

*Climate Change in Developing  
Countries: Identifying and  
Mastering the Challenges*

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# Outline



Observations



Turning the problem on its head



Challenges to be mastered – 5 imperatives



Lessons learnt

# **Section 1 – Observations**

# Observations

## Semantically

– The key words are: ‘**master**’ and ‘**challenge**’

– **Master** =

- to have control over
- To overcome or defeat

– **Challenge** =

- To confront, to defy boldly, to dare

Hence, – a possible paraphrase of the title will suggest the following:

- **A situation that is unacceptable**
- **A situation that needs to be questioned**
- **A situation that needs to be ‘fought’**

# Observations

- **Knowledge is a key resource**, yet knowledge of communities is being tested
- **Resources are essential for infrastructural protection**, yet resources comes in short supply
- **Research is essential for experimentation and building adaptive capacity** , yet in Africa – the research infrastructure and demand is largely external driven
- **Climate change management will require strong institutions** – yet many of the delivery mechanisms and institutional support are weak

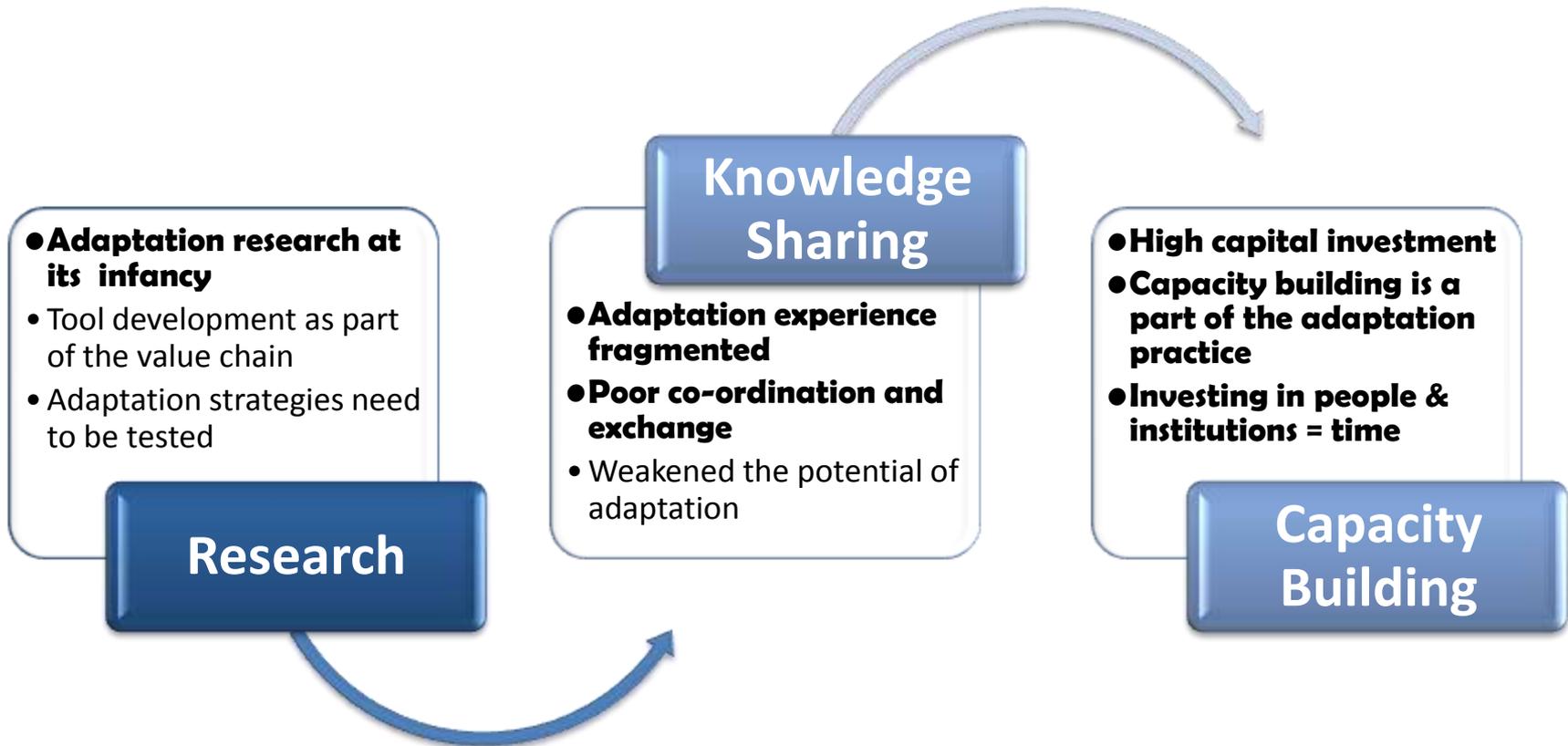
# Observations

- Fighting CC will require a combinations of weapons :
  - (**I**'x 4) Information, Infrastructure, Institutions, Instruments
  - (**R2K**) Research and Knowledge
  - (**Px3**) Policy, Planning and Power
  - (**CRT**) Capacity, Resources, Tools and Technology

## 3 Questions

1. **Threat** – What is the problem?
2. **Scale** – How big is it?
3. **Remedial action** – What needs to be done ?

# Observations



# **Section 2 – Mastering challenges**

# Mastering the **biophysical challenges**

- Increased temperature and changes in precipitation reduces agricultural productivity and natural resources

## **African small holder farmer = 3 imperatives**

1. Manage risks
2. Reduce vulnerability
3. Enhance agricultural productivity

# Mastering the **biophysical challenges**

## **What is the problem?**

- Land degradation
- Quality of soils - arid and semi arid – crop yield reduced due to salinisation - Nile Valley
- Availability and access to environmental resources
- Poor management of water resources
- Poor rainfalls – in the Sahel rainfall has decreased from 20 to 40%
- Increase in extreme events (droughts and floods)

# Mastering the biophysical challenges

## **Overall – What are farmers doing?**

- Farmers are conducting good soil management practices:
  - **improving water retention,**
  - **enhancing productivity**
  - **reducing the risk of crop loss**

# Managing water risks

- *Cape Town*

- Project focuses on water risks in fruit and wine export region
- Working on the gap between water supply and demand – reduced water supplies for farmers and cape town & booming population
- Semi-arid western Cape has seen increasing drought and declining rainfall - a water scarce future
- Researchers looking at climate trends – hydrological and socioeconomic models – exploring possible futures
- Develop strategies for development in a water scarce environment



# Managing water risks (continued)

- Morocco – protecting costal resources



# Managing water risks (continued)

## Problem

- Water scarcity is a chronic problem in Morocco
- Northeast coast = vulnerable to sea level rise, storm surges, and coastal flooding
- Project looks at sea level rise in northern province of Berkane and Nador
- Coastal landscape is changing rapidly - number of beaches being lost
- Torrential rain can add to erosion of fragile mountain soils
- The mountainous coastline is rich in biodiversity , but its people are poor and isolated from the rest of Morocco.
- The IPCC's last assessment predicted between 59 cm and 1 metre sea level rise globally this century.
- Erosion in some parts of the North coast is happening at the rate of 1 metre a year.

# Managing water risks

## Solutions - Morocco

- ENFI scientists pooling knowledge of climate data analysis, coastal dynamics, and social research to = scenarios = inform planning choices
- Mainstream climate change scenarios into development plans.
- Conducting household surveys to understand the degree and thresholds of vulnerability - water quality and availability, or loss of arable land
- Catalogue of good adaptation practices

# Managing climate risks in Benin

## Seasonal Forecasting

**Poverty + climate changing = increasing vulnerability of farmers**

- Early warning systems at local and communal level
  - Farmers are gaining access to climate information
  - Gaining practical information for growing season
  - Developing adaptation options (zai, integrated crop management , organic fertilisers)
  - Setting up consultative groups
- =
- 60 field schools have been set up
  - 300 farmers in field tests
  - Tests used at national level analysis
  - Working closely with M.oE on Benin's NAPA



# Managing climate risks related to Pastoralists

## Problem

- Kenya- Pastoralists are amongst the poorest and most vulnerable groups in Kenya
- Reduced rainfall is increasing the vulnerability of pastoralists - affecting water availability, livestock production and forage = livelihoods
- Conflict over diminishing resources



# Managing climate risks related to Pastoralists

## Northern Kenya

### Solutions

- Project built the capacity of state agencies at County level in Northern Kenya to implement community plans, and support grazing committees
- The Departments of Livestock and State Administration facilitated herders' cross-border access to grazing areas by initiating dialogue with their counterparts in Ethiopia and Uganda.
- As a result of cooperative interventions, reported incidences of livestock death to drought reduced to 15% during the 2009-2010 drought compared to 70% loss in the 2005-2006 drought period.
- Hence, a significant proportion of herders retained their animal wealth.

# Managing climate risks in Benin

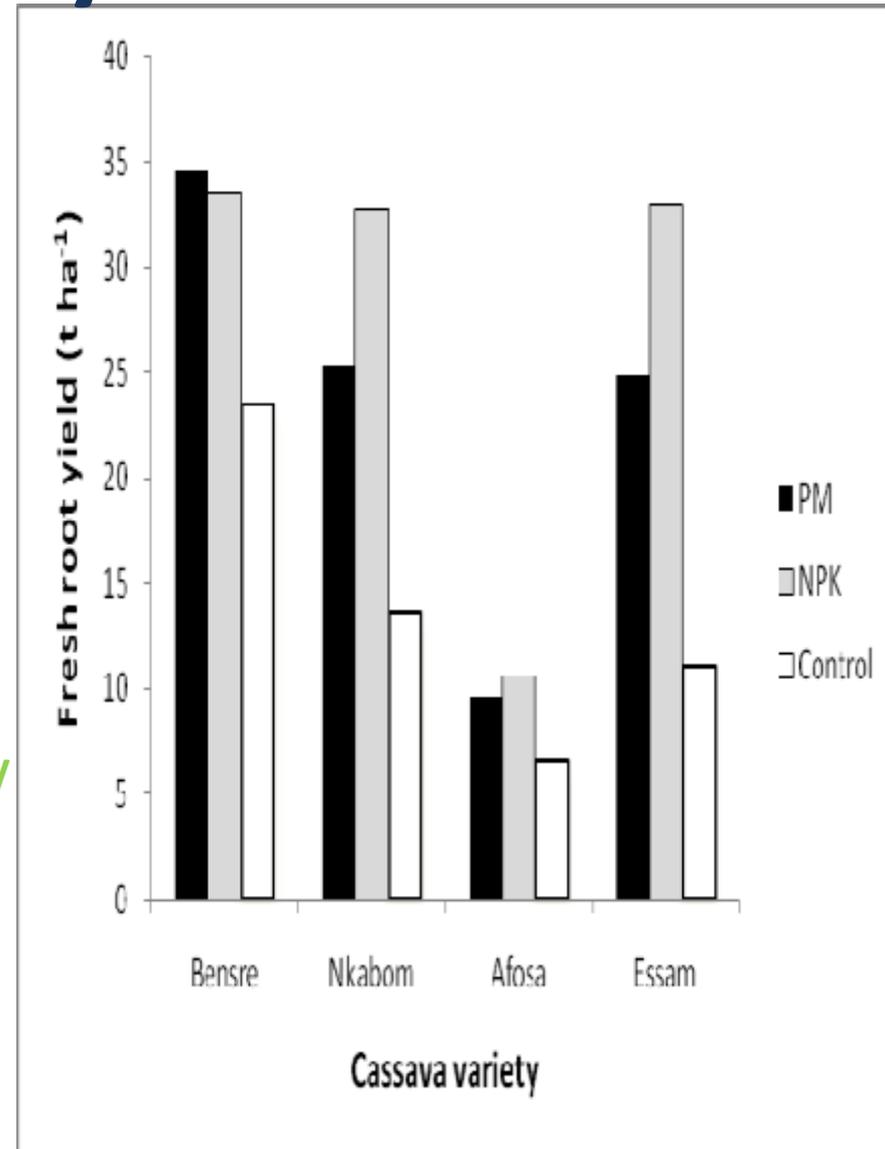
- **Burkina Faso**

- Joint exploration of potential endogenous and exogenous innovations ...
  - Improved seeds of cereals
  - Changing cultivars
  - Techniques of micro-fertilization,
  - Zai strategy



# Managing soil fertility in Zimbabwe

- **Zimbabwe**
- Low and declining soil fertility = cause of hunger and food insecurity in Africa's predominantly smallholder and rainfed agricultural sector
- X Communities did not see the link between CC and soil fertility
- X Reluctant to believe that high maize yield could be obtained from sandy soils
- X the role of phosphorus fertilization and soil organic carbon management in increasing crop yields and enhancing water use efficiency
- Lab based soil tests conducted and participatory diagnostic on-farm experiments produced the desired results
  - Farmers improve production Cassava with Integrated Soil Fertility Management options



# Mastering the biophysical challenges

## Same old Same Old

- Number of adaptation options are common sense good agricultural practices
- Approaches need to be participatory to emphasise that adaptation is a social process
- Repackaged and repurposed to convey the urgency of CC

## Urgency, context, momentum

## Pace & Severity of change

- Increased awareness of the rate of change

# Mastering social vulnerability challenges

## Policy

- Research policy connection is complex
- Temporal and spatial scale of the research and policy processes are not the same
- **Indigenous Knowledge (IK) systems can contribute to improving (i) the forecast quality and (ii) communication of local-level climate information.**
- Marriage of alliance b/w Nganyi community and Kenya Met. Agency
- Resource Centre built to preserve indigenous knowledge
- Project handed over to the Kenyan government

# Maturing the social vulnerability challenge

## Institutions

- Adaptation processes need to involve in an setting
  - lubricant that keeps society moving
- Institutional cultures, values and norms guide behaviour within organisations and mediate environmental policies
- Institutions define roles and provide a social context for action

# **3 Challenges to be Mastered**

# Water Challenges - Degraded Wetlands & Rivers

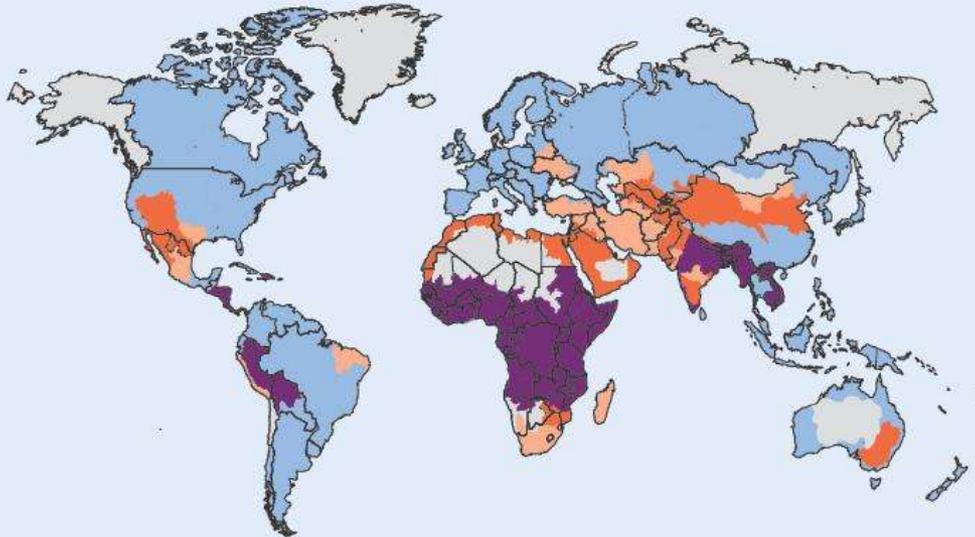
- Over the past 50 years, water availability per Africa has dropped 75%
- Many West African Wetlands are now severely degraded
- Water surface of Lake Chad evaluated at 20 000km<sup>2</sup> in the 1970s now only covers between 2000km<sup>2</sup> and 7000km<sup>2</sup>
- Yet temperature increases is set to continue
- Intensification of the hydrological cycle – increased precipitation and floods- reduced rainfall & droughts in other regions

# A Chain of Contradictions: Water resources

map 2

Areas of physical and economic water scarcity

- Little or no water scarcity
- Physical water scarcity
- Approaching physical water scarcity
- Economic water scarcity
- Not estimated

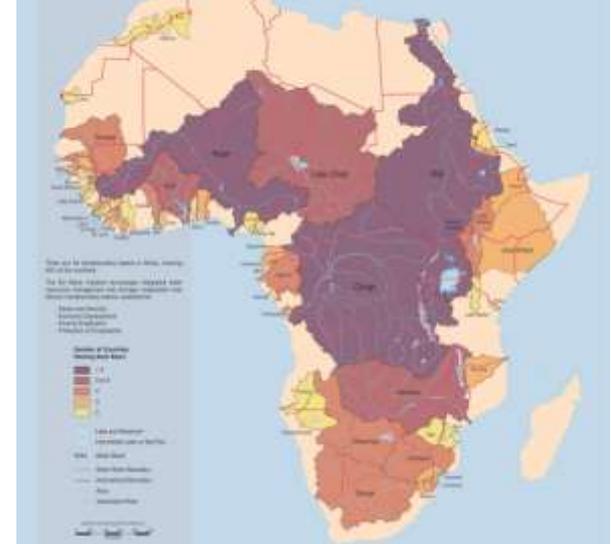


**Definitions and indicators**

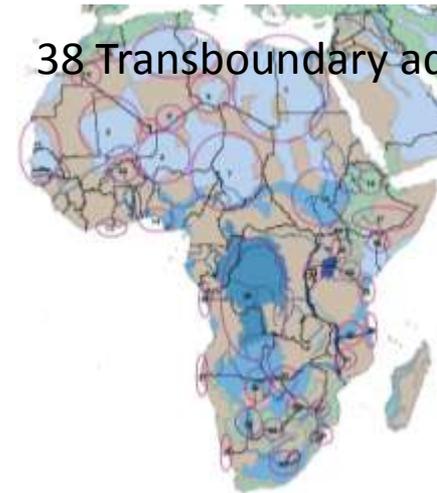
- **Little or no water scarcity:** Abundant water resources relative to use, with less than 25% of water from rivers withdrawn for human purposes.
- **Physical water scarcity (water resources development is approaching or has exceeded sustainable limits):** More than 75% of river flows are withdrawn for agriculture, industry, and domestic purposes (accounting for recycling of return flows). This definition—relating water availability to water demand—implies that dry areas are not necessarily water scarce.
- **Approaching physical water scarcity:** More than 60% of river flows are withdrawn. These basins will experience physical water scarcity in the near future.
- **Economic water scarcity (human, institutional, and financial capital limit access to water even though water in nature is available locally to meet human demands):** Water resources are abundant relative to water use, with less than 25% of water from rivers withdrawn for human purposes, but malnutrition exists.

Source: International Water Management Institute analysis done for the Comprehensive Assessment of Water Management in Agriculture using the Watersim model; chapter 2.

59 Transboundary river basins



38 Transboundary aquifer systems



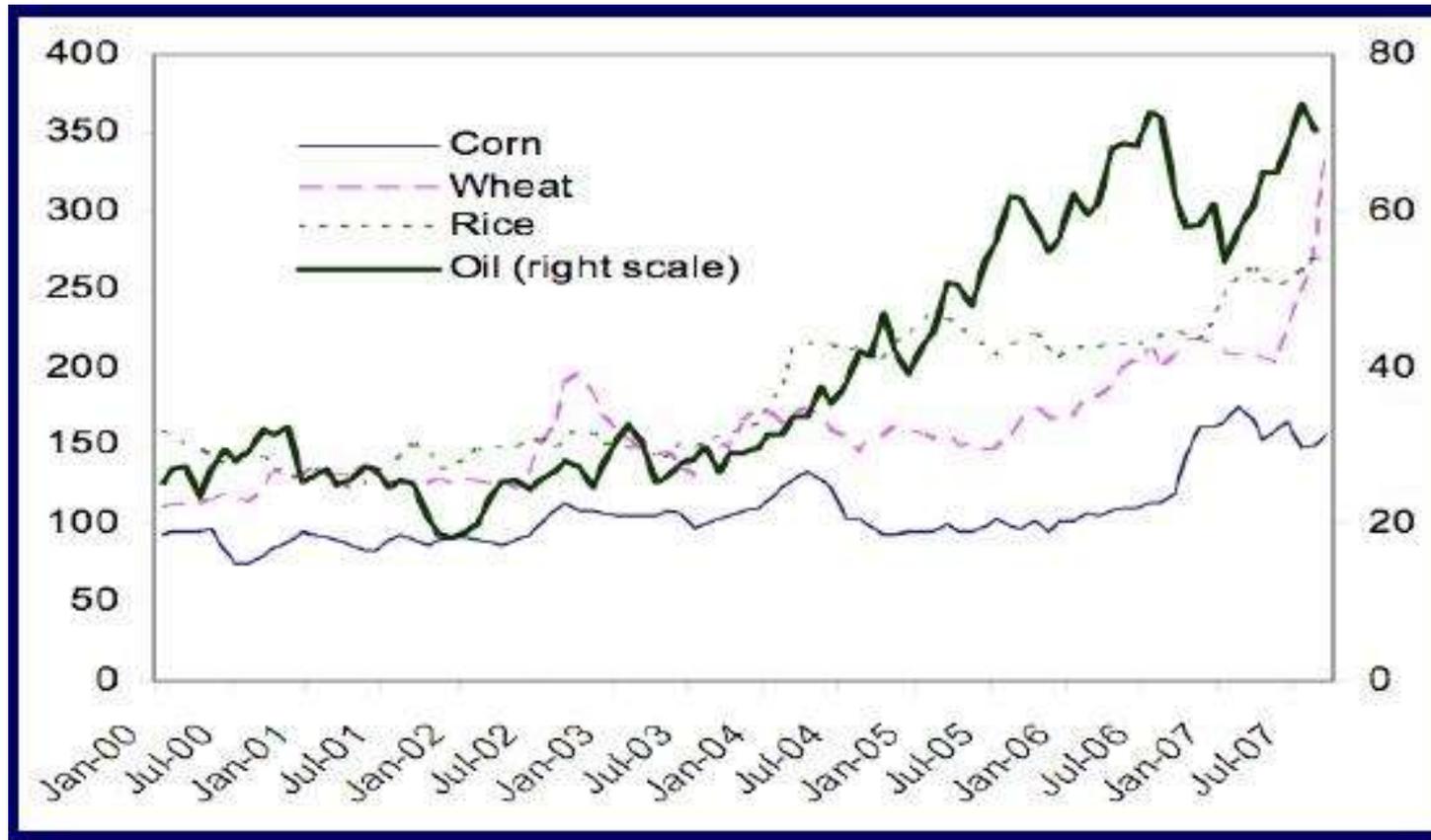
Source: IWMI, 2007

# Energy Challenges

- Diverse and abundant share of global fossil and renewable energy resources
  - 6.2% of coal
  - 7.7% of oil
  - 7.2% of Natural Gas
  - Few Geothermal sources, **but** large potential of biomass, hydro, solar and wind
  - 75% of hydro electrical potential concentrated in 3 countries alone- Ghana, Guinea & Nigeria
- Nearly all the energy resources are under exploited
- **In West Africa**, water used for agricultural, domestic, industrial **energy production** is only **3% of existing renewable water resources**

# Energy Challenges

Increasing link between Energy and Food prices



Source: Pingali, 2008

# Agricultural Challenge

**Mandela – ‘Overcoming poverty is not a gesture of charity, it is an act of justice’.**

- FAO – In 2000 - 800 million women, men and children will go to bed hungry
- Majority of the world’s poor live in Africa - income levels are dropping
- 925 million people do not have enough to eat — more than the populations of USA, Canada and the European Union combined.
- 98% of the world's undernourished people live in developing countries.<sup>2</sup>
- Where is hunger the worst?
  - Asia and the Pacific: 578 million
  - **Sub-Saharan Africa: 239 million**
  - Latin America and the Caribbean: 53 million
  - Near East and North Africa: 37 million
  - Developed countries: 19 million

# Agricultural Challenge

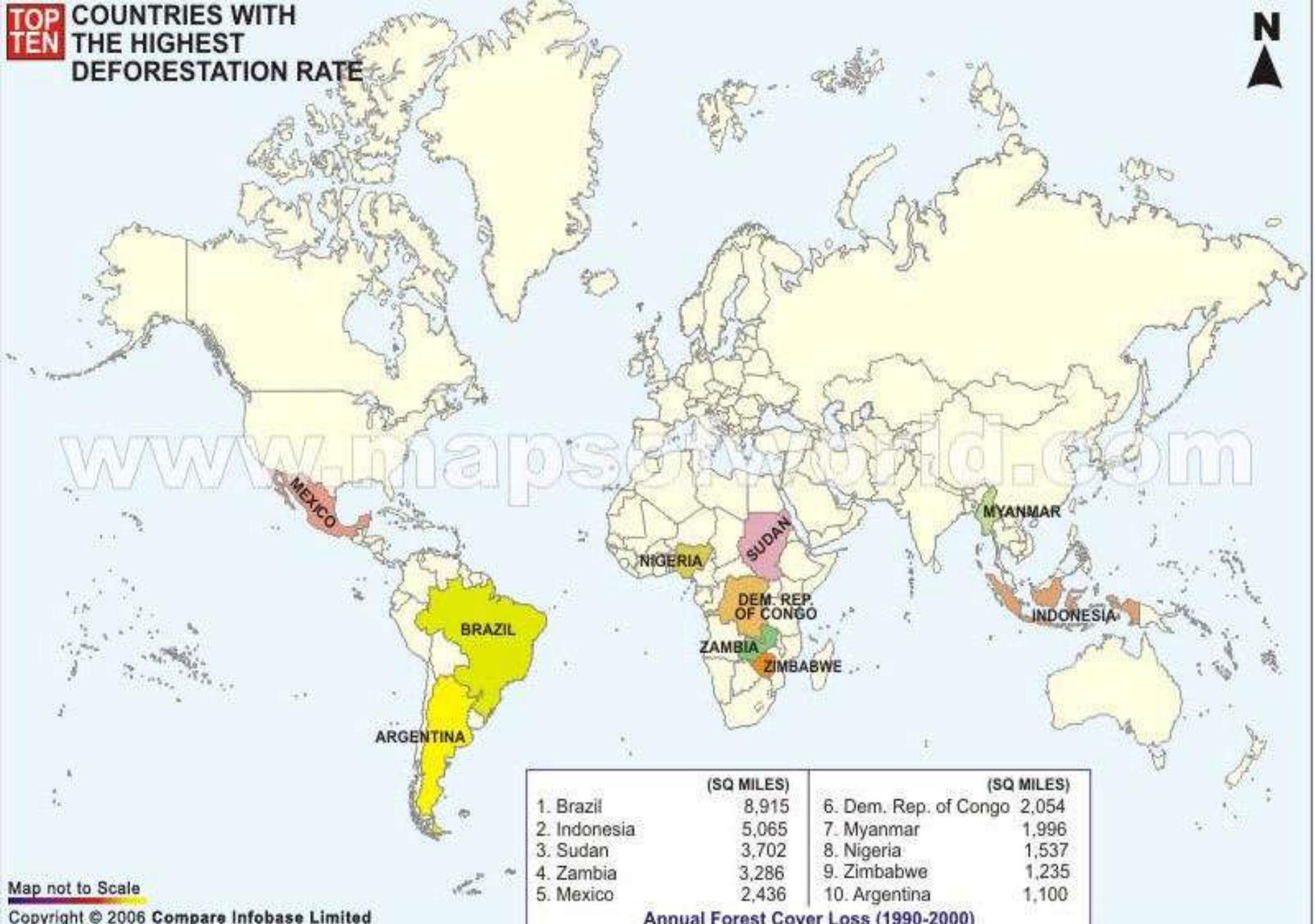
- For Sub-Saharan Africa, patterns in economic growth follow precipitation patterns closely.
- As rainfall has decreased over the last 30 years, so has economic development.
- Rainfed agriculture represents a major share of the economy of countries in Africa as well as for domestic food supply.
- Improved water resources management and a wider resource base are critical to the stability and security that is required for economic development –

**Sources Barrios, Salvador, Luisito Bertinelli & Eric Strobl. 2003. Dry Times in Africa: Rainfall and Africa's Growth Performance, 2008.**

MDG	N Africa	SSA	MDG	N Africa	SSA
 <p>1 ERADICATE EXTREME POVERTY AND HUNGER</p>			 <p>5 IMPROVE MATERNAL HEALTH</p>		
 <p>2 ACHIEVE UNIVERSAL PRIMARY EDUCATION</p>			 <p>6 COMBAT HIV/AIDS, MALARIA AND OTHER DISEASES</p>		
 <p>3 PROMOTE GENDER EQUALITY AND EMPOWER WOMEN</p>			 <p>7 ENSURE ENVIRONMENTAL SUSTAINABILITY</p>		
 <p>4 REDUCE CHILD MORTALITY</p>			 <p>8 GLOBAL PARTNERSHIP FOR DEVELOPMENT</p>		



**TOP TEN** COUNTRIES WITH THE HIGHEST DEFORESTATION RATE



	(SQ MILES)	(SQ MILES)
1. Brazil	8,915	6. Dem. Rep. of Congo 2,054
2. Indonesia	5,065	7. Myanmar 1,996
3. Sudan	3,702	8. Nigeria 1,537
4. Zambia	3,286	9. Zimbabwe 1,235
5. Mexico	2,436	10. Argentina 1,100

**Annual Forest Cover Loss (1990-2000)**

Map not to Scale

Copyright © 2006 Compare Infobase Limited

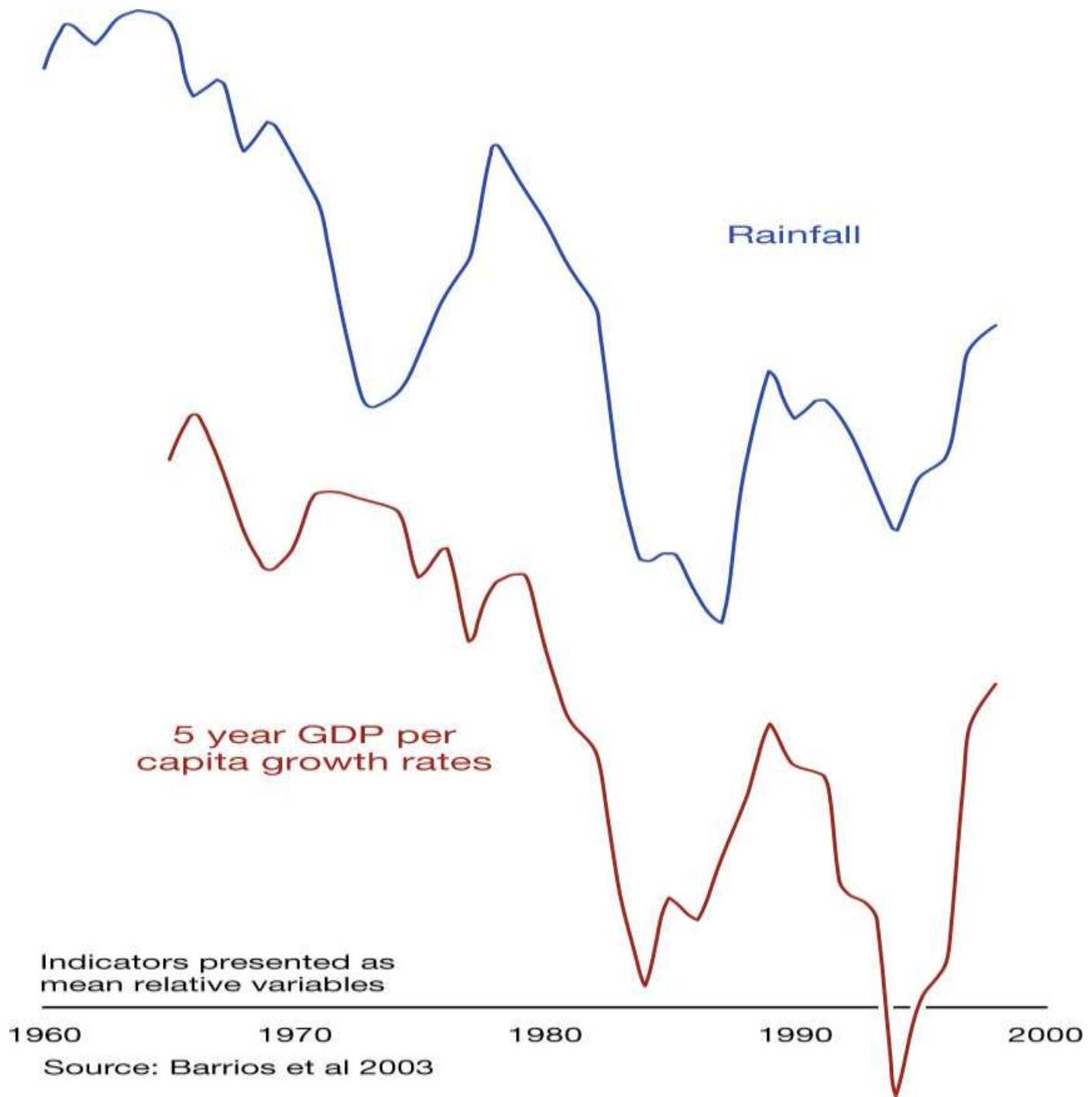
## Food needs / Soil fertility



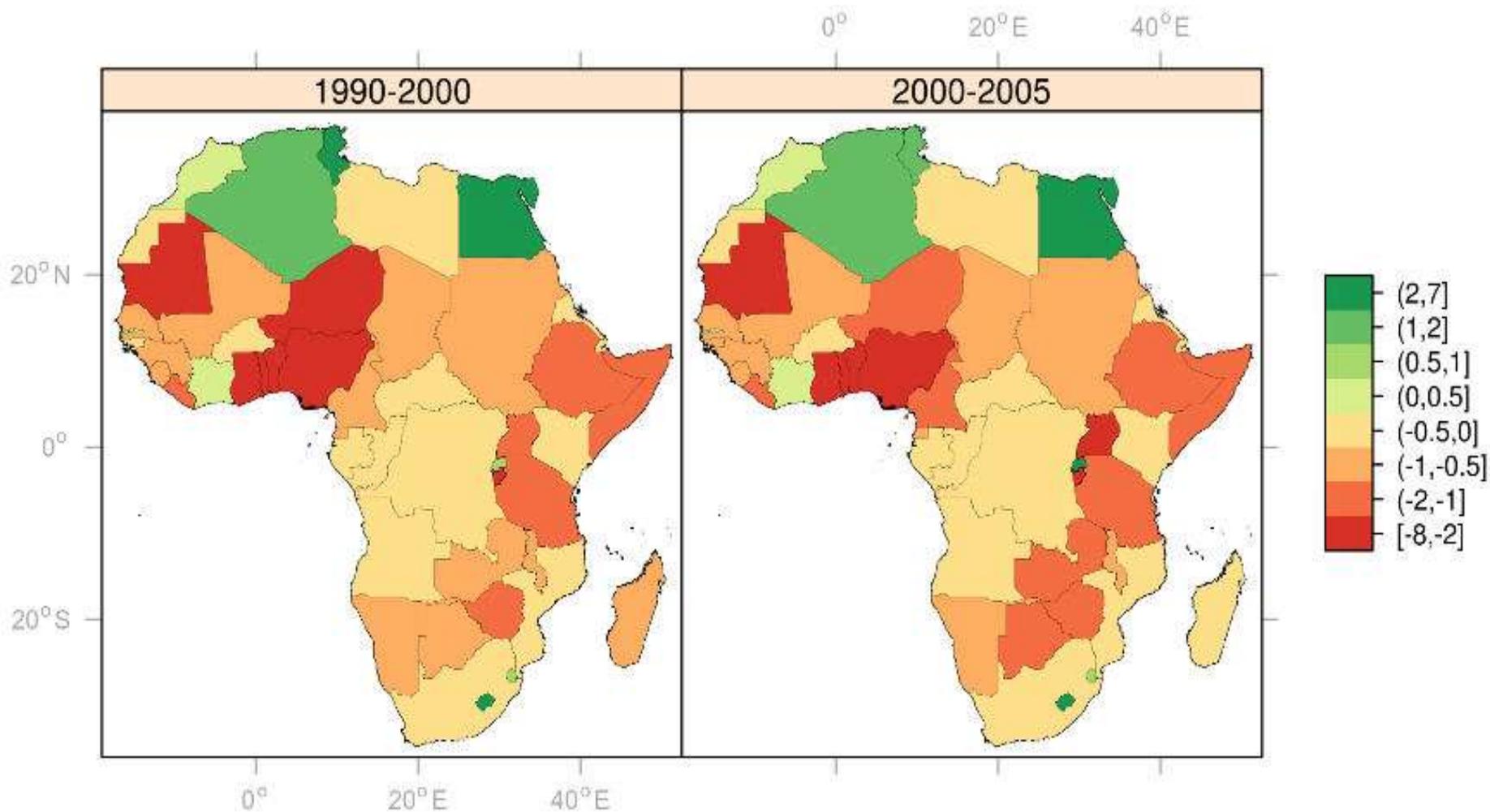
Food insecurity in Africa remains unacceptably high (27%); agricultural production has to increase by at least 4 to 6% a yr to meet growing food needs of the continent

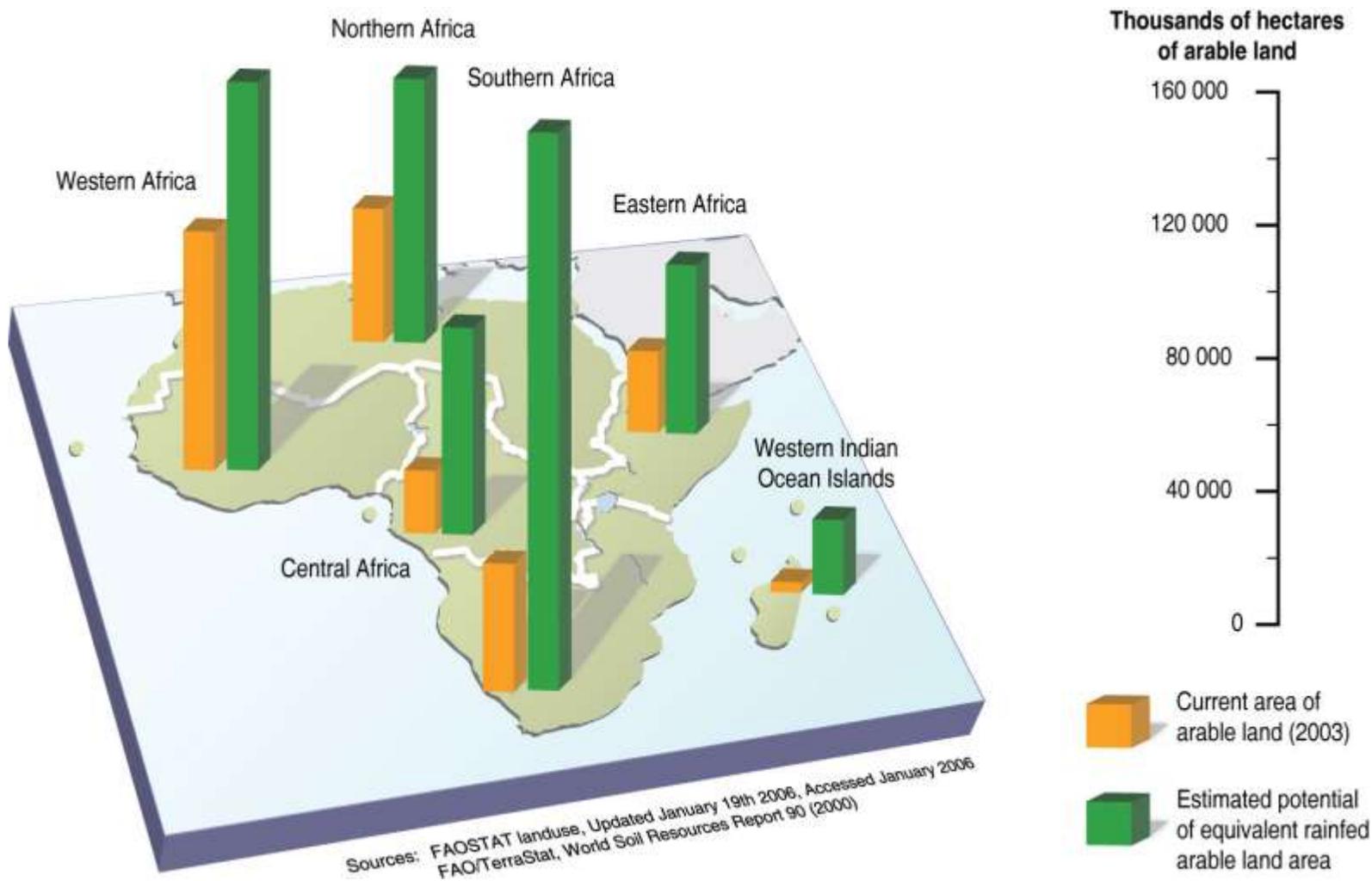


**This will require urgent increase of soil fertility of cropland, reduction of deforestation and grassland conversion**



## Annual change rate in forest cover (%)

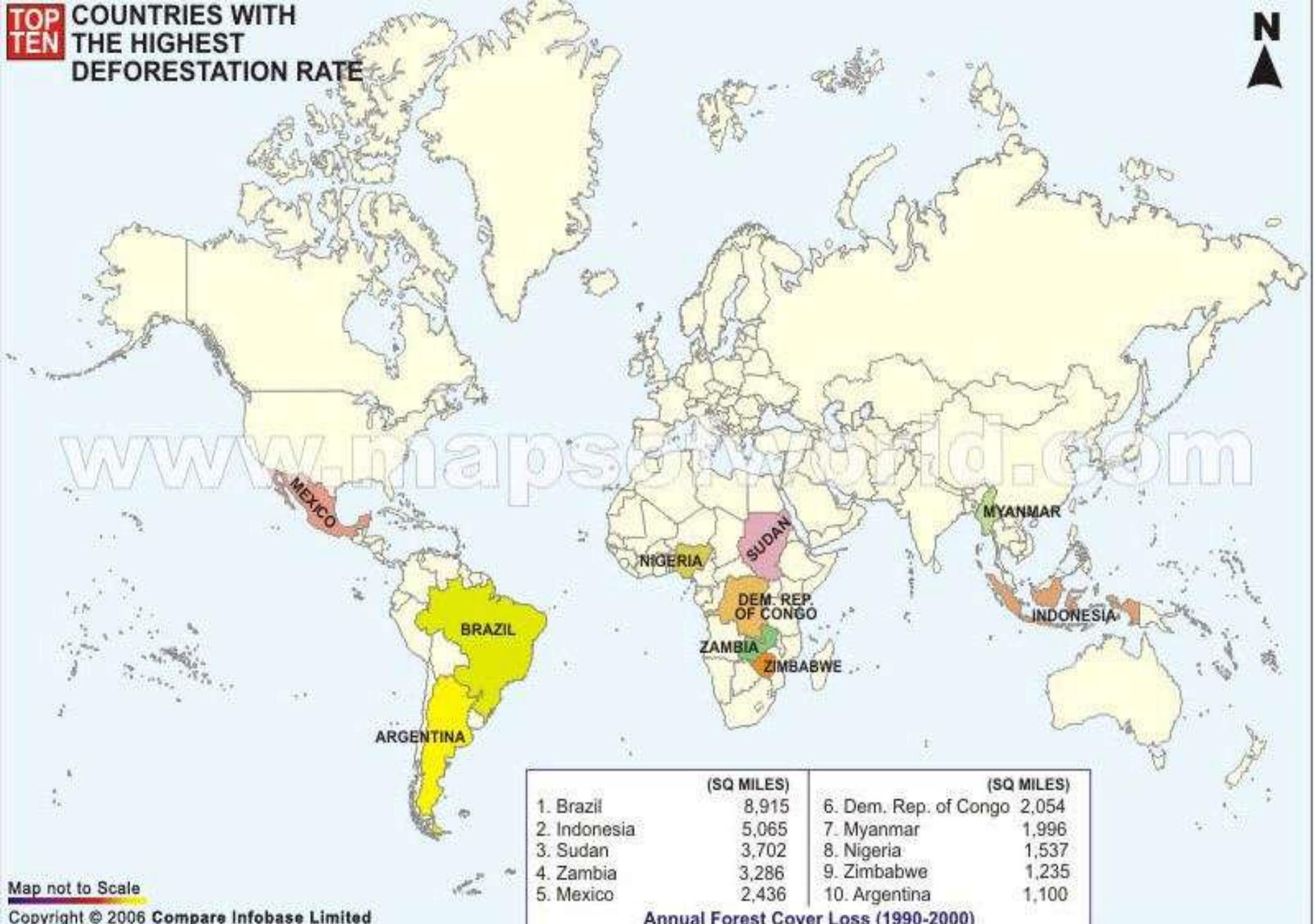




FAO study based on soils and climate (2000)

HIGH POTENTIAL FOR BIOFUEL DEVELOPMENT IN AFRICA

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# What needs to be done – 5 Imperatives

Knowledge

- Understanding vulnerability

Planning and governance

- Managing risks and Institutional governance

Capacity – Building research capacity

- Transition - Adaptation –Mitigation

Scale

Local, national, regional

Transitions

- Adaptation – Mitigation

# Lessons

## Partnerships

- Adaptation is an inclusive, participatory process
- Involving local people is crucial
- Involvement of local authorities and communities vital to formulation of policies (coastal planning, agricultural policies etc)
- Brokering of partnerships across scales and social actors is considered to be a key prerequisite for achieving successful adaptation.
- Social networks can be effective conduits to relay, mobilise and transfer knowledge = building resilience

## Capacity Building

- **Build capacity** = increasing agency of local actors to take action
- Strengthening decision making capacity = implementing adaptation

## Institutions

- **Institutions are fundamental to the process of adaptation** – to intersect climate needs and development priorities

## Policy

- Need 'policy entrepreneurs' – people able to map policy opportunities and give policy makers what they need

## Concluding Quote

*'Challenge is a dragon  
with a gift in its mouth.  
Tame the dragon and the  
gift is yours'*



**Merci**