

Strategic Analysis Paper

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Melanesia: Climate Change, and Food and Water Security

Reginald Ramos

Research Analyst

Global Food and Water Crises Research Programme

Key Points

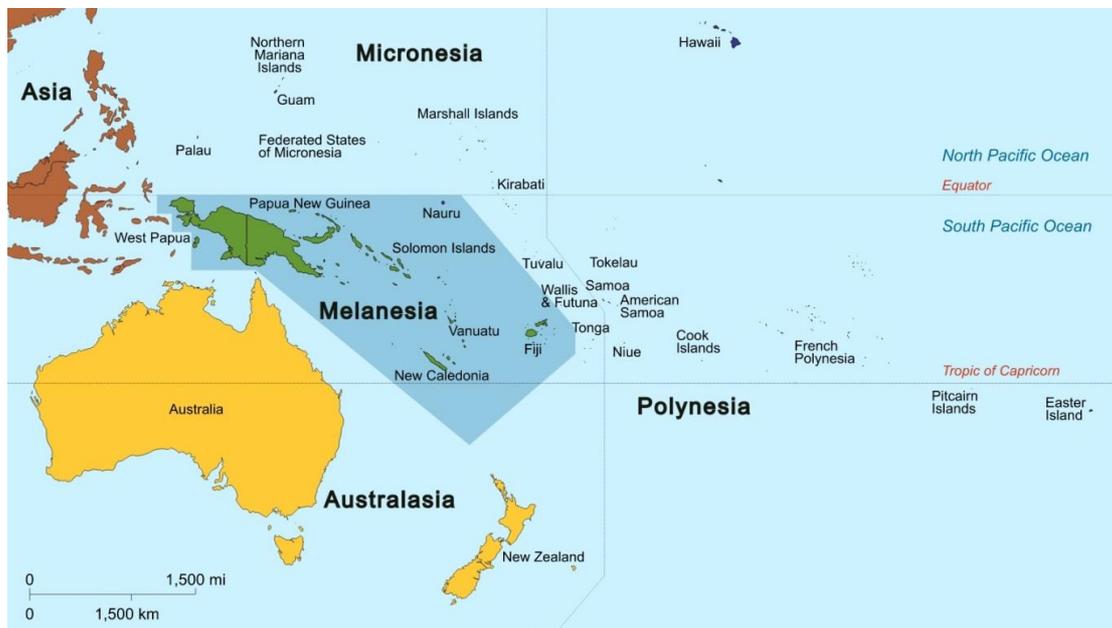
- The effects of climate change, regional demographic trends and humanitarian development are some of the primary drivers in Melanesia's long-term food and water security outlook.
- Melanesia has the highest rates of obesity and diabetes in the world, due to the influx of cheap imported food and the evolution of the Pacific diet over the past several decades.
- Melanesia is vulnerable to the effects of climate change, largely due to its economic dependency on agricultural and fisheries sector.
- Water sanitation and hygiene remains one of the biggest challenges for Melanesian countries, particularly within informal settlements and rural communities.
- Australia must proactively engage with the region's food and water security challenges, as part of its long-term future strategic outlook for a stable and prosperous neighbourhood.

Summary

Melanesia, the biggest subregion in the South Pacific, includes Papua New Guinea (PNG), Fiji, the Solomon Islands, Vanuatu, Nauru and New Caledonia. Due to its geographical proximity, Melanesia is Australia's immediate neighbour and is fundamental to regional stability, a [major strategic interest for Australia](#).

Melanesia currently experiences many food and water security challenges that will be further exacerbated by the effects of climate change and evolving regional demographics.

Australia remains the most influential actor in the region and contributes millions of dollars towards foreign aid, development and humanitarian assistance. Food and water security trends in the region, however, will increasingly pose serious political, social and economic challenges to Australia's role in the region and overall regional stability.



Source: Wikipedia

Analysis

Climate Change

The South Pacific is the most vulnerable region in the world to the impending effects of climate change. Pacific island countries remain heavily reliant on agriculture and fisheries for their economic livelihoods and national economies, however, climate change will increasingly threaten this in coming decades. The Pacific island countries are [faced with a number](#) of challenges such as rising sea levels, environmental migration, ocean acidification, coral bleaching, seawater intrusion and intensifying weather patterns.

The rising sea levels in the South Pacific are particularly worrying for low-lying countries. A sea level rise of three to 20 centimetres throughout Melanesia is projected to occur by 2030. The challenge of environmental migration is already a reality for [several countries](#) in the broader South Pacific. By 2050, it is projected that up to [1.7 million](#) people in the South Pacific could be displaced by the effects of climate change. Environmental migration will potentially strain the long-term food and water security of many Pacific island countries, which are already likely to be stressed by the growing demands of a growing youth population.

With the rise in sea levels, saltwater intrusion can also potentially threaten long-term food and water security. Low-lying land crops and groundwater resources are particularly vulnerable to the intrusion of saltwater onset by rising sea levels or the overexploitation of

groundwater resources. Salt water intrusion can hinder crop growth, and contaminate arable land and water sources, threatening both food and water security.

The warming of ocean temperatures has also resulted in more severe and frequent [coral bleaching](#) events. Coral bleaching reduces the diversity of the marine ecosystem, thereby reducing fish stocks. The economies of the South Pacific rely heavily on fisheries. The Asian Development Bank [states](#) that 30 per cent of regional gross domestic product (GDP) is generated from subsistence fishing. Coral bleaching can, therefore, affect the marine ecosystem upon which fish rely for food and shelter. Thus, the flow-on effect has potential implications for the long-term food security of Melanesians, particularly within the coastal rural communities that are heavily reliant on fisheries.

The effects of climate change are also projected to intensify existing weather patterns in Melanesia. Pacific island countries are subject to a variety of weather extremes such as floods, droughts and tropical cyclones. Melanesia's long-term food and water security will depend on how governments implement adaptation strategies that cater to the future climate and population.

Geography and Natural Disasters

The Pacific islands are geographically diverse - characterised by high volcanic islands, coral atolls and low and high elevations ranging from 71 metres to 4,509 metres. In Melanesia, PNG is the biggest country with a total land area spanning over 460,000 square kilometres, in comparison to Nauru, which is the smallest, at only 21km².

The Melanesian islands are susceptible to natural disasters, particularly tropical cyclones, tsunamis, floods, and tidal abnormalities. Regional projections [suggest](#) that there may be a decrease in the number of tropical cyclones throughout the 21st century; however, tropical cyclones are expected to increase in intensity.

In February 2016, [Cyclone Winston](#) hit Fiji causing damage and loss equivalent to 31 per cent of GDP and affecting roughly 40 per cent of the population. Cyclone Winston devastated the national economy, affecting infrastructure, agriculture, livestock and the fisheries sector. Many Fijians, particularly the women, rely heavily on subsistence farming and fishing as their primary source of income. The availability of food resources was depleted due to the destruction of agricultural crops. The cyclone also damaged water and sanitation infrastructure, resulting in a lack of access to safe drinking water and hygiene accompanied with increased cases of disease such as Typhoid fever. The kind of destruction left by Cyclone Winston is likely to occur more often as cyclonic intensity increases in the near future.

Demography and Urbanisation

Roughly 9.6 million people live in Melanesia, far exceeding the Micronesian and Polynesian subregions of 526,000 and 684,000 people respectively. The [United Nations Population Division](#) has projected that in the next 15 years the Melanesian population will grow to nearly 12.5 million people. The population of Melanesia is relatively young – 32.8 per cent of the region's population is under the age of 15, compared to the global average of 26 per

cent. The growing regional population, both in size and working age, will lead to increased demand for food and water resources and the need for economic opportunities. The effects of globalisation, climate change, natural disasters and increasing rates of rural to urban migration further complicate the situation.

Melanesia Population (size and % of youth)

Country	Current population (2015)	Projected population (2030)	Population under 15 years old (2015)
Papua New Guinea	7,600,000	10,000,000	37%
Fiji	892,000	940,000	29%
Solomon Islands	584,000	757,000	39%
Vanuatu	265,000	354,000	37%
Nauru	-	-	-
New Caledonia	263,000	311,000	22%

Source: World Bank and United Nations Population Division

The increasing rates of urbanisation and rural to urban migration are transforming the South Pacific and its food and water security challenges. Urbanisation rates vary widely throughout Melanesia, but there is a [clear urbanisation trend](#) across the region. Each year the urban population increases in Papua New Guinea by 2.12 per cent, Fiji by 1.43 per cent, Solomon Islands by 4.25 per cent, Vanuatu by 3.42 per cent and New Caledonia by 1.05 per cent.

In Melanesia, urbanisation has affected the long-term food security outlook. The growing trend of urbanisation has lowered the growth of agricultural production because the youth, who are the primary agricultural labour force, are increasingly migrating towards urbanised areas. The *Lowy Institute* [suggests](#) that this is occurring in PNG because the youth are increasingly searching for employment within the formal sector of cities such as Port Moresby or Lae. Similar trends are likely to be occurring across the region. The increased demand from a growing population and decreased agricultural output can potentially pose long-term food security challenges for Pacific island countries. Urbanisation also poses challenges to water security as demand for water resources will also grow.

Water, Sanitation, Hygiene, Infrastructure and Governance

There are many challenges that threaten water, sanitation and hygiene across the Melanesian region. The rapid rate of rural to urban migration has left many Melanesians

unable to afford access to housing leaving them to settle on marginal lands without formal legal titles, commonly referred to as “[informal settlements](#)”. Although there remains a lack of data, it is widely regarded that many informal settlements do not have adequate access to water, sanitation and waste management systems.

Most Melanesian cities have limited sewerage systems and the rapid growth of urban areas will likely pose serious challenges for policymakers in the near future. Rapid urbanisation and heightened population density can reduce access to sanitation facilities, which can potentially lead to degraded water quality, pollution and the outbreak of water-borne diseases. Inadequate access to sanitation facilities has also exposed waste discharge into the open environment, which can potentially contaminate groundwater resources during flooding or heavy rains.

TABLE 3.2: URBAN SANITATION ACCESS ESTIMATES FROM JMP DATA 2012

	Solomon Islands	Fiji	Vanuatu	Papua New Guinea
	Urban (%)	Urban (%)	Urban (%)	Urban (%)
Improved facilities* : human excreta hygienically separated from human contact (e.g. sewers, composting, septic, VIP)	81	92	65	56
Shared facilities : two or more households share a single facility	N/A	4	33	9
Other unimproved : bucket or hanging latrines; no sanitary platform, no effective waste containment	10	4	2	31
Open defecation : no facilities	9	0	0	4

Source: WHO/UNICEF (2014) *Progress on Drinking Water and Sanitation 2014 Update*
 Note: Solomon Islands data for “improved facilities” includes figures for “shared facilities.” Statistics separating the shared and improved facilities are unavailable.
 * WHO, and UNICEF. “Improved and Unimproved Water and Sanitation Facilities Categories.” WHO / UNICEF Joint Monitoring Programme. Accessed February 18, 2015. <http://www.wssinfo.org/definitions-methods/watsan-categories/>.

Source: World Health Organisation and UNICEF

Across Melanesia, water supply systems and infrastructure have generally been poorly maintained. Consequently, water supply pipelines have experienced non-revenue water challenges such as leakages, illegal connections and uncontrolled overflows. This inherently affects revenue collection that can contribute to the investment, development and maintenance of water infrastructure and enhancement of long-term water security. Water infrastructure is also subject to vandalism and broken, cracked or split pipes. The failure to maintain, develop and govern the water sources within Melanesia unquestionably threatens long-term water security.

Access to water resources and sanitation for the most vulnerable members of the population is also largely skewed. Low-income earners can potentially struggle to pay for connections and water utility services. In addition to this, water and sanitation services may also be strictly limited to urbanised areas, as research suggests that some services are [not readily available in informal settlements](#), largely due to the lack of formal land tenure. As a result, social inequality between the rural and urban population is also a significant factor in determining long-term water security in Melanesia.

Nutrition Transition and Non-communicable Disease

The Pacific island countries have experienced a dramatic [transformation](#) in their diets over the past several decades. Traditionally, Pacific diets included root crops, leaves, fish, coconuts and fruit. In recent decades, however, traditional diets have incorporated more meat, and imported and processed foods.

Imported foods, such as instant noodles, rice, cereals and sugar-sweetened beverages, have affected long-term food security in the South Pacific partly contributing to the [nutritional double burden](#) that the region faces – where there is a high prevalence of obesity and diabetes, mainly among the adult population, and micronutrient deficiencies, mainly among the children. The importation of meat, poultry and canned food, such as corned beef, has also contributed to the increase in meat consumption within the South Pacific.

Melanesia Nutrition Data*

	Papua New Guinea	Vanuatu	Solomon Islands	Fiji	Nauru
Overweight prevalence (%)	60.7	67.9	60.2	71.2	77.8
Obesity prevalence (%)	27.9	35.4	27.7	36.4	45.6
Adult Diabetes prevalence (%)	15.9	19.0	16.8	17.7	24.5
Stunting prevalence (%)	49.5	28.5	32.8	-	24
Wasting prevalence (%)	14.3	4.4	4.3	-	1.0

Source: Global Nutrition Report 2016 *Data for New Caledonia was not available

Agriculture, Deforestation and Land Degradation

Since the 1990s, agricultural food production per capita has decreased in most Melanesian countries due to the increasing dependency on imported foods. Despite this, the agriculture industry continues to be the main source of income and employment for many Melanesian countries, making them particularly susceptible to the effects of climate change and natural disasters.

Throughout the South Pacific, the traditional farming system of [“shift cultivation”](#) has transitioned towards the annual cropping of the same land, due to the growing population and the conversion of large-scale cash crops. Shift cultivation is a traditional farming system where land is cleared for the cultivation of crops, abandoned once the soil is exhausted, and is then recultivated once the soil regenerates. Intensive farming of the same land has

resulted in increased soil erosion, nutrient depletion, reduced yields and, consequently, a long-term reduction in food security.

The deforestation and land degradation that accompanied urban land development, commercial logging, mining and the conversion of forests to large-scale monoculture cash crops, such as sugarcane, coconuts and palm oil, has resulted in the evolution of Melanesian topography, particularly evident in the loss of rainforest coverage. These processes have the potential to weaken food and water security in the region.

In PNG, the exploitation of land through deforestation and land degradation, particularly through industrial logging, has received significant attention in recent years. According to the [University of Papua New Guinea's State of the Forests 2014 report](#), roughly 1.2 million hectares of rainforest was lost to deforestation between 2002 and 2004. In addition to this, 15 million hectares of rainforest is subject to [commercial exploitation](#) due to the issuance of Special Agricultural and Business Leases (SABL) and a flourishing industrial logging sector. The Commission of Inquiry into Special Agriculture and Business Leases investigated the issuance of SABL in 2013, and identified [widespread abuse of customary land ownership and corrupt malpractice](#), however, the government has indicated complacency in [allowing forestry exploitation](#) under the guise of "agricultural development".

The deforestation trends in Melanesian countries, particularly in PNG, potentially alter the local and regional climate through the release of carbon dioxide. The deforestation rates also pose [environmental repercussions](#) such as increased soil erosion and disturbances in water infiltration, potentially affecting agricultural production and water retention posing challenges to long-term food and water security.

Fisheries

The value of the Melanesian fishery industry's gross marine product is [estimated](#) at US\$5.4 billion dollars (\$7.08 billion) and remains at the heart of Melanesian economic and cultural activities. The main categories of the regional fishery resources are oceanic fishing (large-scale industrial fishing) and coastal fishing which includes small-scale commercial fishing (commonly referred to as "artisanal") as well as subsistence fishing. The [effects](#) of climate change will threaten the fisheries industry with trends such as increased surface ocean temperatures, rising sea levels, ocean acidification, coral bleaching, over-exploitation of fishery resources, as well as the [location and abundance](#) of fish.

The South Pacific countries are among the highest consumers of fish per capita in the world and therefore fisheries remain integral to the long-term food security of the region. According to [household survey data](#) from the UN Food and Agriculture Organisation, the highest consumer of fish per capita per year in Melanesia was Nauru at 56 kilogrammes. This was followed by the Solomon Islands with 33kg, New Caledonia with 26kg, Fiji with 21kg, Vanuatu with 20 kg and PNG with 13 kg.

The over-exploitation of the fisheries sector, particularly coastal fisheries within Melanesia, also threatens food security, as coastal communities are reportedly near or at maximum fishing capacity. The World Wildlife Fund [states](#) that growing demand, accompanied by a

growing population, will increase demand beyond the current capacity of the coastal ecosystem. Due to projected increase in demand, it is estimated that an additional 100,000 tonnes of fish will be needed by 2030 to provide for Melanesia's nutritional needs. This will be increasingly difficult with the effects of climate change threatening to alter the diversity of marine ecosystems, and the location and abundance of fish stocks.

Conclusion

The South Pacific will increasingly face challenges posed by emerging trends such as a growing and urbanising population, environmental displacement, increased demand for food and water resources, environmental degradation, the nutrition transition and the transformation of marine ecosystems and fisheries.

The effects of climate change will dramatically impact the future of the South Pacific. Although Australia has a deep level of engagement with the Melanesian region, it is in its strategic interest to further deepen the level of engagement and develop innovative initiatives that address the food and water security challenges that will unfold over the coming decades. These emerging future trends, if left unaddressed, have the potential to strain the social fabric of the Melanesian region. If it is to better ensure regional stability, Australia must engage with the multi-faceted challenges that threaten Melanesia.

Any opinions or views expressed in this paper are those of the individual author, unless stated to be those of Future Directions International.