



THE NATIONAL  
RESEARCH INSTITUTE  
PAPUA NEW GUINEA

# SPOTLIGHT

## THE NEED TO ADOPT CLIMATE SMART AGRICULTURE PRACTICES TO PROMOTE FOOD SECURITY IN PAPUA NEW GUINEA

Joe Barak

Volume 16, Issue 15  
[www.pngnri.org](http://www.pngnri.org)

### Key Points

- Despite the recognition of the importance of adopting Climate Smart Agriculture (CSA) practices in Papua New Guinea, there are inherent challenges continue to impact the agriculture sector.
- The adverse impacts of climate change have implications for food security in both the rural farming and urban communities.
- Lack of awareness on both climate adaptation information and available technology is the major impediment to our rural famers.
- CSA practices increase agricultural productivity and build resilience to climate change risks in smallholder farming communities.
- Adopting traditional climate resilient crops are the means to address food security.

inquire  
inform  
influence

October 2023



## THE NEED TO ADOPT CLIMATE SMART AGRICULTURE PRACTICES TO PROMOTE FOOD SECURITY IN PAPUA NEW GUINEA

By Joe Barak

The adverse impacts of climate change on the agriculture sector for rural household farmers is a concern for food security in Papua New Guinea (PNG). Projected changes in rainfall and temperature suggest that PNG will face extreme weather changes with hotter days, long dry and wet seasons ahead (Bourke, 2018). Higher temperatures will likely result in more heat stress with associated crop pests and post-harvest losses, affecting the yields of important rural household staples which in turn have implications on food security. The latter in this instance takes into consideration food shortages, loss of income and imbalances in dietary intakes particularly due to the reduction in crop production.

According to Schmidt et al. (2018), their study has indicated that a positive relationship exists between farm production diversity and consumer dietary diversity. In other words, the more crops farmers produce, the more food they have for their own consumption and the more food they can sell for income to purchase food and other essentials. In light of this, climate change impacts will have multiple implications for local markets and food supplies, representing a challenge for food security for many communities, and especially for low-income consumers and vulnerable population groups (Rahaman et al., 2019). Food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life (World Food Summit, 1996).

In the context of PNG, over 70 percent of local people in the rural communities largely depend on the agriculture sector through subsistence farming for their livelihood. Climate change and climate variability are already affecting land use patterns, crop systems, productivity, and outputs in PNG (Auger & Semple, 2022). Despite the recognition of the impact of climate change among the smallholder farmers in rural communities in PNG, the adaptation strategies needed to address this situation is lacking.

This article focuses on the preliminary findings from a study conducted by United Nations Women PNG regarding the adaptation of small-scale agriculture to improve food security among selected rural communities in three provinces: Enga,

Milne Bay and New Ireland. Prior to the study, the pre-assessment noted that about 80 percent to 90 percent of the households in the study areas remain dependent on traditional cropping practices thus, increasing their vulnerability to weather variations from impacts of climate change. Although these communities are aware of the physical changes from climate change, the level of awareness on ways to mitigate risks is very low.

In light of these findings, the discussion in this paper will focus on issues of accessibility to agriculture information, the level of awareness on climate change and its impacts on smallholder farmers within the framework of Climate Smart Agriculture (CSA) practices. The paper also outlines climate change and other key factors that contribute to food security issues. It ends with a way forward for resilient agricultural practices that can be adopted by smallholder farmers during extreme climate conditions like drought, flooding, salinisation, and curb pest and diseases.

### What is Climate Smart Agriculture (CSA)?

CSA has been defined as agricultural production systems that “sustainably increase productivity, resilience (adaptation), reduce greenhouse gases (mitigation) and enhance achievement of national food security and development goals” (Mugabe, 2019). The objective of the CSA is to increase agricultural productivity and build resilience to climate change risks in smallholder farming and pastoral communities. This should be done by scaling up climate-smart agricultural practices, strengthening climate-smart agricultural research and seed systems, supporting agrometeorological, markets, climate and advisory services. In a nutshell, it is a multi-faceted approach that offer farmers and their families the opportunity to simultaneously achieve three outcomes:

- better food security for farmers and their families;
- farmers are more prepared to handle current and future effects of climate change; and,
- where possible, when it benefits the farmers, it also reduces greenhouse gases.

Currently in PNG, there are some CSA programs being implemented by National Agriculture Research Institute (NARI) and Australia Centre for International Agriculture

Research (ACIAR) in Morobe, East New Britain and Eastern Highlands provinces. The programs are to support farmers to develop a weather advisory information tool to improve agriculture production (NARI, 2022). These practices show the potential of agriculture to adapt to a changing climate; to be more resilient and protect farmers against future changes in weather patterns, pests and diseases, and to slow the rate of climate change. However, while a number of CSA-related programs and projects are ongoing, and a number of different CSA practices are being piloted, these CSA systems are limited and not widely spread across the country, partly because of lack of financial resources, technological capacity, knowledge, and policy support.

### Climate resilient measures and practices that smallholder farmers can adopt

The table below shows some of the examples of the climate resilient practices adopted by smallholder farmers in other parts of the world (Alvar-Beltran et al., 2021). These practices are applicable for the climate situation of PNG and are reasonable to be adopted by small holder farmers. These resilient practices are for cropping systems.

Table 1. Climate resilient practices

Hazards	Practice and countries commonly adopted those practices	Description and adaptation benefits
Drought	Agronomic practices (e.g. weeding, harrowing, grafting, mulching). Brazil and India use these farming techniques.	<ul style="list-style-type: none"> <li>Weeding and defoliation reduce soil water losses from plant transpiration</li> <li>Cover crops reduce soil erosion by increasing soil organic matter, water, air, and nutrient availability.</li> </ul>
	Drip irrigation systems. Country like India applied this technique.	<ul style="list-style-type: none"> <li>Increase water-use efficiency by providing sufficient water depending on type of crop.</li> </ul>
Flooding and Waterlogging	Raised bed system. India and Bangladesh use this practice because of the level rainfall they receive every year.	<ul style="list-style-type: none"> <li>Removes excess water during plant growth by better draining the water retained in the soil.</li> <li>Promotes optimal growth of root systems through soil aeration.</li> </ul>

Salinisation	Salinisation management (from saline water).  In some parts of India and Yellow River region in China, this technique is practiced.	<ul style="list-style-type: none"> <li>Promotion of halophyte crops and soil-less cultivation.</li> <li>Use of saline resistant varieties and grafting techniques in traditional crops.</li> <li>Seed bed management and field grading to minimise local accumulations of salts.</li> </ul>
Pests and diseases	Crop rotations.  This practice is common across the world. It was first developed in European countries.	<ul style="list-style-type: none"> <li>Limit concentration of pests and diseases and lower selective pressure of pathogens (as each crop has different pathogens)</li> </ul>

Source: Alvar-Beltran et al., (2021), FAO

### Factors that contribute to food security issues

Despite the recognition of the importance of adoption of climate-smart agricultural practices, there are inherent challenges which continue to plague the agriculture sector in PNG. These include:

- Production and market access barriers.** Currently, local food production is not competitive with food imports. This is largely due to lack of infrastructure which affects the supply-chain of local produce from farms to markets (Auger & Semple, 2022). For instance, poor condition or non-existence of road connectivity leads to high transaction costs for farmers to access markets. There are also critical value chain challenges such as post-harvest management, food contamination, food loss and waste, and food storage issues that affect food security of the local communities.
- Lack of agriculture extension services.** Agricultural training, information and extension services are drivers of agricultural development for rural poverty reduction. Analysis of sweet potato value chains in PNG identified the need for advanced farmer trainings for at least 20 percent of farmers, especially for improving harvesting techniques, sorting and grading, packing and transportation (Auger & Semple, 2022). However, there are limited services for agricultural training, extension, research, development, biosecurity, and quarantine in PNG. An effective extension system coupled with regular farmer training and engagement in the areas of production, postharvest care and agribusiness is lacking.

- **Lack of data in the agriculture sector.** Agricultural data and information are important tools for policy formulation, decision-making, coordination and tracking of progress for future planning. However, the PNG agriculture database is obsolete and agriculture sector planning is thus done on ad hoc basis with insufficient data and information provided by sub-sector agencies (Auger & Semple, 2022). The lack of statistics and information has resulted in reduced efficiency of sectoral adaptation planning, resulting in reduced performance in the agricultural sector.

### Way forward to promote Climate Smart Agricultural practices

In light of the above challenges, the intervention of government in the adaptation of climate smart practices is needed in the following areas:

- Improve agricultural extension services in the rural areas with emphasis on the integration of climate-resilient agriculture practices into traditional farming techniques in rural communities of PNG.
- Adopting traditional climate-resilient crops as a means to address food security in the absence of available technologies.
- Seasonal climate forecast information is one tool that has been identified as aiding adaption responses to seasonal climate variability. However, its use in rural community food production is challenging due to the complex nature of the information.
- It is also important to boost the ability of vulnerable smallholder farming communities to access postharvest processing, storage technologies, and access to profitable markets. There is a need for greater awareness for available agriculture information on available technology and agriculture practices.
- Integrate climate risk management into the national budgeting process.

### Conclusion

Smallholder farmers in PNG need information and knowledge on appropriate CSA practices, technologies, and institutional innovations in order to effectively adapt to changing climatic conditions and cope with climate variability. There is a greater need, especially for awareness on climate adaptation and resilient farming techniques across the country. Lack of appropriate information has resulted in most farming communities continually practicing their normal traditional methods. Reviving of agriculture extension services at the district level would be an effective mechanism to address challenges our farmers are experiencing.

The agriculture sector is being affected by adverse impact of climate change-related extreme events including, drought,

flooding, rise in sea level and these have implications on food security. This is quite concerning and urgent actions are needed to combat its impacts and maintain food security and livelihoods.

### References

- Alvar-Beltran, J., Elbaroudi, I., Gialletti, A., Heureux, A., Neretin, L., and Soldan, R. (2021). *Climate Resilient Practices: Typology and guiding material for climate risk screening*. FAO, Rome.
- Auger, M. U. and Semple, A. B. (2022). *Adaptation of small-scale agriculture for improved food security of resilient communities in Papua New Guinea*. Retrieved from [https://www.adaptation-fund.org/wp-content/uploads/2022/01/CN-PNG-ASSA\\_AF-Concept-Note-v2-Responses.pdf](https://www.adaptation-fund.org/wp-content/uploads/2022/01/CN-PNG-ASSA_AF-Concept-Note-v2-Responses.pdf)
- Bourke, R. M. (2018). Impact of climate change on agriculture in Papua New Guinea. *Climate Change: Our Environment, Livelihoods, and Sustainability*, 35-50.
- Mugabe, P. A. (2020). Assessment of information on successful climate-smart agricultural practices/innovations in Tanzania. *Handbook of climate change resilience*, 2721-2741. Retrieved from [https://scholar.google.com/scholar?hl=en&as\\_sdt=0%2C5&q=Mugabe%2C+P.+%282019%29.+Assessment+of+Information+o+n+Successful+Climate-Smart+Agricultural+Practices%2F+Innovations+in+Tanzania&btnG=](https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=Mugabe%2C+P.+%282019%29.+Assessment+of+Information+o+n+Successful+Climate-Smart+Agricultural+Practices%2F+Innovations+in+Tanzania&btnG=)
- National Agriculture Research Institute. (2022). *Climate change is real say's farmers*. Retrieved from <https://www.nari.gov.pg/2022/07/24/climate-change-is-real-says-farmers/>
- Rahaman, M. A., Rahman, M. M. and Hossain, M. S. (2019). Climate-resilient agricultural practices in different agro-ecological zones of Bangladesh. *Handbook of climate change resilience*, 1-27. Retrieved from [https://scholar.google.com/scholar?hl=en&as\\_sdt=0%2C5&q=Climate-Resilient+Agricultural+Practices+in+Different+Agro-ecol+ogical+Zones+of+Bangladesh&btnG=](https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=Climate-Resilient+Agricultural+Practices+in+Different+Agro-ecol+ogical+Zones+of+Bangladesh&btnG=)
- Schmidt, E., Gilbert, R., Holtemeyer, B., Rosenbach, G., and Benson, T. (2019). *Synopsis: Papua New Guinea household survey on food systems (2018): Initial findings* (Vol. 1). Intl Food Policy Res Inst. Retrieved from: <https://ebrary.ifpri.org/utils/getfile/collection/p15738coll2/id/133071/filename/133282.pdf>
- World Food Summit. (1996). *Rome declaration on World Food Security*.

## Acknowledgments

The author would like to acknowledge and thank UN Women for granting permission to use the information from data collected from their project on Adaptation of Small Scale Agriculture for improved food security of resilient communities in PNG. The author would also like to thank Dr. Elizabeth Kopel, the Program Leader for Society and Culture Research Program at PNG NRI for refining this paper, and also Dr. Lindsay Kutan, the Program Leader for the Sustainable Land Development Research Program at the PNG NRI for his effort in reviewing the original draft of this paper.

## About the author

**Mr. Joe Barak** is a Research Officer with Society and Culture Research Program at PNG National Research Institute. He has a Bachelor in Business Management and Health Management from James Cook University, Australia. His research interest includes informal economy and issues related to public health.

---

The Papua New Guinea National Research Institute (PNG NRI), PO Box 5854, Boroko, NCD 111, Papua New Guinea. Telephone +675 326 0061; Facsimile +675 326 0213. Website: [www.pngnri.org](http://www.pngnri.org); email: [pngnri@pngnri.org](mailto:pngnri@pngnri.org)

PNG NRI is an independent statutory authority established by an Act of Parliament in 1988 and confirmed by the IASER (Amendment) Act 1993.