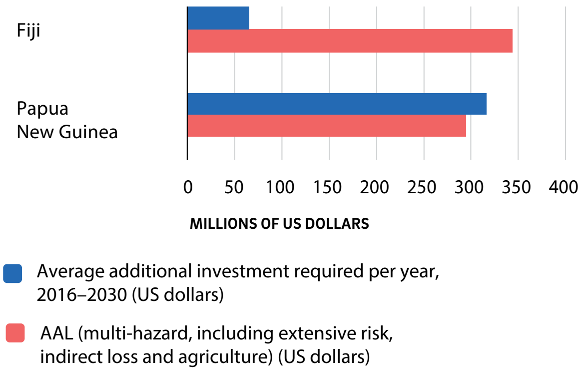
Various reports have attempted to calculate the additional investments needed for particular sectors across the Pacific SIDS. For example, ESCAP's Economic and Social Survey (2019) calculated the investment needed for four SIDS, namely Fiji, Kiribati, Maldives and Solomon Islands, for which data was available, to have sufficient transport, water and sanitation, and ICT infrastructure in order to meet the Sustainable Development Goals, and to ensure that they are maintained and climate-proofed. This is estimated to cost 3.9 per cent of GDP from 2016 to 2030. Currently, 2.5 per cent, 0.1 per cent and 0.09 per cent of GDP are invested from public investments, private investments and development assistance, respectively. This leaves an annual investment gap of 1.3 per cent of GDP, or US$ 0.2 billion, from 2016 to 2030.[12]

There are varying estimates of the total amount of investment required to meet the Sustainable Development Goals, to climate-proof infrastructure and so on. Whilst these all require daunting levels of additional finance, the *Asia-Pacific Disaster Report 2019* demonstrates that Governments can make real improvements in poverty and inequality by investing at least in line with global average expenditures in social protection, education, health, and 2 per cent of GDP in infrastructure.

Figure 12 shows that the additional amounts required to meet these investments levels are small compared to the damage and losses already sustained by Pacific countries due to disasters. Within Papua New Guinea, the additional investments required per year are only 1.07 times the AAL. Moreover, in Fiji the additional investments per year are less than one-fifth of the AAL. The additional investments are also less than the damage and losses sustained in major disasters. For example, in Fiji, the average additional investment per year is US$ 65.9 million, which is just 5 per cent of losses incurred due to the Tropical Cyclone Winston (US$ 1.3 billion).

Increasing sectoral investments also means that Governments can be more ambitious than aiming to bounce back better after a disaster. These are 'no-regret' measures that will not only strengthen resilience to disasters, but will deliver co-benefits such as improved education, health care, social protection and infrastructure, even if no disasters occur. Furthermore, these sectors offer entry points to strengthening resilience to multiple hazards simultaneously, which is essential given that disasters are becoming more complex and harder to predict. This approach also means that numerous government ministries can take steps to prevent disasters from exacerbating poverty and inequality.

FIGURE 12 **Annual additional investment to meet global averages compared to Average Annual Loss (millions of US dollars)**



Source: ESCAP calculations based on CGE model and AAL probabilistic risk assessment.
Note: Additional investment figures refer to the difference between projected average annual investment if public expenditure in each sector, from 2016–2030, continues at the same percentage of GDP as in 2016, and average annual investment required over 2016–2030, if investments in each sector meet global averages.

Emerging technologies can be deployed to overcome the challenges posed by geography in delivering social and disaster risk reduction interventions.

Technological innovations offer unprecedented opportunities for resilience-building in remote Pacific SIDS. Emerging industry 4.0 innovations in robotics, analytics, artificial intelligence (AI) and cognitive technologies, nanotechnology, quantum computing, wearables, the internet of things (IoT), big data, additive manufacturing, and advanced material can be utilised to drive intelligent action for disaster resilience. By investing in these technologies, Governments can ensure that even the poorest countries and most excluded communities can be empowered. For example, big data fill gaps in information flows in pre-response and post-disaster situations, through descriptive analytics that uses historical data to describe what has occurred, predictive analytics that predicts future probabilities and trends by linking static and dynamic data, prescriptive analytics that inform policymaking for disaster risk reduction, and discursive analytics that empower communities as end users. A couple of operational examples are provided below:

With advances in big data analytics, early warning systems are transitioning towards providing more information on impacts and risks. The Secretariat of the Pacific Regional Environment Programme (SPREP), World Meteorological Organization (WMO), and the Pacific Community (SPC) have implemented efforts in this regard. Impact-based cyclone forecasts and warnings help to pinpoint, with far more location and timing accuracy, the community at risk. This has improved evacuation by providing more accurate estimates of the

BOX 1 Helping the poorest bounce back quickly after Tropical Cyclone Winston (2016)

Following a disaster, Governments can use shock-responsive social protection systems to guarantee efficient and comprehensive delivery of emergency support to the affected population. This involves adapting existing social protection systems such as cash transfers and social services, through piggybacking, horizontal expansion, vertical expansion, parallel operation or refocusing.

Cyclone Winston marked the first instance of a Pacific Island country delivering recovery assistance using an existing social safety net programme.[a] The Government used vertical expansion, in which the value or duration of an existing intervention is temporarily increased to meet the additional needs of existing beneficiaries.[b] The beneficiaries of three existing schemes received extra payments; 90,000 recipients of the Poverty Benefits Scheme, the poorest 10 per cent of households, received a lump sum of F$ 600 (US$ 280). 3,257 households with children and single mothers benefiting from the Care and Protection Allowance Scheme received F$ 300 (US$ 140) and 17,232 elderly people benefiting from the Social Pension Scheme received a lump sum of F$ 300. Each of these cash transfers was paid, in addition to the usual benefits, as well as housing vouchers were provided through a reconstruction scheme.

This approach facilitated rapid delivery and the payments were well-utilized by recipients who repaired dwellings and agricultural land, restored food stocks and repaired neighbourhood infrastructure. According to the World Bank, the impact of the cyclone on the poorest Fijians was reduced by more than 20 per cent and the cost-benefit ratio was greater than 4.[c] However, it failed to address the increased vulnerability of the near-poor who were just above the income threshold for government assistance programmes. Disaster assistance may thus affect the balance of vulnerabilities between socioeconomic groups. To address this the Poverty Benefit Scheme could be extended to include details of near-poor households to permit a horizontal expansion at times of disaster.

a Mansur, J. Doyle, and O. Ivaschenko (2018).
b A full explanation and examples of each form of shock responsive social protection are provided within the Asia-Pacific Disaster Report (2019).
c Adapted and expanded from Government of the Republic of Fiji and World Bank (2017).

number of people and timing of evacuation. As a result, there has been a significant decrease in casualties (Box 2). Exposed economic assets can be protected through impact-based forecasting that enables risk-informed, spatial land use planning.

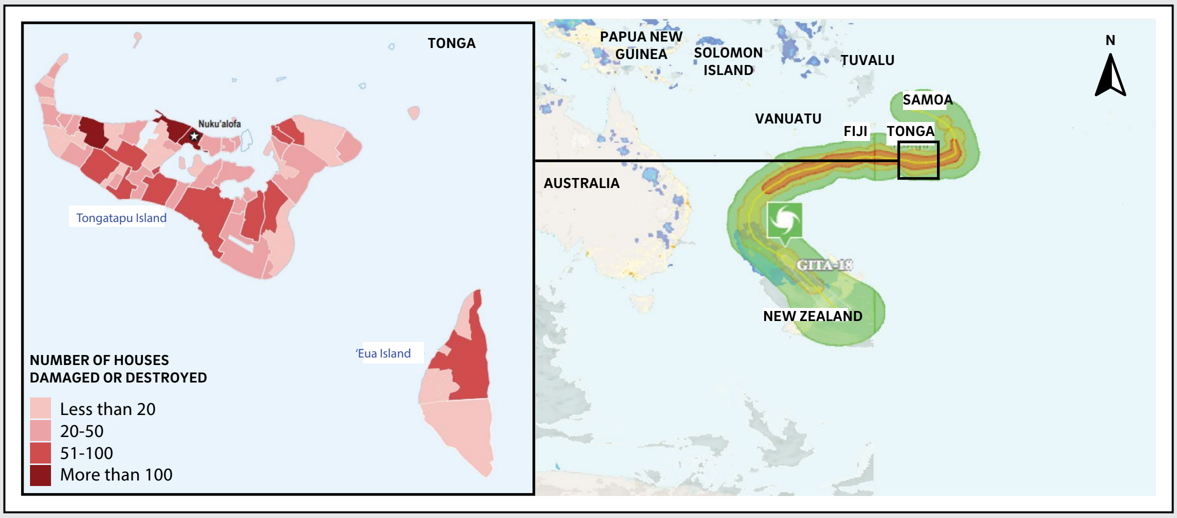
Unmanned aerial vehicle (UAV) or drone, is fast emerging as an alternative and/or complement to traditional satellite-based and remote sensing method for producing high-resolution base topographic maps for pre-disaster risk assessment, as well as risk monitoring. The application of data gathered by drones can enhance the capacity of developing countries to collect and analyse remote sensing and geospatial data for disaster preparedness, response, and long-term risk reduction. Compared to traditional sources of remote sensing data, UAV can provide faster and easier access to quality data. This has particular relevance for the high-risk, low-capacity Pacific countries that have sparse populations scattered across wide distances. Normally, these countries receive geospatial data from space-faring countries but during emergency and disaster situations, they have to wait until these data are provided.

For the Pacific Island countries, early warning systems have had support from the Government of Japan and other key partners, such as the Indonesian Agency for Meteorology, Climatology and Geophysics. This has helped these countries use statistical and geospatial data for early warning systems via technical training, regional workshops and pilot projects.[13]

BOX 2 **Tropical cyclone Gita hits Tonga**

In 2018, Cyclone Gita hit the Pacific Island nations of American Samoa, Fiji, Niue and Tonga, Samoa, Vanuatu, and the Territory of the Wallis and Futuna Islands. Although the cyclone caused significant material damages and affected 87,000 people, it did not cause any fatalities.[a] The availability of timely warning of the potential impacts contributed to putting people out of harm's way.

Number of houses affected by tropical cyclone Gita



Source: Based on Tonga Post-Disaster Needs Assessment – Cyclone Gita, 2018.
Disclaimer: The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations.

a USAID (2018).

Building disaster resilience for the most vulnerable communities requires good baseline data disaggregated by gender, age, and disabilities. Such data are often scarce or completely missing, since official data collection systems often exclude the most vulnerable people who are hardest to reach. International household surveys can omit these people either by accident or by design. With the advances in geo-statistical interpolation techniques, it is also possible to integrate the disaggregated geospatial data into traditional sampling frames.

Pulse Lab Jakarta uses mobile network data to provide insights into internal displacement that can inform the targeting of humanitarian assistance following a disaster. During the response to the eruption of Mount Monaro in Vanuatu, in March 2018, the evacuation could be mapped in near real-time. This application not only allows a more efficient emergency response, but also has potential to support the development of predictive models for evacuee destinations that can inform disaster preparedness. For example, data from Samoa was used to prepare baseline information that could be used when a tropical cyclone hits, such as maps of storm shelters that would likely see an increase in load during a cyclone, so resources can be distributed; and analysis of the normal frequencies of commuting between administrative units when a disaster is not occurring can be conducted, to detect changes during a disaster.[14]

Recognizing the increasing intensity and complexity of disaster risk in the Pacific, responses at all levels need to be enhanced.

The Pacific SIDS have had considerable experience with reducing disaster risk and adapting to climate change. Many countries are increasingly investing in resilience building and forging partnerships to upgrade their social policies and early warning systems, among other steps. They are also building on their history of collaboration, such as under the SAMOA Pathway, to jointly implement priority actions to address regional challenges.

Yet, it will be difficult to stay ahead of the curve as climate change, expanding disaster hotspots, inequality and environmental degradation cumulatively create a more complex riskscape in which to assert disaster risk reduction actions.

The *Asia-Pacific Disaster Report 2019* illustrates the immense challenges for the Pacific SIDS but also the range of policy options to strengthen resilience vis-à-vis the new riskscape. Responses at the national, regional and global levels need to be upgraded across three broad areas:

Implement risk-informed policies and investments.

As the *Asia-Pacific Disaster Report 2019* shows, high disaster risk and high levels of poverty and inequality compound each other. Multiple policies must be deployed depending on local circumstances. It will be important to guarantee risk-informed social protection, education and health services along with more disaster and climate resilient agriculture and infrastructure. The report shows that investments in resilient infrastructure, health and education, all offer an entry point for mitigating disaster-driven increases in poverty and inequality. As disaster risk is also closely linked with environmental vulnerability in the Pacific, investments also need to be coupled with environmental protection and ecosystem restoration.

Capitalize on new technologies.

Disaster risk reduction should be grounded in a seamlessly integrated system that comprises big data, digital identity, risk analytics and geospatial data. As the examples presented in this report show, new technologies could be deployed to overcome some of the critical challenges posed by the geography of the Pacific for delivering disaster risk reduction, preparedness and response actions, particularly in reaching the 'last mile' communities.

Unlock the potential of regional cooperation.

The Pacific SIDS have some of the world's most extensive transboundary disaster hotspots. With climate change these are likely to expand still further, creating deep uncertainties. Addressing these will require strategies at the regional and sub-regional levels building on the considerable work already being undertaken by such organizations as SPREP, WMO and SPC. To unlock the potential of regional cooperation, the ESCAP inter-governmental Committee on Disaster Risk Reduction established the Asia-Pacific Disaster Resilience Network (APDRN). APDRN, with an emphasis on partnerships and innovation, comprises four inter-related streams: (i) multi-hazard early warning system platform; (ii) data, statistics and information management; (iii) technology, innovations and applications; and (iv) knowledge for policy.

Pacific Islanders are literally 'holding the line' vis-à-vis climate change impacts and intensifying disaster hotspots. Actions at all levels need to be upgraded to ensure that every aspect of development in the Pacific SIDS can face up to more intense and complex disaster risk.

Endnotes

1 Explanatory Note: This publication covers American Samoa, Cook Islands, Fiji, French Polynesia, Guam, Kiribati, Marshall Islands, Micronesia (Federated States of), Nauru, New Caledonia, Niue, Northern Mariana Islands, Palau, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu and Vanuatu. Unless otherwise specified, Australia and New Zealand are not included.
2 A probabilistic risk model was used to estimate the risk of a range of hazards including earthquakes, tsunamis, floods, tropical cyclones and storm surges, and drought. The model incorporated intensive risk (high-severity but mid to low-frequency disasters), as well as extensive risk (low-severity but high frequency disasters), and both direct and indirect losses. This was calculated based on a proxy estimate that incorporated exposure of the agricultural sector to drought (ratio of agricultural GDP to total GDP) and vulnerability (proportion of the population in rural areas, the extent of rural poverty and proportion of employment in the agricultural sector).
3 IPCC (2018).
4 NASA Earth Observatory (2016).
5 Government of the Republic of Fiji (2016).
6 Government of Tonga (2018).
7 Republic of the Marshall Islands (2017).
8 Government of Fiji (2016).
9 Government of Tonga (2018).
10 Republic of the Marshall Islands (2017).
11 In nine countries for which data is available: Fiji, French Polynesia, Guam, New Caledonia, Papua New Guinea, Samoa, Solomon Islands, Tonga, and Vanuatu.
12 ESCAP (2019).
13 ESCAP (2017).
14 United Nations Global Pulse (2018).

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The Asia-Pacific region faces a daunting spectrum of natural hazards. Indeed, many countries could be reaching a tipping point beyond which disaster risk, fuelled by climate change, exceeds their capacity to respond.

The *Asia-Pacific Disaster Report 2019* shows how these disasters are closely linked to inequality and poverty, each feeding on the other and leading to a vicious downward cycle. It assesses the scale of losses across the disaster 'riskscape' and estimates the amounts that countries would need to invest to outpace the growth of disaster risk. It shows the negative effects of disasters on economies in the region and where investments are more likely to make the biggest difference.

While this will require significant additional finance, the report shows the amounts are small compared to the amounts that countries in the region are currently losing due to disasters. The report demonstrates how countries can maximize the impacts of their investments by implementing a comprehensive portfolio of sectoral investments and policies that jointly address poverty, inequality and disaster risk. It showcases examples from the region of innovative pro-poor disaster risk reduction measures and risk-informed social policies that are breaking the links between poverty, inequality and disasters. Similarly, it explores how emerging technologies such as big data and digital identities can be used to ensure the poorest and most vulnerable groups are included in these policy interventions.

The Disaster Riskscape across the Pacific Small Island Developing States: Key Takeaways for Stakeholders presents a comprehensive analysis of the sub-region's riskscape to inform policy actions. The overall message is that disaster risks are converging with critical socio-economic vulnerabilities, environmental degradation and climate change, to make the Pacific SIDS a disaster hotspot.