CLIMATE CHANGE AND PACIFIC ISLAND FOOD SYSTEMS

THE FUTURE OF FOOD, FARMING AND FISHING IN THE PACIFIC ISLANDS UNDER A CHANGING CLIMATE

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Front
Fiji landscape, Phil Gibbs Photography

Toka Panda spear fishes for reef fish, Santupaele village, Western Province, Solomon Islands, Filip Milovac (WorldFish)

Back
In Kiribati, protective mangroves are being replanted along the coast, to help reduce the island's vulnerability to storms and cyclone damage and improve fish habitats, Richard Markham (ACIAR)

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CONTENTS

PREFACE

The peoples of the Pacific region live across a vast swathe of the world's largest ocean, mostly on isolated islands and atolls. The region includes countries that are highly vulnerable to the effects of climate change and natural disasters.

Climate change in Pacific Island countries and territories (PICTs) is projected to have significant impacts, including rising sea-levels, more violent tropical cyclones and droughts. Fish stocks in the tropical regions of the Pacific are expected to be directly affected by any changes that may occur in the ocean's ecosystem. Warming waters would harm coral reefs and vital fish habitats. Changes in temperature and rainfall would also impact the farming industry due to an increased risk of infestation by pests and diseases in many staple and export crops.

In order to deal with these threats, profound changes need to be applied to the Pacific food system. Governments, development agencies, communities and farmers will need to work together to develop alternatives to potentially threatened livelihoods of the people of the Pacific region. Similarly, stakeholders should be ready to take advantage of any favourable impacts that may arise from climate change. More resilient food systems will have to be created, but more research is needed before these adaptations can be applied effectively.

The four alternative scenarios of the future of the Pacific food systems that are reported in this booklet provide important insights into the different dimensions of the food system, including fisheries and forests, trade, affordability and consumption, and public health. The scenarios offer essential information for policy-makers, in order for them to be able to test and take steps toward developing policies that enhance resilience and strengthen adaptation to climate change among fishers and farmers in the Pacific region.

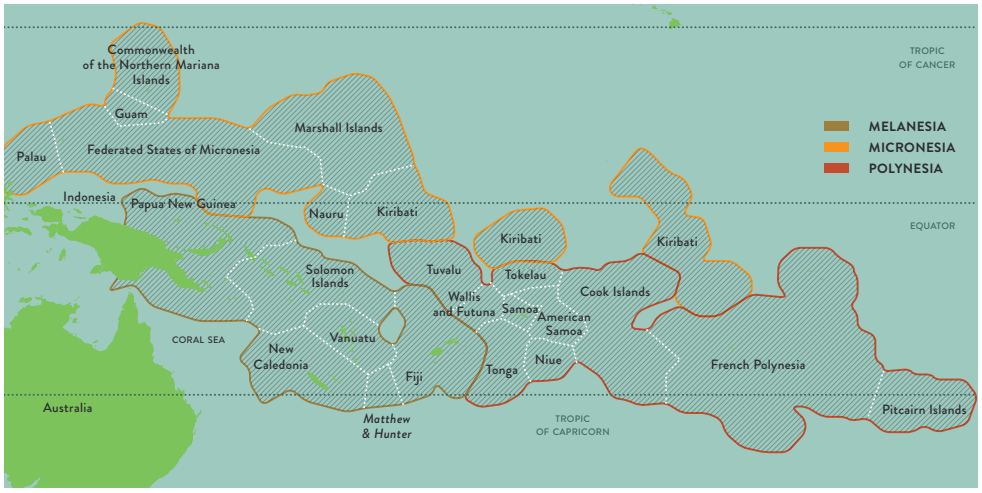
Dr Colin Tukuitonga
Director-General, Pacific Community

INTRODUCTION TO THE PACIFIC ISLAND REGION

DFAT Australia

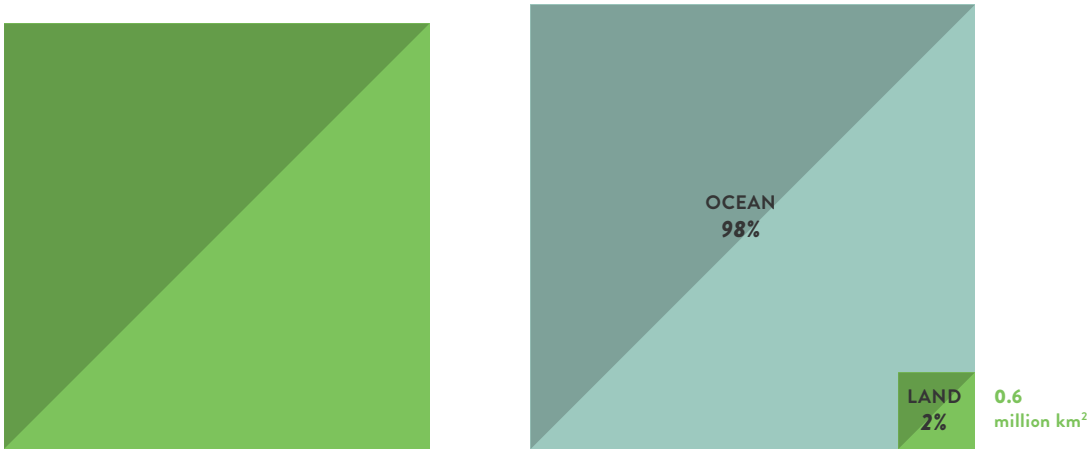
The people of the Pacific Island region live mostly on small land masses flung across the vast expanse of the world's largest ocean. Their nations are part of the alliance of small island developing states, but are better thought of as 'large ocean states' – the exclusive economic zones (EEZs) surrounding the 22 Pacific Island countries and territories make up 98% of their combined jurisdictions. The poor soils on the atolls that comprise several countries and territories also drive the dependence on marine resources – fish provides the majority of animal protein in many places across the region and more than 30% of the world's tuna is caught from the EEZs of Pacific Island countries. The situation is more favourable in larger Pacific Island nations, which typically have rich volcanic soils, and can produce a wide variety of root crops, fruits and agricultural commodities.

Grace Poporia harvests cassava from her home garden in One' Oneabu, Malaita Province, Solomon Islands. *Filip Milovac (WorldFish).*



Although they have a total population of less than 11 million, the 22 Pacific Island countries and territories face challenges such as rapid population growth and urbanisation. Many countries now depend heavily on imported foods that are energy-dense and nutritionally poor. As a result, the incidence of obesity and non-communicable diseases, such as diabetes, is among the highest in the world. Moreover, increasing reliance on imported foods makes nations particularly vulnerable to variation in supply and cost.

PACIFIC ISLAND EEZS COVER A LARGER COMBINED AREA THAN NORTH AMERICA



NORTH AMERICAN LAND AREA
24.7 million km²

22 PACIFIC ISLAND EEZS
27.1 million km²

Another challenge facing Pacific Island people is the climate, which varies considerably across the region, from the high islands that are large enough to influence local weather to the small atolls that are more at the mercy of sporadic rainfall for their fresh water. Climate in the region is also influenced by large-scale phenomena such as the El Niño Southern Oscillation, which not only affects rainfall patterns, but also the location of cyclones and sea-level height.

The region includes some of the countries most vulnerable to the effects of climate change and natural disasters. For example, Kiribati, with a population of about 100,000, consists of 33 coral atolls which rise only one or two metres above sea-level, spread over 3.5 million km² of ocean.

HIGHLY VARIABLE POPULATION DENSITY

Many parts of the region have sparse populations. For example although 80% of the people in Solomon Islands live in rural areas, the average national population density is just 18 people per km². On the other hand, the urban population density of Betio in South Tarawa Atoll in Kiribati is about 10,000 people per km², and on Ebeye Atoll in the Republic of Marshall Islands the population density is over 40,000 people per km². As a comparison, the population density of Hong Kong is 6,690 people per km².

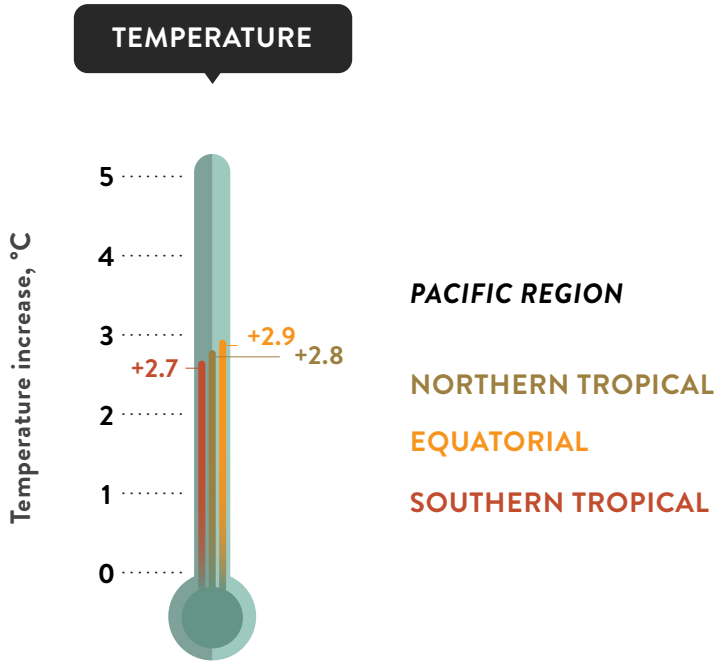
Two fishermen prepare for spear fishing in Santupaele village, Western Province, Solomon Islands. *Filip Milovac (WorldFish).*

IMPACTS OF CLIMATE CHANGE

DFAT Australia

CLIMATE CHANGE IN THE PACIFIC REGION

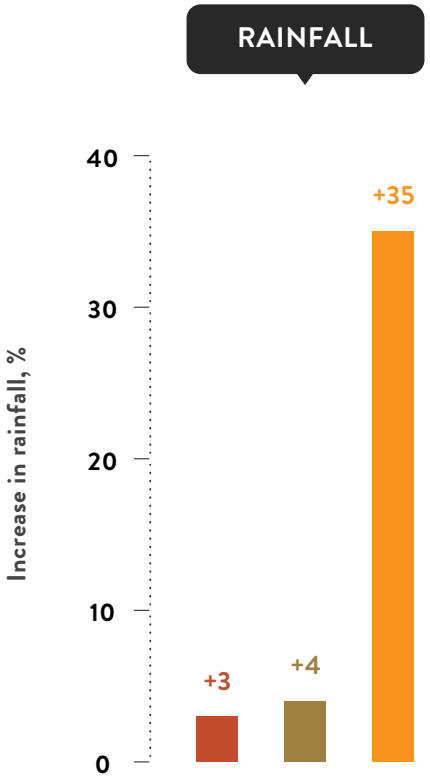
All Pacific Island countries and territories will warm by at least 1.5°C before 2050 and by up to 3.5°C by 2100, based on an ensemble of global climate models and greenhouse gas emissions scenarios. At the same time, the frequency of extremely high temperatures will continue to increase through the current century. As temperatures rise, extreme rainfall events will very likely become more intense and frequent.



The Pacific can expect temperatures 2.7-2.9°C higher in 2081-2100 than in 1986-2005, under a high emissions scenario.

Source: IPCC 2013. High emissions scenario is RCP 8.5. 50th percentile of scenarios from42 CMIP5 global models.

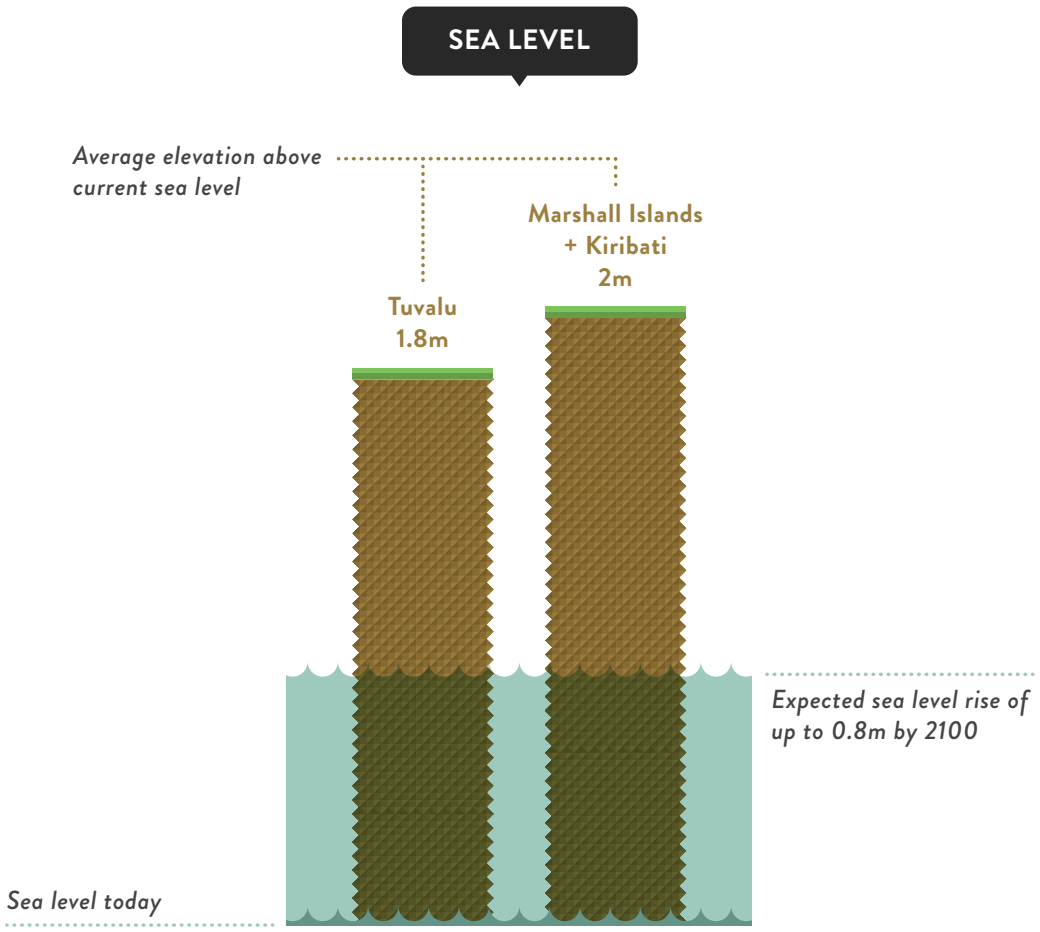
Two young men drive through the heavy rain on a motorbike during a storm in Funafuti, Tuvalu. *Jocelyn Carlin, Panos.*



The Equatorial Pacific can expect up to 35% more rainfall in 2081-2100 than in 1986-2005 under a high emissions scenario, with smaller increases in Southern and Northern Tropical Pacific regions. However, wet seasons will become wetter and dry seasons drier.

Source: IPCC 2013. High emissions scenario is RCP 8.5. 50th percentile of scenarios from42 CMIP5 global models.

Sea-level rise will threaten low-lying coastal areas on islands and atolls. The worst scenarios predict a rise of up to 80 cm by 2100. Tropical cyclones are likely to become stronger and more destructive. The probable increase in maximum wind speed, coupled with higher coastal water levels and storm surges, presents a very great threat to small island states. Rainfall associated with tropical cyclones, already intense, is also likely to increase. Freshwater resources in atoll nations will very likely become contaminated as sea water washes over the islands.



Source: IPCC 2013. High emissions scenario is RCP 8.5. 50th percentile of scenarios from42 CMIP5 global models.

"THE IMPACTS OF CLIMATE CHANGE WILL DIFFER MARKEDLY AMONG PACIFIC ISLANDS"

Ocean temperatures are projected to rise by 1.4°C by 2050 and 2.5°C by 2100, and the water will become more acidic.

The acidity or pH of sea water has stayed steady for millions of years at about 8.2. Higher concentrations of carbon dioxide (CO_2) in the atmosphere will result in more CO_2 being absorbed by the ocean and sea water becoming more acidic. Ocean acidification reduces the amount of minerals in sea water needed by corals to build their skeletons, and will degrade coral reefs in the decades ahead.

The impacts of – and responses to – climate change will be different among the Pacific Islands; this will add to the challenges of regional adaptation and the identification and promotion of sustainable livelihood alternatives in the future.

Higher air and sea temperatures will affect livelihoods

Wetter wet seasons and drier dry seasons will affect agriculture

More catastrophic rainfall and droughts will threaten the local people

Sea level rise will cause severe flooding and erosion

Fresh water supplies will be contaminated by sea water

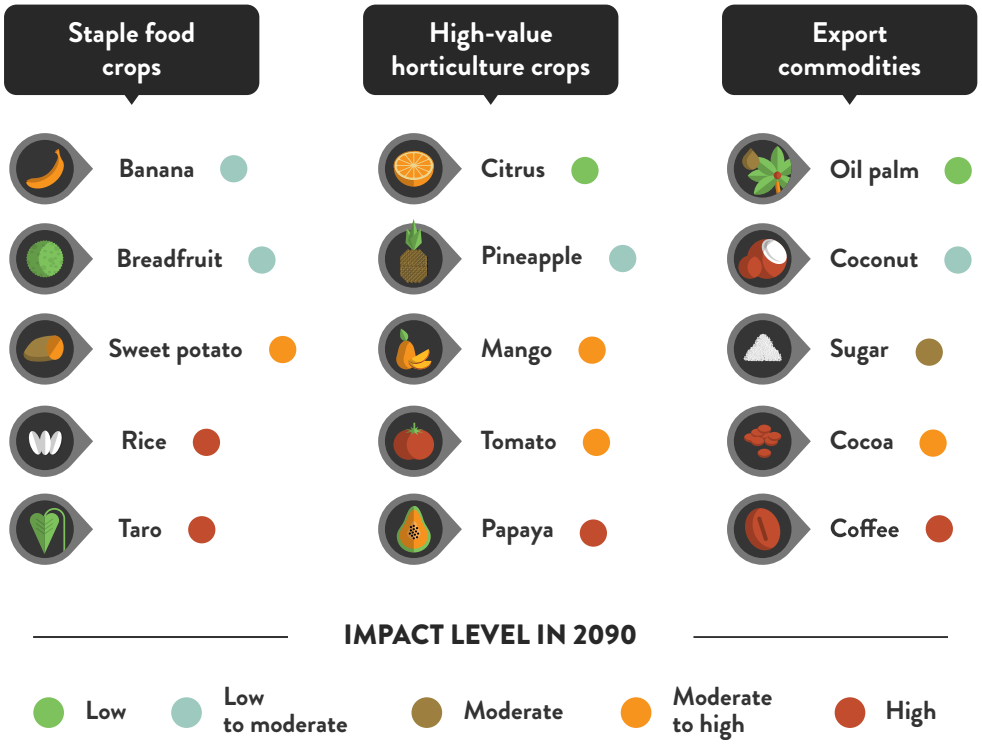
Fish will be driven away because of higher water temperatures

Corals will be killed as the ocean becomes warmer and more acidic

More violent tropical cyclones will decimate the islands

FARMING UNDER A CHANGING CLIMATE

Staple food crops grown in the Pacific Islands include bananas, breadfruit, sweet potato, taro, yams cassava, coconuts, cocoyam, giant taro and swamp taro. Wheat flour and rice are also important staples, but are almost entirely imported. Cacao, coconut, coffee, palm oil and sugar are the main export crops and there is increasing production of horticultural crops, such as papaya.



Source: Bell J and Taylor M. 2015. Building climate-resilient food systems for Pacific Islands. Penang, Malaysia: WorldFish. Program Report: 2015-15.

For most staples, export and cash crops, increases in extreme weather events are likely to have greater impact than changes in temperature in the short-to-medium term (2030–2050). More frequent and more intense

Cyclone damage to coconuts in Fiji. Andrew McGregor (SPC).

rainfall will test the skills of farmers in those countries where rainfall is already high, especially for crops sensitive to waterlogging, such as sweet potato. High temperatures could also affect the formation of sweet potato and yam, and increase the risk of pests and diseases, for example, enabling diseases to expand into highland areas that are currently unaffected.

The impacts on livestock are variable. Indigenous, locally adapted breeds can be more resilient, while and introduced breeds may be more vulnerable. Poultry, an important food source, are particularly vulnerable to projected temperature shifts.

Of the major export crops that are grown for sale (cash crops), coffee is projected to be the most susceptible to global warming, with yields expected to fall significantly by 2050 in current production areas, mainly due to increased temperature in the uplands of Papua New Guinea (PNG).

Most cash crops are vulnerable to extreme weather events, which account for many production losses across the region. High winds from more intense tropical cyclones have a significant impact on crops such as bananas and breadfruit. High wind speeds are a significant threat to coconut palms, especially older palms, which make up a major proportion of many existing plantations. Sugar cane will be affected by flooding. Cacao production in PNG and the Solomon Islands are also likely to be hit hard, though opportunities exist for countries, such as Vanuatu and Fiji, where a warming temperature will increase cacao production.

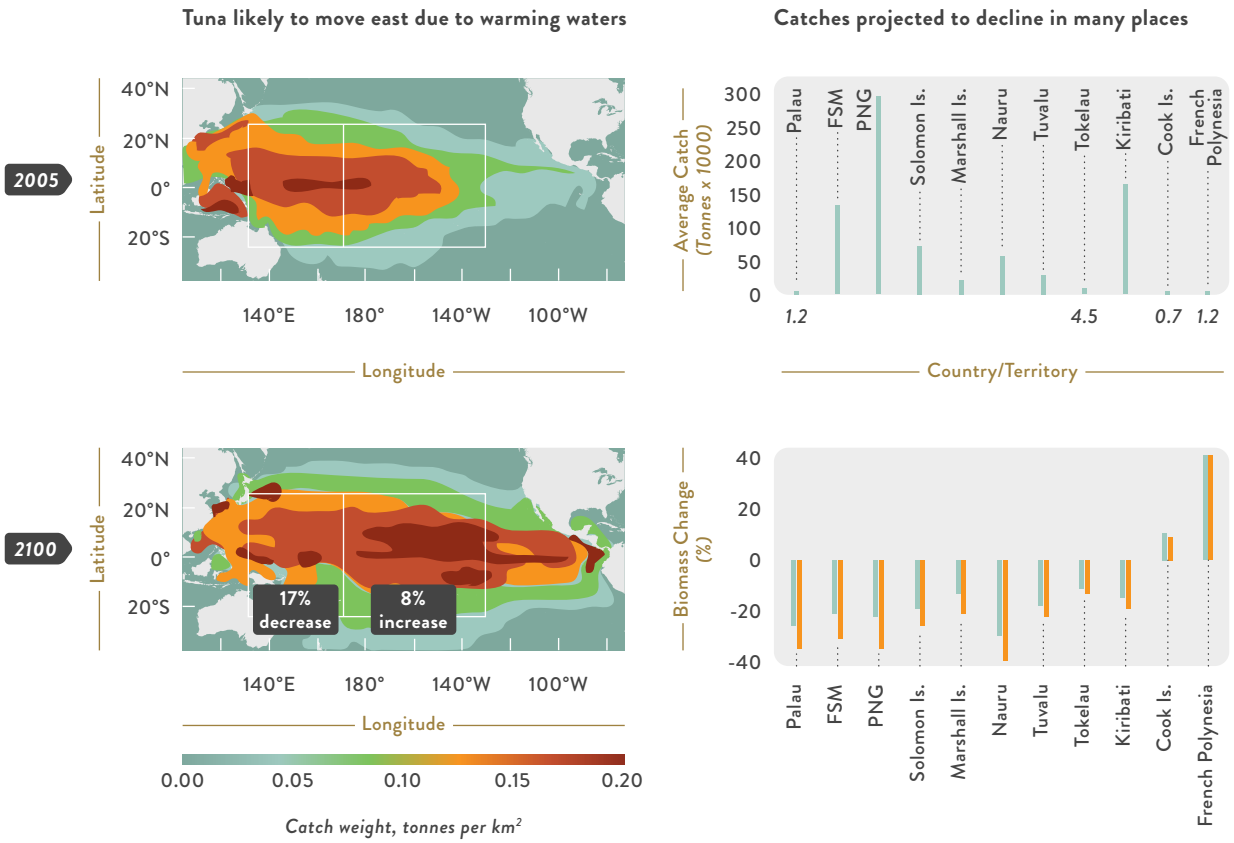
FISHING AND AQUACULTURE UNDER A CHANGING CLIMATE

TUNA FISHERIES

Warmer waters in the tropical Pacific will impact the distribution of tropical tuna species such as skipjack, yellowfin, bigeye and albacore, causing them to progressively shift eastward. Eventually, their abundances are also expected to decrease as climate change reduces the supply of nutrients to the food web that supports tuna, lowers oxygen levels and increases ocean acidification. This will make it more difficult for local people in the western part of the Pacific Island region to catch tuna, and affect the profitability of some industrial fishing fleets.

Climate change threatens people like Fololina Avia, who runs a small scale fishing company in Samoa and stall at the Apia fish market in Samoa. *Asian Development Bank.*

PROJECTED CHANGES IN DISTRIBUTION OF SKIPJACK TUNA BETWEEN 2005 AND 2100



COASTAL HABITATS AND FISHERIES

Many local people rely on fish and other marine species from coral reefs for their food and livelihoods. Higher sea temperatures would reduce the number of fish that spawn successfully, and affect their growth. Ocean warming will also cause corals to bleach more often. Together with the effects of ocean acidification, ocean warming will result in degradation of coral reefs, reducing their ability to support fish. As a result, the production of coastal fisheries from coral reefs is expected to decline by up to 50% by the end of the century.

Coral bleaching is an indicator of environmental stress; unhealthy reefs are unable to effectively sustain fish populations. *Matt Kieffer.*

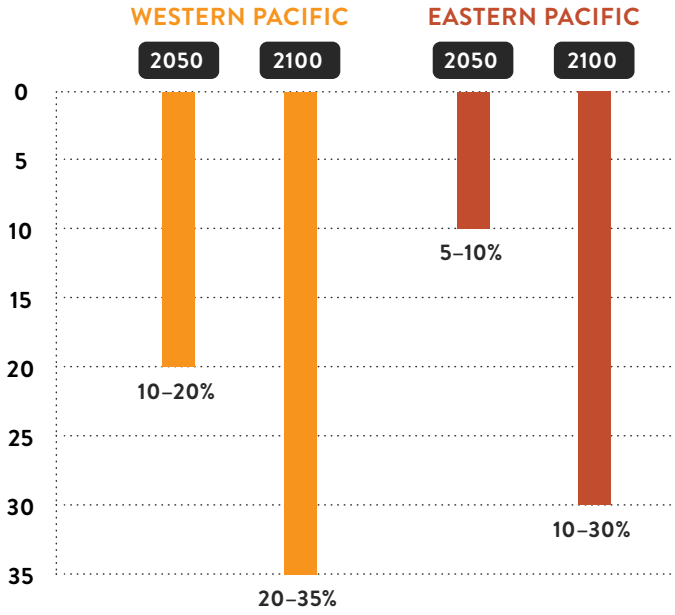
Two other aspects of climate change are expected to make these problems worse. Stronger cyclones would cause more severe physical damage to reefs in subtropical areas, while greater sediment and nutrient runoff from heavier rainfall would damage coral reefs more frequently.

The projected rise in sea-level would reduce the growth of protective mangroves along the coast. If they die off, the coastline would become more vulnerable to storms and cyclone damage. Seagrass beds would also be at risk. Many coral reef and coastal fish species depend on mangroves and seagrasses as nursery areas; if the mangroves and seagrass decline, so will fish populations.

DECLINING COASTAL FISHERIES PRODUCTION

Total coastal fisheries production is projected to decline at different rates in the eastern and western Pacific due to the way that tuna caught by coastal fishers are expected to respond to climate change.

Projected % decline in total coastal fisheries production compared to the present. Total coastal fisheries production is made up of coral reef fish, nearshore pelagic fish (mainly tuna) and shellfish



Source: Bell et al. (2011) Vulnerability of tropical Pacific fisheries and aquaculture to to climate change. Noumea, New Caledonia, Pacific Community.

FRESHWATER AQUACULTURE

In contrast to coastal fisheries, freshwater aquaculture in the Pacific Islands is likely to be favoured by climate change. Conditions for growing Nile tilapia, the main species produced in freshwater ponds, are expected to improve as air temperatures and rainfall increase. Higher temperatures could result in faster rates of growth, as long as ponds are managed to maintain the necessary levels of oxygen in the water. Higher temperatures should also enable tilapia to be farmed at higher elevations in PNG, where the large inland population has limited access to animal protein. Higher rainfall could also create the opportunity to grow tilapia in rain-fed ponds on some atolls.

FOOD AND NUTRITION UNDER A CHANGING CLIMATE

Climate change could have both good and bad impacts on food production in the Pacific Island region, which affects the food security of Pacific Island people. The actual impact would depend on the sensitivity of the plants and animals involved, and other factors affecting production, such as geographical location and farming practices.

The lifestyle and diet of the rapidly growing urban populations in the Pacific are driving the increase in imports of energy-dense, nutritionally poor foods. These imports are replacing traditional foods for several reasons including low cost and convenience, rural people migrating to towns, lack of access to land for growing food, increases in disposable income of urban dwellers, and lack of awareness of the consequences of poor nutrition. The toll on Pacific Island urban populations has already been huge: Pacific Island nations comprise 9 of the 10 countries in the world with the highest rates of overweight and obesity, and 7 of the 10 countries with the highest rates of diabetes.

A mother and her daughter share a meal, Solomon Islands. *Filip Milovac (WorldFish).*

In Tarawa, Kiribati, boys walk past a truck with signage advertising imported rice. *Jocelyn Carlin (Panos).*

The risks posed to global rice and wheat production by climate change, linked with increasing demand for these basic foods by the expanding world population, are likely to lead to less secure and more costly supplies of imported staples in the region. In contrast, the climate resilience of some Pacific staple food crops – such as breadfruit, cassava and giant taro – provides opportunities to soften the potential effects of climate change on food security and livelihoods across the region.

The rich tuna resources of the tropical Pacific are also expected to continue to provide options for maintaining the high rates of fish consumption in the region for decades to come as coral reefs and coastal fish production decline. An important proviso here is that tuna stocks are well managed.

RESPONDING TO CLIMATE CHANGE

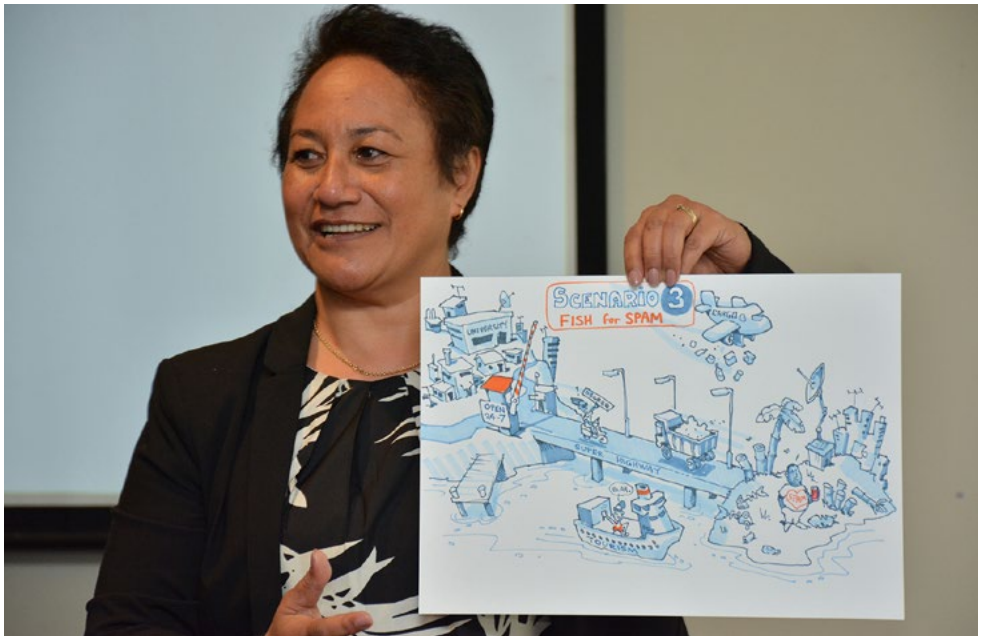
Irene Scott (DFAT Australia)

THE SCENARIOS PROCESS

Rather than attempting to predict a single future for the future of the Pacific food system in the face of many uncertainties, a group of stakeholders from the Pacific region with widely different backgrounds gathered together in August 2015 in Nadi, Fiji, to produce alternative scenarios. Participants included members of the Pacific Community (SPC), civil society, business and national policy-makers.

Scenarios are 'what if?' stories about the future. They recognise two 'axes of uncertainty' that summarise the most important and uncertain drivers of change. The first axis is 'governance of natural resources', which includes the governance of both water and land resources, and considers regulations and policies at all levels, as well as the capacity to implement them. The second axis is 'economic connectedness to the rest of the world'; trade, remittances, migration, tourism and fisheries all may become more or less important in the future. These axes were used to create a set of contrasting scenarios that can be used to develop and test policies, plans and strategies.

This scenarios process has been useful in other regions because satisfying different stakeholder groups' objectives may involve difficult negotiations around complex trade-offs. Trade policy, for example, will impact on public health and the environment, as diets mirror changes in the region's food supply. In the face of great uncertainty and complexity, scenarios can help catalyse policy responses in ways that more technical analyses cannot.



In August 2015, a diverse group of stakeholders came together in Fiji. Their mission was to develop future scenarios for the evolution of the pacific food system under climate change. *Impressive photography (CCAFS).*

The following pages illustrate the four scenarios that were developed at the Nadi workshop. These scenarios identify future drivers of change and then plot plausible directions that they may take. To help demonstrate who wins and who loses in each scenario, the workshop groups created 'character perspectives,' where they imagined the everyday lives of people living in these possible futures. In addition, the groups worked closely with artist Roger Harvey to help bring the scenarios to life.

You can also explore the scenarios in depth and watch them come to life in an animated film https://youtu.be/bg-PEKDNj3M

SCENARIOS WORKSHOP

The workshop was organised by SPC, in partnership with WorldFish, the Technical Centre for Agricultural and Rural Cooperation (CTA), the CGIAR Research Programs on Climate Change, Agriculture and Food Security (CCAFS) and Aquatic Agricultural Systems (AAS), and the University of Oxford's Environmental Change Institute. The aim of the event was to initiate a research and development programme to build resilience and strengthen adaptation to climate change and variability amongst fishers and farmers in the Pacific region.

SCENARIO 1: TUG OF WAR

High connectedness coupled with well-governed natural resources – 'Tug of war' is a story of tough choices, clashing values and great opportunities.

In this 'Tug of war' scenario:

- The Pacific economy is well connected to the rest of the world, with strongly regulated natural resources governance at local, national and regional levels and initiatives to adapt to climate change have worked.
- Tuna help to fill the shortfall in the supply of coastal and reef fish to domestic consumers, aided by better management of coastal fisheries.
- By 2030 exports, imports and tourism have increased in the Pacific region; many people have been able to take advantage of the resultant economic development.
- More fish are being sustainably produced and improvements are being made in the sustainable production of tree crops, supported by national and regional initiatives to adapt to climate change. Agriculture and fisheries are now more productive.

But although the region is more prosperous, many people have missed out:

- Diets are getting steadily worse and peoples' capacity to pull themselves out of poverty is hampered by a lack of resources.
- There are gaps, such as a lack of food standard regulations although regulation of natural resources is strong.
- Little attention has been paid to marginalised and vulnerable people, particularly in rural areas, although the better-off are doing well. As a result, society has more choices but also more gaps.
- Limited progress has been made in improving the nutritional value of everyday food, increasing incidence of health problems.

SCENARIO 2: LIVING ON THE EDGE

Low connectedness coupled with good natural resources governance – 'Living on the edge' is a narrative of fragile self-reliance and idealism challenged by economic and climatic turmoil.

In 'Living on the edge':

- The Pacific depends less on the outside world than at present and there is strong regulation of the food system.
- Young people in the region have high hopes and bright dreams for the future. However, in the years after 2020, global economic turmoil caused by increasingly serious climate extremes, coupled with a decline in development funds from donor countries, creates a period of crisis and chaos in the region.
- The results are very different among the Pacific's nations: wealthier and more resilient countries hold on to their ideas about a promising future, while others see financial ruin and there is an exodus of their population in order for people to find more secure lifestyles elsewhere.
- Self-reliance and national-level resilience become the policy focus in many countries, while environmental degradation is severe.

By 2030:

- Regionalism has grown and the Pacific is more independent of the outside world:
- Collectively, countries produce enough food for their people.
- Environmental degradation caused by climate change and extreme events is widespread, but natural resources are better governed, agriculture and fisheries are strong, and the food system is resilient to shocks. In some places, root crops and other traditional foods have replaced rice as part of a renaissance of traditional ways of life.
- Nevertheless, local economies remain fragile and there are still challenges related to food and nutrition security. In the next decade, food crises precipitate deep changes in societies and set countries on contrasting development pathways.
- Many Pacific islands are under-populated, with waves of migration of young people; the population is ageing; and leaders are calling to the diaspora to come back and contribute. Serious questions are being asked as to whether the Pacific development pathway is viable in the long term, particularly on atolls with few resources and high vulnerability to climate change.

SCENARIO 3: CASH NOW, PAY LATER

High connectedness coupled with poor natural resources governance – 'Cash now, pay later' is characterised by high development and growth at the expense of long-term sustainability, health and increased vulnerability to climate change for the poorest, while others thrive.

In ‘Cash now, pay later’ there is:

- Little effective natural resources governance but the region is deeply embedded in global markets.
- Rapid growth and business is booming – at least for some.
- New-found wealth invested in infrastructure, schools and a rapidly expanding tourism industry.
- Expanding mismanagement of natural resources by governments and extractive industries, such as fishing, forestry and agriculture, which comes at the expense of long-term sustainability.

By 2030:

- Local communities have been displaced to marginal land to make space for primary industry, which has affected lifestyles and increased the dependence on cheap, unhealthy imported foods.
- Wealth is not distributed equally; an elite control land and resources, and large numbers of unemployed youth are causing civil unrest and political instability.
- The epidemic of non-communicable diseases has had a crushing impact on lives and national economies.
- Many negative environmental impacts are emerging, which start to affect local food production and tourism.

SCENARIO 4: CRISIS IN PARADISE

Low connectedness coupled with poor governance of natural resources – 'Crisis in paradise' sees the Pacific region overwhelmed by its challenges: population pressures, environmental degradation and climate impacts.

In 'Crisis in paradise,' the Pacific region is overwhelmed by its challenges:

- Natural resources are unregulated and economic connectedness to the rest of the world is low.
- Growing populations are placing huge pressure on food systems. Coastal fisheries are in decline. There is widespread environmental degradation. Agricultural production continues to decline and half of all Pacific Islanders are food insecure or malnourished, with devastating impacts on public health and economies.
- Communities cope as best they can with climate change, but, because their natural resources are degraded, they have few options to reimagine their future.
- Rapid urbanisation and migration continue, with most young people leaving rural areas in search of economic opportunities in towns and outside their countries.
- Prolonged political instability has resulted in chaos; the weakened social fabric and simmering discontent are heightening fears of serious social unrest.

By 2030:

- Growing population continues to place huge pressure on food systems, especially among poor and vulnerable people. Coastal fisheries continue to decline and rural people receive little benefit from tuna fisheries.
- There is widespread criticism of governments for failing to address the declining state of the environment.
- A decline in dietary diversity is deepening the problem of malnutrition.
- Trade in fish and timber has shrunk, because there is little left to sell, and tourism has declined because the region has become unattractive to visitors.
- Government investment in infrastructure, especially health facilities and transportation, is low because of limited economic activity. Urbanisation and migration continue apace. Prolonged political instability has resulted in chaotic policy environments.
- Community capacity has gradually eroded due to a lack of action, results and trust.

NEXT STEPS

During 2016, the four scenarios will be further developed and underpinned by quantitative analyses of the different dimensions of the food system, including fisheries and tree crops, trade, affordability and consumption, and public health. Once fully developed, it is hoped that policy-makers will use these scenarios to test and guide their policy development.

Pacific leaders recognise that their islands are among the most vulnerable places to climate change. Critical changes – such as sea-level rise, more acidic oceans and population increases to 2030 – are already unavoidable, but societal responses to those changes are not yet set in stone.

A start has already been made:

- There are several high-level strategic frameworks already established to support adaptation by the Pacific Island countries and territories (see page 37).
- Regional and national policies for adaptation to climate change and disaster risk management are in place.
- A number of substantial initiatives are raising awareness of the implications of climate change for the region.

A woman sells produce at a road stall in Honiara, Solomon Islands. *Asian Development Bank.*

But more will have to be done at a practical level. Governments, development agencies, communities and farmers will need to work together to develop alternatives to threatened livelihoods, such as coffee in PNG. Similarly, stakeholders will need to be ready to take advantage of any favourable impacts of climate change, such as increases in cacao production in Fiji.

More resilient food systems will have to be created, but more research is needed before these adaptations can be applied effectively. This approach will allow Pacific Island governments to create options for adaptation. These might include, for example, reducing dependence on imported rice and wheat by increasing production of local staple crops resilient to climate change; persuading people to eat tuna rather than coral reef fish; and developing the freshwater aquaculture systems that are expected to be favoured by warmer temperatures and higher rainfall.

INITIATIVES TO SUPPORT PACIFIC ADAPTATION TO CLIMATE CHANGE

Frameworks include the Pacific Island Framework for Adaptation to Climate Change (2006-2016) and the more recent Strategy for Climate and Disaster Resilient Development in the Pacific. In addition, the United Nations Framework Convention on Climate Change has assisted the least developed countries in the region to develop National Adaptation Plans of Action, and, more recently, Joint National Action Plans for Climate Change and Disaster Risk Management.

RECOMMENDATIONS FOR ACTION TO RESPOND TO CLIMATE CHANGE IN THE PACIFIC ISLAND REGION

1. Conduct national assessments of the vulnerability of agriculture in Pacific Island countries and territories to climate change and identify:
   - implications for food security and livelihoods from projected changes in production, population and urbanisation
   - prioritise agricultural adaptations in each Pacific Island country and territory to minimise threats and maximise opportunities.

2. Identify research to be done in each country to implement priority adaptations based on:
   - projected food needs of rural and urban populations
   - natural and human capital of the country for producing agricultural and fisheries products
   - existing production methods and capacity, including traditional knowledge
   - projected effects of climate change on national food systems
   - previous research that can be used to help improve resilience of national food systems.

3. Strengthen food systems research for the region by:
   - creating effective partnerships between national research and extension agencies, farmers' networks, non-governmental organisations and advanced scientific institutions to improve national capacity to carry out research
   - mentoring national research and extension staff and farmers to document results of field trials and share research data and results with counterparts in neighbouring countries
   - implementing innovative approaches to overcome constraints to sharing knowledge with farmers and fishing communities in other countries and regions
   - improving the understanding of the factors influencing uptake of technology
   - providing farmers and fishing communities with climate services to guide their investments and activities.

Source: Bell and Taylor, 2015

FURTHER READING

This booklet draws heavily from two publications:

1. Bell J and Taylor M. 2015. Building climate-resilient food systems for Pacific Islands. Penang, Malaysia: WorldFish. Program Report: 2015-15. http://pubs.iclarm.net/resource_centre/2015-15.pdf

2. Secretariat of the Pacific Community (SPC). 2015. Alternative futures for the Pacific food system. Suva, Fiji: Secretariat of the Pacific Community (SPC). http://cgspace.cgiar.org/rest/bitstreams/62058/retrieve

MORE INFORMATION

CCAFS Future Scenarios website:
https://ccafs.cgiar.org/scenarios

Flyer: Testing climate and agriculture policy against future scenarios
https://cgspace.cgiar.org/rest/bitstreams/51647/retrieve

SPC's website on climate change:
http://www.spc.int/en/ourwork/climate-change.html

CTA's work on climate change:
http://www.cta.int/en/search.html?search=climate+change

PARTNERS

The work presented in this booklet is the result of a partnership between SPC, WorldFish, CTA, CCAFS, AAS and the University of Oxford's Environmental Change Institute, funded by the New Zealand Aid Programme and the Australian Centre for International Agricultural Research (ACIAR). The partnership is intended to initiate a research and development programme to build resilience and strengthen adaptation to climate change and variability among fisherfolk and farmers in the Pacific islands region.

The food systems of the Pacific region are undergoing massive changes that will be felt for generations to come. Profound changes need to be applied to the food systems in order to deal with challenges such as rapid population growth, urbanisation and the importing of cheap, but nutritionally poor, foods. These challenges are causing some of the highest levels of obesity and non-communicable diseases, such as diabetes, in the world. And, on top of that, increasing carbon dioxide emissions are projected to have significant impacts in the coming years, including rising sea-levels, ocean acidification, and extreme weather events. Fish stocks in the tropical Pacific are expected to be affected directly by physical and chemical changes to the ocean, and indirectly by changes in the ocean's ecosystems. Changes in temperature and rainfall would also impact the farming industry due to an increased risk of infestation by pests and diseases in many staple and export crops.

This booklet puts forward a set of contrasting scenarios that summarise the most important and uncertain drivers of change. The scenarios can be used to develop and test policies, plans and strategies for the future and encourage the necessary investments to support adaptation to agriculture, fisheries and aquaculture.

Collaborators

Pacific Community / Communauté du Pacifique

WorldFish

CTA

CGIAR Research Program on Climate Change, Agriculture and Food Security — CCAFS

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