

# Agricultural Development Means for Food Security and Sustainability in Palau

Yin Yin Nwe<sup>1</sup>, Mee Mee<sup>2</sup>, Ryo Suzuki<sup>3</sup>, Elchung Hideyos<sup>4</sup>, Christopher Kitalong<sup>5</sup>

<sup>1</sup>College of Natural and Applied Sciences, University of Guam, USA; <sup>2</sup>Cooperative Research and Extension, College of Micronesia-FSM, Kosrae, Micronesia; <sup>3</sup>Animal Care and Consultation Center Tama Branch Office, Health and Safety Division, Bureau of Public Health, Tokyo Metropolitan Government, Hino, Tokyo, Japan & Bureau of Agriculture, Ministry of Agriculture, <sup>1, 4, 5</sup>Fisheries and the Environment, Koror, Palau; Palau Community College, Koror, Palau

Correspondence: <sup>1</sup>[yinyinnwe@gmail.com](mailto:yinyinnwe@gmail.com), [mee.psu.agri@gmail.com](mailto:mee.psu.agri@gmail.com), <sup>3</sup>[oioioi1357@yahoo.co.jp](mailto:oioioi1357@yahoo.co.jp), <sup>4</sup>[ghideyos@gmail.com](mailto:ghideyos@gmail.com), <sup>5</sup>[ckitalong@gmail.com](mailto:ckitalong@gmail.com)

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## Abstract

*Agriculture in Palau plays a vital role beyond food production, supporting both social and ecological resilience in the face of climate change and global economic pressures. This paper highlights key challenges to achieving food security and suggests pathways forward. We recommend: (1) promoting climate-resilient, traditional crops like taro, cassava, and sweet potato using conservation practices; (2) investing in soil improvement and agricultural capacity building; and (3) enhancing research on sustainable agro-ecosystems, including organic recycling methods. Revitalizing traditional agriculture through these strategies can strengthen food self-sufficiency and build a healthier, more resilient Palauan community.*

**Keywords:** agriculture; climate change; food security; soil improvement; food conservation; climate resilience

## Introduction

The Republic of Palau is a small Pacific Island well known for its exceptionally rich terrestrial and marine biodiversity. Tourism is the major industry, accounting for more than 40 percent of total gross domestic product (GDP). Traditional agroforestry and taro farming with marine and swine livestock production used to play major roles in the subsistence economy but have been replaced due to import availability and the emergence of the cash economy.

Palau is located in the Micronesian region of the west Pacific Ocean, directly south of Japan, east of the Philippines, and northeast of Indonesia, covering a land area of 535 square kilometers (**Kitalong & Mason, 2021**). It stretches approximately seven hundred kilometers along a northeast-to-southwest axis and consists of more than five hundred islands (Figure 1). Only nine are inhabited, with a total population of 17,614 as of 2020 (**Republic of Palau, 2020**). The landscape of Palau is a medium to low volcanic island chain having all three island types: volcanic, limestone, and atolls (**Omae et al., 2021**). Babeldaob, the largest volcanic island, accounts for 80 percent of the total land area, covering an area of 334 km<sup>2</sup> (**Koshiba et al., 2014**). The island has a series of ridge systems that extend from north to south, which are characterized by small, narrow valley systems and coastal plains, with tidal flats and dense mangrove forests (**Phear, 2008**). The volcanic soils on the island's surface are heavily weathered and form loose, somewhat unstable hill slopes.

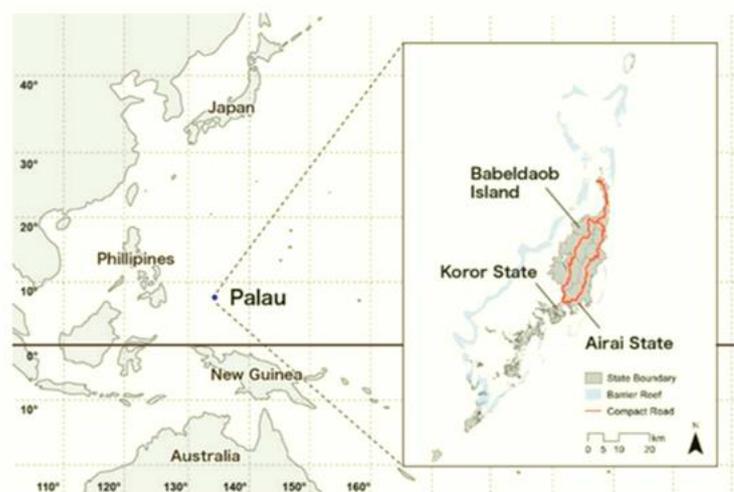


Figure 1: Location of Palau (reprinted with permission from *Iida et al., 2020*).

Palau's climate is tropical and rainy throughout the year, with an average air temperature slightly higher than 28° Celsius and annual rainfall of 3,800 millimeters, contributing to high marine and terrestrial biodiversity (Iida et al., 2020). It conserves the largest tract of tropical lowland forest in the Pacific and the highest number of endemic species per area in Micronesia, with over 1,389 species of plants, including 802 native and at least 150 endemic plant species, as well as 130 types of fungi, an estimated 5,000 species of insects, 92 kinds of snails, 46 species of reptiles and amphibians, 47 species of freshwater fish, as well as 141 species of birds, 400 types of coral reefs and 1200 species of reef fish (Golbuu et al., 2005, Iida et al., 2020, Kitalong et al., 2008). The reef systems of Palau are considered the richest in the Pacific, with the highest species diversity (Phear, 2008). Palau's vegetation comprises a diverse range of types, including mangroves, swamp forests, interior volcanic forests, savannahs and grasslands, limestone forests, strand vegetation, ravine and riparian forests, as well as homestead and agricultural vegetation (Kitalong et al., 2021).

Despite its richness in biodiversity, Palau's food sovereignty is vulnerable, relying heavily on imported food, accounting for over 85 percent of all consumption. Revitalizing agriculture while coping with sound ecosystem conservation is a major developmental challenge. Agriculture, fisheries, and livestock sectors have been encouraged at the national level to improve local food production. Although the largest island, Babeldaob, has available land area with the potential to increase productivity, only 6.6 percent of it is suitable for crop production. Most upland soils of the Babeldaob are acidic, high in red clay and aluminum contents, and not recommended for commercial crop production. Proper soil amendments and erosion controls are necessary to reduce the risks of ecosystem degradation.

Although taro farming is still culturally important, taro production is decreasing. Traditional wetland taro patches (*mesei*) are well-established in lowland areas where the soil is rich, on flatland alongside the coastal area before mangroves. These are threatened by sea level rise and storm surges, accelerating saltwater intrusion, and damage due to global climate change issues. Increased upland taro farming (*sers*) is a favorable option with proper soil erosion control. Past land-use practices had led to a reduction in forested areas on Babeldaob. During the Japanese era (1921–1947), unmitigated farming and mining practices led to a decrease in the forested areas from 74 to 60 percent.

The Pacific region, including Palau, has been integrated into global trade since the 1970s, bringing benefits for information, education, and health, although small island countries have negative trade balances (**Georgeou et al., 2022**). Heavy dependence on the global market has threatened food security and sustainability. The COVID-19 pandemic has seriously affected the Palauan economy, which mainly relies on tourism, reminding them of the importance of developing domestic agriculture (**Republic of Palau, 2022**). Revitalizing agriculture while maintaining sound ecosystem conservation is a key development challenge in efforts to enhance food security.

In Palau, agriculture has been prioritized within the framework of the United Nations' Sustainable Development Goals (**Republic of Palau, 2019**). Additionally, the 2021 Food Systems Dialogues identified 'Increasing production' as a top priority for improving food security and achieving an optimal diet (**Republic of Palau, 2021**). This review covers Palau's economic context, historical land use, the impacts of climate change, and the role of agriculture—particularly taro farming—in advancing strategies to revitalize agriculture and strengthen food security. It proposes that improving the traditional farming systems of food crops can strengthen resilience to climate change. At the national level, revitalizing agriculture based on traditional knowledge and adaptation strategies, soil quality improvement, capacity building, and investment in soil laboratory development other and research and development sectors could all contribute to a more resilient and healthy community in Palau.

### **The Role of Agriculture and Taro Farming**

Agriculture is vital in Pacific Island countries as a source of livelihood and food for their communities (**Iese et al., 2020**). Since the Inter-independence Compact Agreement with the United States of America of 1994 (ICA), major economic activities in Palau have focused on tourism. The country's per-capita income has since become one of the highest in the region (**Iese et al., 2020; Iida et al., 2020**). On the other hand, agricultural production in Palau has been growing very slowly.

Traditional Palauan agriculture runs on a sustainable agroforestry system, utilizing multi-story or forest farming. Agroforestry combines agriculture and forestry technologies to create more integrated,

diverse, productive, profitable, healthy, and sustainable land-use systems (USDA, 2019). The agroforestry system in Palau integrates fruit and forest trees with major staple crops such as taro, cassava, and sweet potato. It also incorporates a variety of vegetables, including eggplant, okra, bitter melon, cucumber, and mustard, along with medicinal and ornamental plants. Traditionally, agroforestry systems in Palau were integrated with coastal components and managed under an agroecological approach. Preparing taro patch fertilizers out of weeds and mulching with leaves of banana and others around the taro patch keeps the soil rich and the marine ecosystem healthy (Koshiba et al., 2014). Traditional taro patches located on natural wetlands are reportedly able to trap on average 90 percent of sediment, therefore sheltering coastal coral reefs and their fisheries from the negative impacts of terrestrial runoff (Koshiba et al., 2014). Taro patches are mostly distributed in areas that are less than ten meters in elevation, within one kilometer from seawater, and on slopes below 3 percent (Yamada et al., 2018).

For over two thousand years, Palauans have sustained their islands through environmental changes as well as societal development using flexible survival strategies (Koshiba et al., 2014). Rational adaptation, persistence of wealth-exchange customs, and competition characterize Palauan society. They have adapted to a century of colonial intrusion by the Spanish, German, Japanese, and Americans (Iese et al., 2020). The village structure and food (culture) can be assumed as the basis of their resilient adaptation strategies.



*Figure 2: Traditional Palauan village in the early twentieth century, illustrating the taro patch at its centre (courtesy of the Bureau of Arts & Culture, Palau).*

The traditional village structure is based on interconnected ridge-to-reef ecosystems, combining terrestrial and marine ecosystems (**lida et al., 2020**), securing the main supply of starch from taro fields and protein from reef fish. The traditional Palauan village of the early twentieth century (pictured in an illustration by Palauan artist Ado Imetuker in Figure 2) highlights the cultural significance of taro (**lida et al., 2020**) with the taro patch at its centre.

The structure of the taro field (*mesei*) as first laid down by the Palauan ancestors, mostly after about 900 to 1100 CE, was presumably the culmination of accelerated erosion in the island's interior following extensive clearing of the vegetation on slopes (**Koshiba et al., 2014**). Although *Cyrtosperma* (giant yellow taro) and *Colocasia* (purple taro) are both grown and eaten quite often, *Colocasia* has a special meaning, found in many aspects of Palauan cultural practices (funerals, first birth ceremonies, transfer of title ceremonies) and used symbolically in chants, dances, proverbs, and stories with moral lessons (**Koshiba et al., 2014**). However, land use changes and intensive cultivation have both increased resulting in traditional taro patches being abandoned (**Koshiba et al., 2014**) (Figure 4). The promotion of continued use of taro farming has the dual benefit of providing food security as well as buffering coral reefs from the impacts of soil erosion (**Koshiba et al., 2014**).

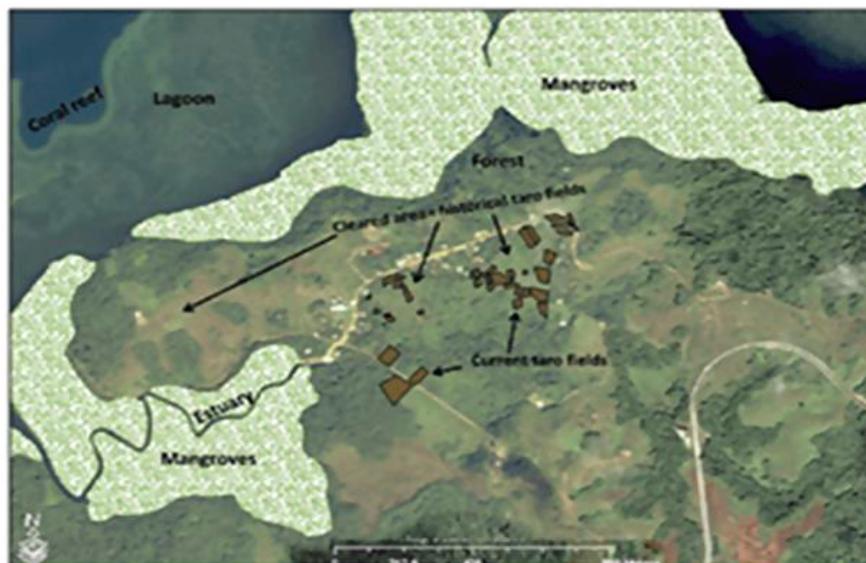


Figure 4: A satellite photograph of the coastline in Ngardmau State, on the western part of Babeldaob Island, showing both the current taro fields and the abandoned historical taro fields that were constructed in the lowland forested floodplain (**Koshiba et al., 2014**, used with permission).

## **The Palauan Economy**

Palau, being a small island country, faces several sustainable development challenges, including low resource availability, geographic isolation, high exposure to hazards, excessive dependence on imports, and (over) susceptibility to global trade (**Filho et al., 2021**). The government is the country's largest employer, with approximately 30 percent of the workforce, and in 2021 the GDP was approximately \$14,243 per capita (**USDS, 2022**). Agriculture is the main source of income for just three percent of households, with the other sources being government employment (29 percent), tourism (18 percent), the service industry (28 percent), and construction (11 percent) (**USDS, 2014**).

Palau remains highly reliant on development assistance, particularly budget support and special funds from the United States, under the Compact of Free Association agreement between the US and Palau. It receives additional aid from Australia, Japan, Taiwan, and international organizations such as the World Bank and the Asian Development Bank (ADB) (**ADB, 2017; ADB, 2024; USDS, 2022**).

Heavy reliance on imports, combined with a limited export base and production capacity of Palau make it highly vulnerable to external shocks (**USDS, 2022**). The primary economic challenge for Palau is to ensure long-term viability by reducing its dependence on foreign assistance (**USDS, 2015**) and ensuring an adequate supply of food and crops. To sustain Palau's economy, it is essential to maintain a proper balance among the domestic market, subsistence agriculture, and fisheries.

## **History of Land Use**

Palau's history of land cultivation started with taro (*Cyrtosperma merkusii*) more than three thousand years ago (**Liston, 2008; Athens and Ward, 2002**). Early settlers transformed the landscape of Babeldaob from forest to terraced fields, taro fields, and vast savannah (**Welch, 2008**). The interior of Babeldaob was heavily altered by human activity during the Earthworks Era, which is believed to have occurred around 3100–2400 BP (Before Present, which indicates before 1950 CE), when hills and terraces cover around 20 percent of the island were artificially constructed (**Koshiba et al., 2014**). The first sign of disturbance indicators is proposed to mark swidden agriculture activities (e.g., burning), followed by a

decline in indicators from 3000 to 2700 BP, which is seen to represent a shift from extensive to intensive agriculture through terrace construction done to keep up with population growth (**Phear, 2008**).

The Palauan landscape has been continuously altered by political, socioeconomic, cultural, and demographic changes. For example, vast areas of the landscape were disturbed and altered by the establishment of coconut plantations and trading posts during the 1800s (**Hezel & Berg, 1979**) and in the German era from 1899 to 1919 (**Spennemann, 1999**). The unmitigated exploitation of commercial agriculture, mining, and fishing peaked during the Japanese period from 1921 to 1947, which reduced total non-mangrove forest cover by 16 percent (**Peattie, 1988; Dendy et al., 2022**). By 1940, four plantation villages cultivating pineapples and cassavas of 2,236 hectares, and two bauxite mining sites of 106 hectares, were the biggest industries of Babeldaob Island (**Iida et al., 2011**). From 1947 to 2006, almost forty square kilometers of deforested area was reforested, but more than thirty square kilometers remained as grass or bare land (**Iida et al., 2011**). Those lands are currently used for infrastructure development, homes, and agriculture. As a result of urbanization, eroded soil has reached the ocean, decreasing coral cover by forty percent over a decade (**Omae et al., 2021**).

### **Palau and Climate Change**

The Pacific Island region accounts for only 0.03 percent of the world's total greenhouse gas emissions but is one of the regions that is facing the greatest impacts of climate change. These include rising sea levels, warming oceans, drought, coral ecosystem destruction, ocean acidification, and extreme weather (**Kumar et al., 2020**). In the 1990s, the cost of extreme weather events in the Pacific Island region is estimated to have exceeded US\$1 billion (**FAO, 2008**). As a Small Island Developing State (SIDS), Palau is included among the countries most vulnerable to climate change, owing to its smaller size, insularity, and remoteness (**Kumar et al., 2020; Republic of Palau, 2015; Saleem et al., 2024**). Climate-related disasters adversely affect food systems, particularly fisheries and agriculture, as well as freshwater availability, tourism, coastal infrastructure, and buildings (**Godde et al., 2021; Thornton, 2010**).

Sea-level rise poses a significant threat to SIDS, as people, assets, and infrastructure are highly concentrated in coastal zones (**Martyr-Koller et al., 2021**). Palau's buildings and infrastructure are scattered along the coastal fringe, and a substantial proportion of the

population lives near the sea: almost 60 percent of residents are located within approximately five hundred meters of the coastline, 16 percent within one hundred meters, and 7 percent live within fifty meters (**Kumar et al., 2020**). This emphasizes how important it is for Palau's population to be able to adapt to future coastal hazards, which could require community relocation (**Kumar et al., 2020**).

Extreme weather can influence the timing of reproduction in plants and animals, animal migration, length of cropping seasons, distribution of species, population sizes, and availability of food species. It also impacts natural indicators that Palauans have used for generations as signals of fishing and hunting seasons for specific species. Rising sea levels and storm surges, which cause saltwater inundation, intrusion, and salt spray, are contributing to the decline of coastal agricultural land, especially in atolls (**Kumar et al., 2020; Saleem et al., 2024**). Water and soil salinity in atolls and coastal areas will increase with rising sea levels, and the risks to food security will grow due to reduced land area and soil degradation caused by inappropriate ecosystem management practices.

During Typhoon Surigae in 2021, an estimated 1,500 houses were damaged and 150 were destroyed (**IFRC, 2022**). Saltwater inundation also damaged the rainwater system in Kayangel (**IFRC, 2022**), and landslides were observed on Babeldaob Island. Changing weather patterns and warming temperatures can contribute to shifting pests, diseases, and weed distribution and increase stress on key pollinator species (**Godde et al., 2021; Subedi et al., 2023**). Elevated carbon dioxide can increase yields but won't benefit all crops equally (**Godde et al., 2021**). Drought impacts feed supplies, posing a risk to livestock retention, while increased prevalence of pests and diseases will affect livestock negatively (**Godde et al., 2021**). Temperature changes can affect fisheries by changing the habitats and migration ranges of many aquatic creatures (**Brierley & Kingsford, 2009**).

In adapting to climate change, large uncertainties remain, and consequently, adaptation choices based on traditional knowledge and centered on soil health will need to account for a wide range of possible futures (**Godde et al., 2021; Iese et al., 2020**). In these circumstances, it is highly recommended to use the systems approach, which focuses on soil health and water availability, as well as how farming management techniques, climate parameters, and other biological and human impacts affect the balance of the system (**Iese et al., 2020**).

## Revitalizing Agriculture

### *Soil*

Revitalizing agriculture while balancing ecosystem conservation is a major development challenge in Palau (**Republic of Palau, 2016**). Agriculture is a sector that stretches from the ridge to the reefs— involving different formal and informal sectors, different land tenure systems, diverse ecosystems, and different regional and international development partners (**Iese et al., 2020**). Palau is challenged with limited land areas, poor soils, and large distances between islands. According to soil taxonomy, major soil types in most vegetation areas of Palau belong to Entisols, Histosols, Inceptisols, Oxisols, and Ultisols, which differentiate between mineral soils and organic soils. Palau's landscape and diverse soil types play a vital role in sustaining crop and livestock production. A combination of traditional knowledge and scientific research guides agricultural development in the country.

Increased development activity and agriculture without soil erosion mitigation by land use of foreign occupancy in Palau have resulted in increased acidification of the soil and loss of arable topsoil (**Kitalong & Mason, 2021**). The most effective way to revitalize agriculture is by building resilience through the integration of traditional production systems (**Government of Tonga, 2016**). Almost all agricultural systems in Palau are rain-fed, making them highly vulnerable to variations in rainfall. The lands of Babeldaob are characterized by steep slopes and highly erodible volcanic soils, making them particularly vulnerable to heavy rainfall, which contributes to the degradation of soil quality (**Koshiba et al., 2013**). Taro patches are located close to coastal areas where they are vulnerable to saltwater inundation and intrusion. Ongoing pressure from population growth, urbanization, and infrastructure development reduces the land available for agriculture. Increasing incidences of pests, diseases, and the introduction of invasive species also contribute to the vulnerability of Pacific agricultural systems (**Sisifa et al., 2016**).

Soil is the foundation of crop production, and soil health is very important for the resilience of agricultural systems (**Iese et al., 2020**). Conventional/full tillage and current industrial agricultural practices can cause rapid loss of organic matter, biological fertility, and resilience of soil, leading to a high potential for soil degradation and a decline in environmental quality (**Nwe et al., 2021**). To

revitalize its agricultural sector, Palau is strongly encouraged to adopt Conservation Agriculture (CA) practices, which involve minimal soil disturbance, permanent soil cover through mulching, and diverse crop rotations (**Nwe et al., 2021**).

#### *Labor*

Labor scarcity presents a significant obstacle to the revitalization of agriculture in Palau. As of 2020, less than six percent of the labor force was employed in the agricultural sector (**Government of Palau, 2020**). Traditionally, farm labor has been performed by women. However, changing lifestyles have shifted 92.4 percent of women into the service sector. While some female farm owners continue to engage in subsistence and semi-commercial taro farming, they rely on foreign labor to sustain production (**Government of Palau, 2008**).

Despite a low national unemployment rate (0.8 percent), youth unemployment remains a concern at 3.3 percent. Similar to other Pacific Island nations, this disparity is driven by limited attractive employment opportunities, skills mismatches, and inadequate job readiness of youth (**ILO, 2017**). Addressing youth unemployment through targeted capacity-building programs offers potential to fill critical gaps in the agricultural workforce.

Migration also significantly affects Palau's domestic labor market. The country has one of the highest migrant-to-native population ratios globally. In 2020, 2,656 Palauans were living abroad, primarily in the United States, under the Compact of Free Association, with remittances contributing 0.9 percent to national GDP (**ILO, 2017**). To address these labor challenges, national strategies should prioritize youth-focused agricultural training, promotion of low-labor-demand crops, and small-scale partial mechanization to reduce farm workloads. These measures would help improve agricultural productivity while reducing reliance on external labor.

#### *Budget Allocation*

Limited budget allocation by the government to the agriculture sector is a challenge in the development of a resilient agricultural system in Palau. Although one of the government's goals for achieving sustainable agriculture is to triple agricultural production—including fruit trees, livestock, root crops, and vegetables—only 2.9 percent of the total executive national budget is allocated to the Ministry of Agriculture, Fisheries, and the Environment (MAFE) (**Republic of Palau, 2023**). It is obvious that such a limited budget

allocation will not be sufficient to achieve this. Resources for the implementation of national agriculture policies mainly come from development partners in the Pacific Island countries (**Iese et al., 2020**). Investment in technologies such as soil laboratory development, crop models, geographic information system (GIS), remote sensing tools, and resilient cropping systems continues to be a challenge.

### **Agriculture and Food Security**

Traditionally, root crops play a major role in the Palauan diet. But in Pacific Island societies, as is the case in many parts of the world, food not only fulfills a biological function; it also represents a variety of social, cultural, and spiritual values (**Connell, 2020**). Agriculture is an important sector for sustaining culture and maintaining social bonds and practices (**Iese et al., 2020**). High-value cultural items are exchanged during weddings, funerals, ceremonies for forgiveness, and marriage proposals (**Iese et al., 2020**). These items are raw and processed agricultural products such as fine mats, tapa, root crops, pigs, betel nuts, and handicrafts (**Iese et al., 2020**). In Palau, a staple carbohydrate, purple taro, as well as specific species of fish, turtle, and pigs, have special status. While subsistence agroforestry is a traditional farming system, the increasing abandonment of traditional wetland taro patches indicate that current agricultural production is below the self-sufficiency line (**Koshiba et al., 2014; Nwe et al., 2021**).

After trade liberalization in the mid-1990s, Palau experienced a surge of cheap food imports, making local production more vulnerable and marginal (**Connell, 2020**). Subsistence agriculture has almost disappeared from some Micronesian islands; as populations have become more urban, agricultural work offers fewer attractions (especially to youth). Other stumbling blocks to agriculture include the conversion of land, an ageing farmer population, inadequate prices and weak marketing infrastructure, 'parcelization' of land into tiny plots through inheritance, 'modern' education and higher wages in other sectors (**Connell, 2020**). Food security has long been identified as a special sustainability challenge in the Pacific Islands due to natural, topographical, social, environmental, political, and economic constraints. Globalization has brought nutrient-poor imported foods that have driven an increase in non-communicable diseases (NCDs) in Pacific communities (**Cauchi et al., 2021**).

Palau has one of the highest urbanization rates in the Pacific, with 78 percent of the population residing in the urban area (Mason et al., 2020). This population shift caused an increase in rural poverty, primarily due to urban migration, which resulted in less manpower for farming and, thus, less food production (FAO, 2008). Although various challenges prevail, Palau is trying to increase domestic food products, extending the tourism sector to substitute imported foods with sustainable farming. Most of the farms are managed by family labor, producing food commodities from taro, sweet potato, cassava, and some fruits. These farms mainly exist along the coastal areas where the soil is rich in nutrients. Mulch agroforestry farms, in combination with diverse agriculture and livestock, are still active in several areas of the villages of Babeldaob Island (Iida, 2011). For future agricultural development, the land of Babeldaob has been classified into categories based on topography (especially slope), soil productivity, and current land use (Kikuchi, 2021, see Table 1).

Category	Area (ha)	Share (%)	Description	Slope (%)	Depth of soil with organic matter above 1% (cm)	Current land use
1	2,476	6.6	Recommendable for agriculture	< 12	≥ 30	Non-forested*
2	1,141	3.1	Recommendable for agriculture with attention to soil erosion	12-30	≥ 30	Non-forested*
3	2,488	6.7	Soil amendment required for agriculture	< 30	< 30	Non-forested*
4	11,197	30.1	Recommendable for agroforestry with attention to deforestation	< 30	≥ 30	Forested
5-1	19,069	51.2	Non-recommendable for agriculture	≥ 30	-	-
5-2				< 30	< 30	Forested
6	210	0.6	Others	-	-	Mines, urban lands

*Table 1. Surface area descriptions and shares of each land category for agricultural development in Babeldaob Island, Palau (reprinted with permission)*

In order to support the development of the agriculture and aquaculture sectors, the Palau Community College (PCC) established both a research and development (R&D) station and a multi-species hatchery. In the R&D station, research on plant tissue culture, germplasm conservation of root crops, and integrated pest management has been conducted. In the 1970s, the Palau Mariculture Centre, later renamed the Palau Mariculture Demonstration Center (PMDC), established giant-clam farming techniques with ongoing technical and financial support from international partners (Republic of Palau, 2016).

A major constraint for agricultural production in Palau is its poor volcanic soil. The creation, commercialization, and widespread application of low-cost, locally produced soil amendments could improve soil quality. The local biomass sources, such as green waste, food scraps/kitchen waste, and woody/carbonaceous waste, are inputs for the local production of high-quality aerobic composts, anaerobic 'Bokashi' composts, pyrogenous carbon/biochar, and liquid fertilizers/bio-stimulants. The limestones and coral sand are readily available sources of calcium and an important amendment for buffering acidic soils commonly found in Palau.

Aquaculture waste can be upcycled through aerobic conversion into high-quality liquid fertilizers enriched with nitrogen sources. Seaweed, macroalgae, Azolla, poultry manure, composted poultry manure, feathers, and eggshells can provide balanced nutrition and organic matter to plants, as they contain all the essential nutrients required for crop production. Municipal carbon sources—such as untreated cardboard and paper—can serve as valuable inputs for aerobic composting, acting both as a carbon source and a bulking agent. This is especially important for very acidic, red iron and aluminum rich Oxisols, the dominant soil type in Palau, which are typically low in organic carbon. Incorporating carbon-rich materials into compost helps balance the carbon-to-nitrogen ratio, which enhances microbial activity and accelerates decomposition. In turn, this process improves the quality of compost and contributes to increased organic soil matter and overall soil fertility.

To address the constraints discussed above, Palau's traditional farming system with multi-story agroforestry offers a promising model. This system incorporates wetland taro cultivation, mixed tree gardening, and backyard gardening—practices that align closely with the Sustainable Development Goals. Traditional taro patches, for instance, can retain up to 90 percent of sediment, thereby playing a crucial role in safeguarding Palau's coral reefs (**Koshiba et al., 2014**). In addition, diverse crop rotations help ensure a resilient food supply and mitigate environmental and natural resource degradation, while drawing on local ecological knowledge to support sustainable practices. Effective soil management under this integrated system can boost the productivity of traditional nutrient-rich root crops and foods, thereby enhancing food security.

## **Conclusion**

The major role of agriculture in Palau is not only to provide food but also to facilitate social and ecosystem services and achieve a resilient community to adapt to global economic developments and climate change. In this paper we have given an overview of some of the major challenges that Palau is facing in trying to gain more food security and better food self-sufficiency in these times of climate change. We have also given some indications of where solutions might be sought. These include the production of traditional crops (taro, cassava, sweet potato), which are a good agronomic fit with the environment, within traditional farming systems and conservation techniques. Secondly, a reliable approach and investment structure for improving soil quality and developing capacity in agriculture is necessary.

Finally, we recommend enhancing research on sustainable agro-ecosystems, including organic recycling methods, and the application of organic residues and animal waste. We argue that if these recommendations are followed, more food would be generated, and ecosystems would be reasonably better conserved. In short, we propose that the promotion of revitalizing agriculture at the national level—based on traditional knowledge and adaptation strategies, soil quality improvement, capacity building, national-level investment in soil laboratory development, and increased R&D—could lead to a more resilient and healthy community in Palau.

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Dr Yin Yin Nwe is an agronomist and horticulturist from Myanmar. She earned her PhD in Biological Production Sciences from Tokyo University of Agriculture and Technology in 2012. Currently she serves as a research scholar and adjunct faculty member at the College of Natural and Applied Sciences, University of Guam. Her research interests include crop improvement, soil revitalization, and workload management in agriculture, with a focus on sustainable practices and productivity enhancement in tropical and island farming systems.



Mee Mee is an agronomy researcher at the College of Micronesia-FSM. She earned her MSc in Agricultural Development from Prince of Songkla University, Thailand, in 2020. Her research focuses on agricultural development, food security, crop diversification, plant propagation, and farming systems. She is currently engaged in research on plant propagation and crop diversification to enhance local crop production, food security, and sustainable agricultural systems for island communities.



Ryo Suzuki is a Master of Epidemiology candidate at the School of Public Health, University of Queensland, Australia. He previously worked as a veterinarian for Palau's Bureau of Agriculture, Ministry of Agriculture, Fisheries, and the Environment. His research interests include infectious disease epidemiology, One Health, and global health systems. He is particularly interested in translating epidemiological evidence into policy and practice in international and resource-limited settings.



Elchung Gladys Hideyos is a researcher at Palau Community College and a PhD student at Kindai University's Graduate School of Agriculture in Nara, Japan. She earned her Bachelor of Science in Environmental Studies from Chaminade University of Honolulu in 2018 and her Master of Science in Global Environmental Studies from Sophia University, Tokyo in 2021. Her research advances food security and climate resilience in Small Island Developing States (SIDS) by integrating Indigenous Palauan knowledge with science, emphasizing natural resource management, community-based research, environmental education, and culturally grounded solutions.



Dr Christopher U. Kitalong is a researcher and educator advancing sustainable development and health in the Pacific. He earned a Bachelor of Science from the University of Notre Dame (2002), a Master of Science from Toyama Medical and Pharmaceutical University (2007), and a PhD from the Graduate Center, City University of New York (2014). He serves as Vice President of Cooperative Research and Extension at Palau Community College and also holds affiliations with Oregon State University and the University of Guam. His work integrates ethnobotany and pharmacology to address diabetes, obesity, food security, and agricultural resilience in the Pacific.



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