Ministry of Agriculture and Land Reclamation
Agricultural Research & Development Council

The International Treaty's Multilateral System of Access and Benefit Sharing: Impact on Food Security

Prof. Adel El-Beltagy
Chair
International Desert Development Commission (IDDC)
&
Agricultural Research and Development Council (ARDC)

elbeltagy@optomatica.com

Challenges
The Changing Environment

تدهور حالة كوكب الأرض

The Deteriorating Health of Our Planet

- Over 2,000 million hectares of land degraded
- Loss of agrobiodiversity
- Increasing water scarcity
- Increasing population
- Natural resources destruction by conflict and war





Food Production



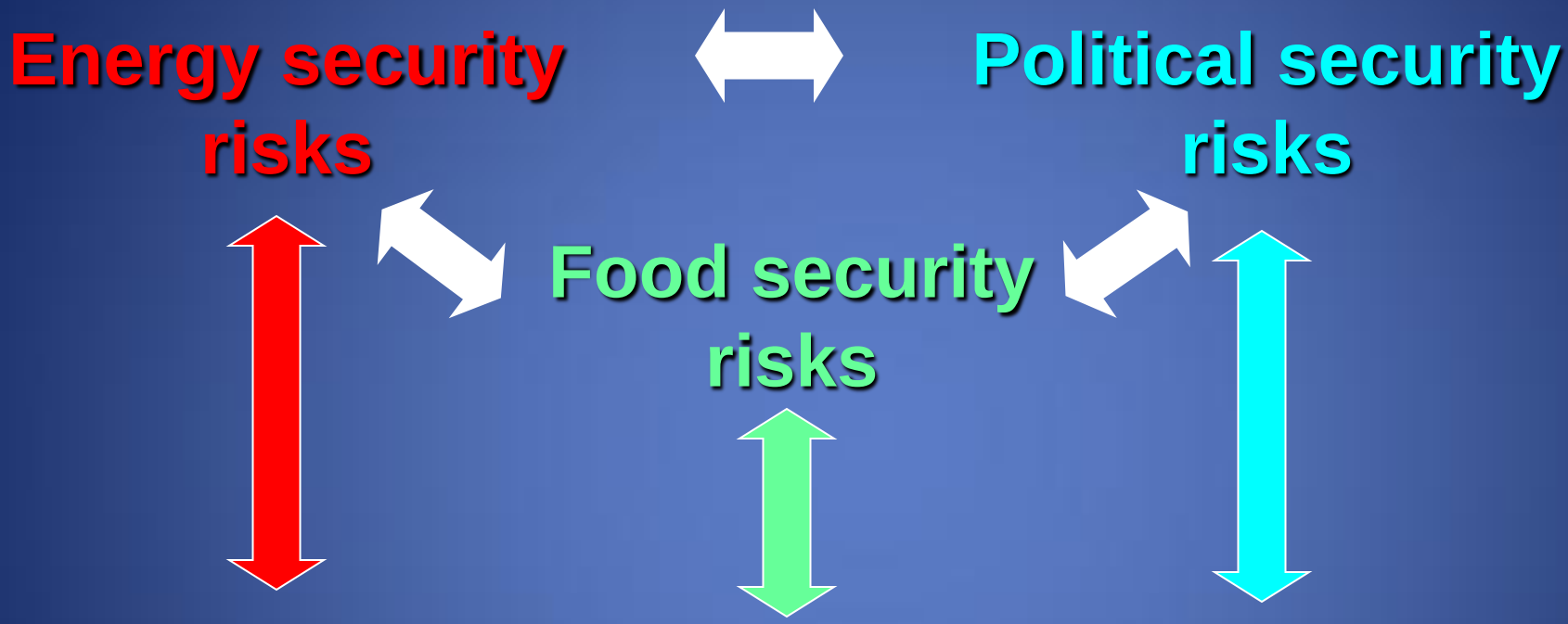
Surging Food Prices and Global Stability

Misguided policies favor biofuels and animal feed over grain for hungry people

Prof. Adel El-Beltagy, Copenhagen, COP15


BOB
THE SALT LAKE TRIBUNE
FUEL
USA
BIOFOOL

The food crisis tradeoffs and effects



+ Mass protests in about 60 countries

  Violent: Bangladesh, Egypt, Guinea, Haiti, Honduras, Tunisia, etc.

+ The poorest suffer most and do so silently

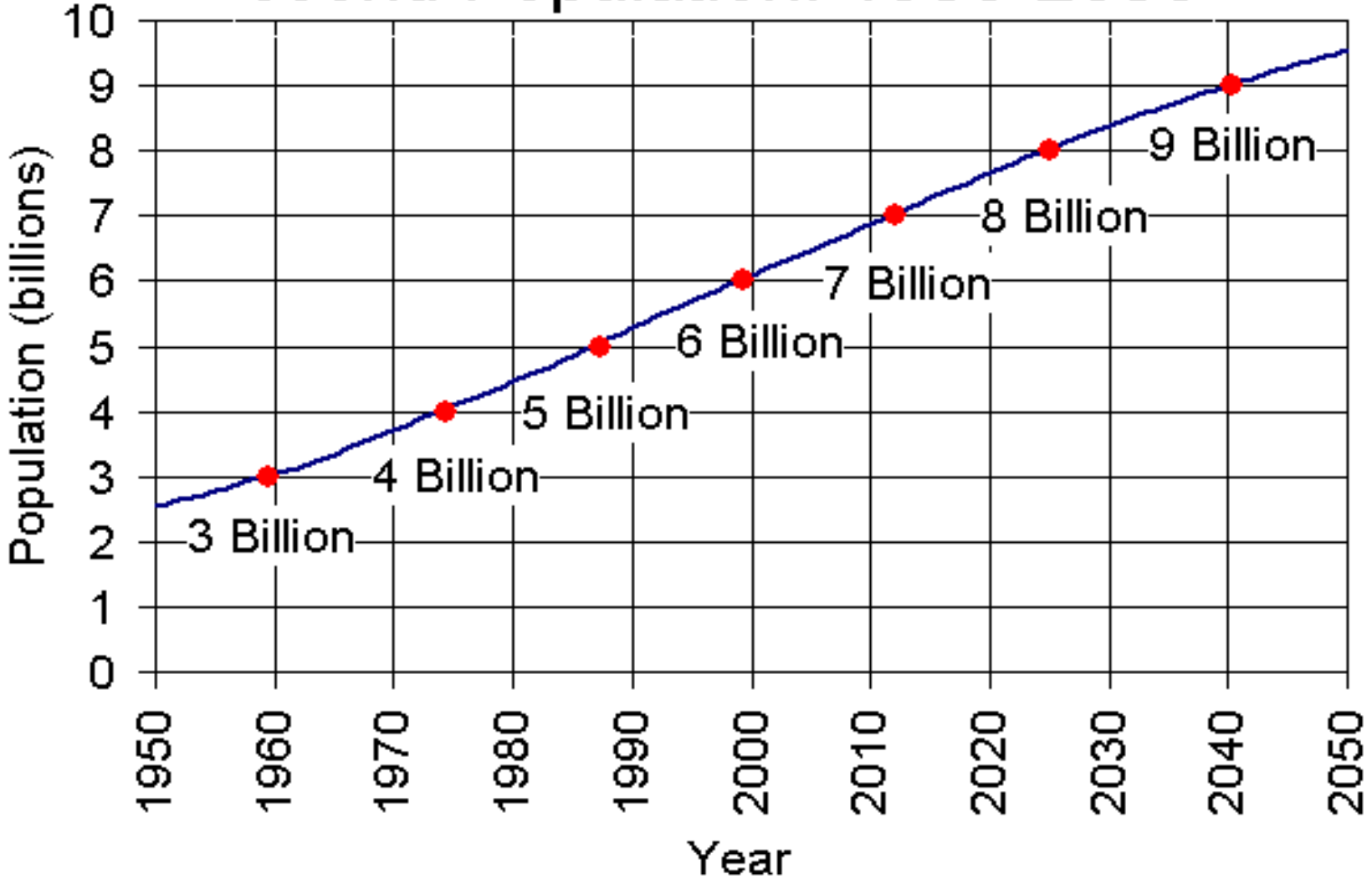
+ Inflation and macro-economic imbalances

+ Environmental sustainability consequences

Prof. Adel El-Beltagy, Copenhagen, COP15

Prof. Adel El-Beltagy, Copenhagen, COP15

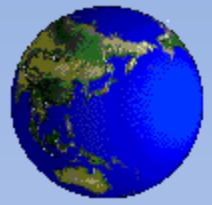
World Population: 1950-2050



Source: U.S. Census Bureau, International Data Base, December 2008 Update.

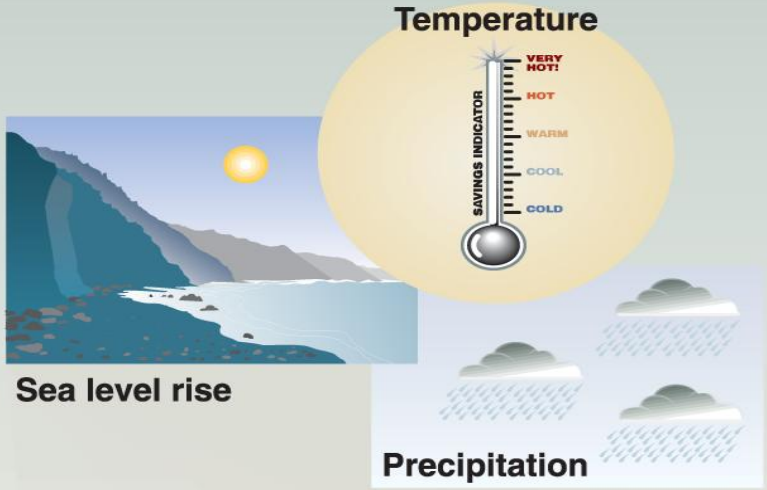

NEWSin3D.com
NEWSin3D.com

Climate change- impacts



- There is compelling evidence that climate change is a serious sustainable development challenge -- not only an environmental issue.
- Climate change impacts will affect all countries
- Developing countries and the poor will bear disproportionately high negative impacts.
- Consequently, climate change may undermine the ability of developing countries to achieve MDGs

Potential climate changes impact



Impacts on...

Health

Weather-related mortality
Infectious diseases
Air-quality respiratory illnesses

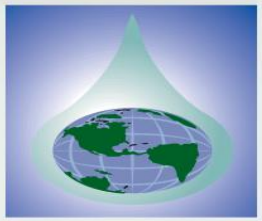
Agriculture

Crop yields
Irrigation demands

Forest

Forest composition
Geographic range of forest
Forest health and productivity

Water resources



Water supply
Water quality
Competition for water

coastal areas

Erosion of beaches
Inundation of coastal lands
additional costs to protect coastal communities

Species and natural areas

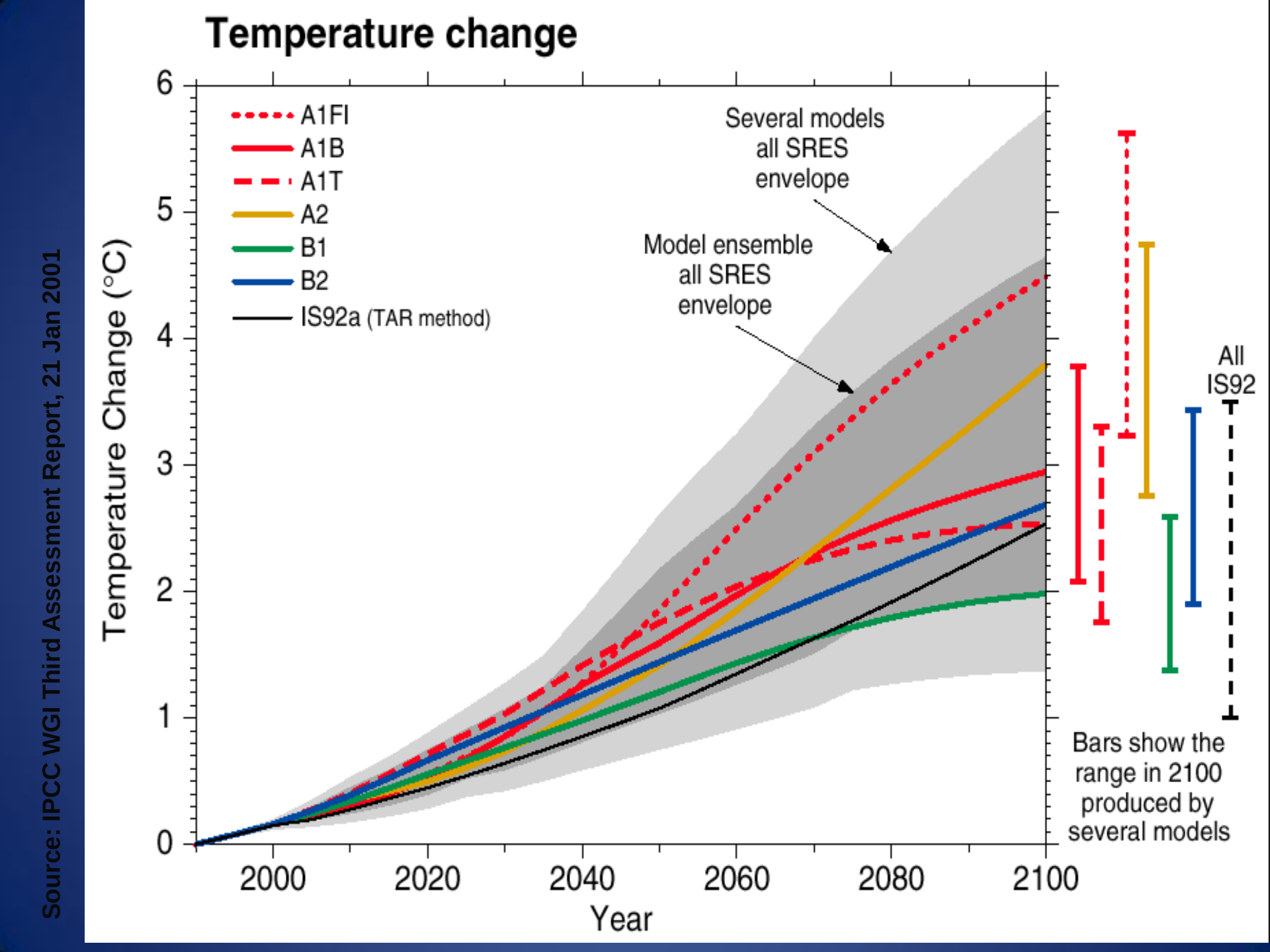
Loss of habitat and species
Cryosphere: diminishing glaciers

GRID Arendal UNEP

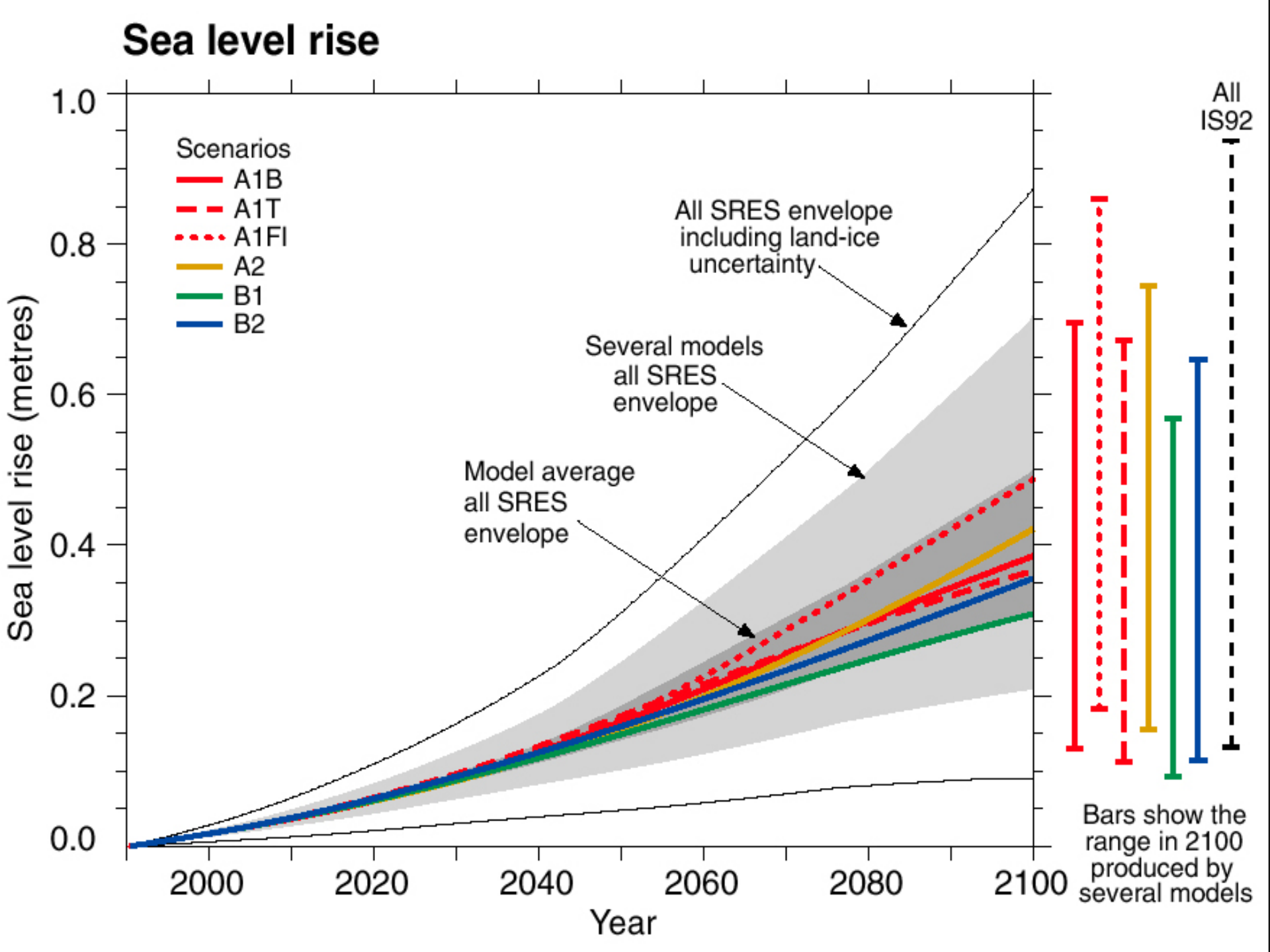
Prof. Adel El-Beltagy, Copenhagen, COP15

GRAPHIC DESIGN : PHILIPPE REKACEWICZ

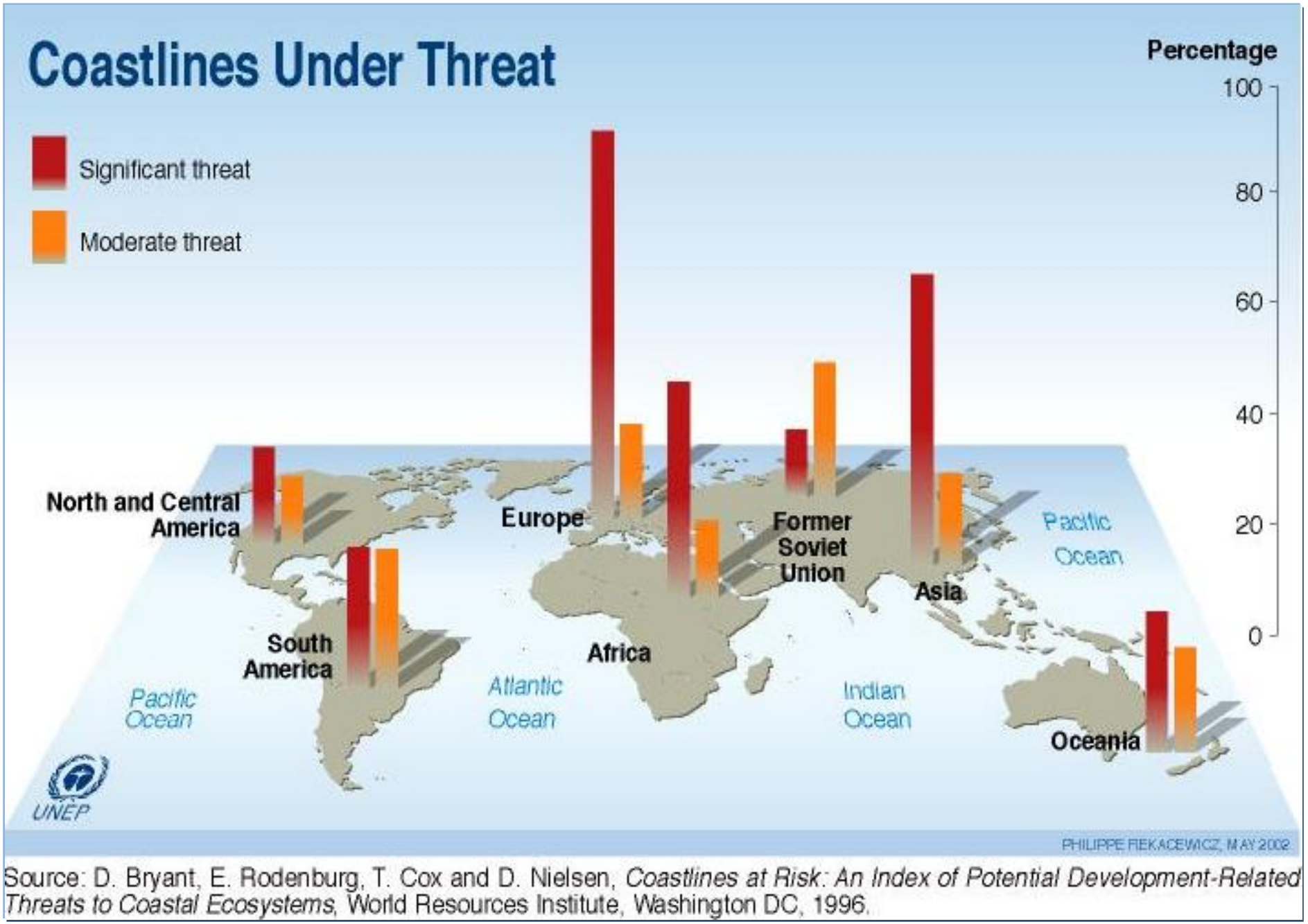
Source: United States environmental protection agency (EPA).



Source: IPCC WGI Third Assessment Report, 21 Jan 2001


Sea level rise
Scenarios
A1B
A1T
A1FI
A2
B1
B2
All SRES envelope including land-ice uncertainty
Several models all SRES envelope
Model average all SRES envelope
All IS92
Bars show the range in 2100 produced by several models
Sea level rise (metres)
Year
1.0
0.8
0.6
0.4
0.2
0.0
2000
2020
2040
2060
2080
2100


Prof. Adel El-Beltagy, Copenhagen, COP15



Source: D. Bryant, E. Rodenburg, T. Cox and D. Nielsen, *Coastlines at Risk: An Index of Potential Development-Related Threats to Coastal Ecosystems*, World Resources Institute, Washington DC, 1996.

Threatened deltas

Indicative population potentially displaced by current sea-level trends to 2050:

Extreme ≥1 million people displaced
High 1 million to 50,000 people displaced
Medium 50,000 to 5,000 people displaced

ارتفاع مستوي سطح البحر المتوقع في مصر وعلاقتها بالفقد في دلتا النيل
Sea Level Raise

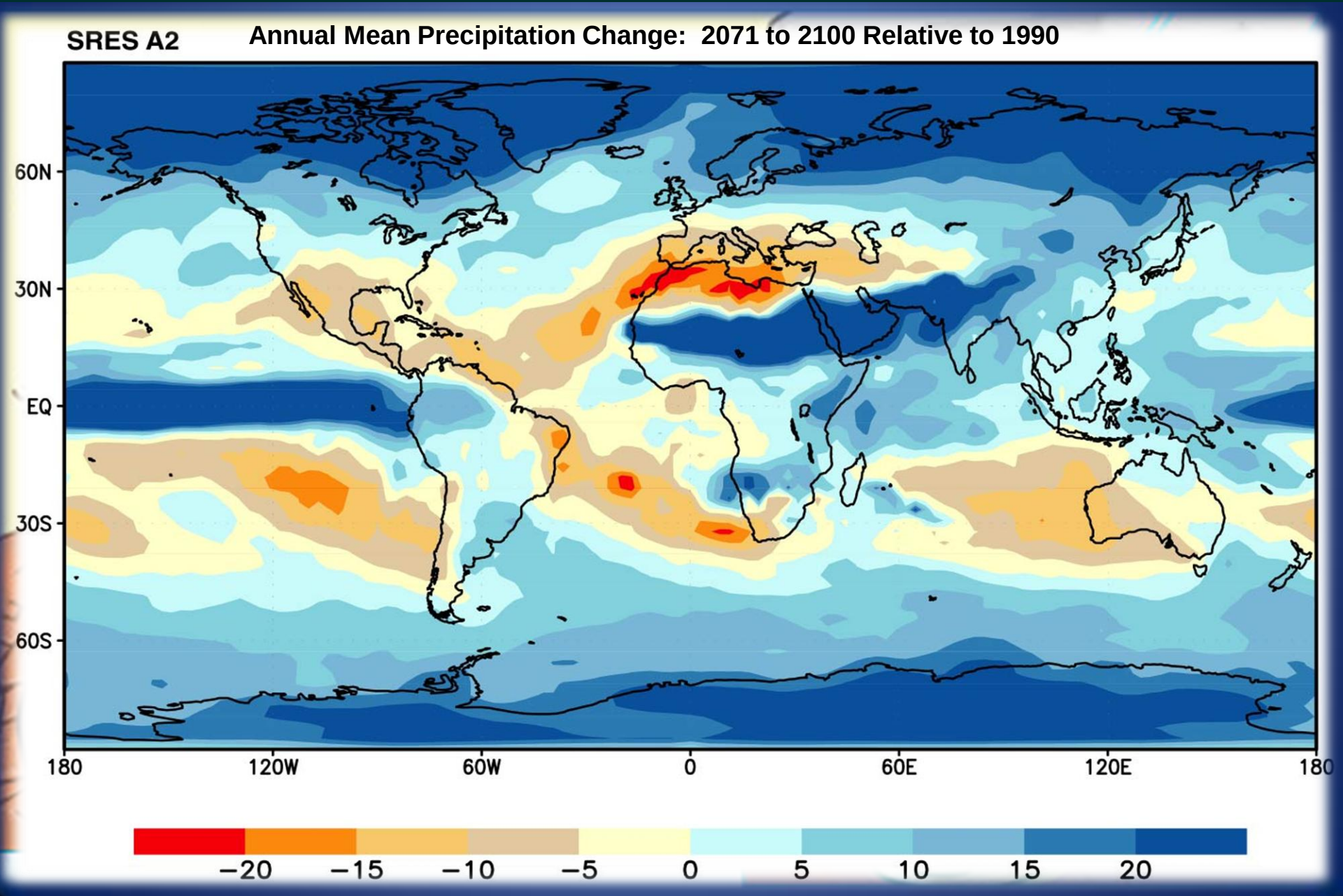
Nile Delta
Potential impact
of sea level rise

Sources: Cleo Simonett, UNEP/GRID Geneva; Prof. G. Sestini, Florence; Remote Sensing Center, Cairo; DIERCKE Weltwirtschaftsatlas.

GRID Arendal UNEP

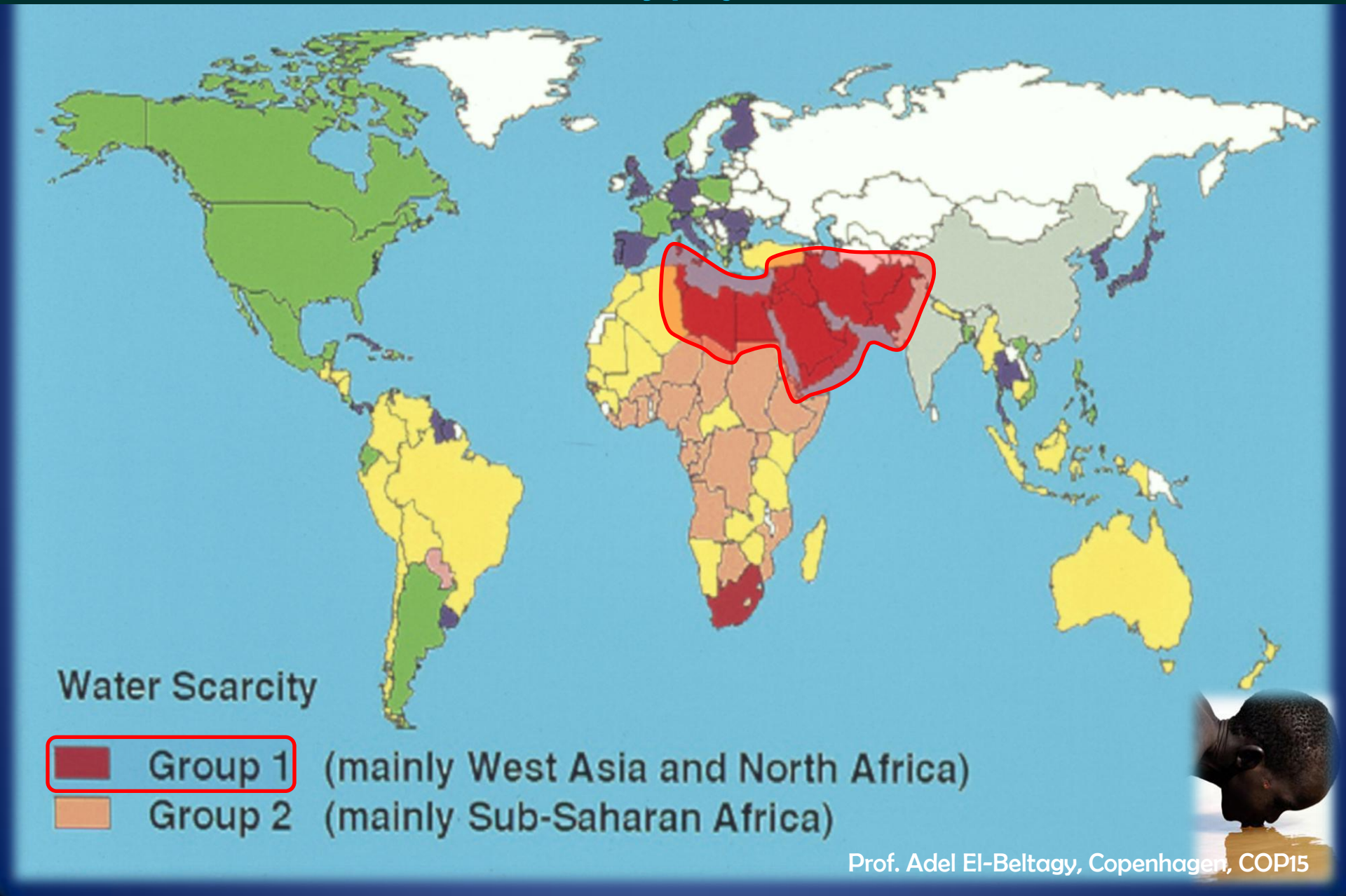
بعض المناطق ستصبح أكثر مطيرة والبعض أكثر جفافاً

More wetter & more drier



شح المياه المتوقع حتى 2025

Water Scarcity projection 2025



Prof. Adel El-Beltagy, Copenhagen, COP15

Climate change is projected to decrease water availability in many arid- and semi-arid regions

One third of the world's population is now subject to water scarcity

Population facing water scarcity will more than double over the next 30 years

From IPCC 2001

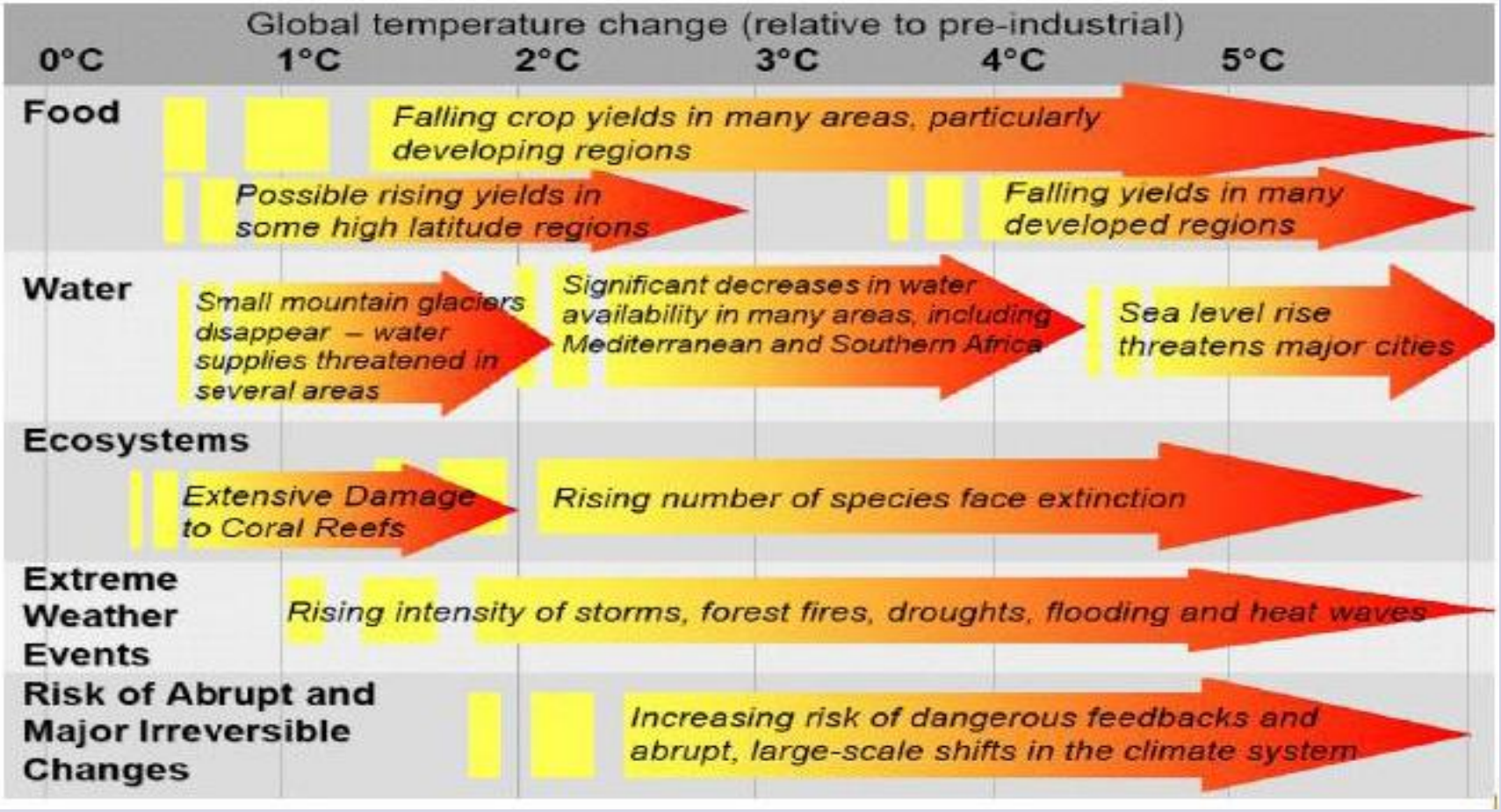
Met Office

Hadley Centre

Water & water resources

- Uncertain water quantity
- Seasonal shift in streamflow
- Increased intense rainfall
- Decreased water quality

Climate Change: major impacts



Drylands

1. Drylands are home to over 2 billion people or 35% of the world's population.
2. 54% of dryland inhabitants live in rural areas.
3. More than 90% of dryland inhabitants are found in developing countries.
4. Approximately half of all people living in poverty are in drylands.
5. Drylands populations had the highest population growth rates.

Prof. Adel El-Beltagy, Copenhagen, COP15

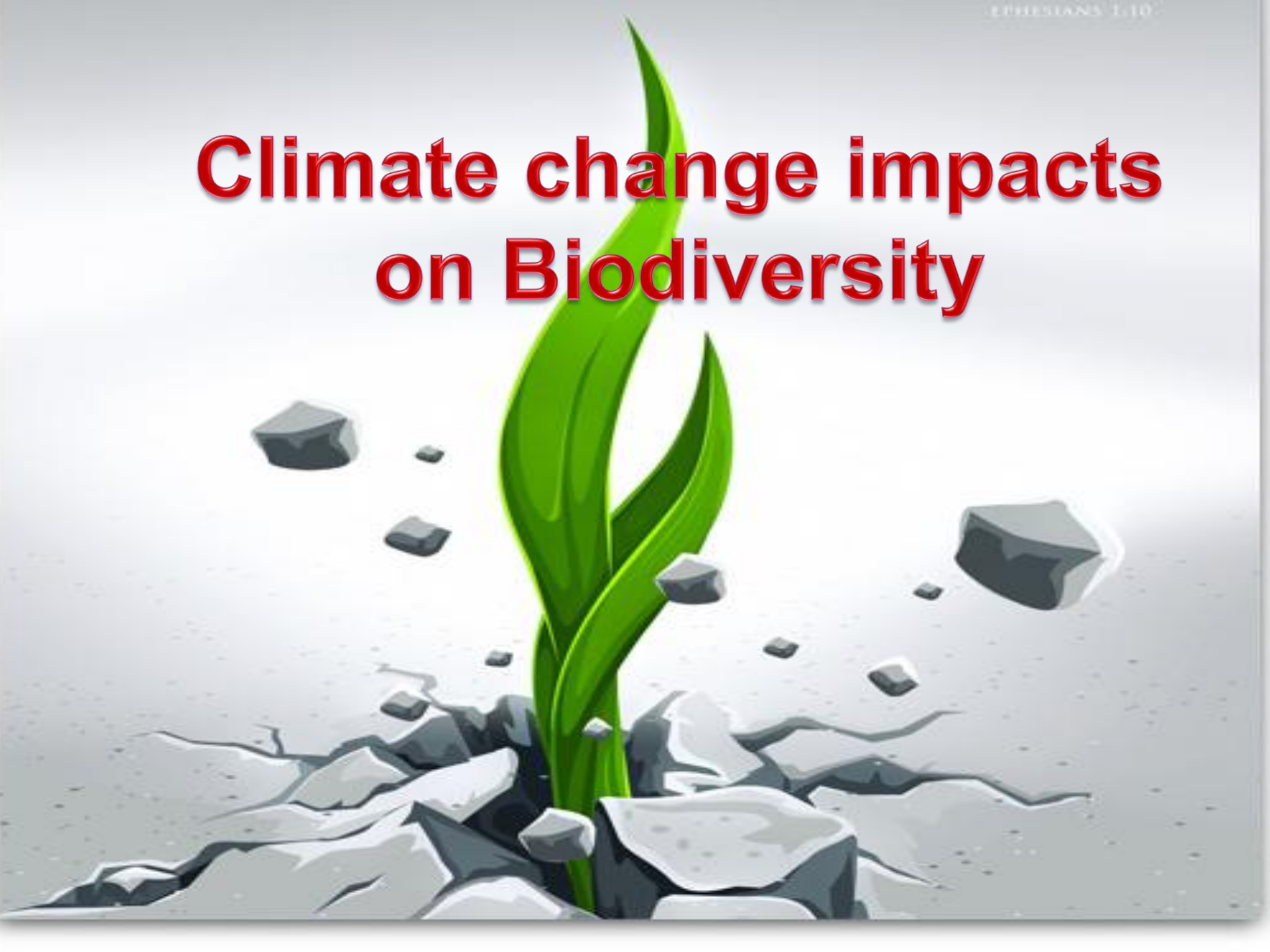

Mediterranean sea

Achieving the
2 0 1 0
Biodiversity
Target

Climate Change and Biodiversity

United Nations Convention on Biological Diversity

Climate change impacts on Biodiversity



NewsRadio | Now playing: Continuous news, finance, sp | Listen: Win Real

ABC News

Video Audio Photos Podcasts/RSS Email

News Home | Just In | Australia | World | Business | Entertainment | Weather | Sport | The Drum | Blogs

CLIMATE CHANGE
Copenhagen December 7-18

ABC SPECIAL COVERAGE

Native plants under threat

Climate change and land clearing threatens 800 native plant types. (ABC News)

Global Changes Alter The Timing of Plant Growth

Under today's conditions, grasses flower early in the growing season and wildflowers flower later, but when we increased the concentration of carbon dioxide to simulate future conditions, the two groups flowered at the same time,"

Impacts of Climate Change on Biodiversity

- **Millennium Ecosystem Assessment** – climate change is the second greatest threat to biodiversity

- Climate change is **changing species** through:
  - shifting habitat
  - changing life cycles
  - the development of new physical traits

- Climate change is reducing the ability of **indigenous and local communities** to sustain traditional, biodiversity-based livelihoods

Achieving the 2010 Biodiversity Target

CBD


Gene Bank
ICARDA

Prof. Adel El-Beltagy, Copenhagen, COP15

Prof. Adel El-Beltagy, Copenhagen, COP15


NORDIC GENE BANK
SAFETY BASE
COLLECTION


Prof. Adel El-Beltagy, Copenhagen, COP15

CLIMATE CHANGE

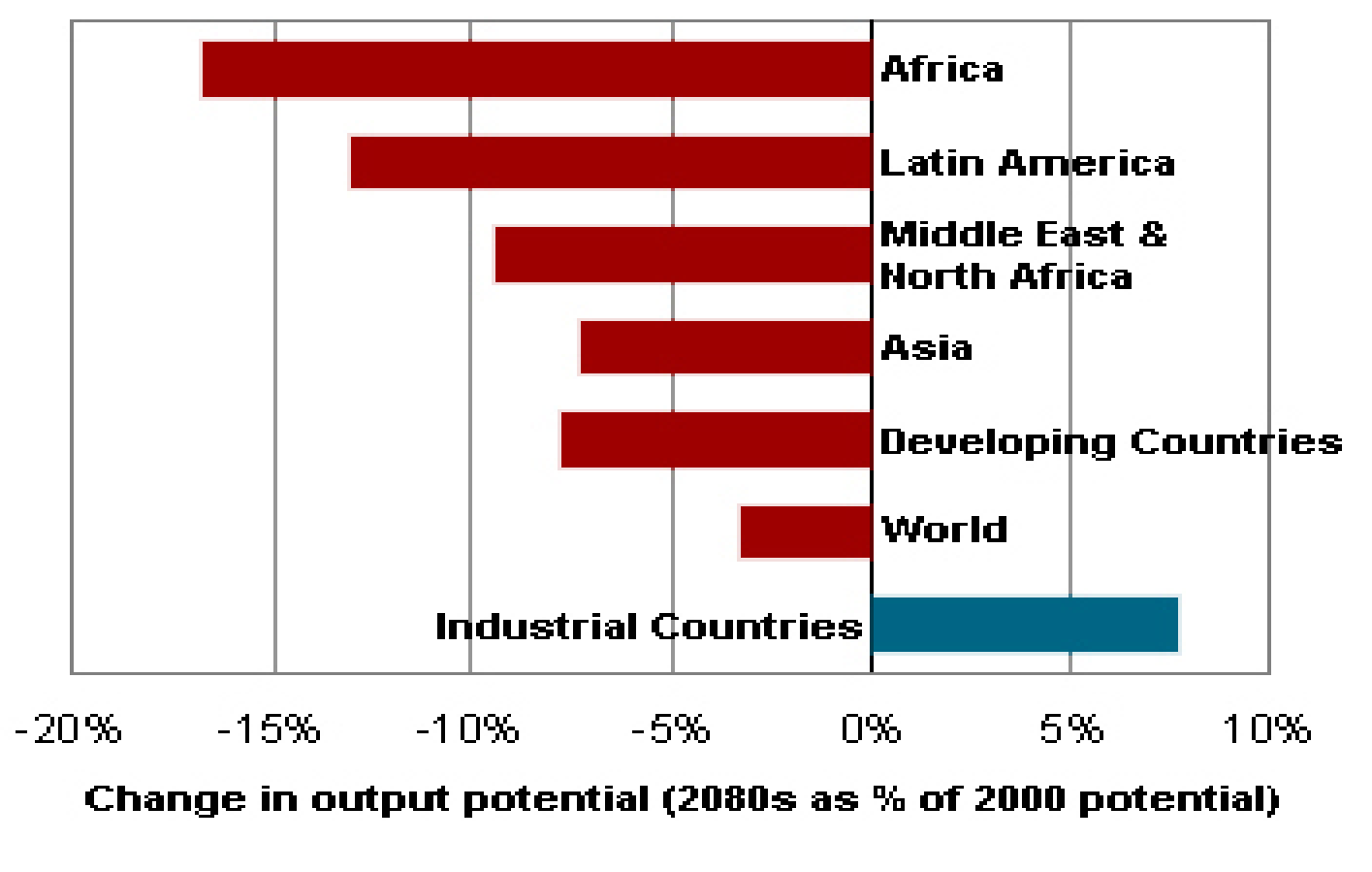
REPORT
FOOD POLICY

Impact on Agriculture and Costs of Adaptation

International Food Policy Research Institute
Washington, D.C.
Updated October 2009

Farmers Feel Effects of Climate Change

Change in Agriculture Output Potential Due to Climate Change, 2000-2080



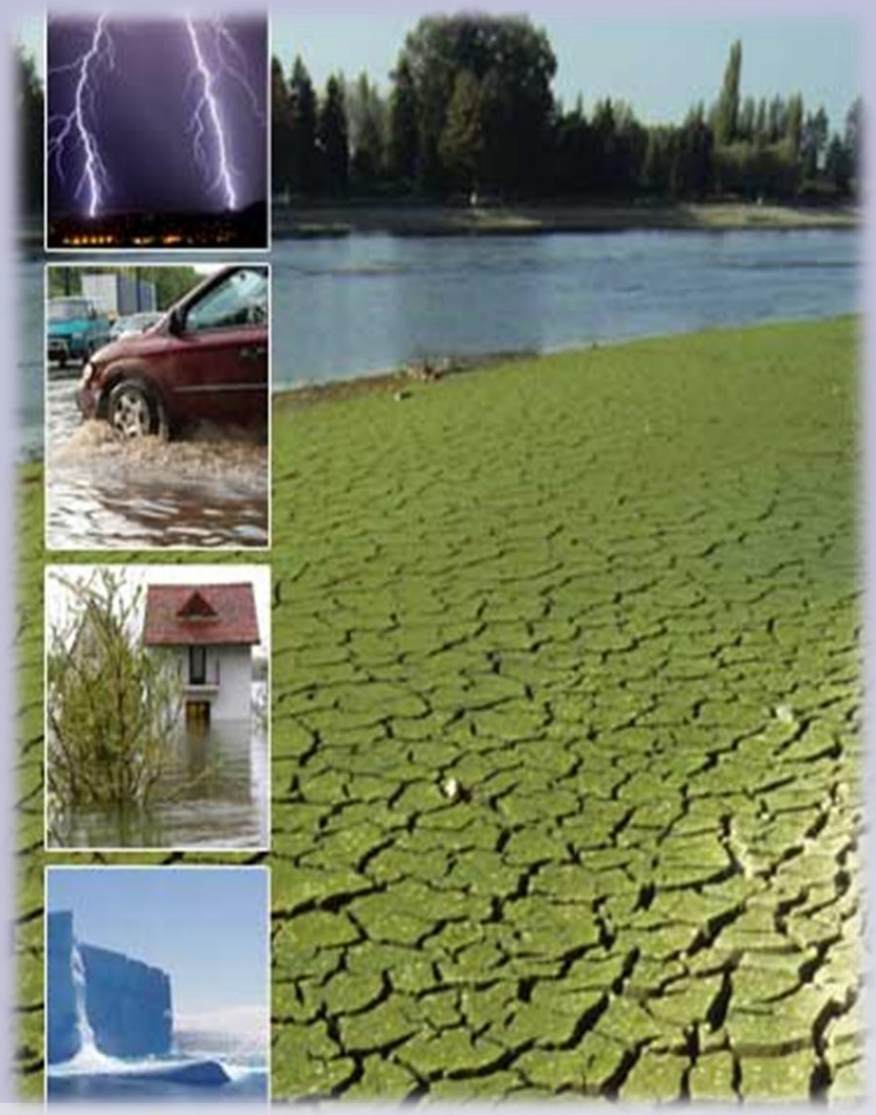
Possible Impacts on Agriculture, Forestry and Ecosystems by Region in the Developing World

Region	Potential Impacts
Africa	By 2020, in some countries, yields form rain-fed agriculture could be reduced by up to 50%. Agricultural production, including access to food, in many African countries is projected to be severely compromised. This would further adversely affect food security and exacerbate malnutrition.
Asia	By the 2050s, freshwater availability in Central, South, East, and Southeast Asia, particularly in large river basins, is projected to decrease.
Latin America	By mid century, increases in temperature and associated decreases in soil water are projected to lead to gradual replacement of tropical forest by savanna in eastern Amazonia. Semi-arid vegetation will tend to be replaced by arid-land vegetation. Productivity of some important crops is projected to decrease and livestock productivity to decline, with adverse consequences for food security. In temperate zones, soybean yields are projected to increase. Overall, the number of people at risk of hunger is projected to increase.

Source: FAO, 2008 based on information from IPCC, 2007

Key climate changes

- Higher temperatures
- More extreme heat
- More precipitation
- More severe storms
- More floods
- More droughts

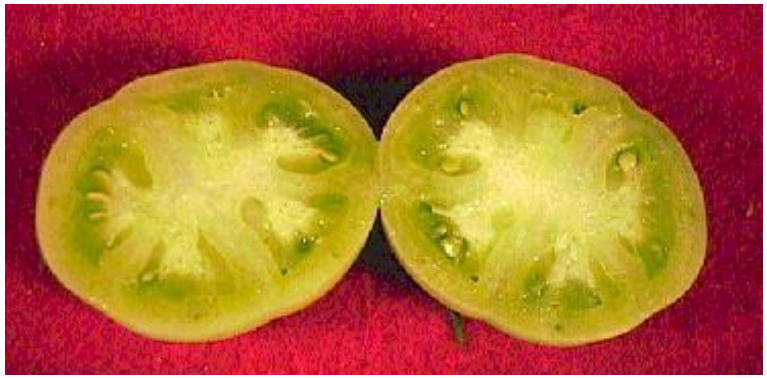


Key sectors affected by climate change

- Agriculture
- Forestry
- Water & water resources
- Ecosystems
- Human health
- Recreation

Crops vulnerable to rising temperature

Moderate temperature stress effects on quality



Control (82/71 F) Seeded fruit

Tipburn

Heat stress (90/79 F)
undeveloped flowers

Blossom end rot

Potential Effects of Rising Temperature on Plant Disease

- Wheat has been found to be more susceptible to rusts at higher temperatures

Prof. Adel El-Beltagy, Copenhagen, COP15

Potential Impacts of Changes in Moisture on Plant Disease

- Higher atmospheric water vapor concentrations favor fungal spore production, accelerating epidemic development

Prof. Adel El-Beltagy, Copenhagen, COP15

How Changes in Precipitation May Affect Insects

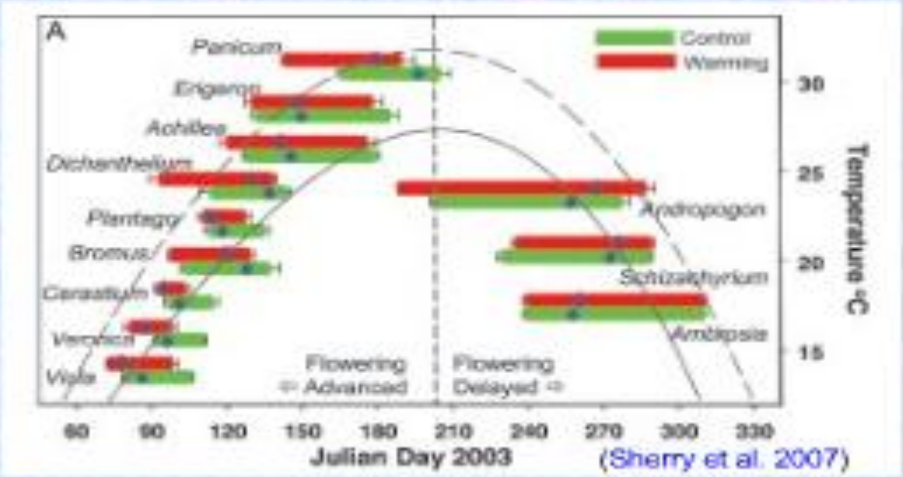
- Physical impact of heavy rainfall is a significant mortality factor for small insects

Climate change impacts on Plant Growth

Plant Phenological Responses to Climate Change

Divergence of Community Bloom Patterns

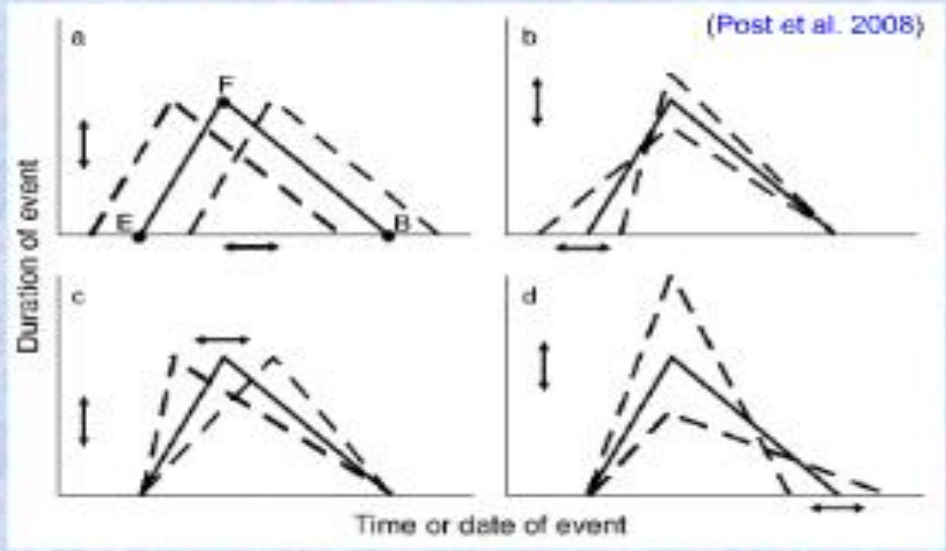
- Spring flowering species tended to bloom earlier
- Late-flowering species underwent a delay in flowering



Plant Phenological Responses to Climate Change

Aggregate Life History

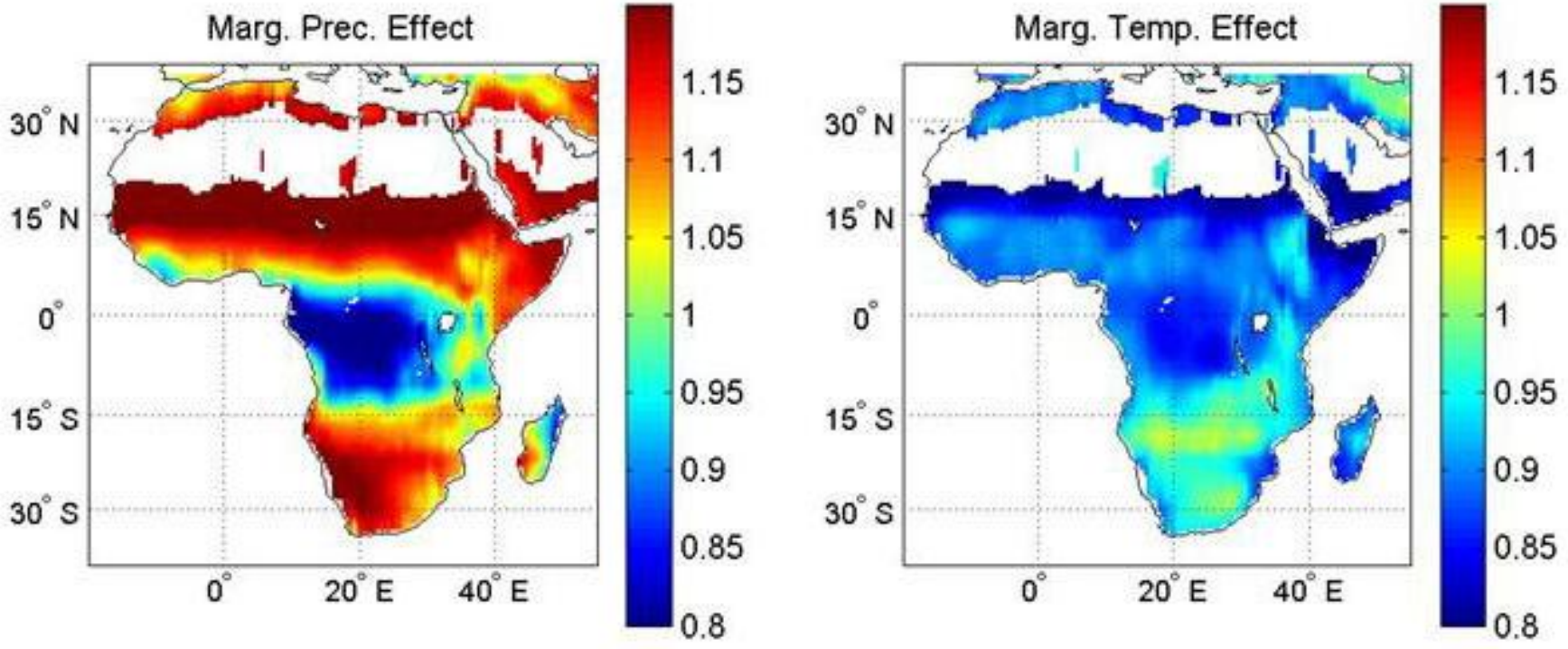
- Not all phenological events will respond equally to all environmental cues
- New community dynamics in competition for resources



Sensitivity of Cropping Patterns in Africa to Transient Climate Change

Prof. Adel El-Beltagy, Copenhagen, COP15

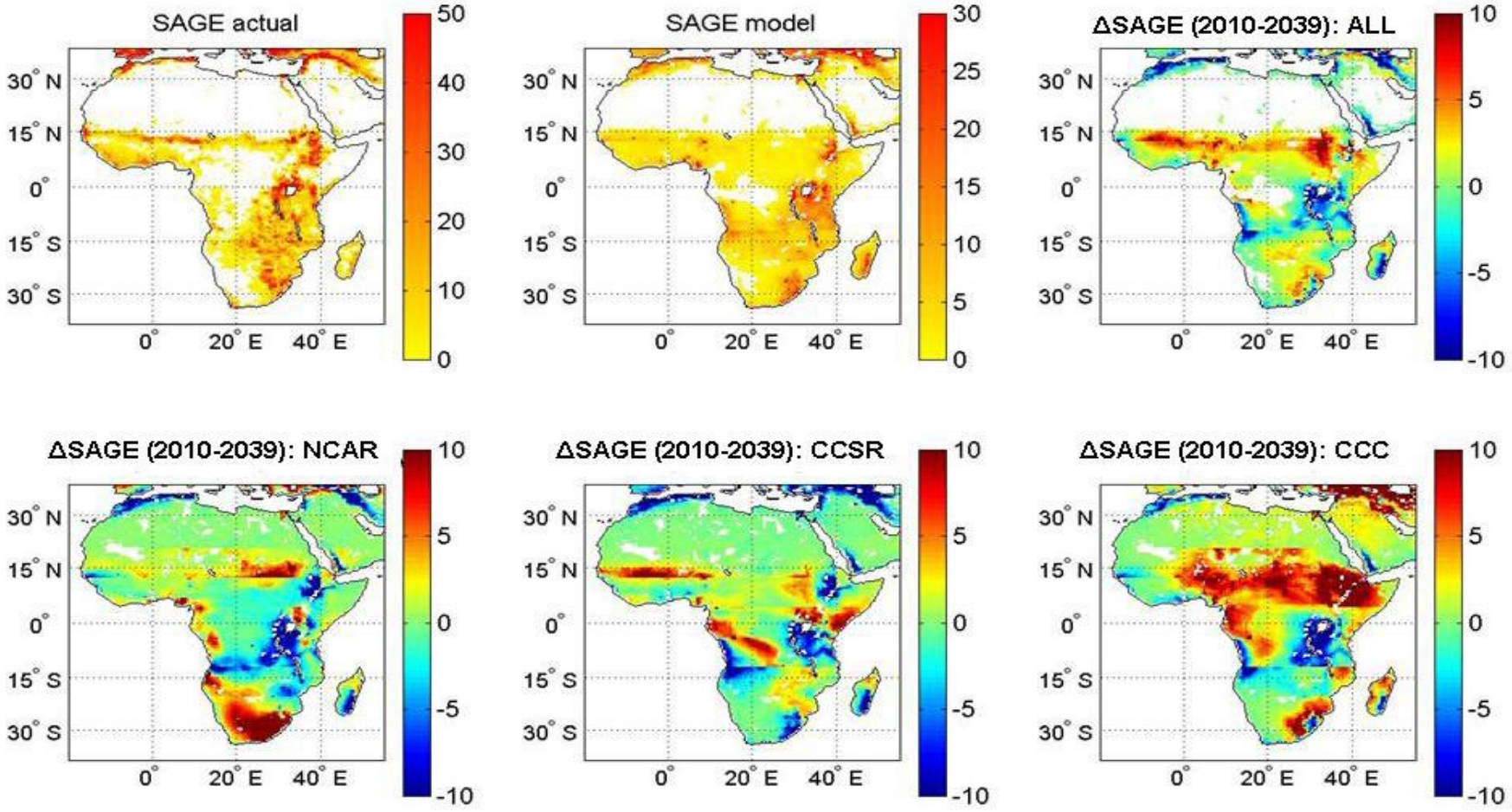
Geographic patterns of cropland sensitivity to precipitation and temperature



Cumulative marginal effects for precipitation and temperature across all seasons (winter, spring, summer, fall) were evaluated at long-term (1961–2000) mean conditions for each location (grid cell). Changes in the odds ratio per unit change in seasonal precipitation (10mm/month) and temperature (°C) are averaged across all six cropland models. Positive marginal effects ($Q > 1$) are shown in yellow-to-red colors, and negative marginal effects ($Q < 1$) in green-to-blue colors. For instance, $Q = 1.1$ indicates that the odds of land being used for cropping increases by 10% if the long-term mean monthly precipitation increases by 10mm (120mm/year). Increases in precipitation have a positive effect on croplands (left) in subtropical regions (10–20° N and 20–30° S) whereas they are neutral or negative in tropical regions. For temperature, increases in seasonal temperature have negative effects for most of the African continent, with the exception of mild positive effects in parts of southern Africa.

Policy Research Working Paper 4289, World Bank 2007

Changes in cropland share predicted by climate models



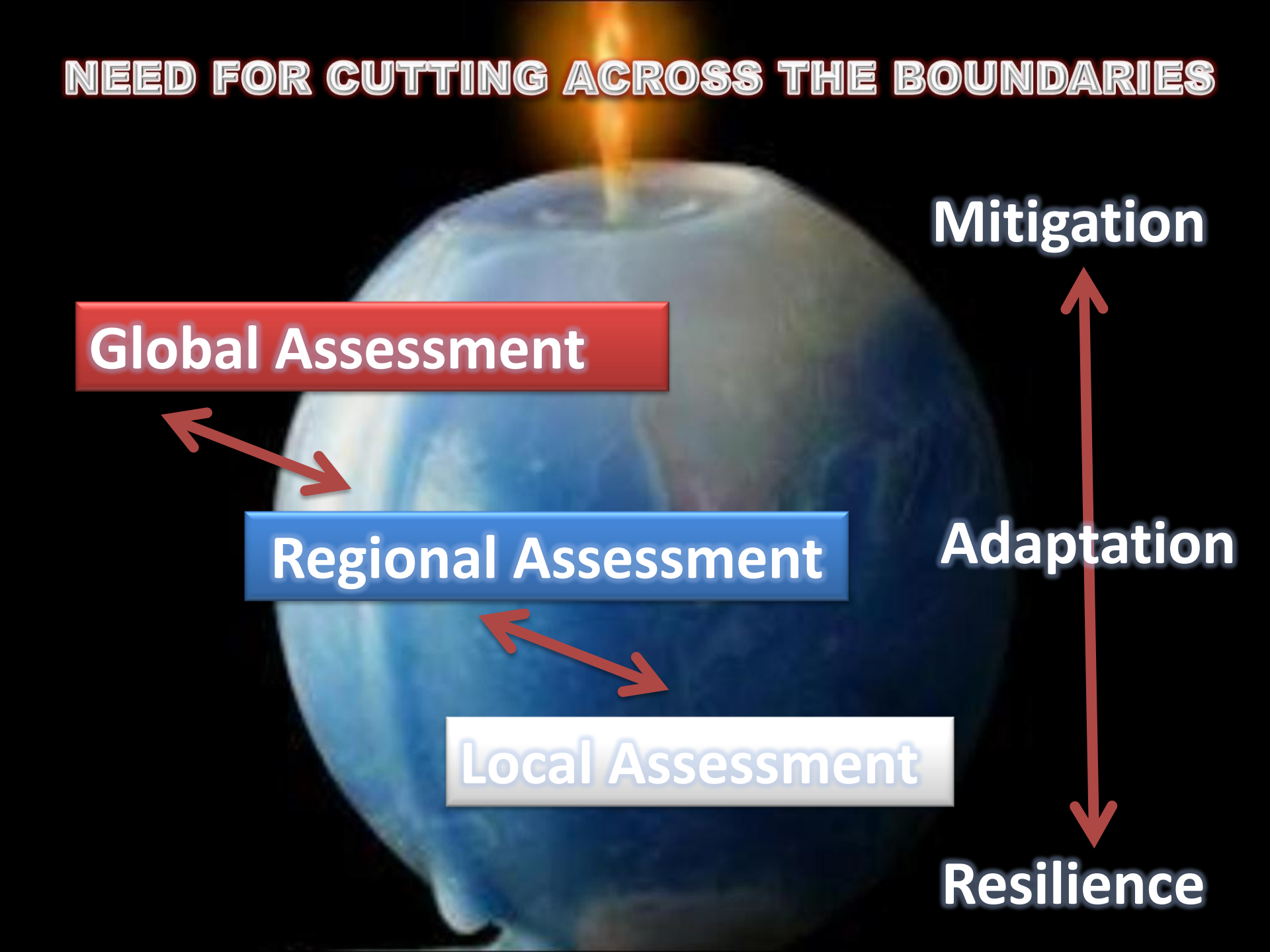
Long-term (2010–2039) changes in cropland share (in percent) arising from changes in seasonal temperature and precipitation patterns are estimated from an ensemble of seven AOGCMs (top right panel). Cropland sensitivities are based on the SAGE cropland model (for summary of other cropland models see Table 4). Actual (current) and modeled distribution of cropland share (percent) based on the SAGE data are shown in the left and center panels, respectively. Cropland share in subtropical regions (10–15° N and 15–30° S) is expected to increase, whereas croplands in tropical regions are expected to decrease, in particular in tropical eastern Africa (Great Lakes region).

Policy Research Working Paper 4289, World Bank 2007

Agriculture and climate change: working on adaptation and mitigation with poor rural people

Prof. Adel El-Beltagy, Copenhagen, COP15

NEED FOR CUTTING ACROSS THE BOUNDARIES



A report by ActionAid
October 2006

Climate change and smallholder farmers in Malawi

Understanding poor people's experiences in climate change adaptation

Prof. Adel El-Beltagy, Copenhagen, COP15

IMPACTS OF CLIMATE CHANGE IN ASIA

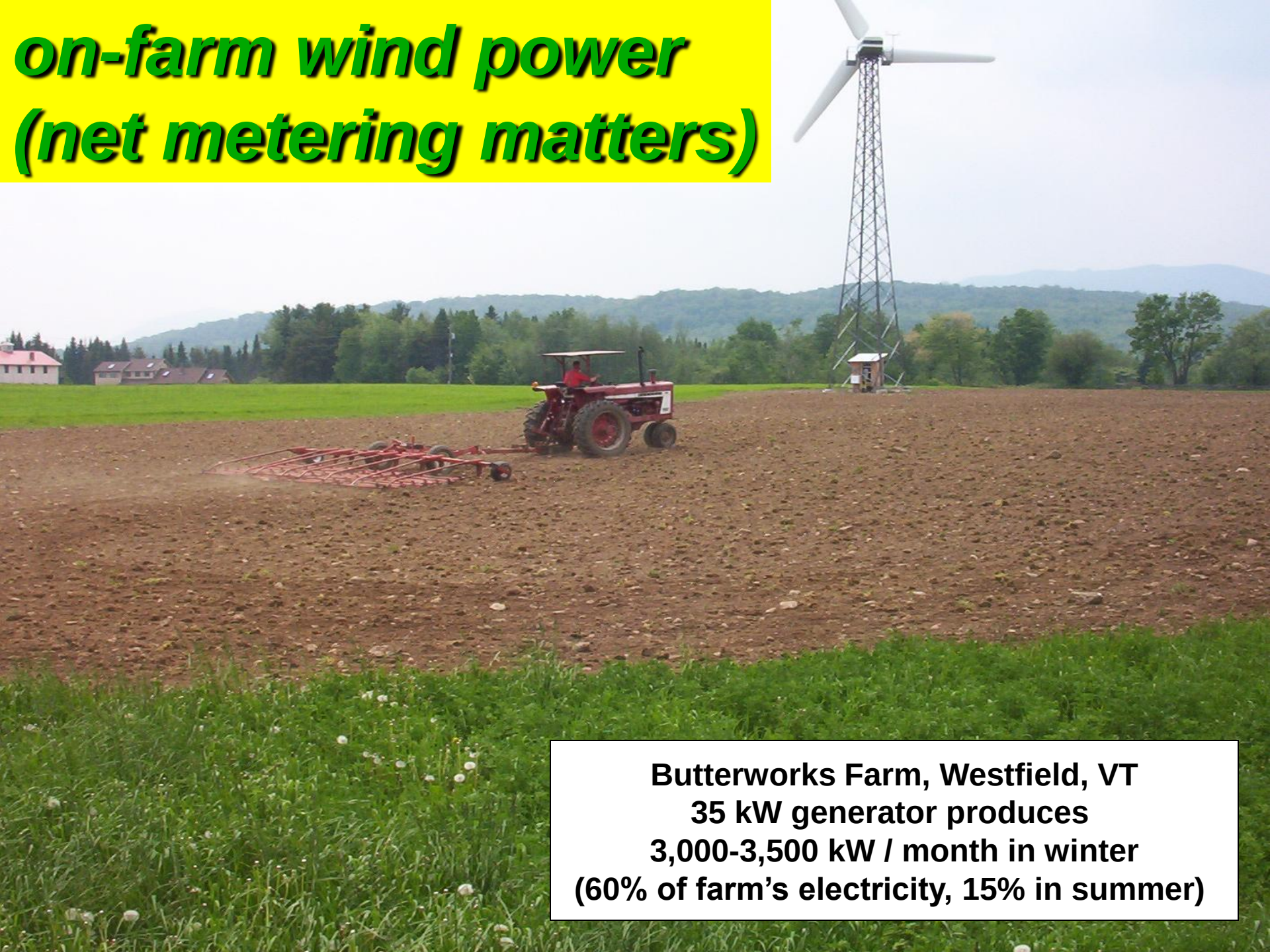
- Water shortage + thermal stress: adverse affect on wheat and, more severely, on rice even under the positive effects of CO2.
- Decline in yields due to frequency of droughts and extreme rainfall events
- More frequent forest fire in arid and semi-arid regions of Asia.
- Mountain regions: impact on soil erosion and sedimentation
- Rangelands and drylands: environmental and social stress.
- Higher temperatures in winter: higher pathogen survival rates, more host plants for pathogens.
- Weakening of disease resistance due to heat-stress and more favourable growth conditions for pathogenic bacteria.
- Warmer and wetter climate: widespread incidence of wheat scab, rice blast, and sheath, reproduction, and spread of disease bacteria

Prof. Adel El-Beltagy, Copenhagen, COP15

IMPACTS OF CLIMATE CHANGE IN LATIN AMERICA

- **Pampa Province (Argentina)**: 1921- 2000 trends show drought cycle with a peak in 1940 and lasting until 1960
- **Cuba**: frequent climatic abnormalities in the last decades had a noticeable negative impact on all socio-economic activities.
- **Brazil**: During the positive phase of ENSO, increase in the intensity of drought in the northeastern region while in the south an increase in precipitation is observed.
- **Argentina**: close relationship between the increase or decrease of rainfall and the warm or cold phase of ENSO.
- **Brazil**, Argentina and Uruguay: Evaluation of El-Niño and La- Niña (1938 to 1998) on barley showed that in most cases La- Niña had a positive impact and El-Niño a negative one.

on-farm wind power (net metering matters)



Butterworks Farm, Westfield, VT
35 kW generator produces
3,000-3,500 kW / month in winter
(60% of farm's electricity, 15% in summer)

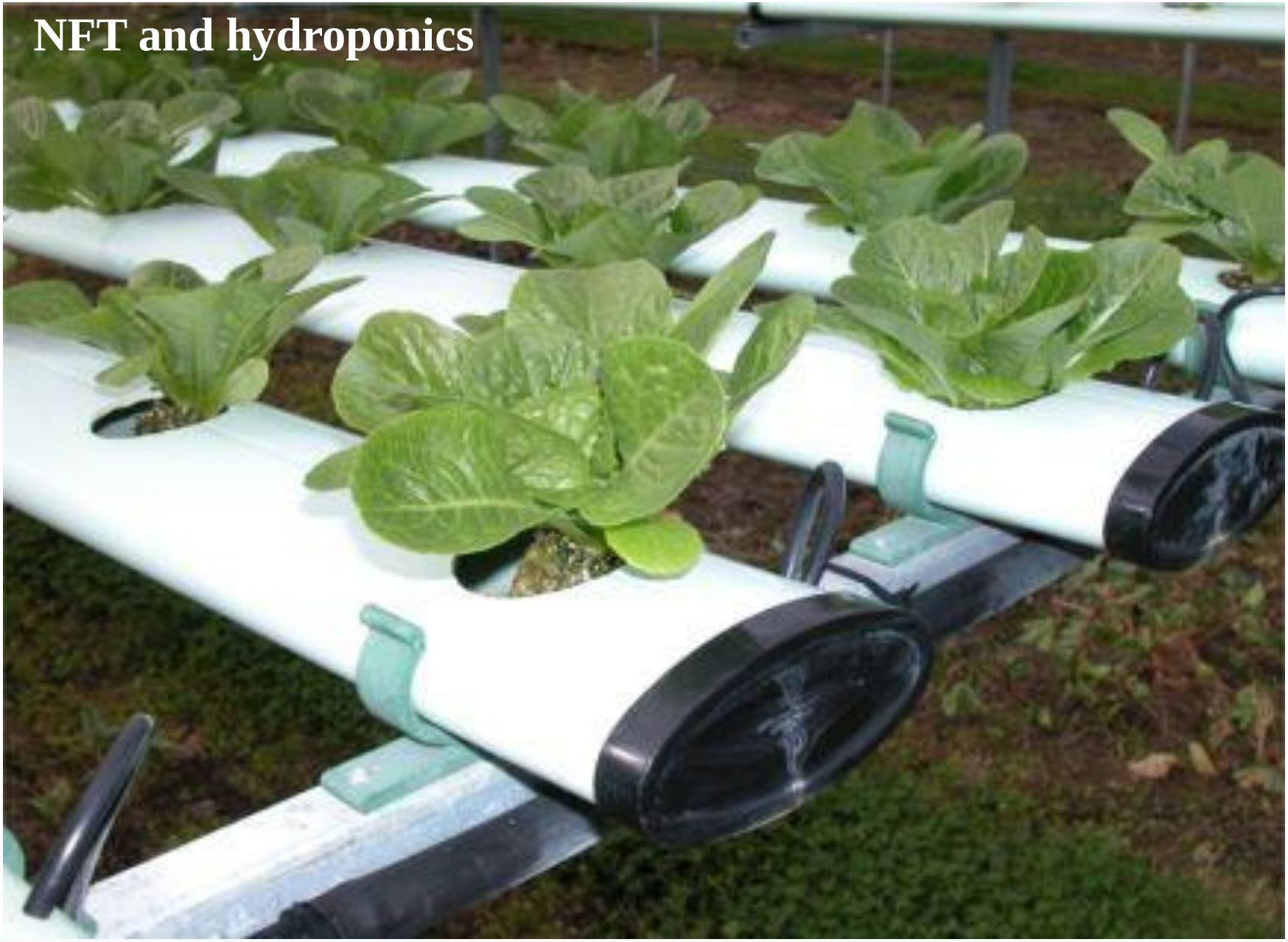

Reducing tillage: no-till

Reducing tillage: spader

Irrigation is becoming 'essential'

Different crops & systems

NFT and hydroponics



Fodder production in hydroponics

Sustainable Agricultural Development









Water Resources

Legislation

Policies

Technology

Technology

Human Resources

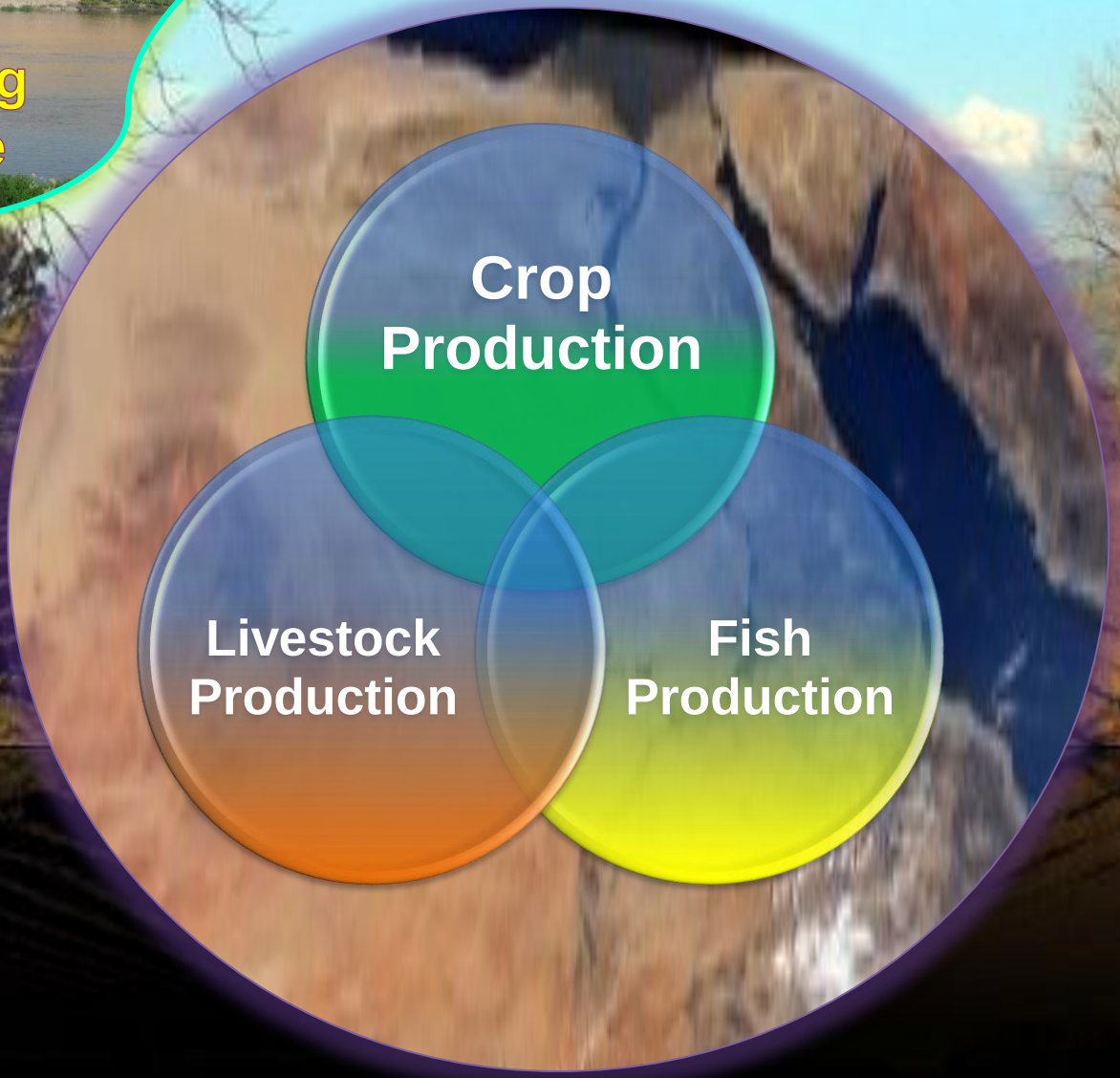
$ Investments $

Land Resources

Prof. Adel El-Beltagy, Copenhagen, COP15

National vision

Maximizing water use



Pomegranates

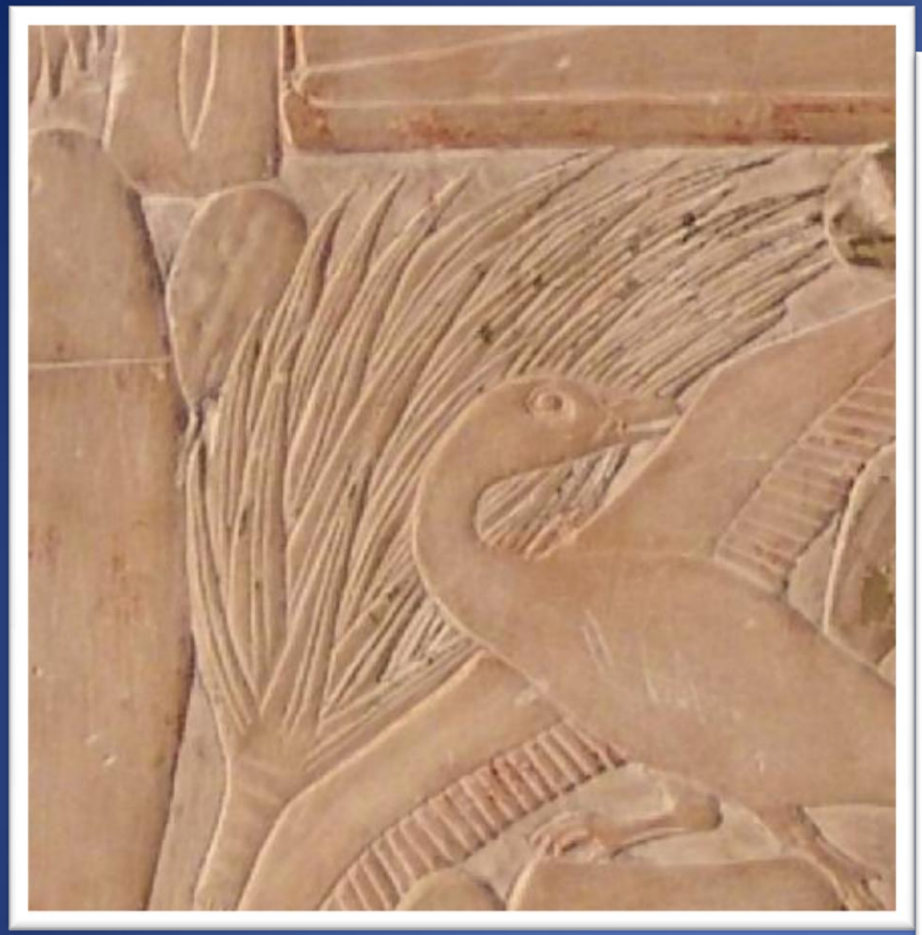
Tomb of Nakht

Doum and Date Palm trees
Sycamore trees

Tomb of Sennedjem

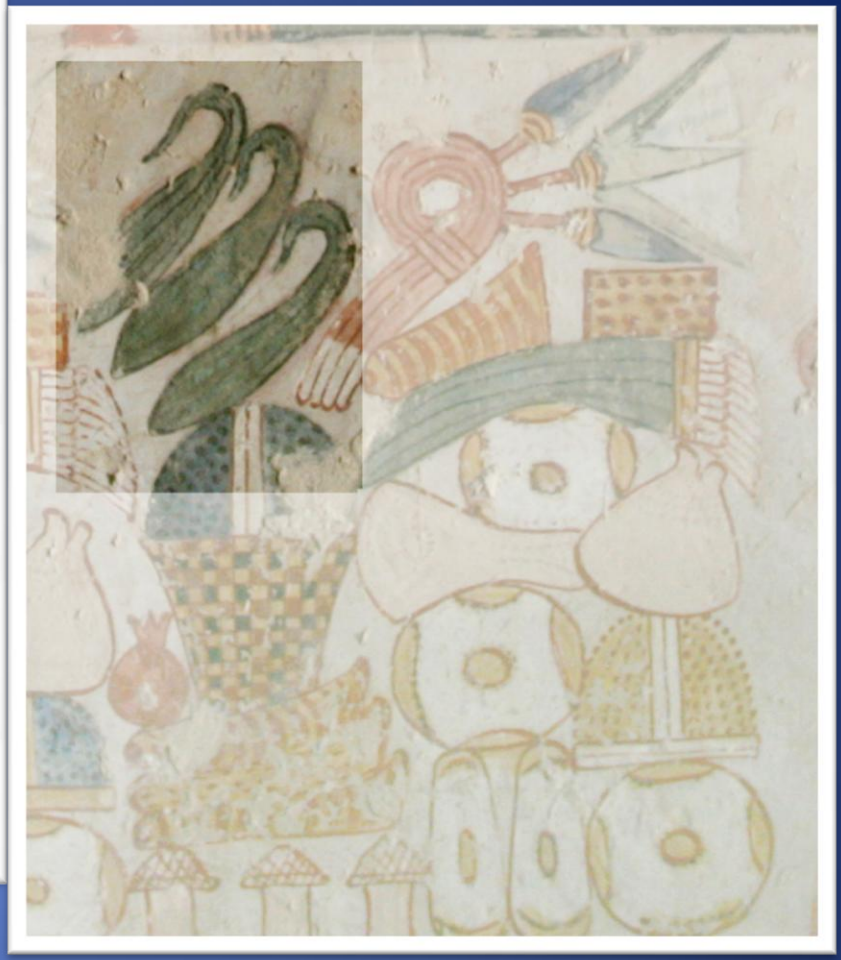
Fig trees

Tombs of Nakht, Menna, Rekhmire, Amenem and Khnumhotep



Lettuce

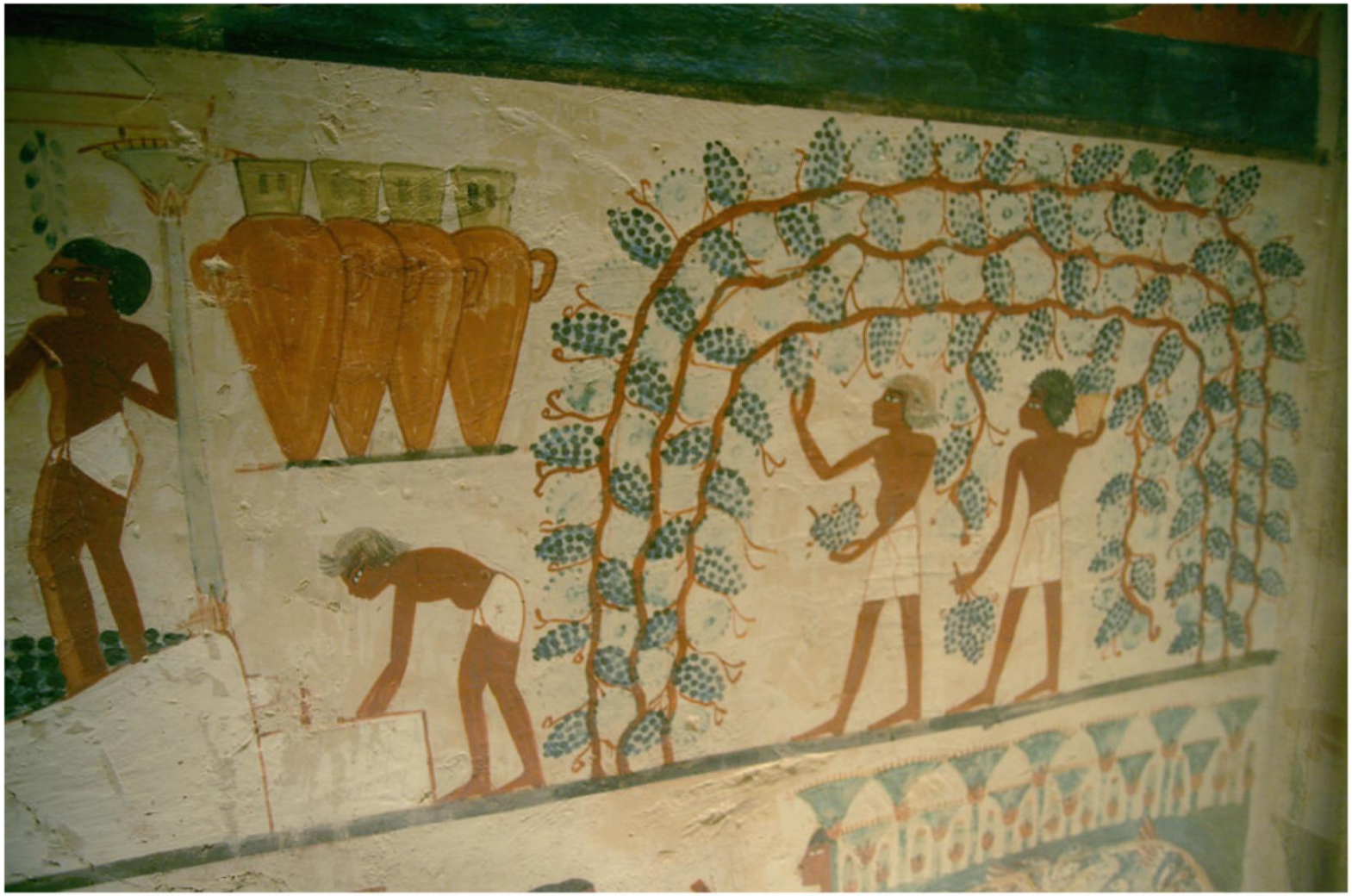
Tomb of Menna



Cucumber Qatha

(Egyptian Chate)

Tomb of Menna



Grape Vine

Tomb of Nakht

Flax (Linen)

Tomb of Sennedjem

The International Treaty on Plant Genetic Resources for Food and Agriculture

The Treaty represents an important advancement in access to plant genetic resources, and establishes the bases for a fairer distribution of the benefits derived from using these resources, including farmers' rights in the distribution of commercial benefits, which may contribute to alleviating global hunger and poverty.

Article 10 – Multilateral System of Access and Benefit-sharing

10.1 In their relationships with other States, the Contracting Parties recognize the sovereign rights of States over their own plant genetic resources for food and agriculture, including that the authority to determine access to those resources rests with national governments and is subject to national legislation.

10.2 In the exercise of their sovereign rights, the Contracting Parties agree to establish a multilateral system, which is efficient, effective, and transparent, both to facilitate access to plant genetic resources for food and agriculture, and to share, in a fair and equitable way, the benefits arising from the utilization of these resources, on a complementary and mutually reinforcing basis.

Article 13 - Benefit-sharing in the Multilateral System

13.2 The Contracting Parties agree that benefits arising from the use, including commercial, of plant genetic resources for food and agriculture under the Multilateral System shall be shared fairly and equitably through the following mechanisms:

(a) Exchange of information.

(b) Access to and transfer of technology.

(c) Capacity-building, and

(d) Sharing of the benefits arising from commercialization.

Capacity-building

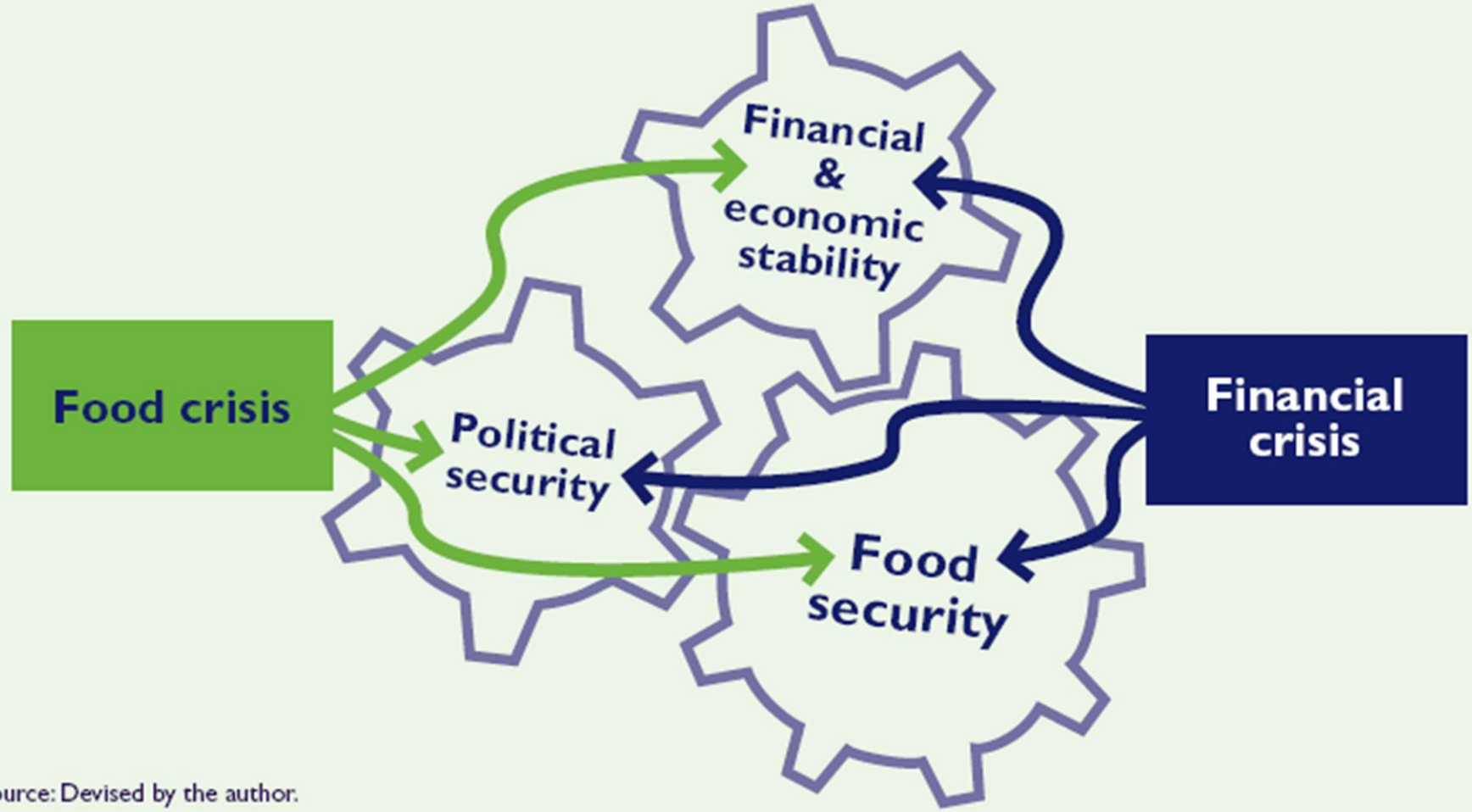
(i) establishing and/or strengthening programmes for scientific and technical education and training in conservation and sustainable use of plant genetic resources for food and agriculture.

(ii) developing and strengthening facilities for conservation and sustainable use of plant genetic resources for food and agriculture, in particular in developing countries, and countries with economies in transition, and

(iii) carrying out scientific research preferably, and where possible, in developing countries and countries with economies in transition, in cooperation with institutions of such countries, and developing capacity for such research in fields where they are needed.

IFPRI December 2008/ Joachim von Braun

Figure 1—Linkages between the food and financial crises



Source: Devised by the author.

Economist.com

October 4th – 10th 2008.

Prof. Adel El-Beltagy, Copenhagen, COP15

Prof. Adel El-Beltagy, Copenhagen, COP15

New Tools of Science & Technology

- Remote sensing, GIS/GPS
- Biotechnology/genetic engineering.
- Genetic and Proteomics (Gene mining …etc).
- Simulation modeling
- Information Technology/ Expert System/ Advanced artificial intelligence
- Renewable energy: solar, wind, biofuel
- New energy-saving techniques for desalination and water transportation
- Nanotechnology, (Biosensors – Bioprocessing – Nanomaterials).





The International Treaty
ON PLANT GENETIC RESOURCES FOR FOOD AND AGRICULTURE

On farm conservation and *In vitro* preservation of Citrus local varieties and sustainable utilization in Egypt.

Hanaiya El Itriby
National Gene Bank and Genetic Resources - Egypt

INTRODUCTION

- **Citrus species are native to Southeast Asia where they are found wild and in as uncultivated form.**

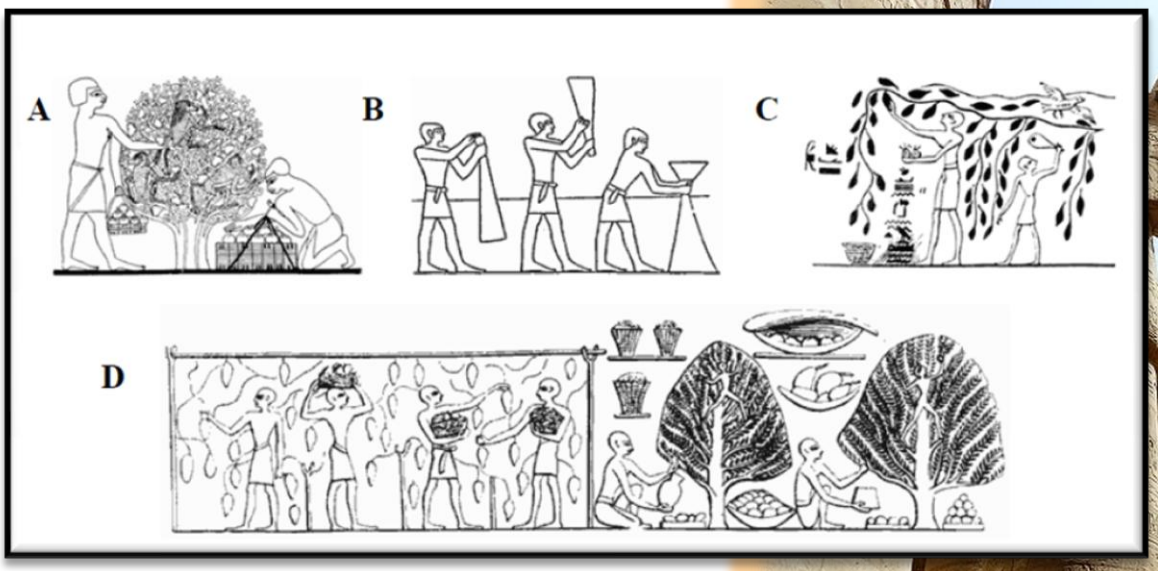
- **Citron (*Citrus medica*) has been renown in Egypt since the time of the pharaohs, where the egyptologist and archaeologist Victor Foret had found it inscribed on the walls of the botanical garden at the Karnak Temple which dates back to the times of Thutmosis III (15th Century BC) during his wars on Asia.**

- **The Louvre Museum exhibits a Citron fruit which was excavated from a Pharaoh's tomb.**

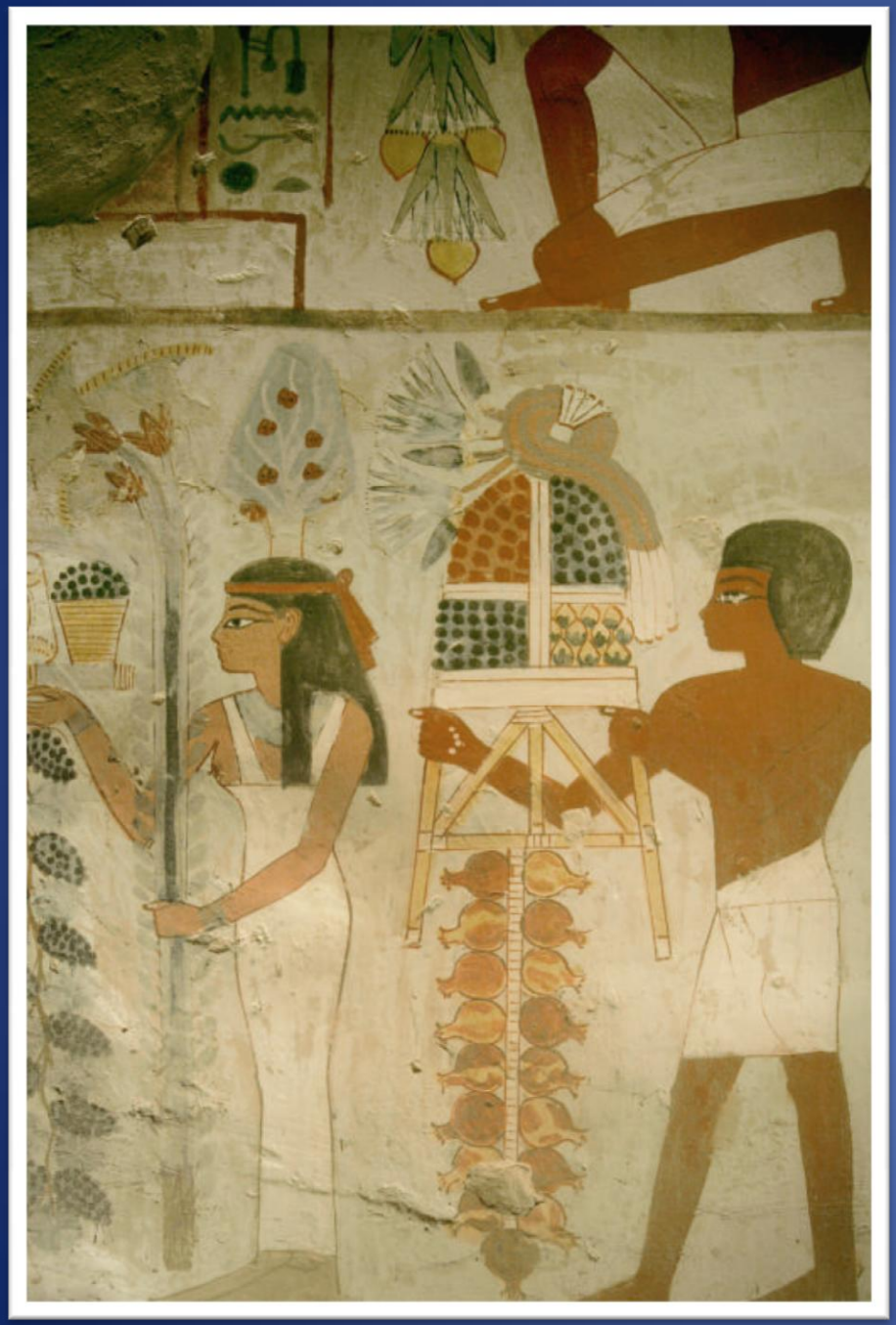
- **The word Gitri in the Coptic language which was taken from the hieroglyphic language means sour fruit.**

The International Treaty

ON PLANT GENETIC RESOURCES FOR FOOD AND AGRICULTURE



HISTORY OF EGYPTIAN AGRICULTURE AND HORTICULTURE



شكراً لحسن
استماعكم

THANK YOU