

# FOOD SECURITY IN VULNERABLE ISLANDS

A REGIONAL FOOD SECURITY ATLAS OF THE PACIFIC



Pacific  
Community  

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Communauté  
du Pacifique

# Foreword

What is The Regional Food Security Atlas of the Pacific?

The Regional Food Security Atlas of the Pacific is a joint publication by the Pacific Community (SPC) and the World Food Programme (WFP). It is generously funded by the Australian Government's Department of Foreign Affairs & Trade.

The 2018 Atlas provides a spatial overview of the core issues that affect food security across the Pacific Island Countries (PICs). Divided into nine topical sections, the Atlas provides the reader with information and knowledge on the causes and outcomes of food security and nutrition in the region.

The Pacific is prone to natural disasters. To be able to respond quickly and effectively after the occurrence of a disaster, accurate and up to date data is essential. The Regional Food Security Atlas of the Pacific is intended to provide a baseline of statistical information that can be helpful to decision makers to improve food security and the nutritional status of vulnerable people across the Pacific Island countries.

It is hoped that the 2018 Food Security Atlas for the Pacific will contribute to attaining the Sustainable Development Goal 2: end hunger, achieve food security and improved nutrition and promote sustainable agriculture.

Anthony Freeman  
Director of Pacific Office  
United Nations World Food Programme, Fiji

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## THE PACIFIC ISLANDS

Spreading over a distance of 10,000 km, the Pacific Islands comprise nations and territories of Oceania. The region is generally divided into three sub-regions – Melanesia, Micronesia, Polynesia – with distinct geographic and cultural features.

### MELANESIA

The arc of islands located north of Australia and south of the Equator is known as Melanesia, named after the dark-skinned peoples of these islands. This island group includes Papua New Guinea, the Solomon Islands, New Caledonia, Vanuatu and Fiji. The sub-region is characterized by relatively larger islands of predominantly volcanic nature and complex topography.

### MICRONESIA

North of the Equator and east of the Philippines are the Micronesian islands, named accordingly due to the relatively small size of the islands. This group includes Palau, Guam, the Northern Mariana Islands, the Federated States of Micronesia, Nauru, the Marshall Islands and Kiribati. The group includes 2,100 islands with a total area of 2,700 km<sup>2</sup> with many atoll and low-lying islands.

### POLYNESIA

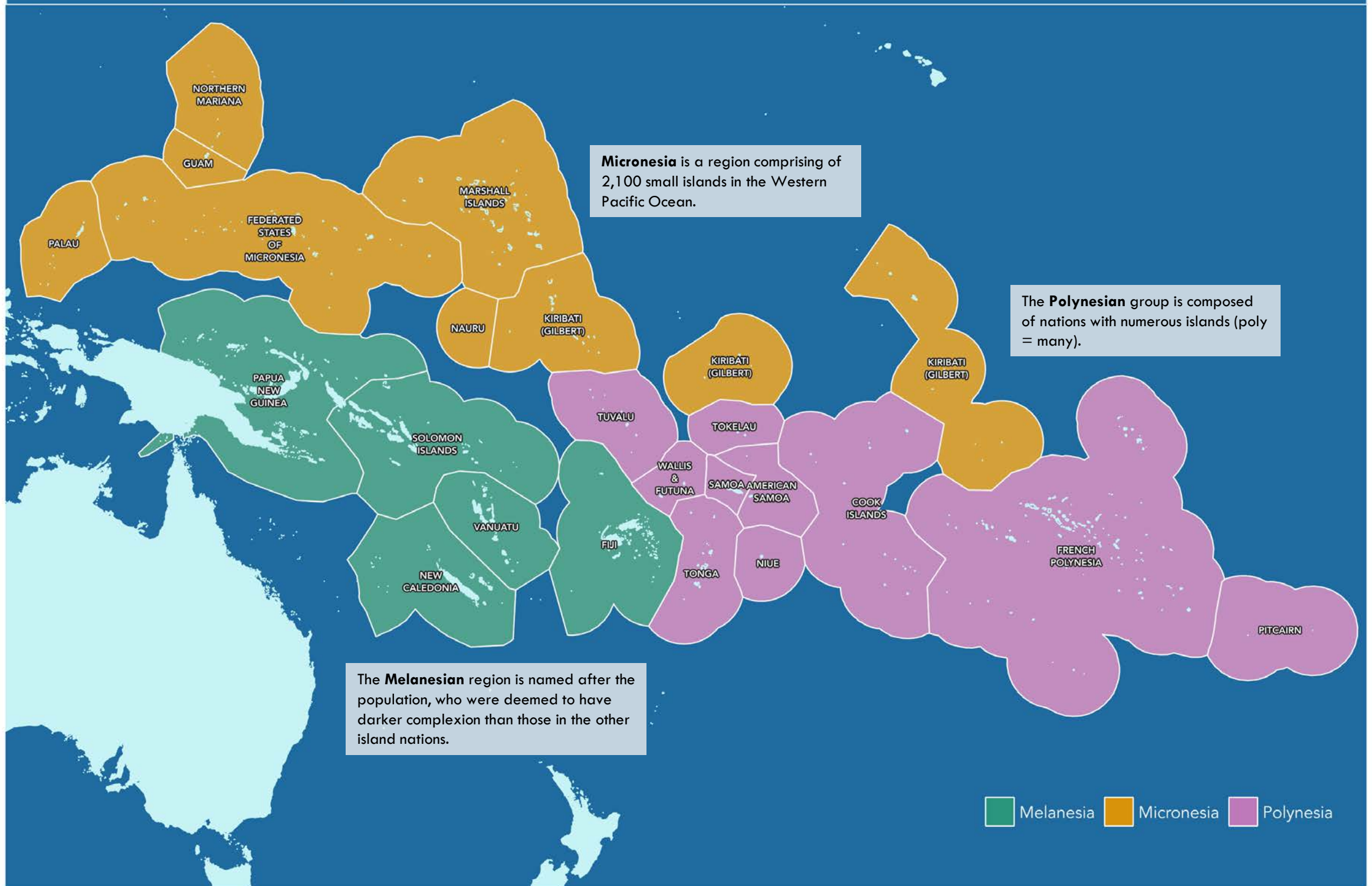
In the Eastern Pacific, Tuvalu, Wallis & Futuna, Tokelau, Samoa, American Samoa, Tonga, Niue, the Cook Islands, French Polynesia and the Pitcairn Islands comprise the largest island group, Polynesia, named after the many islands of this group. Characterized by a small amount of land spread over a large portion of the southern Pacific Ocean, islands in this group are predominantly of volcanic origin.

## TERRITORIES AND DEPENDENCIES

After the Second World War several of the islands in the Pacific became territories or dependencies of other countries. While several of the islands have become independent states in the last few decades, a number of island groups maintain their status as a dependency or territory; a small number of independent island states have also signed a Compact with the United States to ensure long-term assistance. Below is a list of these countries.

ISLAND GROUPS	STATUS
 Marshall Islands  Palau  Federated States of Micronesia	} Independent states that have signed a Compact with the United States
 Guam  Northern Mariana Islands  American Samoa	} Insular area of the United States
 French Polynesia  New Caledonia  Wallis & Futuna	} Overseas country of France
 Tokelau	} Dependent territory of New Zealand
 Pitcairn Islands	} British overseas territory
 Cook Islands  Niue	} Non-United Nations member states

# REFERENCE MAP | ISLAND GROUPS OF THE PACIFIC



## POPULATION TRENDS

Over 11 million people live in the Pacific Islands. The relatively small population of the region is dispersed over a vast territory covering an area of over 13,000 km<sup>2</sup>.

The largest countries by population are in the Melanesian group with Solomon Islands, Fiji and Papua New Guinea having over 600,000; 800,000; and 8 million inhabitants respectively. The three countries account for almost 90% of the population in the region. The Micronesian islands have medium-sized populations relative to other Pacific islands but are dispersed over many remote islands. The smallest countries by population are located in the Polynesian group, with countries such as Pitcairn (57), Niue (1,611) and Tokelau (1,411) having populations of under 2,000 inhabitants. Other Polynesian islands (apart from French Polynesia) also have relatively small numbers of people spread over several islands.

Despite relatively small population numbers, there are areas of the Pacific that have high population densities such as Ebeye (Marshall Islands) and South Tarawa (Kiribati). In fragile atoll environments such as these, high population densities stress limited water resources, sanitation, and land availability.

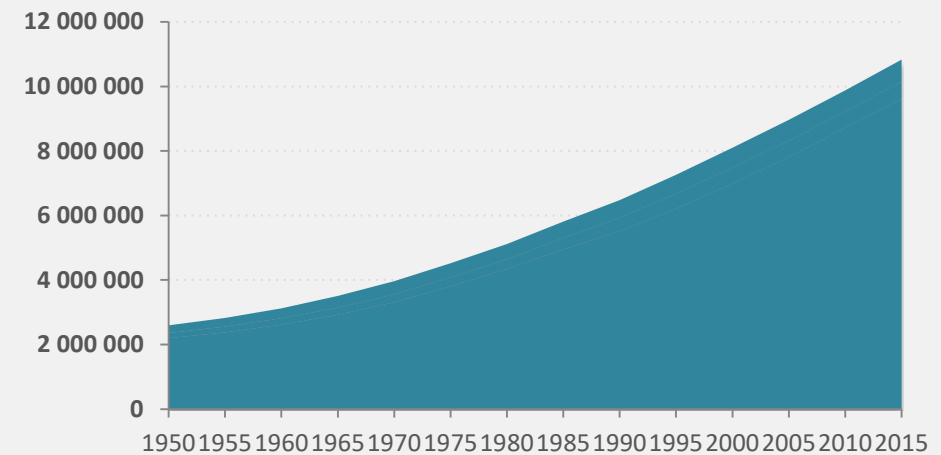
Population growth rate in the region is relatively low – at 2%. International migration, mainly to Australia and New Zealand is keeping population growth levels low. One of the consequences of migration is the reduced availability of specialized labour in the Pacific countries, but on the flipside, migrants are supporting family members in their home countries through remittances which is significantly changing the economy of the region.

## A GROWING POPULATION?

The population of the Pacific islands has grown five-fold between 1950 and 2015, largely due to population growth in Vanuatu (highest growth rate at 2.5%), Papua New Guinea, Fiji and Solomon Islands. Migration has been a way of life for Pacific islanders and migration continues to affect the growth and distribution of Pacific populations. In recent years, much of the migration has been in the form of rural-urban population movements, particularly as people from the outer islands move to urban centers. Indeed, in many Pacific islands urban population growth is greater than national population growth.

Despite the growth trend at the regional level, over 16,000 Pacific islanders leave their countries every year – mainly to Australia and New Zealand. Several islands including the Cook Islands, Niue and Tuvalu are experiencing depopulation trends with the more remote outer islands being particularly affected.

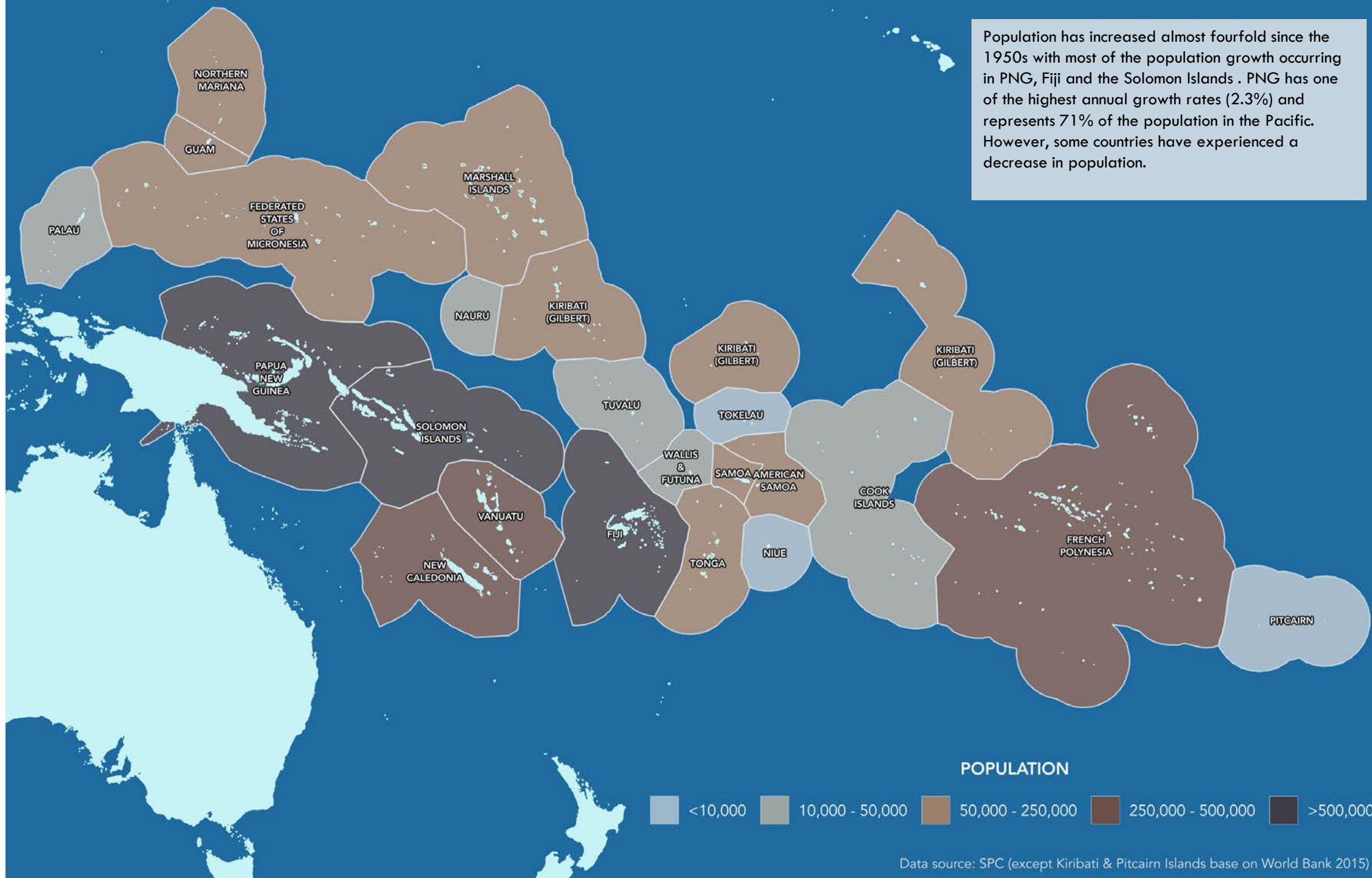
POPULATION GROWTH IN THE PACIFIC (1950-2015)



Source: UN Population Fund (2016)



# DEMOGRAPHICS | POPULATION (Mid-year 2016)



## THE URBANIZATION OF THE PACIFIC

An estimated 34% of the peoples of the Pacific Islands live in urban areas. Urbanization rates are high and are primarily responsible for the population growth experienced in the Pacific. Urban growth rates are particularly high in Melanesian countries: for instance, in the Solomon Islands, urban growth rate exceeds the national population growth rate by a factor of two.

### CHANGING DIETS

As the population of the Pacific Islands becomes increasingly urbanized, their diets are changing from traditional root crop based cuisines to a higher reliance on imported foods – particularly rice, noodles and processed foods. Nevertheless, in most Pacific Island nations, urban populations supplement their diets and income with home gardens.

### EMERGING CHALLENGES

Most of the economies of the Pacific Islands are still transitioning from being predominantly rural to largely urban; as a result countries are experiencing labour shortage. A higher reliance on imported foods also means that urban populations are vulnerable to food price spikes and can be heavily affected when disasters disrupt transportation routes.

### COPING WITH DISASTERS

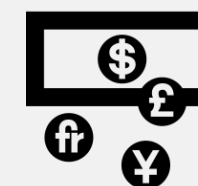
When affected by disasters, households rely on a variety of coping strategies. Across all countries, government food assistance and social protection systems provide support to the most vulnerable. To a lesser extent, traditional family and church support as well as food sharing mechanisms (such as the *bubuti* system in Kiribati, whereby a person in need of a specific item may borrow it from a friend or relative) are also employed to cope with food shortages.

## THE CHALLENGES OF URBANIZATION



around  
**34% of the population**  
of the Pacific Islands lives  
in urban areas

migration from rural to urban areas  
has led to the rise of a  
**cash economy**

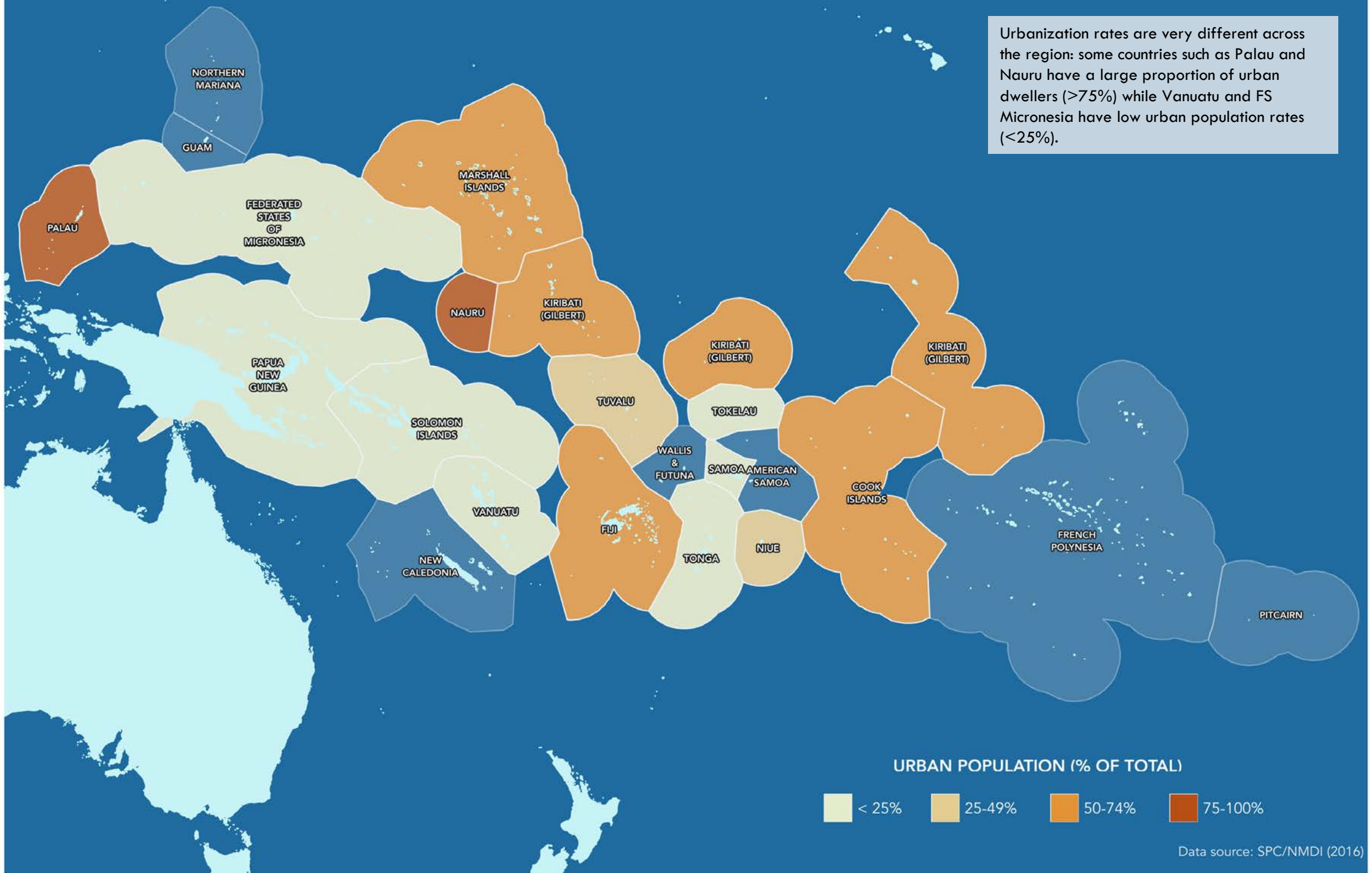


urban dwellers are increasingly consuming  
**imported foods**  
such as rice, noodles and processed foods.

households rely on  
**social protection and  
traditional family support  
mechanisms**  
to cope with food shortages



# DEMOGRAPHICS | URBAN POPULATION (2011)



## POVERTY IN THE PACIFIC ISLANDS

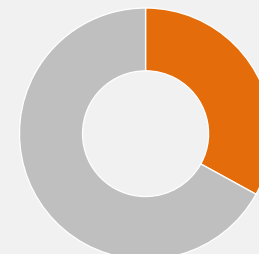
Around 3.5 million people (approximately one third of the region's population) live under their countries' national poverty lines and are unable to meet their basic food and non-food needs. Many factors affect poverty rates including location (communities in more remote islands often experience higher poverty rates), education (lower education rates are linked to lower income) and work status (lack of stable employment reduces income earnings).

Poverty remains a serious challenge in the region and the situation is deteriorating with school enrollment rates falling and health services declining. The economies of the Pacific are especially vulnerable to shocks due to their particular geographies and high dependence on global commodity markets. The countries' unique geography renders them vulnerable to natural disasters; eight of the twenty countries with the highest annual average losses (as a proportion of gross domestic product) are in the region. Dependence on imported foods means that households are vulnerable to price volatility, particularly in urban areas.

Poverty data are scarce in the Pacific; the World Bank's \$1.25 a day threshold is generally not applied to Pacific Islands due to limited purchasing power parity information. Instead, countries generally report basic needs poverty (i.e. the ability of families to meet their basic food and non-food needs). For this reason, comparing estimates of poverty across countries is not feasible. This explains why relatively wealthy countries (such as Fiji) appear to have higher poverty rates than less developed economies (such as Vanuatu).

Despite this data gap, initial results reveal that at the regional level 30 percent of the population is unable to meet basic needs – a significant statistic.

## MEASURING POVERTY



around **31% of the population** of the Pacific Islands are unable to meet their basic needs

internationally comparable poverty data (such as PPP) are not available for the Pacific



representative household surveys are infrequent; highlighting the need to prioritize such tools and assessments

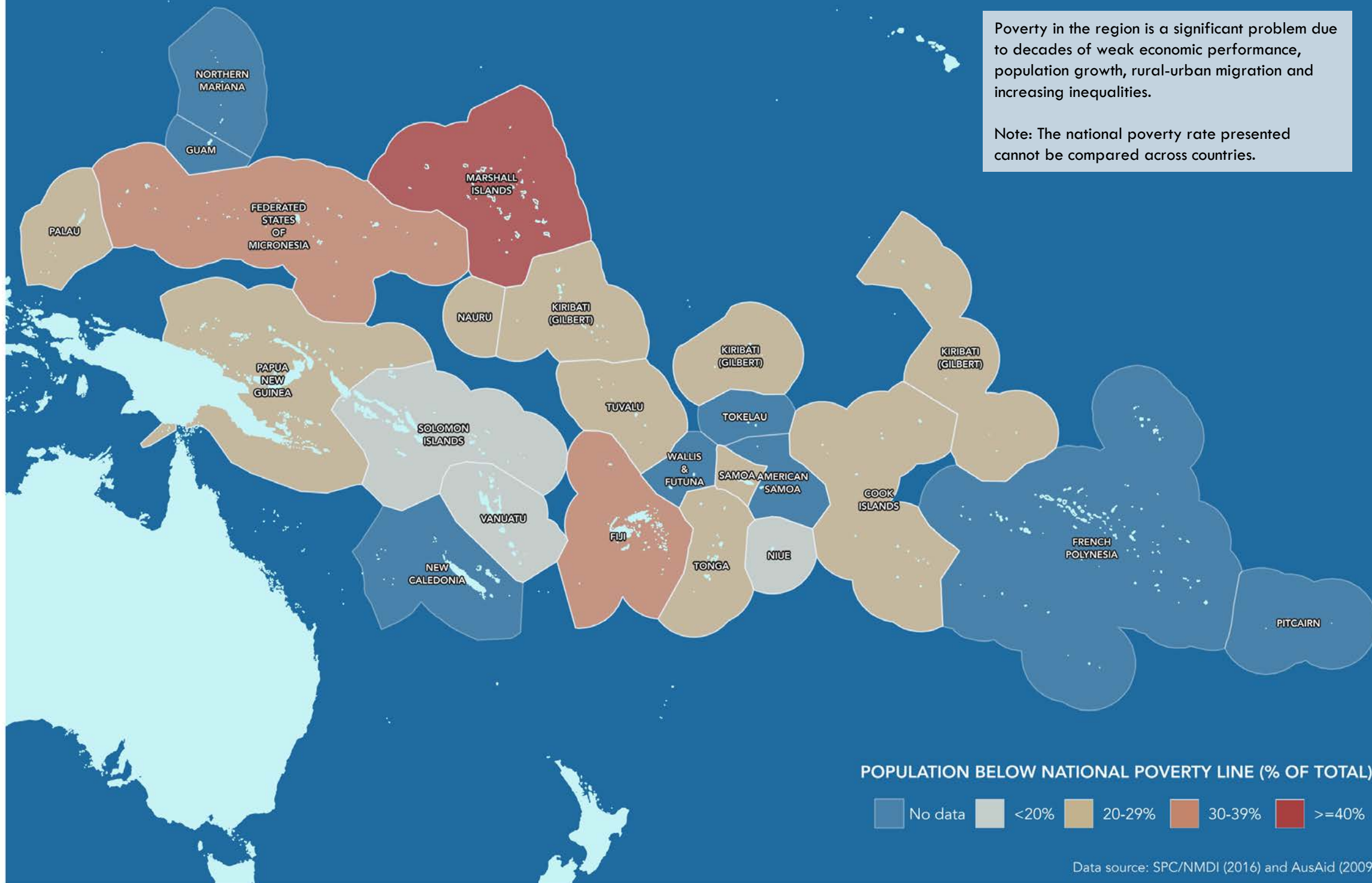
data collection and ensuring public access to data and analysis are priorities for a number of donors in the region



# POVERTY | BASIC NEEDS POVERTY RATE (PROPORTION OF POPULATION)

Poverty in the region is a significant problem due to decades of weak economic performance, population growth, rural-urban migration and increasing inequalities.

Note: The national poverty rate presented cannot be compared across countries.



## CHRONIC HUNGER

Chronic hunger and malnutrition persist in the region. High population growth, rapid urbanization, natural disasters, limited sources of cash income and low awareness about nutritional requirements are some of the key factors influencing hunger risk in the region.

### AVAILABILITY

Across most the Pacific Islands, agricultural production per capita is declining. Traditionally the country has relied on diets consisting of readily available indigenous foods such as root crops, fish and vegetables. However, as the region is becoming more urbanized, diets are becoming increasingly dependent on imported foods.

### ACCESS

High income disparities exist in the region; generally urban populations have higher incomes than those in rural areas. While rural communities generally rely on traditional farming and fishing for food (and income), trade in small markets also helps supplement diets.

### UTILIZATION

Even when the quantity dietary energy is sufficient, individuals may not consume sufficiently diverse or nutritious food. Underweight and overweight are significant problems in the region – both are associated with the increasing dependence on foods with high sugar and fat contents.

## ACHIEVING ZERO HUNGER

Achieving zero hunger is a key component of the Sustainable Development Goals. In the Pacific Islands, the objective of zero hunger can only be achieved by tackling some of the current food security issues in the region:



The region is experiencing rapid urbanization rates; these rates are projected to increase between 3.5 and 4 percent by 2050.



Rapid population growth in urban areas is happening at the expense of growth in rural communities. A consequence of this is lower agricultural output...



... and higher reliance on imported food items with lower nutritional value (e.g. spam, processed meats and baking goods). Consumption of nutritious food should be promoted.

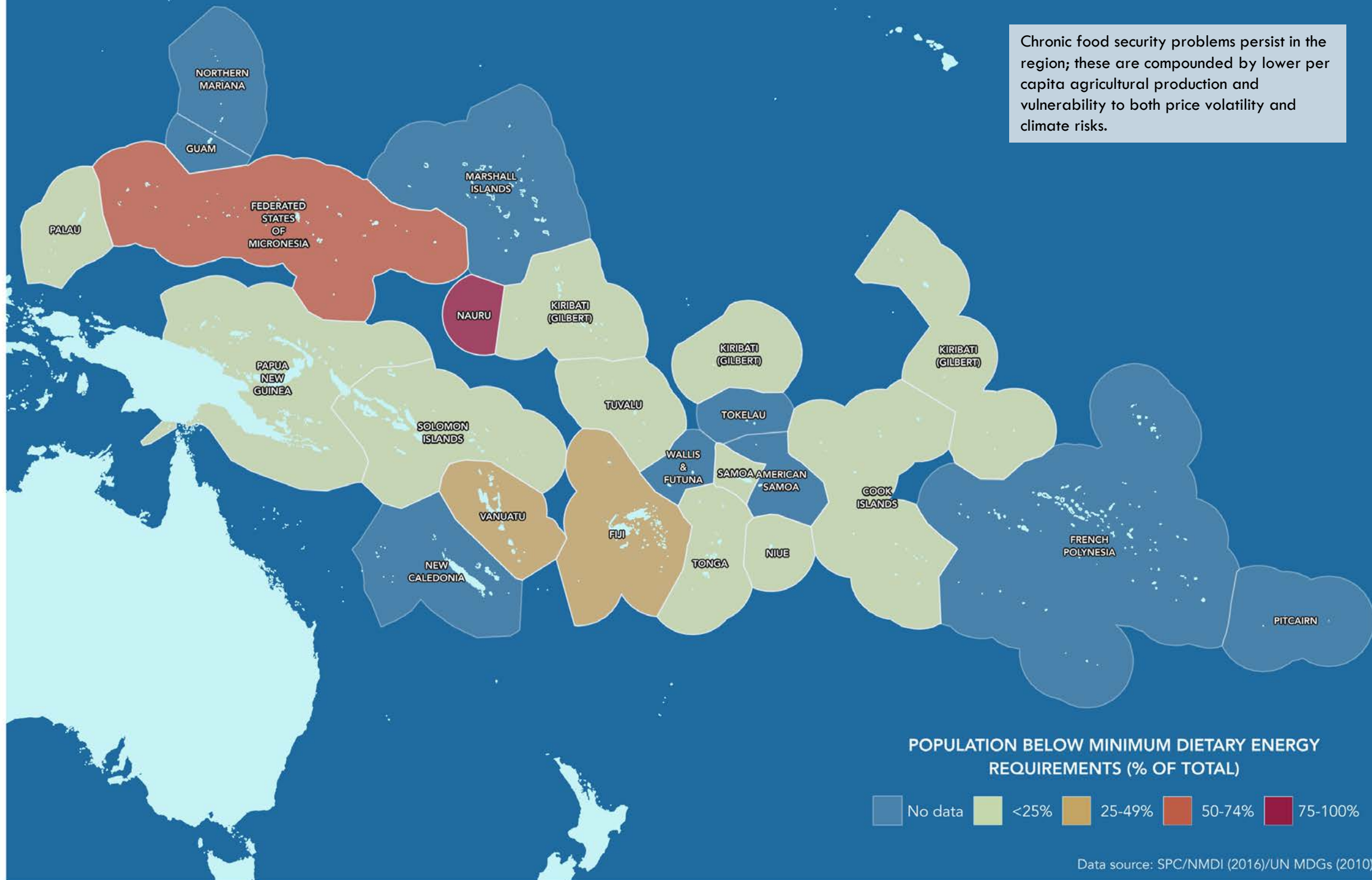


The region is particularly vulnerable to the effects of climate change, which will likely stress agricultural systems and traditional livelihoods. Adapting to these risks is key.



Strengthening regional cooperation and collaboration is necessary for facilitating trade – a key component of the food system in the Pacific.

# POVERTY | POPULATION BELOW MINIMUM LEVEL OF DIETARY ENERGY REQUIREMENTS



## DIETS: THE IMPORTANCE OF FISH

Fishing is culturally and economically important for most of the Pacific Islands, and is an important element of food security in the region, contributing protein to an otherwise carbohydrate-rich diet.

The majority of fish consumed in the region originates from coastal fishing although a small proportion does come from inshore (and freshwater) fishing. As well as being a major source of food, fishing is a critical source of income. Indeed the main food export for many Pacific countries is frozen fish.

The consumption of 70 kg/year of fish is equivalent to the recommended daily protein intake. Several countries and territories in the region consume a higher quantity of fish and also supplement their diets with protein from imported meats and milk products.

Fish consumption is more important in rural areas where there is a limited range of other protein sources. In many rural communities, particularly in Tokelau, Kiribati and Palau, fish is the only source of animal protein.

In contrast, in urban areas imported foods provide a diverse choice of protein sources including processed meats and milk. In highly urbanized countries, fish consumption is considerably lower than in other countries. For instance, Marshall Islands and Nauru consume less than 25 kg/year per capita which is equivalent to one third of recommended protein intake but they supplement their diets with imported protein sources. Fish consumption is also comparatively low in Papua New Guinea, where communities rely on traditional crops and carbohydrate-rich foods for their diet.

## CLIMATE CHANGE AND FISHERIES



As fish is a critical source of protein for several communities in the region, threats to fisheries can have significant food security consequences.



Climate change will affect marine environments in multiple ways.



Ocean warming is associated with negative effects on coral health and marine ecosystem stability.



Carbon dioxide results in ocean acidification which increases the risk of coral bleaching and fish death.



Rainfall is projected to increase in much of the Pacific Ocean. Higher rainfall and the associated flooding would threaten freshwater fishing.

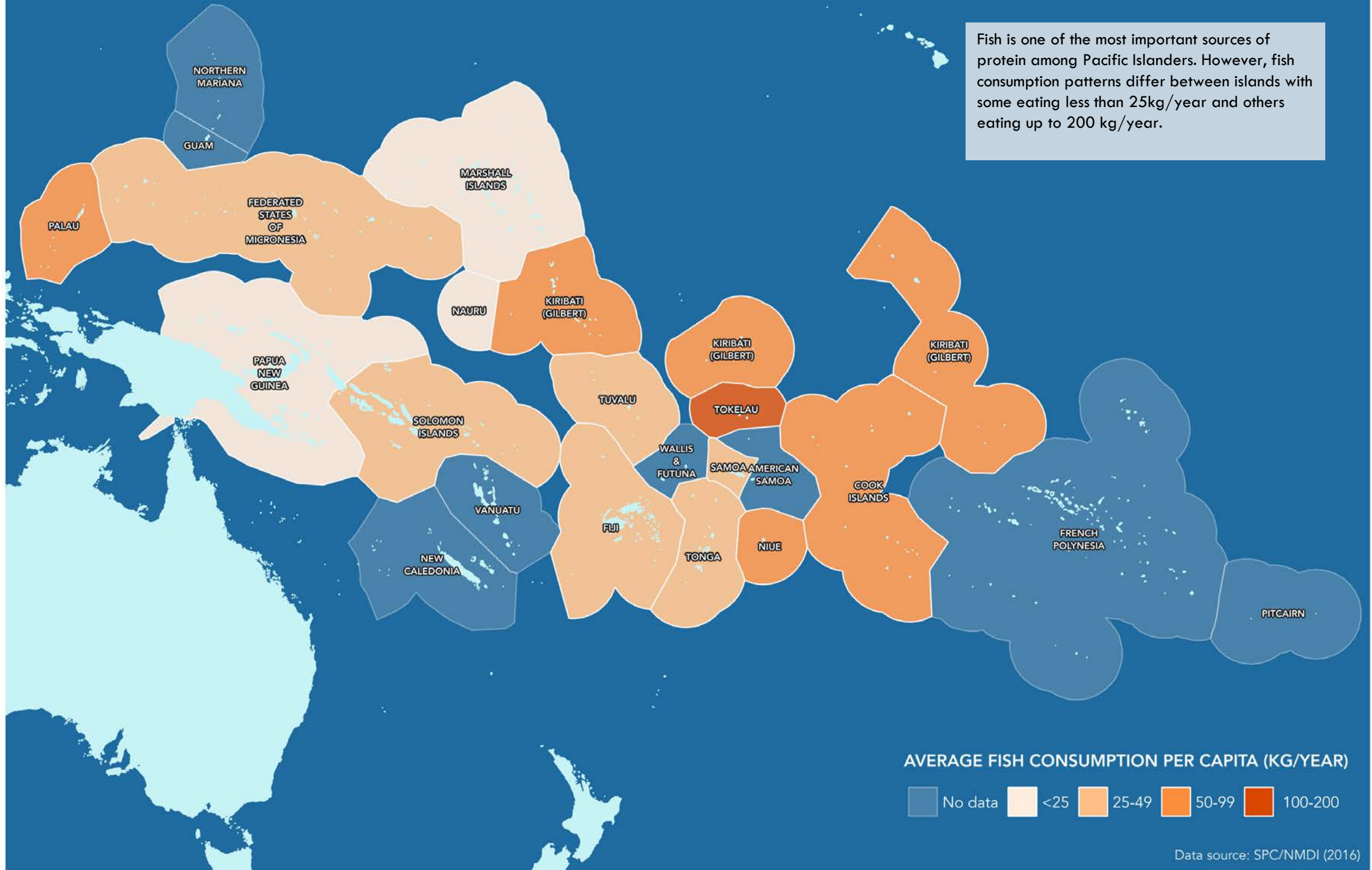


Higher cyclone risk is projected under climate change; more intense and frequent tropical storms can destroy fishing infrastructure and can destroy some low-depth marine ecosystems.



# DIETS | AVERAGE FISH CONSUMPTION PER CAPITA (KG/YEAR)

Fish is one of the most important sources of protein among Pacific Islanders. However, fish consumption patterns differ between islands with some eating less than 25kg/year and others eating up to 200 kg/year.



## OBESITY

The Pacific region faces a “double burden” of high undernutrition rates coupled with high obesity rates. The prevalence of overweight and obesity in some Pacific Island nations is among the highest in the world; over 80% of adults are overweight (BMI >25) in Cook Islands, Kiribati, Federated States of Micronesia, Marshall Island, Nauru, Tokelau, Tonga and Samoa. Obesity (BMI >30) rates exceed 45% in all these countries. Papua New Guinea has the lowest rates of obesity and overweight in the region at less than 15%.

Data on child obesity and overweight is limited but corroborates the concern of increasing obesity patterns in the region.













This trend is also contributing to the emergence of diabetes and heart disease. Some of the countries in the region experience high rates of diabetes: 8,000 people out of 53,000 in the Marshall Islands are reported to suffer from diabetes.

Part of the problem is due to the traditional diets which rely heavily on starchy products (e.g. taro, sweet potato, cassava) designed to help survive long inter-island travel. However, more recently urban diets are also increasingly reliant on heavily caloric processed food items such as spam and corned beef. As urban dwellers continue to prefer such processed food items, it is likely that overweight challenges will continue.

Several Pacific Island countries have recognized this challenge and have developed nutrition plans to address the problems associated with obesity.

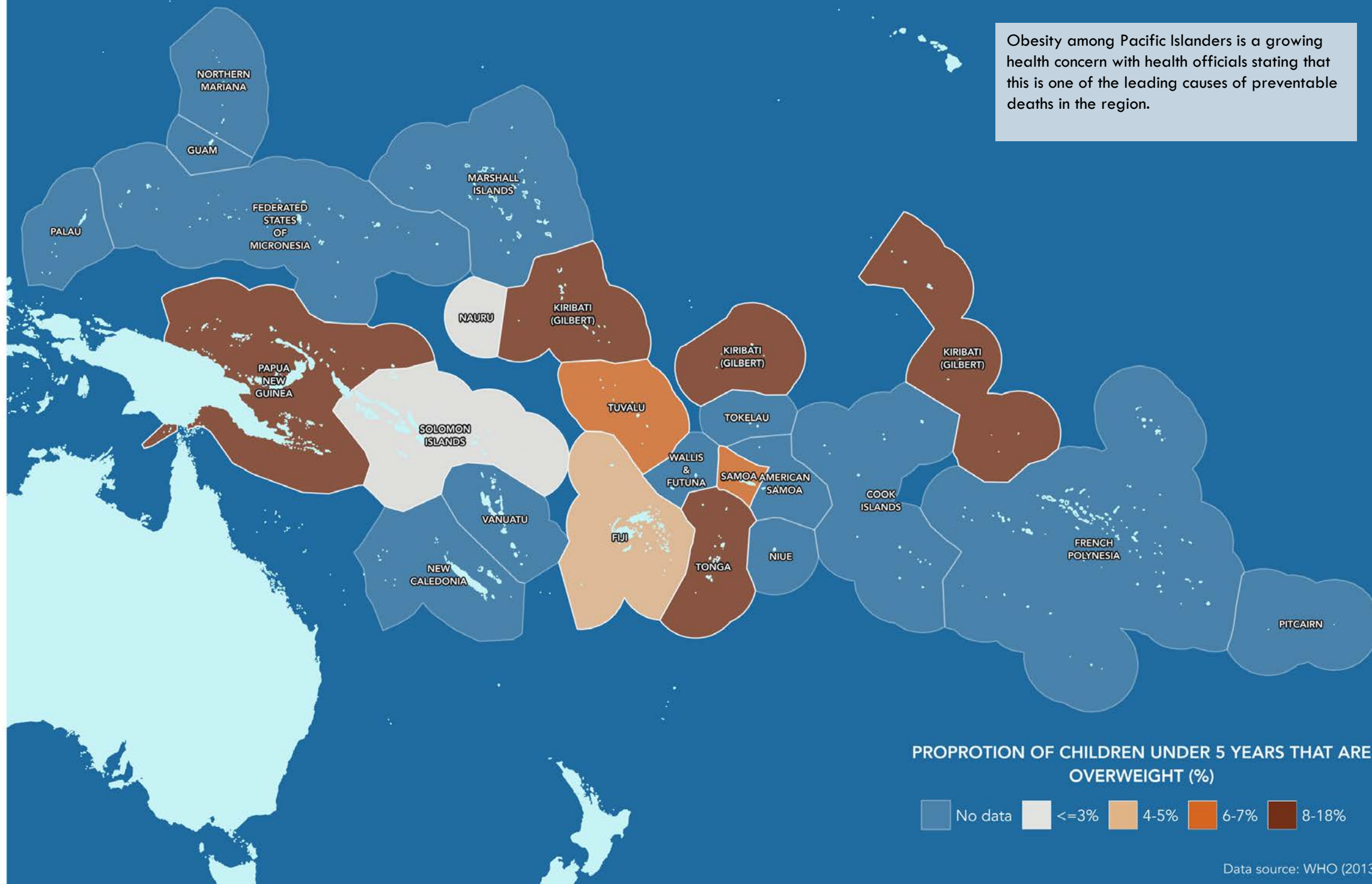
## OBESITY RATES BY GENDER

Obesity rates differ between women and men, as shown below:

COUNTRY	OBESITY RATES (%)	
	female	male
 Cook Islands	57.8	48.6
 Fiji	35.0	24.9
 Kiribati	47.0	32.8
 Marshall Islands	51.4	38.0
 Federated States of Micronesia	48.6	35.4
 Nauru	56.1	46.0
 Niue	56.3	46.6
 Papua New Guinea	14.4	13.0
 Samoa	54.5	39.2
 Solomon Islands	23.4	12.4
 Tonga	54.3	40.5
 Vanuatu	28.8	17.3

# NUTRITION | PROPORTION OF CHILDREN (<5 YEARS) OVERWEIGHT

Obesity among Pacific Islanders is a growing health concern with health officials stating that this is one of the leading causes of preventable deaths in the region.



## UNDERNUTRITION

Despite the high rates of obesity and overweight in the region, undernutrition requires attention. Undernutrition is a significant concern with high rates of stunting in Papua New Guinea, Solomon Islands and Kiribati.

Similarly, the prevalence of anemia in children aged 6-59 months is high in the region. In 15 countries of the region, more than one fifth of children and pregnant women are anemic, and the prevalence of anemia exceeds 40 percent (the threshold for 'severe' anemia rates) in Fiji, Nauru, Solomon Islands and Tuvalu.

Micronutrient deficiencies in the region are common. In part, this is due to heavy reliance on processed foods with little nutritional value. Data on the prevalence of vitamin A deficiency is limited but the most recent data (from the 1990s and 2000s) suggest that vitamin A deficiency in children is a public health concern in some countries, including Kiribati, the Marshall Islands and the Federated States of Micronesia.

The importance of improving nutrition, particularly in the early stages of child development, is internationally recognized as a priority.

The objective of reducing undernutrition needs to be complemented with plans to reduce obesity as well as the health implications of both issues.

## DOUBLE BURDEN OF MALNUTRITION



The region is experiencing high rates of obesity and undernutrition simultaneously



The region has some of the highest rates of obesity in the world, with countries like Samoa and Tonga having obesity rates among adults of over 50%...



... while at the same time undernutrition is a key concern in countries like Solomon Islands, Papua New Guinea and Kiribati

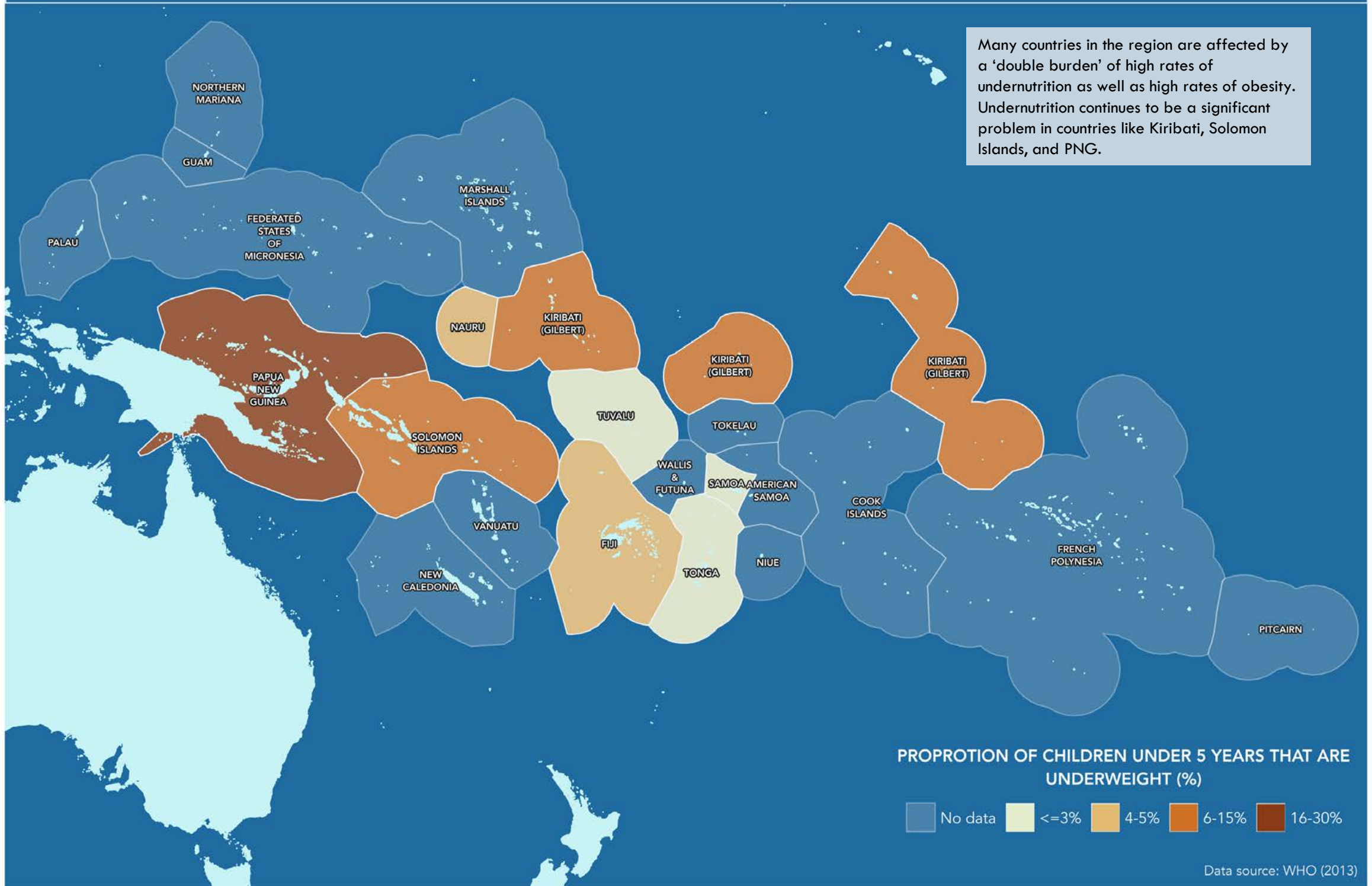


High reliance on imported foods with low nutritional value but high fat and sugar content is exacerbating this problem.



Efforts to address both obesity and undernutrition should be prioritized. A number of countries have already initiated policies to address these challenges simultaneously but additional work is needed.

# NUTRITION | PROPORTION OF CHILDREN (<5 YEARS) UNDERWEIGHT



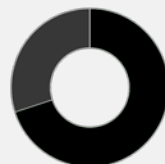
## VULNERABLE LIVELIHOODS

Livelihoods across the Pacific Islands are highly dependent on subsistence agriculture and fishing, which provide the main source of food and income for the majority of rural communities. The main crops grown include root crops such as cassava, sweet potato, taro and yam. Vegetables and fruits, including cabbage, banana and breadfruit, are also grown – predominantly in home gardens. Both vegetables and fruits are typically grown year-round. A smaller number of households earn income from high-value crops such as citrus, pineapple, mango and papaya. Irrigation is limited and households depend almost entirely on reliable rainfall patterns. Climate variability and erratic weather patterns, and particularly extreme weather events, therefore affect the ability of households to maintain their livelihoods.

Fishing – ranging from coastal subsistence fishing to coastal commercial fisheries, freshwater fishing and aquaculture – is also a key activity for the population in the region. In several countries of the region, coastal subsistence fishing ranks highest in terms of production, highlighting the contribution of the activity to food security. A key challenge relates to limited water area (particularly for countries such as Samoa and Vanuatu), which limits fishing potential. Moreover, fish populations are susceptible to changes in ocean temperature and may respond negatively to increases in temperature under a climate change scenario.

Although agriculture and fishing continue to be the dominant source of income in the region, the rapid rates of urbanization are changing livelihood patterns. As populations move towards urban centers, households rely increasingly on wage labor and more recently on tourism. A related trend is that of outward migration which has resulted in larger remittances from Australia and New Zealand being sent to the Pacific Islands.

## CHALLENGES FOR LIVELIHOODS



70% of the region's population depends on **subsistence agriculture or fishing** and there is little diversity in rural areas



Agricultural households engage in production of root crops, fruits and vegetables. A minority of households also grow high-value crops such as tobacco and sugarcane



Fishing – particularly coastal subsistence fishing – is another major source of income for households in the region



Due to lack of irrigation, households depend on rainfall. Climate variability and projected climate change threaten these highly climate-sensitive livelihoods



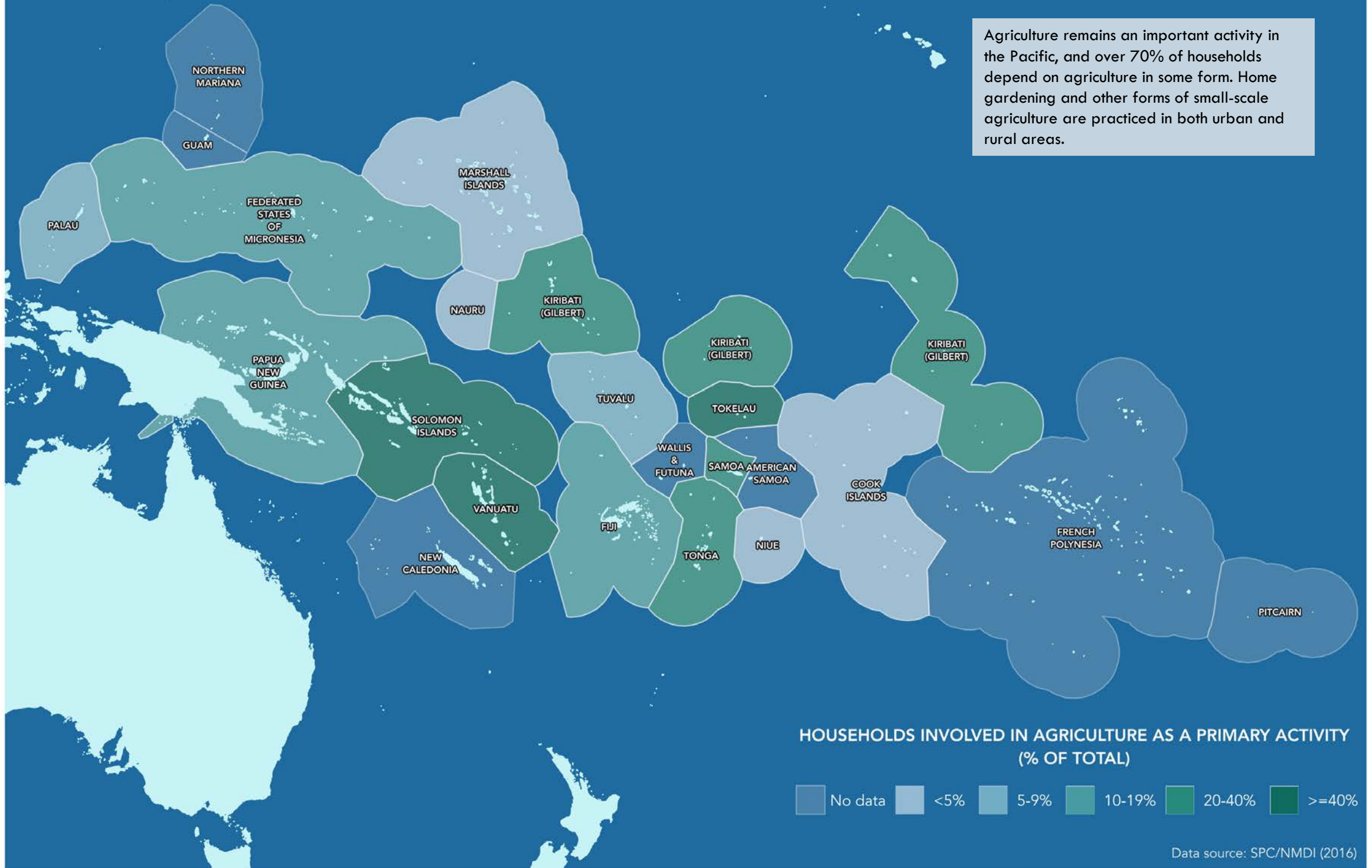
But livelihood patterns are changing as people migrate to cities, with higher reliance on wage labor, tourism and other activities



And international migration is resulting in higher remittances being sent to the Pacific Islands.

# LIVELIHOODS | PROPORTION OF HOUSEHOLDS INVOLVED IN AGRICULTURE

Agriculture remains an important activity in the Pacific, and over 70% of households depend on agriculture in some form. Home gardening and other forms of small-scale agriculture are practiced in both urban and rural areas.



## GENDER ISSUES

Gender inequality is a significant issue in the Pacific Island countries: low levels of women’s political representation, poor working conditions, violence against women, increased risk of HIV/AIDS, declining access to customary land rights and culturally enforced discrimination of women are all issues that have been identified by international organizations.

Violence against women is the most direct form of gender inequality in the region with high prevalence rates of physical and sexual violence against Pacific Island women. In Solomon Islands and Kiribati, 68 and 64 percent of women respectively experienced violence from a partner.











Despite this, progress has been made in getting more girls in school and getting them to stay longer. Indeed, in most Pacific Island nations girls stay at school longer than boys. But progress in education has not translated to improved economic opportunities. While women’s share of the labor force is increasing, it is lower than that of men. Less than two thirds of all women of working age are employed. In this respect to, there are wide regional disparities: in Samoa, only 23% of women are employed, while in Vanuatu, Cook Islands, and Tokelau over 60% of women participate in the labor force.

Business ownership is even more skewed. In Fiji, for instance, around 19 percent of business are registered to women and the majority of these are small businesses.

Women’s employment in the Pacific is mostly informal, insecure and unregulated due to discrimination and the absence of protective legislation.

## GENDER PARITY IN EDUCATION

Despite limited improvements in promoting gender equality at the regional level, promoting school enrollment among girls has been relatively successful, as demonstrated below.

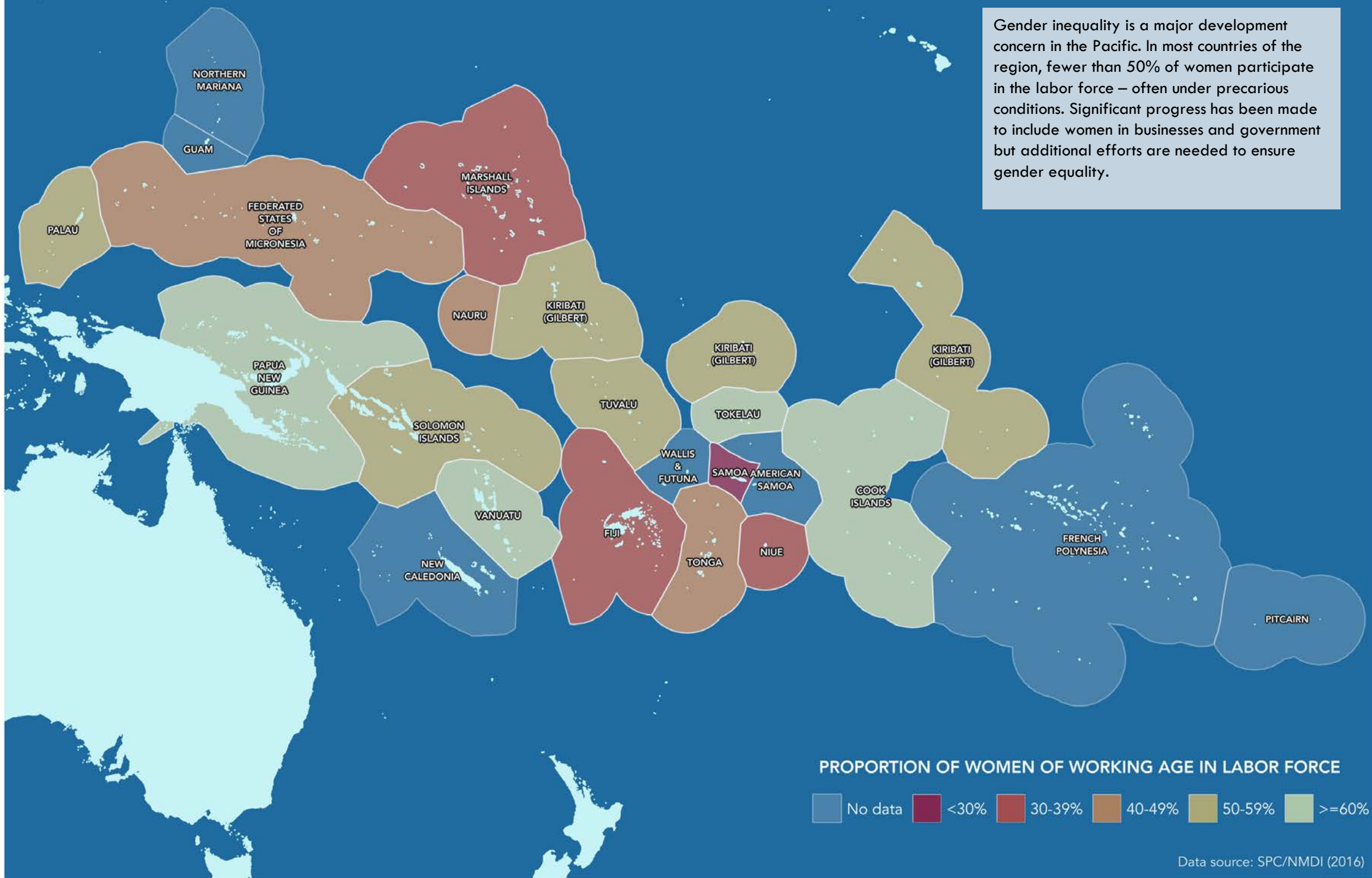
COUNTRY	GENDER PARITY
 Cook Islands	1.4
 Fiji	1.18
 Kiribati	1.21
 Marshall Islands	1.03
 Federated States of Micronesia	1.06
 Niue	2.56
 Papua New Guinea	0.93
 Solomon Islands	0.74
 Tonga	1.1
 Vanuatu	0.93

*(secondary education: a score >1 indicates more girls than boys)*



# GENDER | FEMALE LABOR FORCE PARTICIPATION

Gender inequality is a major development concern in the Pacific. In most countries of the region, fewer than 50% of women participate in the labor force – often under precarious conditions. Significant progress has been made to include women in businesses and government but additional efforts are needed to ensure gender equality.



## CYCLONE RISK IN THE PACIFIC

Recent cyclones such as Cyclone Winston (2016) and Pam (2015) have highlighted the vulnerability of Pacific island nations to tropical storms, with massive devastation of critical infrastructure and agricultural land resulting in significant food security concerns. Cyclones can affect the fragile food systems of Pacific Islands by damaging trees and root crops (the main staple of rural diets) or by disrupting trade routes which supply food to the urban areas.

In the South Pacific, cyclone activity is correlated with El Niño cycles with more intense and frequent storms forming during El Niño warm years.








The main cyclone season usually lasts between November and April, with cyclones forming in two basins – namely the Western Pacific and the South Pacific. The most destructive cyclones originating in the Western Pacific make landfall in Palau and occasionally in the Marshall Islands destroying coastal infrastructure. In recent years, the South Pacific cyclone activity has become increasingly powerful with significant damage to Vanuatu, Fiji, Tonga and Samoa, particularly on agricultural land and coastal infrastructure.

Tuvalu, the Solomon Islands and the Cook Islands are occasionally affected by tropical cyclones but generally receive less powerful storms than those in neighboring countries.

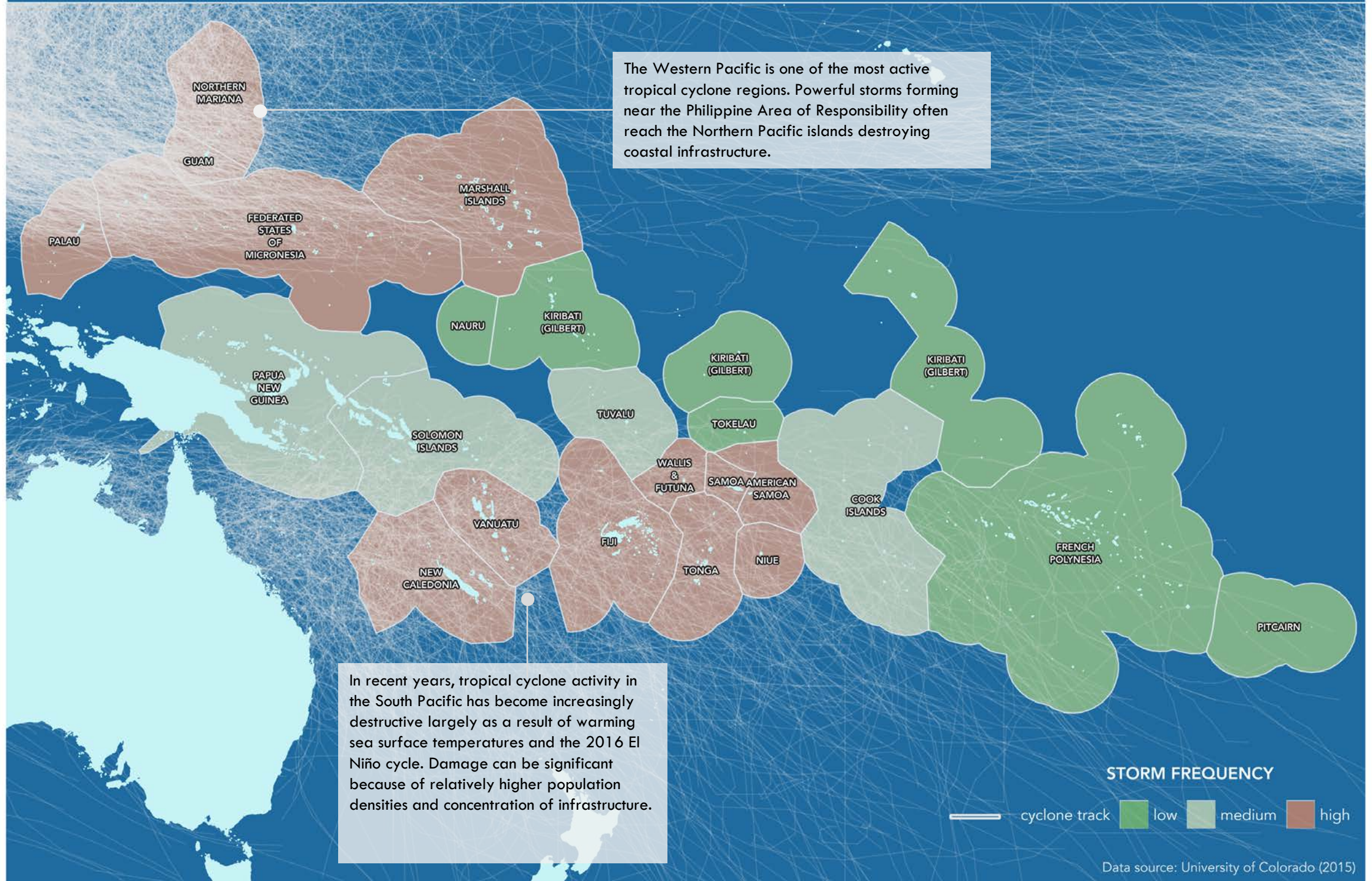
Finally, a number of island nations lie in the transition between the two main cyclonic zones and are rarely affected: these countries include Nauru, Kiribati and Tokelau.

## AT-RISK ISLANDS

Pacific Islands are particularly prone to tropical cyclones. Because they are small and isolated by vast expanses of ocean, disaster impacts on the economy and on vulnerable populations are disproportionate. Below is a summary of impacts associated with recent cyclones.

Cyclone (year)	Main country affected	Damage (US\$)
Cyclone Winston (2016)	 FIJI	\$1.4 billion
Cyclone Pam (2015)	 VANUATU	\$360 million
Cyclone Ian (2014)	 TONGA	\$48 million
Cyclone Haiyan (2013)	 PALAU	\$450,000
Cyclone Evan (2012)	 SAMOA	\$316 million
Cyclone Bopha (2012)	 PALAU	\$10 million
Cyclone Wilma (2011)	 SAMOA	\$22 million

# CLIMATE RISK | CYCLONE TRACKS (1950-2016)



## EL NIÑO: A RISK FOR THE PACIFIC

El Niño is a period of warm ocean temperatures in the central and central-eastern Pacific which is associated with higher incidence of climate-related risks such as droughts, floods and storms. The inverse phase of the cycle, La Niña, usually follows after an El Niño event and is linked with opposite climatic conditions.

### DROUGHT RISK

Across most of the Pacific Island nations, El Niño is linked to greater drought risk due to higher temperatures and below-average rainfall between December and February. The dry conditions associated with El Niño exacerbate water shortages (in a region where water shortages are common under normal conditions) and can threaten the productivity of the primarily rainfed agricultural systems. Warm and dry conditions also affect the distribution of fisheries. Drought-related impacts are gradual and are felt up to one year after the El Niño event has peaked.

### FLOOD RISK

In Kiribati, Tuvalu and Nauru, El Niño events are usually associated with higher rainfall and potential coastal flooding. Consequences for food security and livelihoods can be significant: heavy rainfall events can destroy agricultural land and key livelihood assets, and stagnant water can affect cassava production.

### CYCLONE RISK

During an El Niño event, cyclone risk is elevated, particularly for countries in the Eastern region of the Pacific with potential humanitarian implications. However, several of these island groups are territories of European countries or Australia and rely on these countries for humanitarian assistance.

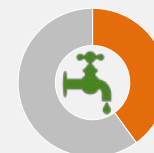
## THE 2014-2016 EL NIÑO EVENT

Over 2.3 million people were affected by the drought conditions brought about by the 2014-2016 El Niño event through water shortages, food insecurity and higher disease incidence. The scale of the problem necessitated government and international assistance to ensure provision of drinking water, food and purification tablets.

### EXAMPLES OF REGIONAL EL NIÑO IMPACTS



VANUATU



40% of communities experienced water shortages



SOLOMON ISLANDS



100% of water tanks were depleted and most communities used coastal brackish water for at least one month

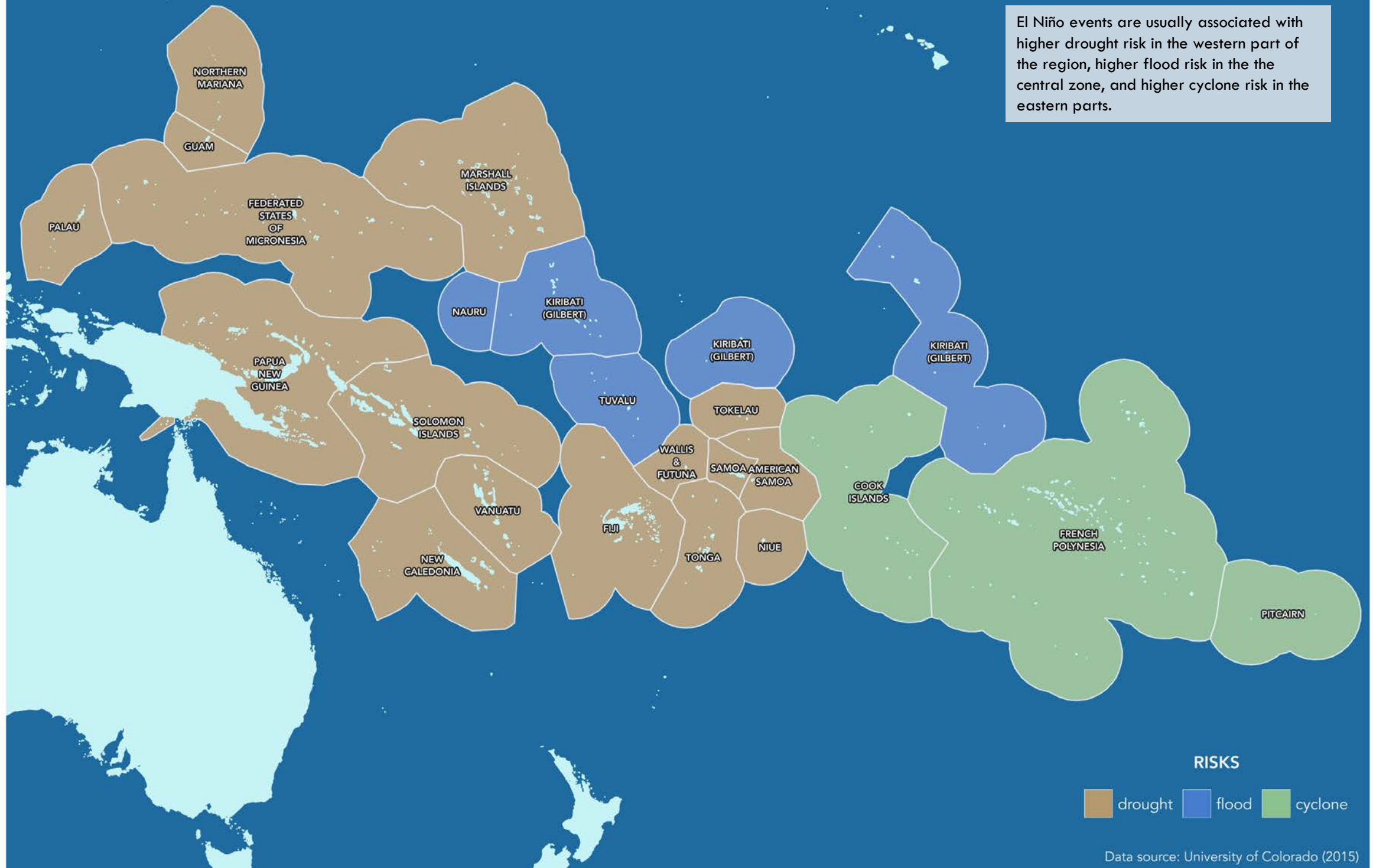


FIJI



At least 67,000 people on the western and northern divisions of Fiji were targeted with water deliveries due to water shortages.

# CLIMATE RISK | RISKS ASSOCIATED WITH EL NIÑO



## SEA-LEVEL RISE: CURRENT THREATS

Analyses of sea-level measurements indicate that, in the Pacific Ocean, sea levels have risen at a rate of 10 mm/year or faster – a rate higher than the global average of 3 mm/year. Rising sea levels can significantly damage critical coastal infrastructure (ports, harbors and other marine facilities) and also affect coastal infrastructure.

Estimated impacts of a sea-level rise of as little as 50 centimeters on Pacific Islands' coastal communities are quantified in over 77,000 km of shoreline affected with direct costs of almost US\$1.5 million. Thermal expansion due to warming oceans and accelerated sea-level rise due to glacial melt threaten to exacerbate this trend.

Higher sea levels are associated with salt intrusion (which affects the productivity of the limited agricultural land in the region) and higher storm surges resulting in higher cyclone damage. Implications for food security are therefore significant.

In addition, several islands in the region are low-lying atolls, rendering them particularly vulnerable to the risk of sea-level rise. Indeed, satellite observations confirm that atolls in Kiribati and the Marshall Islands have been submerged due to rising sea levels. These island groups are particularly vulnerable: sea-level rises of 1 meter would be associated with potential damage to 80 percent and 20 percent, respectively, of the countries' territories. A rise of 1 meter is well within the range of likely scenarios, according to climate projections.

## SEA-LEVEL RISE: FUTURE THREATS

Pacific Islands are particularly prone to tropical cyclones. Because they are low-lying, atoll islands in the region are particularly vulnerable. The islands of the Pacific are already affected by rising sea levels but climate change projections suggest rises of up to 1.5 meters by the end of the century with potentially devastating impacts on coastal communities.



Sea-levels could rise by up to 1.5 meters by the end of the century



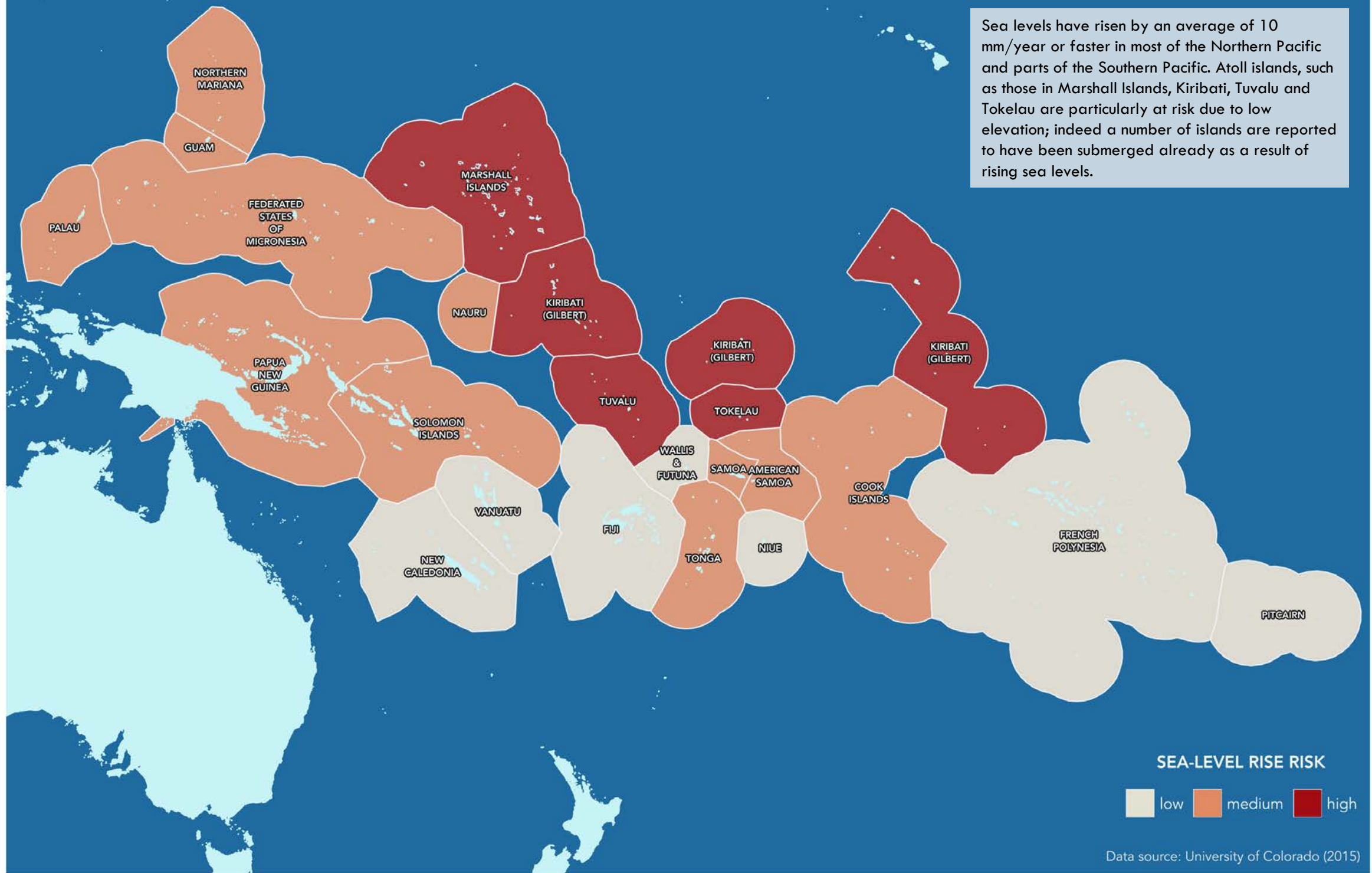
Low-lying atolls are particularly vulnerable; 20% of the territory of Kiribati and 80% of the territory of the Marshall Islands are potentially at risk with an increase of up to 50 cm.



Food security consequences are significant: rising sea levels and higher cyclone risk can destroy already limited agricultural land, and can increase salt intrusion which reduces productivity of land.

Sea-level rise has been a central issue in Loss & Damage (unavoidable and irreversible climate change impacts) discussions. Because addressing the impacts of sea-level rise is often unfeasible or extremely expensive, managing these changes will be challenging and may require innovative compensation mechanisms.

# CLIMATE RISK | SEA-LEVEL RISE EXPOSURE



Sea levels have risen by an average of 10 mm/year or faster in most of the Northern Pacific and parts of the Southern Pacific. Atoll islands, such as those in Marshall Islands, Kiribati, Tuvalu and Tokelau are particularly at risk due to low elevation; indeed a number of islands are reported to have been submerged already as a result of rising sea levels.

## ACCESS TO WATER

The Pacific Islands have uniquely fragile water resources due to their small size, lack of natural storage systems, competing land use and higher urbanization rates. Access to clean water has improved only marginally by 6% since 1990. At just 20%, access to piped water in the Pacific is the lowest in the world and over a third of the population depend on water taken directly from rivers, ponds and lakes.

Despite these challenges, there are a number of countries where there has been impressive progress towards ensuring access to improved sources of water: Niue and Tuvalu offer near-universal access to piped water while in Samoa, Tonga, Cook Islands, Fiji and Vanuatu over 90% of the population enjoy access to piped water. In other countries, however, progress has been lagging: in Papua New Guinea only 40% of the population have access to improved sources while the rest rely on unimproved sources (e.g. wells) or they take their water directly from rivers and ponds.

There are significant inequities in water availability. Across the region, on average, urban households are eight times more likely to have piped water than rural households. While two thirds of urban dwellers rely on piped water as their main source, only a tenth of rural households use this type of source. This highlights that the majority of people using unimproved sources of water live in rural areas.

Across wealth groups, too, there are significant disparities. Surveys in Vanuatu reveal that only 12% of the poorest quintile of the population have access to piped drinking water compared to 50% for the wealthiest quintile. Similarly only 69% of the poorest quintile have access to any source of improved water compared to 100% for the wealthiest quintile.

## CHALLENGES FOR WATER SECURITY



Access to improved sources of water is a challenge due to the relatively small size and remoteness of the island countries; low-lying and atoll islands are particularly at risk due to limited surface water.



There is relatively limited progress towards ensuring universal access to improved sources of water at the regional level, but some countries are performing better than others.



Papua New Guinea is the most at-risk country with only 40% of the population enjoying access to piped water.



In Tuvalu, by contrast, there is near universal access to piped water.



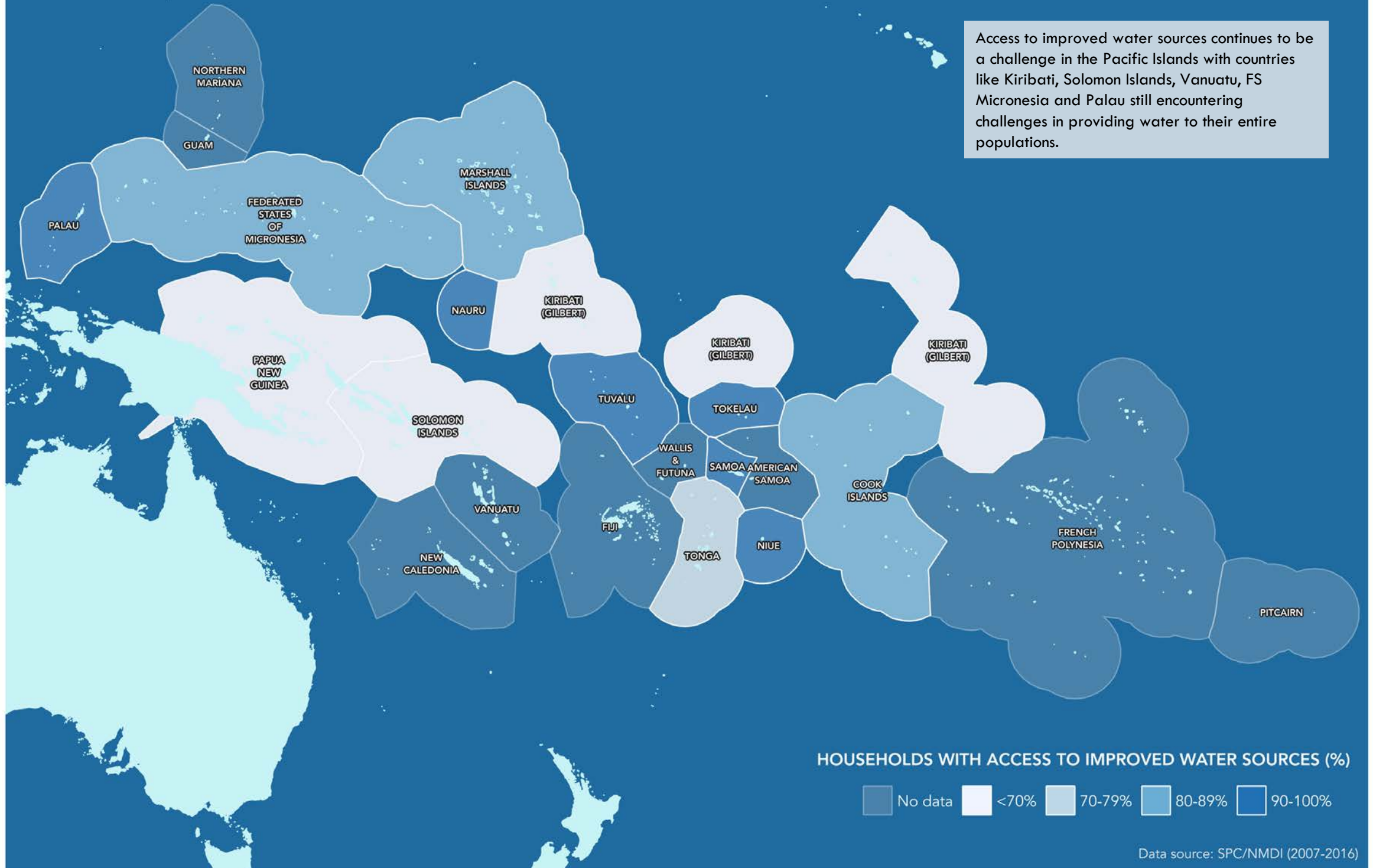
In rural areas, access to water is particularly limited: on average, only a tenth of rural households use piped water.



Wealth also influences access to improved sources of water.



# WATER & SANITATION | POPULATION WITH ACCESS TO IMPROVED SANITATION



## SANITATION: STATUS AND ISSUES

Limited progress has been made since 1990 to increase access to improved sanitation in the Pacific region; about two thirds of the population continue to use unimproved sanitation facilities and 13% practice open defecation. Access to improved sanitation is far below the global average: while at the global level 68% use improved sanitation facilities, only 31% of the Pacific region's population use these.

Access to improved sanitation is uneven in the region. Melanesian countries experience the lowest rates of access (Papua New Guinea; 19%; Solomon Islands, 30%; Kiribati, 40%; Vanuatu 58%). Given its population size, Solomon Islands hosts more than half of the Pacific population without access to improved sanitation. On the flipside, a number of countries have made impressive progress towards improving access to sanitation: in Niue, Palau, Cook Islands, Fiji and Tonga over 90% of the population use improved sanitation facilities.

As with piped water, access to improved sanitation facilities is uneven between urban and rural areas. Only 21% of rural dwellers have access to improved sanitation facilities compared to 71% in urban areas. Rural areas have been neglected in terms of investments; in urban areas the absolute number of unserved people has only increased marginally (from 360,000 in 1990 to 540,000 in 2015) whereas in rural areas, the number of unserved people has grown from 3.8 million in 1990 to 6.41 million in 2015.

Disparities between wealth groups also exist. Household data from Vanuatu reveal that the poorest households do not have any access to flushing toilets while over 80% of the wealthiest quintile enjoy access. Similarly only 38% of the poorest quintile use improved sanitation facilities while 97% of the wealthiest quintile use these.

## CHALLENGES FOR SANITATION



Access to sanitation is a key challenge in the region with around two thirds of the population using unimproved sanitation facilities.



Access to improved sanitation at the regional level (31%) is below the global average (68%) though progress is uneven in the region.



Melanesian countries are most at-risk with Papua New Guinea (19%), Solomon Islands (30%), Kiribati (40%) and Vanuatu (58%) experiencing the lowest levels of access.



But other countries such as Niue, Palau, Cook Islands, Fiji and Tonga offer access to improved sanitation to over 90% of their population.



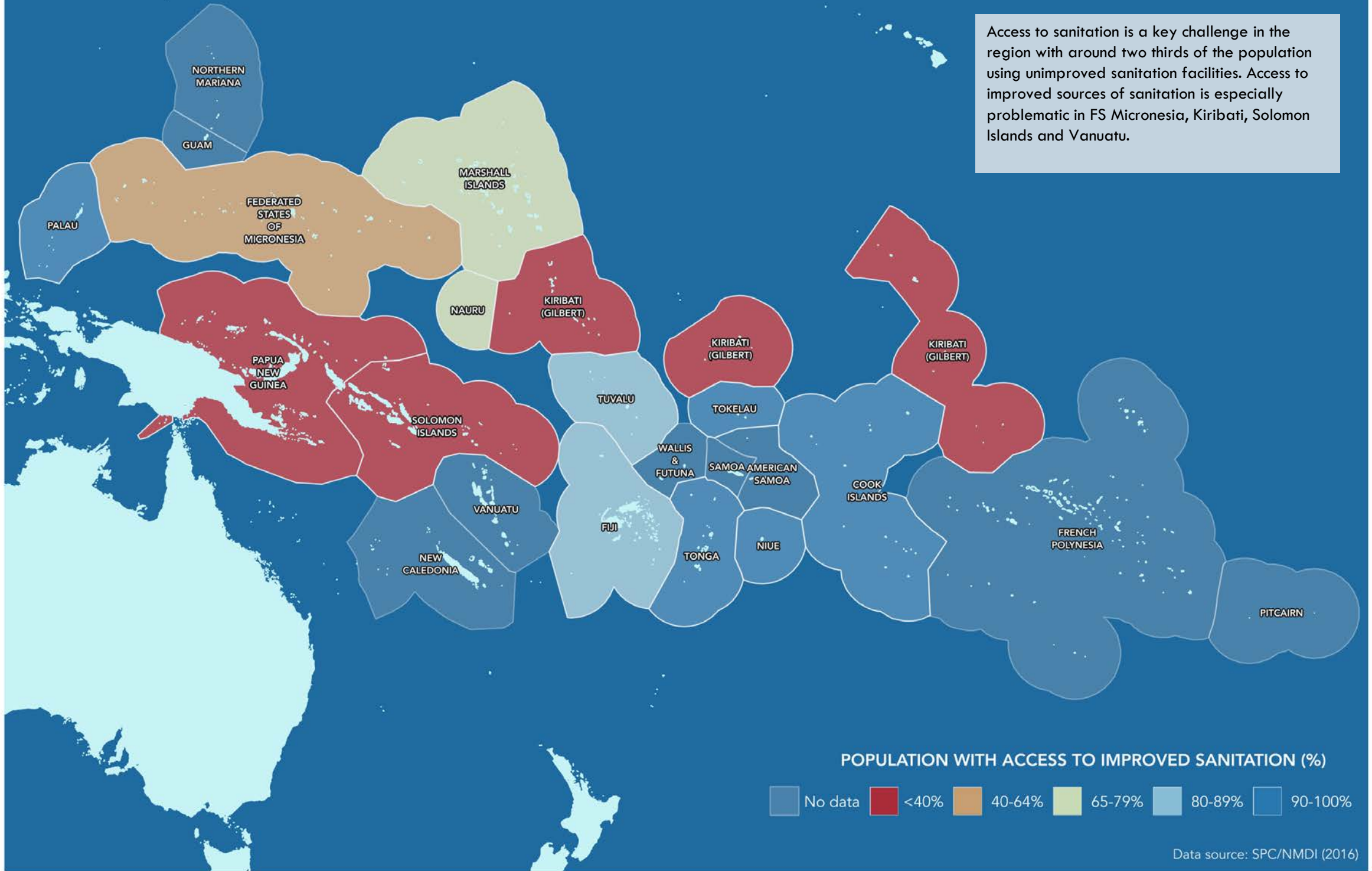
In rural areas, access to water is particularly limited: on average, only one fifth of rural households use improved sanitation facilities.



Wealth also influences access to improved sanitation facilities.

# WATER & SANITATION | POPULATION WITH ACCESS TO IMPROVED SANITATION

Access to sanitation is a key challenge in the region with around two thirds of the population using unimproved sanitation facilities. Access to improved sources of sanitation is especially problematic in FS Micronesia, Kiribati, Solomon Islands and Vanuatu.



## FOOD TRADE FLOWS

Historically, Pacific Island countries have depended on trade of agricultural and fishing products among each other. More recently, however, the countries of the region have become increasingly dependent on imports from global markets.

Currently all Pacific Island nations have negative or highly negative food trade balances. The transition from traditional farming and fishing to urban livelihoods has also been accompanied by a diet rich in imported foods with high sugar, salt and saturated fat content. The rapid urbanization in the Pacific countries has also ensured that the region has become food-import dependent.

The main food items being imported include processed foods (such as spam, canned meats), baked goods and meats (such as poultry and beef).

Key sources of these imports include Asian markets, predominantly China, Japan, Thailand, Vietnam and to a lesser extent the Republic of Korea, Australia, New Zealand, France, and the United States. Australia and New Zealand are particularly important trade partners for Papua New Guinea. The relationship between France and the United States with the Pacific countries is linked to colonial and historical ties: the main recipients of French and US food items are French Polynesia and New Caledonia, and Guam and Palau respectively.

Though intra-regional trade is limited, Fiji continues to export food items to neighboring countries – particularly Vanuatu and Tuvalu. Due to the Compact with the United States, some trade between Guam, Palau, Marshall Islands and Federated States of Micronesia also takes place.

## EXPORTS FROM THE PACIFIC

Though the region experiences negative food trade balances, a number of countries export large quantities of food both within the region (notably Fiji) and to other markets.

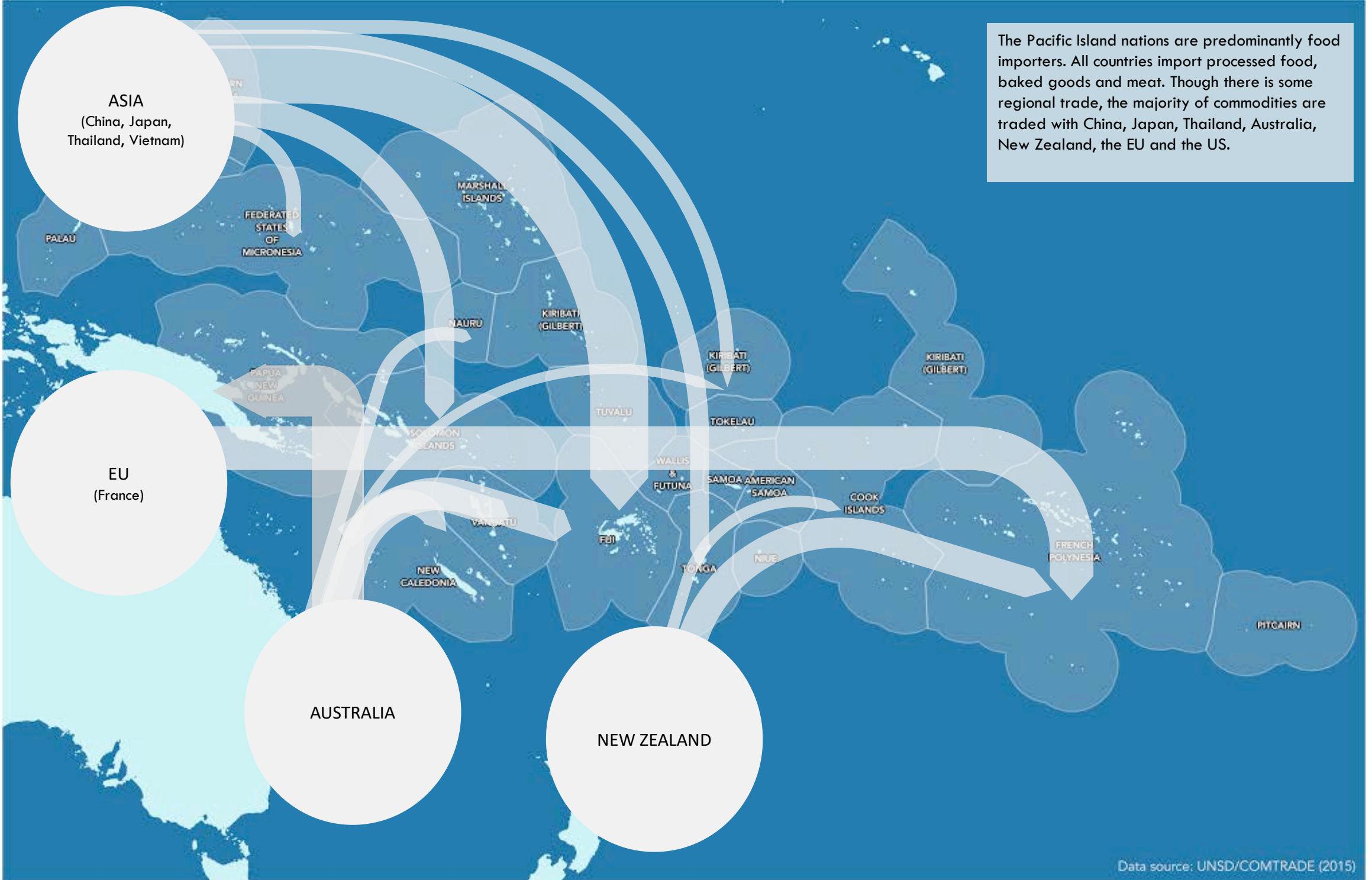
Frozen and processed fish as well as high quality fillets are the main items exported by Pacific countries. To a lesser extent, agricultural products such as cassava and sweet potato are also exported. In addition to these products, Fiji also exports large quantities of sugar.

The main markets importing food items from the Pacific are in Asia (China, Japan, Thailand, the Republic of Korea), the European Union (Spain, France, the United Kingdom) and the United States. There is also large-scale trade with Australia and New Zealand.

A key challenge for Pacific countries is the ability to compete in produce marketing systems. Subsistence producers in the region lack financial means to buy modern agricultural inputs to transition into commercial production and distribution.

As such, the scale of exports is relatively limited; the majority of countries export food commodities with an average value of \$12 million. Only Fiji, Vanuatu, Solomon Islands and Marshall Islands export food commodities with a value of over \$100 million. In contrast, countries in the region import food commodities with an average value of \$90 million.

# TRADE | OVERVIEW OF KEY FOOD TRADE FLOWS



Data source: UNSD/COMTRADE (2015)

## ROAD NETWORKS IN THE PACIFIC

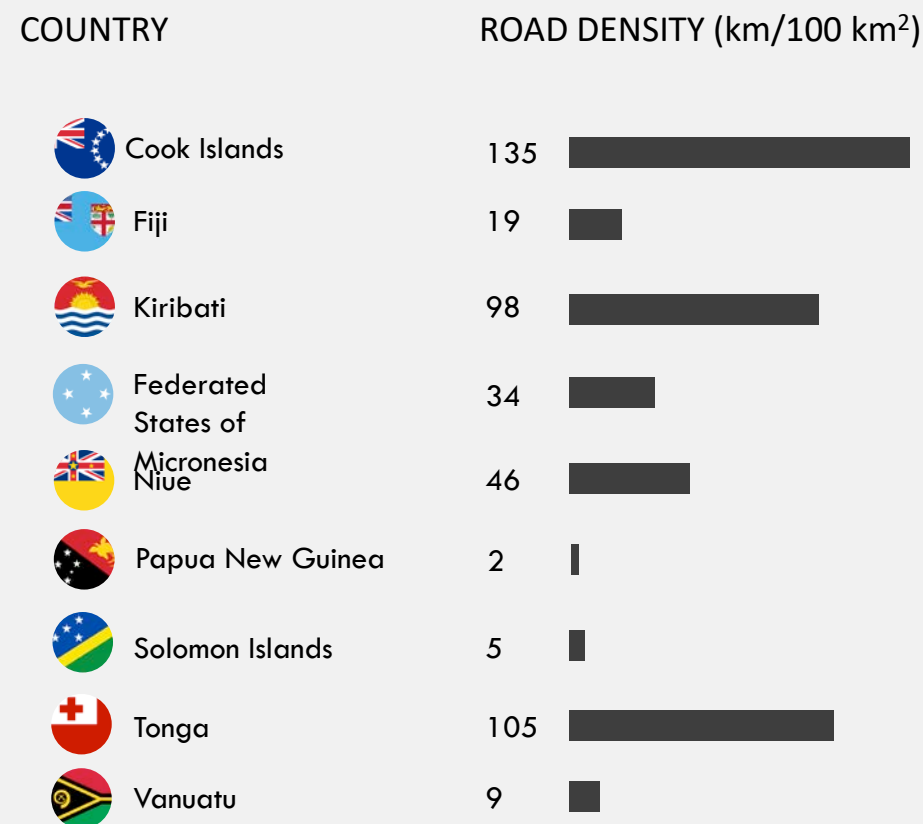
The national road network is essential for economic and social development as a reliable network enables communities to access key services such as markets, health facilities, and schools. Most countries in the Pacific region have one or two major urban centers with several rural settlements spread over different islands. This highlights the critical need for a well-connected transport system. Continued investment in road networks can ensure better trade within countries.

The quality of roads is highly diverse in the region. Overall, less than one third of all roads are paved but progress in this respect is uneven in the region. Some countries enjoy high access to paved roads: roads in Niue and Tuvalu are all paved, while in Nauru 80 percent of roads are paved; in contrast, only 4 percent and 2 percent of the roads Marshall Islands and Solomon Islands respectively are paved.

However, these trends should be analyzed in the context of the total road length. Even though roads in Niue and Tuvalu are fully paved, these are the countries with the smallest road network (120 km and 8 km respectively). The spatial relationship between length of road network and proportion of roads is not clear. For instance, Fiji has the largest road network (3,440 km) with one of the highest rates of paved roads – about 49 percent of the domestic road network being paved. On the other extreme, Marshall Islands and Solomon Islands also have large road networks (2,080 km and 1,390 km respectively) but less than 5 percent of the roads in these countries are paved. These uneven patterns of infrastructure quality indicate the need for continued investment in extending the road network as well as improving the quality of roads.

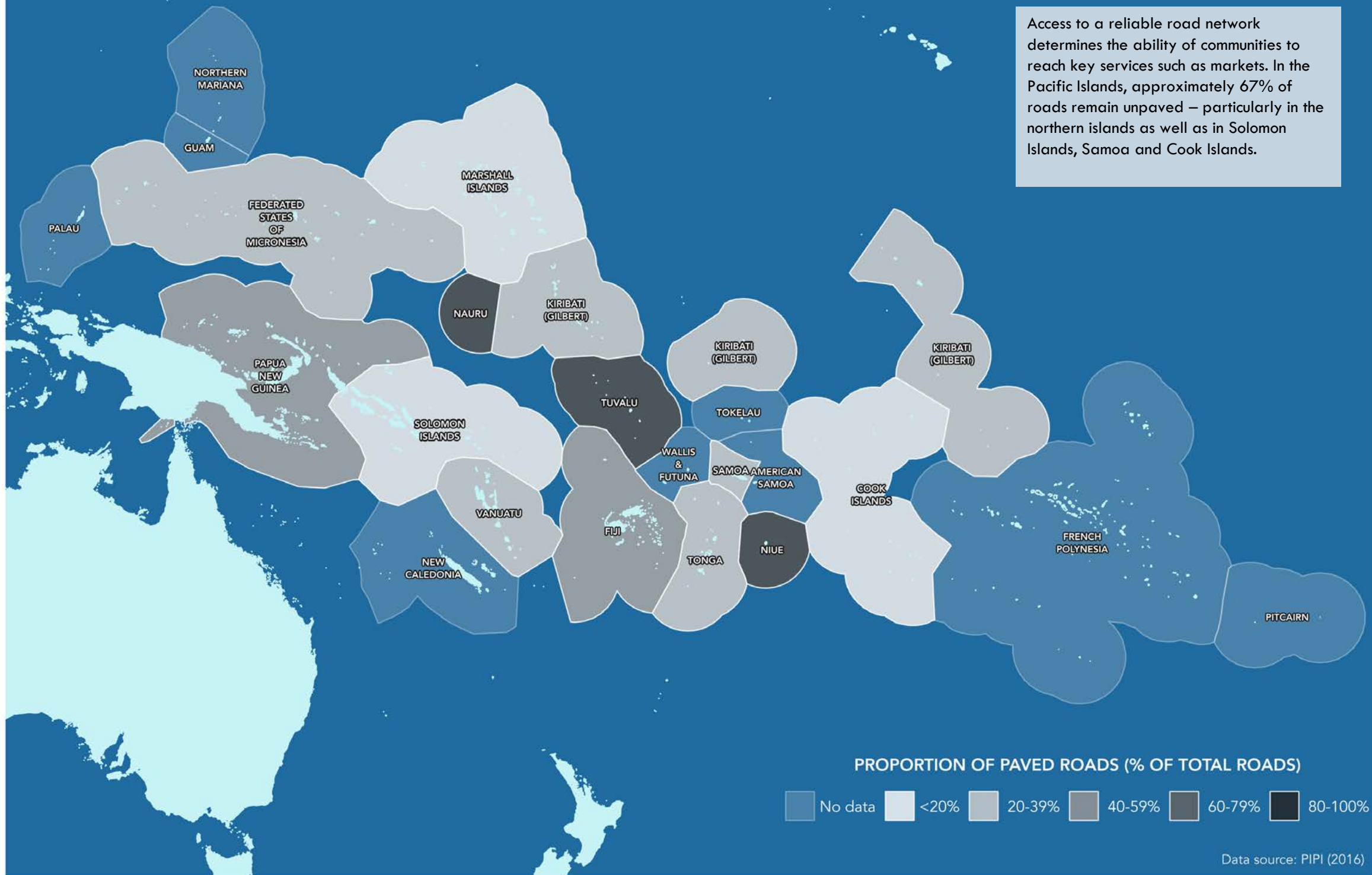
## ROAD DENSITY

Road density is a useful indicator of infrastructure performance. Road density refers to the road length in relation to a country's land area, and is expressed as length of roads (in km) per 100 square kilometers. In the Pacific region, countries have on average 43 km of roads per 100 km<sup>2</sup>. The number is low compared to other regions because some areas remain difficult to access. The range of values associated with road density in the Pacific countries is shown below.



# INFRASTRUCTURE | PROPORTION OF PAVED ROADS

Access to a reliable road network determines the ability of communities to reach key services such as markets. In the Pacific Islands, approximately 67% of roads remain unpaved – particularly in the northern islands as well as in Solomon Islands, Samoa and Cook Islands.







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The following people worked on the compilation of the Atlas:

### Pacific Community:

Phil Bright	Geographic Information System Specialist	Statistics for Development Division	Noumea
Luis de la Rua	Geographic Information System Specialist	Statistics for Development Division	Noumea
Alison Culpin	Demographer/Social Statistician	Statistics for Development Division	Noumea
Anare Motukula	GIS Technician	Land Resources Division	Suva
Gibson Susumu	Participatory Extension Specialist	Land Resources Division	Suva

### World Food Programme:

Krishna Krishnamurthy	Food Security Consultant	Regional Bureau for Asia and the Pacific	Bangkok
Siemon Hollema	Sr Regional Programme Policy Officer	Regional Bureau for Asia and the Pacific	Bangkok
Elenoa Deni	Regional GIS Officer for the Pacific	Pacific Office	Suva
Amy Chong	Regional GIS Officer	Regional Bureau for Asia and the Pacific	Bangkok
Ruangdech Pongrom	Sr Programme Associate	Regional Bureau for Asia and the Pacific	Bangkok



**World Food  
Programme**



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Community**  
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