

Climate Conversations: Coffee Farming in a Changing Papua New Guinea

Toktok bilong klimat senis: Pasin bilong lukautim kofi long taim bilong klimat senis insait long PNG

Australian National University

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This guide is part of a series of resources aimed at fostering community dialogue around the impact of climate change on smallholder coffee farmers in Papua New Guinea's Eastern Highlands. It has been shaped by the valuable insights and expertise of contributors from the following organisations:

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Introduction

Climate Conversations: Coffee Farming in a Changing Papua New Guinea was developed to support extension officers in the Eastern Highlands of Papua New Guinea (PNG) to discuss climate change with smallholder coffee farmers.

Climate change is impacting farming around the world, including in PNG. Coffee farmers are already experiencing hotter weather, unpredictable rain patterns, and changes in their coffee systems. The impact of climate change on coffee systems are complex and scientific understanding is still evolving. Communicating the impacts of climate change should consider different knowledge systems and levels of education to support equitable outcomes.

Extension officers play an important role in helping coffee farmers to adopt good farm practices that make the land and community healthy and productive. By sharing knowledge and encouraging conversations, they can empower farmers to adapt to climate changes and protect their livelihoods.

This guide supports extension officers to explain climate change and its impact on coffee by providing:

- key messages to share with farmers;
- supporting information to enhance extension officers' understanding;
- practical activities to support discussion.

Through this guide, we hope extension officers feel more confident and better equipped to discuss climate change with coffee farmers in the Eastern Highlands.

Who is this guide for?

The guide was written for extension officers working with coffee communities in the Eastern Highlands of PNG who would like to discuss the impacts of climate change with farmers.

How is this guide organised?

Chapter 1: Introduction to climate change

This module introduces smallholder coffee farmers to the basic concepts of climate change. It explains climate change, its causes, and how it affects PNG.

Chapter 2: Climate change and its impact on coffee in PNG highlands

This module explains the main ways climate change is affecting coffee in the Eastern Highlands of PNG. It draws on global research and local observations.

Chapter 3: Adaptation strategies for smallholder farmers

This module explains climate adaptation and introduces practical strategies that smallholders can implement to reduce risks and sustain coffee production in a changing climate. These include on-farm practices like shade management and pruning as well as national-level actions such as early warning systems.

How to use this guide

This guide is designed to be a reference for extension officers to discuss climate change with coffee farmers in the Eastern Highlands of PNG. Officers are encouraged to consider their local community and tailor their approach.

The guide contains three chapters which can be discussed in order or used on their own, depending on what suits the group best. Officers should have a complete understanding of each chapter before engaging with communities.

Each chapter contains learning outcomes, discussion questions, key messages, and activities. The learning outcomes are meant to guide officers and can be shared with the group if appropriate.

Start with the discussion questions to help farmers reflect on the topic and help the officer understand the group's needs. After the discussion, officers should share the key messages in the chapter.

The discussion questions and messages are written in Tok Pisin and English but can also be translated into Tok Ples. The messages may need to be contextualised further for the community. Additional information on each page can be shared if appropriate.

Officers can facilitate the activities to help farmers explore the information presented further and apply what they have learned.

Some pages are marked "for trainers only". These pages include information that may be useful for trainers to know but do not need to be shared in detail with smallholder farmers.

For more technical information on coffee farm management, please refer to the Smallholder Coffee Production in Papua New Guinea training package. Throughout the document, this is referred to as "PNG coffee training package".

Symbol legend


Key message


Learning outcomes


Discussion questions


Activity


More information can be found in the PNG coffee training package

Chapter 1: Introduction to climate change



Learning outcomes:

- **Identify activities that contribute to climate change**
- **Understand the concept of global warming**
- **Recognise the impacts of climate change in Papua New Guinea**



Discussion questions:

- **What changes in the weather have you noticed?**
  Wanem kain senis long weta yu wok long lukim?
- **What activities contribute to climate change?**
  Wanem kain ol wok o samting i mekim klimat i senis?
- **Have you heard about climate change?**
  Yu harim toktok bilong klimat senis pinis o nogat?

Introduction to climate change

Climate change means the weather is changing over time. The weather our grandparents knew won't be the same as what our grandchildren will experience.

Klimat senis i minim olsem weta i senis isi isi. Weta long taim bilong ol bubu bilong yumi long bipo, i no wankain olsem weta ol pikinini bilong yumi bai lukim long bihain taim.

- Climate change is like the weather changing its habits — it can be hotter, wetter, or drier than before. It can be unpredictable, with many changes happening quickly.
- Before, you could tell when the rain would come and when it would be dry. You knew when your coffee trees would flower and when to pick the cherries. But now, the weather is not the same. Sometimes the rain comes too early or too late. Other times, the sun is too strong and dries the flowers before they become coffee beans. That is the impact of climate change.



What causes climate change?

Climate change is caused by global warming, which happens when human activities release greenhouse gases into the air.

Klimat senis i kamap long global warming, na dispela i kamap taim ol man i mekim kain wok we i tromoi gas nogut (greenhouse gases) i go antap long skai.

- Global warming refers to the long-term rise of the average temperature of the Earth. It is caused by greenhouse gases that trap too much heat into the atmosphere.
- You can think of greenhouse gases as the smoke from things that burn like wood or from things that use oil and petrol like cars and trucks.
- Some examples of activities that contribute to global warming are burning fuels, cutting down trees, and using cars, and machines.
- Think of a mumu oven. The Earth is being warmed, just like food inside a mumu. The hot rocks represent the sun, which heats the Earth. Leaves on top act like the natural gases that keep Earth warm, which is essential for life. Now, imagine greenhouse gases as a layer of foil that wraps the Earth. This can trap too much heat and make the Earth too hot. That is what happens with global warming.

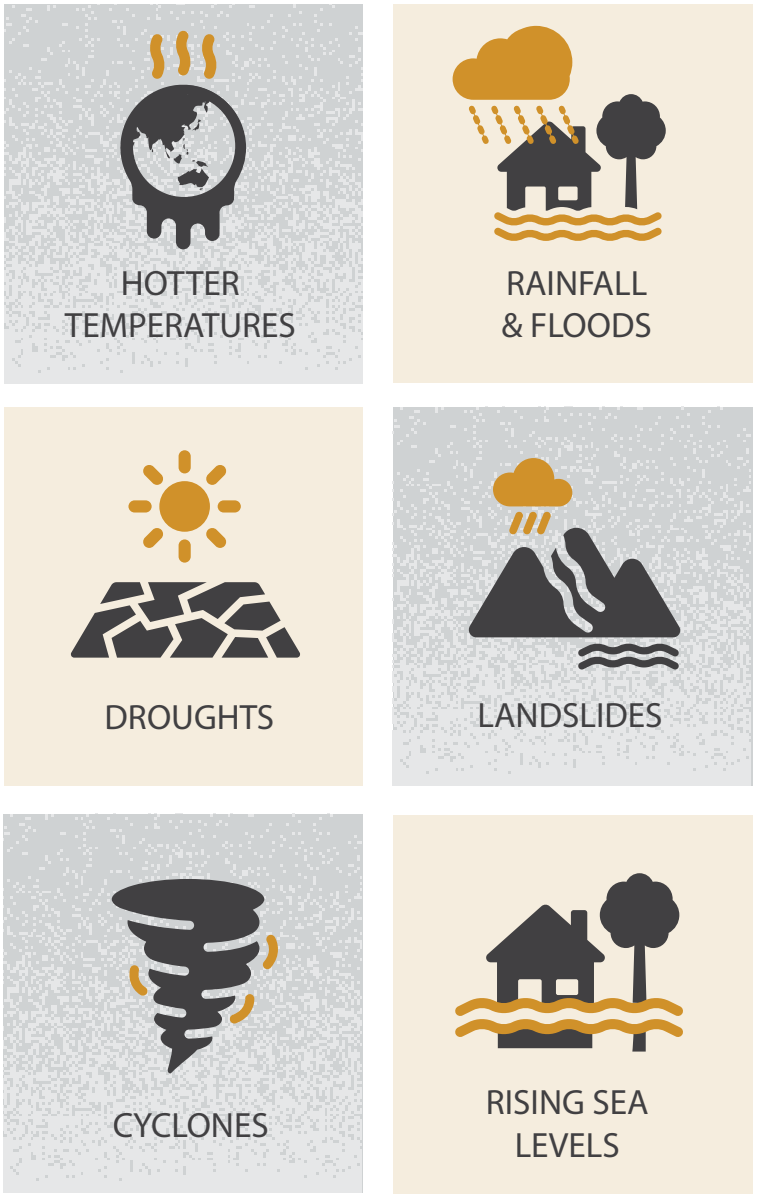


What are the impacts of climate change on PNG?

PNG and its people are already negatively impacted by climate change.

PNG i bin experiencim pinis bagarap lo klimat senis.

- **Hotter temperatures** – PNG is getting much hotter and faces a high risk of heatwaves, which can make people and plants sick.
- **Rainfall and floods** – More people in PNG may be affected by floods, which can damage homes and farms and spread diseases.
- **Droughts** – Droughts are expected to be drier, making it harder to grow food and other crops.
- **Landslides** – PNG often has landslides because of earthquakes and its steep mountains. Climate change makes landslides more likely because of heavy rain.
- **Cyclones** – PNG may have stronger and more frequent cyclones which can harm homes, farms, forests, and people.
- **Rising sea levels** – Rising sea levels are threatening PNG's coastal communities' homes, livelihoods, and way of life. Thousands of people have already had to relocate.



Climate change impacts across PNG

Materials needed: none

Steps

1. Tell the group: “Now that we’ve talked about what climate change is, let’s think about what it means for us.” Ask everyone to sit comfortably while you read stories about people in PNG affected by climate change. These stories are on page 12. You may also share stories about events that have impacted the community you are speaking to or nearby communities.
2. Ask participants to break into small groups and talk about this question for 15 minutes: “Have you observed any changes in the local environment since your parents or grandparents’ time to the current times?”
3. After 15 minutes, bring everyone back together and ask each group to share what they discussed.

Blanket activity

Materials needed: at least 3 blankets (1 thin, 2 thick), 1 volunteer

Steps:

4. Tell the group: “In this activity, we’ll see how the Earth gets hotter because of greenhouse gases. You can think of these gases as smoke or fumes from cars and fires.”
5. Ask for a volunteer to come to the front and explain that they will represent the Earth.
6. Wrap a thin blanket around the volunteer and say it represents the natural gases that help keep the Earth warm. Ask if they feel warmer than before.
7. Wrap a thicker blanket around them and explain it represents extra gases from human activities, like smoke and fumes. Ask again if they feel warmer.
8. Keep adding layers until the volunteer feels hot.
9. Finish by explaining: “The Earth has always had a natural way to stay warm, like a blanket. But now, because of things people do — like burning fuel and cutting down trees — we’ve added too many gases that trap heat. It’s like putting on too many blankets. The Earth is getting too hot, and that’s causing changes in the weather patterns.”

Activity: Climate change impacts across PNG





Story 2: In March 2024, very heavy rain fell in the highlands. This caused big floods and landslides in four provinces: Western Highlands, Jiwaka, Chimbu, and Eastern Highlands. Many roads, houses, and gardens were destroyed. At least 23 people died. More than 9,000 people lost their homes, and over 50,000 people were affected.

WESTERN HIGHLANDS

JIWAKA

CHIMBU

EASTERN HIGHLANDS

2

WESTERN PROVINCE

1



Story 1: In 2015-16, a months-long drought destroyed crops and dried up water sources in Western Province. This left people with nothing to eat or drink, leading to malnutrition and death. Government help was limited because the drought affected many areas and many villages were hard to reach.

BOUGAINVILLE



3

Story 3: The Carteret Islands are shrinking and sinking. Seawater is damaging the land and their crops. The community can no longer grow their own food and must rely on the government for food. Over 3,000 people need to be relocated to the Bougainville mainland, but they need to find land so they can grow food and cash crops to support themselves.

Chapter 2: Climate change and its impact on coffee in PNG highlands



Learning outcomes:

- **Understand how climate change affects the coffee value chain**
- **Learn how climate change impacts coffee gardens now and in the future**
- **See how climate change affects the lives of coffee farmers**



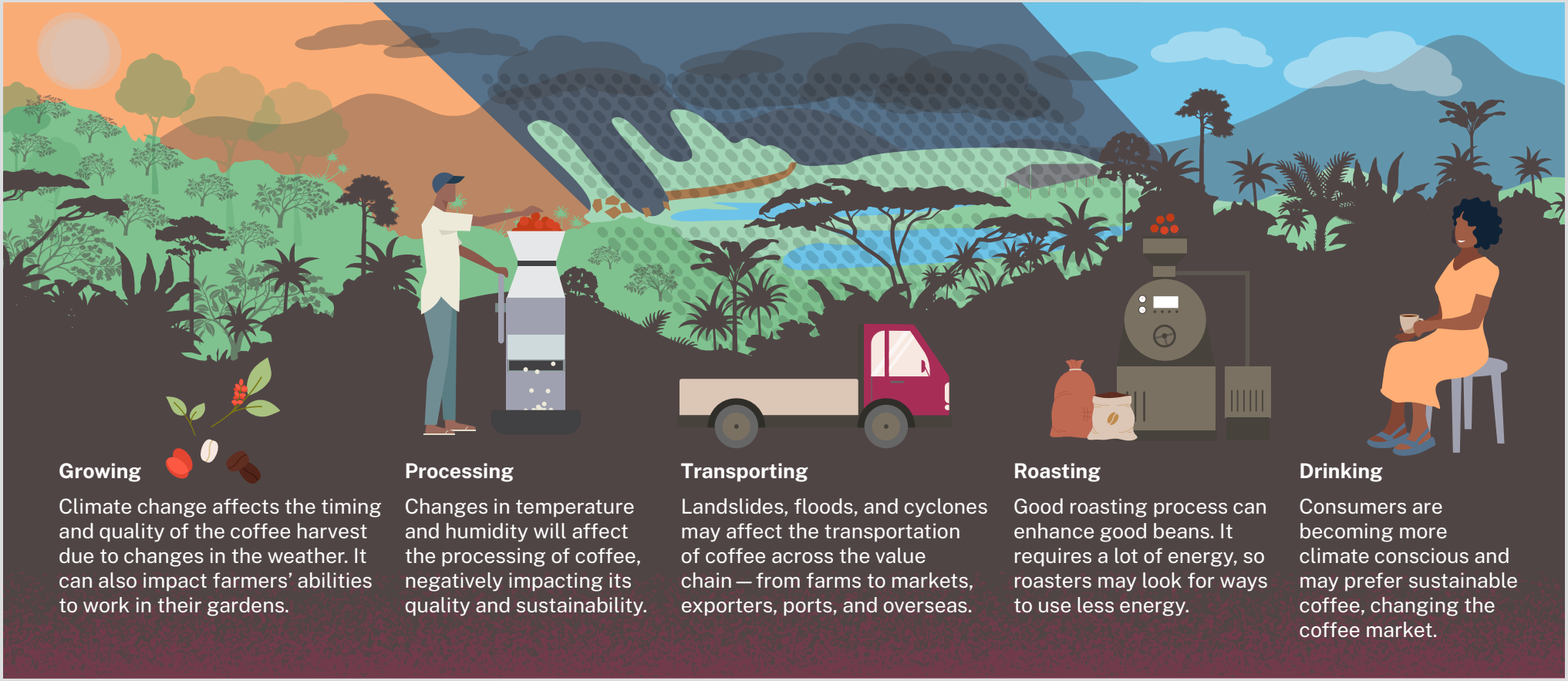
Discussion questions:

- **What changes have you observed in your coffee gardens?**
  Wanem kain senis yu wok long lukim insait long kofi gaden bilong yu?
- **Have you experienced any change in the timing of when you grow, pick, or dry coffee?**
  Yu bin experiensim sampela senis long taim bilong planim, kisim, o draim kofi?
- **Have you changed how you work on your coffee garden?**
  Yu bin senisim pasin o we bilong wok insait long kofi gaden bilong yu?

Impacting the coffee value chain

Climate change impacts the entire coffee value chain. Overall, it will be harder to produce good coffee.

- The illustration below discusses some of the impacts of climate change across the coffee value chain. It does not cover all the impacts.
- New policies that try to address climate change can affect the entire value chain. For example, the EU Deforestation Regulation (EUDR) requires companies to show no land was cleared to plant cocoa and coffee. This regulation affects buyers, traders, exporters, and farmers who sell to the European market.



Growing

Climate change affects the timing and quality of the coffee harvest due to changes in the weather. It can also impact farmers' abilities to work in their gardens.

Processing

Changes in temperature and humidity will affect the processing of coffee, negatively impacting its quality and sustainability.

Transporting

Landslides, floods, and cyclones may affect the transportation of coffee across the value chain — from farms to markets, exporters, ports, and overseas.

Roasting

Good roasting process can enhance good beans. It requires a lot of energy, so roasters may look for ways to use less energy.

Drinking

Consumers are becoming more climate conscious and may prefer sustainable coffee, changing the coffee market.

TRAINER USE ONLY

Unpredictable rain disrupting the coffee tree

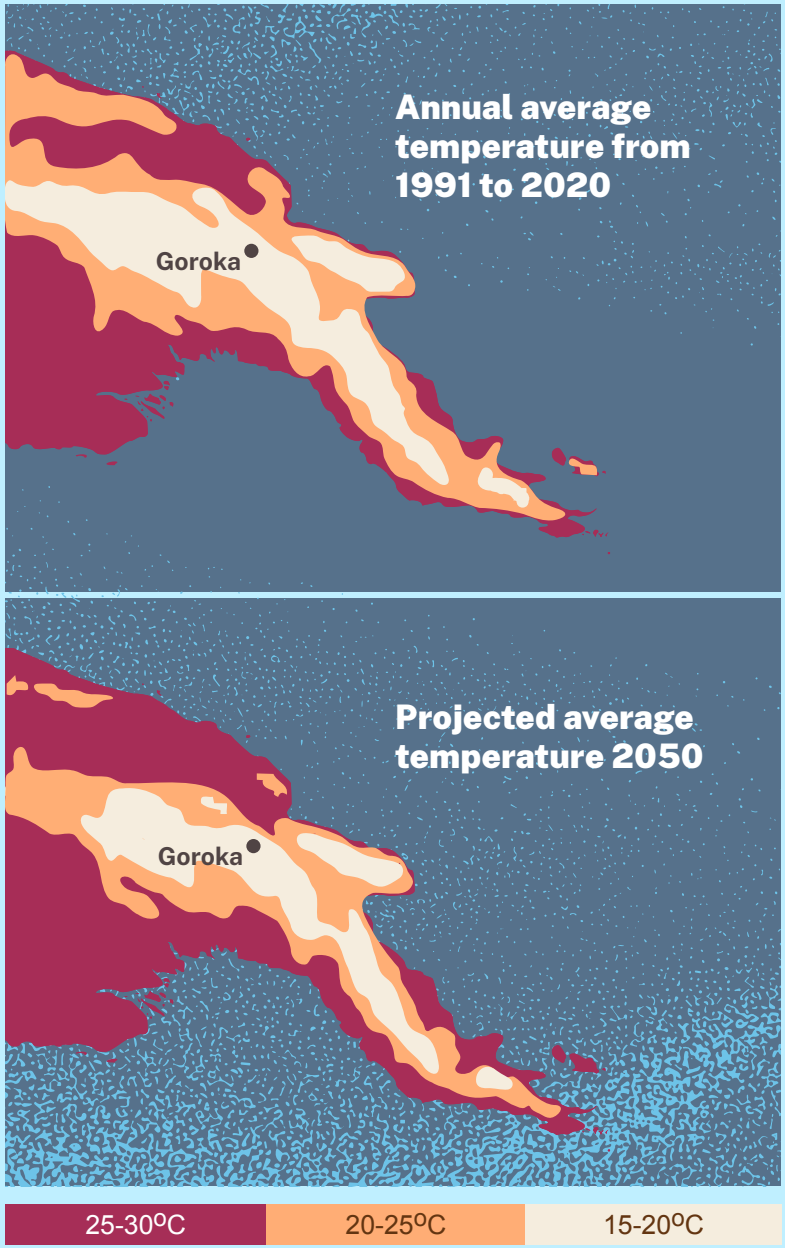
Coffee farming will get harder because of unpredictable rain patterns. Too much rain or stronger droughts can hurt coffee plants and lead to smaller harvests.

Wok long kofi bai kamap hat moa bikos ren i no save kam stret. Plenti moa ren o bigpela drai taim i ken bagarapim kofi diwai na mekim kofi harvest i kamap liklik.

- Coffee needs the right mix of wet and dry weather to grow well. Experts say that in the future, some parts of PNG might get too much rain, while droughts may bring even less rainfall. Both changes may lead to smaller harvests and other problems.
- Heavy rain can damage soil, hurt roots, and stop coffee flowers and fruit from growing.
- Strong droughts can change the soil and affect the coffee tree's growth. Flowers may dry up too fast, beans may not grow well, and the normal growth cycle may change.
- Rainfall is becoming less predictable across the seasons, which makes it harder to know when to plant or harvest.







Source: NSW DPIRD

Changes to the suitable area for growing coffee

Rising temperatures in PNG are making some coffee growing areas too hot. Some cooler mountain regions may become suitable, but overall the total land suited to Arabica coffee farming is expected to shrink.

Insait long PNG, hot igo antap moa. Sampela ples we kofi i save grow bipo, nau i kamap hot tumas. Sampela kol ples (mountain) bai i kamap gut liklik long planim kofi. Tasol gutpela graun bilong planim kofi bai kamap liklik moa long olgeta hap bilong PNG.

- PNG is expected to become hotter. The map on the left shows the average temperature of PNG in the past and the likely future average temperature.
- In PNG, Arabica coffee grows best in cooler areas where the average temperature is between **18°C to 22°C**. Weather records and farmer experiences show it is getting hotter even in these cooler areas. You can see the predicted change in the decrease of the light area on the map in the future.
- As PNG gets warmer, the best areas for growing coffee are changing. Some cooler mountain areas may become good for coffee, but traditional coffee regions could get too hot. By 2090, the total land suitable for coffee farming is expected to shrink from 71% to 68% of PNG land.

Increasing pest and disease outbreaks

Warmer weather and heavier rains help coffee pests and diseases grow and spread faster.

Binatang na sik bilong kofi save kamap planti moa na spred long planti hap taim ples i moa hot na planti ren

- Because of the unpredictable weather, pests and diseases can appear any time in the year and are becoming more common. New pests and diseases are appearing in the highlands.
- Pests and diseases stop coffee trees from growing well. They can damage the tree or stop it from producing cherries. For smallholder coffee farmers, they can cause a loss of 30-40% of their harvest.
- Coffee berry borer (CBB) is the most harmful pest for coffee. It is spreading to higher areas, including the PNG highlands. Because coffee trees are producing fruit continuously, CBB does not stop breeding. Warmer weather also helps it breed, so more CBB are being found in coffee gardens. It can infest up to 95% of unmanaged crops.
- Heavy rainfall increases the risk of coffee leaf rust. Since PNG is expected to become wetter and warmer, the disease is likely to persist and spread to higher altitude areas.

For more information on coffee pests and diseases, refer to the PNG coffee training package, Unit 2, Modules 5 & 6.

Pests found in PNG coffee gardens



Coffee berry borer



Green scale



Brown scale



Oribius weevil



Leafhopper



Armyworm



Intensifying landslides and floods

Climate change is increasing landslides and floods in PNG. This damages coffee gardens and roads, making it harder to get coffee to the market.

Klimat senis i mekim graun buruk na planti wara tait long Highlands bilong PNG. Dispela i bagarapim kofi gaden na rot. Dispela i mekim hat long karim kofi i go long maket.

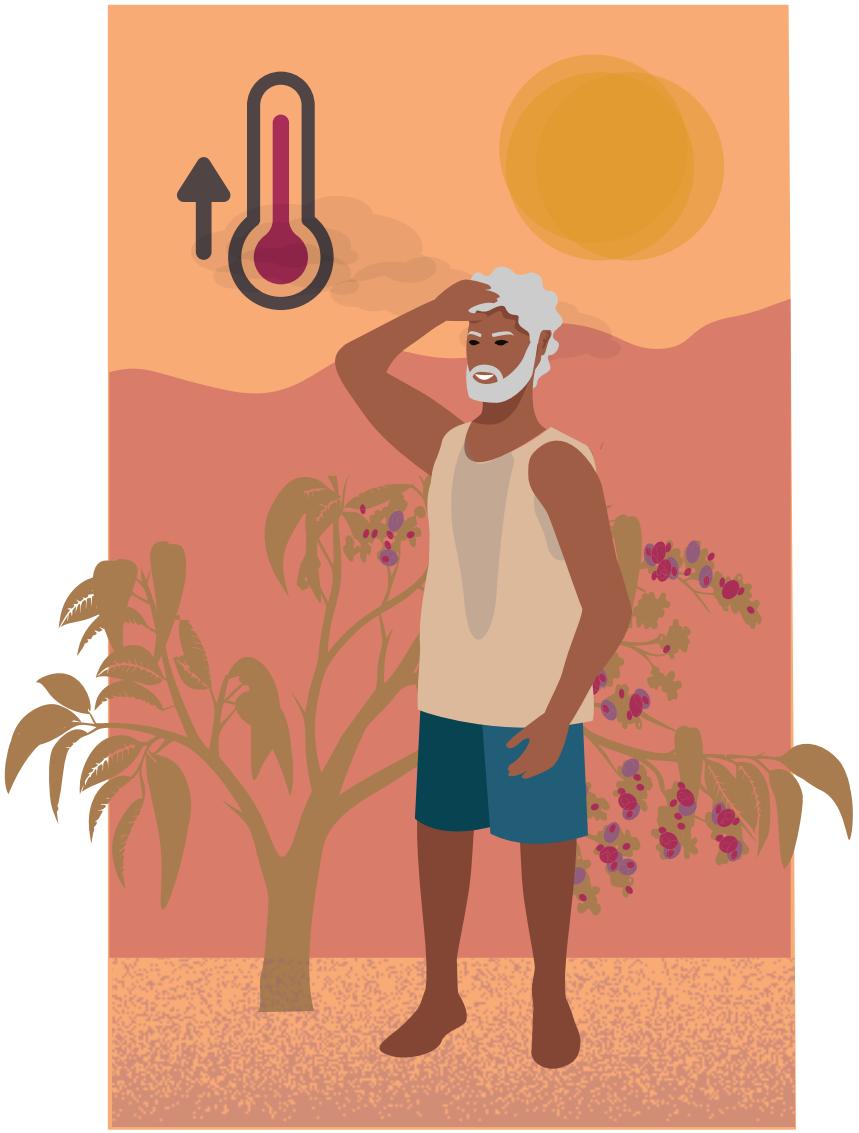
- Not all landslides are caused by climate change — some happen because of the natural shape and soil of the land — but climate change is making landslides more common and more dangerous.
- Higher temperatures increase the amount of moisture in the atmosphere, resulting in heavier and more unpredictable rainfall.
- Drought can cause soil to crack and lose its healthy structure. When heavy rains eventually come, the soil cannot absorb the water, which runs off quickly and increases the likelihood of flash floods.
- Heavy rainfall quickly soaks the soil, making slopes weak and causing landslides. These landslides can destroy coffee trees, wash away good soil, and damage young plants.
- Floods and landslides can also damage roads, making it difficult to transport coffee to the market.

Impacting livelihoods

Climate change doesn't only affect the coffee garden. It can also impact farmers' health, income, and communities.

Klimat senis i no afektim kofi gaden tasol nogat, em tu i ken bagarapim helt bilong ol famas, rot bilong mekim mani, na gutpela sindaun bilong komuniti.

- Hotter temperatures will make it harder to work outdoors. Older farmers are more likely to get sick from the heat.
- Because of climate change, coffee flowers at different times of the year. This means farmers may not get one big payment. Instead, they may get small payments throughout the year. Farmers may need to budget differently.
- Climate change also affects other crops. Some farmers might find new income by planting different crops, while others could struggle if staple foods no longer grow well in their area.
- More floods, droughts, and other disasters may force people to move to new places. When too many people move into one area, it can cause conflict around land, water, or food.
- Coffee prices go up and down depending on how much coffee is available around the world. If another big coffee country experiences a disaster, PNG coffee might sell its coffee for more money. But PNG is also at risk of disasters that can destroy coffee gardens and market access, infrastructure, reducing supply and income.



Coffee garden mapping - impact

Materials needed: Papers and pen

Steps:

1. Explain that the group will draw their coffee gardens to show areas affected by climate change.
2. Ask each participant to draw a layout of their coffee garden, showing key areas like:
   - Coffee trees
   - Shade trees
   - Slopes or flat areas
   - Water sources
3. Ask participants to mark areas where they have noticed changes, such as:
   - More pests or diseases
   - Less shade or more sun
   - Soil erosion or dryness
   - Changes in flowering or harvesting
4. Ask volunteers to share their drawings and discuss changes. Encourage others to ask questions and share their own experiences.
5. Put aside the drawings. They can be used again for an activity in Chapter 3 (page 30).

Seasonal calendar comparison

Materials needed: Two large sheets of paper and markers

Steps:

1. Explain that the group will compare past and present coffee seasons
2. On one sheet, draw a month-by-month calendar showing a typical coffee season 5–10 years ago. After, ask:
   - When did the rains usually start and stop?
   - When did flowering happen?
   - When was harvesting done?
   - When were pests or diseases common?
3. On the second sheet, repeat the process for the current season. Ask the same questions.
4. Place the two calendars side by side. Ask:
   - What differences do you see?
   - How have the differences affected your farming and income?
   - What have you done to adapt to these changes?
5. Summarize key changes and encourage farmers to think about how they can adapt their farming practices.

Chapter 3: Adaptation strategies for smallholder farmers



Learning outcomes:

- **Learn about climate adaptation and farming strategies to respond to climate change**
- **Understand that adaptation must consider the long-term impacts for the community and the land**
- **Identify maladaptive practices that may seem helpful in the short-term but can harm the wider community and cause long-term negative impacts**
- **Learn about other national adaptation programs that could help farmers**



Discussion questions:

- **What changes have you made or thought about for your coffee garden to adapt to weather changes?**
  Wanem senis yu bin mekim pinis o wanem senis yu tingting long mekim long kofi gaden bilong yu long go wantaim ol senis bilong weta?
- **How do you manage coffee pests and diseases?**
  Wanem ol sampela rot bilong kontrolim sik na binatang nogut bilong kofi?
- **Have you tried making changes to your farm that ended up causing problems by accident?**
  Yu bin traim mekim sampela senis long kofi gaden bilong yu na bihain em i mekim narapela hevi i kamap gen?

What is climate adaptation?



Climate adaptation means making changes to the way you farm so that your coffee trees and income can do well, even as weather patterns change. The changes we make on our farm must help our coffee and family for a long time, not just for now.

Klimat adaptesen i minim olsem yu senisim sampela pasin bilong wok long kofi gaden bilong helpim kofi olsem rot bilong kisim moni, maski weta i senis. Ol senis yumi mekim biahinim klimat senis i mas helpim kofi na famili long nau na behain taim.

- Good adaptation should consider both short-term and long-term impacts on the farmer, community, and the environment. It should make **coffee systems stronger for longer**.
- Adaptation is not one big change — it is many small changes guided by understanding your farm, knowledge of climate change, and care for your community.
- Good adaptation can look different across provinces and communities.
- Maladaptive changes can have immediate benefits to an individual but negative impacts on the environment, community, or in the long-term. The table below summarizes the difference between adaptation and maladaptation across different areas.

	Adaption	Maladaption
Timeframe	Encourages a long-term view	Has a short-term focus
Environment	Enhances or protects ecosystems	May harm ecosystems and/or increase greenhouse gases
Equity	Inclusive benefits that support marginalised groups	Increases inequality and leaves some people behind
System view	Approaches that consider impacts on other areas	Creates problems for other communities or sectors

What is maladaptation?



Sometimes, changes that are good in the short term can be 'maladaptive' for the future: you make a change to fix a problem, but that change causes another problem or makes things worse later.

Yu mekim senis long wok bilong kofi bihainim klimat senis, tasol dispela senis i kamap narapela bigpela hevi gen long behain taim.

Maladaptive practices can have immediate benefits but can be harmful in the long-term or for the community and the environment. They don't consider that the weather will become more unpredictable, that things will keep changing, and that your actions can negatively impact your community and your environment.

Good changes keep farmers, communities, and coffee farms productive and resilient for longer.

Short-term change on the farm	What happens long-term	Why it's a maladaptation
Cutting down shade trees to help beans ripen faster	Too much sun can make it very hot and likely that soil dries up and more pests increase	Faster ripening, but long-term damage to soil, trees, and bean quality
Using too much fertilizer or chemical spray to grow more coffee or fight pests	Soil becomes hard, water polluted, good insects die, individuals get sick	Solves one problem but creates others in the future
Planting only more coffee to get quick money	Diseases may spread easily and destroy the coffee, no food back-up, price of coffee may drop	Not resilient if coffee prices decrease, no family food, and higher chance of CBB

Adaptation strategy: Improve coffee garden management

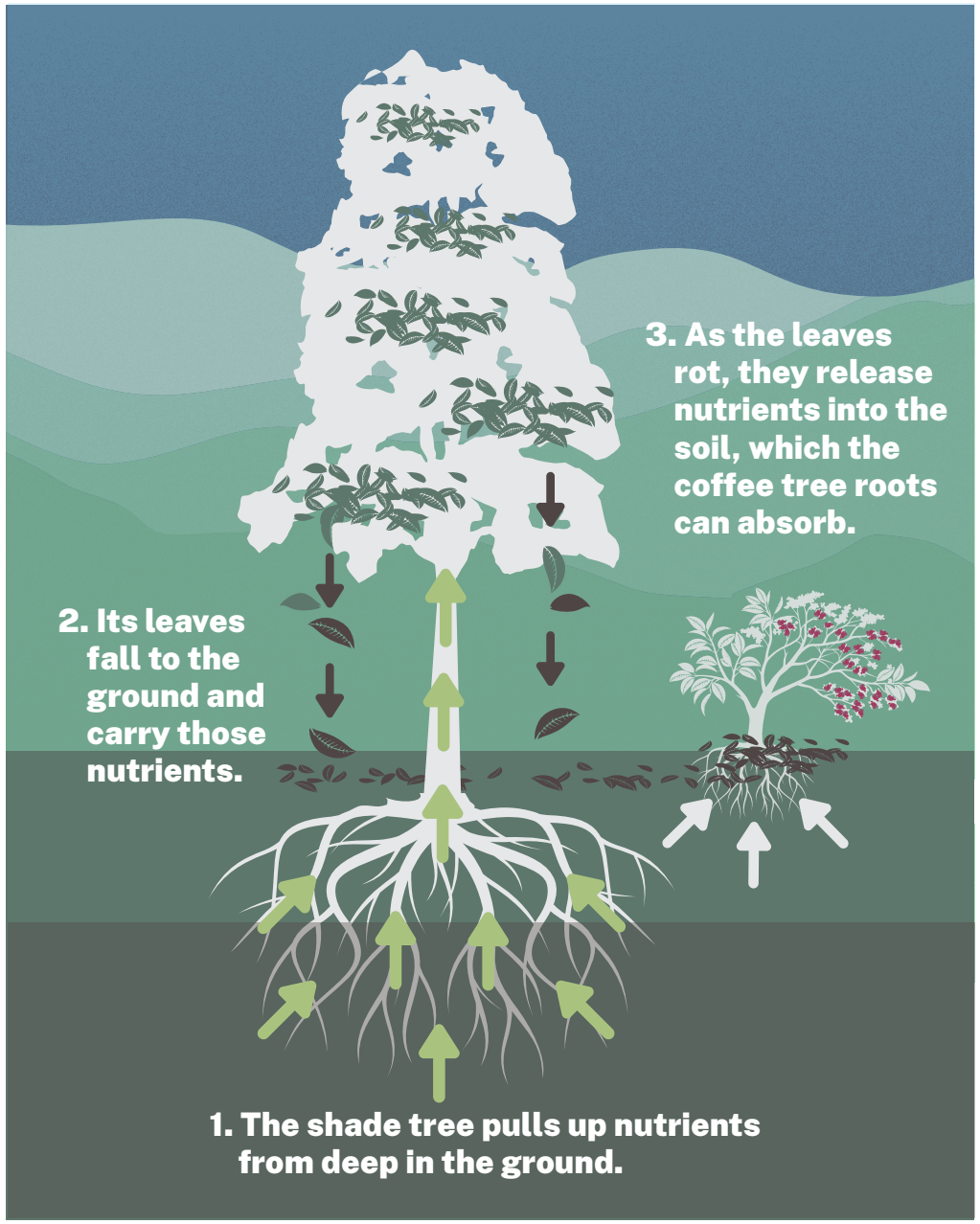
Applying best farm management practices to your coffee garden is important for adapting to climate change.

Aplaim ol gutpela pasin bilong wok long kofi gaden bilong yu em i bikpela samting bilong helpim yu long stretim wok na stap strong long taim we klimat i senis.

Farmers likely follow some recommended adaptation practices listed below:

- **Plant shade trees** to protect coffee from heat and heavy rain. Shade trees also keep the soil healthy, store water, improve coffee quality, and give extra benefits like fruit, firewood, and natural fertiliser.
  - CIC recommends **40 – 60 percent** shade
- **Use mulch, compost, and cover crops** to help the soil stay healthy and moist. Using a cover stops soil erosion and helps coffee grow better in dry weather and on steep land. Avoid creating large draining channels that can carry soil and water away from your farm.

BENEFITS OF SHADE TREES



Adaptation strategy: Improve coffee garden management

- **Prune coffee and shade trees to help** air move through coffee trees, which lowers the likelihood of diseases and helps farmers grow healthier trees with more coffee.
- To manage CBB, **farmers can pick berries often** and remove infected berries and branches.
- If necessary, construct a drainage system to prevent too much moisture in the soil. **Traditional drainage systems that align downslope are no longer recommended**. Proper planning is necessary since drainage requirements will differ for each coffee garden.
- Closely monitor weeds in your coffee garden. **Integrated weed management** is the best way to control weeds. It includes manually pulling out weeds, adding mulch, and planting cover crops, intercrops, and temporary and permanent shade trees.

For more information on best farm management practices, check Unit 2 of the PNG coffee training package



Protect against CBB and other pests

CIC and Australian institutions are researching the best methods to address CBB in PNG. Some methods can be found in Module 6, Unit 2, of the PNG coffee training package.

The researchers are also exploring the use of biopesticides, pesticides that come from natural sources. The Beauveria fungus has shown some promise to kill CBB and reduce pests. Meanwhile, Metarhizium Rileyi has been effective against armyworm.

Adaptation strategy: Diversify to reduce risk

Intercropping gives farmers food, extra money, and alternatives if coffee production or price drops. However, some crops are friendlier to the coffee tree while others can be harmful.

Intercrop i givim kaikai long famili, sampela moa mani, na tu i kamap narapela rot bilong kisim mani sapos kofi i no kamap gut o prais i pundaun. Tasol long narapela sait, sampela kain kaikai i gutpela wantaim kofi diwai, tasol sampela i no gut na inap bagarapim kofi.

- Planting trees and other food crops helps keep soil stable and healthy, reduces how much water drains away from trees, and protects coffee yield.
- Intercropping can also provide an additional source of income, particularly for women who tend and harvest vegetables and flowers.

For more information on intercropping, check PNG Farmer Training Guide, Unit 2, Module 8

Type of crop that can be used for intercropping in coffee gardens	Very suitable for new and mature coffee gardens	Not suitable in all circumstances or unsuitable
Legumes	Soya beans, peanuts, Pinto peanuts	Asbin (winged bean)
Vegetables	Cabbage, pak choi, broccoli, carrot, tomato, onion, zucchini, pumpkin, chilli, ginger, & cucumber	Choko and corn
Root crops	Potatoes	Kaukau, taro, tapiok, yam
Fruits & nuts	Banana & Tamarillo during the first 3 years of coffee establishment. They can be boundary plants in mature coffee gardens	Guava, kapiok (bread fruit), avocado, karuka, marita, muli, pineapple
Grasses		Sugar cane & rice
Other	Bamboo	Shrubs

Source: PNG Farmer Training Guide, Unit 2, Module 8, Page 17

Adaptation stories

Here are some stories from Papua New Guinea showing how farmers are improving their gardens and setting up for long-term benefits. Share these with farmers if appropriate.



PNG's smallholder coffee project shows benefits of intercropping and mulching

From 2017-2024, research supported by ACIAR tested intercropping recommended vegetables in coffee plots. This supported women to plant cabbages and other friendly food crops alongside coffee, helping them earn their own money and feed their families.

Intercropping makes the most of the land that farmers have access to, which helps families with small land plots. It also improves soil health and biodiversity, which protects coffee trees from pests and diseases.



The benefits of managed shade trees in smallholder coffee production

Managing shade trees means that farmers make a plan for using and replanting shade trees on their coffee farm. This can lead to labour efficiencies and socio-cultural benefits for smallholder coffee farmers in PNG. It also means that by planning ahead, coffee gardens will be optimally shaded even when some trees must be cut down for timber, firewood, and food.

Optimal levels of shade trees in a coffee garden can improve soil, coffee quality, and yields. Managing shade and planning for long-term benefit is adaptation.

Adaptation strategy:
Building community and sharing knowledge

When the community works together, all coffee farmers will benefit more from a healthy environment and strong support system.

Taim komuniti i harim tok na wok bung wantaim long bihainim adaptesen praktis, ol bai benefit long helti environment na strongpela komuniti sapot system.



- Working together in farmer groups or cooperatives can make farmers less vulnerable and more capable of responding to climate change. Farmers can share knowledge and resources to create good outcomes for everyone.
- Training workshops, radio programs, texts, and demo farms help farmers learn new information about climate risks and adaptation strategies.
- Field days bring together coffee farmers to learn from each other and extension officers about the impacts of different farming practices.
- Showing video documentaries to the community shares more information about the impacts of climate change and ways farmers are adapting across PNG.
- Avoiding chemical fertilizers in coffee gardens can improve garden health because chemicals build up over time and can have negative impacts on the farm and environment in the long-term.

Adaptation strategies beyond the farm

Climate change will affect all of PNG and the whole coffee value chain. Changes will be needed at local, regional, and national levels to help everyone adapt to climate change.

Coffee farmers can be proactive in adapting their farming practices. However, everyone has a part to play in keeping the PNG coffee system healthy and profitable. Here are some examples of national-level adaptation strategies that could help farmers:

- **Researching improved coffee cultivars** could enhance resilience to heat, drought, and pests while sustaining yields and reducing disease losses.
- **Investing in early warning systems** to help farmers prepare for extreme weather and pests, enabling proactive actions that reduce risks and costs.
- **Supporting certification schemes for coffee** that can bring in premiums while promoting sustainable practices and cooperative community approaches.



Seasonal farm advisories for enhanced food security in PNG

From 2019-2025, PNG and Australian institutions co-produced a seasonal farm advisory (SFA) system that shared locally-tailored climate forecasts to farmers via text messages. The SFA helped farmers better plan their farming activities according to the forecast. Although advisories were initially developed for fresh produce farmers, other agricultural producers, including coffee farmers, also reported benefiting from the SFA.

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Coffee garden mapping - adaptation

Materials needed: Papers and pen

Steps:

1. Explain that the group will draw simple maps of their coffee gardens to show areas that have changed due to weather, pests, or other climate-related issues. You can also use the same coffee garden drawing from the Chapter 2 impact activity.
2. Ask each participant (or small group) to draw a basic layout of their coffee garden. It doesn't need to be perfect — just a rough sketch showing key areas like:
   - Coffee trees
   - Shade trees
   - Slopes or flat areas
   - Water sources
   - Dry or wet spots
3. Ask participants to mark areas where they have been making changes to their garden based on weather pattern changes. Ask them to also think about where they may need to make changes so their garden and income stay healthy in the future.
4. Ask volunteers to share their maps and discuss the options they have identified to 'adapt' their coffee garden so it stays healthy in the future. Encourage others to ask questions and share their experiences.

Discussing impacts for the future

Materials needed: Pen and paper for notes

Steps:

1. Explain that climate adaptation is important for building long-term resilience. Adaptation should consider the long-term impacts for the individual farmer, their land, and their community.
2. Ask participants to brainstorm adaptation changes in response to changing climate conditions on their farms in small groups. This can build on the mapping activity. The groups or facilitator should write down the ideas mentioned.
3. Go through the adaptation ideas out loud. For each idea, ask the group:
   • How does this help the farmer in the short-term?
   • How does this impact the land?
   • How does this impact the community?
   • How does this impact the farmer in the long-term?
4. Close the activity by reiterating how positive changes in the short term might be 'maladaptive', meaning they may cause problems for the environment or community later on.
5. If it is difficult for participants, ask them to consider what their grandchildren might worry about and what changes now could help avoid bad impacts and increase good impacts for the future.

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