



# Changing Climate & Food Security

threatens the survival of  
**SMALL ISLANDS**



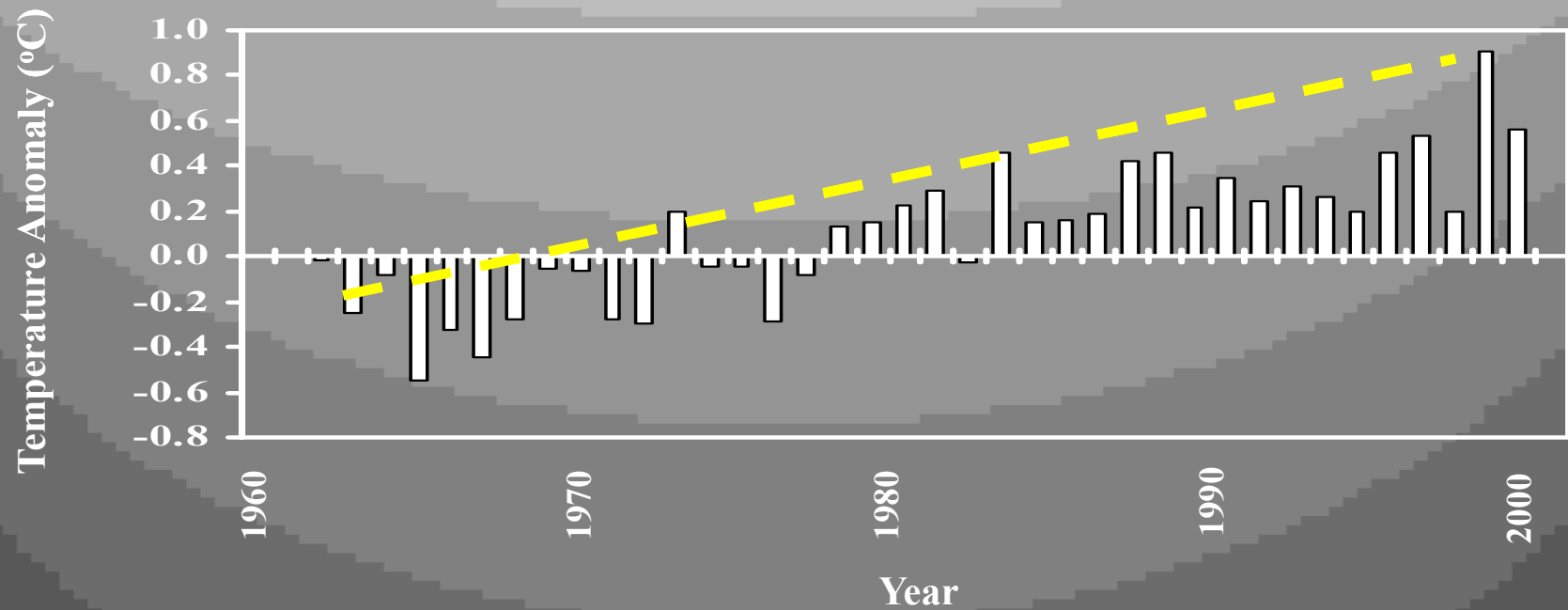
**Are We Ready?**

A Ramakrishna



How Does the Climate Change  
Manifested in PNG

## Increased temperatures

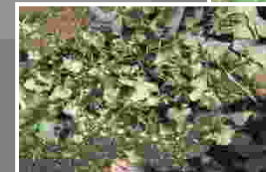
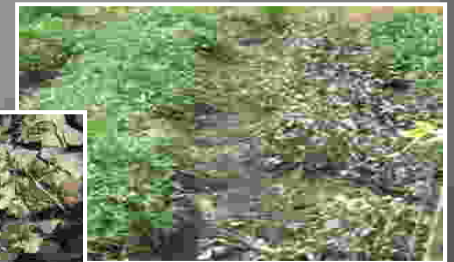
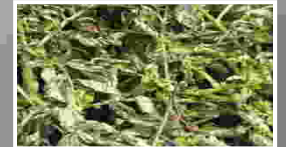


Temperature anomalies for PNG (*Inape and Humphrey, 2000*)

# Impacts on PNG

## Increased temperatures - Increased crop diseases

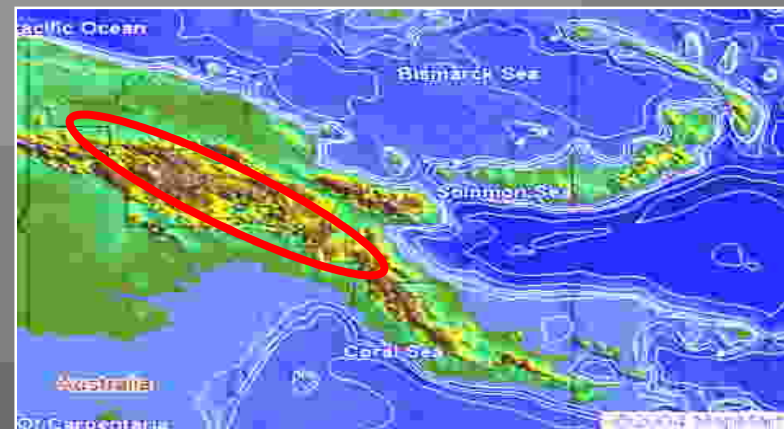
- ❑ *Virtual elimination of PNG's potato industry in the last decade due to the outbreak of Potato Late Blight Disease*
- ❑ *Leaf scab disease is almost at epidemic proportions in many sweet potato varieties in the highlands*



# Impacts on PNG

## Increased temperatures - Increased Malaria spread

- ❑ *Warmer temperatures are increasing the spread of malaria-carrying mosquitoes*
- ❑ *In the PNG highlands, which were previously too cold for mosquitoes to survive, there have been increasing reports of malaria*
- ❑ *Experts are now predicting that epidemic malaria will be present up to 1,500 m.a.s.l. by 2030*



## LANDSLIDES

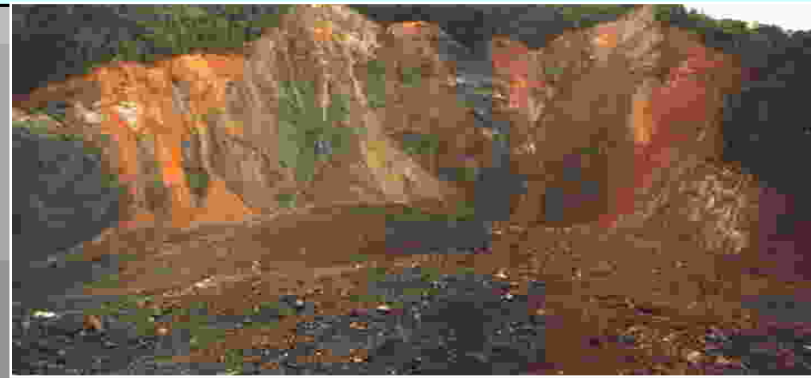
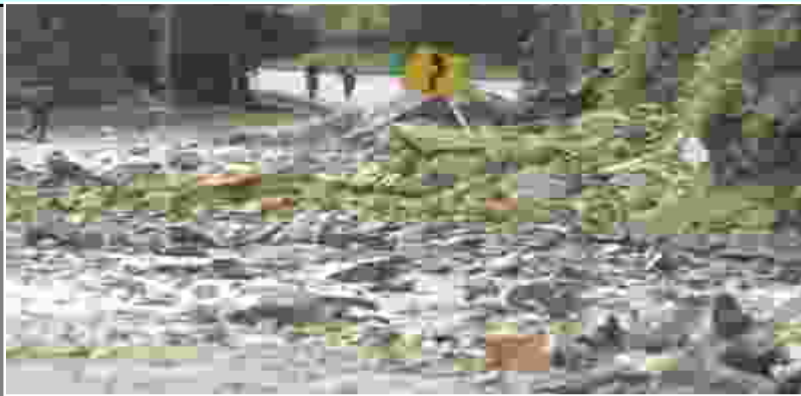


## MUD FLOWS



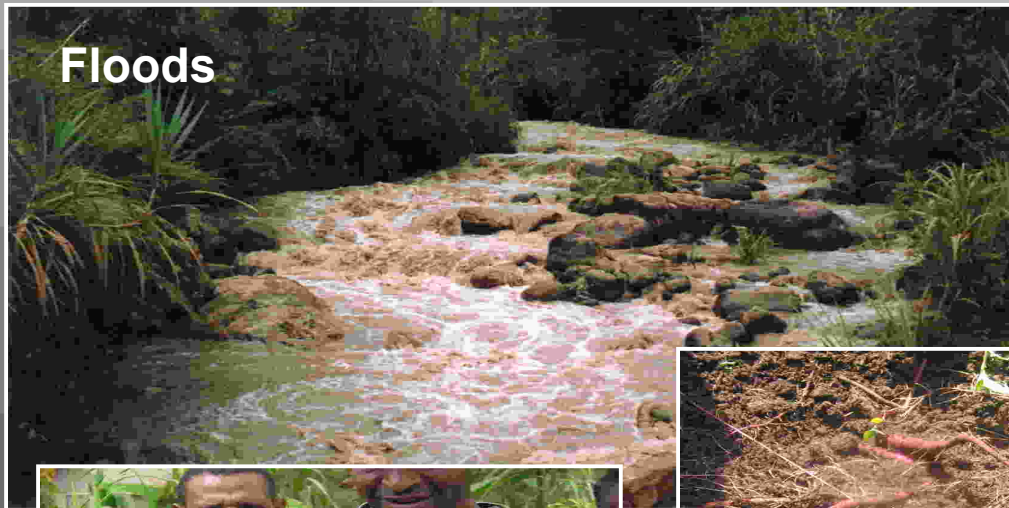
# Climate Change Impacts on PNG

## La Niña – Landslides destroying roads and gardens



# Climate Change Impacts on PNG

La Niña – excessively wet conditions



# Climate Change Impacts on PNG

La Niña – excessively wet conditions



- ❑ *Continuous rainfall conditions can drastically affect Cocoa production*



# Climate Change Impacts on PNG

## El Niño/La Niña – disrupting normal seasonality

- ❑ *Lack of distinctive wet and dry seasons in the past few years is causing coffee to flower out of season – with detrimental effects on production*



# Climate Change Impacts on PNG

El Niño – devastating drought events of 1997-98



Parched landscapes



Wild fire



Food aid

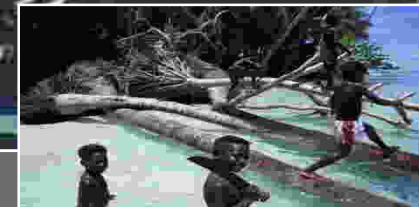
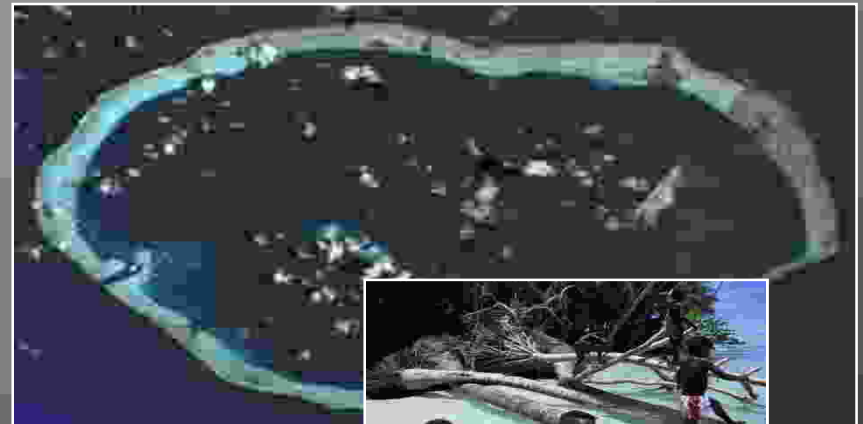


Hunger

# Impacts on PNG

## Rising Sea levels - Submerging small islands

- ❑ *Rising sea levels coupled with King tides have forced residents of the Carteret islands to relocate to Bougainville*



# Impacts on PNG

## Rising Sea levels - Contaminating water supplies

- ❑ *Rising sea levels are also threatening water supplies on small islands and atolls such as the Ninigo Islands in Northern Manus Province*
- ❑ *King tides have contaminated wells on the islands with saline water*



# El Niño

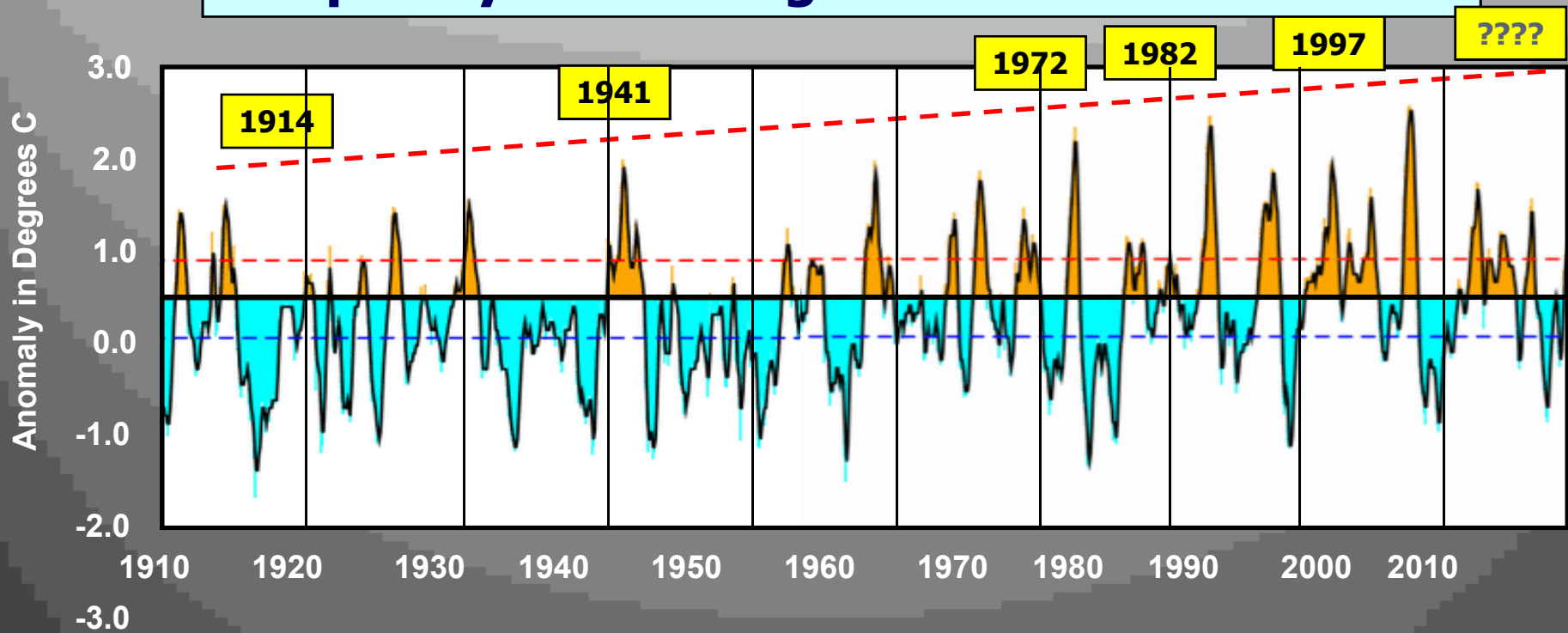
## PNG – Vulnerable to El Niño/Southern Oscillation

- ❑ *Situated on the western rim of the tropical pacific, PNG is highly vulnerable to extremes in rainfall intensity linked to the El Niño Southern Oscillation*



# El Niño

## Frequency and strength of El Niño events



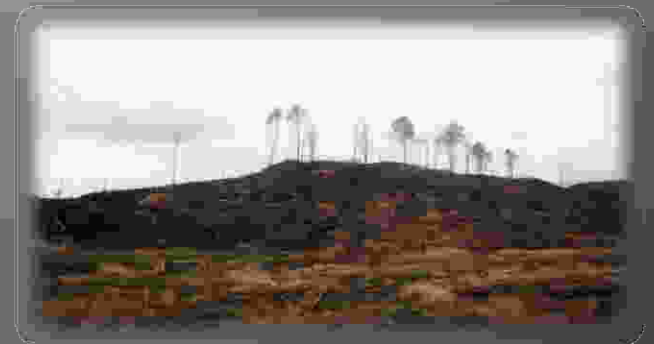
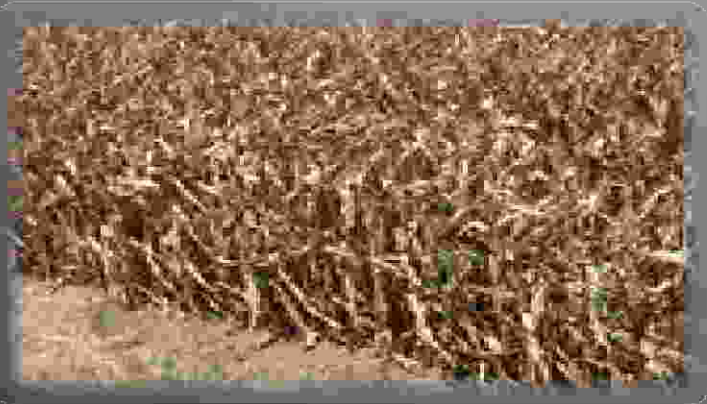
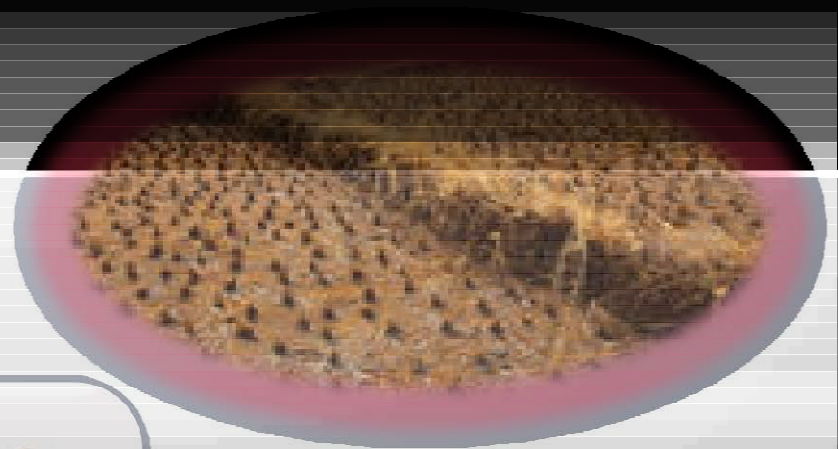
Sea Surface Temperature anomalies in the Niño 3.4 region of the equatorial Pacific



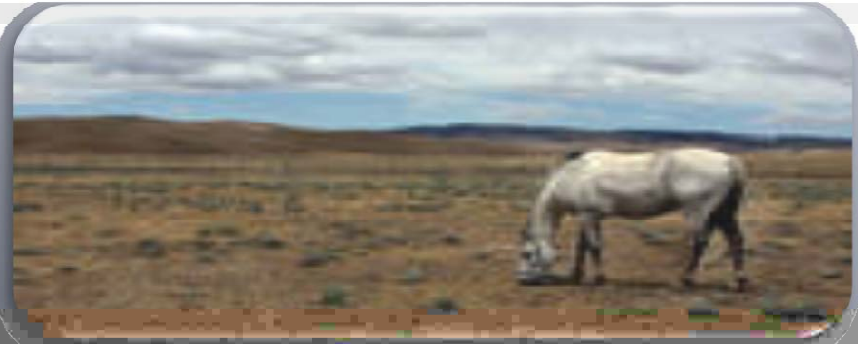
# Dry catchments & Empty Yonkis



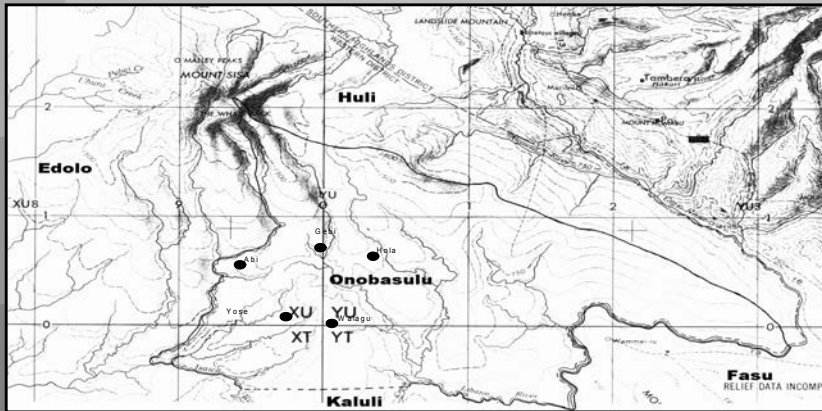
# Failed Crops



# Perishing Animals and Fish



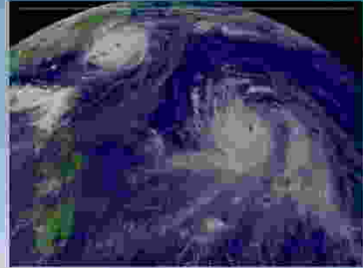
# Possible CC Effect - Bosavi Area of Southern Highlands



# the Struggle for survival



# Is this the Future?



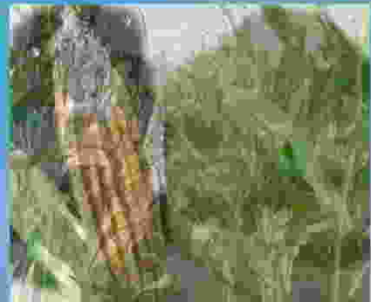
*Intensed  
Typhoons*



*More  
Floods*



*Frequent  
Droughts*



*Crop  
Failure*



*Reduced  
Biodiversity*



*Increased  
Health Risks*

# COPING WITH CLIMATE CHANGE

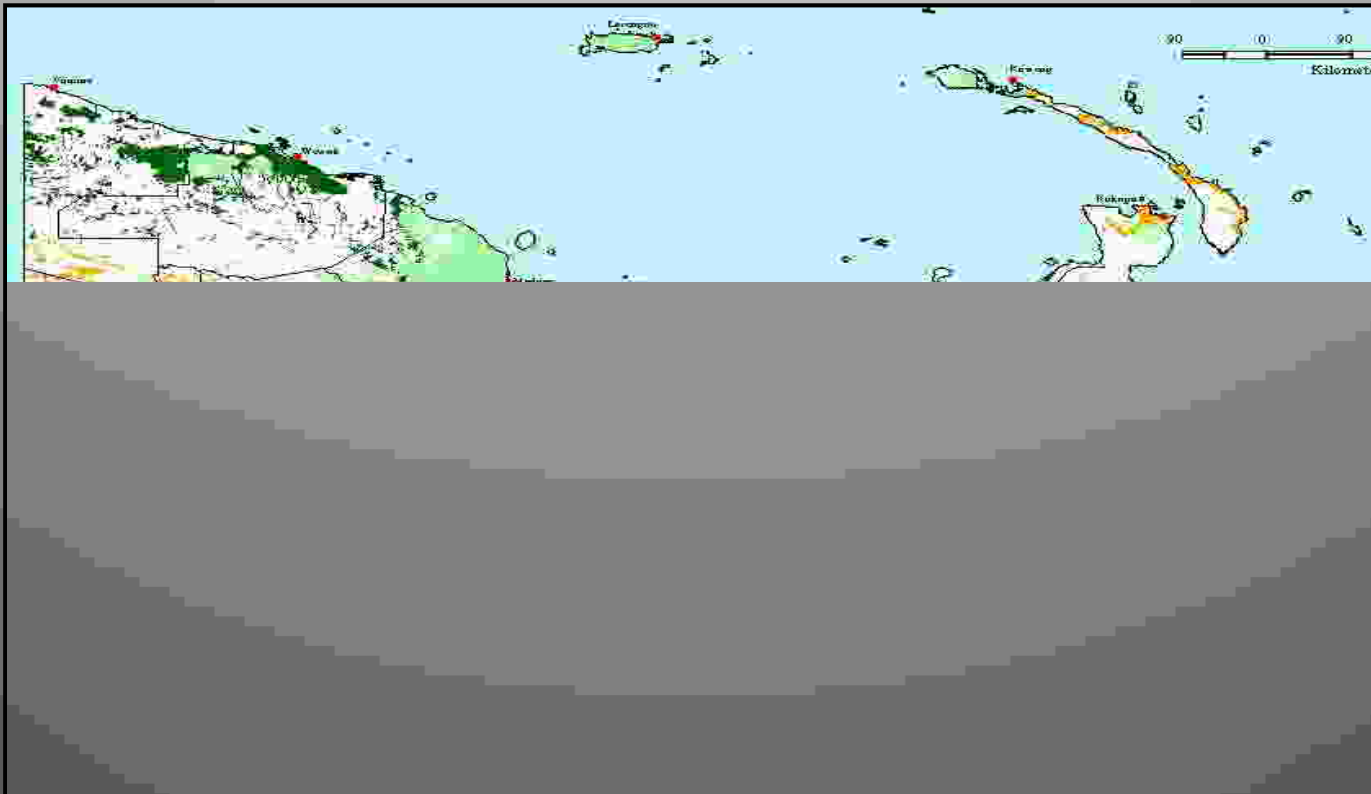


# R&D Strategies for Adaptation and Mitigation

## A 5-part strategy

- ❖ The strategy basically has five main parts which tackle different aspects of the climate change problem in PNG
  1. *Early warning system*
  2. *Crop & genotype diversification*
  3. *Biotechnology targeting of pests and disease*
  4. *Dissemination & adaptation of drought-coping strategies*
  5. *Sustainable water supply*

# Food Security for > 2 Million



## Food Security for > 2 Million

### What do Communities NEED?

1. *Agricultural Production Systems resilient to climate change*
2. *Ready access to Emergency Food Supplies in extreme situations*

# Strategy for alleviating CC impacts

## 1. Early warning system

- ❖ Many Pacific Island countries including PNG are prone to the impacts of climate variability and climate extremes (floods and droughts).
- ❖ The ability of PNG to respond to these challenges will be largely influenced by its preparedness at local, institutional and national levels.
- ❖ An early warning system based on seasonal climate forecasts and building local capacity to use this technology



# Strategy for alleviating CC impacts

## 2. Crop/genotype diversification

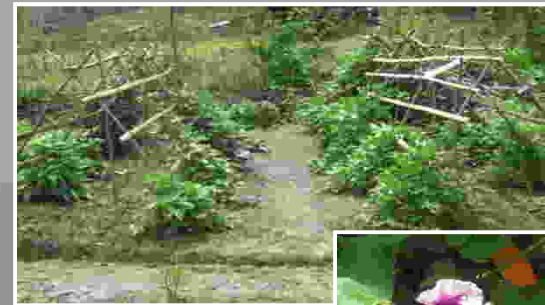
- ❖ Risk aversion stratagem is the diversification of genotypes and cropping systems for unforeseen/predictable impacts of climate change
- ❖ Preservation and broadening of existing national gene pools of staple crops such as sweet potato to ensure ample genetic scope for crop adaptations



# Strategy for alleviating CC impacts

## Crop/genotype diversification

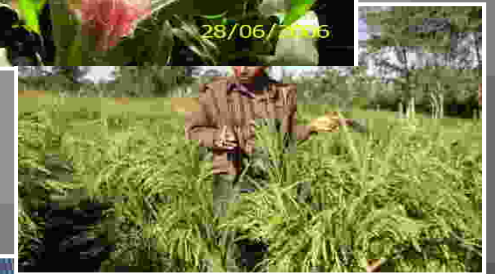
- ❖ Selection and breeding of crop varieties with genetically imparted tolerances to biotic and a-biotic stresses.
- ❖ A breeding and hybridization program is underway to develop early maturing, high yielding recombinants of sweet potato to facilitate the speedy recovery of food production following drought or excess rainfall conditions.



# Strategy for alleviating CC impacts

## Crop/genotype diversification

- ❖ Widening gene pools of specific crop species and diversifying traditional cropping systems by introducing new high-performing varieties --maize, rice, yam and peanut, etc.
- ❖ Such diversification should help to prevent the build-up of host-specific pests and diseases and minimize the risk of outright crop failure due to abiotic stresses e.g. frost or drought.



# Strategy for alleviating CC impacts

## 3. Biotechnology targeting of pests & disease

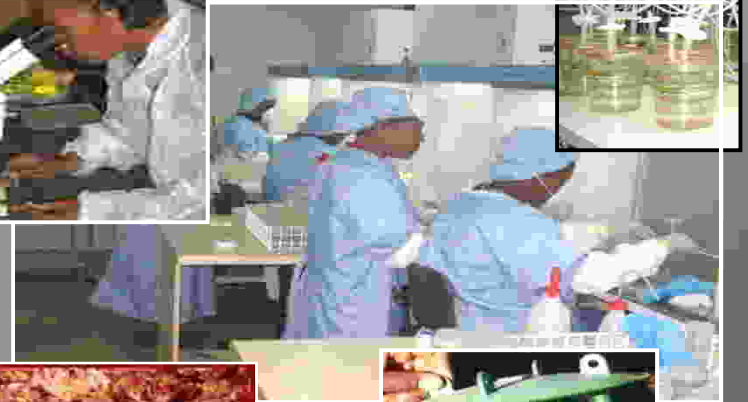
- ❖ Targets the problem of heightened pest and disease outbreaks owing to climate change.
- ❖ Potato late blight disease in 2003, and viral disease and pest infestations of sweet potato and other crops are increasingly hampering production and marketing.



# Strategy for alleviating CC impacts

## Biotechnology targeting of pests & disease

- ❖ Biotechnological solutions - micro-propagation, blight free and blight resistant potato clones, and the development of 'clean' pathogen tested sweet potato planting materials.
- ❖ Biological, cultural and low cost chemical methods for controlling *Oribius* weevils and fruit flies are also being investigated



# Strategy for alleviating CC impacts

## 4. Dissemination of CC-coping strategies



### DROUGHT RESPONSE ON-FARM COPING STRATEGIES

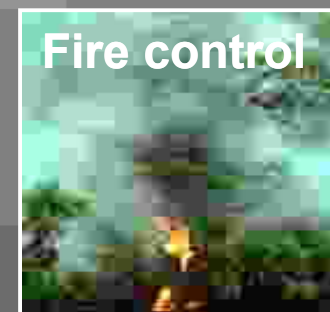


Coordinated by Gertjan Hoogen, Sergio Echeverri, Doreen Nairn and Sjoerd Aalbers

WARI-2008  
WATER AND AGRICULTURAL RESEARCH INSTITUTE/WARI  
WARI-2008-001-00-0

# Strategy for alleviating CC impacts

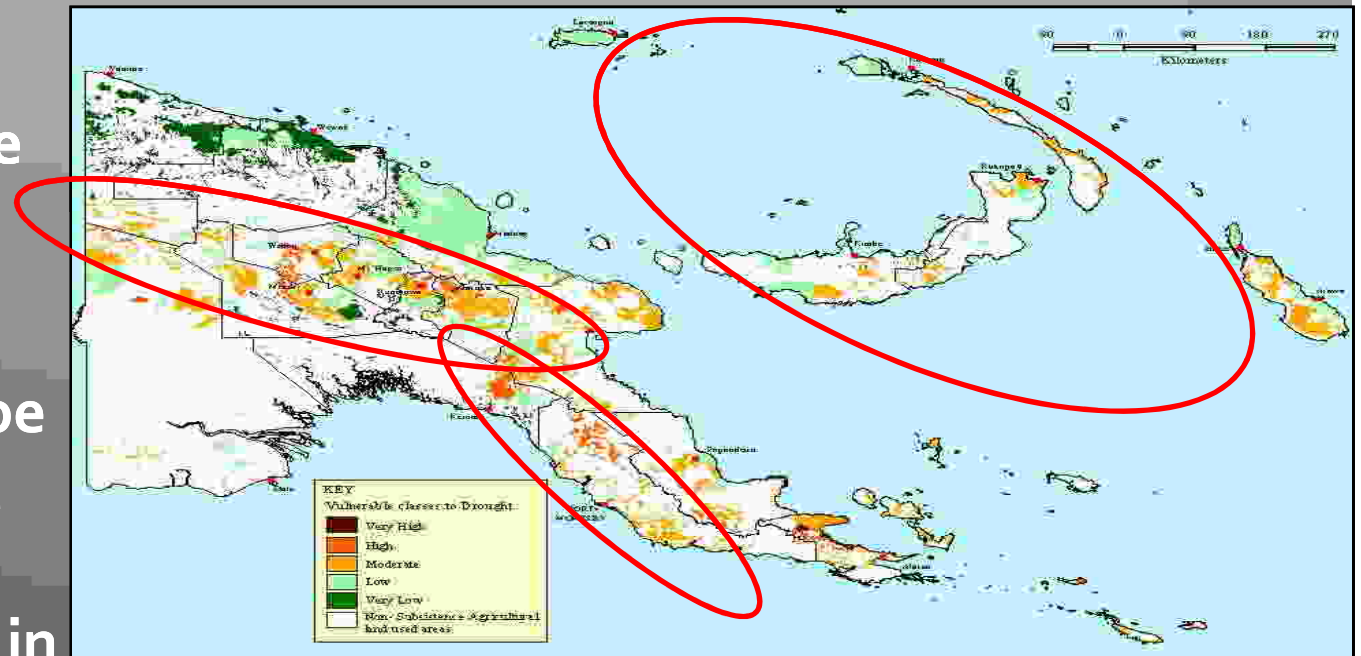
## Dissemination of CC-coping strategies



# Strategy for alleviating CC impacts

## Dissemination/Adaptation of climate resilient strategies

- ❖ Drought coping strategies need to be made accessible to rural communities
- ❖ Resource centres be set up or equipped in in each drought vulnerable district in PNG



**While you can go almost  
a month without food...**

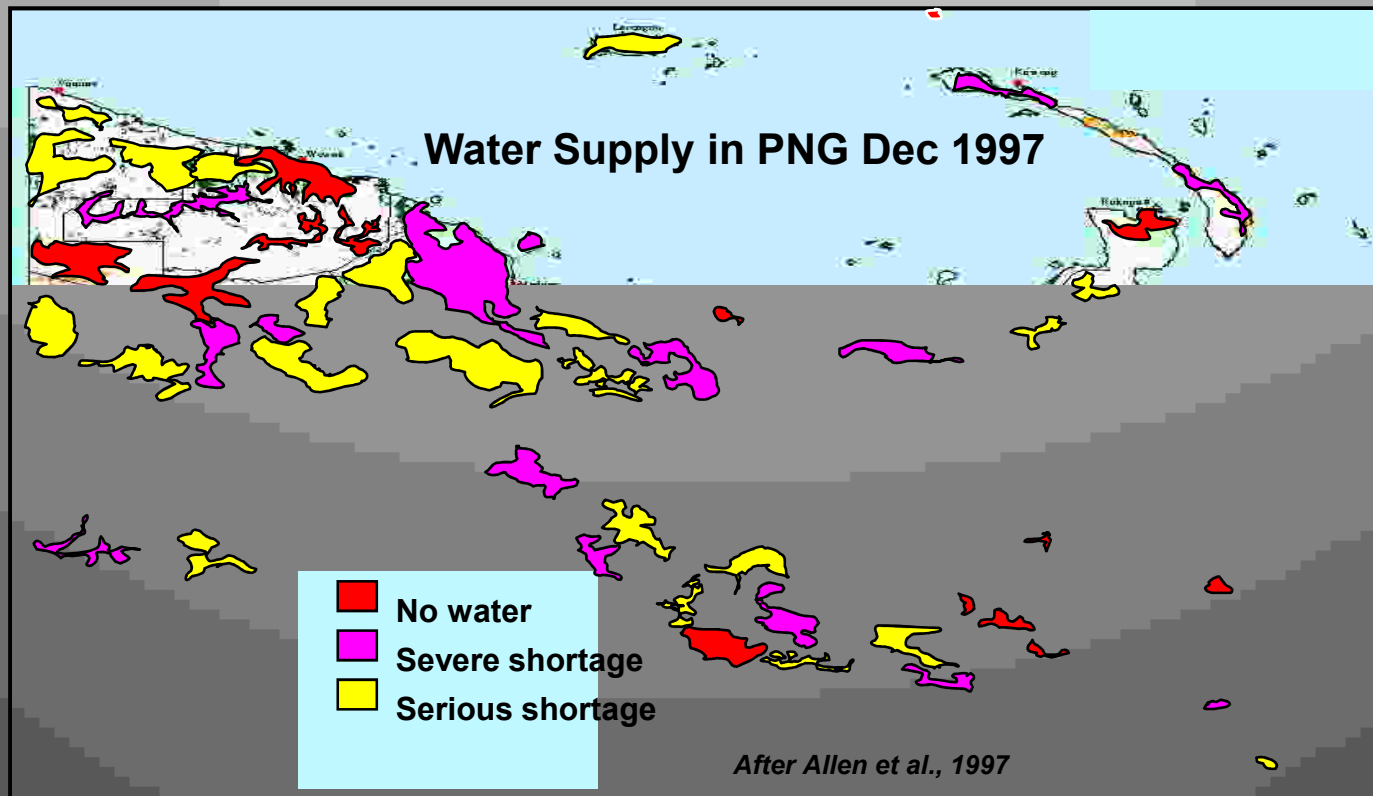


**your body  
can't survive  
one week  
without water.**



# Top Priorities

## Water Security for 1 Million



**According to the U.N., a child dies  
from a water-related disease  
every 15 seconds.**



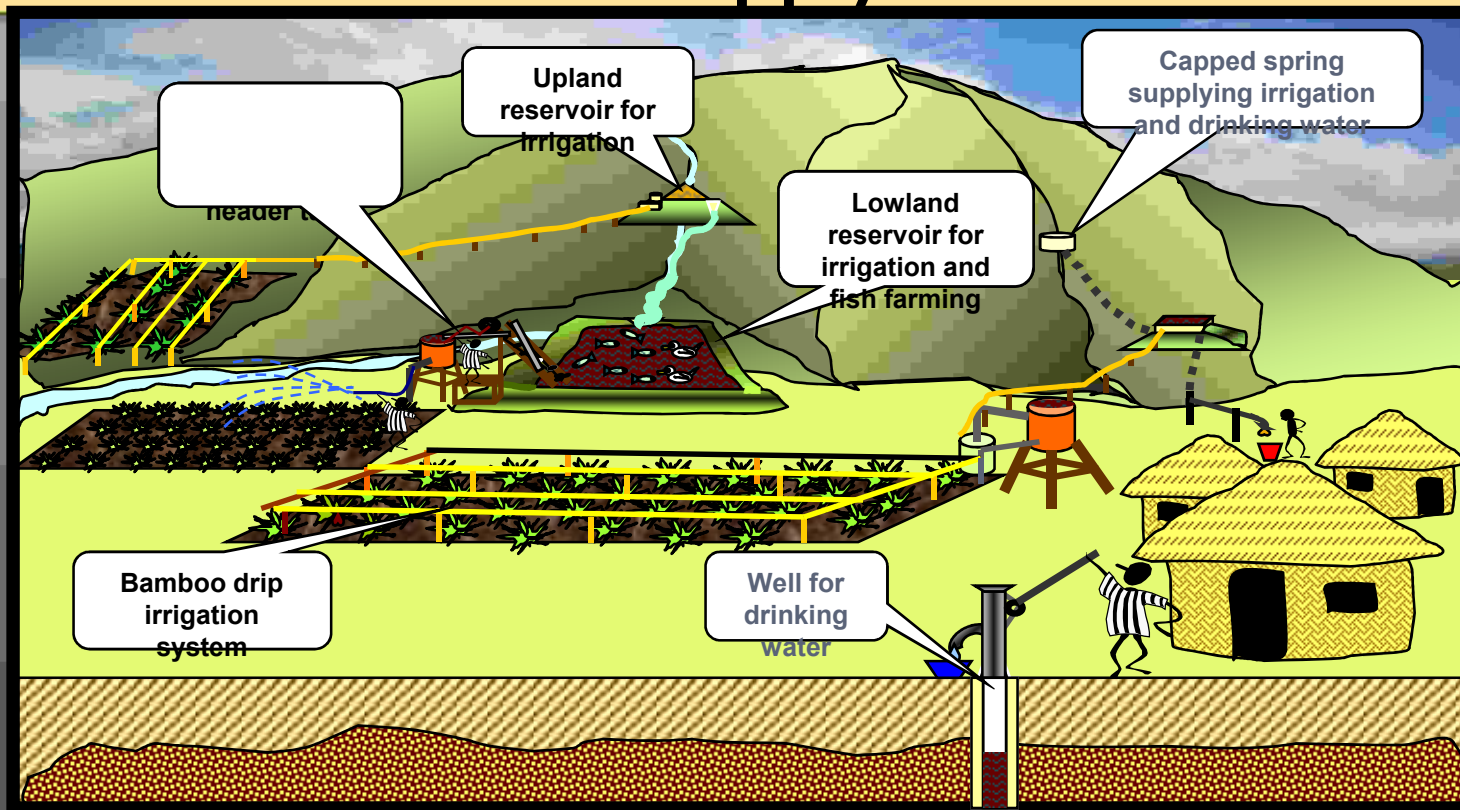
## Water Security for 1 Million

### What do Communities NEED?

- 3. Clean potable water*
- 4. Freedom from health risks linked to water-borne diseases*

# Strategy for alleviating CC impacts

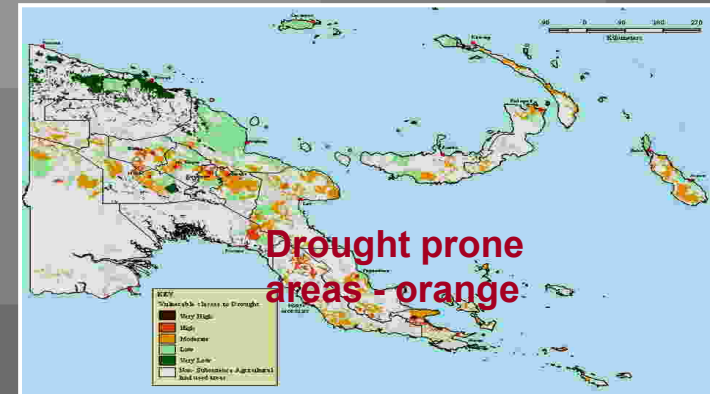
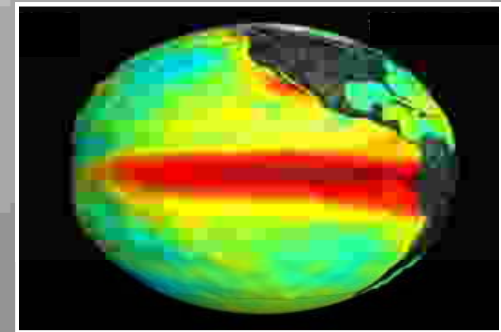
## Sustainable water supply



# Strategy for alleviating CC impacts

## 5. Sustainable water supply

- ❖ This strategy focuses on the provision of water supply facilities to sustain crop production in a scenario of recurring El Niño-induced drought events.
- ❖ Regional geological surveys are needed to investigate aquifer accessibility and terrain suitability for the construction of mini-reservoir, spring and borehole supply facilities in the five main agro-ecological regions of PNG



# Strategy for alleviating CC impacts

## 5. Sustainable water supply

- ❑ Community surveys for local preferences for specific types of water supply.
- ❑ Pilot studies in each region to assess the feasibility, practicalities, costs and effectiveness's of the different methods of supplying water



Header tank for garden irrigation



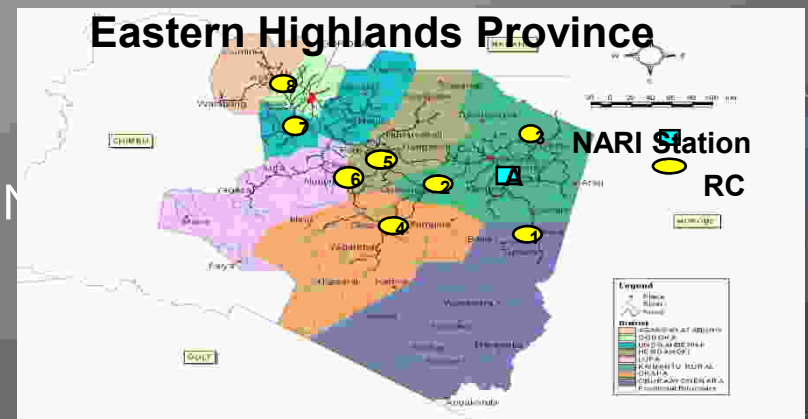
Water Storage tank for capped spring supply

# 6. Facilitate Exchange of Information

## Resource Centers

### Ground Truthing and Identification of 32 Resource Centers as Info centers, hubs for training and multiplication

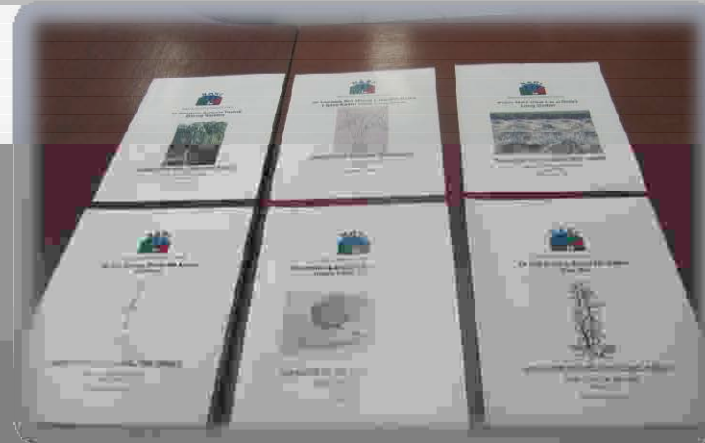
- Ialebu; Gambogel; Tabi buga; Ogelbang; Kandep, HATI
- Domil-Jiwaka; DAL station-Korefegu, Kemenave RC, Negiland Community Assoc-Mehenave-Henganofi; Homo SDA, Lufa, Okapa
- Abau, Bereina, Merani, Kemabolo, Hisu --Central Province
- Managalas– Oro
- Balimo– Western Province
- DAL station-Rabaraba, Milne Bay;
- ECOM School-Manus;
- Pomeo, Duke of York, Napapar, Rapitok --EM
- Finschhafen;
- RC-1;RC-2; Amele, Bunabun– Madang
- DAL-Bougainville



# Multiplication & Distribution of new generation crops & technologies

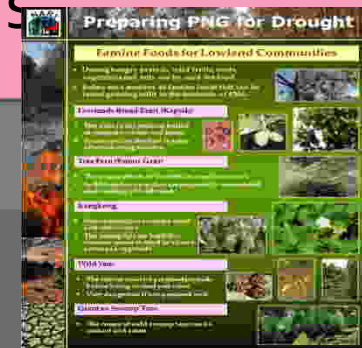
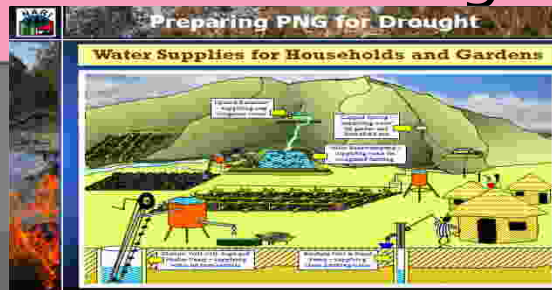


## 5. Raising Responsiveness



# Raising Responsiveness

A1 and A4 posters illustrating 34 drought-coping strategies most suitable for visual demonstration were designed, printed and laminated in sufficient numbers to supply one copy of each poster to each IRC together with self-standing wooden mounting boards.



# Getting the Communities Prepared

Rural Communities are made aware of the necessity of adopting and incorporating drought-coping strategies, particularly water conservation and food storage, into their seasonal work schedules for the foreseeable future.



# Field days/Open Days/Shows



# Seminars



## Radio & Print Media

- Radio programmes on – 1) FM –Lae, 2) FM-POM 3) Australia-New Zealand Radio Network 4) YumiFM 5) Radio New Zealand 6) Radio Peter Torot, Manus
- National Newspapers

# Community Empowerment

- Rope-and-washer pump
- Yam mini-setting
- Food processing, preservation & storage
- Famine foods & Crop diversification
- Water harvesting



## Monitoring community preparedness



The KEY point is...



# Food Security....

“Never mind the science, how about just planning for the future?”

Because it would be “Be or not to be”



**S E R I O U S L Y !**

**THINK ABOUT IT...**

# EM TASOL

