LNG REVENUE AND AN ATTRACTIVE OPTION OF INVESTMENT IN AGRICULTURAL RESEARCH AND INNVATIONS IN PNG

By Raghunath Ghodake
NARI

THIS PRESENTATION

1. Vision 2050 and Prosperous PNG
2. Agriculture –Centre of the Development Agenda
3. LNG Revenue and An Attractive Opportunity for Investment in ARD
4. Agricultural Research and Innovation- Essential Catalytic Contribution
5. Challenges and Opportunities
6. Potential Areas of ARD Investment
7. Looking Forward


PAPUA NEW GUINEA
VISION 2050
Vision
2050
PAPUA NEW GUINEA
PAPUA NEW GUINEA
DEVELOPMENT
STRATEGIC PLAN
2010 - 2030
Healthy and Happy Society by 2050"
Independent State of Papua New Guinea
Ministry of Agriculture and Livestock
NATIONAL AGRICULTURE
DEVELOPMENT PLAN
2007 – 2016
PAPUA NEW GUINEA
MEDIUM TERM DEVELOPMENT
PLAN 2011 - 2015

PNG VISION 2050

Vision : Smart, Wise, Fair and Happy PNG Society by 2050

Mission : PNG with top 50th HDI in UN by creating opportunities for personal and national advancement though economic growth, smart innovative ideas, quality Service, ensuring equitable distribution of benefits for all in a safe and secure environment.

VISION 2050 – KEY PILLARS

1. Human Capital Development
2. Wealth Creation and Natural Resources
3. Institutional Development and Service Delivery
4. Security and International Relations
5. Environmental Sustainability and Climate Change
6. Spiritual Cultural and Community Development
7. Strategic Planning, Integration and Control

TOWARDS IMPROVED WELFARE AND PROSPERITY

- Gainful Employment/ Optimal Utilisation of Available Resources
- Food & Nutrition Security and Cash Incomes
- Improved Health, Livelihoods, Harmony, Peace and Welfare
- Income Distribution/ Broad-based Quality and Balanced Economic Growth
- Sustainability and Environmental Integrity
- Overall Prosperity

Balanced Diet

Agriculture Sector in PNG

1. 86% of 6 million people depend on agriculture and 4 out of 5 live in rural areas: spin-off benefits, multiplier efforts non-farm rural activities
2. PNG in category of Agriculture-based countries (as against transforming countries and developed countries) –WDR 2008
3. Agriculture precursor to the industrial revolution/ manufacturing industries. Very much true and we have just initiated into this stage
4. The Ag. GDP share may go down but absolute value should rise if these 86% are to participate, benefit and prosper

Importance of Ag. Sector

1. An Economic Activity (export tree crops, emerging cash crops, traditional fruits and nuts, employment, income generation)
2. Provides Livelihood (Subsistence and semi-subsistence smallholder agriculture in all agricultural areas in PNG)
3. Provides Environmental Services (clean drinking water, stable water flows, carbon sequestration and protection of biodiversity (*in-situ* germplasm management), agro-forestry traditional tree crops sago, galip, Okai, Nutmeg, Ton, development of indigenous tree crops in PNG)

AGRICULTURAL DEVELOPMENT CHALLENGES AND OPPORTUNITIES

1. Resource rich but income poor
2. Climate change and adverse/ unpredictable impacts– droughts, frosts, emerging pests diseases
3. Low factor productivity /high resource-use inefficiency, resource degradation and low rate of replenishment under existing systems
4. Marginal, neglected, difficult access and resource poor areas – atolls, frosts, dry, poor soils
5. Unexplored rich and unique genetic diversity

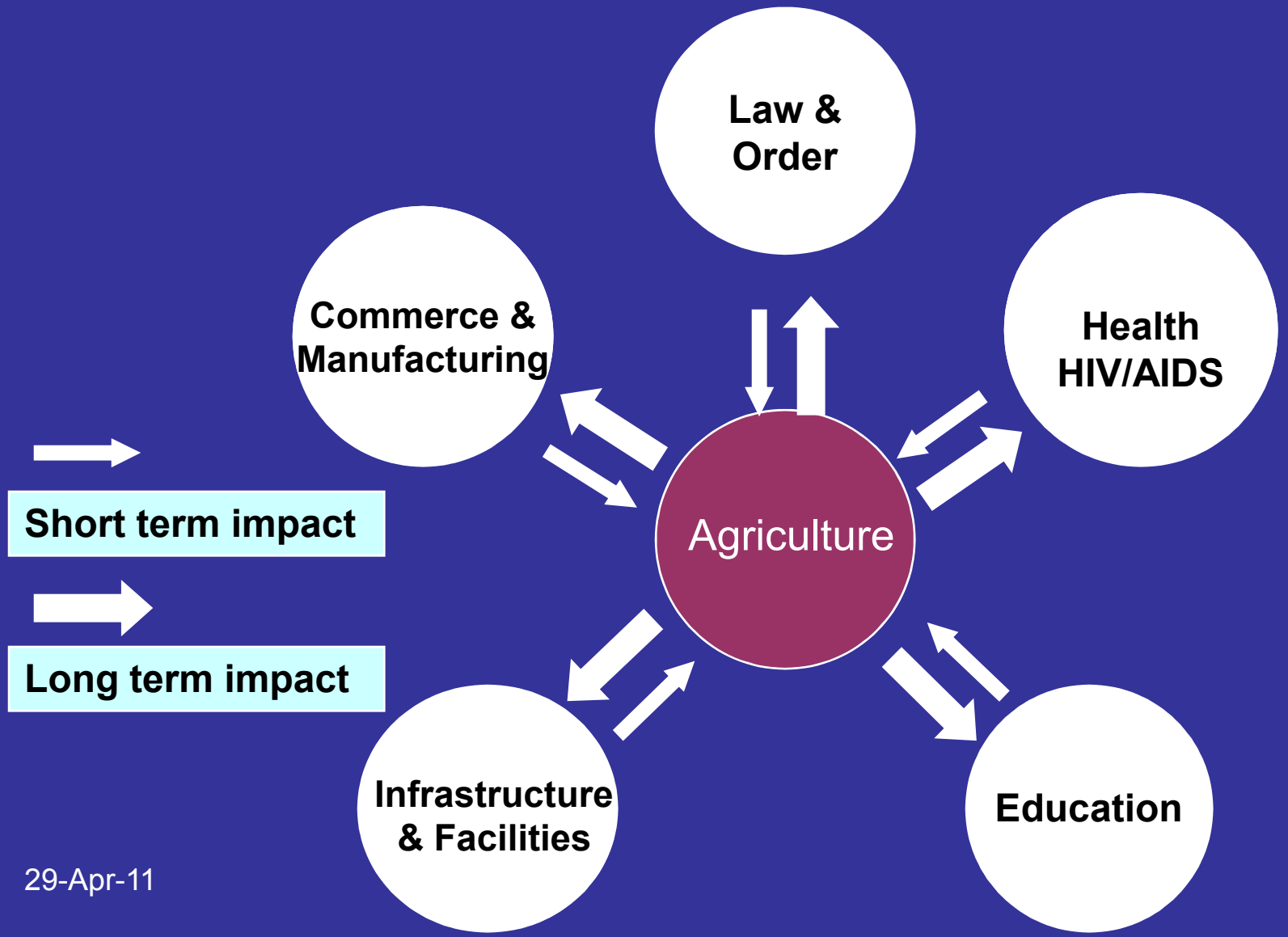
AGRICULTURAL DEVELOPMENT CHALLENGES AND OPPORTUNITIES

6. Under-utilised domestic resources - feeds and Indigenous nuts/fruits/ livestock, etc.
7. Perishable and high weight/volume to value/ Value adding/ preservation/linking farmers to markets
8. Emerging enterprises/ niche markets/export– organic produce, bio-pesticides, pulses, vanilla, honey
9. Domestic demand– rice, grains, meat, feeds

AGRICULTURAL DEVELOPMENT CHALLENGES AND OPPORTUNITIES

10. Gender imbalance/benefits/participation
11. Health - HIV/AIDS, Malaria and other disorders and likely imperatives for and from
12. Weak infrastructure, facilities and marketing
13. High exposure to external environment - economic crisis, food price crisis, swine flue
14. Emerging policies/strategies implementation (NADP, MTDP, DSP and Vision 2050)

Agriculture at the Center of Socio-Economic Development in PNG



Investment of LNG Revenue in Other Sectors

Purpose: to enhance agricultural development

Law & Order	**Village court system**	Women can work safely in their gardens; People don't loose produce and hard earned cash to thieves; Safe transport of produce to markets
	Feeder roads, jetties	Marketing improved; cost reduced, agricultural production becomes attractive
Education	**Literacy, agr skill dev**	Mobilization of women and youth in agriculture and increased production and productivity
Health & HIV/AIDS	**Nutrition and prevention**	Balanced diets, healthy productive workforce
Commerce & Manufacturing	**Agr . mechanization**	Many fold increase in labor and land productivity

Under Investment in PNG Agriculture

1. **Agriculture sector truly and vastly underused and under invested and often misplaced**
2. **10% Ag GDP needed if to be progressing into transformed country (WDR 2008)**
3. **Less than 5.0% Ag GDP invested (Kina 190 million, including recurrent, NADP allocations to districts and National Bank and others)**
4. **Ideally K400 million needed to reach 10% (of Kina 4 billion Ag. GDP)**
5. **Only about 0.5% (K 20 million) of Ag. GDP on agricultural R&D in PNG; Ideal 2% of GDP (K 80 million)**

Investment in PNG Agriculture: Two Major Donors

1. European Union focus on education, health, and social sectors – has been since last two years as per strategic change
2. AusAID – on health (HIV/AIDS), education, law and order, infrastructure, transport to optimise their efficiency in focused areas
3. Whatever is left from ARDSF (PGK 6 - 8 million (about 0.5%) per annum out of an Annual outlay of PGK 1.3 billion) is to cease in 2012 onwards
4. So declining investment (both in absolute and relative terms) in the agriculture sector

Investment by PNG Government in Agriculture Sector – 2011 Budget

1. Recognised enablers of growth and development??: education, health, infrastructure/transport, and others including law and order
2. Recurrent budget increased from Kina 6.9 billion (2010) to Kina 7.8 billion in 2011 (by Kina 851 million (or 12.2 %): all increases go to above sectors
3. Development budget increased by Kina 647 million (19.0% higher) from Kina 3.4 billion (in 2010) to Kina 4.0 billion (in 2011); All increases go to the above sectors
4. Thus declining investment (both in absolute and relative terms) in the agriculture sector; this trend may continue (MTDP and MTRF).

Growth and Development

1. More than 8% economic growth projected is achievable (LNG and other resource projects) but will be accompanied by much higher rate of inflation
2. Smallholders and subsistence sector, natural resource management and development/ environment, biodiversity, policy, technology, innovations, capacity development – need public sector investment
3. Growth if not used in further wealth creation, can translates into "Dutch Disease" signs already
4. Economic growth not participated and shared by masses lead to double disasters **(typical enclave development both in non-renewable and even in renewable resource sectors)**

Design of Appropriate Technologies and Policies

Fish

- Direct support to projects/individuals – highly unsustainable

Fishing Net

- Technology/innovation and policy implementation – empowered communities

Designing Fishing Net

- Development of appropriate technology/policy regimes for dynamic national capacity and empowered communities for long term sustainability

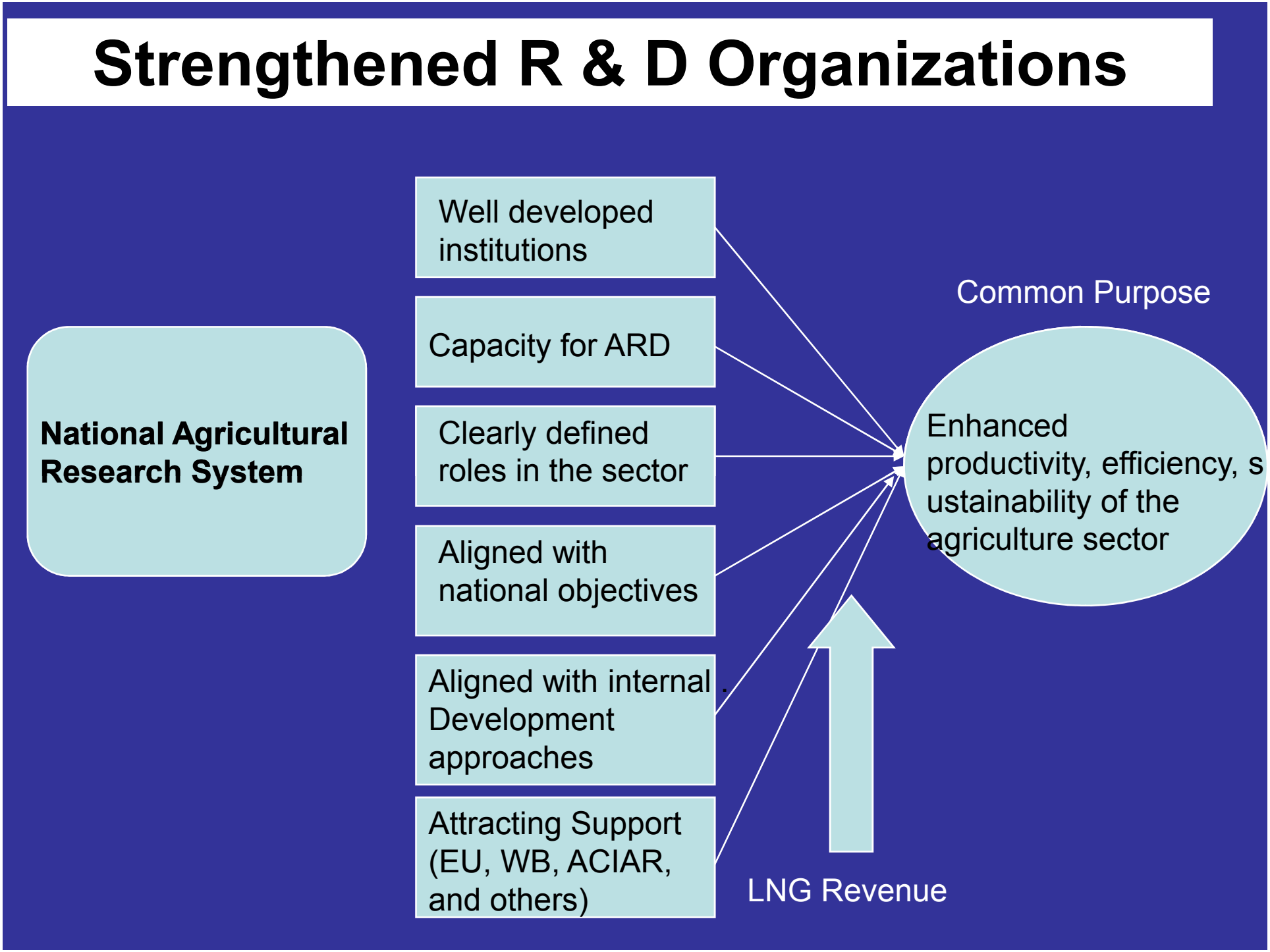
Attractive Investment in ARD

1. Substantial efficiency in the smallholder farming (e.g. Sweet potato yield per hectare can be increased by 4 folds)
2. 43% IR®R internationally and 30-35% in PNG as demonstrated from various research investments
3. Much larger multiplier aggregate impact
4. Low international transfer of technologies for staple crops, traditional nuts and fruits and vegetables and resources
5. Researching on location specific, high value and add value technologies

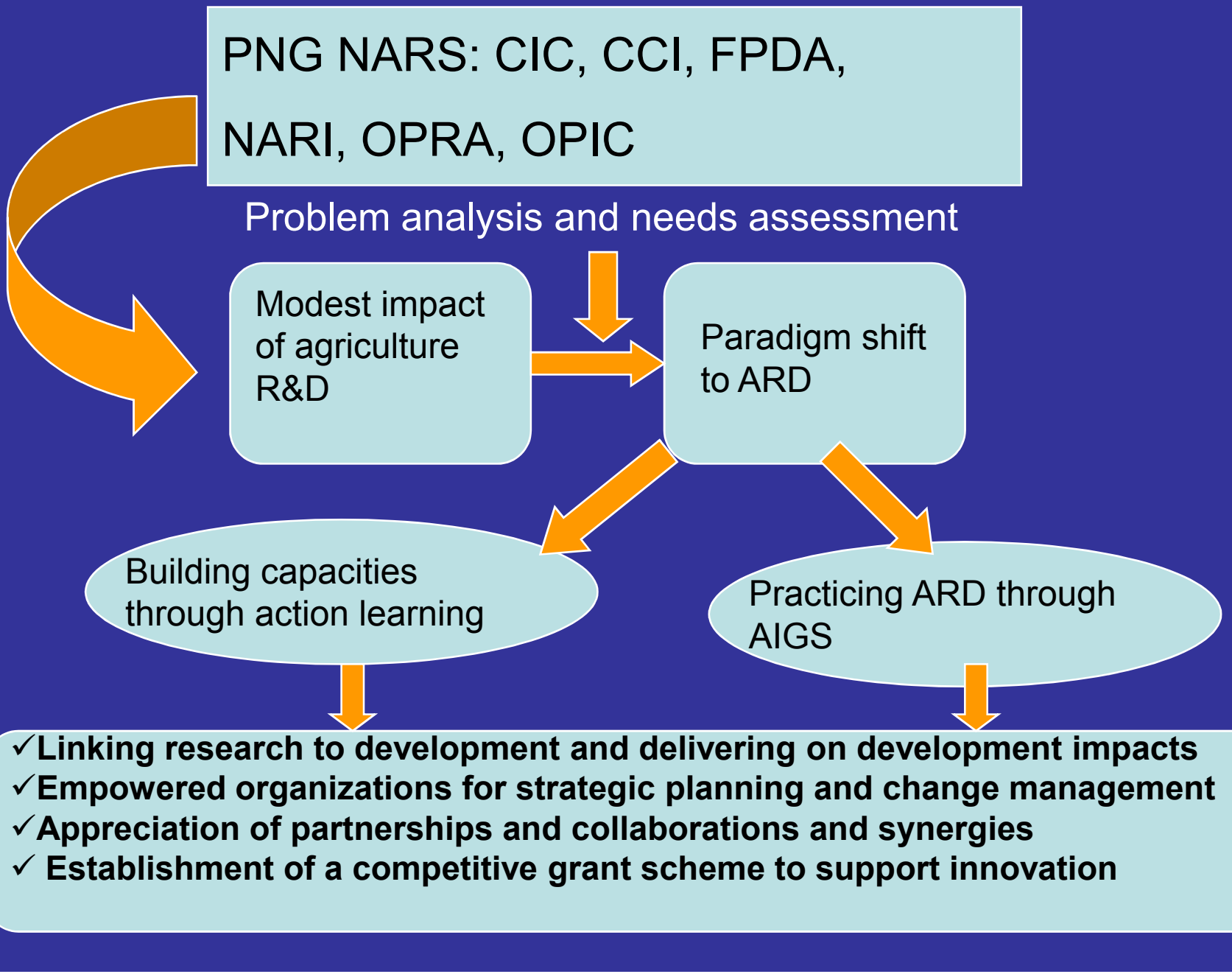
International Scene

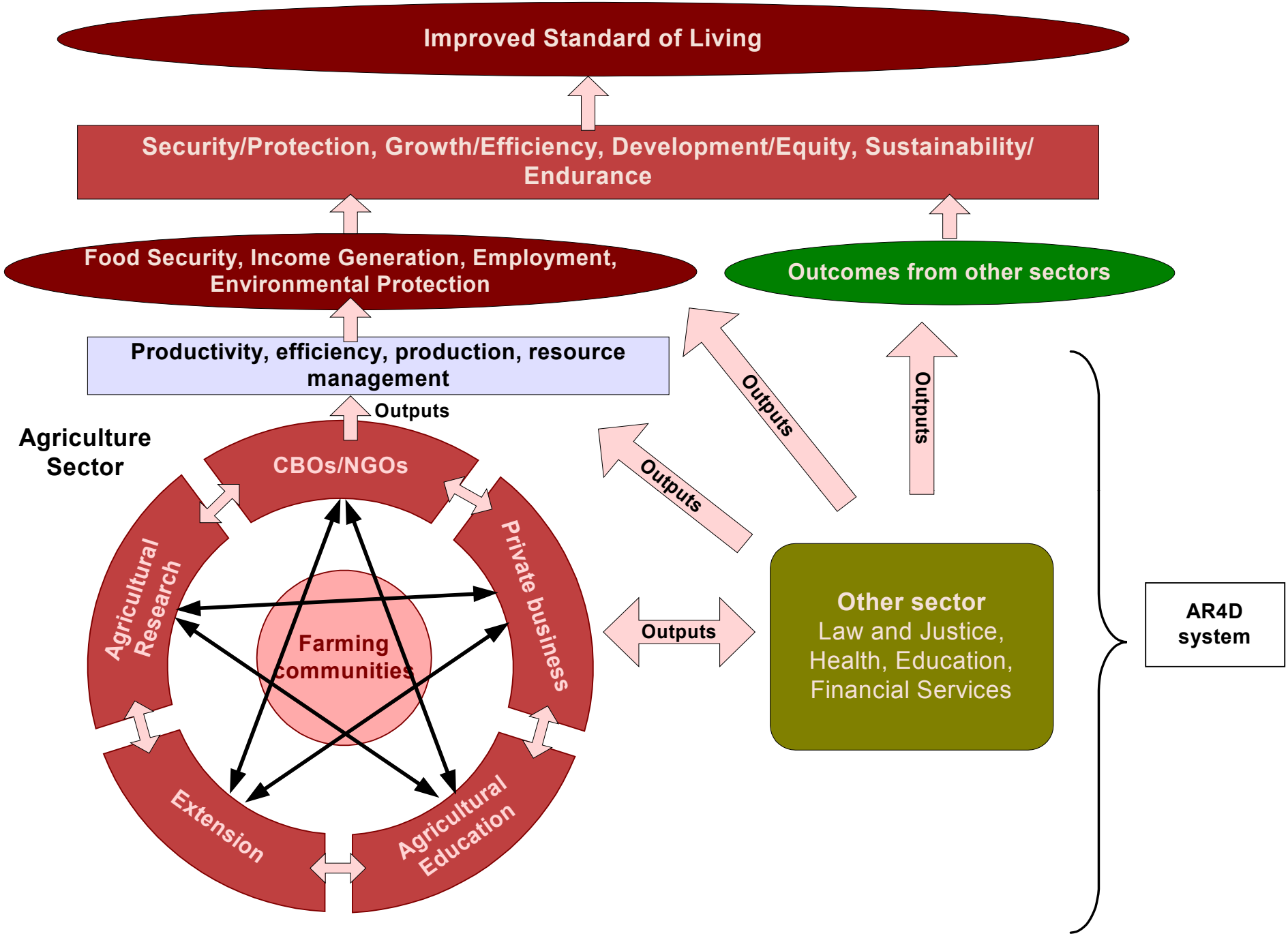
- Continued food price crisis/financial crisis, climate change and poverty (MDGs)
- Fast growing economies and diversification of food to bio-fuels/niche demand
- International organization and communities focusing on food security, poverty reduction and climate change through ARD
- Reformed IARC towards ARD and global public goods and services
- Continued contribution of ACIAR, AusAID, JICA, World bank and others

Strengthened R & D Organizations



Contribution of AusAID ARDSF to ARD

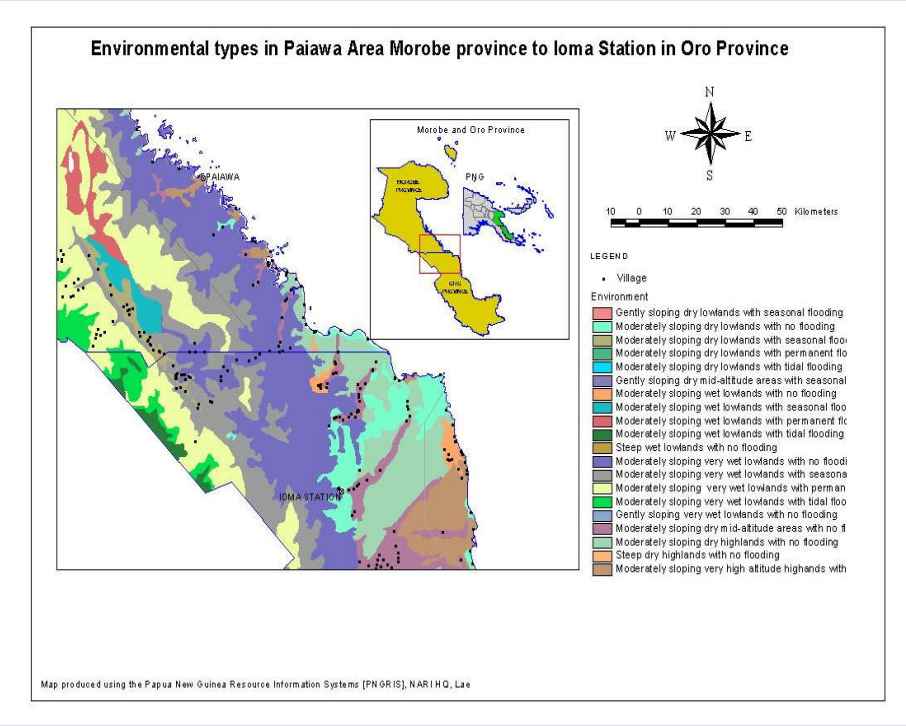



Improved Standard of Living
Security/Protection, Growth/Efficiency, Development/Equity, Sustainability/ Endurance
Food Security, Income Generation, Employment, Environmental Protection
Outcomes from other sectors
Productivity, efficiency, production, resource management
Outputs
Outputs
Outputs
Outputs
Agriculture Sector
CBOs/NGOs
Private business
Agricultural Research
Farming communities
Extension
Agricultural Education
Outputs
Other sector
Law and Justice, Health, Education, Financial Services
AR4D system

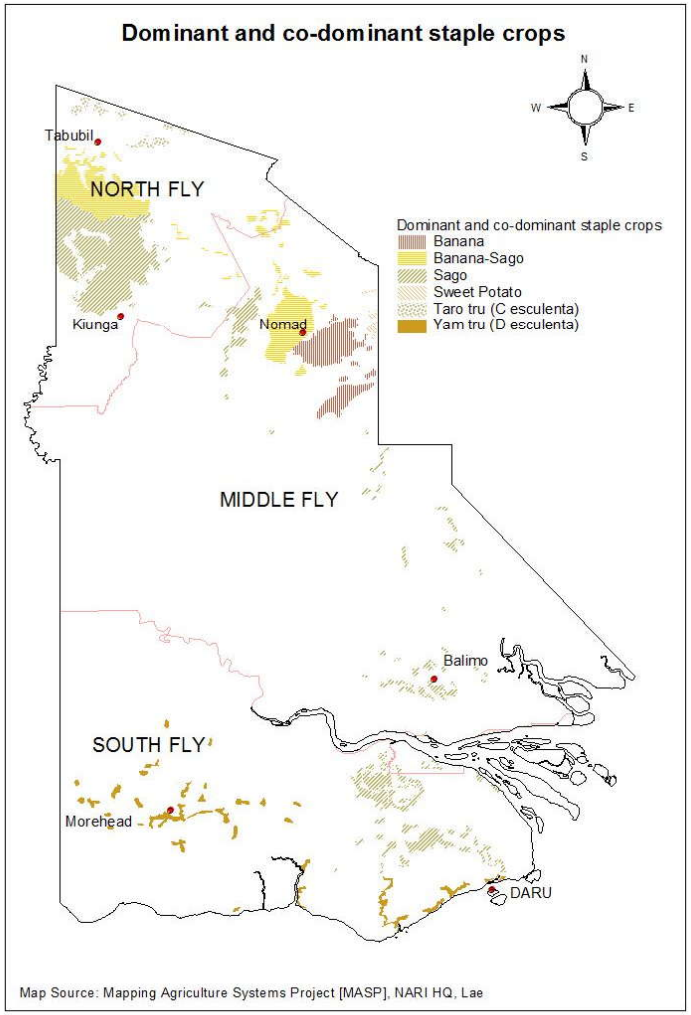
GIS for Research Planning and Development

Spatial Information Databases

PNGRIS – natural resource database system



MASP – agricultural systems database



29-Apr-11

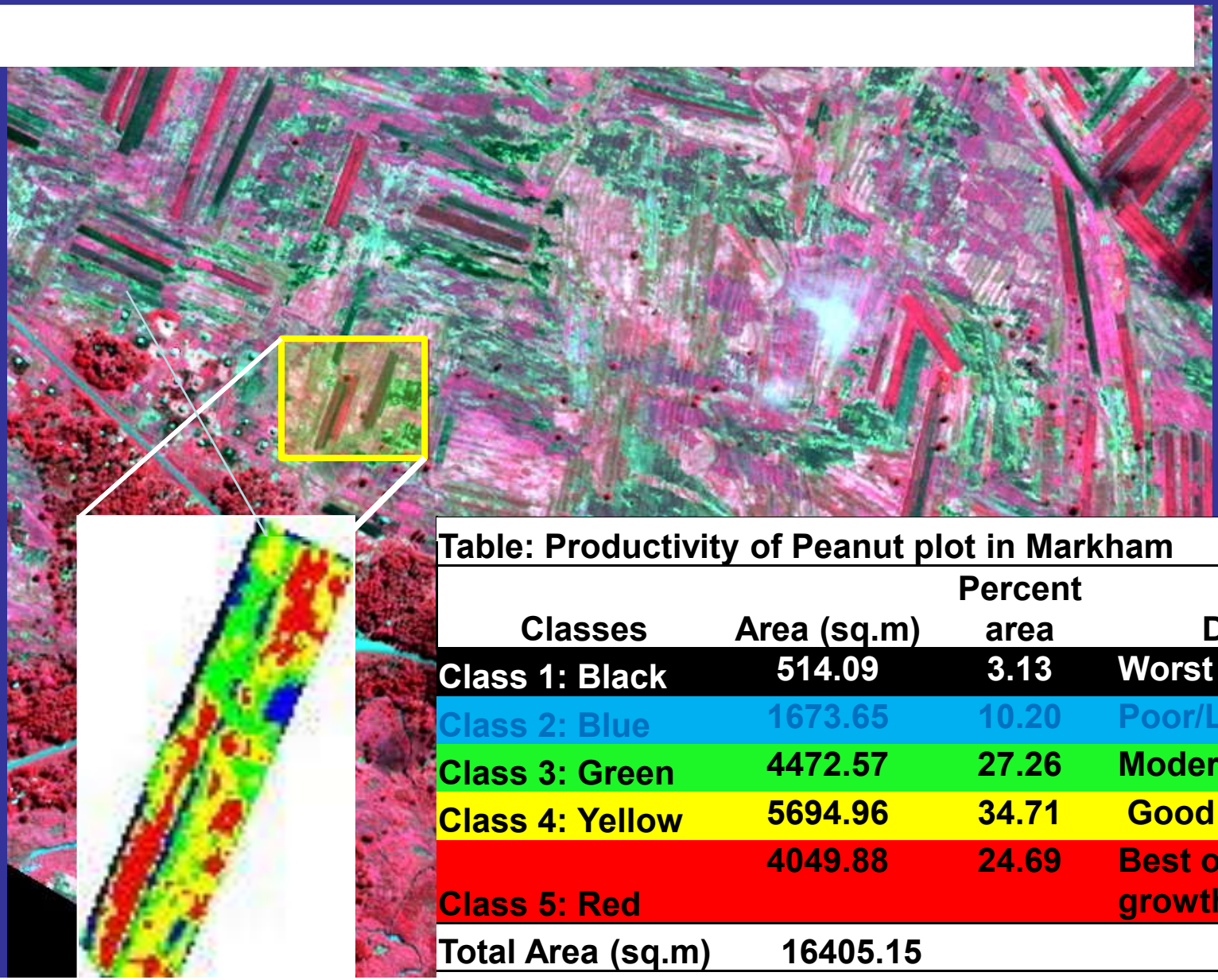
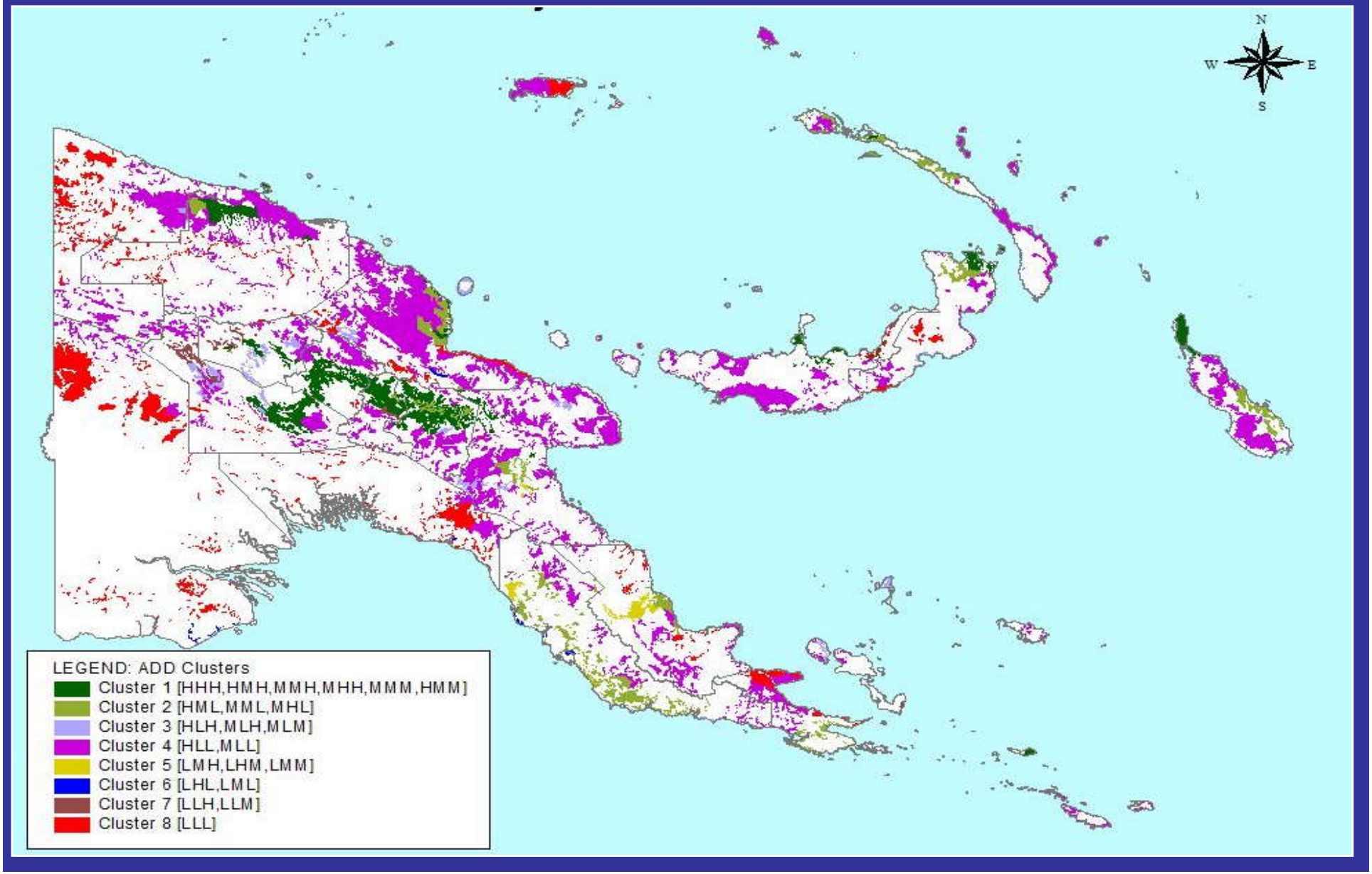


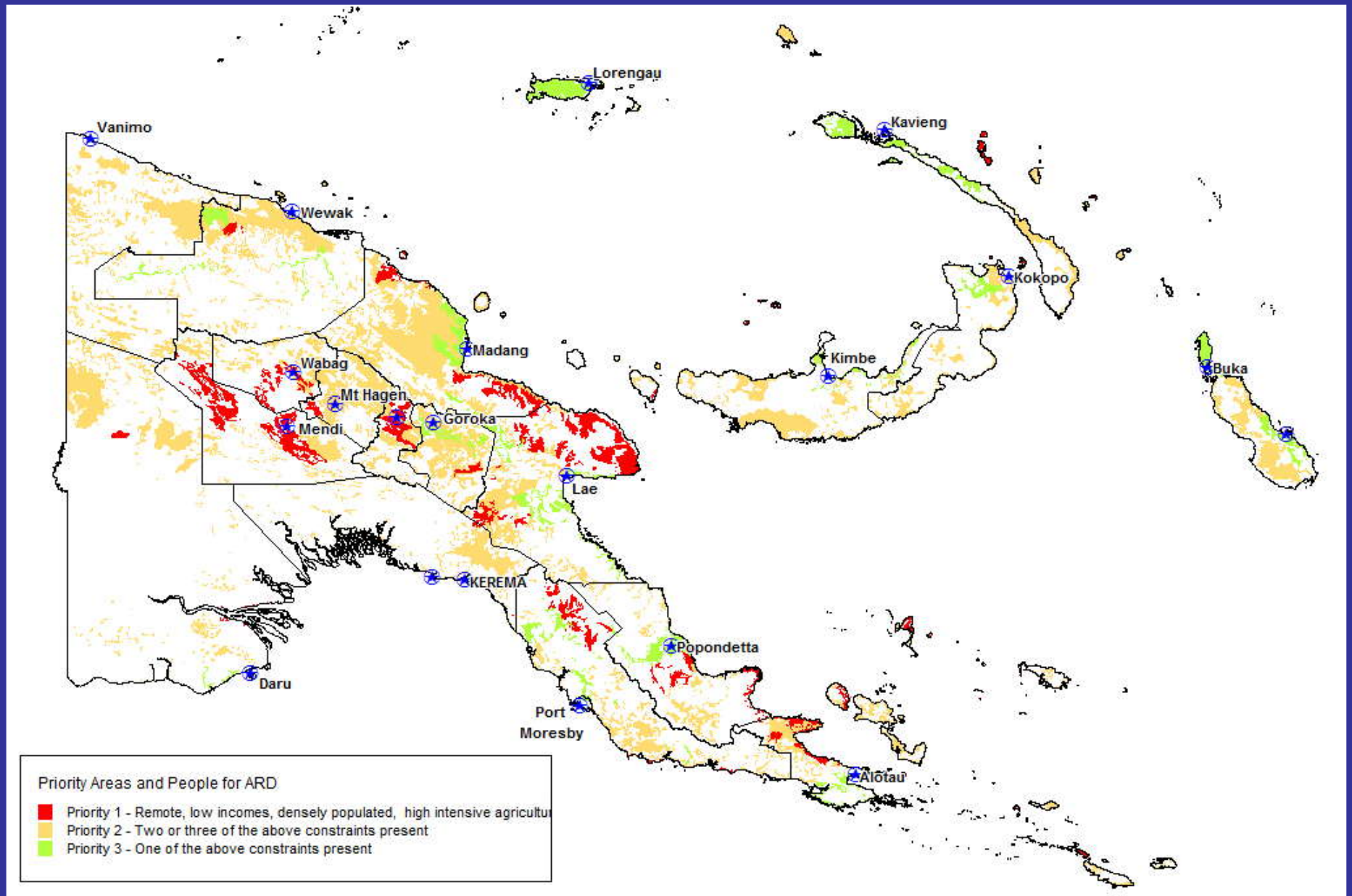
Table: Productivity of Peanut plot in Markham

Classes	Area (sq.m)	Percent area	Description
Class 1: Black	514.09	3.13	Worst or No vigour
Class 2: Blue	1673.65	10.20	Poor/Low
Class 3: Green	4472.57	27.26	Moderate
Class 4: Yellow	5694.96	34.71	Good
Class 5: Red	4049.88	24.69	Best or Vigorous growth
Total Area (sq.m)	16405.15		
al Area (Ha)	1.64		

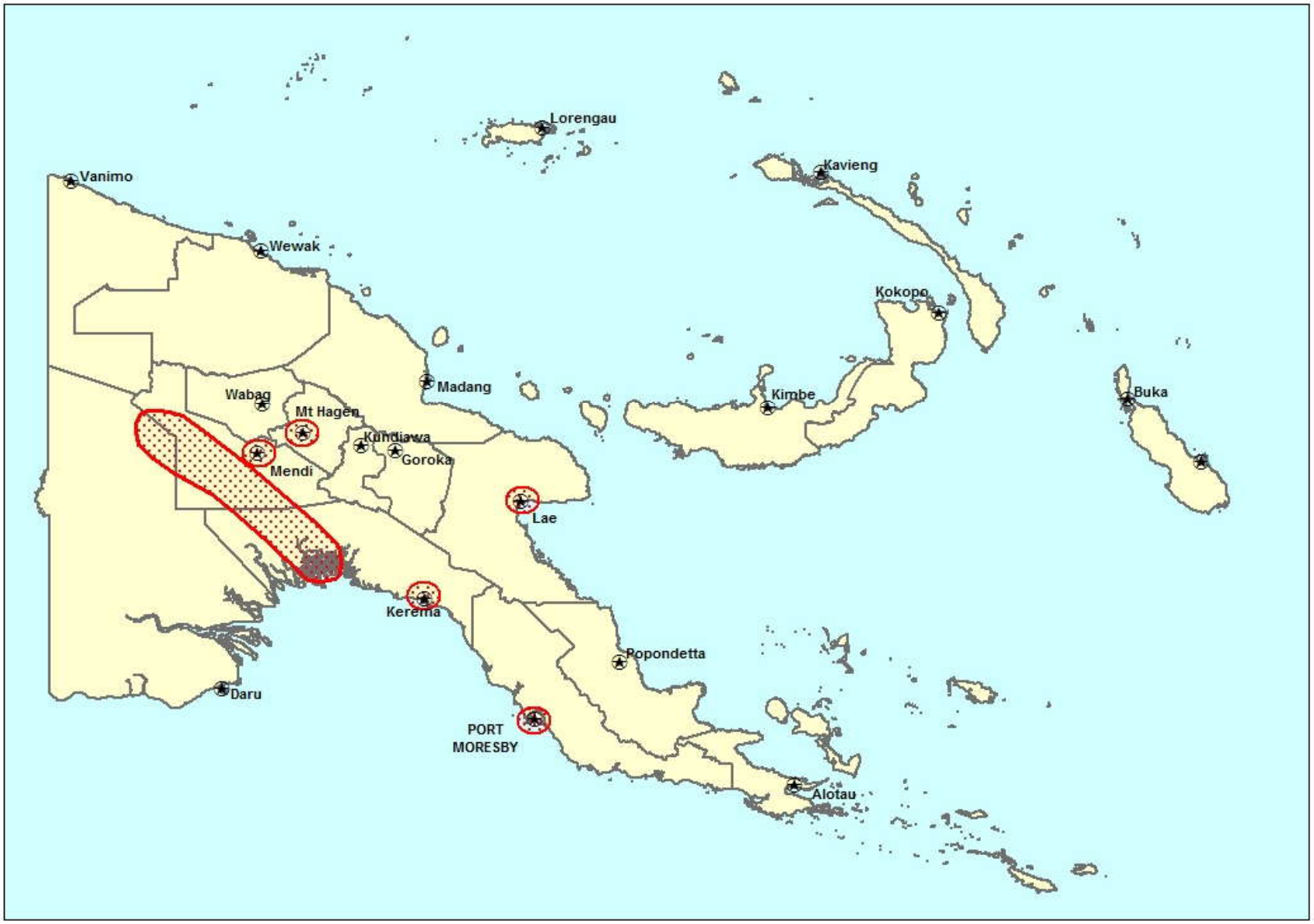
Strategic and Focussed Interventions through GIS and ADDs



Vulnerable (disadvantaged) Areas and People for focussed ARD Investment



Areas likely be benefiting from LNG



Cocoa Improved Technologies

- **SG2 Hybrid (released in2003) and SG 3 Hybrid Ready for release in 2011**

- **Integrated pest and disease management (IPDM) technology released in June 2010**

- **Management of Cocoa Pod borer technology**

Coffee Improved Technologies

- **Coffee Leaf Rust Management Technologies in the late 1980s**

- **Management of coffee pests – berry borer/green scale**

Successful Food Crops Technologies

- Diamond back moth on Brassicas - Diadegma

- Popular Routandata (African) Yam

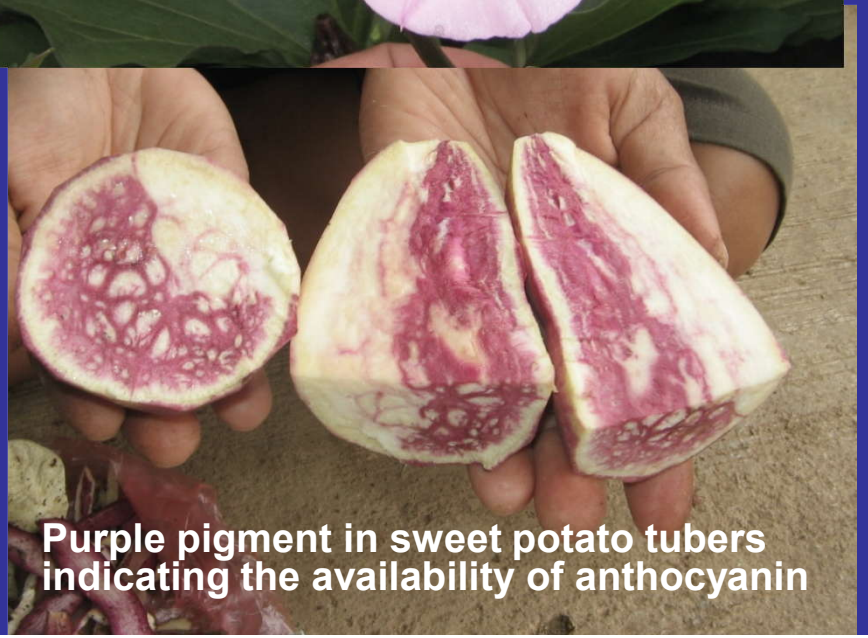
- Adopted rice varieties adopted

Promising Sweet potato Material

Flowered sweet potato lines showing

A closer picture of sweet potato flower

Vitamin A rich OFSP tubers cut opened



Purple pigment in sweet potato tubers indicating the availability of anthocyanin

Promising Potato Variety E2

Potato Variety Description

Variety: E2

CIP No: 384298.56

CIP breeding population: Pop A LB-Group V

Flower colour: Light purple

Tuber shape: Long/Elongated

Tuber eyes: Superficial

Tuber skin colour: Cream

Tuber flesh colour: White

Pests and diseases tolerance

Late blight: High

Early blight: Medium

Bacterial wilt: Low

Maturity

Time to maturity: 140 days (5 months)

Average Tuber Yield Potential

Marketable number/plant: 10

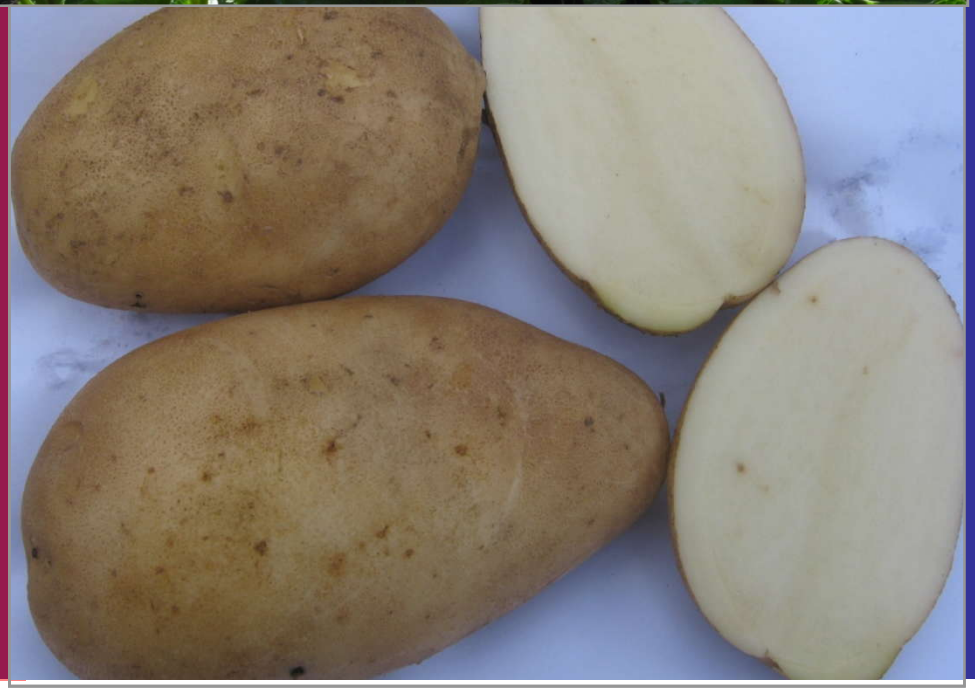
Marketable yield: 40-45t/ha

Total yield: 50-60t/ha

Uses

Processing (chips): Very good

Boiling: Good



Promising Potato Variety E24

Variety Description

Variety: E24

CIP No: 393077.159

CIP breeding population: B3C1

Flower colour: Light purple

Tuber shape: Oval

Tuber eyes: Pink superficial

Tuber skin colour: Cream with pink

Tuber flesh colour: White

Pests and diseases tolerance

Late blight: High

Early blight: Medium

Bacterial wilt: Low

Maturity

Time to maturity: 130 days (4 ½ months)

Average Tuber Yield Potential

Marketable number/plant: 10-15

Marketable weight: 40-45t/ha

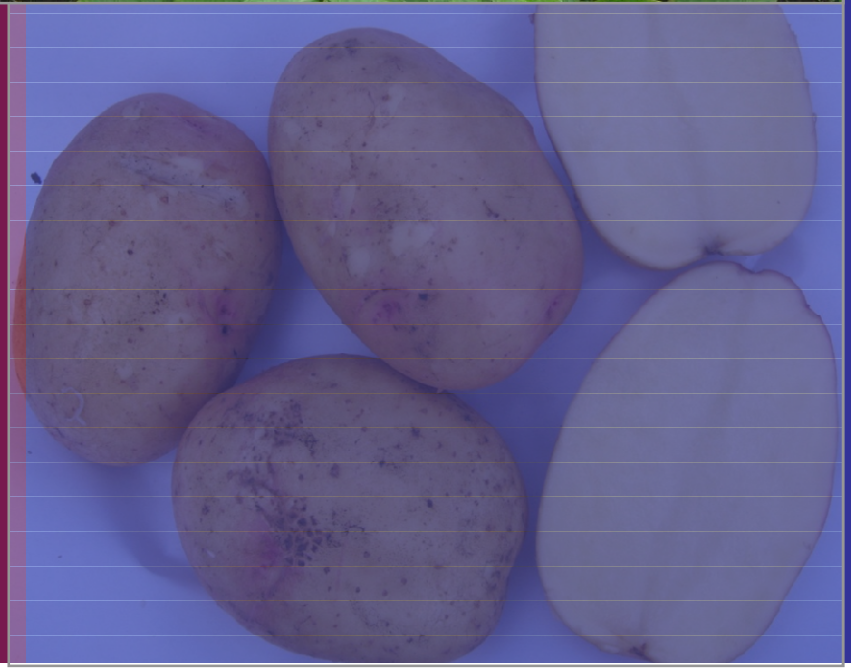
Total yield: 50-60t/ha

Uses

Processing (chips): Very good

Boiling: Good

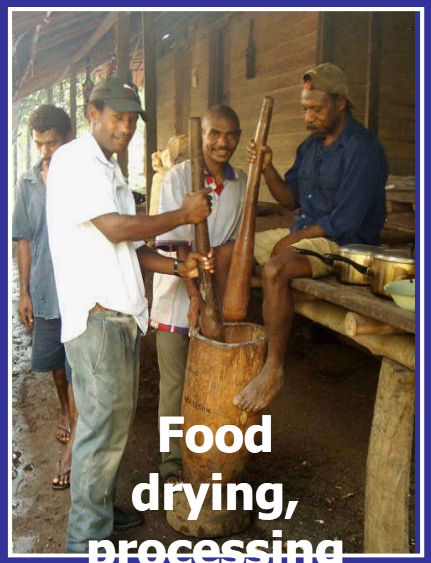
Tuber flesh quality issue

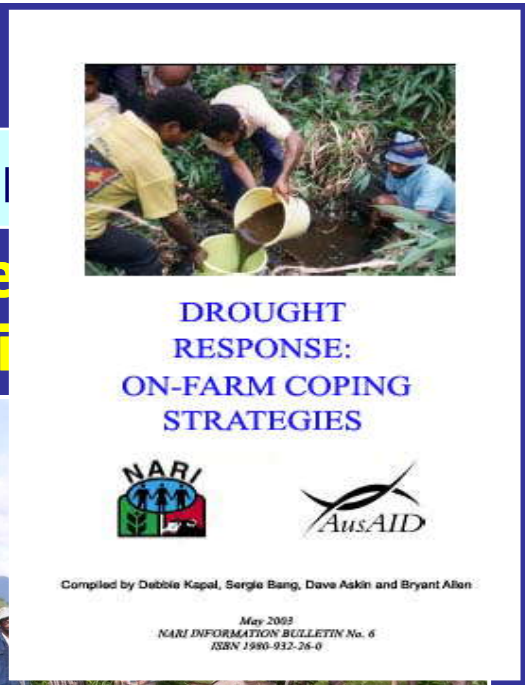


Drought Coping Strategies

Managing CC impacts: preparing for sever

Drought-coping strategies need to be disse
more than 60 drought vulnerable districts i



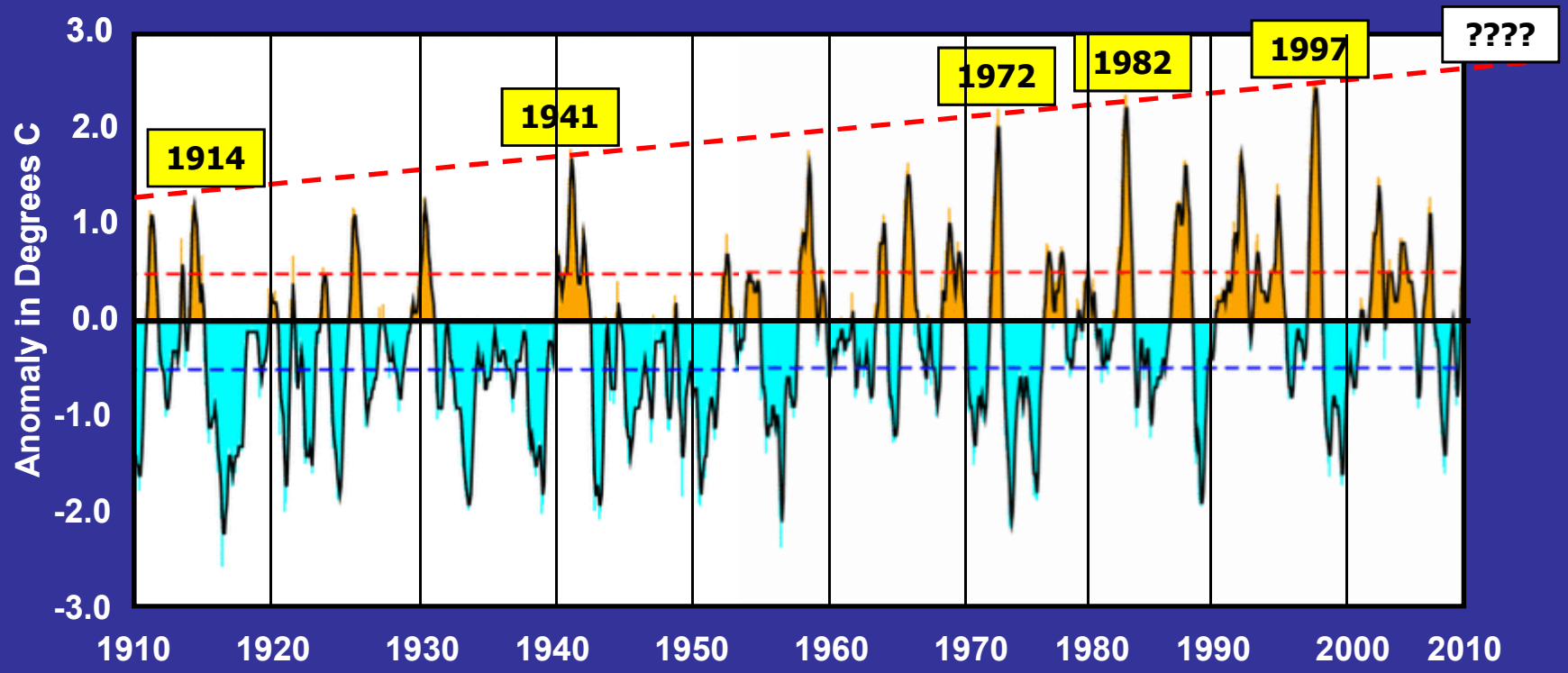


Climate Change and Climate Related Risks and Management

1. Adaptation to climate change – crops and farming systems/pest management
2. Mitigation of climate change – Methane, Co2, deforestation (rice/livestock)
3. Droughts, frosts, water management, floods, cyclones, etc.
4. Resource management – alternative systems

El Niño Droughts and Frosts

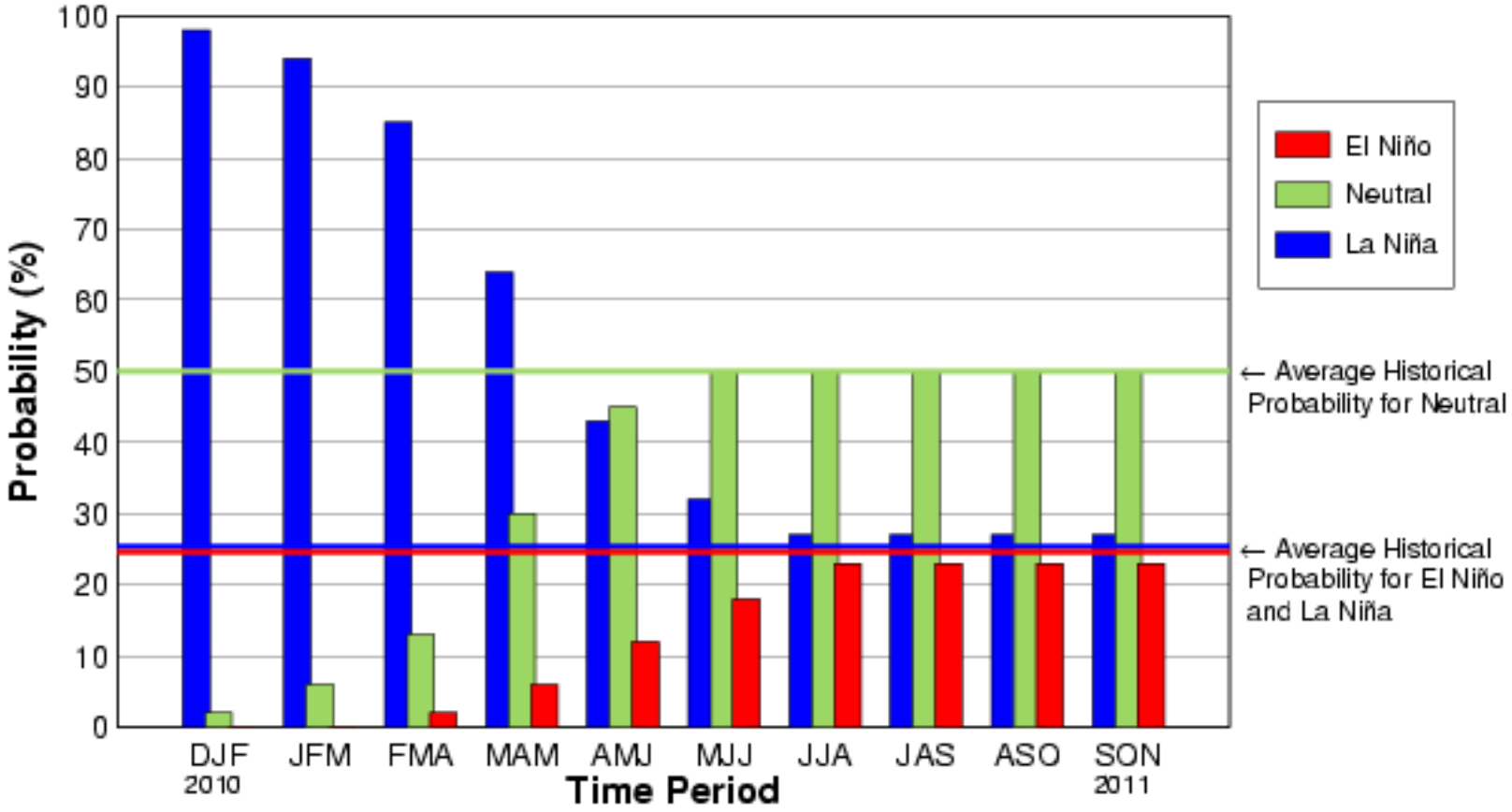
Frequency and strength of El Niño events



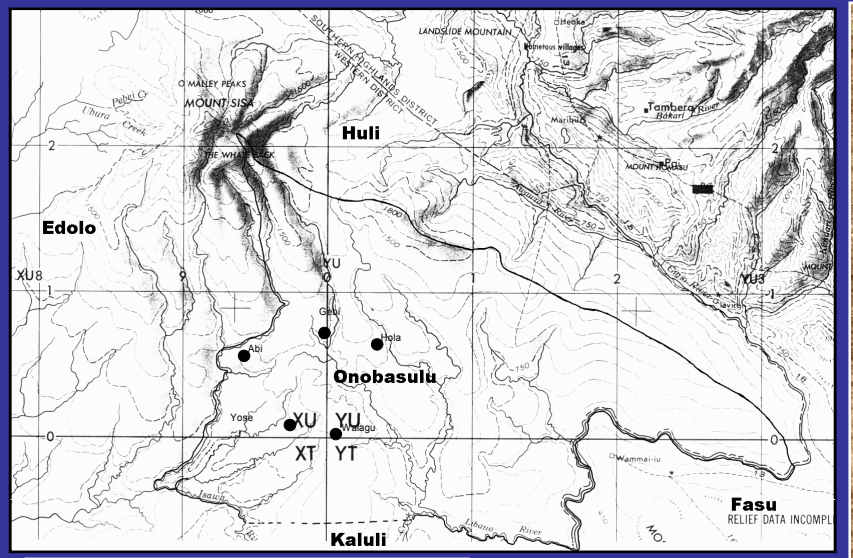
Sea Surface Temperature anomalies in the Nino 3.4 region of the equatorial pacific

The International Research Institute for Climate and Society

IRI Probabilistic ENSO Forecast for NINO3.4 Region

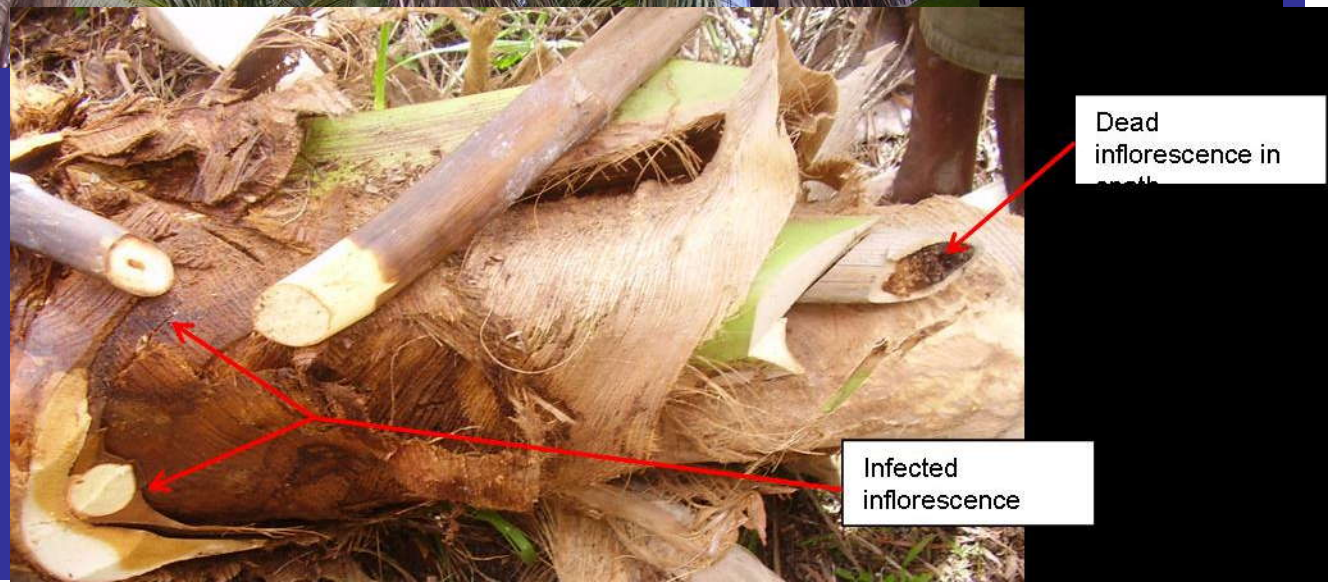


Possible CC Effect - Bosavi Area of Southern Highlands



Coconut "Lethal Yellow Disease" caused by a Phyatoplasma

- Found in the Bogia area of Madang province
- Earlier called Bogia coconut syndrome
- Caused by a Phyatoplasma (group of micro-organisms)



Management of Pests – Adaptation to Climate Change

- Sweet potato weevil

- Management Economic impact of Varroa mite

- Fruit fly management

- Mikania – Invasive weed management

Management of Pests- Adaptation to climate Change

- Potato late blight management

- Banana Fusarium wilt

- Virus management in Sweet potato

Smallholder Livestock - broiler feeds using local feed resources

- **Local feeds (e.g. sweet potato, cassava, sago)**
- **On-station and participatory on-farm trials**
- **Community feed mills tested**
  - **Training and demonstrations**

Release of SP Silage-Pig Feed at the NARI Innovations Show on 5 May 2010

POSTHARVEST & PROCESSING

1. Sweet potato
   (noodle, chips, flour)

2. Taro
   (chips, flour, ice cream)

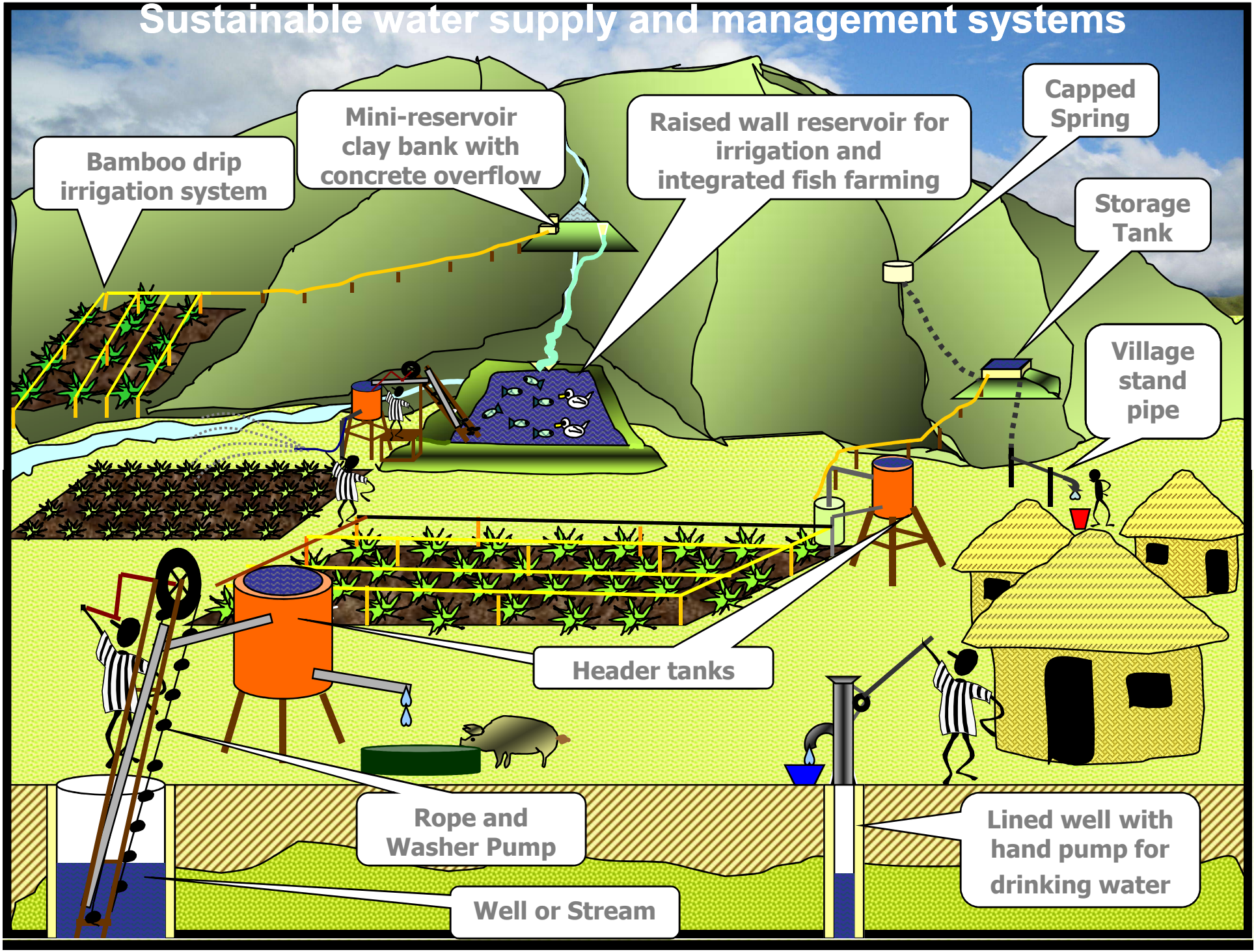
3. Banana
   (puree, chips, cake)

POSTHARVEST & PROCESSING

4. Vanilla – cured beans, extract

5. Spices (eg. tumeric)– dried tumeric, powder

6. Fruits (pineapple, mango, pawpaw) - dried slices, jam


Sustainable water supply and management systems
Bamboo drip irrigation system
Mini-reservoir clay bank with concrete overflow
Raised wall reservoir for irrigation and integrated fish farming
Capped Spring
Storage Tank
Village stand pipe
Header tanks
Rope and Washer Pump
Well or Stream
Lined well with hand pump for drinking water

Biotechnology

1. Micro-propagation

Production of disease-free planting material

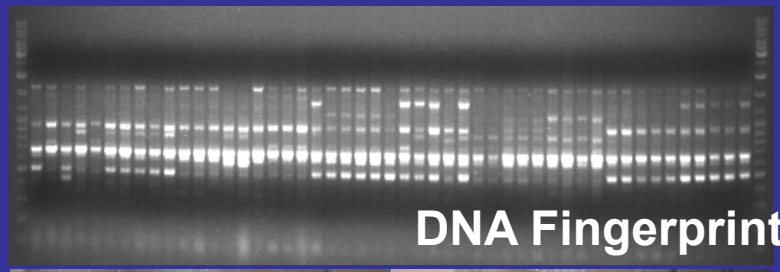
Disease-free plantlets of Irish potato (ready for supply)

Mass propagation of orchids using RITA technology

Rapid multiplication of planting material (e.g. Orchids)

Biotechnology.

Germplasm / DNA fingerprinting and *in vitro* maintenance



DNA Fingerprinting

Cassava

Anther culture attempts in Cassava for production of doubled haploids

In vitro screening for abiotic stresses (SP)

3. ***In vitro* screening and crop improvement**

Emerging Crops – Galip Nut

Genetic Resources

National banana collection

National taro collection

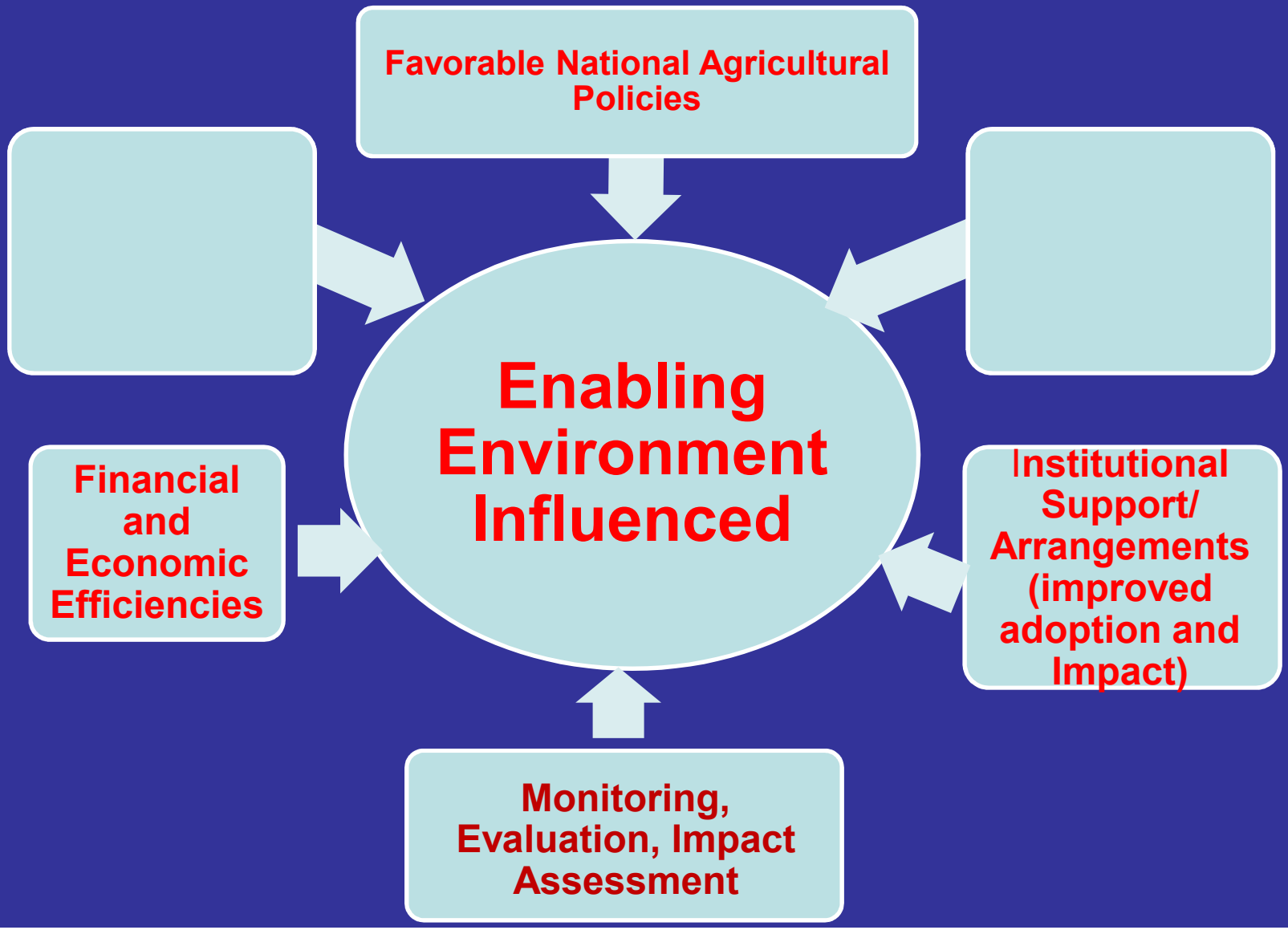
Characterizing yam collection

Selected elite sweet potato cultivar rich in carotenoids

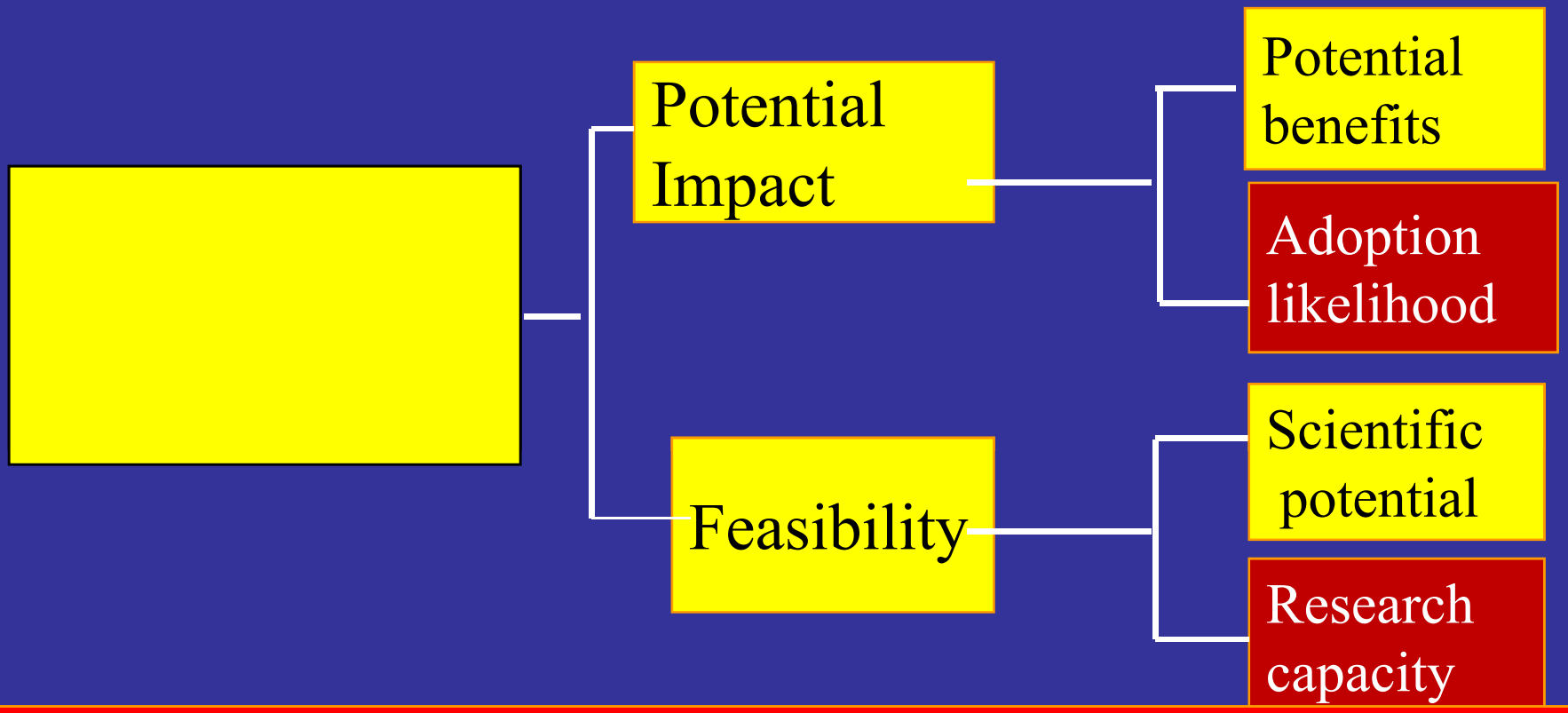
Biodiversity, Bio-security and Bio-safety – Management and Benefit Sharing

1. CBD –Convention of Biological Diversity – Conservation and Sharing
2. Cartagena Protocol (Bio-safety) of 2000
3. ITPGRFA 2004 (International Treaty on Plant Genetic Resources for Food and Agriculture)
4. Nagoya Protocol (Benefit sharing) of 2010 on biological resources
5. Appropriate policies, strategies, and implementation for national benefit

Influencing Enabling Environment for Sustainable Development



Effective and Successful ARD



- **Critical need in enhancement of adoption by creating enabling environment, and**
- **Enhancement of research capacity– human talent (attracting, training, retaining and utilizing), networking, infrastructure, facilities**

IN CONCLUSION

1. Need placing agriculture at the center of development agenda
2. Huge unexplored and realizable potential for investment in Ag. Research and innovations
3. LNG and other resource development and growth - good opportunities to do this through affirmative actions
4. The current trend does not help and not a good signal (as reflected in 2011 budget and donor strategies)
5. Planned policy forum on ARD in PNG
6. Policy submission to Treasury
7. Introspection and reconsideration needed

THANK YOU