Assessing village food needs following a natural disaster in Papua New Guinea

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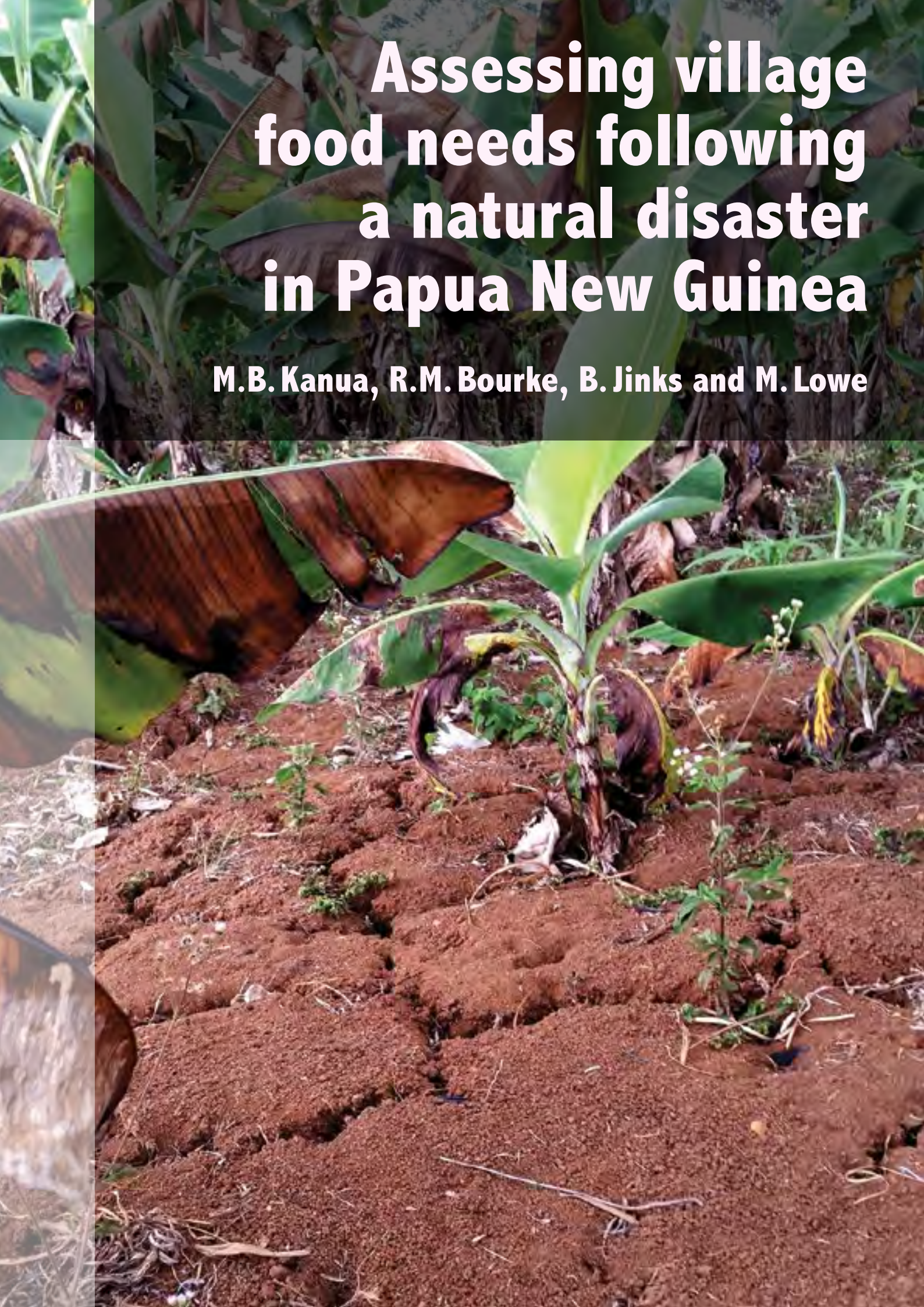

Front cover image: Dry cracked soil in a banana garden, Mougulu area, Western Province, October 2015. Villagers in the Nomad-Mougulu area suffered from severe food shortages in both the 1997–98 and 2015–16 droughts. Photo by Sally Lloyd.

Back cover image: At Panduaga Elementary School, Margarima area, Hela Province, March 2016, James Komengi (United Church, Tari) listens to a schoolboy who shows his lunch for the day, a small amount of green leafy vegetable. Half of the children who normally would have been at school were absent due to hunger and sickness, and children were fending for themselves and searching for food in the bush, because their parents had left the area in search of food or could not provide food for them. Photo by Brendan Jinks.

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Australian Government

Published October 2016 by Church Partnership Program, Port Moresby
Funded by Australian Government Department of Foreign Affairs and Trade (DFAT)

Parental and community consent has been received for use of photographs in accordance with the child protection policies of Adventist Development and Relief Agency Australia and DFAT.

Editing and layout by Tracy Harwood
Cover design by Sutherland Studios

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Authors

Matthew Kanua is an agricultural specialist with over 30 years' experience in agricultural development in Papua New Guinea (PNG). He is a former secretary of the Department of Agriculture and Livestock. He coordinated the Church Partnership Program El Niño Drought Response Program during the 2015–16 drought and was involved in assessments during the 1997–98 drought.

Dr R.M. (Mike) Bourke is an agricultural scientist and a specialist in PNG food production with over 45 years' experience in research, development and training in PNG. During the 2015–16 food shortages he assisted with many aspects of assessment and relief. He conducted assessments during the 1997–98 drought.

Brendan Jinks served as information management officer for the El Niño response component of the Church Partnership Program in Port Moresby in 2016, and is undertaking doctoral research at the Australian National University.

Dr Michael Lowe has worked in PNG since 1991, specialising in social surveys and assessments (including mapping, GIS and GPS tasks), smallholder agriculture issues, rural livelihoods and income-generating projects, and physical resettlement matters.

Acknowledgements

This document builds on the experience of many people during major food shortages associated with frost and drought in Papua New Guinea (PNG) during 2015–16, including those in the following organisations:

PNG public sector, including Department of Agriculture and Livestock, Department of Prime Minister and National Executive Council, National Agricultural Research Institute, National Disaster Centre, National Disaster Committee, National Weather Service and provincial and local administrations in a number of provinces.

Churches in PNG and their Australian and New Zealand partners, including Seventh-day Adventist Church and Adventist Development and Relief Agency; Anglican Church of PNG and Anglican Board of Mission; Baptist Union of PNG and Transform Aid International; Catholic Church, Caritas Australia and Caritas New Zealand; Evangelical Lutheran Church of PNG and Australian Lutheran World Service; United Church in PNG and UnitingWorld.

International non-government organisations including CARE, Oxfam, Save the Children and World Vision.

Commercial bodies in PNG and their partners, including Ok Tedi Development Foundation and Digicel Foundation.

International development and humanitarian partners, including Australian Government Department of Foreign Affairs and Trade, European Union, Food and Agriculture Organization of the United Nations, global Food Security Cluster, International Organization for Migration, Japanese International Cooperation Agency, Japanese Ministry of Foreign Affairs, New Zealand Government Ministry of Foreign Affairs and Trade, UNICEF, United Nations Development Programme, United Nations Office for the Coordination of Humanitarian Affairs, United Nations Resident Coordinator's Office in PNG, United Nations World Food Programme, USAID and the World Health Organization.

Media organisations that covered the impact of the drought include the *National* and *Post Courier* newspapers, as well as Radio Australia, Australian Broadcasting Corporation and Radio New Zealand International.

Many villagers in PNG readily provided information on food, water, health and education issues during field assessments in 2015–16. These assessments were conducted by national and provincial public servants, members of some churches and the Church Partnership Program and international development partners.

This publication and the Church Partnership Program El Niño Drought Response Program were funded by the Australian Government Department of Foreign Affairs and Trade, with the contract managed by the Adventist Development and Relief Agency. The publication was edited by Tracy Harwood.

We acknowledge and thank everyone for their help.

Foreword

A severe El Niño event and associated drought and frosts began in Papua New Guinea (PNG) in April 2015. An assessment of food shortages and the impact on people's livelihoods was conducted by the United Church in remote high-altitude Hela and Enga provinces in September 2015. The seven churches of the PNG Church Partnership Program[1] (CPP) and the Australian Government Department of Foreign Affairs and Trade (DFAT) then agreed to implement a response to the unfolding disaster. DFAT funded an El Niño Drought Response Program to be coordinated under the auspices of CPP and managed by the Adventist Development and Relief Agency (ADRA).

Six disaster response coordinators and a program coordinator were recruited to implement a seven-month program between December 2015 and July 2016. The main role of the CPP El Niño Drought Response Program was to coordinate the disaster response work of the churches, conduct field assessments of food and water needs, train disaster response coordinators in conducting field assessments, and report assessment results to the PNG National Disaster Centre and other stakeholders to assist the overall coordination effort.

In early December 2015, a pastor was asked to report on the impact of the drought in the Morehead area, South Fly, Western Province. He had just returned from conducting church meetings which some 1000 people attended over a week. He was asked about the food and water needs, and health situation of the people there. His response was *'You should have guided me on what questions to ask. What do I report on? I am a clergyman and I need to be guided on these technical matters.'*

The experience of the pastor working in remote Western Province was telling. There was a clear message that something more had to be done. The CPP accepted this challenge. By June 2016 the CPP completed 12 food needs assessments in high-priority locations of PNG. The reports produced led to a greater understanding of the effects of the drought and frosts, and the numbers of people severely short of food.

In part this manual brings together the learnings of the 2015–16 CPP experience and attempts to better prepare practitioners to deal with future food shortages, thereby reducing the suffering of villagers in remote communities. I congratulate the authors, DFAT, ADRA and the CPP on producing this manual. It is dedicated to the rural villagers of PNG who provide food for their families in good times and in difficult times.

Rt. Rev Bernard Siai
Moderator, United Church in Papua New Guinea and Chair, Church Leaders Council

[1] The seven churches are Anglican, Baptist, Catholic, Evangelical Lutheran, Salvation Army, Seventh-day Adventist and United. Associated non-government organisations are Adventist Development and Relief Agency, Anglican Board of Mission Australia, Australian Lutheran World Service, Caritas Australia, Transform Aid International and UnitingWorld.

1. Introduction

1.1 Background

Papua New Guinea (PNG) is vulnerable to natural disasters, including drought and frost associated with El Niño events and excessive rainfall associated with La Niña events. El Niño and La Niña are the names given to changes in air circulation patterns across the Pacific Ocean.[2] El Niño events commonly result in reduced rainfall in most of PNG and frost at high-altitude locations, above 2000 metres. In contrast, La Niña events generally result in excessive rainfall in much of PNG.

Most of the food consumed in PNG is produced domestically by village farmers.[3] Drought, frost and excessive rainfall can cause major disruptions to village food supplies. Drought also reduces villagers' access to clean drinking water and this in turn has a negative impact on peoples' health and the capacity of education institutions and hospitals to function. There may be other impacts — damage to crops and property by wildfires, out-migration and an increased death rate.

The impact of these climatic extremes is greatest on people living in remote and inaccessible locations. People in those communities have limited or no road access and low cash incomes. They have very limited capacity to generate cash which can be used to purchase food when subsistence production fails. Even if they have access to cash, they often cannot access urban centres where they can purchase imported or locally grown food.

In 1997–98 a major drought and a series of severe frosts at very high altitude locations devastated food gardens, resulting in widespread food shortages that led to an estimated 1.2 million villagers extremely short of food by the end of 1997. This was almost 40 percent of the rural population at that time. Another drought and series of frosts associated with an El Niño event had a major impact on food production, the supply of drinking water, schools and villagers' health in 2015–16. At the time of maximum impact in late 2015, an estimated 800,000 villagers were very short of food, many more did not have access to clean drinking water and many schools were closed. These events also impacted on production at a number of copper and gold mines in PNG and hence on the national economy.

The severe drought and frosts in 1997–98 and 2015–16 — and earlier events — demonstrate the relative frequency of these natural disasters in PNG. We do not know when the next severe El Niño will occur, but we know it will happen at some time in the future. Providing food aid is very expensive, particularly in remote locations where there is no road access. Hence it is imperative that government, churches, non-government organisations and development partners have accurate information on rural food supplies when a disaster strikes. Then limited resources can be directed to those in greatest need. The purpose of this manual is to assist field staff and others to gather more accurate information on rural food supplies during a drought (or disaster).

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[2] Further information on El Niño and La Niña can be found in Section 1.6 of Bourke, R.M. and Harwood, T. (eds) (2009). *Food and Agriculture in Papua New Guinea*. ANU E Press, The Australian National University, Canberra.

[3] Over 80 percent of the food energy and about three quarters of food protein consumed in PNG is produced in PNG. See Section 2.1 of Bourke, R.M. and Harwood, T. (eds) (2009). *Food and Agriculture in Papua New Guinea*. ANU E Press, The Australian National University, Canberra.

1.2 Building on past experience

The genesis of this manual was a realisation that in spite of the relatively recent 1997–98 El Niño event in PNG, and the national and international response to it, there exists little practical or easily accessible information that locally based officers can use in similar situations. A major challenge during 2015–16 was that almost no lessons learnt from 1997–98 had been institutionalised, with many organisations relying heavily on just a handful of people with previous experience. This was clearly demonstrated by a general absence of basic tools required to guide the assessment of impacts on food gardens and household food needs.

A common experience among concerned church workers, community teachers and health workers in severely affected remote communities was that they did not know how to analyse the local situation in a clear and logical manner, or communicate their findings effectively to the relevant authorities. The information in this manual was compiled to address this particular aspect of disaster response work.

This document is a 'first-of-its-kind' practical guide for disaster response coordinators, frontline church workers, community teachers, health staff and provincial or district-based disaster management officers to prepare for and respond to food shortages in PNG. Its primary focus is to prepare such people to conduct food needs assessments and communicate their findings. The manual is divided into four sections: background information, pre-fieldwork preparation, field assessments and post-fieldwork reporting.

1.3 Food shortages in Papua New Guinea

1.3.1 Environmental causes of food shortages

A number of short-term changes in the climate and other environmental factors are a common cause of subsistence food shortages in PNG. The most important climatic issues are drought, frost and excessive soil moisture. Other causes include flooding, landslides, tidal waves and volcanic eruptions, but the overall impact of these factors is generally much less than that of the first group. Drought and frost are often associated with El Niño conditions and very high rainfall is often associated with La Niña conditions. El Niño and La Niña are the names for a major shift in wind and rainfall patterns that impact the Pacific Ocean region and beyond.[4]

Over the 140 years since written observations commenced in PNG, there have been a number of widespread severe food shortages associated with El Niño conditions as well as some less severe events. It is difficult to make accurate comparisons between events as information before 1950 is often sketchy. The most severe events over the past 150 years were in the years 1902, 1914, 1941, 1997 and 2015, with the droughts in 1914 and 1997 probably the most severe of these. Drought and frost have been recorded in other years. For example, over the period 1950 to 1985, frosts affected food production in parts of the highlands in 1953, 1958, 1960, 1961, 1965, 1972, 1980 and 1982.[5]

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[4] Further information on El Niño and La Niña can be found in Section 1.6 of Bourke, R.M. and Harwood, T. (eds) (2009). *Food and Agriculture in Papua New Guinea*. ANU E Press, The Australian National University, Canberra.

[5] Detailed information is given in papers in a special edition of the journal *Mountain Research and Development* volume 9, issue 3 (see Appendix 2). There is also a lot of detailed information in Bourke, R.M. (1988). *Taim hangri*: variation in subsistence food supply in the Papua New Guinea highlands. Unpublished PhD thesis, The Australian National University, Canberra.

Drought

Rainfall is high to very high in most of PNG and people commonly manage their food gardens so as to get rid of excess rainfall and soil moisture. This is done by making food gardens on slopes, constructing drains and planting certain crops in drained beds, in mounds or both. As well, the crops grown in PNG are mostly adapted to high-rainfall conditions, although some staple crops such as banana and cassava are tolerant of a wide range of soil moisture conditions. Hence when rainfall is deficient, food production can be severely affected. The most severe droughts, such as those in 1997 and 2015, are associated with El Niño conditions, but sometimes droughts occur at other times.

In most of PNG, rainfall is normally high in most months of the year, but in some places there is a marked drier period in most years. These locations include coastal Central Province, southern Western Province, the Dogura to Cape Vogel area in Milne Bay Province, the Markham and Ramu valleys in Morobe and Madang provinces, the Wau and Bulolo areas of Morobe Province, the north coast of the Huon Peninsula in Morobe Province, some coastal locations in Madang and East Sepik Province from Bogia and westward, and the Henganofi and Benabena areas of Eastern Highlands.

In locations that experience a drier period in most years, the agricultural system used by villagers accommodates the seasonal rainfall pattern and people plant a range of food crops at the start of the wetter months to spread food supply throughout the year.[6]

Frost

During El Niño conditions, the air is much drier and heat is lost to the atmosphere at night. This results in frosts at very high altitude locations. Frost can occur as low as 1500 m in the highlands, but it is the severe and repeated frosts at very high altitude places that destroy most food crops. These locations are mostly above 2200 m altitude in Enga and nearby locations in Western Highlands, Hela and Southern Highlands provinces. The impact of frost is different from drought in that it kills most crops quickly and very little is spared. Sweet potato, English potato and most green vegetables are killed, and even *karuka* nut pandanus palms can be damaged. One of the few food crops that survives frost is round cabbage.

Excessive soil moisture

Excessive soil moisture can reduce yields of sweet potato greatly, particularly if the soil is too wet when vines are planted and in the weeks after planting. This is the period when tubers are formed. The problem of reduced yield from excessive soil moisture is not immediately obvious and the impact only becomes apparent when the women attempt to harvest tubers.[7] This is mainly an issue in the highlands where soils tend to have a higher clay content and do not drain as freely.

During some El Niño years, rainfall is sometimes exceptionally high at the start of the calendar year, then dry in the middle of the year. The combination of too much soil moisture when crops are planted early in the year, then insufficient soil moisture later in the year, reduces sweet potato yield

[6] See, for example, the following paper which gives information on how people manage food supply in drought and non-drought years: Mogina, J. (2001). Food aid and traditional strategies for coping with drought: observations of responses by villagers to the 1997 drought. In R.M. Bourke, M.G. Allen and J.G. Salisbury (eds), *Food Security for Papua New Guinea*. *ACIAR Proceedings No 99*. Australian Centre for International Agricultural Research, Canberra.

[7] Women generally do most harvesting of subsistence food crops, although men sometimes harvest crops.

in the highlands. However, the low yields are attributed to the event near the harvest, that is, the drought rather than the excessively wet period earlier in the year.

Flooding

Floods sometimes damage food gardens in some parts of PNG in both the highlands, for example in parts of the Wahgi Valley, and the lowlands, for example, near the Sepik River. Floods can cause significant damage to groups of food gardens and lead to local food shortages. However, the impact is nowhere as widespread or severe as the three climatic extremes noted above.

Other environmental causes of food shortages

A number of other changes in the physical environment can cause food shortages, including landslides, volcanic eruptions and tidal waves. These are often spectacular events and cause significant changes to the physical environment at the local level. However, their impact on food production tends to be very localised and not significant at a district, provincial or national scale. Their impact on food production is generally overestimated by outside observers.

1.3.2 Biological and human causes of food shortages

A number of human and biological events can also result in food shortages in PNG. These can be very widespread and sometimes result in significant shortages.

Variation in garden planting rate

Variation in the rate of planting food gardens in the highlands can result in widespread low-level food shortages. This does not appear to be an issue in the lowlands where there is a greater range of staple food crops. When food is scarce at the household level in the highlands for whatever reason, women commonly increase the area planted to sweet potato and other food crops and men often clear fallow vegetation so that the women can plant into land of higher fertility. The result of these two factors is an abundance of food in the following year. Subsequently, the planting rate is reduced. This often results in a second food shortage about two years after the first one commenced. This cycle occasionally lasts for five years in the highlands, but generally it runs for three years. After this time, people in the households tend to resume the long-term planting rate (which is about 50 m^2/woman/month in the highlands). The second food shortage is attributed by outside observers to local factors, such as coffee or *karuka* harvesting season or male migration. But the cause is actually the large variations in the planting rate for sweet potato.[8]

Villagers should be advised to be aware of these cycles in planting rate and to maintain a steady planting rate for sweet potato in the highlands.

Post-drought nitrogen flush

Following drought-breaking rain, there is increased microorganism activity in the soil. After some weeks, these microorganisms die and release nutrients into the soil. This is known as a post-drought nutrient flush and occurs globally. For most crops such as corn, beans and vegetables, the extra nutrients promote vigorous growth and higher yields. However, for sweet potato the high levels of

[8] Further information is given in Bourke, R.M. and Harwood, T. (eds) (2009). *Food and Agriculture in Papua New Guinea*. ANU E Press, The Australian National University, Canberra, pages 417–418, and in Bourke, R.M. (1988). *Taim hangri*: variation in subsistence food supply in the Papua New Guinea highlands. Unpublished PhD thesis, The Australian National University, Canberra.

soil nitrogen reduce tuber yield. This was observed in early 1998 after the big drought in 1997. The same phenomenon was reported in many highland and lowland locations in early to mid-2016. When the women attempt to harvest the tubers, few tubers are there. This effect delays return to normal food supply.

We do not know how best to reduce this problem. The best advice to villagers is to plant sweet potato on less fertile soil after a drought. If a sweet potato crop does not yield tubers, remove the crop and replant the site or plant in another site. However, further research is needed on this issue as it is not well understood.

Insect infestation

Sweet potato weevil is generally a minor pest in most of PNG, except in places that experience a regular marked dry period each year, such as Benabena in Eastern Highlands Province and coastal Central Province. However, during a drought, the infestation rate increases greatly. The weevil makes tubers inedible (for both humans and pigs) because of the foul smell that it gives to the tubers. Until recently, there was only one type of sweet potato weevil in PNG. But since about 2010, two further types have been identified, one from the West Indies. Little is known about the impact of the new species. Observations in Tari Basin, Hela Province, in September 2015 showed that the incidence is greatest at 1400–1600 m altitude and reduces with increasing altitude.[9]

Social disruption

In some locations, especially in the PNG highlands, tribal fighting and other social disruption leads to shortages of subsistence food or makes shortages caused by drought and frost worse than they would have been otherwise.

Chronic food shortages

In a limited number of locations in PNG, food supply is barely adequate or always short. There are only a few such places and most are on very small islands where the population pressure is very high or in the highlands where there is high population pressure on land of low soil fertility. Overall, this is not a huge issue in PNG but it may become more important as the population continues to grow rapidly and the broader economy does not expand.

1.3.3 Locations most vulnerable to drought and frost

Based on reports and observations on the impact of drought and frost over the past 60 years, it is possible to say which locations are more vulnerable to the impact of drought and frost in PNG. The impact tended to be greatest in the same places in both the large events in 1997 and 2015. Notes follow on the broad pattern. See map of the impact of drought and frost on food needs in mid-2016 (Figure 1, inside back cover).

Very high altitude locations

The impact of frost is greatest at very high altitude places over the altitude range of 2200 to 2800 m in Enga (Kandep and Marient basins, Upper Lagaip Valley) and nearby locations in Western Highlands (Upper Nebilyer Valley and Tambul Basin), Hela (Upper Wage area, Levani Valley) and Southern Highlands (Upper Lai Valley and Upper Mendi Valley). Frost can occur as low as 1500 m altitude and

[9] Kanua, M.B. (2015). *El Niño 2015: United Church Drought/Frost Assessment Report*. Prepared for United Church in Papua New Guinea, Port Moresby.

in the upper Simbu Valley, but the impact on crop growth is not great. The traditional response at these very high altitude places in Enga is for villagers to migrate to lower altitude valleys until they can re-establish their food gardens.

Highland valleys and highland fringe

The heavy reliance on sweet potato as the most important staple food crop in the central highlands means that when production is impacted by inadequate or excessive soil moisture or planting cycles, food is scarce. However, in many places in the main highland valleys up to 2200 m altitude, people now have access to some cash income from sales of coffee, fresh food or other products and they can purchase sweet potato, imported rice and other food when their subsistence supplies are inadequate.

The impact of drought on food supply is often much greater on the edge of the highlands or in mountainous locations in coastal provinces. In most of these locations, villagers have limited access to cash income, there are often few roads and hence access to markets is limited so people cannot readily sell produce or buy food. There are many such highland fringe or mountainous locations where villagers are vulnerable to food shortages. These include Telefomin District in Sandaun Province; Gumine District in Simbu Province; the area where Gulf, Morobe and Eastern Highlands provinces meet (Kaintiba, Menyamya, Wonenara and Marawaka areas); the Mountain Koiari area of Central Province; mountainous parts of the Huon Peninsula in Morobe and Madang provinces; and mountainous areas in Milne Bay Province (Agaun area).

Inland Western Province

Villagers in a number of locations in inland lowland Western Province were severely affected by drought in 1997 and again in 2015. The greatest impact in both years was in the Nomad–Mougulu area. Food, drinking water and water to process sago were also scarce in the Morehead area of the province.

Small islands

Villagers living on atolls and other small islands in Milne Bay Province and in some other locations, such as the islands in East Sepik Province, are vulnerable to water and food shortages. Water and food shortages were major issues in more than 30 atolls and small islands in Milne Bay in 2015–16.

Other locations

There are a number of other locations in PNG where villagers are vulnerable to water and food shortages during droughts. The pattern has been somewhat different in different droughts in recent decades. Villagers in some of these places suffer from regular seasonal rainfall deficit in most years and this is worse in the drought years. These places include the Dogura to Cape Vogel area of Milne Bay Province and the Sialum coast of the Huon Peninsula in Morobe Province.

In general, the 1997 and 2015 droughts had a greater impact at locations further from the equator in PNG, that is, from about 6 to about 12 degrees south of the equator. However, this is a broad pattern and there were exceptions.

1.3.4 Other issues associated with drought and frost

The focus here is on food shortages. However, drought and frost impact villagers' lives in other ways. Brief notes on these impacts follow.

Water supply

Most rural villagers rely on small streams, springs or water tanks for drinking water. During major droughts, such as occurred in 1997 and 2015, these sources dry up and villagers are forced to use other sources. This has knock-on effects, including people being forced to use larger polluted rivers as a water source, drinking muddy water, women and girls travelling longer distances to obtain water and closure of schools. In the second half of 2015, many children did not attend schools in many locations in PNG, even in places where food supply was reasonably good. Shortages of drinking water and associated partial or complete closure of schools was the most widespread impact of the 1997 drought.

The issue can be addressed by provision of more secure water sources, including water tanks and piped water for villages and schools.

Health

There were many reports of drought and the stress of seeking food resulting in an increase in a number of diseases during and after the recent major droughts. Health problems included an increase in skin disease, diarrhoea, malaria, typhoid fever and respiratory ailments.

There was a documented increase in the death rate at five locations during and immediately after the 1997 drought. The common factor in these places was remoteness, very low cash income and lack of access to markets. During and after the 2015 drought there were credible reports of an increase in the death rate associated with shortages of food and clean drinking water in a number of locations in Western Province and in parts of the highlands.

Wildfires

During the really big droughts in 1914 and 1997, wildfires (bushfires) were reported in many places in PNG. In 1997, these occurred even in places where the rainfall was usually very high, such as the Salamaua–Morobe area of Morobe Province and the Karimui Plateau in Simbu Province. Wildfires were less widespread in the 2015 drought, but were reported in some highland locations. Wildfires resulted in loss of property, crops and fallow vegetation which is used to rebuild houses lost in fires.

2. Field Preparations

2.1 Pre-fieldwork checklist

Background information

- It is important to read and understand the questions in the assessment form (Appendix 1) and the guide to field assessments (Section 3) before commencing fieldwork.
- Note what to do during field observations. Think about the interview techniques you will adopt and how you will conduct the data collection exercise.
- Undertake basic desktop research and obtain all relevant reports on the study area (see Appendix 2).
- Consult the population census and get an indication of the numbers of people in the area of your assessment who may be affected (see Section 4.2). Seek expert advice if you need it.
- Take some time to think about the data collection, compilation and analysis methods you will use. It is always good to consider how you will write your assessment report, including the major sections you intend to include (see Section 4.1).
- Study the local geography on a map, noting the roads, terrain and other important features.

Logistical considerations

- Obtain the contact details of key local people, review costs and obtain information about any cultural particularities. Discuss your plans and itinerary, then ask if there is anything else you need to do or carry with you.
- Confirm travel, local transport and accommodation arrangements.
- Obtain a pre-trip medical examination if necessary, and carry antimalarial tablets, snake gaiters and personal protection equipment as required.
- Safety and security are critically important and preparations will depend on where the assessments are conducted.

Materials to carry with you

- Small backpack
- Notebook, pen and pencil
- Mobile phone with spare batteries
- Camera with video recording capability, if available
- Small denominations of cash
- Torch with spare batteries
- Map of the local area
- Global positioning system (GPS) unit, if available.

If you plan to stay in villages

- Bring enough food, such as rice, tinned fish or noodles, for your stay. It is good practice to bring more food than required by the assessment team so that any leftovers can be given to villagers.
- Carry a sleeping bag or something to cover yourself with at night.
- Be prepared to pay a small rent (about K50 per person per night).
- It is often useful to have a fireside chat in the village over tea or coffee. A lot of information is gathered in this way.
- Be aware of cultural sensitivities — if in doubt about anything, ask someone who knows the people in the area well.

3. Field Assessments

3.1 Using the Papua New Guinea Drought and Frost Assessment Form, 2015–2016

These notes are to guide those using the Papua New Guinea Drought and Frost Assessment Form, 2015–2016 (see Appendix 1). The form was developed in August 2015 and modified from one used in the 1997–98 drought and frost assessments. It was updated at the Church Partnership Program (CPP) December 2015 workshop.[10] The form has proved easy to use by outside observers with no training in its use.

Disaster management often starts with a critical analysis of the situation on the ground. It requires objective assessment by professional people who have experience in conducting field assessments. Villagers, meanwhile, often tend to exaggerate the impact of a disaster. This is to be expected as they have no basis on which to compare their situation with that elsewhere. It is important that you make a critical situation analysis, by comparing the situation to other locations or reports, and make projections based on your comparative assessments and those of other team members. The information collected must be accurate, verifiable and sufficient for planning purposes.

It is important that you do not make any promises of food or other aid being delivered when conducting an assessment, and you should state that such decisions will be made by others and depend on resources available. In many circumstances, people will be highly critical of their local member of parliament or the government. Take note of such comments, but do not encourage such comments or contribute to them.

Always review, discuss with other team members, save your field notes in a safe place and compile any data collected at the end of each working day in the field. This helps to avoid data loss, fill in any gaps, corroborate and cross-check stories and interpretations of conditions, and provides an important opportunity to review the categories assigned to estimates of food, water and health impacts.

The contacts you make and networks you develop while conducting assessments are an invaluable resource. Ensure that the names, locations, phone numbers, addresses and expertise (professional or otherwise) of all your informants, co-workers and any other people working in the same field as you are recorded, saved and distributed among your team members. Use this database to identify other contacts who may be able to assist you in various aspects of your work, provide feedback and updates to the communities in which you have previously completed assessments, and conduct follow-up data collection activities as conditions change over time (see also Section 4.3.3).

3.1.1 Field interview techniques

The assessment form is not intended to be used as a questionnaire, that is, you do not sit with the form in hand while you interview villagers about their situation. Rather, you should talk with villagers about the impact of the drought (and frosts at high-altitude locations) and guide the conversation if necessary. When you have completed the discussions, fill in the form or at least check it to see whether there are any points you have not discussed. You can fill in the form after meeting with villagers. Ideally, you should meet with a group of people, as well as a number of

[10] Several churches, community-based organisations and non-government organisations used their own assessment forms during the 2015–16 drought and frosts.

individuals. Sometimes individuals can expand on what was said at a larger meeting or offer another viewpoint.

You should also attempt to interview community health workers, schoolteachers and church leaders, who live or work in the location you are assessing. You should also visit a number of food gardens to inspect damage to gardens, their recovery, and to estimate when food is likely to become available from new plantings after the drought. As much as possible, cross-check statements by examining food in *bilums*, kitchen scraps and contents of kitchens. This will often give you further information on food supply. If your observations in kitchens or elsewhere indicate that statements made by villagers are incorrect, follow this up with further questions.

Some issues that require particular attention are:

- Claims about an increased rate of illness
- Claims about an increased death rate
- Evidence of increases in child malnutrition
- Types and quantities of alternative foods eaten
- Sales or killing of livestock
- Out-migration because of food shortages (especially important in very high altitude locations)
- Quantities of food aid received
- Amount of remittances received
- Damage to crops by insects and other pests during the drought.

The emphasis should always be on the collection of accurate and verifiable data, facts and stories, supported by photographs and video where equipment is available. Try to avoid bias, exaggeration, political statements and controversial issues.

3.1.2 Gender sensitivity

It is important to strike the right balance between respecting local gender norms and ensuring the views of women are heard. In some communities it is normal for men to do most of the talking and they may speak on behalf of women. However, it is important to find a way to speak directly with women about their experiences. It is often women and children who suffer most during food shortages, and it is often women who do the cooking, meaning they know more about what food the family is eating. Ideally, assessment teams will include at least one woman, which will help to make women feel comfortable talking.

3.1.3 Estimation of food, water and health impacts

The Papua New Guinea Drought and Frost Impact Assessment Form, 2015–2016, combines descriptive information for each of the sites assessed along with severity of impact ratings for three categories (food supply, water supply and health), ranging from 1 to 5 — with 1 being near to normal conditions and 5 being the worst case situation (Tables 1–3). You are asked to assess on a scale of 1 to 5 the impact of the drought and frosts on food supply, water supply and villagers' health. Note that your estimate is at the time of the visit. You can modify this in the 'justification' notes under the boxes for these assessments (see Appendix 1). For example, you might note: 'Water supply is now OK, but people were drinking water from the large river from about July to November, when heavy rain fell and the small streams started to flow again'.

Table 1. Food supply assessment categories

Unusually dry, but no major food supply problems	1
Some inconvenience: staple food is limited but other foods available	2
Difficult: food limited and some famine or unusual foods being eaten	3
Conditions bad: no food in gardens; only famine food being eaten	4
Extreme situation: no food available at all	5

Table 2. Water supply assessment categories

Unusually dry, but no major drinking or other problems	1
Some inconvenience: usual water source not available, or water tastes salty	2
Difficult: water available but at a greater distance than normal and takes longer to collect	3
Conditions bad: water in short supply or possibly polluted	4
Extreme situation: water very limited or too salty or polluted to drink	5

Table 3. Health impact assessment categories

Unusually dry, but no major health problems	1
Some inconvenience: dry skin, sunburn or other minor health problems	2
Difficult: disabled and old people and children unwell; increase in diarrhoea	3
Conditions bad: more people sick; lives of disabled, old people and children at risk	4
Extreme situation: many people sick; small children, disabled and old people dying	5

3.1.4 Post-drought recovery

The rainfall pattern in recent months should be noted if information is available.

Other post-drought issues include:

- What people are eating now
- Price of staple crops in local markets, such as changes in price or heap size for sweet potato
- When staple foods are expected to become available in usual supply (this will depend on access to sago, altitude, extent of damage by frost and when rain fell)
- Availability of planting material, including corn, pumpkin, sweet potato and English potato
- Insect damage to food crops after the drought was over
- Failure of sweet potato to form tubers (try to establish the extent of the problem)
- Extent of damage caused by landslips, if any — estimate damage caused by landslips to newly constructed gardens and estimate delay of recovery of food supply due to landslips
- Extent of damage caused by floods, if any — estimate damage caused by floods to newly constructed gardens and estimate delay of recovery of food supply due to floods.

3.1.5 Information on logistics for possible food aid

There is no space on the form for comments about logistics for potential food aid delivery. However, it can be useful if you record information on how relief food might be delivered to this area. For example: 'The road from Hagen to MMM is in good condition. However, there may be security issues near XXX. It is not possible to travel by road from YYY to ZZZ as the bridge just past the LLL Church at KKK is down. This means that food or other aid would have to be carried the final 5 km to ZZZ.'

If there are airstrips or helipads, record their locations, preferably using a GPS to record the latitude/northing and longitude/easting (see Appendix 3 on the use of a GPS unit).

Case study 1: The use of networks in conducting assessments — James Komengi

This case study illustrates the importance of establishing networks within a community and maintaining regular contact.

James Komengi works for the United Church in Hela Province leading numerous community development programs, including peace-building initiatives in conflict areas. When the drought started in early 2015 and severe frosts hit gardens in July 2015, James identified a need to quickly build relationships and establish networks. He began driving to remote high-altitude communities in Hela and Enga provinces, and he began seeking support through the United Church and outside church networks. In September 2015 he participated in a food needs assessment, which was followed by a report, short media pieces and presentations at stakeholder meetings. James initiated small deliveries of rice to some schools and health centres with the support of the United Church. He maintained regular contact with communities via phone and text messages and documented the situation.

In March 2016, James led another assessment back into these areas, which supported efforts to activate the United Nations Central Emergency Relief Fund for emergency food support to these areas. The World Food Programme sought advice from James on procurement, logistics, cultural sensitivities and security. James was subsequently employed by CARE International as a community engagement officer to facilitate delivery of emergency food supplies in Hela and Enga provinces.

The work undertaken by James and the United Church underscores the value of building and maintaining networks, both at the community level and at regional, national and international levels. James was able to mobilise people quickly to obtain updated information, and to let the community know that food relief was coming.

3.2 Estimating the severity of impact indicators

There will always be significant variations in conditions between communities and districts, and there are many reasons for this. The criteria for rating the severity of a drought or frost includes both physical/verifiable features as well as non-physical or non-climatic factors. Some communities will cope better than others, and this must be considered and taken into account when assigning a rating for the severity of damage and its impact on food availability.

3.2.1 What people will not tell you

When deciding on a severity score, you may find that, even after completing fieldwork and collating the data, there are still gaps in the information set. For example, we have found that people will often not tell you how much money they have in the bank, or how much money relatives have sent to the family. Sometimes they will not tell you how many pigs they own. For these reasons, important indicators to help determine a fair rating of impact for each community are discussed in detail below.

3.2.2 Agrophysical and climatic factors

- Physical impact on food gardens (especially the effect on sweet potato) and other food sources (other garden foods, bush food, fish)
- Impact on drinking water sources, walking distance to fetch water
- Health impacts (through interviews with health workers and health centre records, if available)
- Impact on schools — closed completely or only operating for half days (from interviews with teachers)
- Migration — people and families may move in or out
- Remoteness, accessibility and isolation — for example, rural communities characterised by no roads, very high altitude (2200–2800 m), coral atolls and where villagers have little cash income
- Development influences — for example, PNGLNG project, oil/gas exploration and development, Porgera gold mine
- Wildfires — extent of environmental damage, disruption to livelihoods, damage to building materials
- Drought-induced social problems
- Remittances to communities from outside.

3.2.3 Development and economic factors

It is important to note that socio-economic factors such as the development of infrastructure (roads and bridges) and the presence of businesses and multinational corporations will improve the economy of a region and therefore household incomes. The per capita income of communities near towns, plantations or major highways is usually better than the per capita income of communities in remote locations.

Socio-economic development can cushion the impact of drought on households. Food availability and cash supply may be reduced but the situation of communities near these developments is far better than in communities not exposed to such improvements.

3.2.4 Remittances

During food shortages, family members employed in cities often send money home to help households purchase food. This was documented in Simbu and Milne Bay provinces in 2015–16. During an assessment, ask indirect questions to get a sense of the available cash situation in communities. You can also ask about the number of educated people in a community and get a sense of their employment status to work out whether some cash may be coming into the community.

3.3 Estimating available food needs

3.3.1 Objective

The main objective of conducting a food needs assessment is to assemble accurate, factual and relevant data in a timely manner. It is important to remember that the information collected may be used by a government body or some other organisation, including churches, to help with planning relief assistance to those in need.

3.3.2 Methodology

The methodology on estimating available food supply was developed and tested by the CPP team during the 2015–16 El Niño drought and frosts in the highlands of PNG. It was not tested in lowland areas where farming systems and food crops differ from those in the highlands.

3.3.3 Assessing and estimating available food

In a disaster assessment, estimating the food supply available to an affected household or community (i.e. their food security situation) is probably the most critical task. It is therefore important that this aspect of the assessment is done correctly.

At the outset, try to quickly establish a basic understanding of the local gardening system. When assessing food supply issues, the most important indicator is availability of the staple crop (generally sweet potato, banana, sago, yam, taro or cassava). Usually a family will plant a kitchen garden (or home garden) around their house, which is clearly visible when you first visit to conduct an interview. They will also have other gardens located in various places. Some gardens are located at higher elevations (e.g. *karuka*) while others may be planted lower down in valleys near rivers or creeks (e.g. *marita*).

When conducting an assessment, try to estimate the food supply available to the household by taking into account all gardens belonging to the family being interviewed, not just the gardens you have been shown.

Methods to assess sweet potato availability

A number of methods used to estimate the availability of sweet potato in drought-affected areas are described in Appendix 4. These notes should be studied thoroughly before undertaking a food needs assessment.

Appendix 4 includes step-by-step instructions on how to:

- Survey and estimate the number of sweet potato tubers in a garden
- Survey and account for other sources of food
- Estimate daily food consumption by households
- Estimate how long available food supplies will last
- Score sweet potato tubers damaged by weevils.

3.3.4 Other types of information to collect

Apart from estimating available food supply in gardens, there are three other important types of information that must be collected.

Market observations

Observations of food sold in local markets will provide useful clues to the available food needs in a community. It is advisable to interview vendors and collect information on where the food is coming from — whether it is grown locally or imported from elsewhere. You should note the range of foods sold.

It is useful to note the price of sweet potato and other staple food crops and ask what the price would be in a normal situation. This information will give you a rough estimate of price increases associated with the drought or other disaster.

Micro-environments

It is important to note any micro-environment influences, such as the shadowing effects of mountains on gardens or gardens on steep slopes, that may explain why a particular food needs situation is different to that of similar communities nearby.

Migration

Migration into or out of a community often provides a good indication of the severity of a disaster. Usually whole families, but sometimes individuals, will move out of a disaster zone. It is more obvious when a family migrates because everyone in the village will know about it and can relate the story. An estimate of the number of people or families who have already migrated out, or are planning to move, will indicate whether food availability is declining. If there is evidence of in-migration from other communities, this will indicate that the local situation is probably better than in the communities they have come from.

It is advisable to record the names and contact numbers, if available, of persons leaving or coming into an area being assessed, so that information can be crosschecked later.

3.4 Disaster assessment checklist

- Interview farmers (men, women and youths), community leaders, church pastors, schoolteachers, health workers and public servants, including provincial and district disaster coordinators
- Investigate reports of deaths
- Visit creeks and rivers to assess the availability of drinking water
- Visit health centres and hospitals and obtain information on any marked increase in disease incidence
- Visit markets to assess locally produced food being traded
- Assemble general information on the provincial and local economy
- Investigate and record cases of in-migration and out-migration by individuals, families and entire communities
- Assess the landscape features — look for micro-environment effects such as aspect and shadowing
- Obtain basic data about households (number and age of family members)
- Estimate the number of villagers who are suffering from food shortages in each area (see Section 4.2)
- Establish the numbers of domesticated animals (especially pigs) and whether they are being culled. (Humans and animals compete for food during a drought. Stories of pig culling often give a good indication of the severity of a disaster. An estimate of the numbers of pigs killed by a family will indicate whether available food supplies are depleted.)
- Inspect gardens and conduct a thorough assessment. Record the following information:
    - The coordinates and altitude of each garden, using a GPS unit (see Appendix 3 on the use of a GPS unit)
    - The number of mounds (or channels) in the garden
    - An estimate of the average size of mounds (m^2)
    - The age of the garden
    - The most important crop planted in the garden

- The numbers of sweet potato tubers in a few mounds; use this to calculate the average number of tubers in at least one garden per farmer[11]
- The average number of food gardens per household

- Estimate, based on the size of the garden visited and assessed:
  - The approximate size of their other gardens (larger, the same or smaller than the garden assessed)
  - The approximate age of each garden (newer, the same or older)
  - Record the types of crops planted and the dominant crop in each garden
  - Estimate the quantities of sweet potato relative to the garden measured
  - Estimate the quantities of other food planted (e.g. *karuka* nut pandanus, sugar cane, greens, cassava, banana, taro, corn, peanut and *marita* pandanus)
  - Note the availability of 'bush foods' such as mushrooms and game meat.

The data collected in the field must then be summarised and recorded in a consistent manner.

[11] Women usually separate small tubers (which are fed to pigs) from larger ones. During a drought, however, every sweet potato is precious to humans, and only leftovers are fed to pigs. Therefore, during an assessment, all available tubers in a garden should be considered as potential food for the household.

Prolonged droughts reduce the supply of food for home consumption and sale in local markets. The bare benches at Mougulu market in January 2016 are a stark reminder of the severity of the drought in what is normally a busy market full of food. There are few stores in this remote location and people depend on buying food in markets when their own gardens fail. Photo by Sally Lloyd.

Damage to food gardens by repeated severe frosts, lower Kaugel Valley, Western Highlands Province, July 2015. Such frosts destroy most food crops, including sweet potato and English potato. Immediately after a major frost, sweet potato is in good supply, but then people are short of food, often for many months. Round cabbage is one of the few food crops to survive frosts. Photo by Kud Sitango.

A woman carries water in a metal container on an island in Milne Bay Province during the 1997–98 drought. In major droughts many water sources dry up, which forces villagers, mostly women and girls, to walk much further to find water and carry it back to the village. Shortages of drinking water affected more rural villagers than did food shortages in both the 1997–98 and 2015–16 droughts. Photo by Mike Bourke.

Three generations of a family pose with a small bunch of bananas, Mougulu area, Western Province, early 2016. The adults and children show clear signs of malnutrition, induced by limited food supply during the 2015–16 drought. There were strong indications of increased malnutrition in some remote communities in PNG during this and previous droughts. Photo by Sally Lloyd.

A group of schoolboys carry firewood as they walk to school at a high-altitude location in Hela Province, September 2015. Their own school was closed because of food and water shortages. Many children in rural PNG did not attend school in the second half of 2015 or were there only in the morning because of water and food shortages. Even in locations where the impact on food supply was less severe, schools were closed completely or for part of the day because there was insufficient drinking water for pupils and staff. Photo by Matt Kanua.

An area burnt by wildfire in the Kandep Basin, Enga Province, September 2015. During drought, wildfires can cause significant damage to fallow vegetation, crops, houses and occasionally to people. One impact is that vegetation used to rebuild houses is scarce and delays rebuilding. Photo by Matt Kanua.

Two women carry bags of imported rice and flour to their village from a store, Chuave area, Simbu Province, November 1997. Villagers who have access to cash income survive shortfalls in subsistence production by purchasing food from markets or stores. Those without access to cash suffer the most when subsistence food production fails. Photo by Mike Bourke.

A family carry banana and sugarcane planting material from a food garden to a wetter site near a stream, Mt Elimbari area, Simbu Province, November 1997. This is a useful strategy to preserve planting material so that gardens can be re-established once rains return. Provision of large quantities of planting material to affected villagers is a very important way to help villagers recover from a natural disaster. Fast-growing, high-energy foods such as corn (maize), sweet potato and English potato are the most useful food crops in this situation. Photo by Mike Bourke.

Sweet potato tubers damaged by sweet potato weevil, Tari Basin, September 2015. This insect pest is usually of minor significance in most of PNG, but damage increases dramatically during droughts when weevils can access tubers via cracks in the soil. The insect renders the tubers inedible by imparting a strong flavour to the tubers. There are now three species of sweet potato weevil in PNG, whereas there was only one up to about 2010. Damage to tubers is greater at lower altitudes in the highlands, but further research is needed to understand how to reduce the impact of this pest. Photo by Matt Kanua.

Pumpkin fruit destroyed by insect damage, Mougulu area, Western Province, January 2016. The return of rain resulted in high infestation rates of pest insects on a variety of food crops in many parts of PNG in early 2016. This was probably caused by an imbalance between pests of food crops and the predators of those pests. Further research is needed on insect damage and possible ways to reduce it. Photo by Sally Lloyd.

Sweet potato plants that have failed to form tubers, Nondugl area, Western Highlands Province, January 2016. When rains return after an extended dry period, there is a flush of nutrients in the soil. This promotes good growth of most crops but, for sweet potato, it promotes excessive leafy growth at the expense of tuber production. The best solution is to replant the crop at a site of reduced soil fertility. More research is required to understand solutions to this issue. Photo by Jean-Luc Siblot.

Three members (Matt Kanua, James Komengi and Philip Pepo) of a United Church team record information in their notebooks as they assess food supply in Hela Province, September 2015. Field assessments are an important process to understand the impact of a disaster on villagers' lives. It is important to listen to villagers' stories and to take extensive notes as these form the basis for reports and presentations. Photo taken for Matt Kanua.

4. Post-Fieldwork Reporting

4.1 Writing a food needs assessment report

An important part of any assessment is making the findings available to those who may be able to help with providing aid. Disseminating your findings can be done in a number of ways, including media interviews and presentations. A written report needs to be prepared in almost all situations. As you prepare this, keep in mind the intended audience. Remember that a short report is more likely to be read and acted on than a longer one. Aim for a maximum of three pages of written material and preferably less. You do not need to give very detailed information of locations visited, people consulted and travel arrangements, although this could be given in an appendix if necessary.

The parts of a report are described below, with brief notes.

Title

This should be short and give the reader an understanding of the nature of the report.

Author/s name, contact details, date

This information could appear under the title, or in a footnote, or at the end of the report. It is very important to give a date that the report was written or finalised.

Summary

In many ways, this is the most important part of any report as it may be the only part that is actually read. It does not have to be long (100 to 300 words is adequate). It needs to contain a sentence or two on what was done and then give a summary of the most important findings. This should be written last, ideally a day or so after the body of the report has been finalised.

Background

This is the short introduction that gives the background to the assessment (e.g. reports by local pastors of severe frost damage and food shortages in the Kandep Basin). A summary of how the information was gathered follows (e.g. a five-day field trip was made to the Kandep Basin and assessment methods included garden visits, village meetings and interviews with non-village observers).

Findings

Here you give a summary of the main findings of the assessment, focusing on the impact of the event on food supply, water supply and health, as well as how villagers are responding to the situation (such as eating alternative foods, purchasing rice, selling pigs or out-migration).

Your information may be supported by tables, graphs or photos. Importantly, such material should be placed at the end of the report, not in the text. After editing, it can be incorporated but, initially, it should be kept separate from the text.

Conclusions

If the report is longer, a short conclusion may be helpful to the reader. But if the conclusions are brief, they can come at the end of the Findings section.

Acknowledgements

You may wish to acknowledge assistance provided in a separate section. In a short report, it is unlikely there will be space for this. Alternatively, include an acknowledgement in a footnote.

Examples of two types of food needs assessment reports prepared during 2015–16 are provided in Appendixes 5 and 6.

4.2 Estimating the number of affected people

It is very important to provide an estimate of the number of villagers who are suffering from food shortages in an area. This information is needed for planning relief by national or provincial governments, donors and others. Estimating the number of affected people can be a difficult exercise to do in PNG, particularly as some of the census data is not accurate. Three main sources of population data are described below.

4.2.1 The 2011 census[12]

The information on population numbers in the 2011 census appears accurate for some parts of PNG. But in many locations, particularly in highlands provinces but also in some lowlands provinces, the data is clearly not accurate. Hence, even though this is the most recent census data available at a national level, population figures in the census need to be used with great caution. People who have experience comparing data from different censuses in PNG can make a judgement as to whether the data can be used with confidence in any given location.

4.2.2 The 2000 census

The national census conducted in 2000 appears to be much more accurate than the 2011 census. It is possible to estimate the current population by extrapolating from the 2000 data. This is not an ideal solution, however, as it is now over 16 years since this census was conducted. As well, the population growth rates vary between locations in PNG. Nevertheless, such an exercise often provides more accurate information than that contained in the 2011 national census.

To calculate the population in a particular location, you need to know:

- The population in the area of interest in the 2000 census
- The number of years since the 2000 census
- An estimate of the population growth rate in the area of interest since 2000.

For example, if the population in the area of interest in the 2000 census was 10,000 people, you want to estimate the mid-2016 population, and you assume that the population growth rate was 2.7 per cent per year for this 16-year period, then you would perform the following calculation on a hand calculator:

- 2.7 ÷ 100 + 1 [= 1.027]
- Multiply
- Multiply
- 10,000
- Hit the ‘equal’ button 16 times.

[12] The final figures from the 2011 census can be found at http://fscluster.org/sites/default/files/documents/book_2012_nso_png_census_2011.pdf.

The estimated population in this location in mid-2016 would be 15,315.

Note that some calculators, including some on laptops and iPhones, use a different sequence. On these devices, you would perform the following calculation:

- 10,000
- Multiply
- Multiply
- 1.027
- Hit the 'equal' button 16 times

The estimated population in this location in mid-2016 would be 15,315.

4.2.3 Locally generated census data

If it is available, census data generated at the local or provincial level is often the most accurate and recent in PNG. Some provinces have conducted provincial censuses in recent years, for example, Milne Bay Province in 2015. In other locations, locally based officials have conducted a census in response to a natural disaster. This was done, for example, in parts of Western Province in 2016 where the population data provided by local officials was more accurate than that recorded in the 2011 national census.

An example of how estimates of the number of affected people were prepared and included in a recent food needs assessment report is provided in Appendix 6.

4.3 Media publicity, social networking and presentations

4.3.1 Mainstream media

A senior local journalist reported that while there has been a proliferation of information service providers in recent years, the *Post Courier* and *The National* newspapers remain the primary information sources in PNG and are still widely read. In 2015, however, the media industry did not send out staff to research and report on the drought; reports were meagre, sporadic and for the most part generalised. As a result, the impact of the drought was either exaggerated or played down for most of the country. Coupled with censorship of critical information from government sources, the performance of the media sector in disseminating factually correct and well-researched information on the drought was poor.

Consequently, field workers need to engage with the media to encourage useful reporting and to publicise the disaster situation.

In 2015–16, the PNG media ran a number of reports issued by the Church Partnership Program (CPP) team, especially the comprehensive drought coverage reports compiled by the CPP technical adviser. CPP staff, the technical adviser and disaster response coordinators were also interviewed several times by the international media, particularly the Australian Broadcasting Corporation and Radio New Zealand. These interviews received some coverage in overseas newspapers.

4.3.2 Social media

Social media can be a useful tool in communicating the impacts of El Niño on the ground to a wider audience. However, before putting anything on social media it is important that you:

- Think about what your purpose is
- Make sure you have consent from the community or individuals involved to use photos of them
- Ensure your employer approves of your social media use.

If you decide to use social media there are a number of important points to keep in mind, including:

- Ensure photos are of good quality
- Appeal to the heart, not the brain. Photos of people are usually more effective than photos of landscapes or gardens
- Think about what you would like your audience to do. You may simply want your friends and networks to know about the situation, but if you want action then think about directing your audience to a place they can donate funds
- Think about who else will see your post. While being critical of the government or international organisations can be useful, your post may be seen by wider circles than you first envisage.

Case study 2: Bringing local food shortages to the attention of the media

Sally Lloyd is an Australian woman and the daughter of pioneering Evangelical Church of PNG missionaries in the Nomad area of Western Province. Sally grew up in Mougulu, speaks the Bedamini language and knows the communities well.

The communities in this area were not receiving food aid, despite severe food and water shortages caused by the El Niño drought. Frustrated by this lack of support, Sally began posting stories of their suffering on Facebook in late 2015. These posts were viewed, shared and commented on by friends, family and others concerned with the impact of the drought on village communities.

The momentum Sally's posts created led to Sally being interviewed by *The National* newspaper. The 19 January 2016 edition of *The National* led with a front page story on the food shortages in North Fly, and photos of a malnourished mother with her infant son. Media attention and national and international interest in the drought intensified, in large part due to the article in *The National*. Sally subsequently worked with the Church Partnership Program to undertake food needs assessments in the area, and later joined the World Food Programme to coordinate deliveries of food supplies in the region.

Although Sally focused mainly on one geographical area of PNG, her efforts to raise awareness led to funding for food distribution in other parts of the country, including Hela and Enga provinces and Milne Bay Province. Her story highlights the power of social media and the national print media in PNG.

4.3.3 Awareness and communicating results

Using the most effective media and telecommunication channels available, disaster response coordinators communicated regularly to create awareness in the community at large. This was demonstrated powerfully by the United Church in Hela Province, where the disaster response coordinator maintained a database of telephone numbers of respected community leaders. He used this network during the drought to encourage ward councillors, church pastors, community schoolteachers and health workers to provide factual, evidenced-based reports. He followed up regularly to get updates on the rapidly evolving situation on the ground. He prepared reports immediately and emailed them to the CPP drought coordinator in Port Moresby. The reports were then included in the regular messages provided to key stakeholders (see Case study 1 on page 18).

While mainstream media was used for reporting the drought impact, telecommunication services were used to assess drought conditions during 2015–16. In Milne Bay, the provincial disaster coordinator reported that villagers, officials and church workers on remote islands used a Digicel toll free number to provide situation updates. The World Food Programme also used the Digicel network to conduct assessments by the mobile vulnerability and analysis mapping (mVAM) phone survey method, guided by technical information provided by the CPP team.

Based on these experiences, those involved in disaster response work should always:

- Ensure there is a functional communication system to distribute their findings to government agencies, international development partners, churches, non-government organisations, the media and other stakeholders
- Employ the networking tactics used by the United Church in Hela Province to report disaster situations
- Communicate factually correct, evidenced-based events in reports and verbal presentations
- Communicate effectively to both domestic and international media with powerful graphic images
- Use social media to capture the attention of the elite and educated population
- Be mindful about propriety rights, human dignity, the disabled and child-protection guidelines
- Communicate emphatically — when talking to journalists, aim at ‘the heart not the brain’.

Appendix 1: Papua New Guinea Drought and Frost Assessment Form, 2015–2016

Location

Province	District	Local-Level Government	Village(s)
Latitude/Northing	Longitude/Easting	Altitude	

Surveyor

Name	Institution/Employer	Mobile Phone Number	Date

Situation report

Print a brief summary of the situation at this place.

Food supply assessment (Clearly circle one number that best describes the situation here)

Unusually dry, but no major food supply problems	1
Some inconvenience: staple food is limited but other foods available	2
Difficult: food limited and some famine or unusual foods being eaten	3
Conditions bad: no food in gardens; only famine food being eaten	4
Extreme situation: no food available at all	5

Print a brief justification for your assessment score for the food supply situation.

Water supply assessment (Clearly circle one number that best describes the situation here)

Unusually dry, but no major drinking or other problems	1
Some inconvenience: usual water source not available, or water tastes salty	2
Difficult: water available but at a greater distance than normal and takes longer to collect	3
Conditions bad: water in short supply or possibly polluted	4
Extreme situation: water very limited or too salty or polluted to drink	5

Print a brief justification for your assessment score for the water supply situation.

Health impact assessment (Clearly circle one number that best describes the situation here)

Unusually dry, but no major health problems	1
Some inconvenience: dry skin, sunburn or other minor health problems	2
Difficult: disabled and old people and children unwell; increase in diarrhoea	3
Conditions bad: more people sick; lives of disabled, old people and children at risk	4
Extreme situation: many people sick; small children, disabled and old people dying	5

Print a brief justification for your assessment score for the health situation.

Other impacts of drought/frost (Tick and print very brief notes)

Schools closed, teachers gone		
Cash crops damaged		
Fires burned forest/grassland		
Fires burned houses/property		
Social unrest		
Other events		

Responses by villagers (Tick and print very brief notes)

Eating non-staple foods		
Eating famine foods		
Travelling long distances for water		
Buying food with cash savings		
Killing and selling pigs		
Fishing to obtain cash		
Making plans to move (where to?)		
Other responses		

External assistance received (Tick and print very brief notes on quantity, when received and adequacy)

Assistance from government, church, NGOs (names)		
Food received from family and wantoks (where do they live)		
Remittances of money from family or wantoks (where, etc.)		

Other observations (e.g. brief notes on local food markets (changes in volumes, prices, items), security situation, movements of people, conflicts, increased gender violence, local variation, access to health services)

Appendix 2: Useful publications

There are a number of accessible publications which will help you to conduct a better assessment. Ideally, you should consult these before going to the field and again when you write your report. You should also try to obtain other reports on the food needs situation in the area of interest prior to fieldwork. These include newspaper reports, as well as those by non-government organisations, researchers, concerned citizens in the area or locally based officials. Details on some of the key publications follow.

Papua New Guinea Rural Development Handbook

Hanson, L.W., Allen, B.J., Bourke, R.M. and McCarthy, T.J. (2001). *Papua New Guinea Rural Development Handbook*. The Australian National University, Canberra. 326 pp.
http://fscluster.org/papua-new-guinea/document/resource-document-papua-new-guinea-rural

This book is the single most useful publication for anyone going to the field, particularly if they do not know the area. In the book, the 19 provinces (as there were at the time of publication) and the 85 rural districts (electorates) are described under eight categories: physical description, population, access to services, cash income, subsistence agriculture, land potential, pressure on land and relative disadvantage of the population.

The descriptions are short, with a small amount of text, a map and a bar graph on one page for each category in each province. Each district in the province is then described on one page for the same categories. At the end of the book, the information is presented as maps, with tables ranking the 85 rural districts for the various categories. There are many hard copies held in libraries in PNG.

Food and Agriculture in Papua New Guinea

Bourke, R.M. and Harwood, T. (eds) (2009). *Food and Agriculture in Papua New Guinea*. ANU E Press, The Australian National University, Canberra. 638 pp.
http://epress.anu.edu.au/food_agriculture_citation.html

This is the definitive book on agriculture in PNG. The first 15 sections are devoted to the physical landscape, population and data held in geographic information systems. The final 100 pages of appendix tables contain much statistical data on PNG agriculture, including estimates of production of the staple food crops in each province. The book has a comprehensive index.

Hard copies can be obtained free of charge from the University of Papua New Guinea bookshop in Port Moresby. To obtain a copy, send an email request to upngbooks@gmail.com.

Food Security for Papua New Guinea

Bourke, R.M., Allen, M.G. and Salisbury, J.G. (eds) (2001). *Food Security for Papua New Guinea. Proceedings of the Papua New Guinea Food and Nutrition 2000 Conference*. ACIAR Proceedings No. 99. Australian Centre for International Agricultural Research, Canberra. 882 pp.
http://aciar.gov.au/files/node/306/pr99_pdf_10703.pdf

The book contains over 100 papers from the 2000 Food and Nutrition Conference. Importantly for food supply issues, there are 17 papers devoted to the impact of, and response to, the 1997–98 drought and frosts. The impact and response are addressed at a range of scales and by different

organisations. The 17 papers on the 1997–98 drought and frost are available at http://aciar.gov.au/files/pr99_-_abstract_x_17._drought_related.pdf.

Agricultural Systems of Papua New Guinea Working Papers

Over a six-year period in the 1990s, teams of Australian and PNG scientists surveyed agriculture in all of PNG. They classified the rural landscape into 342 mapping units termed 'agricultural systems'. For each system, over 100 aspects of agriculture were described. The most important aspects are the most important staple food crops, fallow types, fallow period, cropping period and techniques used to maintain soil fertility (other than natural fallows).

Other information includes details of fieldwork, how the boundaries were defined, relevant publications for the area, comparison with data in a national nutrition survey and additional notes. These reports provide the baseline information on food production in each 'agricultural system' in PNG during normal situations. The information was published as a series of 19 working papers, one per province.

An example of one of the 19 publications is:

Bourke, R.M., Allen, B.J., Hide, R.L., Fritsch, D., Grau, R., Hobsbawn, P., Konabe, B., Levett, M.P., Lyon, S. and Varvaliu, A. (2002). Southern Highlands Province: Text Summaries, Maps, Code Lists and Village Identification. *Agricultural Systems of Papua New Guinea Working Paper No. 11*. Department of Human Geography, The Australian National University, Canberra.
http://fscluster.org/papua-new-guinea/document/resource-document-agriculture-systems

Special edition of *Mountain Research and Development*

Allen, B., Brookfield, H. and Byron, Y. (eds) (1989). Frost and drought in the highlands of Papua New Guinea. *Mountain Research and Development* 9(3):199–334.

In 1989, an entire issue of the international journal *Mountain Research and Development* was devoted to drought and frost in PNG. The issue contains a series of papers on the 1972 and 1982 events, as well as broader aspects of the impacts on food production. There is much information on recorded or likely food shortages in PNG in the past. This publication would be more useful to a specialist researcher.

Appendix 3: Basic use of a global positioning system unit

Global positioning system (GPS) units provide a quick, easy and accurate method of identifying the specific location where field assessments are conducted. The following step-by-step notes provide a brief outline of how to operate a GPS unit and specifically refer to the Garmin GPSMAP 64s/64st model.

While GPS units are robust and designed to be both water and shock resistant, care should be taken at all times to prevent damaging the device.

3.1 Getting started

Installing batteries

- Turn the D-ring at the base of the rear panel counterclockwise (to the left) and pull out to remove the cover
- Insert two AA batteries (1.5 volts each) with the **+** end of the left-hand battery pointing up and the **+** end of the right-hand battery pointing down (following the images printed inside the battery cavity) — lithium batteries are preferable but alkaline batteries are also fine
- Replace the battery cover (top end first) and turn the D-ring clockwise (to the right)
- Press and hold down the power button on the right-hand side of the GPS unit until **GARMIN** appears on the screen, followed by a mapping image
- Press the **MENU** key twice, use the up or down and left or right arrow key to highlight **Setup** on the screen, press the **ENTER** key, use the up or down and left or right arrow key to highlight **System** on the screen, press the **ENTER** key, press the up or down arrow key until **AA Battery Type** is highlighted on the screen, press the **ENTER** key, use the up or down arrow key to highlight the battery type being used, press the **ENTER** key
- Press and hold down the power button on the right-hand side of the GPS unit until the screen goes blank
- Always take a spare set of batteries when doing fieldwork.

Attaching and using the carabiner clip

- Place the black plastic part of the carabiner clip over the slots on the lower part of the silver mounting spine on the rear of the GPS unit, with the metal loop towards the GPS antenna
- Slide the black plastic part of the carabiner clip upwards until it locks in place
- Press the black spring-loaded gate on the metal loop inwards, hook the metal loop through somewhere secure (e.g. a pants belt loop or strong backpack fitting) and release the spring-loaded gate
- Lift the bottom of the black plastic part of the carabiner clip and slide it downwards off the mounting spine.

3.2 Recording a waypoint

Why record waypoints?

- Identify an actual location on the earth's surface (in terms of latitude and longitude or eastings and northings), rather than depending on ambiguous regional or unclear locally specific names, or vague and imprecise descriptions
- Record specific locations accurately on printed maps

- Import locations into digital mapping software packages (such as MapInfo) which can then be used to produce maps and link the location data collected to other datasets (such as provinces, census districts, agricultural systems or census units and their populations), photos and reports
- Highlight the location/s where conditions are different within an otherwise homogenous region (such as a local-level government area)
- Revisit specific sites to review conditions or provide relief supplies.

Setting or changing the position-recording format

- Press and hold down the power button on the right-hand side of the GPS unit until **GARMIN** appears on the screen, followed by a mapping image
- Press the **MENU** key twice, use the up or down arrow key to highlight **Setup** on the screen, press the **ENTER** key, use the up or down arrow key to highlight **Position Format** on the screen, press the **ENTER** key, use the up or down arrow key to highlight one of:
    - **hddd.ddddd°** for decimal degrees (latitude and longitude) — best when using mapping software packages such as MapInfo
    - **hddd°mm'ss.s"** for degrees minutes and seconds (latitude and longitude) — best when using mapping software packages such as MapInfo
    - **UTM UPS** for metres (easting and northing) — best when using printed 1:100,000 scale topographic map sheets
- Press the **ENTER** key
- **Map Datum** and **Map Spheroid** should always be set and kept to **WGS 84**
- Press and hold down the power button on the right-hand side of the GPS unit until the screen goes blank.

This procedure will set or convert the way in which all waypoints stored in the GPS unit are recorded and can be changed at any time.

Acquiring satellite signals

- Stand outdoors in an open area
- Press and hold down the power button on the right-hand side of the GPS unit until **GARMIN** appears on the screen, followed by a mapping image
- Wait while the GPS unit searches for satellites — a red question mark will flash on top of the blue arrow on the mapping image and **Acquiring Satellites** will appear at the top of the screen while the GPS unit finds its location
- Press (but do NOT hold down) the power button on the right-hand side of the GPS unit — when the five scaled **GPS** bars in the bottom right-hand corner of the screen are green the unit has acquired sufficient satellite signals
- **Ready to Navigate** will appear at the top of the mapping image screen.

Saving and editing a waypoint

- When the GPS unit is switched on and has acquired sufficient satellite signals, press the **MARK** key
- Edit the waypoint details (if necessary) by using the up or down arrow key and the left or right arrow key to:

    - highlight the symbol feature in the top left-hand corner of the screen, press the **ENTER** key, use the up or down arrow key and the left or right arrow key to highlight a different symbol feature, press the **ENTER** key; and/or
    - highlight the **Note** section, press the **ENTER** key, use the up or down arrow key and the left or right arrow key to highlight different letters, symbols (in the lower left-hand corner of the screen), spaces (in the lower centre of the screen) or numbers (in the lower right-hand corner of the screen) and press the **ENTER** key after highlighting each letter, symbol, space and/or number to enter unique identification information, then highlight **Done** at the bottom of the screen and press the **ENTER** key
- Record all relevant information in a field notebook for each waypoint saved (including the date, time, three-digit ID number, **Note**, **Location** (latitude/**S** and longitude/**E** or easting/first digit **0** and northing/first digit **8** or **9** readings), **Elevation** and recorder's name) — this data should later be entered into a digital spreadsheet such as Microsoft Excel
- Use the up or down arrow key to highlight **Done** in the bottom right-hand corner of the screen (if the waypoint has NOT been edited) and press the **ENTER** key, or just press the **QUIT** key (if the waypoint has been edited)
- Press and hold down the power button on the right-hand side of the GPS unit until the screen goes blank.

Editing a saved waypoint

- Press and hold down the power button on the right-hand side of the GPS unit until **GARMIN** appears on the screen, followed by a mapping image
- Press the **MENU** key twice, use the left or right arrow key to highlight **Waypoint Manager** in the top right-hand corner of the screen, and press the **ENTER** key
- Use the up or down arrow key to highlight the waypoint record to be edited, press the **ENTER** key, edit the waypoint symbol or **Note** (refer to the previous section 'Saving and editing a waypoint' for more details), press the **QUIT** key
- Press and hold down the power button on the right-hand side of the GPS unit until the screen goes blank.

Deleting a saved waypoint

- Press and hold down the power button on the right-hand side of the GPS unit until **GARMIN** appears on the screen, followed by a mapping image
- Press the **MENU** key twice, use the left or right arrow key to highlight **Waypoint Manager** in the top right-hand corner of the screen, and press the **ENTER** key
- Use the up or down arrow key to highlight the waypoint record to be deleted, press the **ENTER** key, press the **MENU** key, use the up or down arrow key to highlight **Delete**, press the **ENTER** key, use the up or down arrow key to highlight **Yes** and press the **ENTER** key
- Press and hold down the power button on the right-hand side of the GPS unit until the screen goes blank.

Deleting all saved waypoints

- Press and hold down the power button on the right-hand side of the GPS unit until **GARMIN** appears on the screen, followed by a mapping image
- Press the **MENU** key twice, use the left or right arrow key to highlight **Waypoint Manager** in the top right-hand corner of the screen, and press the **ENTER** key

- Press the **MENU** key, use the up or down arrow key to highlight **Delete All**, press the **ENTER** key, use the up or down arrow key to highlight **Yes** and press the **ENTER** key
- Press and hold down the power button on the right-hand side of the GPS unit until the screen goes blank.

3.3 GPS unit registration, support and updates, and getting more information

Refer to page 9 of the GPSMAP 64 Quick Start Manual.

Regular practice in the basic use of a GPS unit is necessary.

Make multiple copies of the Quick Start Manual and store them in separate locations.

Always make sure that more than one person in your organisation is trained and confident in the basic use of a GPS unit.

Appendix 4: Methods to assess food availability in the highlands

Estimating the number of sweet potato tubers in a garden[13]

First, let the farmer know what you want to do and obtain his or her permission before you proceed. Tell the farmer you will pay K5 compensation per sweet potato mound you dig to inspect the tubers. After your work is completed, the farmer can have the tubers. Then:

- Count the total number of mounds in the garden (e.g. 200 mounds)
- Randomly select a few mounds (e.g. 3 mounds)
- Count the number of planting stations on each selected mound (e.g. 1st mound = 9 stations, 2nd mound = 10 stations, 3rd mound = 11 stations)
- Add up the total number of planting stations on the selected mounds (e.g. 9 + 10 + 11 = 30 stations)
- Divide the total number of planting stations on the selected mounds by the number of selected mounds to give the average number of planting stations per mound (e.g. 30 ÷ 3 = 10 stations)
- Randomly select 3 planting stations on the 1st selected mound, dig up the sweet potato tubers and count them (e.g. 1st station = 8 tubers, 2nd station = 7 tubers, 3rd station = 9 tubers)
- Add up the total number of tubers dug from the selected planting stations (e.g. 8 + 7 + 9 = 24 tubers)
- Divide the total number of tubers dug from the selected planting stations by the number of selected planting stations to give the average number of tubers per planting station (e.g. 24 ÷ 3 = 8 tubers)
- Multiply the average number of tubers per planting station by the average number of planting stations per mound to give the approximate number of tubers in the 1st selected mound (8 x 10 = 80 tubers)
- Repeat the previous four steps for the remaining two selected mounds
- Add up the total number of tubers dug from the three selected mounds (e.g. 80 + 70 + 50 = 200 tubers)
- Divide the total number of tubers dug from the three selected mounds by the number of mounds to give the average number of tubers per mound (e.g. 200 ÷ 3 = 66.7 tubers)
- Multiply the average number of tubers per mound by the total number of mounds in the garden to give the approximate total number of tubers in the garden (e.g. 66.7 x 200 = 13,340 tubers).

Accounting for other food sources

Once an approximation of sweet potato availability is completed, a crude estimate of other food sources (e.g. cassava, banana, taro, sugarcane, greens, *marita* and *karuka*) should be made. A proportionate increase to sweet potato numbers contributed by these other crops will provide an estimate of total household food supply. This information is generally collected by interviewing the farmer and often relies heavily on the assessor's judgement.[14]

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[13] The methodology described here applies to sweet potato tubers dug from large composted mounds used in Enga, Southern Highlands and Hela provinces. In other parts of the highlands, small mounds measuring about 1 m^2, or just prepared and raised flat beds are used (as in parts of Western Highlands). This method of assessing available sweet potato supply can be adapted and applied to other types of gardening systems.

[14] Agricultural scientists and experienced field extension officers should be included in assessment teams if possible. They can relate the effects of a disaster on soil, plants, cropping systems or agricultural practices to weather and make intelligent projections based on comparative assessments.

- Establish how many other gardens the family has, where they are located, and when they were planted. Gardens located at high altitude (above 2000 m) and recently planted should be discounted because they will not produce any food, while those in the mid to low altitude range (between 1400 and 1700 m) should be included in any estimates. If gardens have just been planted, crops may be lost to the combined effects of drought and frost, while weevils may destroy sweet potato tubers
- Identify the most important food crops planted in each garden
- Based on the size of the assessed sweet potato garden, estimate the size of each other garden, and the approximate volume of food likely to be produced from the dominant and subdominant crops planted. This is very crude, but it is important to establish the total available food for the household. For example:
    - Garden 1: sweet potato (assessed)
    - Garden 2: cassava/taro = 5% of Garden 1
    - Garden 3: corn/vegetables = 4% of Garden 1
    - Garden 4: banana/sugarcane = 3% of Garden 1
    - Garden 5: *pandanus* = 0% of Garden 1
    - Garden 6: *marita* = 0% of Garden 1
    - Average contribution of other gardens = (5% + 4% + 3%) ÷ 3 = 4% of Garden 1
    - Total household food availability = (4% x 13,340 tubers) + 13,340 tubers, or approximately the equivalent of 13,874 sweet potato tubers.

Estimating daily household food consumption

- Ask how many sweet potato tubers are eaten at each meal by every adult and child in the household. For example:
    - Adult 1: 6 sweet potato tubers per meal
    - Adult 2: 5 sweet potato tubers per meal
    - Child 1: 5 sweet potato tubers per meal
    - Child 2: 4 sweet potato tubers per meal
    - Child 3: 3 sweet potato tubers per meal
    - Child 4: 3 sweet potato tubers per meal
    - Child 5: 2 sweet potato tubers per meal
- Ask how many meals are eaten per day (in a drought most families eat only one meal, usually in the evening). For example:
    - Two meals each per day
    - Calculate the total number of sweet potato tubers eaten per day
      (e.g. (6 + 5 + 5 + 4 + 3 + 3 + 2) x 2 = 56 sweet potato tubers per day)
- Calculate the total number of sweet potato tubers fed to pigs per day
  (e.g. 7 pigs x 4 sweet potato tubers per pig per day = 28 sweet potato tubers per day)
- Calculate the total number of sweet potato tubers required each day
  (e.g. 56 + 28 = 84 sweet potato tubers per day).

Estimating how long available food supply will last

A question frequently asked by journalists and people using assessment findings to plan relief assistance is '*how long do you think the current available food will last, if the drought persists?*'

A crude estimate of how long the available food supply in an affected community will last can be determined using the following formula:

$$\text{Days of remaining food} = \frac{\text{Total household food availability}}{\text{Total number of sweet potato tubers required each day}}$$

And using the example figures previously calculated:

13,874 ÷ 84 = 165 days
165 days ÷ 30 days per average month = 5.5 months remaining food

(If multiple farmers were assessed in an area, the average number of days of remaining food supply can be calculated by adding up the 'days of remaining food' for each farmer and dividing the total by the number of farmers.)

Sweet potato tuber damage by weevils

Sweet potato tubers damaged by weevils cannot be eaten by humans or pigs. The effect of weevils is greatest in the lowlands and up to about 1700 metres above sea level.

An assessment of the damage to sweet potato crops by weevils can be done using tubers dug from gardens, sold in local markets, or preferably both (as the more samples collected in a survey area, the more accurate the results). During drought conditions sweet potato is often costly and scarce and the sample size in local markets can be small.

Sometimes women will publicly display sweet potato tubers to show the problems they face with weevil damage — these examples should also be inspected.

A method to score weevil damage

Let the vendor/s know what you want to do and obtain her or his permission before you proceed. Tell the vendor you will pay K1 compensation *for each heap of sweet potato you disrupt*, then:

- Randomly select a few sweet potato vendors (e.g. 3 vendors)
- Randomly select a few heaps of sweet potato from each vendor (e.g. 3 heaps)
- Count the number of tubers per heap (e.g. 1st heap = 8 tubers, 2nd heap = 7 tubers, 3rd heap = 10 tubers. Total = 25 tubers in 3 heaps for the 1st vendor)
- Count the number of damaged tubers per heap (e.g. 1st heap = 4 of 8 tubers damaged, 2nd heap = 6 of 7 tubers damaged, 3rd heap = 4 of 10 tubers damaged. Total = 14 tubers damaged out of 25, or 14/25 tubers damaged)
- Repeat the last two steps for the other vendors
- Calculate the total number of sweet potato tubers damaged by weevils in the selected heaps sold by the selected vendors (e.g. 1st vendor: 14/25 tubers damaged, 2nd vendor: 11/20 tubers damaged, 3rd vendor: 17/28 tubers damaged. Total = 42/73 x 100 = 57.5% damaged tubers).

A percentage score can be recorded for each sample and/or location (market).

Appendix 5: Summary of assessments of food needs situation in Kandep Basin, Enga Province and Panduaga Valley, Hela Province

The Church Partnership Program (CPP) Food Security Assessment Team conducted an assessment of the food needs situation in a number of locations in three highlands provinces in late March 2016. This summary reports findings of the CPP team from several very high altitude locations in Enga and Hela provinces, specifically the Kandep Basin, Enga Province and Panduaga Valley, Hela Province. These represent Wage LLG, Upper Wage LLG and Lai LLG. The assessment team was led by James Komengi of Hela United Church, who previously had participated in a United Church assessment in these areas in September 2015 (led by Matthew Kanua). Other members of the CPP assessment team in March 2016 were Brendan Jinks, Daniel Olen, Philip Pepo and Elijah Yandowe.

Visits were made to a number of communities in the Kandep Basin, at Yapum Health Centre and Longap village, as well as to Panduaga village, north of Margarima, in Hela Province. We interviewed local pastors and church leaders of the United Church and Catholic Church, and schoolteachers, councillors, health centre workers and men, women and children in the communities. In Longap we interviewed people who had walked up to six hours from Yumbis, Karekare and Petendek to speak with us.

1. There are widespread and severe food shortages across Kandep Basin and Panduaga Valley. Most people are surviving mainly on round cabbage, supplemented by some 'bush foods' including watercress, wild beans, ferns, pandanus nuts, choko leaves and dried wild fruit.

2. We heard of many reported cases of typhoid fever, pneumonia and diarrhoea. Sickness is reported to be caused by eating bush foods, lack of foods high in carbohydrate and protein, and lack of adequate hygiene.

3. There has been widespread failure of sweet potato and English potato crops. Crops were completely destroyed by a series of severe frosts in July 2015. Plantings made after the rains in November–December have failed, for unknown reasons, possibly associated with excessive soil nitrogen.

4. There are almost no sweet potato or English potato tubers in these areas. This was the case throughout the entire Kandep Basin and Panduaga Valley. We saw very small amounts of sweet potato in markets and tubers were much smaller than usual. There is a shortage of planting material. Hence fast-growing crops, including corn and beans, are not being planted. Because of the long growing period at these high-altitude locations, maturity time for sweet potato is 9–10 months. Hence, there is unlikely to be significant supply of the staple food for another 9–10 months, even if plantings were made now.

5. These communities have very little cash to purchase foods, including rice. There are no cash crops and even those food crops which can be grown successfully, such as round cabbage, cannot be readily sold because of distance from markets.

6. We were told there had been one distribution of food aid (rice), by the Hela Provincial Government at Panduaga. This consisted of about 10 kg of rice per household. As households

contain 6 to 10 people, each person has received about 1–2 kg of rice over the past 9 months, assuming that the rice was distributed evenly within and between families.

7. The CPP assessment team visited Panduaga Elementary School. Out of 140 students, only 80 were present. All 80 students were hungry, weak and dehydrated. All 80 students are living almost solely on round cabbage and self-sown bush foods. Of the 80 students, 55 indicated they did not have any food in their bags for lunch, but we have reasons to believe that this number was about 70 of the 80 in the school. The food that some of the students had for lunch consisted of a tiny handful of watercress, cabbage or other wild green leaves.

8. Students at Panduaga Elementary School appeared tired, malnourished, traumatised and distressed. They reported being unable to concentrate and study due to hunger. The teacher confirmed this, and we noticed that students were fatigued and resting their heads on their desks. This is not a normal reaction to an unannounced visit to their classroom by outsiders. Students reported fainting in class and leaving school to walk long distances to look for food. They leave school at will, arrive late, or stay home due to hunger and to recover from diarrhoea.

9. All students at Panduaga are fending for themselves, looking for food and taking great risks to obtain food. Some students reported that they have stolen food from gardens and have been beaten as punishment. Some of the children bear scars from the risks they have taken to obtain food. Many parents have left due to food shortage, and many students are staying with aunts or other relatives who have many children and are coping with food shortages in their own households.

10. When asked about consumption of rice, only 15 students indicated they had eaten 'some rice' in the past two weeks, but this may have been as little as one small bowl of rice. This was confirmed by the teacher and pastor.

11. To summarise the situation of the students at Panduaga Elementary School: All these children are suffering from extreme food shortages, there is evidence of trauma and stress, students have witnessed and experienced violence related to food shortages, and many have been abandoned by their parents.

12. Food aid is urgently needed for large numbers of people in the Lai LLG, Wage LLG and Upper Wage LLG. Figures provided by local pastors and councillors indicate that approximately 16,000 people are seriously affected in the locations we visited. However, there are other villagers in the very high altitude zone of Enga and Hela provinces who are also suffering extreme food shortages. **We have not assessed the total number of villagers who require food aid.**

13. A broader field and desktop assessment is required to gain an accurate estimate of the number of people who are suffering from severe food shortages in the very high altitude parts of Enga and Hela provinces.

Report prepared by James Komengi and Brendan Jinks
Contact person: James Komengi (kinukomengi@gmail.com)
File updated: 28 March 2016

Appendix 6: Food needs situation in Milne Bay Province, May 2016: A report by the Milne Bay Provincial Government and Church Partnership Program

Summary

A Church Partnership Program (CPP) food needs assessment team visited Alotau in mid-May 2016 to conduct a rapid assessment of the food needs situation in Milne Bay Province. The team reviewed the extensive documents in the Milne Bay Provincial Disaster and Emergency Services (PDES) Office, including reports from ward councillors, area managers and concerned citizens about the acute food supply situation throughout the province. We find that food needs in parts of the province is still critical. It is estimated that 98,233 people are still in Category 4 or 5, that is, they are very short of food. This figure represents 36% of the total population of 276,512.

We recommend that the province be given financial assistance so that provincial officials can provide food aid to those people who are still short of food.

Agriculture and rainfall

Milne Bay Province comprises 149 islands and atolls with a landmass of 14,281 square kilometres and a sea area of 235,189 square kilometres (Figure 1). Given the size of the province and number of islands, transport and communication costs in the province are high. It is administratively challenging, comprising 4 electorates, 16 local-level governments and 394 wards. Most (66%) of the population lives on islands, while the rest (34%) lives on the mainland.

Figure 1. Geography of Milne Bay Province

Source: CartoGIS, Australian National University.

The most important staple foods for rural villagers in Milne Bay Province are sweet potato, cassava, yam, banana, coconut and various types of taro. Minor staples include sago and several other root crops. On most islands and in most locations on the mainland, most food comes from food gardens. Intensity of land use is generally low.

There are some exceptions to this pattern: people on the small atolls near the Trobriand Group and near Woodlark Island depend on coconuts, fish and some root crops for subsistence. Villagers on some small islands are not self-sufficient for food and their livelihoods are maintained by trading for food. In the Owen Stanley Range and in the Pumani and Wedau areas, people cultivate low-intensity sweet potato gardens. In a few restricted locations near Rabaraba, irrigation is used to grow taro and cassava. This is the only location in PNG where irrigation is still practised on a significant scale. Villagers in the coastal valleys of Cape Vogel cultivate banana as their main food.

Mean annual rainfall varies from 1800 mm per year on Cape Vogel to over 4000 mm per year in the Trobriand and Woodlark islands. There are three rainfall seasonality patterns: most rain in the north-west wind season (December to March); most in the south-east wind season (May to September); and locations that receive rain throughout the year, that is, in both the north-west and the south-east seasons. Long dry seasons are experienced on Goodenough Island, the north-east coast of Fergusson Islands and in the Cape Vogel area. Most of the small atolls and larger raised coral islands are prone to drought.

Methods

A CPP food security team visited Alotau in mid-May 2016 to conduct a rapid assessment of the food needs situation in Milne Bay Province. This assessment has been informed by:

- CPP and Milne Bay Provincial Government desktop analysis and review of documents held by the Milne Bay PDES
- Reports and requests for assessments from approximately 50 ward councillors (out of 394) to the Milne Bay PDES since September 2015
- Reports and requests for assistance from area managers from each of the four districts since September 2015
- Phone calls from ward councillors and area managers to the PDES
- Milne Bay PDES food assessments in Kunia and Kawa (Kiriwina LLG), small island communities in East Calvados and West Calvados (Louisiade LLG and Murua LLG), Amphlett Group of Islands (Dobu LLG), four small islands in Suau LLG and small islands in Bwanabwana LLG in September 2015 (Phase 1)
- Milne Bay PDES food assessments in mainland areas of Milne Bay Province in Makamaka LLG, Weraura LLG and Maramatana LLG in November 2015 (Phase 2)
- Assessments conducted by Milne Bay PDES during food distributions in December 2015, January 2016 and March 2016
- Interviews by CPP with staff of the Anglican Church, Anglicare, Catholic Church, Caritas and Uniting Church in Alotau
- Report from the United Church in PNG in April 2016
- Assessment forms completed by Anglicare in April 2016.

Following the series of meetings between CPP and the Milne Bay PDES in May 2016 in Alotau, numerous phone calls and emails were exchanged between CPP and PDES to review the population numbers, and to incorporate new information as it came to hand.

Food needs

The total number of severely affected people is estimated at 98,233. This represents 36% of the total population of 276,512.[15] A breakdown of affected populations for each LLG is given in Table 1.

The El Niño–related drought began in most parts of the province in April 2015, which led to very low crop yields in the mid-2015 harvest. Many gardens were already vulnerable due to damage by Cyclone Ita in April 2014. Despite rainfall in many parts of the province since January 2016, the food supply in most LLGs in the province was classed as Category 4 or 5 in mid-May 2016. The rain has improved the food needs situation in some areas because some crops including pumpkin have begun to bear. However, it is expected that the harvest in mid-2016 will be poor. This is due to the protracted 2015 drought and because many crops have been harvested and eaten early as villagers were hungry.

Table 1. Milne Bay populations suffering severe food shortages, 2015–16

Local-level government	Number of wards	Number of households	Total population	Category	Population affected
Alotau District					
Au	6	2,465	12,628	2	
Huhu	29	6,654	28,752	4,5	1,000
Maramatana	19	2,035	8,836	4,5	7,500
Weraura	30	3,229	14,495	4,5	9,500
Makamaka	26	2,161	9,751	4,5	7,751
Daga	18	1,360	7,908		
Suau	28	2,318	11,201	4,5	5,000
Subtotal	**156**	**20,222**	**93,571**		**30,751**
Samarai Murua District					
Bwanabwana	23	2,504	12,125	4,5	8,200
Louisiade	32	5,065	23,806	4,5	15,235
Yeleyamba	17	2,668	13,470	4,5	5,500
Murua	17	2,019	9,491	4,5	2,847
Subtotal	**89**	**12,256**	**58,892**		**31,782**
Kiriwina District					
Kiriwina	33	7,659	38,073	4,5	22,700
Goodenough	28	6,000	27,270	4,5	7,000
Subtotal	**61**	**13,659**	**65,343**		**29,700**
Esa'ala District					
Duau	28	3,773	17,313	4,5	1,000
Dobu	35	5,084	23,832	4,5	5,000
West Ferguson	25	3,254	15,156		0
Subtotal	**88**	**12,111**	**56,301**		**6,000**
Total	**394**	**58,248**	**274,107**		**98,233**

[15] The total population for Milne Bay Province in the PNG national 2011 census was 276,512 and this is the figure used here. The population growth rate in the province between the 2000 and 2011 national censuses was 2.5% per annum. The population in mid-2016 is calculated as 312,848. This is based on a population growth rate of 2.5% pa over the five-year period 2011 to 2016.

Villagers in many locations have had very little food since October 2015 when food from the mid-2015 harvest was depleted. Locations where the food situation is classed as Category 5 are mostly small island communities with a population of 500 people or less, as well as the grassland areas of the mainland. Areas that have Category 5 communities include, but are not limited to:

Kunia Island and Kawa Island in Kiriwina LLG, Amphlett Group of Islands in Dobu LLG, Suau Island Ward in Suau LLG, Bwanabwana LLG, East Calvados and West Calvados in Louisiade LLG, Alcester Group of Islands, Marshall Bennet Islands and Egum Atoll in Murua LLG, Ware Island in Bonabona LLG, Weraura LLG, Maramatana LLG, Makamaka LLG, Budibudi Island and Renard Group of Islands in Yeleyamba LLG.

Villager responses to food and water shortages vary greatly depending on whether they live on islands or the mainland, whether they live on a large or small island, and what types of foods are available. Responses by villagers include drinking muddy water, drinking liquid from green coconuts, digging new wells, trading for food with people from other islands, rationing food, eating more seafood and coconuts than normal and bathing in the sea.

Milne Bay provincial government response

Assessments were conducted by provincial staff to verify the large numbers of written and oral reports from ward councillors and concerned citizens. Several small, targeted food distributions were conducted by PDES staff between September 2015 and March 2016. For example, in late October 2015, 1496 tonnes of rice, flour and cooking oil and 8780 litres of water were sent to Brooker Island (Louisiade LLG), Budibudi Islands and the Alcester Group of Islands (Murua LLG) and the Simsimla Islands (Kiriwina LLG). Assessments and food distributions have been undertaken with financial resources from the provincial government. However, these resources are now largely exhausted.

Recommendations

- It is recommended that funds be mobilised to provide immediate food relief to the approximately 98,000 people where the food supply is classed as Category 4 or 5. These people have had little food since October 2015 and are unlikely to have much food over the coming months due to the expected poor harvest in mid-2016.
- Research and funding is needed into longer term agricultural recovery and food security in the province as population increase, climate change and other factors mean that many parts of the province are food insecure even outside severe El Niño years.

Report prepared by Steven Tobessa, coordinator, Milne Bay PDES and Brendan Jinks, CPP and reviewed by Dr Mike Bourke, technical advisor, CPP
Contact person: Steven Tobessa (steven.tobessa@milnebay.gov.pg, ph: +675 7957 1770)
File updated: 7 June 2016

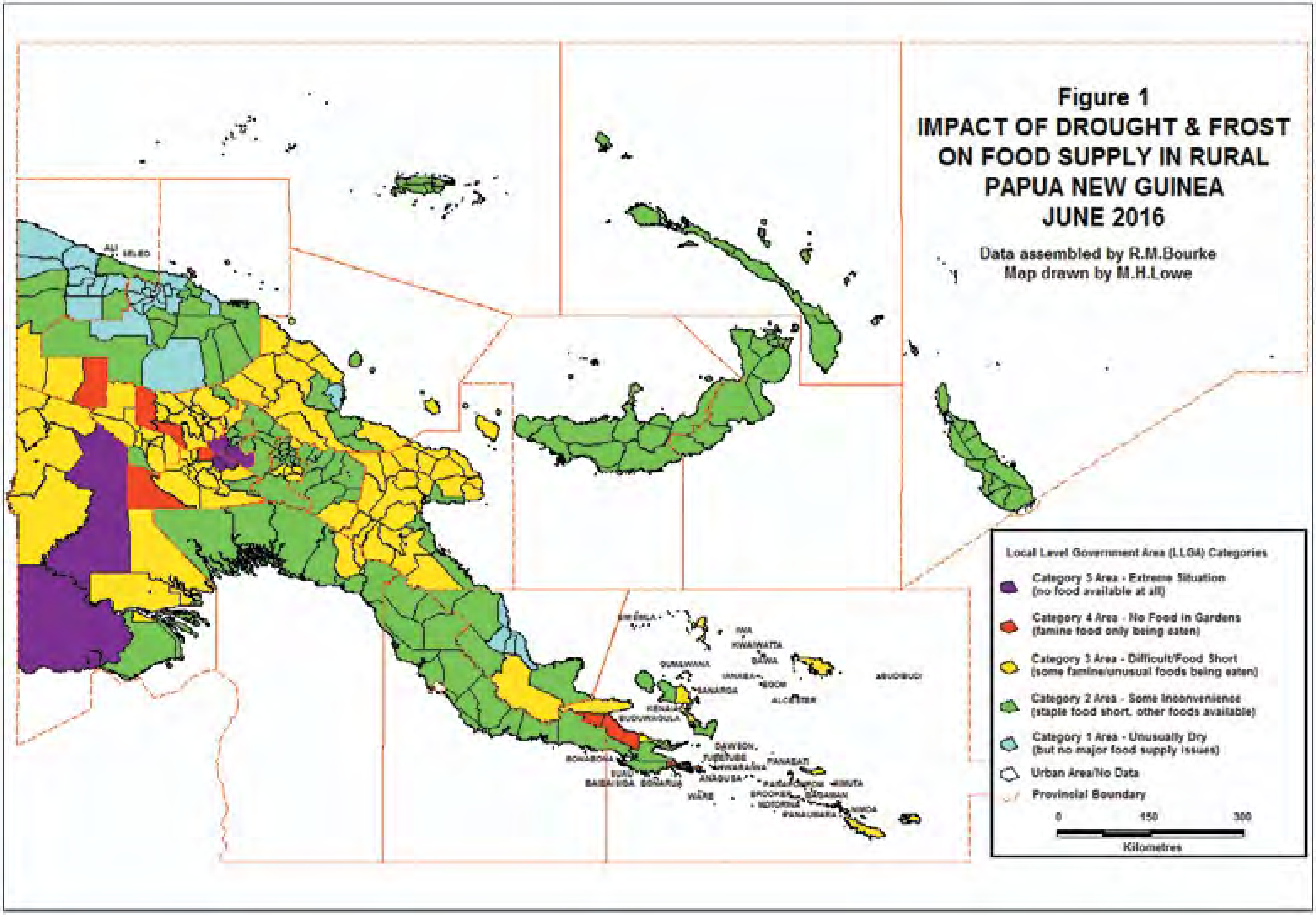
Figure 1
IMPACT OF DROUGHT & FROST
ON FOOD SUPPLY IN RURAL
PAPUA NEW GUINEA
JUNE 2016
Data assembled by R.M.Bourke
Map drawn by M.H.Lowe
Local Level Government Area (LLGA) Categories
Category 5 Area - Extreme Situation
(no food available at all)
Category 4 Area - No Food in Gardens
(famine food only being eaten)
Category 3 Area - Difficult/Food Short
(some famine/unusual foods being eaten)
Category 2 Area - Some Inconvenience
(staple food short, other foods available)
Category 1 Area - Unusually Dry
(but no major food supply issues)
Urban Area/No Data
Provincial Boundary
0
150
300
Kilometres

Papua New Guinea is vulnerable to natural disasters, including drought and frost associated with El Niño weather events and excessive rainfall associated with La Niña events. Drought, frost and excessive rainfall can cause major disruptions to village food supplies. Drought also reduces villagers' access to clean drinking water, which in turn has a negative impact on peoples' health and the capacity of schools and hospitals to operate. There are often other impacts — damage to crops and property by wildfires, out-migration and an increased death rate.

In 1997–98, and again in 2015–16, a major El Niño event caused significant disruption to drinking water and food supply for many Papua New Guinean villagers. Staff of many agencies, including those working through the Church Partnership Program El Niño Drought Response Program, were involved in assessing the impact and providing relief in 2015–16. This publication brings together the experiences of those working on the Church Partnership Program response to the 2015–16 El Niño event and serves as a guide for assessing future food shortages and to help those in need.