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# SPOTLIGHT

## ADVERSE IMPACTS OF CLIMATE CHANGE IN PAPUA NEW GUINEA:

ARE WE READY TO ADAPT AND  
MANAGE DISASTERS?

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### Key Points

- In Papua New Guinea (PNG), livelihoods of many people are strongly linked to agriculture. Climate change can have adverse effects on agricultural production.
- PNG has witnessed various natural hazards that are associated with climate change such as drought and frost.
- Our experience regarding drought and frost of 2015 in PNG revealed that the agriculture sector is not ready to adapt to climate change and the country is not prepared to manage disasters.
- In order to promote adaptation to climate change in the agriculture sector, there is a need to promote public awareness on climate change, and to encourage agriculture systems that combine agriculture with forestry (agroforestry).
- There is also a need to promote effective agricultural extension services, make drought and frost-tolerant crop varieties more accessible to farmers, and provide more irrigation facilities.
- In order to promote effective management of natural disasters, there is a need to improve funding of provincial disaster offices, train more people on planning and management of disasters, and encourage collaboration among disaster management agencies.

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## ADVERSE IMPACTS OF CLIMATE CHANGE IN PAPUA NEW GUINEA: ARE WE READY TO ADAPT AND MANAGE DISASTERS?

By Maureen Thomas and Eugene Ezebilo

The livelihoods of many Papua New Guinean residents are strongly linked to agriculture, making them more vulnerable to the adverse impacts of climate change. The poor and the weakest in society are often hit hardest by the impacts, as reported by Mertz, et al. (2009), in their study of adaptation to climate change in developing countries. This paper is in response to the drought and frost incident that led to food and water shortages in several provinces of Papua New Guinea (PNG) in 2015, which affected almost two million people as reported in *The National* (Nalu, 2015).

PNG has been a witness to many droughts and frosts. However, despite this reality, the agriculture sector in the country has not been able to develop a climate adaptation strategy. Furthermore, PNG has not been able to develop an effective and efficient system for managing disasters associated with climate change. If the intention of the state is to reduce the vulnerability of the agriculture sector to the hazards associated with climate change such as drought and frost, it is important to create more public awareness on climate change, support agricultural extension services for food and cash crops, make drought and frost-tolerant crop varieties accessible to more farmers, promote agricultural systems that combine crop production with forestry (agroforestry), and provide irrigation facilities. In order to improve effectiveness in disaster management, it is necessary to improve funding of provincial disaster offices, train more PNG citizens on planning and management of disasters, and improve long-term monitoring and forecasts of climate change events. For people vulnerable to the adverse impacts of climate change to continue having access to the necessities of life, they must first develop the capacity to adapt to this inevitable change.

### Lessons learnt from the 2015 drought and frost incident in Papua New Guinea

As PNG has already witnessed drought and frost incidences

several times, especially in the 1990s, it is expected that the country would have developed a sustainable adaptation and management strategy to cope with drought and frost issues. However, the 2015 drought and frost incident revealed that government agencies responsible for managing natural disasters in PNG were not well equipped and prepared to tackle the problems faced.

Furthermore, the agricultural sector was not well prepared to adapt to the adverse impacts of climate change. For example, during the 2015 drought and frost incident, the people that were affected, especially farmers, sought help from provincial disaster offices. However, these offices in turn requested the intervention of the national government. This could have been because the provincial disaster offices are underfunded and do not have enough resources and the capacity to manage the situation.

It took the state several weeks to respond to requests from the provincial disaster offices. At that time, almost two million people were already severely affected by food and water shortages (Nalu, 2015). Many were children, the poor, the elderly, and especially those who lived in remote areas.

There were also problems in the distribution of relief materials, making it all the more difficult for affected people living in remote areas. The distribution and access problems were partly due to poor funding of provincial disaster offices, the national government not finding budget sources for immediate release of funds, poor road conditions, lack of roads, and poor planning.

Other lessons learnt from the 2015 drought and frost incident include the following:

- The Provincial disaster offices do not have the capacity and sufficient funds to provide relief materials to people affected by the drought and frost problem. The offices were underfunded and did not have enough staff to manage the situation. Lack of resources is one of the reasons why provincial offices had to seek funding assistance from the national government for relief materials and the logistics involved in distributing relief to the affected people.

- It appears that the national government does not have funds set aside for the provision of relief materials in the event of natural disasters. When provincial disaster offices requested for funding to buy relief materials, it took the national government several weeks before funds were released. This was partly because there was no allocation in the annual budget for addressing disaster-related problems.
- Farmers, especially those living in remote areas, are not well informed about climate change and its adverse effects. In PNG, those who live in remote areas rarely have access to mass media channels such as newspapers, radio and television. They rely primarily on personal contact for exchange of information. Therefore, it is difficult for these people to be aware of weather forecasts, including drought and frost forecasts, and the potential ways to adapt to these environmental threats. Lack of communication access might have contributed to them being not prepared to tackle the 2015 drought and frost incident. Furthermore, some PNG residents often do not take weather forecasts seriously.
- Most farmers, especially in rural areas, do not have the capacity to adapt to climate change. The National Agricultural Research Institute (NARI) has developed some techniques for storing farm produce. However, facilities for storing food for an extended period of time are still not common especially in rural areas. Rural farmers mainly depend on subsistence agriculture for livelihood, and often harvest farm produce for immediate use with little or none left for future use.
- Poor institutional arrangement and coordination exist in government agencies involved in managing disasters. The responsibilities of each agency in PNG involved in disaster management are not clear. The lack of clear-cut roles must have contributed to confusions and delays in the release of funds from the state and the distribution of relief materials. Furthermore, the agencies have difficulty collaborating with each other.
- Road networks are either poor or non-existent in remote areas. One of the major problems that relief workers faced during the distribution of food and water was poor road networks, and in some cases, roads that were not suitable for motor vehicle use. Lack of infrastructure made it difficult for those who were affected by the drought and frost to access relief materials.
- Most farmers in PNG do not have access to drought and frost-tolerant varieties of crop, or, don't like growing them on their farms. NARI has developed sever-

al drought and frost-tolerant crop varieties; however, almost all crops in the affected provinces were lost to either drought or frost which turned out to a total crop failure. If these farmers did have access to drought and frost-tolerant varieties and were informed of these crops' advantages amidst the threats of climate change, the devastating impact would have been significantly less.

- Officials of agencies involved in managing disasters require more training in disaster mitigation and management. The handling of the 2015 drought and frost incident regarding the distribution of relief to affected people and information sharing among relevant stakeholders, revealed that agency officials do not have enough training in disaster mitigation.

### Interventions required for the agriculture sector to adapt to climate change

Adaptation to climate change has to do with anticipating the adverse effects of climate change, and taking appropriate action to reduce the damages the change can cause (European Commission, 2016). In order to further empower farmers and to make them more resilient amidst environmental changes, there is a need for the state to introduce a range of programs that can focus primarily on reducing the adverse impacts of climate change. Such programs can include the following:

- The government should introduce agricultural extension services that focus primarily on teaching a variety of farming techniques to enhance farmers' resilience to climate change. There used to be a vibrant and an effective agricultural extension service in PNG in the 1980s, but was ceased in the 1990s. Agricultural extension services should be reintroduced in order to increase the efficiency of subsistence farmers in terms of food production, which can then help out in improving their standard of living. Good quality extension services are needed to meet the challenges confronting the agricultural sector in PNG, as reported by Ezebilo (2015), in a study of PNG's drive for self-sufficiency in food production.
- Promote public awareness and education on climate change. It is important to develop a climate change awareness program to provide people with more information not only on climate change, but more so on the many ways by which people can adapt to its adverse impacts. The awareness program could also be used to inform people about long-term weather forecasts so that they can also prepare for anticipated natural hazards.

- Encourage agricultural systems that combine agriculture with forestry on the same land (agroforestry). Agroforestry promotes diversification of livelihood sources, and reduces the risk of total crop failure in the event of drought and frost incidence. Furthermore, trees help to conserve soil water, stabilise environmental temperature, and contribute organic fertilizers to the soil, which then provide a conducive environment for agricultural crops. Agroforestry can thus be used to reduce drought-related problems.
- Drought and frost-tolerant crop varieties should be made more accessible to farmers. Crop variety access will help reduce the risk of crop failures in the event of drought and frost, and can also reduce vulnerability of people to the incidence. Farmers may prefer varieties that are intolerant to drought because of their all-weather characteristic. However, it is important to encourage farmers to always plant both drought-tolerant and drought-intolerant crop varieties to lower the risk of total crop failure amidst the threats of climate change.
- Provide facilities for irrigation to promote crop production throughout the year. Crop production in PNG depends primarily on rainfall, which often results in total crop failure in the event of drought. To make water accessible throughout the year, the state should consider the installation of manually operated boreholes in rural areas for domestic use, and the construction of dams in strategic locations for watering farmlands.
- Train farmers on various farming practices that work towards soil water conservation. There are several farming practices already existent that promote conservation of soil water, and also prove to be helpful during droughts. These practices include: leaving crop residues on the soil surface after harvesting crops (called “conservation tillage”); use of organic manure in the advanced stage of decay (called “composting”); collecting run-off water using surface and underground structures; and rain-water harvesting. It is important for relevant government agencies to promote these farming practices.

### Interventions for promoting effective management of natural disasters

- Allocate more funds to support provincial disaster offices. In order to avoid delays in the provision of relief materials to affected areas, it is important for provincial offices to be fully funded. Fully funded provincial disaster offices can respond to crises and can distribute relief materials in a more time-efficient manner. Funds can also be used in

recruiting more people when the need arises to further increase the office’s capacity in reaching out to affected areas.

- Support training of more PNG citizens in natural disaster risk reduction, management and mitigation. There is currently a shortage of disaster management professionals in PNG, which further contributes to improper disaster mitigation planning and management, logistics, and operations. There is a need to train more people in natural disaster management to help alleviate these problems, especially in terms of planning and distribution of relief materials.
- Encourage collaboration among agencies that are involved in managing disasters. As collaboration often results in a “smart solution,” there is a need for both government and non-government agencies involved to collaborate, especially in the exchange of information and expertise. Doing so will help promote effectiveness and efficiency in managing natural disasters in PNG.
- There is a need to improve existing road networks, and to construct new ones, to link remote areas to major towns. This infrastructural improvement is required in order to make distribution of relief materials easier in the event of natural disasters, as well as to help affected residents move to safer areas.
- Support training of farmers on food storage and preservation techniques. This will help farmers augment their food resource needs during times of scarcity or bad harvest. In fact, knowledge on food storage and preservation techniques and facilities can also motivate farmers to produce a food surplus for future use. This is against the tenets of subsistence farmers who only cultivate for immediate consumption, but is a practice that could have greatly reduced farmers’ vulnerability to the drought and frost incident in 2015. Food storage and preservation are not common practices in PNG, so it is important for relevant government agencies to develop a farmer training program on various food crop storage and seed preservation techniques.
- There is a need to improve the monitoring of drought and other climate change-related incidences in PNG. In order to increase and improve preparedness for environmental changes, it is important to develop systems for making long-term predictions that could capture future vulnerabilities.

## Conclusions

PNG's agricultural sector is not ready to adapt to climate change and also the country is not well prepared to manage natural disasters. It is not enough for the state to provide relief materials on the onset of natural disasters. More importantly, the people would benefit more if they are provided with facilities and the knowledge that would help them adapt to climate change. As climate change intensifies, natural disasters associated with it might become more frequent in PNG. To this end, various programs that could lower the vulnerability of PNG residents to the adverse impacts of climate change must be developed and implemented, and management of natural disasters must be made more effective.

If the intention is to develop a climate change adaptation strategy, attention should focus more on increasing public awareness on climate change, promoting effective agricultural extension services on food and cash crops, and making drought and frost-tolerant crop varieties more accessible to farmers. It is also important to promote agricultural systems that combine agriculture with forestry, and to provide more irrigation facilities.

In order to promote effective natural disaster management in PNG, provincial disaster offices should be fully funded, and more PNG citizens should be trained on planning against and management of disasters. Furthermore, road networks should be improved, collaborations between agencies involved in disaster management improved, and long-term monitoring of climate change events promoted.

It is important to note that, it is often less costly to put drought adaptation measures in place compared to addressing a drought situation. This paper contributes to the ongoing debates on adaptation to climate change and how best to manage natural disasters in PNG.

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