

Climate and Food (In)Security in Micronesia: Do Traditional Food Crops Hold Answers?

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Climate-food-health Nexus in the Pacific

“All we have to do is throw it into the cooker and it is ready.” This is the common refrain from most women on the island of Pohnpei when asked why they prefer rice to any other starch. In a country that is rich in demonstrably healthier starches like taro and breadfruit, rice dominates the Micronesian plate even if all these other starches are available aplenty. In a country that does not produce any rice of its own, people seem to relish it.

Rice was first introduced to the Federated States of Micronesia (FSM) in the 1940s by the occupying Japanese forces.¹ Rice received a significant push in the 1960s and ‘70s, when the USA, while governing the FSM as part of the Trust Territories of the Pacific Islands, supported the Supplementary Feeding Program across Micronesia.² As part of this program, the

USA supplied surplus agricultural commodities including rice and tinned foods like spam. Together with the Japanese occupation, this program profoundly shaped the food habits of the people of the FSM. One of the results of the dependence on rice is the high incidence of non-communicable diseases like obesity and type-2 diabetes across the FSM.^{3 4} Studies show that the FSM has one of the highest rates of obesity in the world as a percentage of total population.⁵ Climate change is likely to both increase the dependence on rice and threaten its supply, thereby jeopardizing the long-term food security of the island nation.

In this paper, we examine the pathways through which climate change impacts food security in the FSM. We then posit that traditional food crops may have answers to the brewing food security crisis in the country and discuss ways to revive the consumption of these crops.

¹ Engelberger, L, Marks, Geoffrey C, and Fitzgerald, Maureen, H. (2002). Insights on food and nutrition in the Federated States of Micronesia: a review of the literature. *Public Health Nutrition*. DOI: 10.1079/PHN2002364.

² Engelberger, et.al (2002).

³ Connell, J. (2015). Food security in the island Pacific: Is Micronesia as far away as ever? *Regional Environmental Change*, 15(7), 1299–1311. <https://doi.org/10.1007/s10113-014-0696-7>.

⁴ Swinburn, B. (2020). The Obesity and Climate Change Nexus. In *Obesity* (Vol. 28, Issue 1, p. 8). Blackwell Publishing Inc. <https://doi.org/10.1002/oby.22708>.

⁵ Govt. of the FSM. (2023). The FSM Nutrition Action Plan (2023-2033). *Department of Health and Social Affairs, FSM National Government*.

Climate Change Undermines Food Security

It is predicted that climate change will undermine the food security of the FSM, and of several other countries across the Pacific. First, climate change is expected to result in an increase in the occurrence of extreme rainfall and tropical cyclones (TCs) which are in turn expected to trigger landslides, thus damaging standing crops. Second, the growing CO₂ emissions into the atmosphere are exacerbating ocean acidification.⁶ Ocean acidification accelerates coral bleaching, in turn destroying coral-reef ecosystems which are important fishing grounds, including in countries like the FSM, thus undermining one of the mainstays of the Micronesian diet. Third, climate change is expected to cause sea-level rise (SLR). States of the FSM like Chuuk and Yap, and several outer islands of the other states, are especially vulnerable to rising sea levels, as evidenced by the spike in the number of high-water hours, due to climate change.⁷ This is expected to increase the incidence of coastal flooding and of the

incursion of seawater into agricultural lands, rendering those lands uncultivable,⁸ at least for a duration.⁹ Such incursions are also expected to pollute groundwater resources. But the biggest threat to the food security of the FSM emanates far away from its shores, in the rice-producing parts of the world.

The average Micronesian consumes about 84 kilograms of rice in a year,¹⁰ with about 96% of the population having it at least thrice in a week.¹¹ But the country hardly produces any rice of its own and imports every grain that it consumes. The FSM imported 1.2 million kilograms of rice in 2023, mostly from the USA, China, Japan, and Singapore.¹² In the 23-year period between 1995 and 2018, the total rice imports of the FSM went up by over 50%.¹³ This heavy dependence on rice poses a serious threat to the long-term food security of the FSM's population. Evidence indicates that changes in temperature and rainfall patterns are likely to depress the global rice production, including in the regions mentioned above,¹⁴ by as much as

⁶ Grecni, Z., Bryson, C., & Chugen, E. (2023). *Climate Change in the Federated States of Micronesia: Indicators & Considerations for Key Sectors*. <https://doi.org/10.5281/zenodo.8125584>.

⁷ Grecni, Bryson, and Chugen, 2023.

⁸ Widlansky, M. J., Timmermann, A., & Cai, W. (2015). Future extreme sea level seesaws in the tropical Pacific. *Science Advances*, 1(8). <https://doi.org/10.1126/sciadv.1500560>.

⁹ ICCAI. (2011). Current and future climate of the FSM. *Pacific Climate Science Program, Australian Government*. [chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.pacificclimatechangescience.org/wp-content/uploads/2013/06/7_PACCSAP-FSM-11pp_WEB.pdf](https://www.pacificclimatechangescience.org/wp-content/uploads/2013/06/7_PACCSAP-FSM-11pp_WEB.pdf).

¹⁰ World Population Review. (2024). Rice Consumption by Country. <https://worldpopulationreview.com/country-rankings/rice-consumption-by-country>.

¹¹ Corsi, A., et.al. (2008). A participatory assessment of dietary patterns and food behavior in Pohnpei, Federated States of Micronesia. *Asia Pacific Journal of Clinical Nutrition*.

¹² World Integrated Trade Solutions. (2018). Rice exports to Micronesia. Sts. In 2018. <https://wits.worldbank.org/trade/comtrade/en/country/All/year/2018/tradeflow/Exports/partner/FSM/product/1006>

¹³ Brewer, TD, et.al. (2023). The role of trade in pacific food security and nutrition. *Global Food Security*. <https://doi.org/10.1016/j.gfs.2022.100670>.

¹⁴ Palanisami, K., Kakumanu, K. R., Nagothu, U. S., & Ranganathan, C. R. (2019). *Climate Change and Future Rice Production in India: A Cross Country Study of Major Rice Growing States of India*. Springer. <https://doi.org/10.1007/978-981-13-8363-2>.

4.2%.¹⁵ It is expected that such a disruption to the rice production will trigger inflation in its price, in turn making it challenging for countries like the FSM, with small economies, to afford the additional import bill. It could also trigger food price inflation within these countries. In a predominantly rice-eating country like the FSM, such inflation can jeopardize the people's ability to access food. The threat of food inflation comes on top of the other challenges to food security that climate change poses in the FSM. At the same time as SLR and ocean acidification combine to undermine fish availability and reduce the availability of arable land, the people of the FSM are likely to increase their dependence on imported rice. However, simultaneously, climate change is likely to make rice more expensive.

Traditional Starches: A Way Forward?

We have demonstrated that dependence on rice is likely to be detrimental to the long-term food security of the people in the FSM. The solution might lie closer to home in the various traditional crops like swamp taro, breadfruit, and bananas. These crops have been shown to be significantly more nutritious than rice. For instance, swamp taro has 2930-4486µg/100g of beta carotene, which is significantly higher than that of rice. It also has significant quantities of calcium and fiber. The Island Food Community of Pohnpei (IFCP) has been striving to revive the consumption of these traditional crops for nearly sixteen years. But they face significant barriers in their efforts. It is far easier to access rice than these other

traditional crops. In most of the FSM, rice is available in a neighborhood store. Swamp taro on the other hand would have to be harvested from a taro patch that may not always be located close to one's home (see Figure 1). Further, cooking crops like swamp taro is a time-consuming process. The giant corm of swamp taro, sometimes weighing as much as 20 kilograms (see Figure 2) needs to be cut up into smaller chunks and cooked for a long time before it is ready to be eaten. On the other hand, one only needs to rinse the rice and throw it into a rice cooker before it is ready.



Figure 1. Giant swamp taro plants with the distinct broad leaves.

¹⁵ Bezner Kerr, R., et.al. 2022: Food, Fibre, and Other Ecosystem Products. In: Climate Change 2022: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [H.-O. Pörtner, D.C. Roberts, M. Tignor, E.S. Poloczanska, K. Mintenbeck, A. Alegría, M. Craig, S. Langsdorf, S. Löschke, V. Möller, A. Okem, B. Rama (eds.)]. Cambridge University Press, Cambridge, UK and New York, NY, USA, pp. 713–906, doi:10.1017/9781009325844.007.



Figure 2. Giant swamp taro corm.

In the FSM, women traditionally perform the task of cooking within a household. But as more and more women enter the labor market rice becomes a preferred option because of the ease and speed with which it can be cooked, relative to other traditional crops in the FSM.

Lastly, the food culture of the FSM is imbued with rice and other processed foods. Successive generations have grown used to eating these foods and are reluctant to give them up for health considerations. To overcome these barriers and encourage the sustained consumption of these traditional crops, the IFCP has been experimenting by turning them into flours. Swamp taro, for instance, is shredded and sundried before being milled into a fine flour which can then be used to bake bread and other products.

The IFCP along with the East-West Center, Honolulu, is systematically studying the barriers and enablers to the steady uptake of these flours. The results from this study could inform the food policies of the FSM and beyond.