

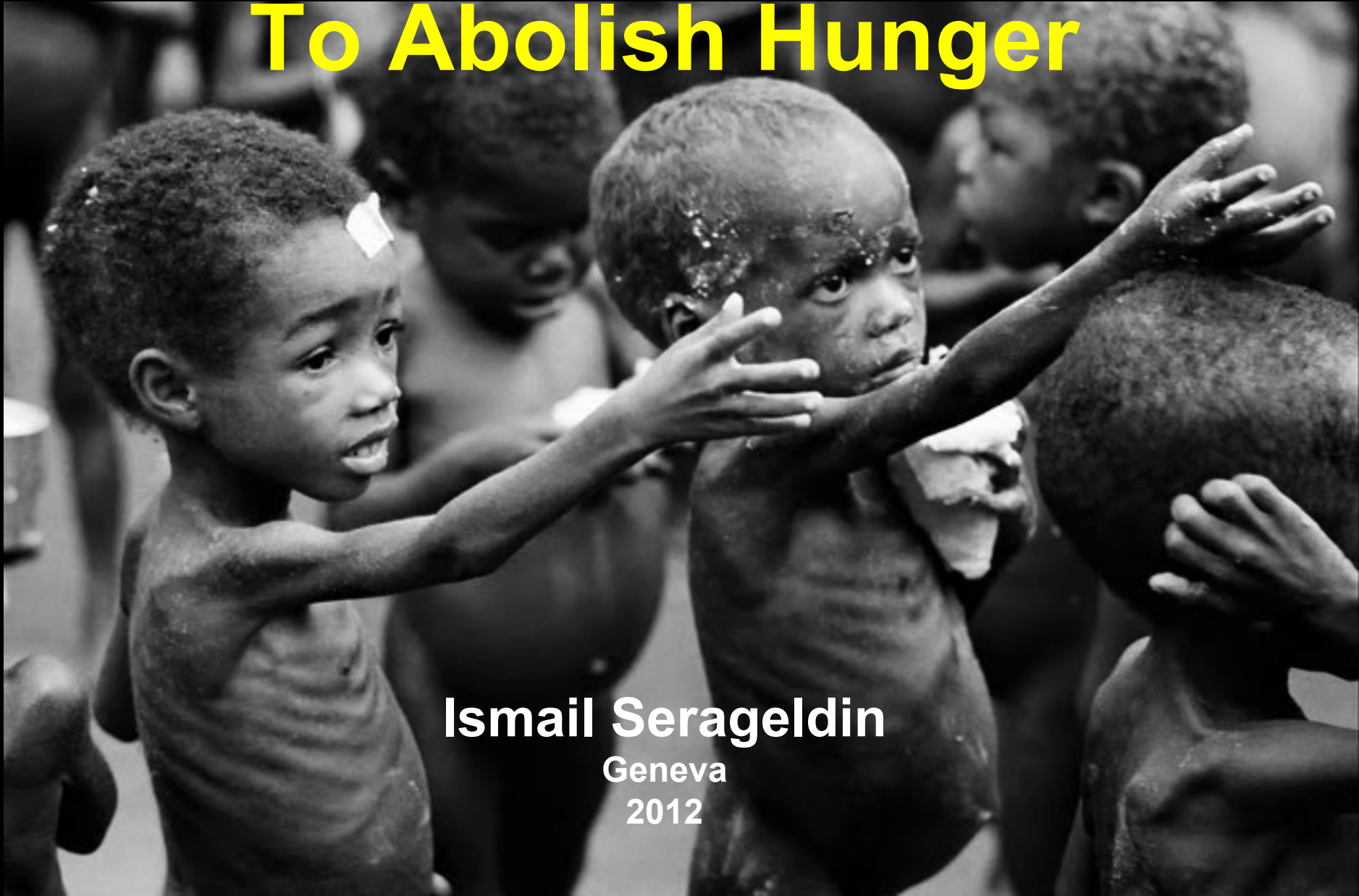
Innovation, Food Security and Rural Development: Collaboration and Partnerships

A presentation by Ismail Serageldin

**WIPO
Global Challenges Seminar
Series:**

Geneva 16 11 2012

Collaborating in a Partnership To Abolish Hunger



Ismail Serageldin

Geneva
2012

Outline

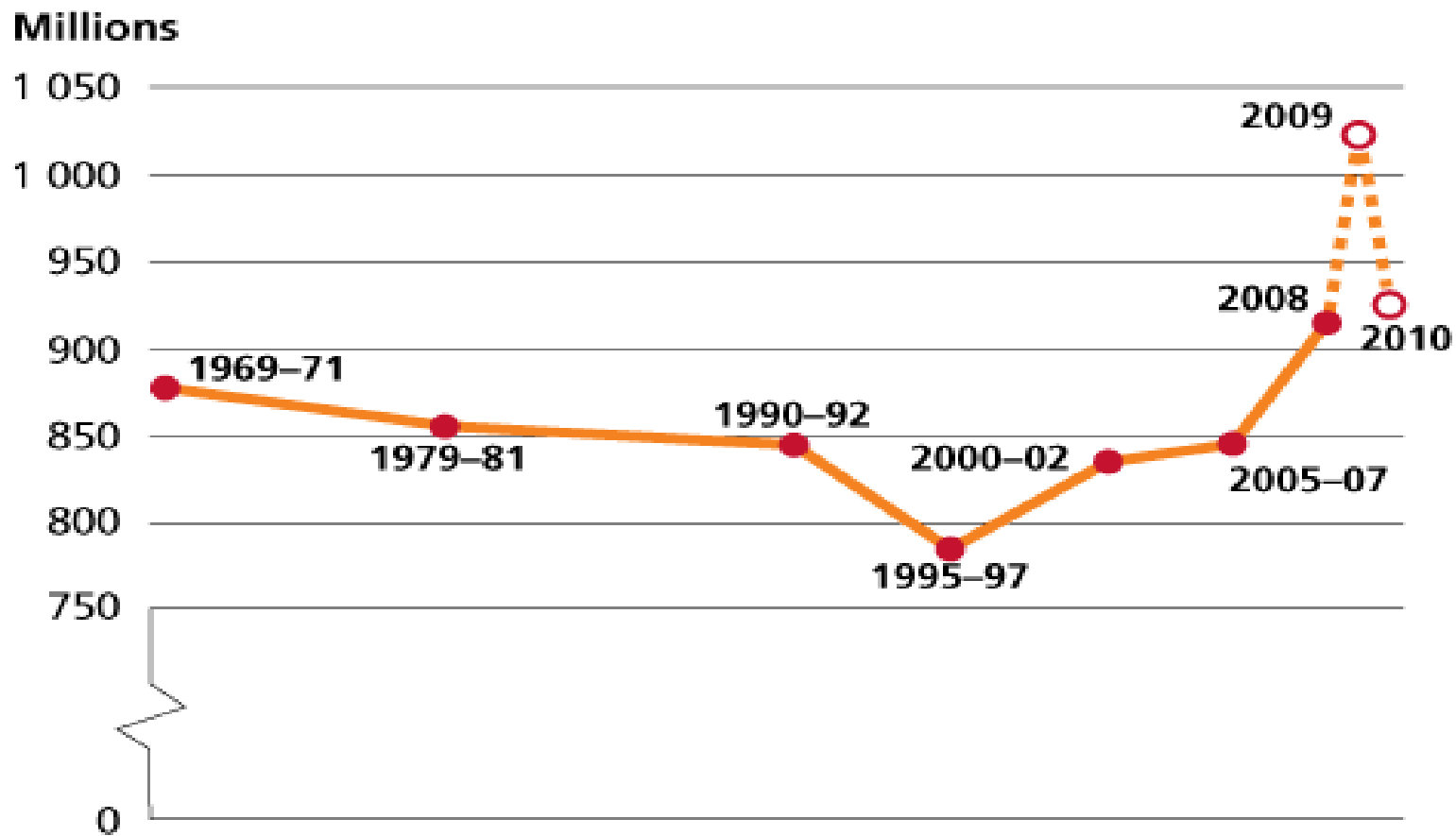
- **On Hunger And Food Security**
- **Diagnosing Poverty**
- **On Hunger And Urban Poverty**
- **On Hunger And Rural Poverty**
- **The Gender Dimension**
- **The Environmental Dimension**
- **The Role Of science**
- **Transforming Global Agriculture**
- **Envoi**

On Hunger And Food Security

Hunger!
Over One Billion persons are
chronically malnourished!



Trends in world hunger, 2010



Note: Figures for 2009 and 2010 are estimated by FAO with input from the United States Department of Agriculture, Economic Research Service. Full details of the methodology are provided in the technical background notes (available at www.fao.org/publication/sofi/en/).

Source: FAO.

Global Hunger Index, 2010

Three equally weighted indicators constitute the GHI:

- 1. Undernourished as % of the population** (reflecting the share of the population with insufficient dietary energy intake)
- 2. Underweight as % of Children < 5 years old** (indicating the proportion of children suffering from low weight for their age)
- 3. Mortality rate of Children < 5 years old** (partially reflecting the fatal synergy between inadequate dietary intake and unhealthy environments)

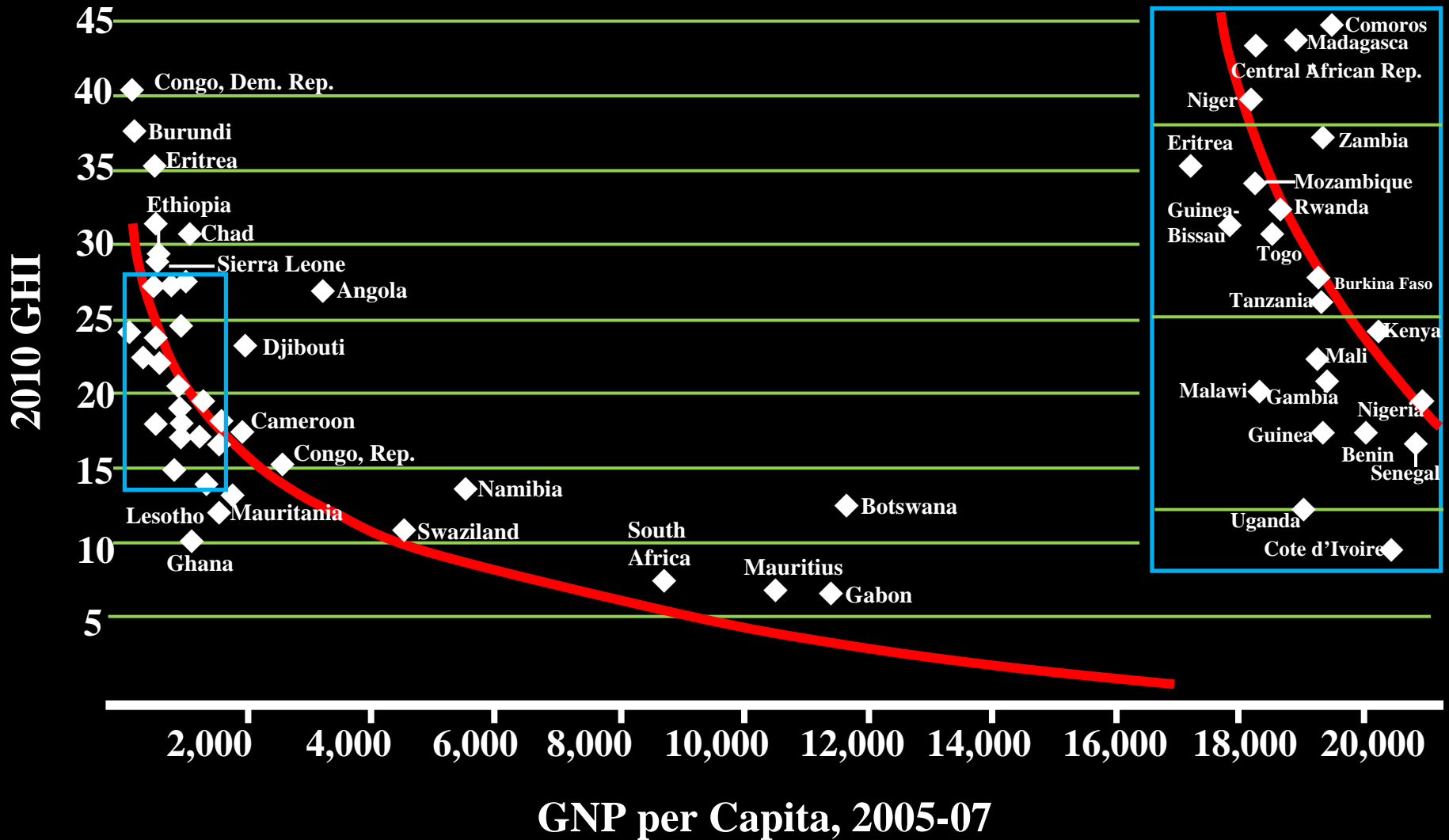
Global Hunger Index, 2010

- **> 5.0** **Low hunger**
- **5.0 - 9.9** **Moderate hunger**
- **10.0 - 19.9** **Serious**
- **20.0 - 29.9** **Alarming**
- **≥ 30.0** **Extremely alarming**

The index ranks countries on a 100-point scale, with 0 being the best score (no hunger) and 100 being the worst, although neither of these extremes is reached in practice.

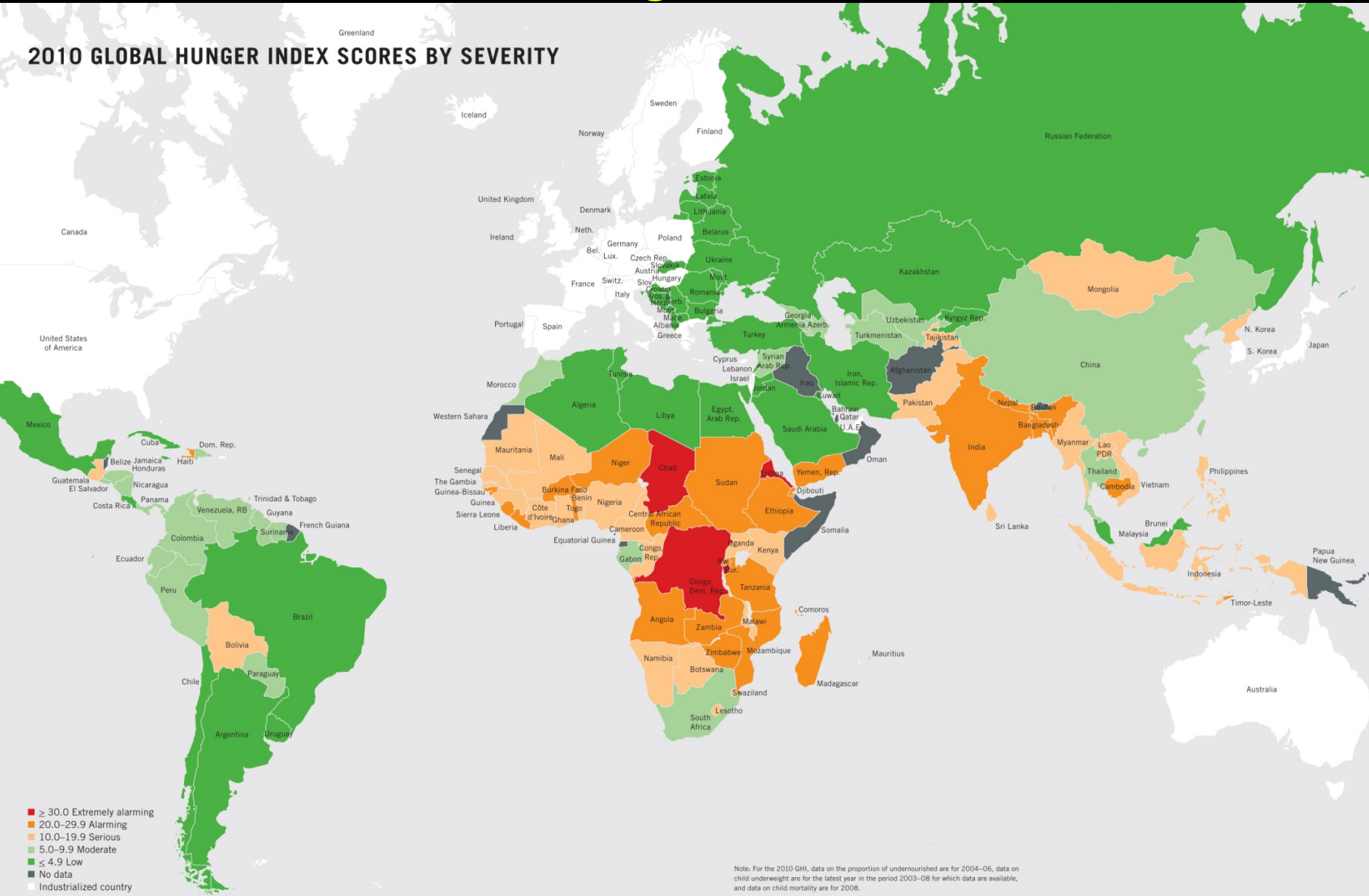
GNP per Capita and Global Hunger Index, 2010

SUB-SAHARAN AFRICA



Global Hunger Index, 2010

2010 GLOBAL HUNGER INDEX SCORES BY SEVERITY



Note: For the 2010 GHI, data on the proportion of undernourished are for 2004–06, data on child underweight are for the latest year in the period 2003–08 for which data are available, and data on child mortality are for 2008.

**Sub-Saharan Africa Remains most
vulnerable region**

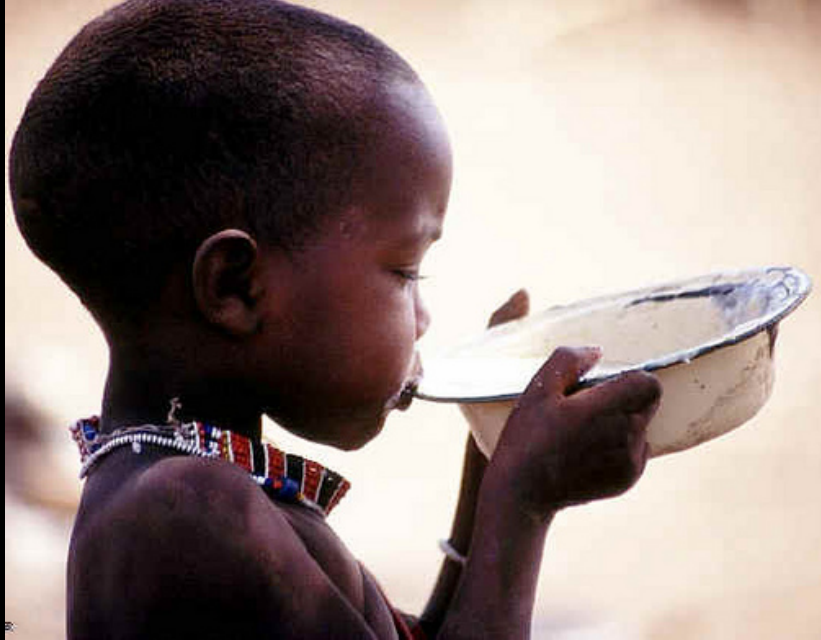












Kevin Carter
(1960 - 1994)

On Hunger And Food Security

- **The Causes Of Hunger**
- **Defining Food Security**
- **The Challenges Ahead**
- **Towards A Program For Action**

On Hunger And Food Security

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**The Primary Cause Of Hunger Is
Extreme Poverty**

AMARTYA SEN

Poverty and Famines

An Essay on Entitlement
and Deprivation

Amartya Sen on Famines





Norman Borlaug
(1914 – 2009)



On Hunger And Food Security

- The Causes Of Hunger
- **Defining Food Security**
- The Challenges Ahead
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Food security is to ensure for each individual, at all times, access to the food they need in enough quantity and quality, produced in a sustainable manner.



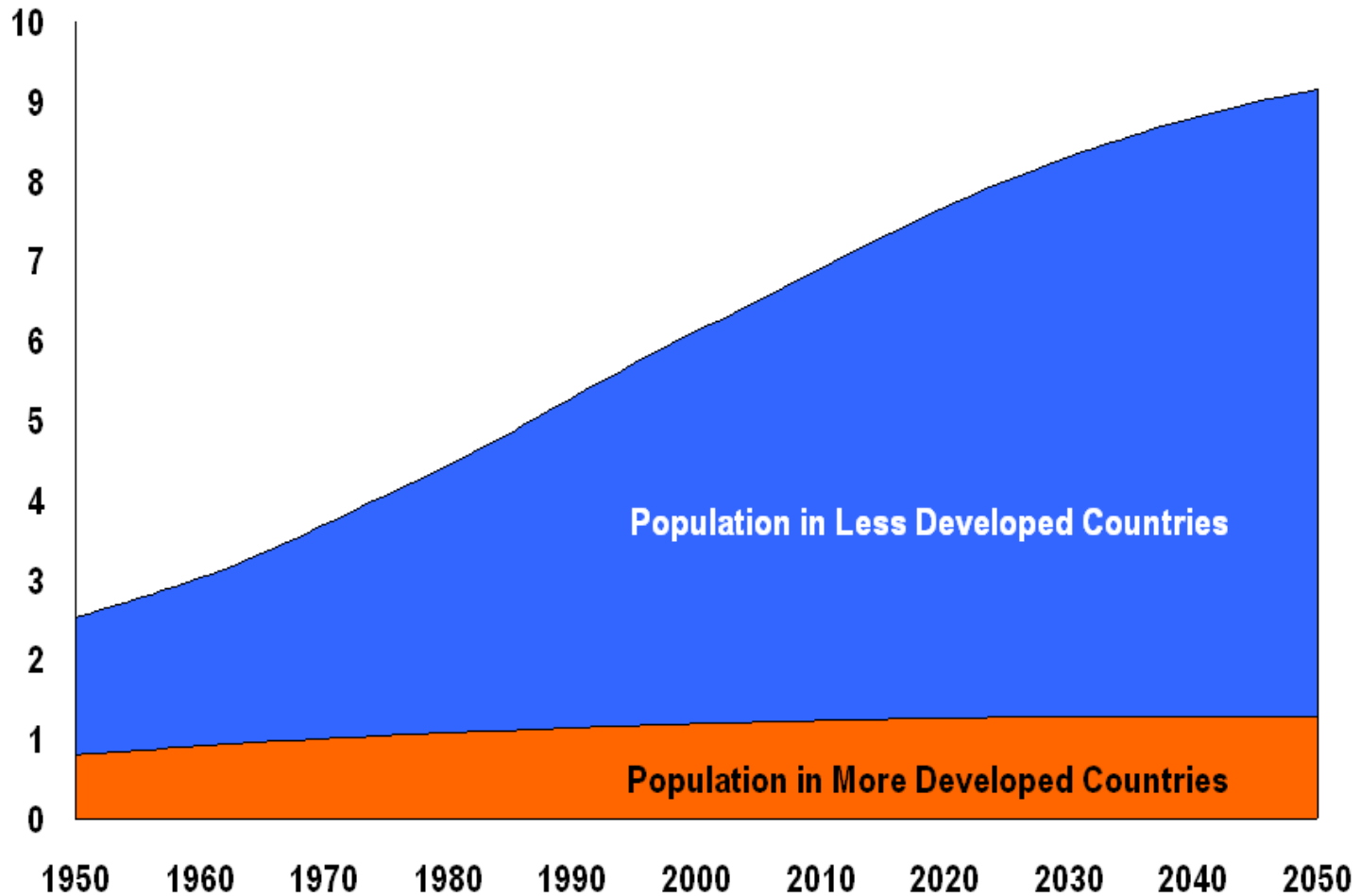
Food whether you buy it or grow it yourself



On Hunger And Food Security

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World Population, in Billions 1950-2050



Source: United Nations Population Division, *World Population Prospects, The 2008 Revision*.

**Global Food Production
Must Grow by
+40% by 2030
&
+70% by 2050**

Opening statement by IFAD President at the Jeddah Economic Forum 2010: “The Global Economy in 2020” <http://www.ifad.org/events/op/2010/jeddah.htm>

Food Security and Production

- **Production is a necessary but not sufficient condition for food security**
- **Focusing on the small-holder farmer in developing countries is key to environmental protection, poverty reduction and food security**

Responding to the Production Challenge:

- **Increasing area under cultivation**
- **Increasing yields**

Meeting the Production Challenge

- **Increasing biological yields**
- **Improving nutrient content**
- **Intensifying agriculture**
- **Managing natural resources sustainably**

**“We are all on this earth as guests of
the green plants and those who tend
them.”**



-- M.S. Swaminathan

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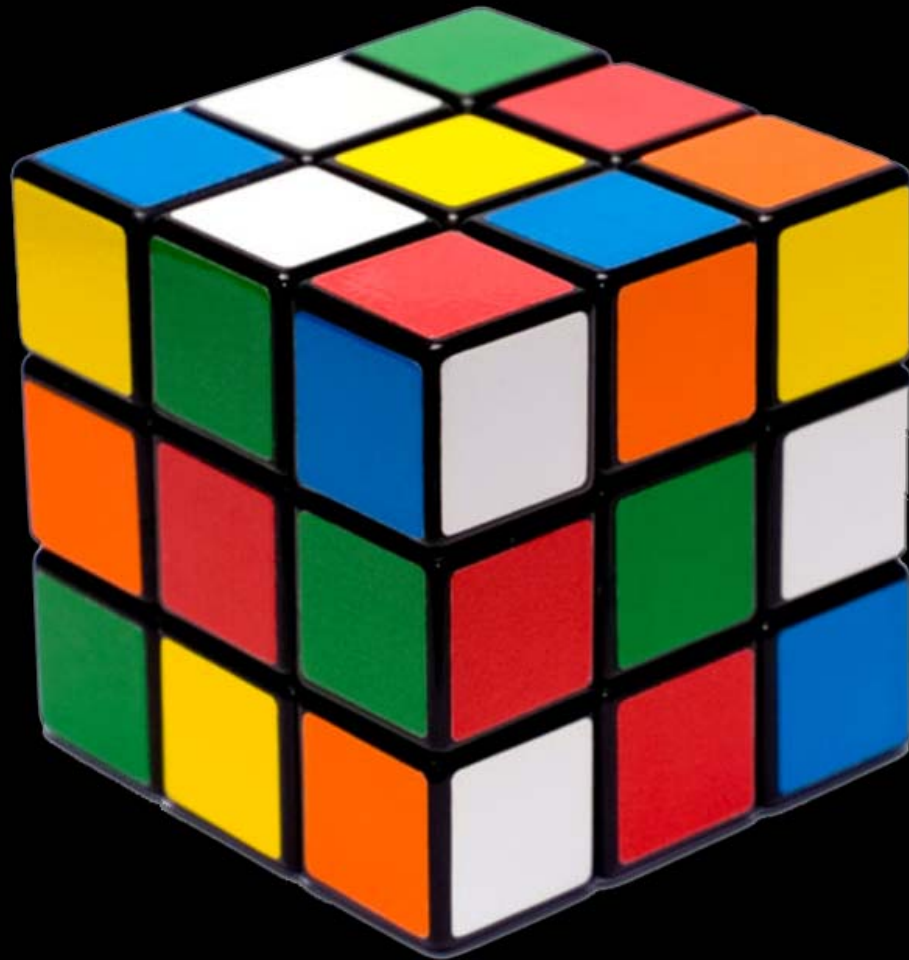
**The response is to produce
differently, not less**



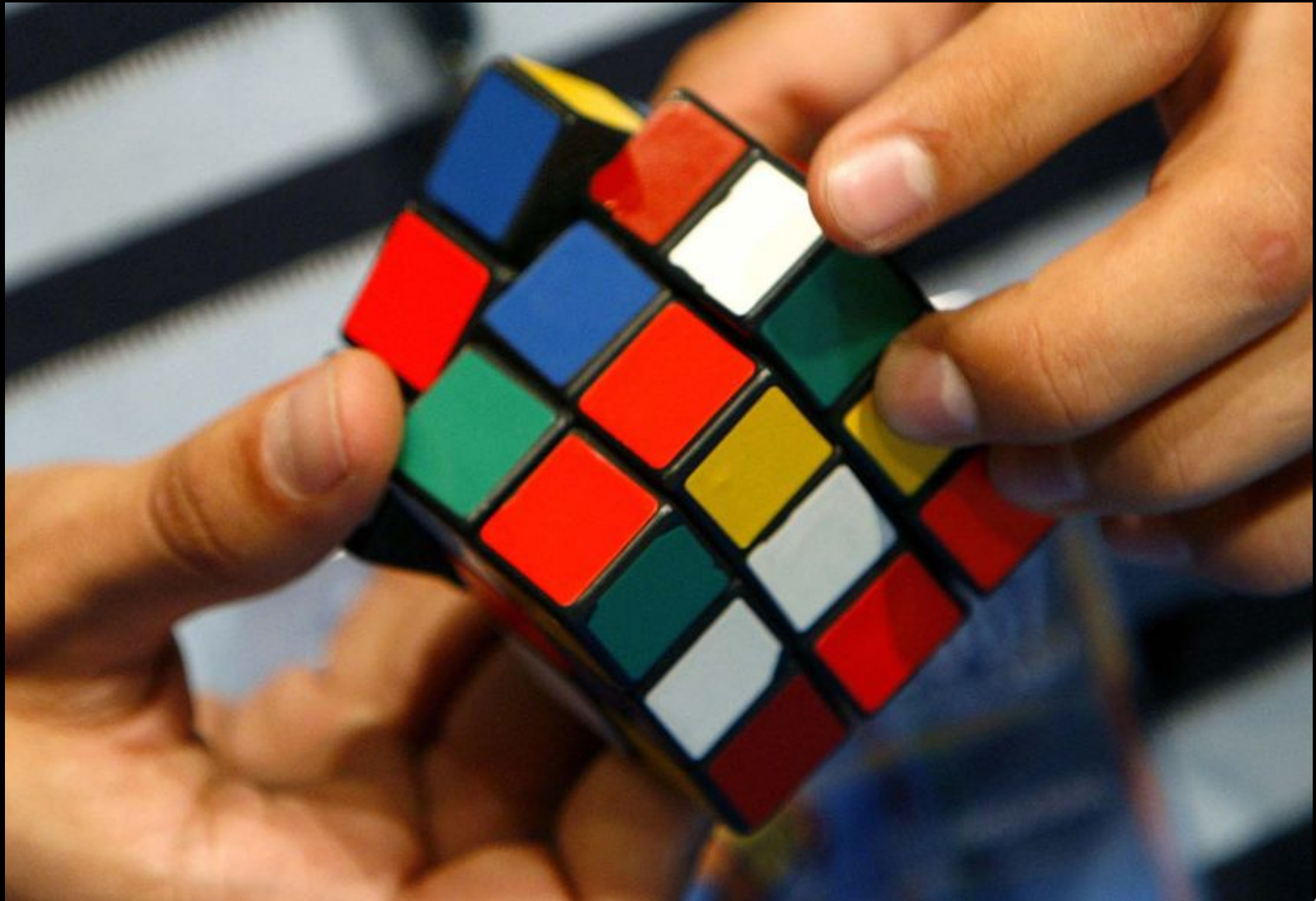


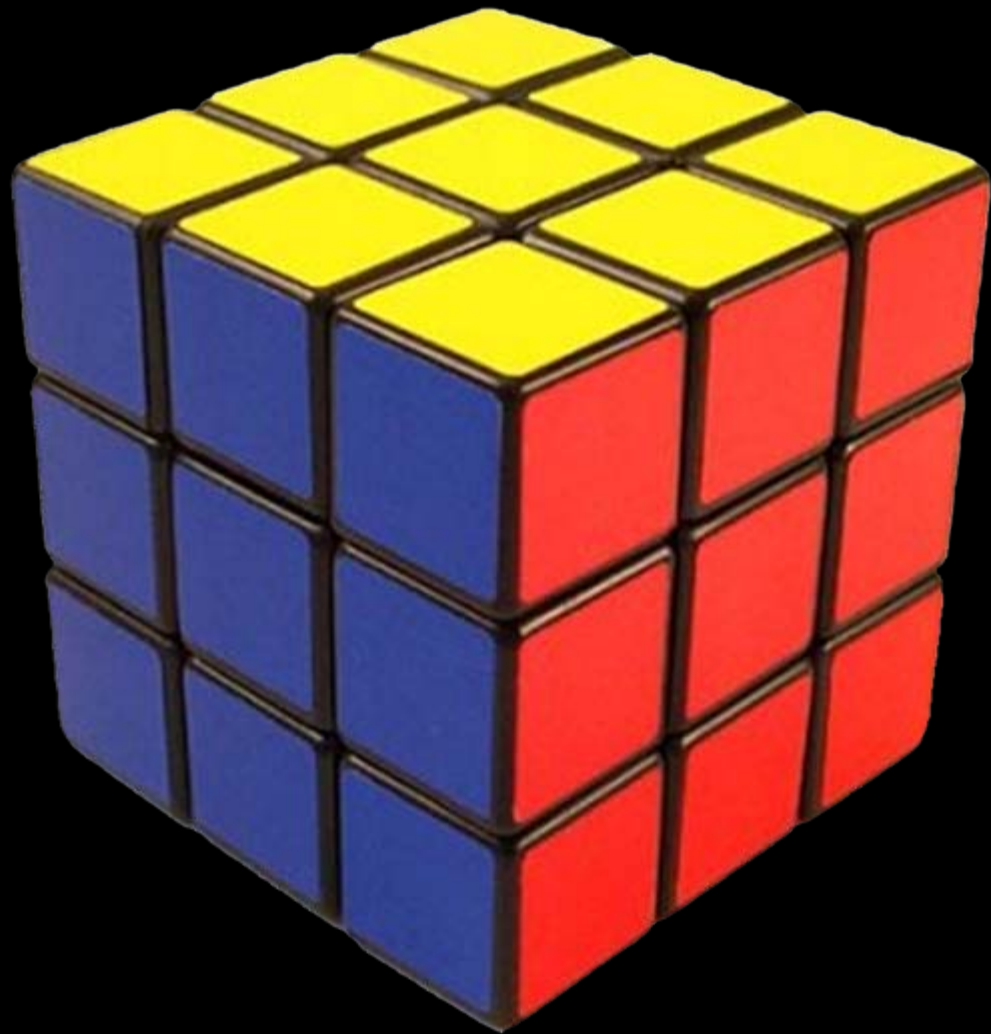
Several policies and programs need to be developed for:

- Agriculture
- Environment
- Social Issues
- Political Issues
- Participation
- Gender
- Urbanization
- Poverty
- Infrastructure
- Economy
- Trade
- Marketing
- Public/Private Interface
- Finance and credit
- Local, National, Régional and International Issues
- And more ...



It can be Mastered and Solved





Diagnosing Poverty

Diagnosing Poverty

- **On Absolute And Relative Poverty**
- **Deprivation, Dispossession, And Societal Marginalization**
- **Rural And Urban Poverty**
- **Problems Of The Ultra Poor**
- **Social Versus Economic Policies, Programs And Projects**

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Relative and Absolute Poverty

- **Absolute Poverty** is defined as having income less than the minimum amount needed by a person or household to obtain the basic necessities for living.
- **\$1/day per person** was the benchmark for international comparisons
- Now it is **\$1.25 /day per person**

Relative Poverty

- **Varies from society to society**
- Sometimes taken as **the lowest 40% of the income distribution** in that country
- Sometimes defined as someone receiving below **60% of the median income**

**Almost all the hungry are among
those in absolute poverty**

Poverty

- **Income or consumption measures**
- **Marginalization and powerlessness**
- **Social context (link to inequality)**
- **Individual self-esteem and culture of poverty**





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**It is not just the absence of income
that defines poverty**



It is marginalization, deprivation and social exclusion



Loss of dignity

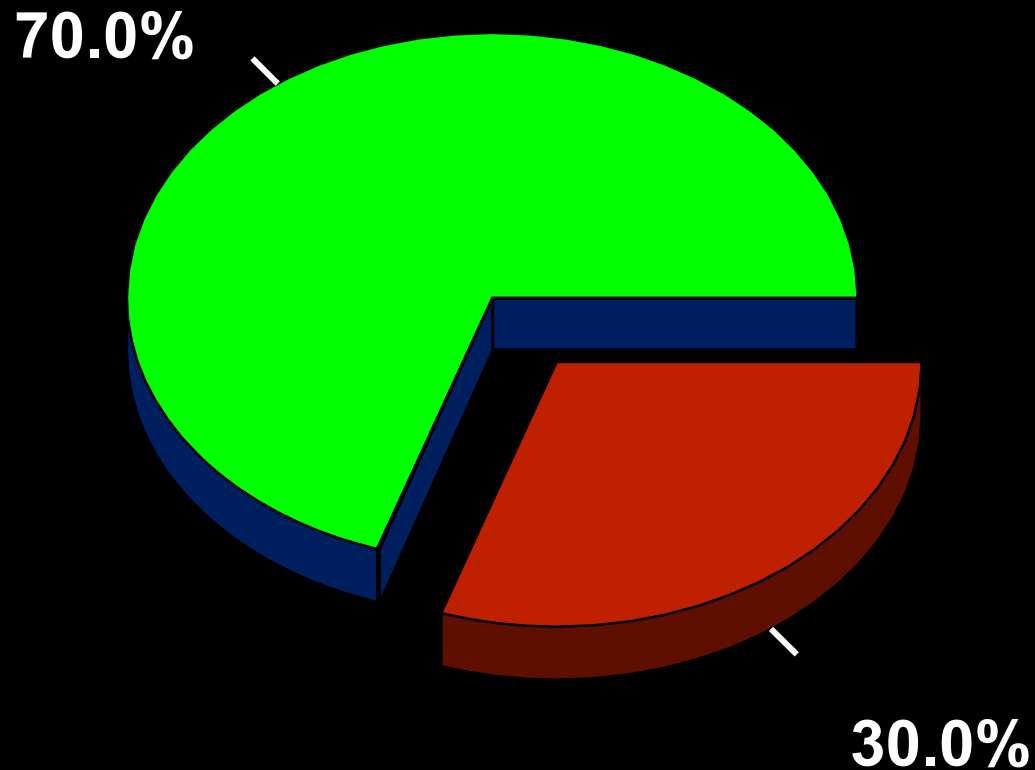


Social Exclusion

Diagnosing Poverty

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Rural and Urban Poverty in Developing Countries

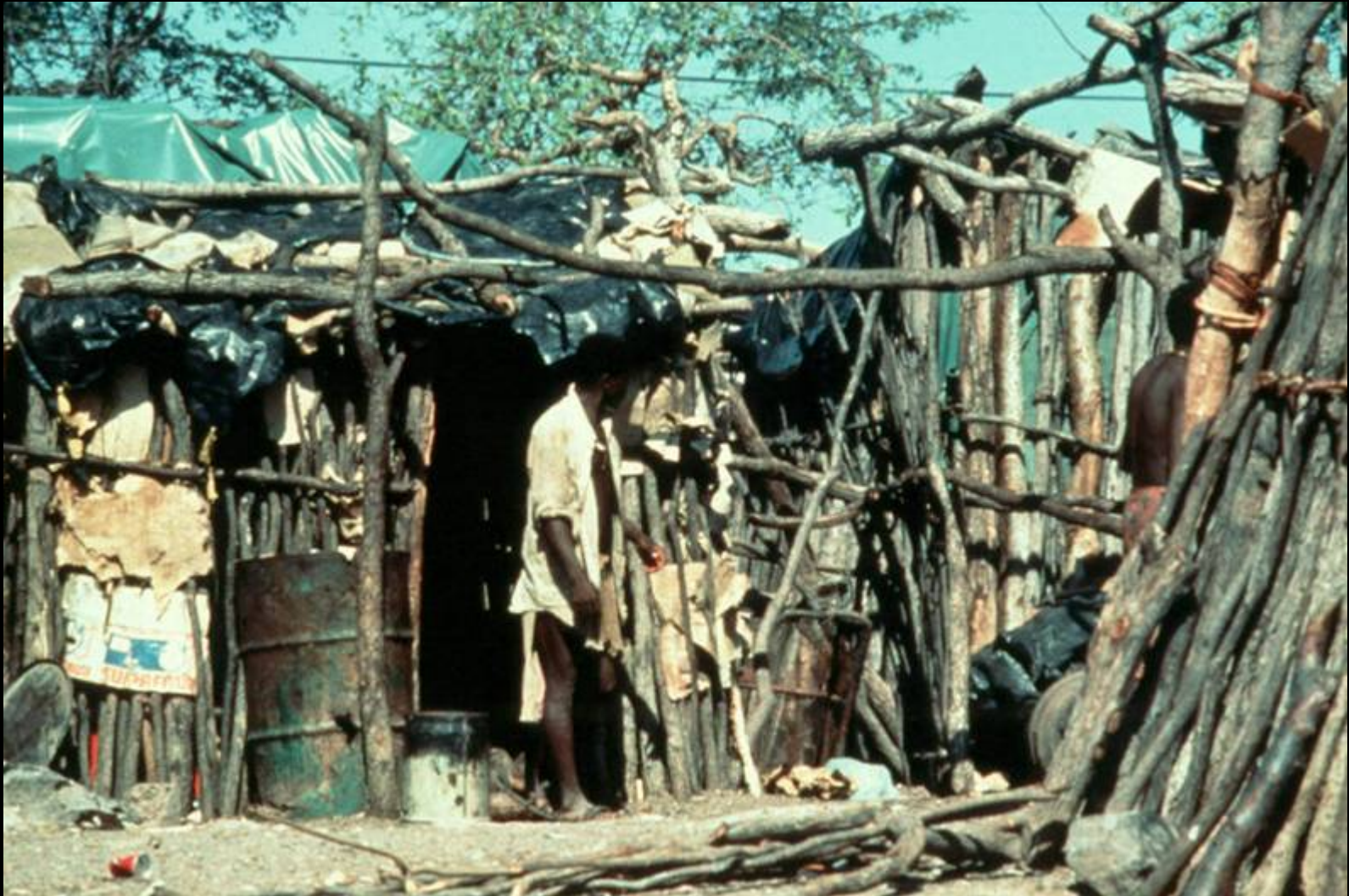


Source: IFPRI estimate from World Bank data.

Diagnosing Poverty

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The Ultra Poor require special help





AN
INQUIRY INTO
Well-Being
AND
Destitution
Partha Dasgupta



PARTHA DASGUPTA

PROFESSOR OF ECONOMICS, UNIVERSITY OF CAMBRIDGE

Diagnosing Poverty

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**Much
Economic
Analysis
Erases the
Human
Factor**

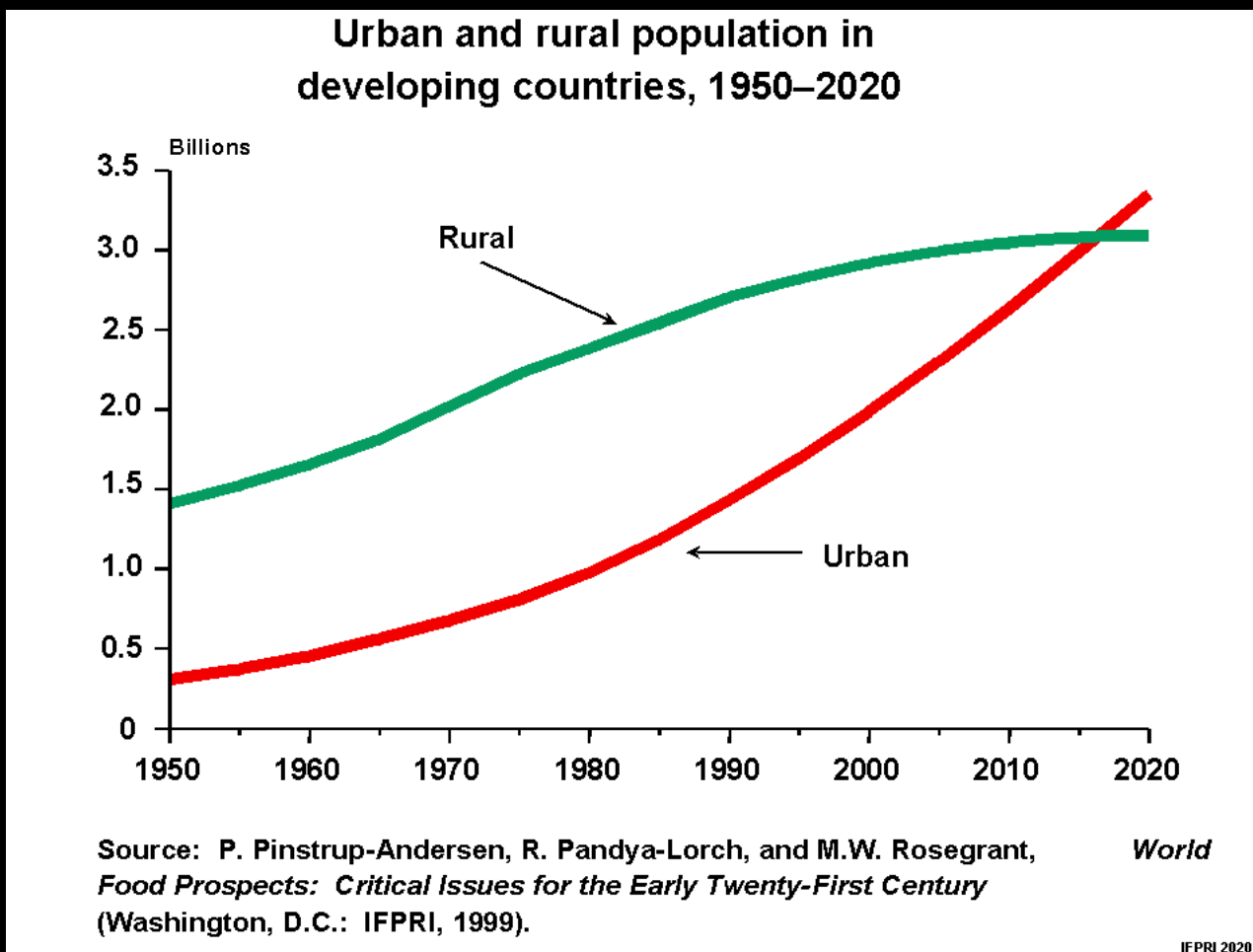


The Need for Social Inputs Into Development Decisions

- **Social policy is more than the social consequences of economic policies**
- **Social goals and policies complement economic ones**
- **Economic Analysis by itself is insufficient: Social, cultural, political and ethical dimensions must be introduced**

On Hunger And Urban Poverty

A Visual Guide to the Future World Food Situation, IFPRI



More graphs are available through this link but dates back to 2002 :

http://pdf.usaid.gov/pdf_docs/PNACJ176.pdf

**An Enormous Gap Exists Between the
Rich and the Poor...**



TIME



†
I AM
HOMELESS
PLEASE HELP





Rich and Poor in Sao Paulo

source: <http://mindblog.dericbownds.net/2007/10/rich-and-poor.html>

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On Hunger And Urban Poverty

- **Who Are The Urban Poor**
- **How To Approach Them**
- **Employment Programs And Their Impact**
- **Revisiting The Informal Economy**
- **The Role Of Urban Agriculture**

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Urban poverty



Urban Poverty

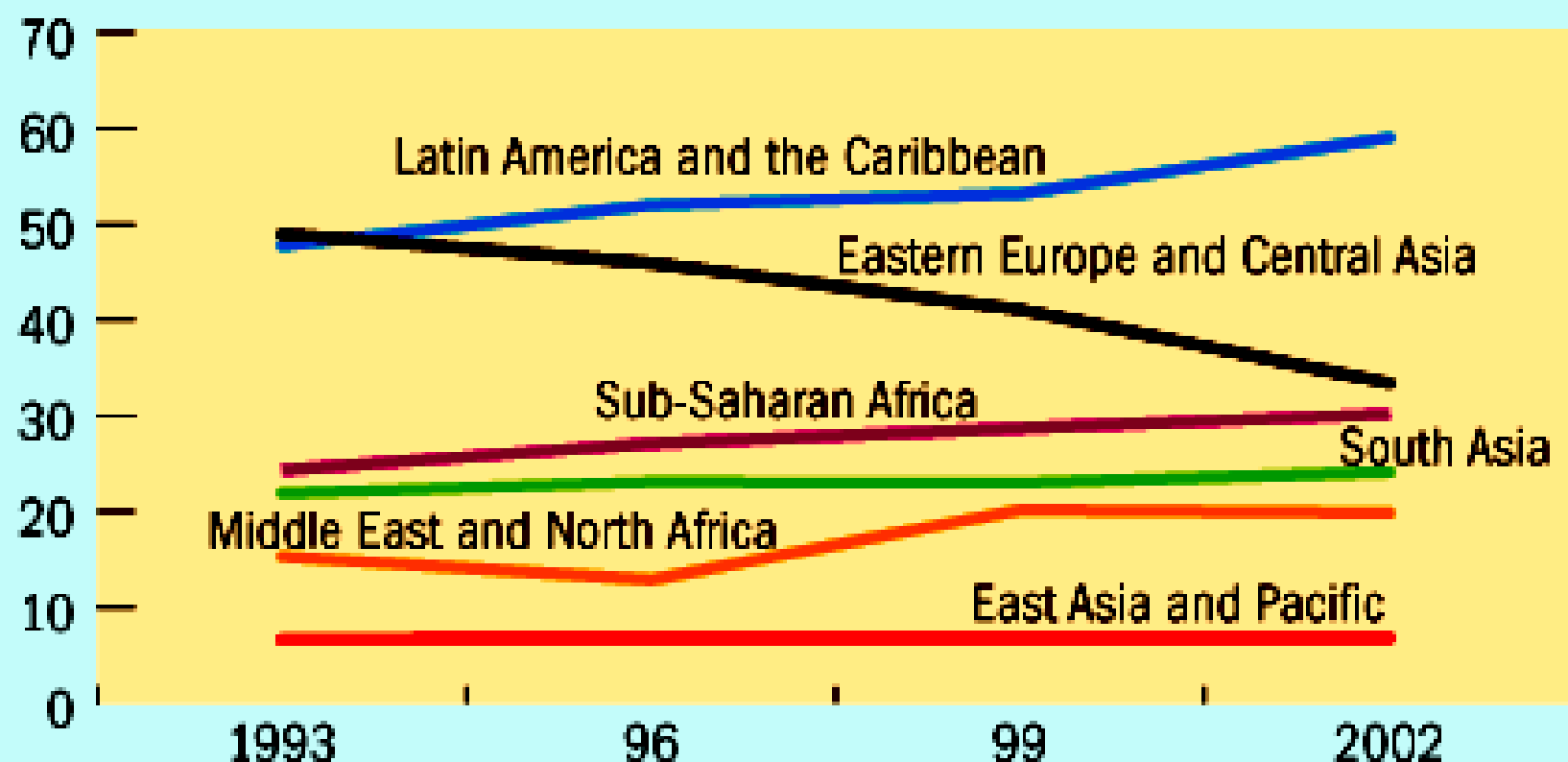


Chart 1

Big regional differences

Almost 60 percent of Latin America's poor reside in urban areas, far more than in other regions.

(share of "\$1 a day" poor living in urban areas, percent)



Source: Ravallion, Chen, and Sangraula (2007).

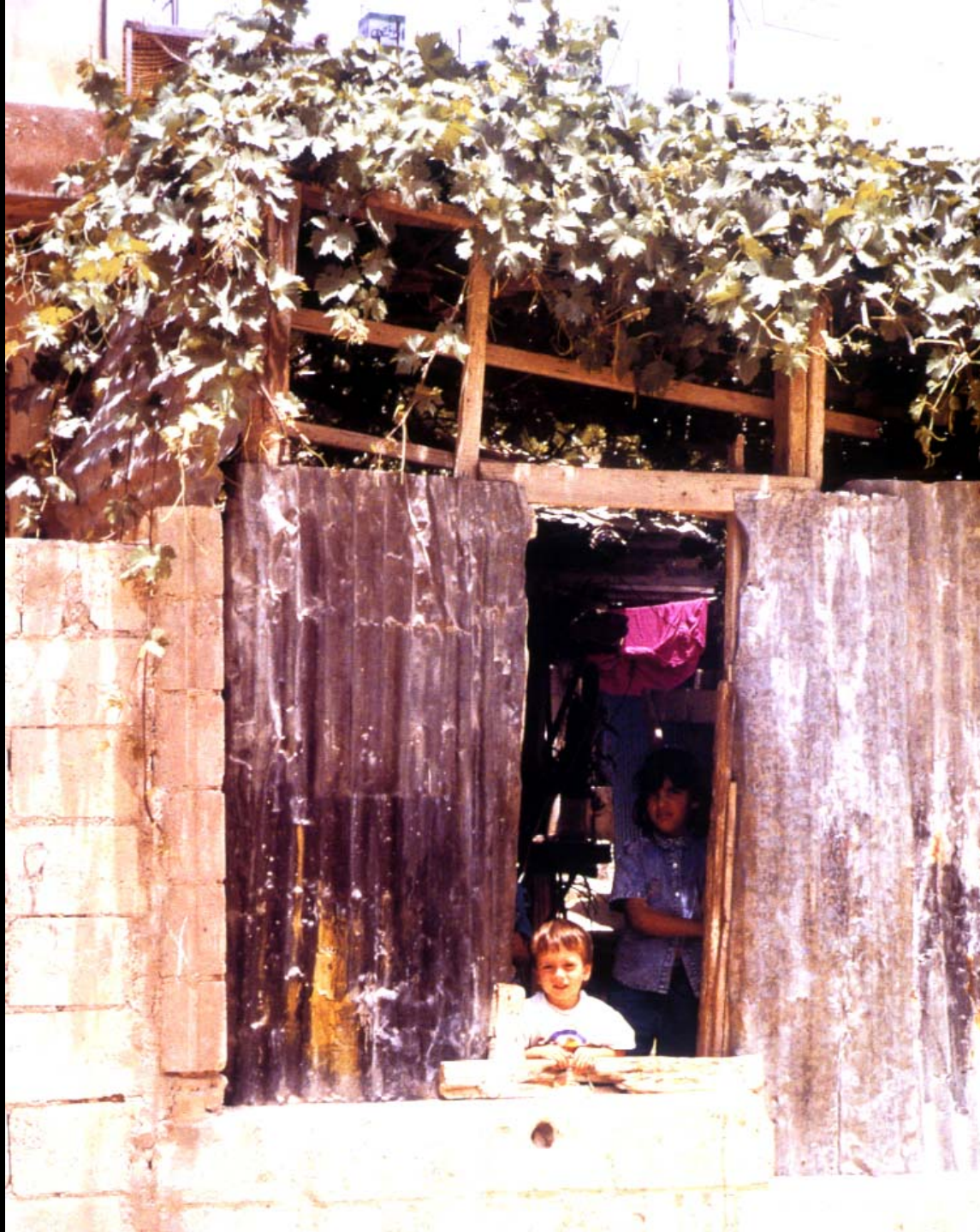
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Empowerment

“Progress, real progress, is when the poor must become the producers of their own bounty and welfare not the recipients of charity or the beneficiaries of aid”

-- Ismail Serageldin



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Reaching the Poorest

Garbage pickers in the
Philippines





Three Key strategies to cope with Urban Poverty and Hunger

- Reduce the price of food

The Urban Poor mostly buy their food



**And food is a major part of their budget –
Hence their wellbeing is very sensitive to the
price of food**



Three Key strategies to cope with Urban Poverty and Hunger

- Reduce the price of food
- Increase the opportunities for employment of the poor



Three Key strategies to cope with Urban Poverty and Hunger

- Reduce the price of food
- Increase the opportunities for employment of the poor
- **Increase the returns to the kind of skills and assets that the poor have**



Three Key strategies to cope with Urban Poverty and Hunger

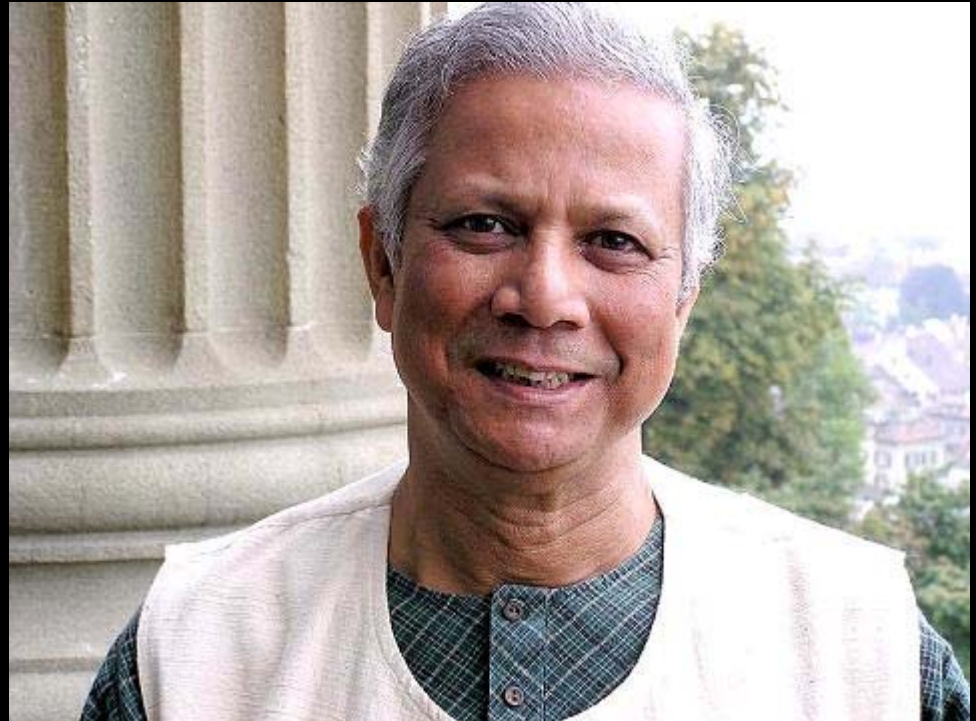
- **Reduce the price of food**
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On Hunger And Urban Poverty

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Muhammad Yunus

- **Founder of Grameen bank**
- **2006 Nobel Peace Prize Winner**



Solidarity Groups are important

- **Micro-financiers help strengthen solidarity groups**
- **These solidarity groups are proving very helpful outside of financial issues**
- **They give voice to the poorest women and reduce their vulnerability**
- **This works in both rural and urban areas**



Ela Bhatt

**Founder of
SEWA,
the Self
Employed
Women's
Association
of India**



SEWA

SELF EMPLOYED WOMEN'S ASSOCIATION
1999







सर्वधर्म
समभाव

अमार्तुं भविष्य
शांतिमय जन्मपा

अमार्तुं नो धर्म
अमार्तुं धर्म

अमार्तुं

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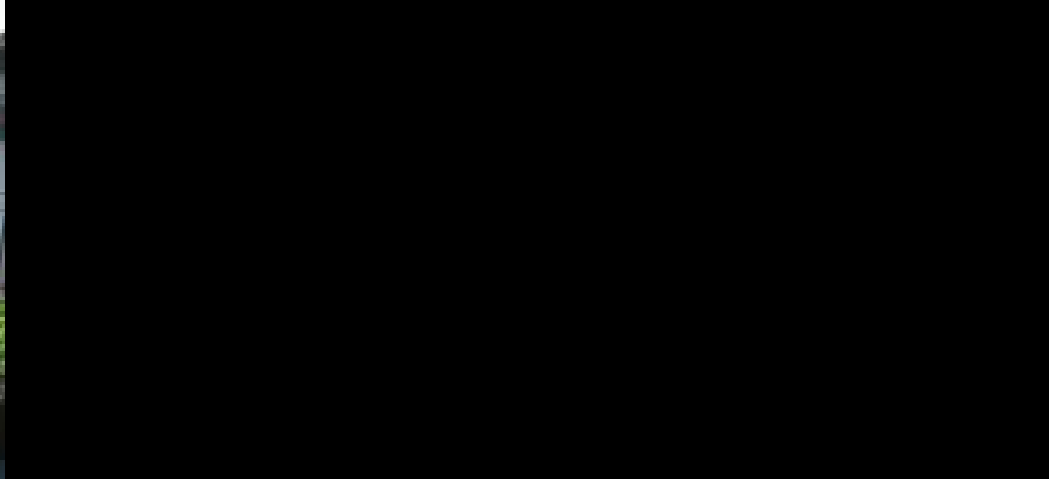


बगवन्ना हवा बिना दूद क
निकाले जाते हैं।

On Hunger And Urban Poverty

- Who Are The Urban Poor
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**Urban Agriculture
on roofs and
between buildings
on vacant land**



On Hunger And Rural Poverty

Observation:

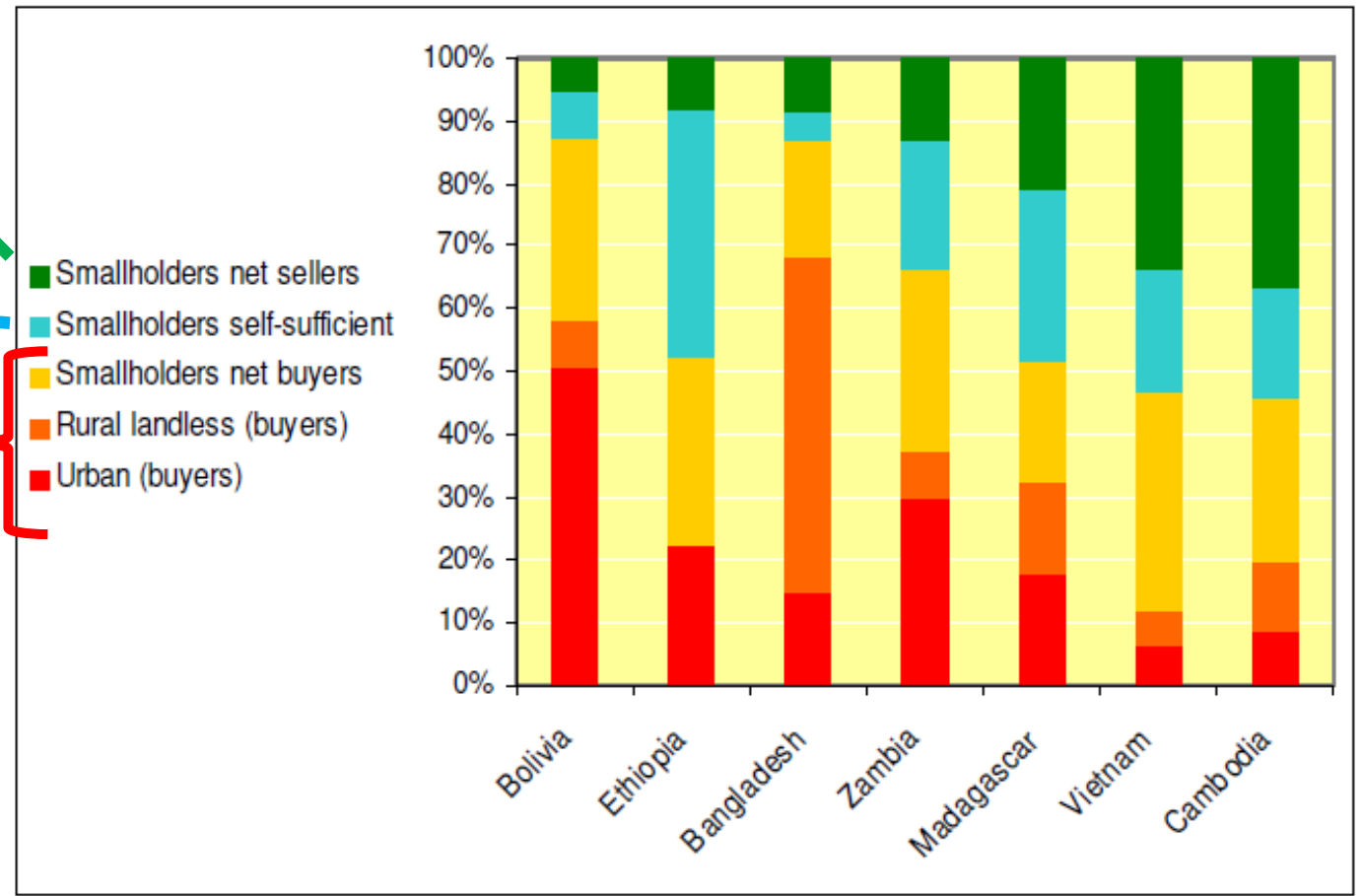
Observation: Many rural poor continue to pay for their food needs

Figure 2.2: The proportion of the poor population who are net buyers or sellers of rice, wheat, maize and beans.

Sellers

Self-Sufficient

Buyers



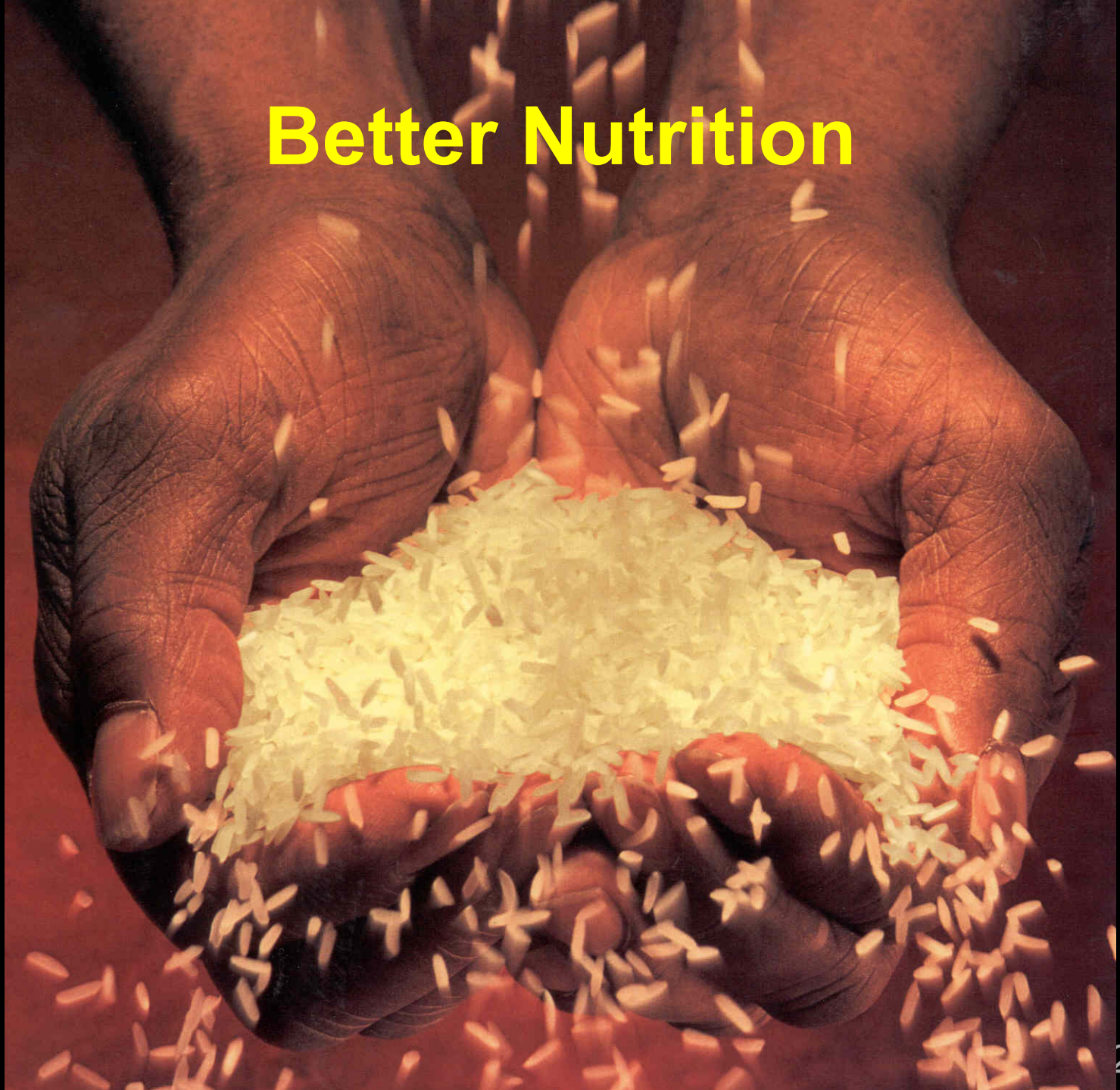
Source: World Bank, 2007.

**Then, Reduce Prices and Improve
Nutritional Content**

Improve Nutritional Content

- **Enormous health benefits**
- **Bio-fortification is just the beginning**
- **Edible vaccines?**

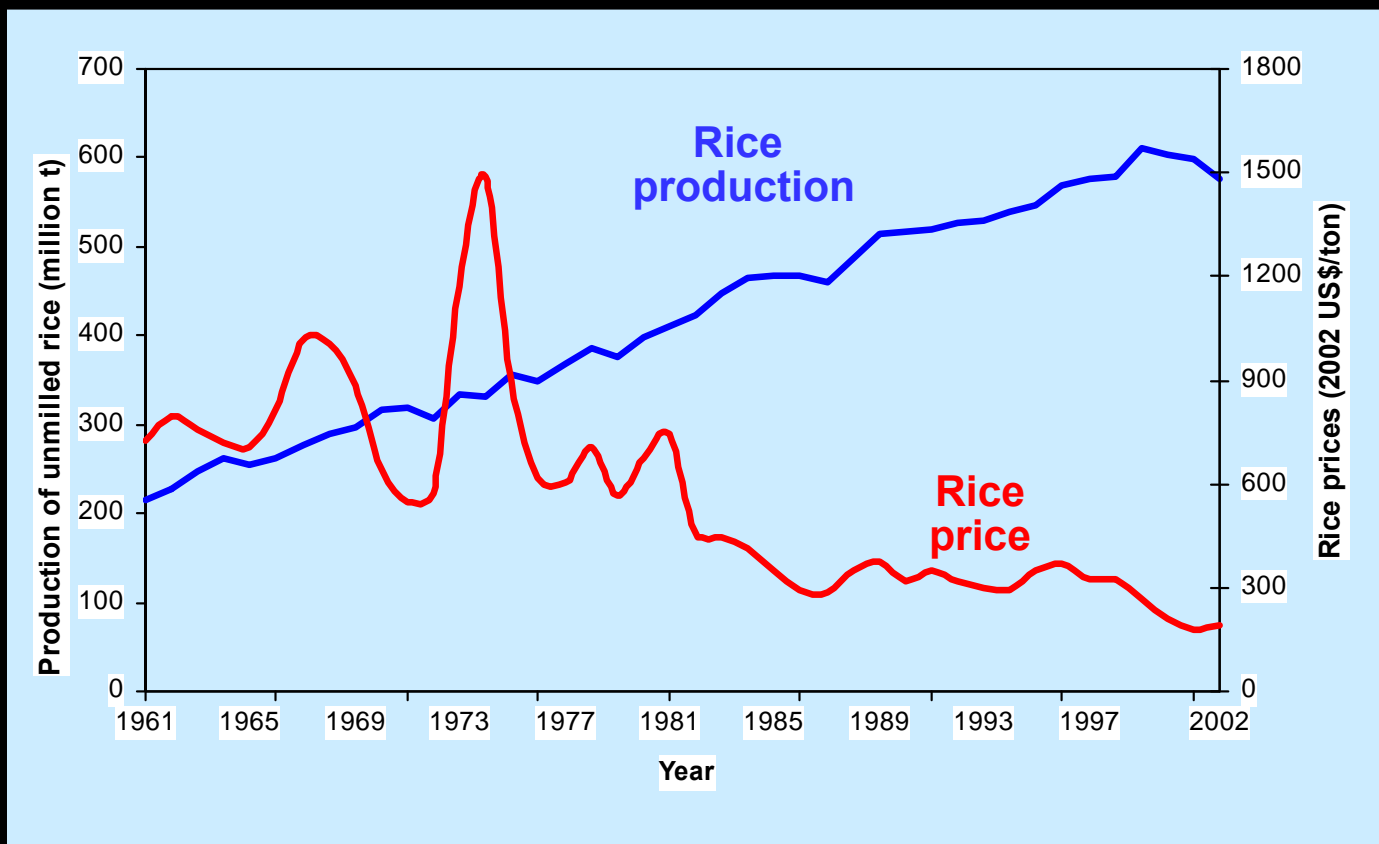
Better Nutrition



But ...

**How to reduce prices without
harming the poor farmers who
produce food?**

Increase productivity faster than the decline of prices!



Trends in world rice production and price adjusted for inflation, 1961-2002

Source: Production: FAOSTAT Electronic Database, FAO.10June2003

Rice Price: Relate to Thai rice 5%-broken deflated by G-5 MUV Index deflator (adjusted based on 2002 data update)

Source: World Bank Quarterly Review of Commodity Markets

On Hunger And Rural Poverty

- **The Problem Of Rural Bias**
- **The Problem Of Vulnerability**
- **The Problem Of Small-holder Farmers**
- **Towards A Plan Of Action**

On Hunger And Rural Poverty

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Reform Policies And Markets

- **Remove urban bias**
 - **Roads**
 - **Education**
 - **Health**
 - **Etc.**
- **Improve access to markets**
- **Reduce post harvest losses**





T. AIDS
CARDS

CLASS
LITERACY

On Hunger And Rural Poverty

- The Problem Of Rural Bias
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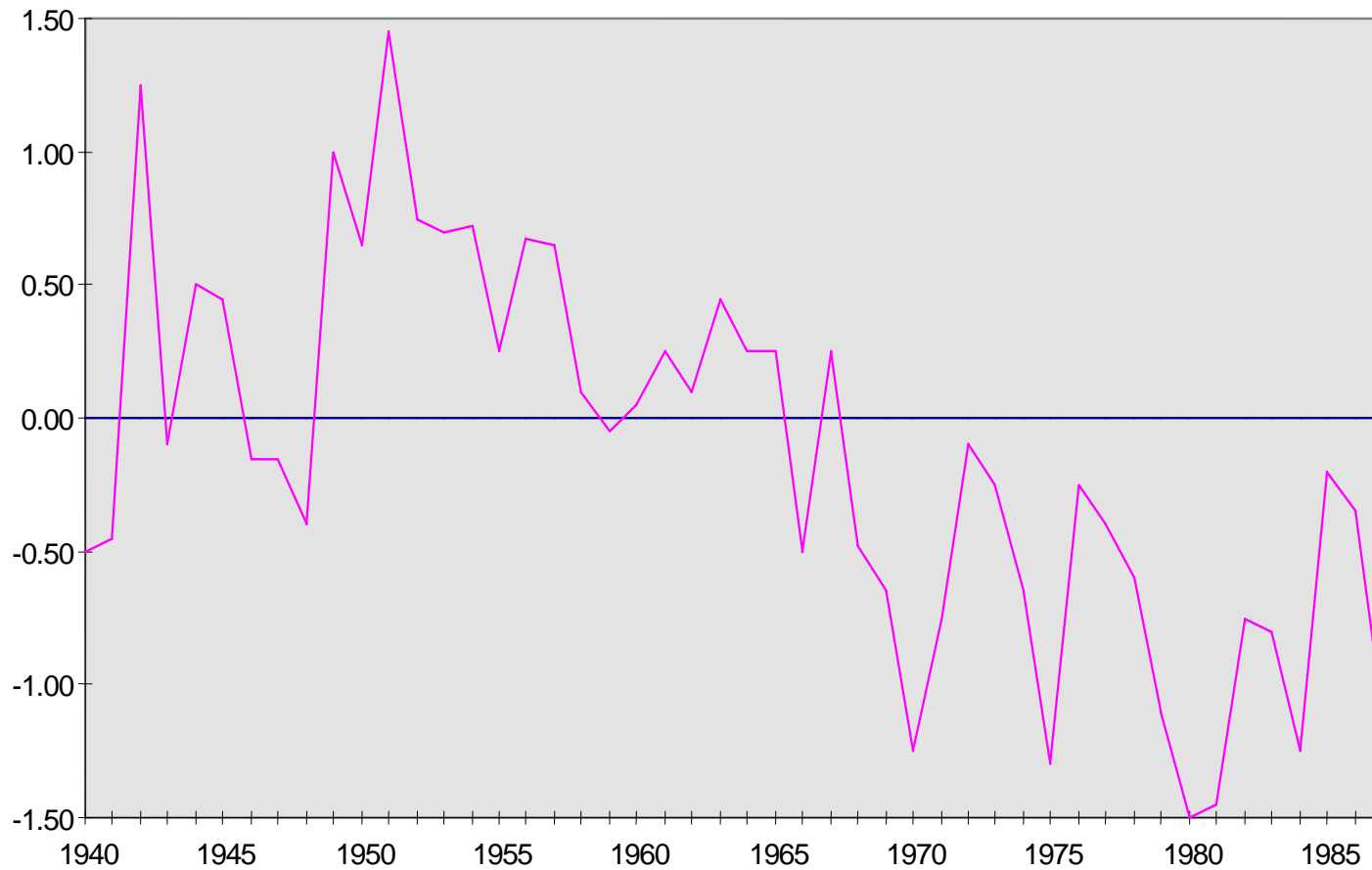
Address Short-term Vulnerability

- **Most farmers live precariously**
- **Downside is devastating**
- **Climate change is increasing vulnerability**



Climate Variability (Change?)

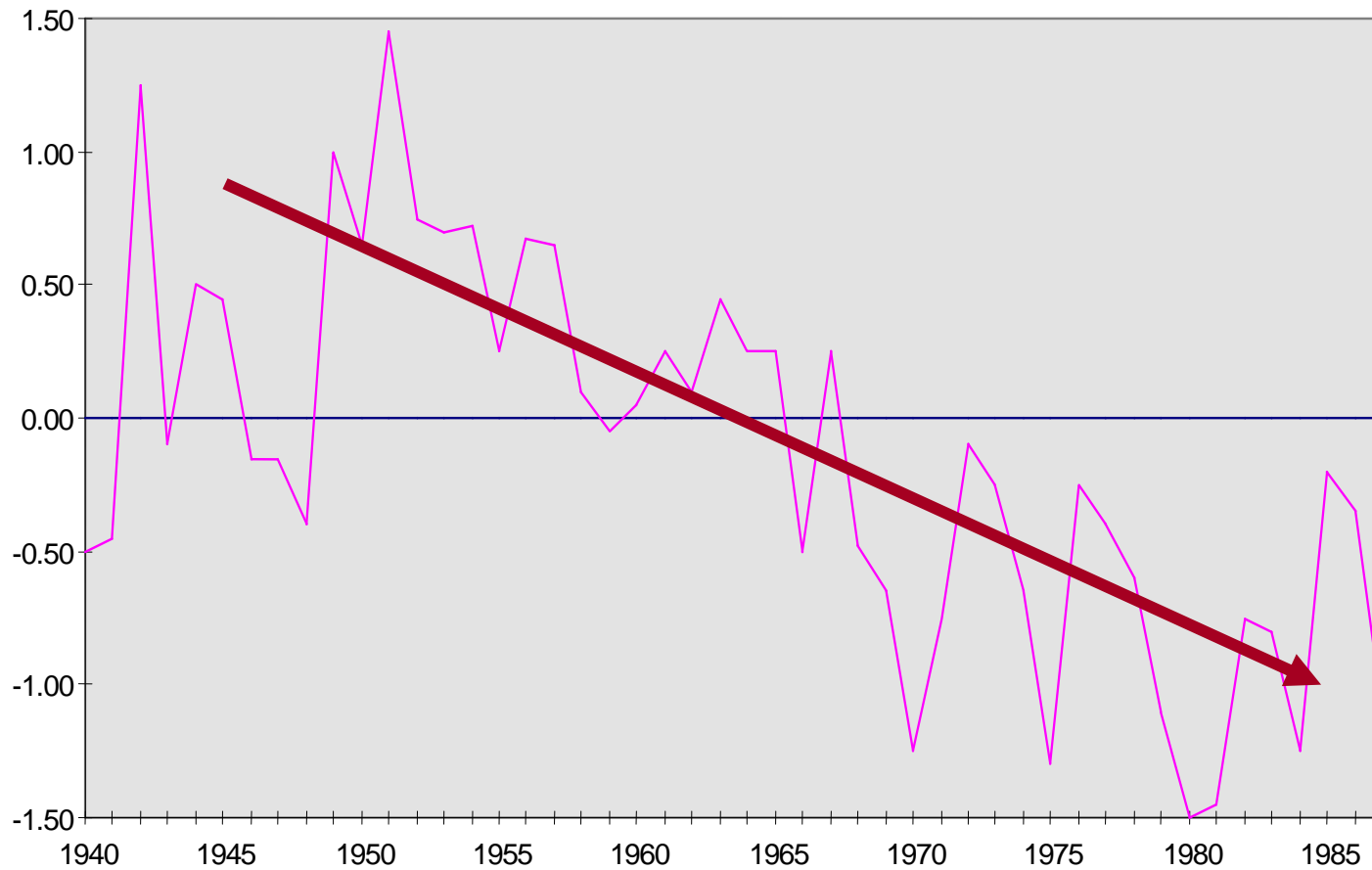
Index of Rainfall in Sahel 1941-1990



Source: Departure from standard deviation; Climate Prediction Center 1991, Presentation by South Africa at Camdessus Panel meetings

Climate Variability (Change?)

Index of Rainfall in Sahel 1941-1990



Source: Departure from standard deviation; Climate Prediction Center 1991, Presentation by South Africa at Camdessus Panel meetings

Extension Must bring Research To These Farmers



On Hunger And Rural Poverty

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Focus on Small-holder Farmers

- They are the majority of all farmers in the world
- They are disproportionately poor
- The returns in terms of growth, poverty reduction and improved environmental management is substantial



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Raise Agricultural Productivity

- **Productivity must rise faster than price declines** to generate surpluses for the small-holder farmers and reduce their poverty as their cheaper products help reduce the poverty in the cities
- Measure in terms of Total Factor Productivity (land, water, labor, energy and chemical inputs)

Challenges Facing Small Farms

- **Globalization, including super-markets even in poor countries.**
- **Low world market prices for agriculture.**
- **Climate change.**
- **HIV/AIDS**
- **Continuing population growth that is making small farms smaller.**
- **No political voice.**

On Hunger And Rural Poverty

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Diagnosis

- **How to find the “points nevralgiques du systeme”**
- **How to choose interventions that will have maximum impact on these**
- **Must focus on raising productivity in the complex ecosystem of the small holder farm**
- **Must bring science and other inputs to the farmers**

**No policy or program will ever be
sufficient alone**

We need a range of interventions...

**Many existing policies need to be adjusted and many
new programs need to be developed.**

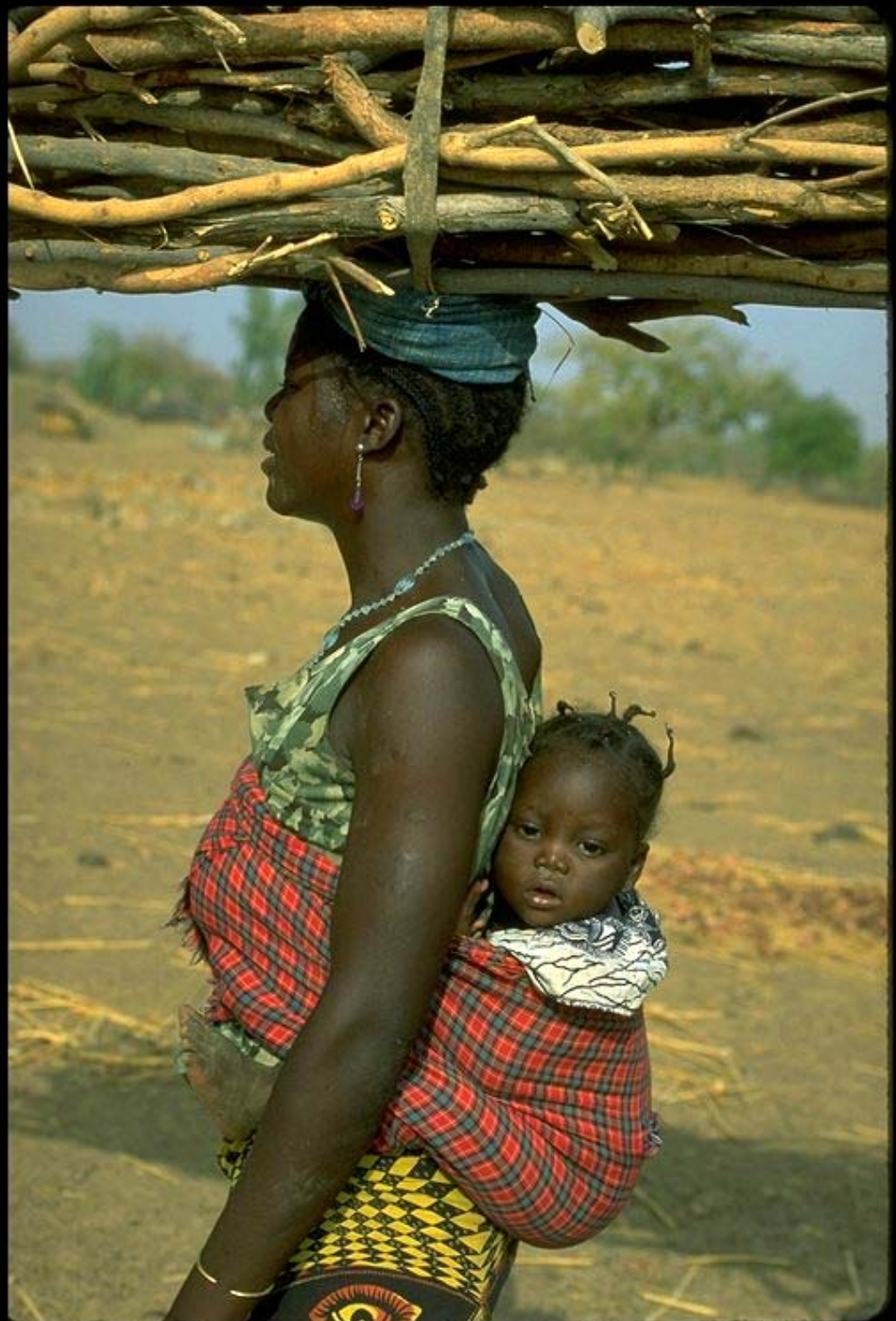
The Gender Dimension

And We Must Never Forget the Gender Dimension...



Women In Africa

- Produce **80%** of the food
- Receive **10%** of the wages
- Own **1%** of the land
- Some contest the figures, but the orders of magnitude are correct





Women Empowerment

- **Essential to recognize the gender dimension of agriculture**
- **Empowering Women results in major improvements in infant mortality, school enrolments, child morbidity**

Women Empowerment

- **Women have unequal opportunity in:**
 - **Education**
 - **Health care**
 - **Income**
 - **Credit**
 - **Employment**
 - **Assets**
 - **Decision-making**

The Environmental Dimension



Climate Change

The Most serious Issue Facing Humanity



GHG emissions are a key contributor

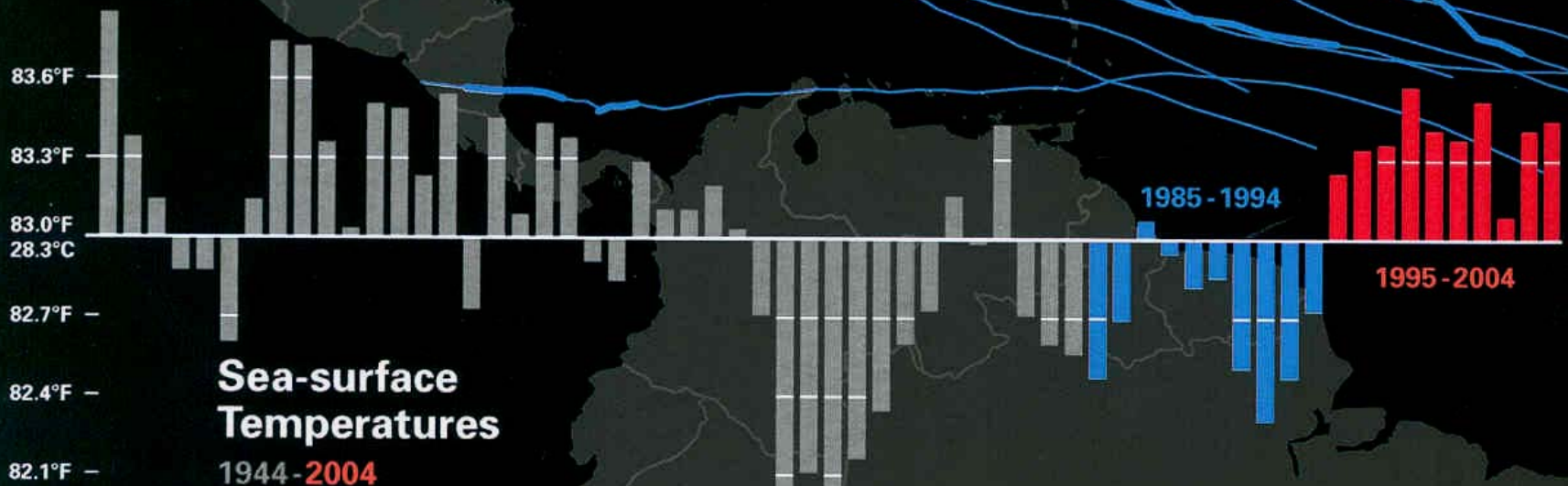




Hurricane Tracks

When sea-surface temperatures were cooler (1985-1994)

- Category 3-5
- Lower-intensity storm



Now that they're warmer (1995-2004)

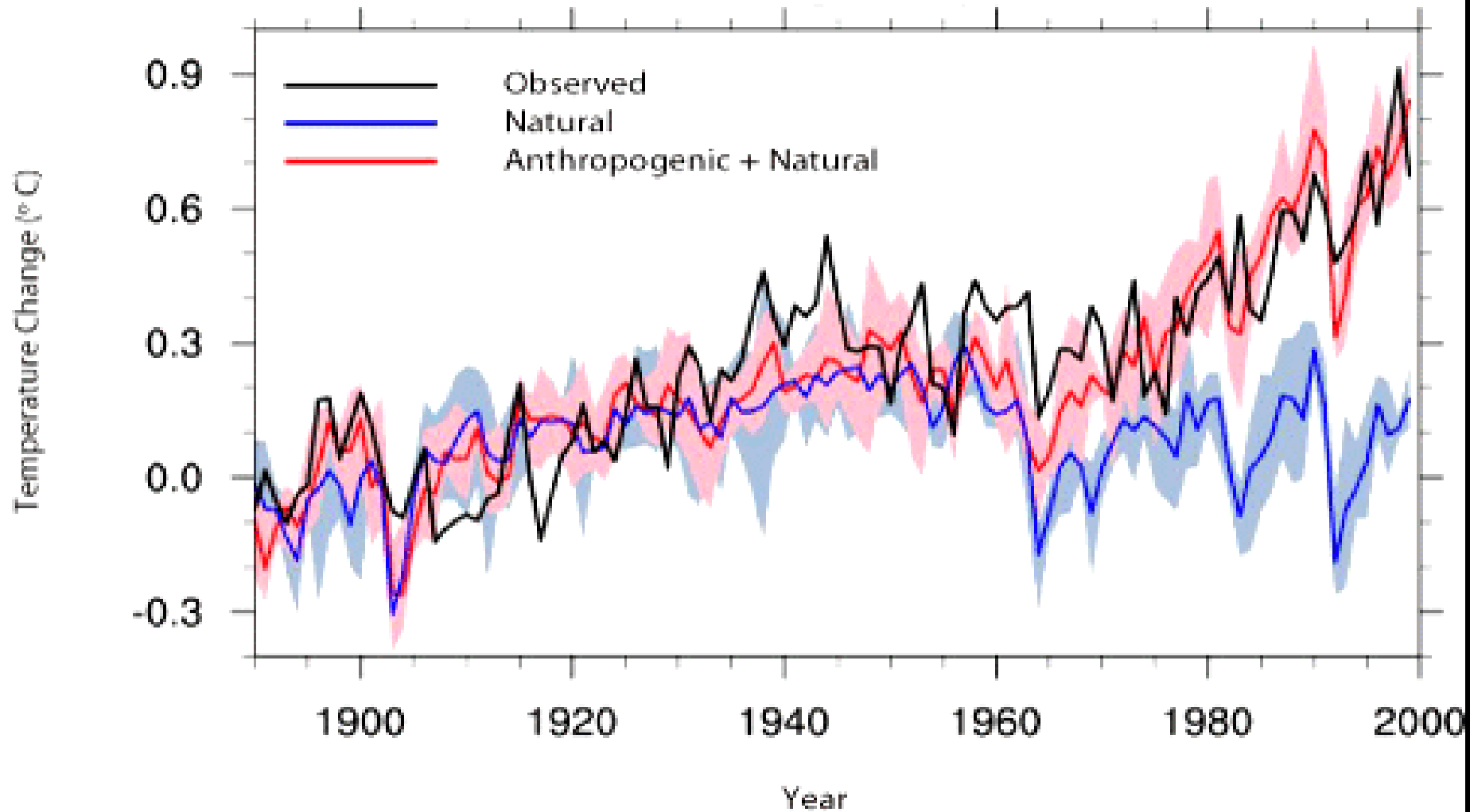
RELATIVE CALM GIVES WAY TO FRENZY Two ten-year periods of hurricane activity show that from 1985 to 1994, when sea-surface temperatures were low, there were half as many major hurricanes as during the most recent decade, when temperatures rose by one to two degrees F—the result of changes in ocean currents that cycle water and heat between the far northern Atlantic and the tropics. Frequency of major hurricanes rises and falls on a multidecadal time frame (graph at left) that scientists are still trying to understand.

**Can this be just a
“natural phenomenon”?**

NO!

Comparison of Modeled and Observed Temperature

1890 - 2000

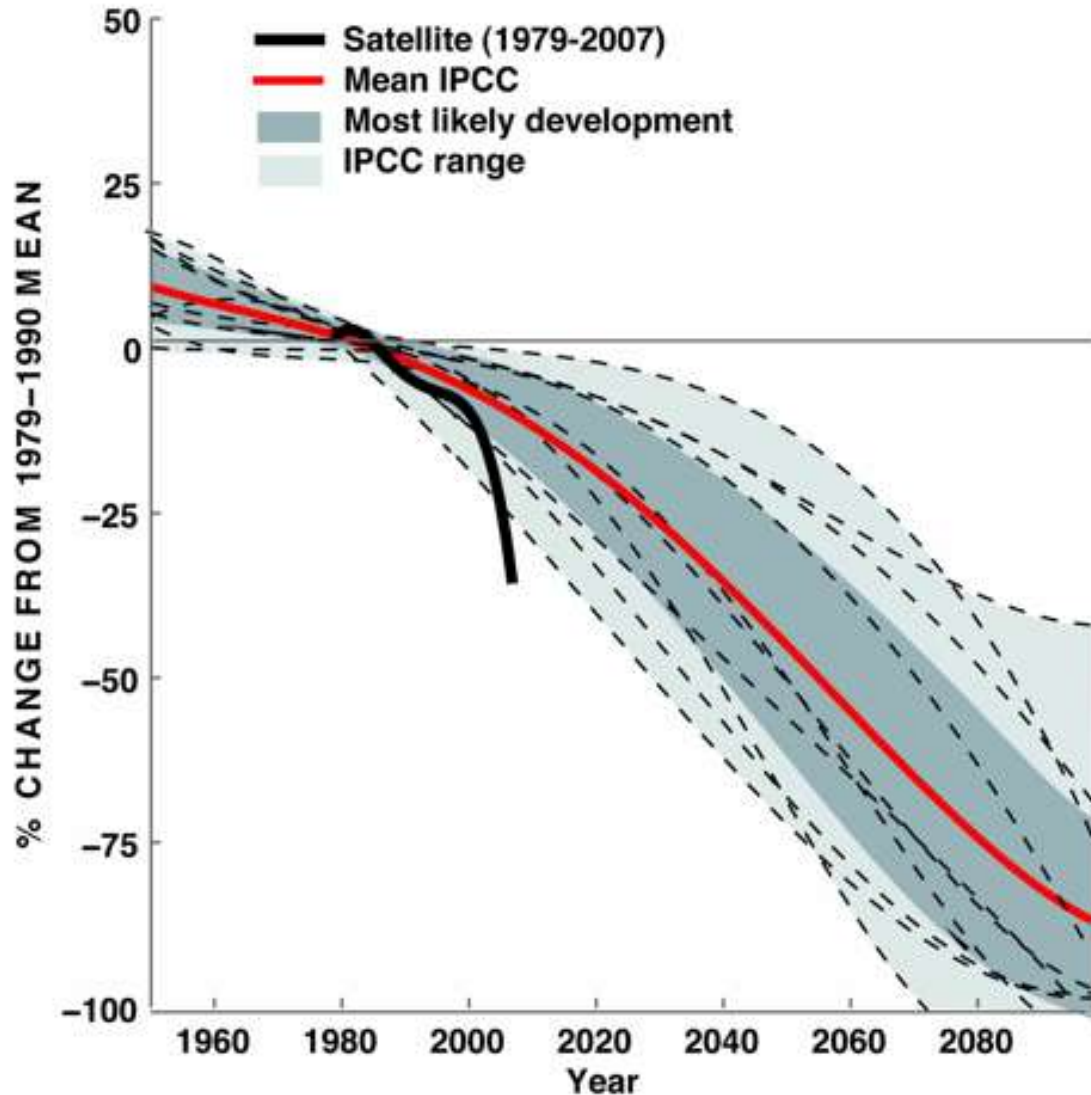


Should we be concerned?

YES!



Source: *The Economist – The World in 2007*



Arctic sea ice loss compared to IPCC models

Arctic ice extent loss to September 2007 compared to IPCC modelled changes using the SRES A2 CO2 scenario (IPCC high CO2 scenario). September loss data from satellite observations. Data smoothed with a 4th order polynomial to smooth out the year-to-year variability. Chart courtesy Dr Asgeir Sorteberg, Bjeknes Centre for Climate Research and University Center at Svalbard, Norway.

Date: 23 September 2007 www.carbonequity.info/images/seaice07.jpg



How serious is the problem?

VERY!

The Nile:

Reaches Cairo with 12 million Tons of salts
Reaches the sea with 34 million tons of salts



Impact on Nile Delta

Population: 3 800 000
Cropland (Km²): 1 800



Population: 6 100 000
Cropland (Km²): 4 500



GRID
Arendal



0 50 km

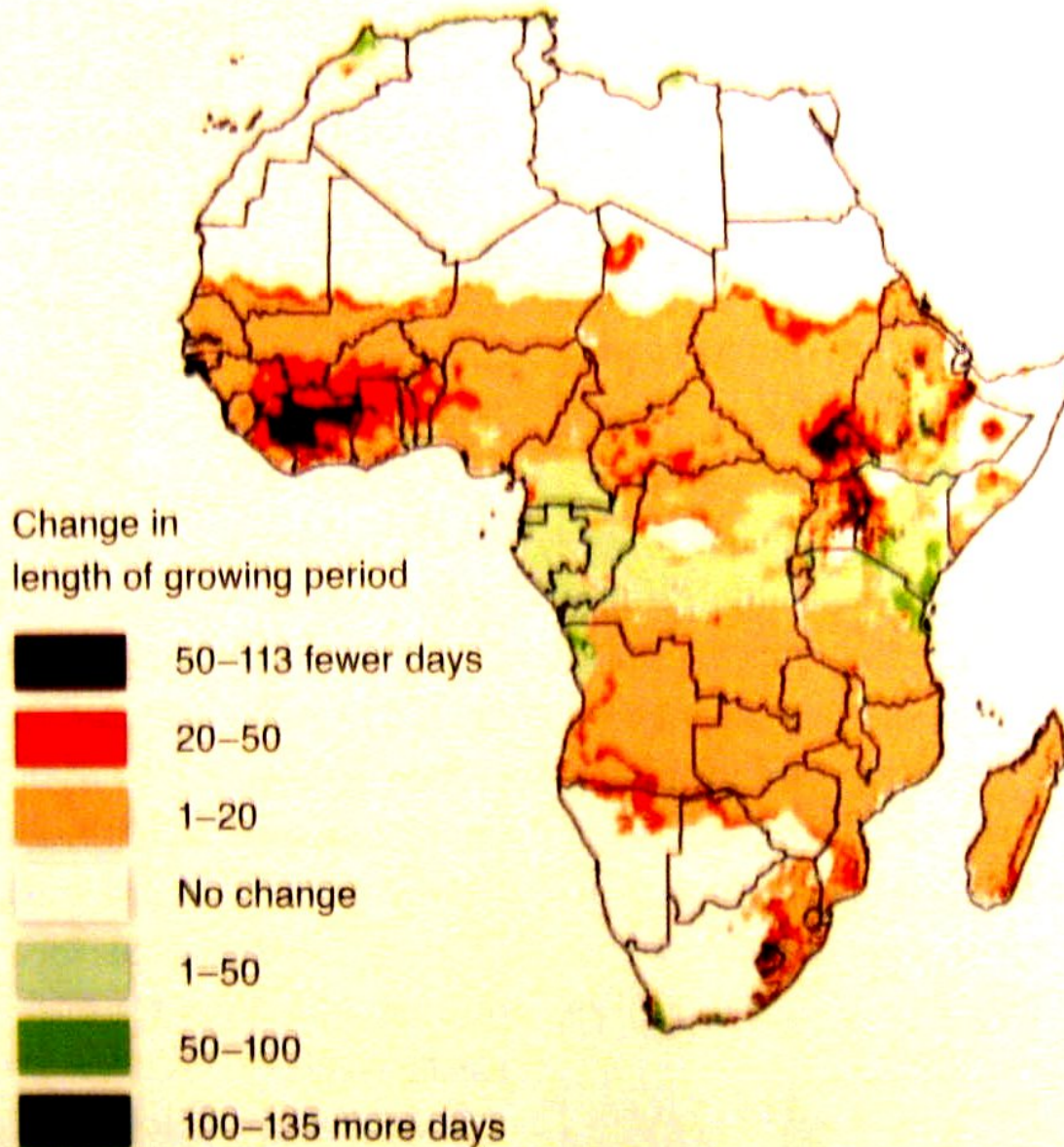




**But Also increased Floods, Droughts,
Forest Fires and Desertification**

Climate Change and Food Security:

Changes in Length of growing period 2000-2005



Thronton, et.al., cited in Greg Mock and Paul Steele, "Power to the poor: tapping the wealth of ecosystems", in *Environment*, vol 48: 1; Jan/Feb 2006, p. 15

We observe...

- **Floods in Pakistan**





We observe...

- Floods in Pakistan
- Droughts in Russia



Droughts and Floods?

Yes, The Models predict that Both will co-exist



We observe...

- Floods in Pakistan
- Droughts in Russia
- **Hurricanes hitting the Caribbean and the USA**

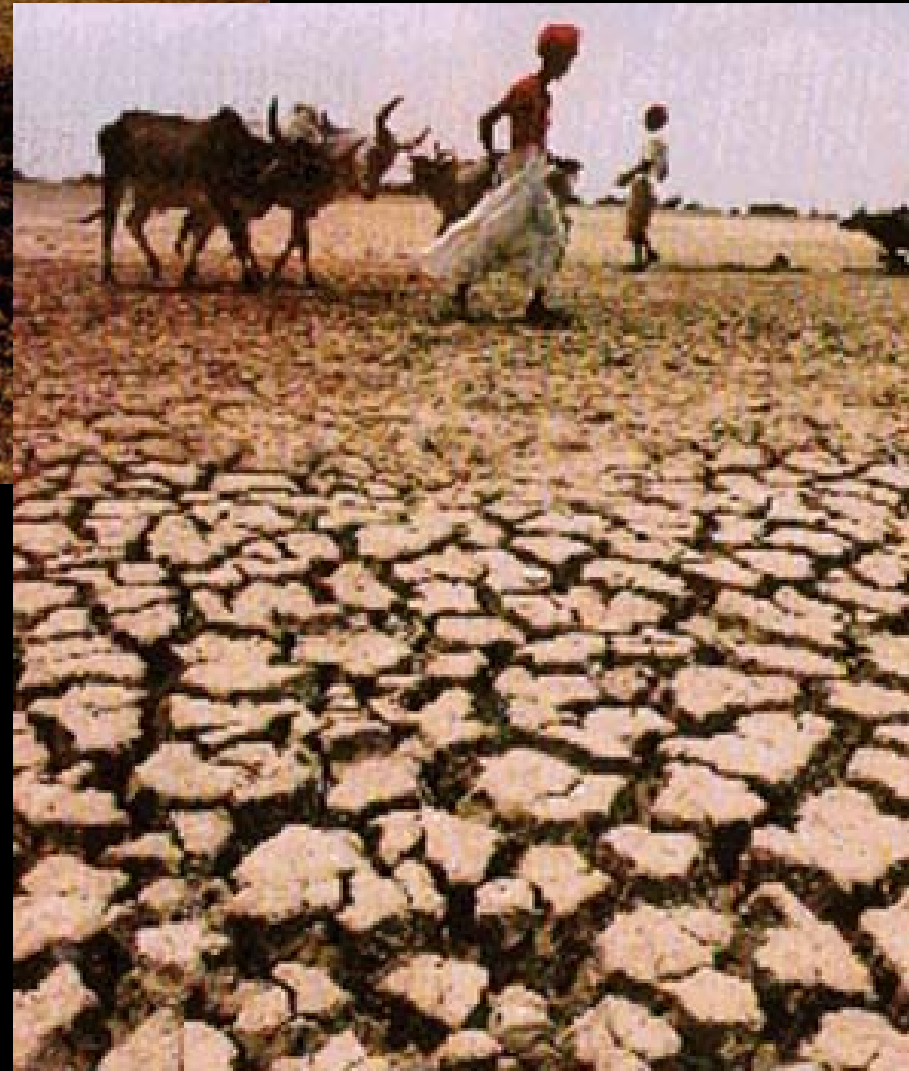
Hurricanes and floods in USA



**All these intemperate weather
conditions lead to stresses on food
production**



The Food on which we all depend



Drought

Drought Devastates Agriculture



**That leads to
More Hunger**



**The food price crisis exposed the
weakness and fragility of the
current world system**

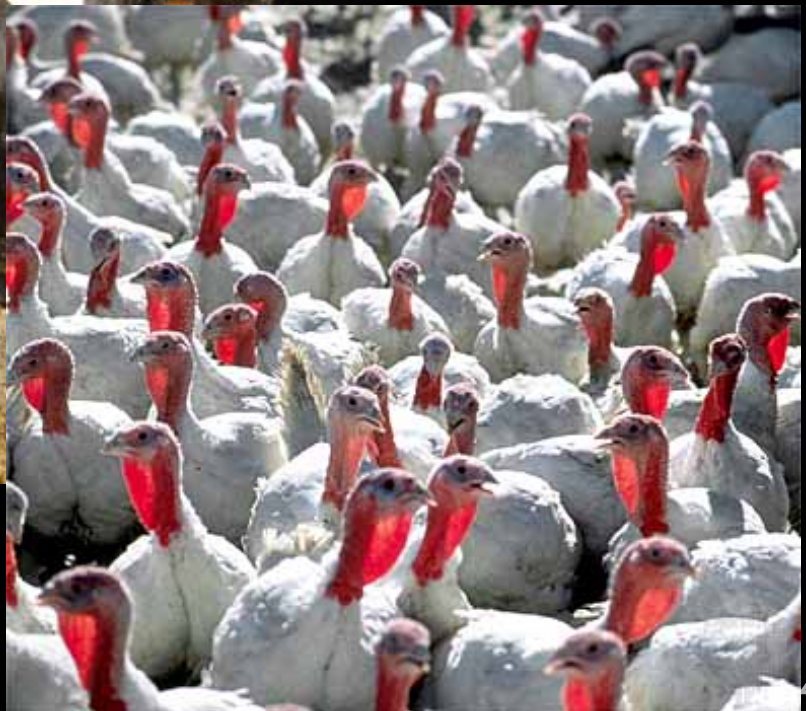
Prices spiked and Countries slapped on export bans!



Not Just for Food



Increasing demand for feed



**In addition to the first generation of
biofuels (Ethanol from Corn)**



**It is wrong to burn
the food of the
poor to drive the
cars of the rich!**

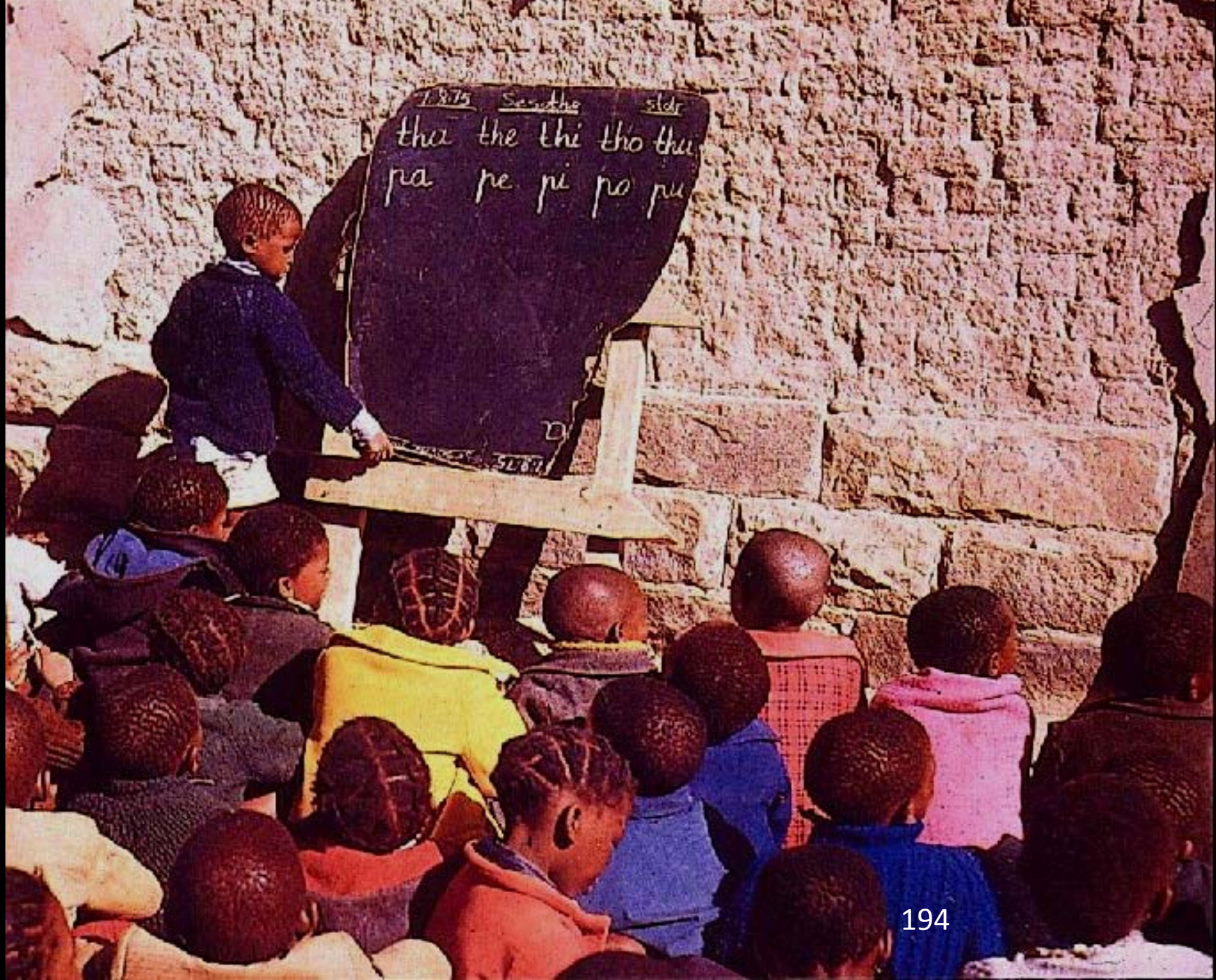
Biofuels

**We must move to second
generation biofuels**

**Above all,
Science must be mobilized**

The Role Of Science





\$100 Computer



Rich Countries Vs. Poor Countries

Income:

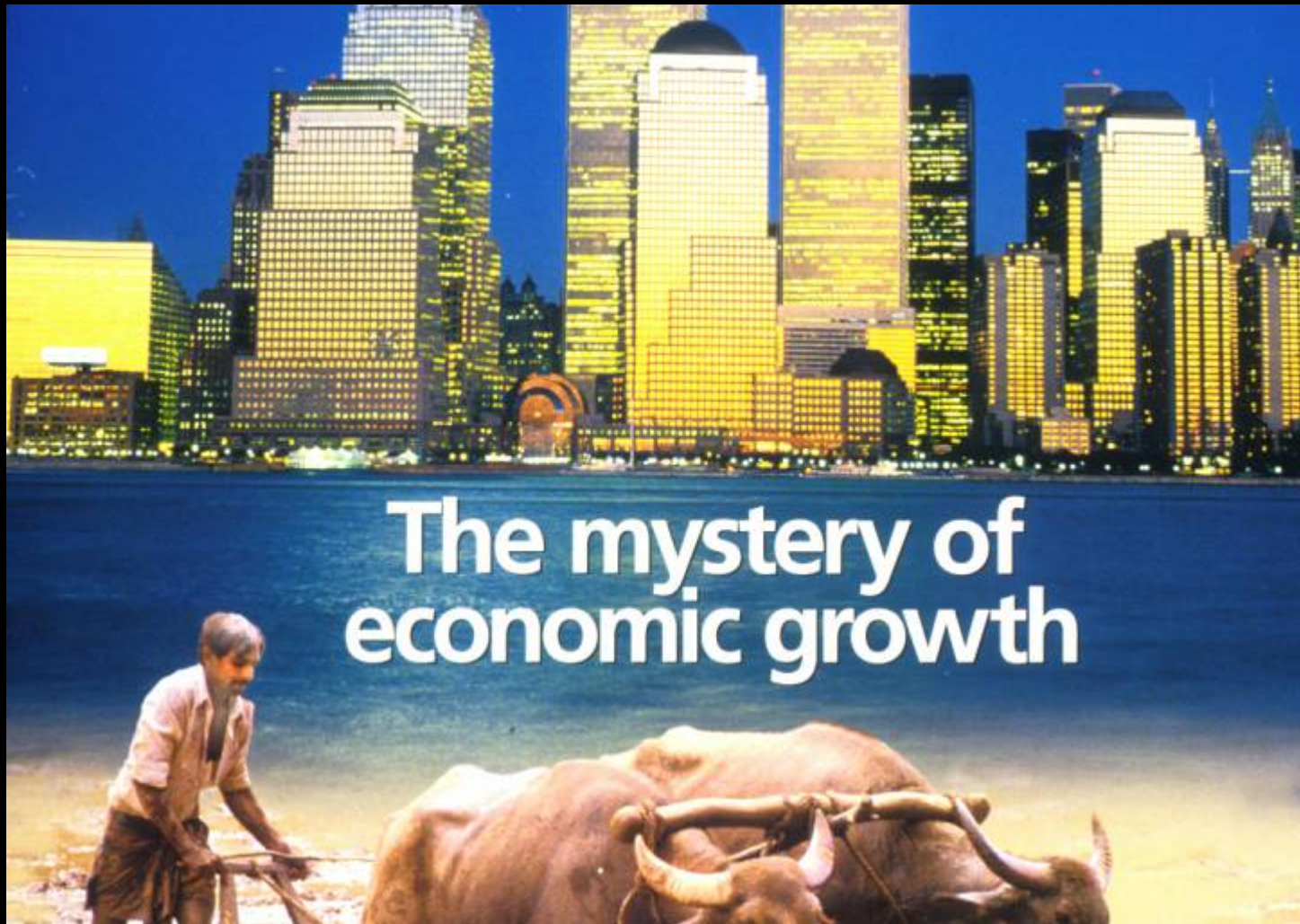
40 Times

Research:

220 times



The Divide in S&T Capacity









Scientific Apartheid!

The Future

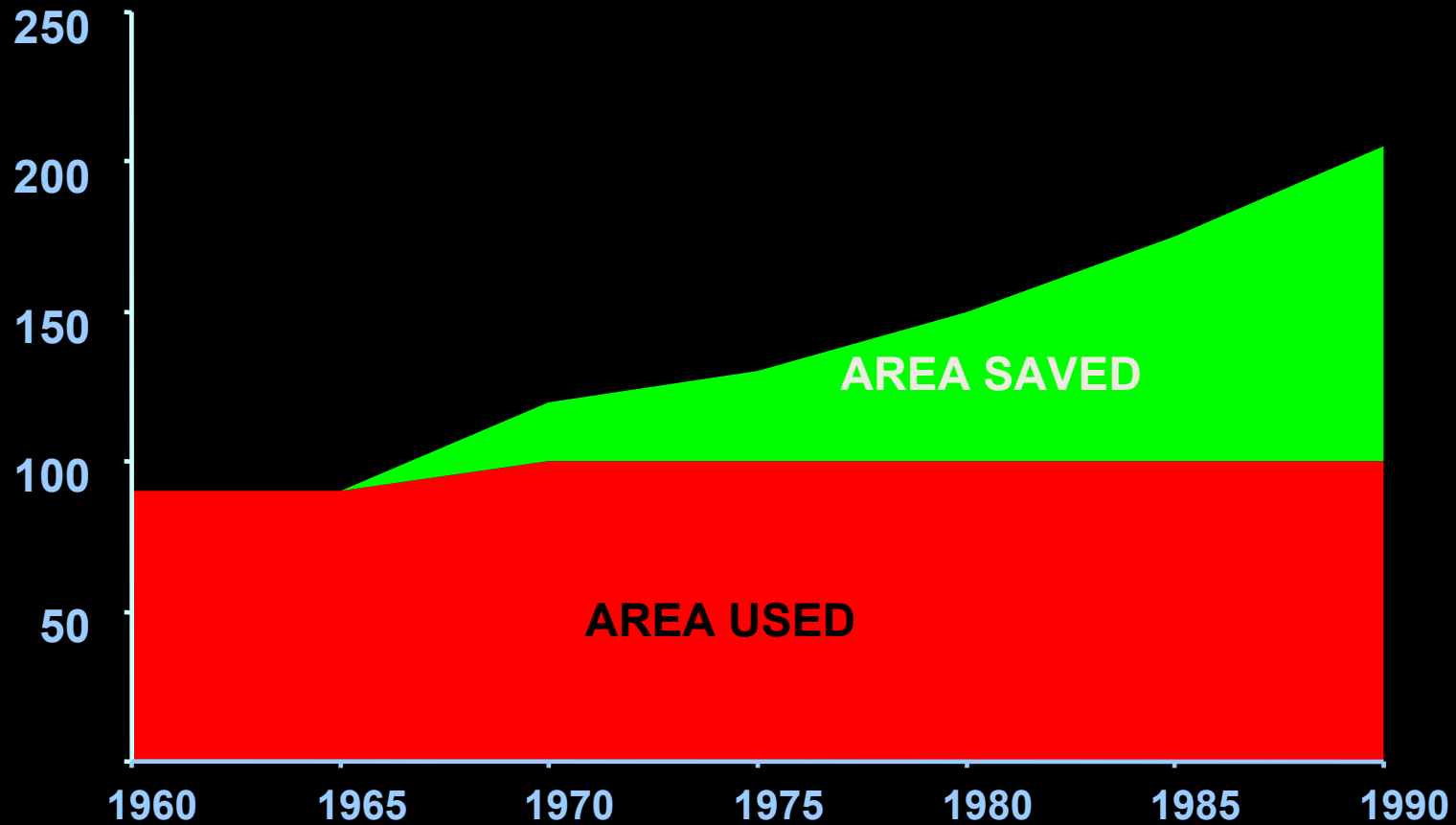


From the Green Revolution to the Doubly Green Revolution



AREA SAVED

India -- All Cereals, 1960-1990











WORLD COWPEA
COLLECTION

Doubly green revolution

- **More genetically diverse crops**
- **Less chemical inputs (IPM and other means)**
- **Integrated soil, water and nutrient management**
- **Small holder farming system context, environmentally and socio-economically**









**Recognize
The Gender
Dimension**

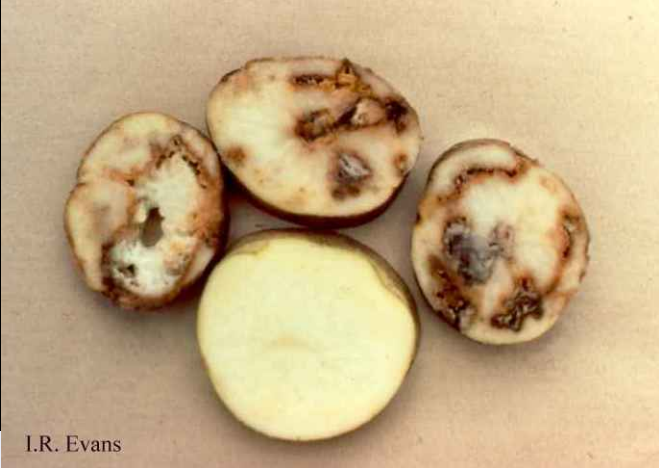




**Promoting Alternatives to
Slash and Burn**



**Reduce
Post-Harvest Losses**



I.R. Evans



Storage and post-harvest losses

**Always
Pro-Poor
Pro-Women
Pro-Environment**



**A Double Shift in the Research
Paradigm:**

- Contextualization**
- The new life sciences**

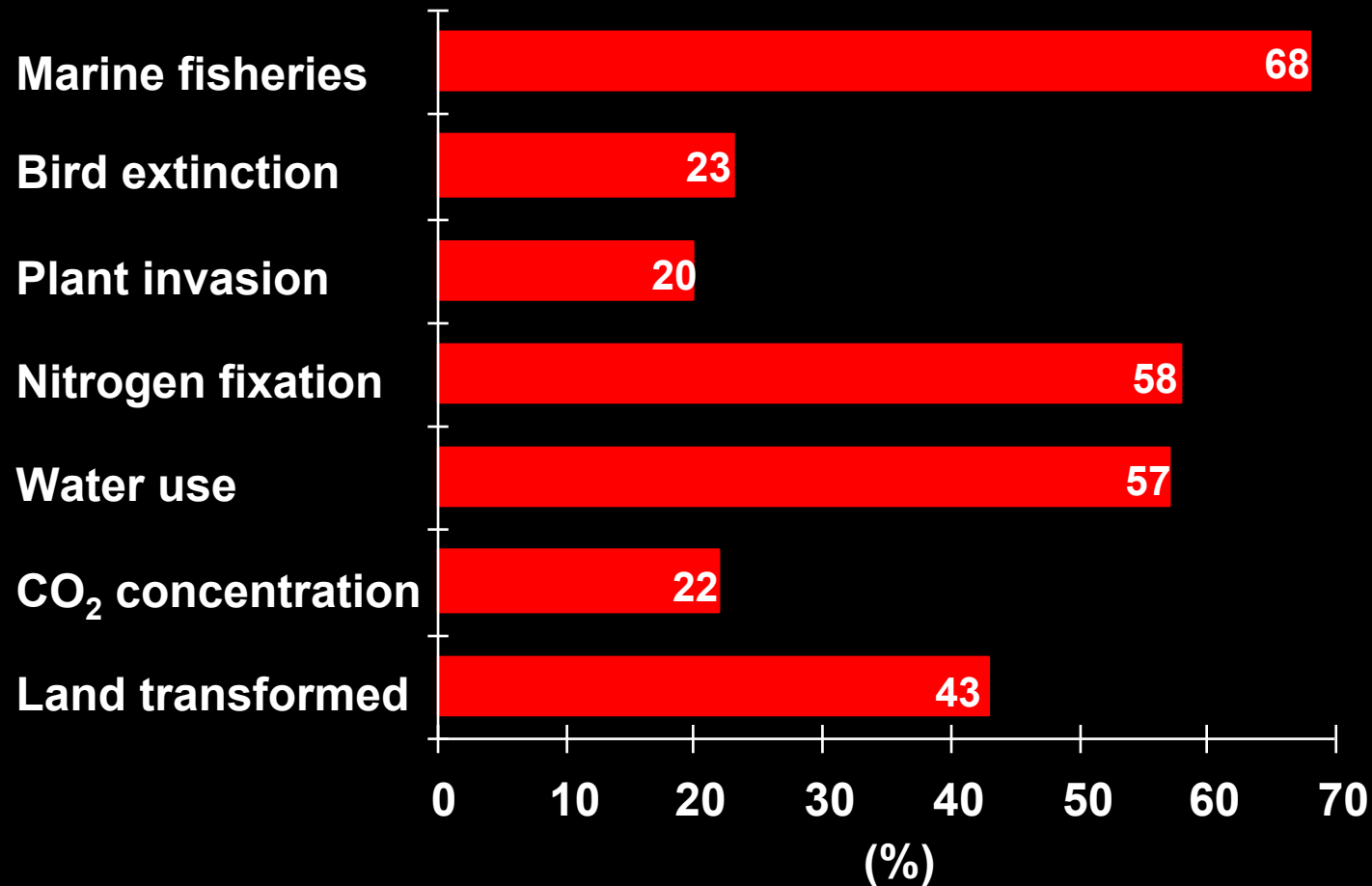
The Role Of Science

- **Land**
- **Water**
- **Plants**
- **Animals**
- **The Role Of Aquatic Resources**

The Role Of Science

- **Land**
- **Water**
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- **Animals**
- **The Role Of Aquatic Resources**

Human Alteration of Major Components of Earth System





The Role Of Science

- Land
- **Water**
- Plants
- Animals
- **The Role Of Aquatic Resources**

Water Is Also a Constraint



227/480



**10% of World Grain Production
Depends on Unsustainable
Underground Water Withdrawals.**









One Calorie = One Liter





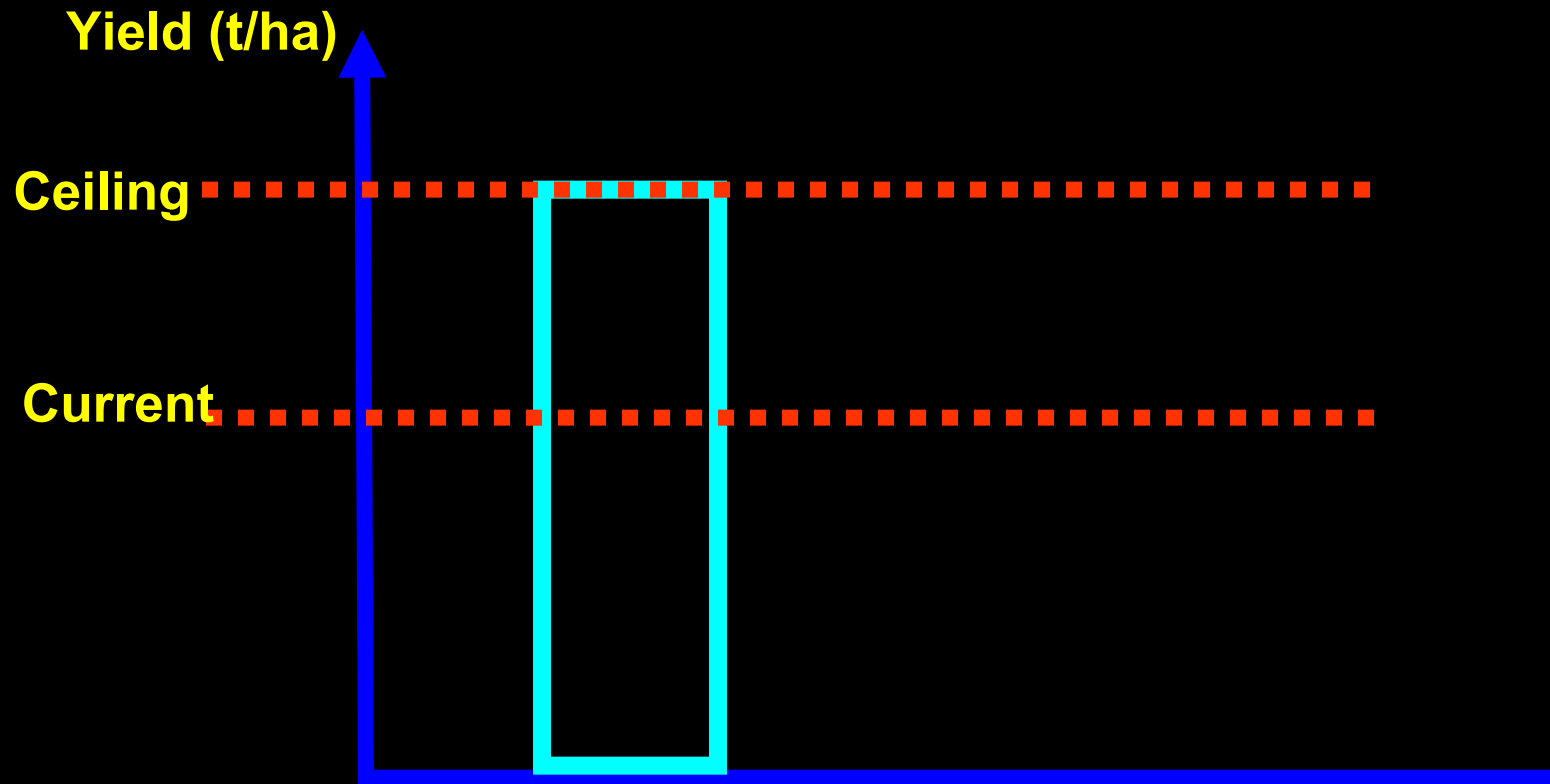
More Crop Per Drop!

And So Much More...

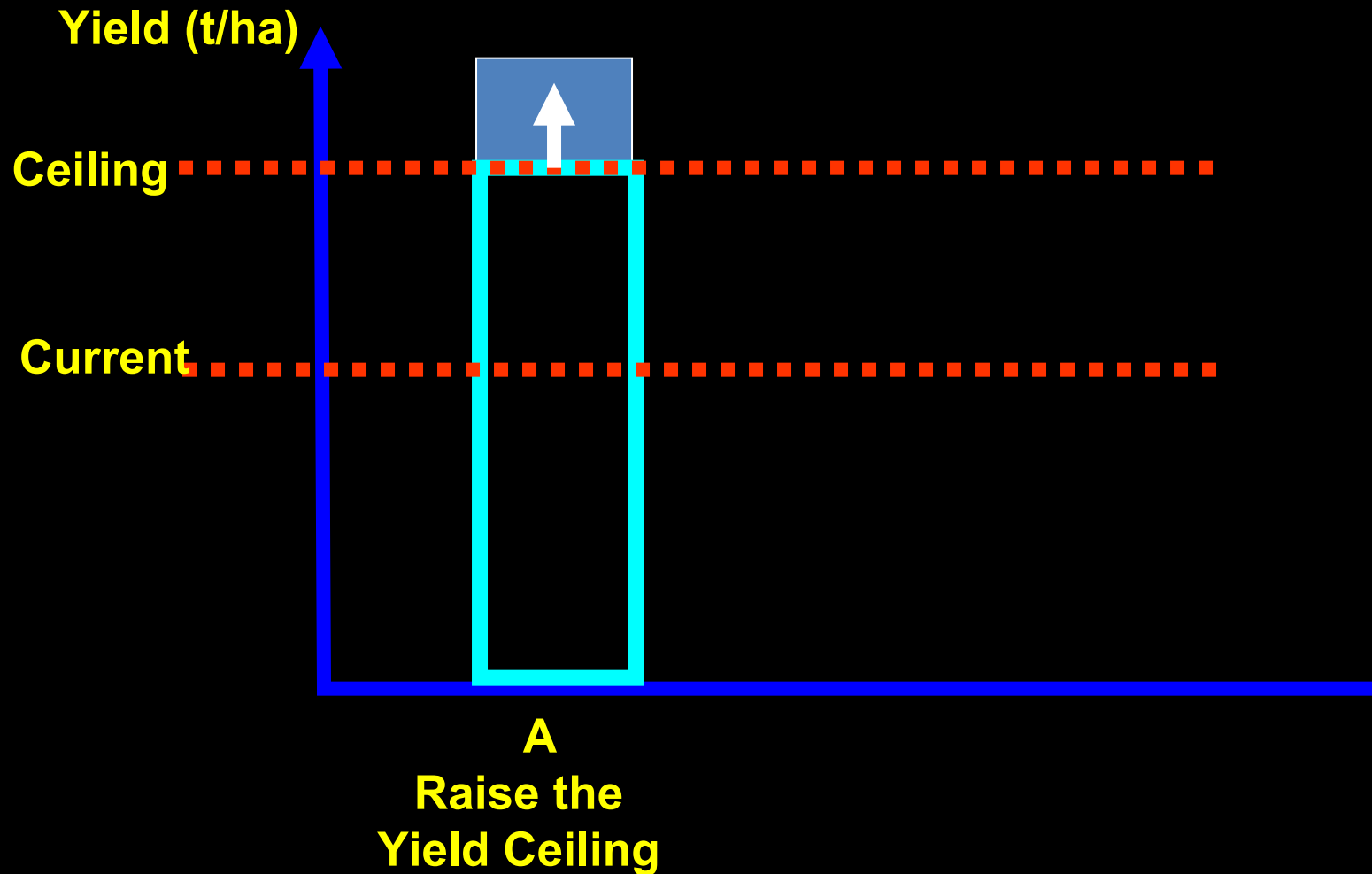
The Role Of Science

- Land
- Water
- **Plants**
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- **The Role Of Aquatic Resources**

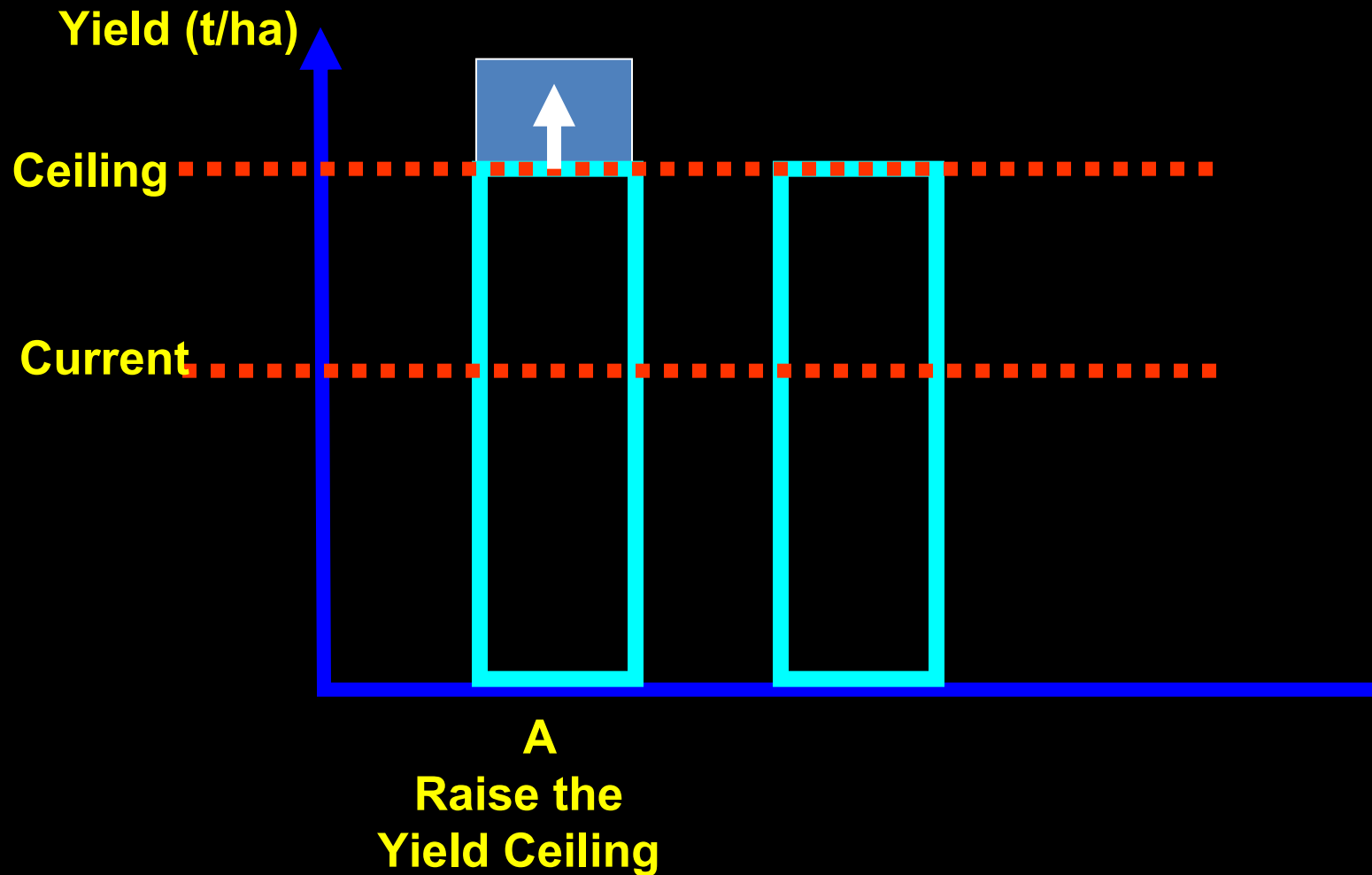
Three Themes in Rice Research for Increased Production



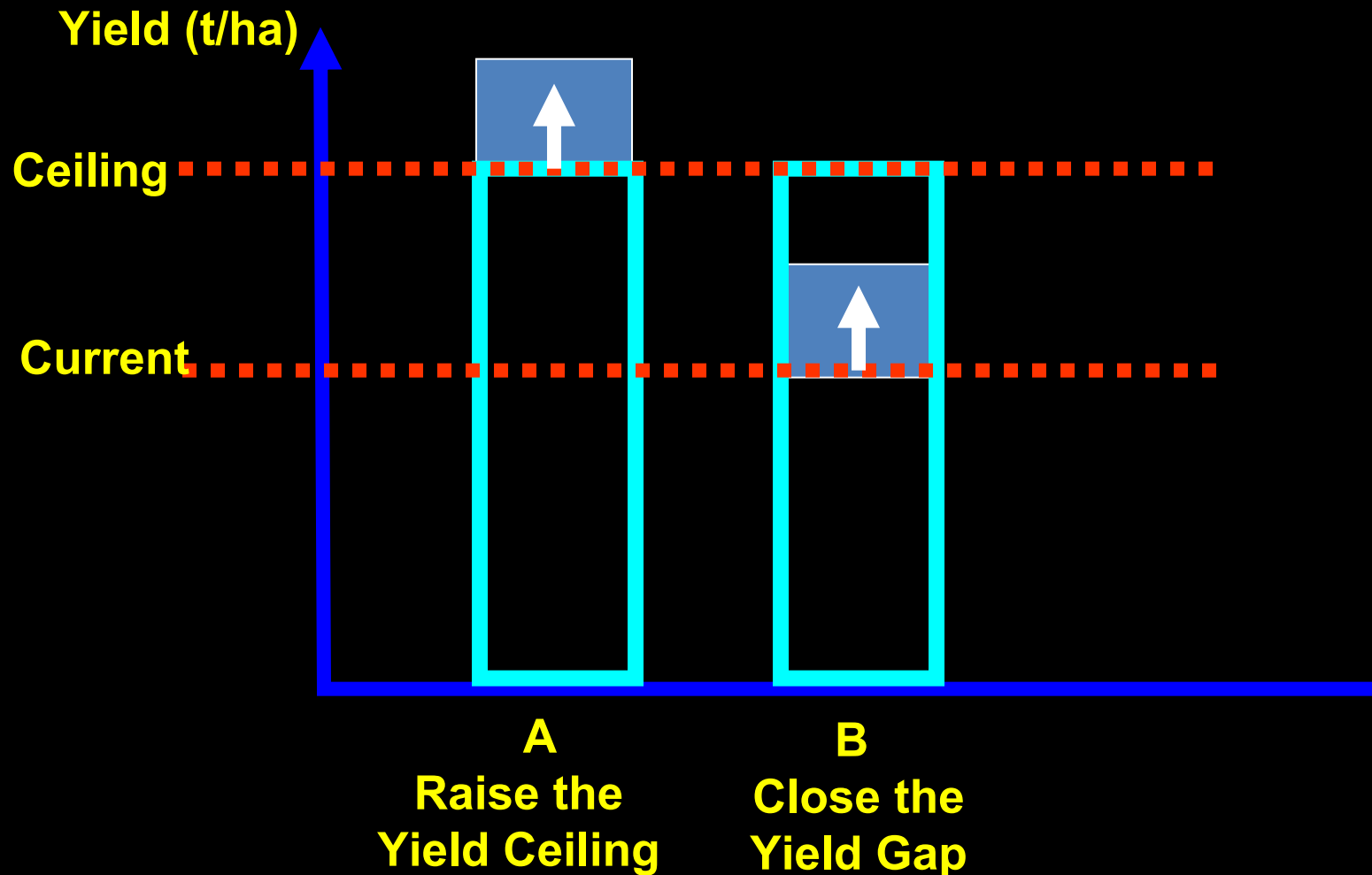
Three Themes in Rice Research for Increased Production



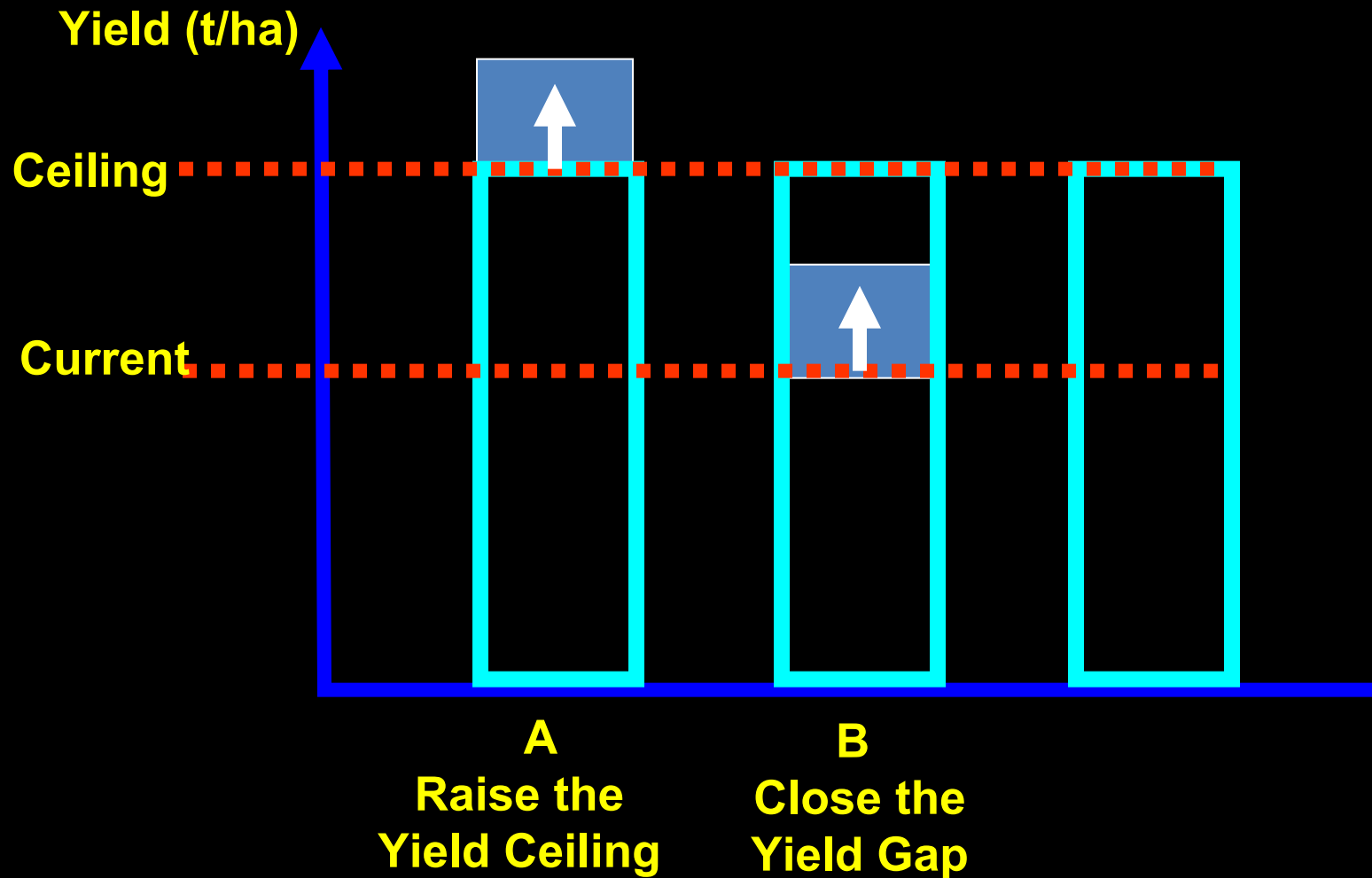
Three Themes in Rice Research for Increased Production



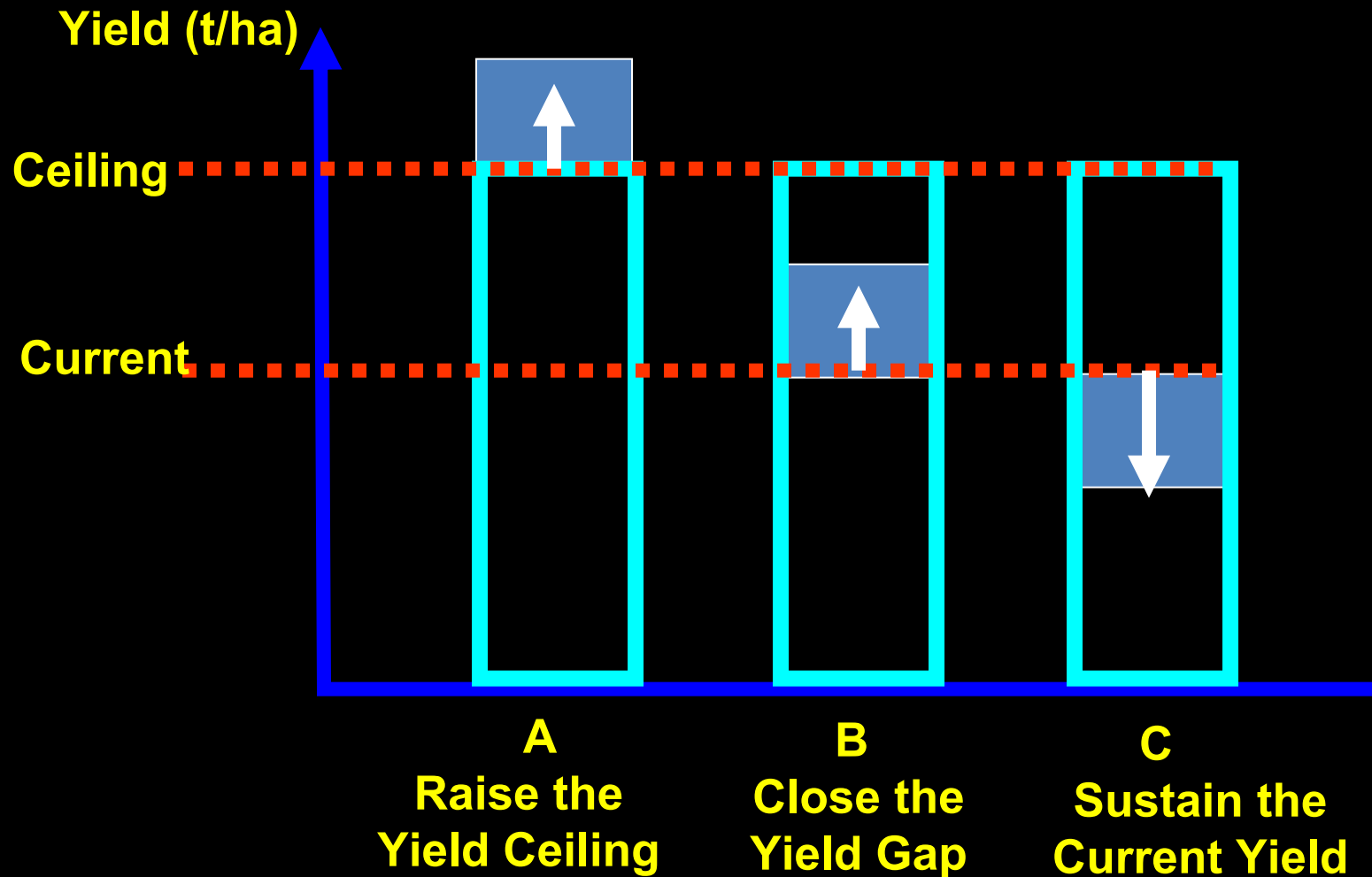
Three Themes in Rice Research for Increased Production



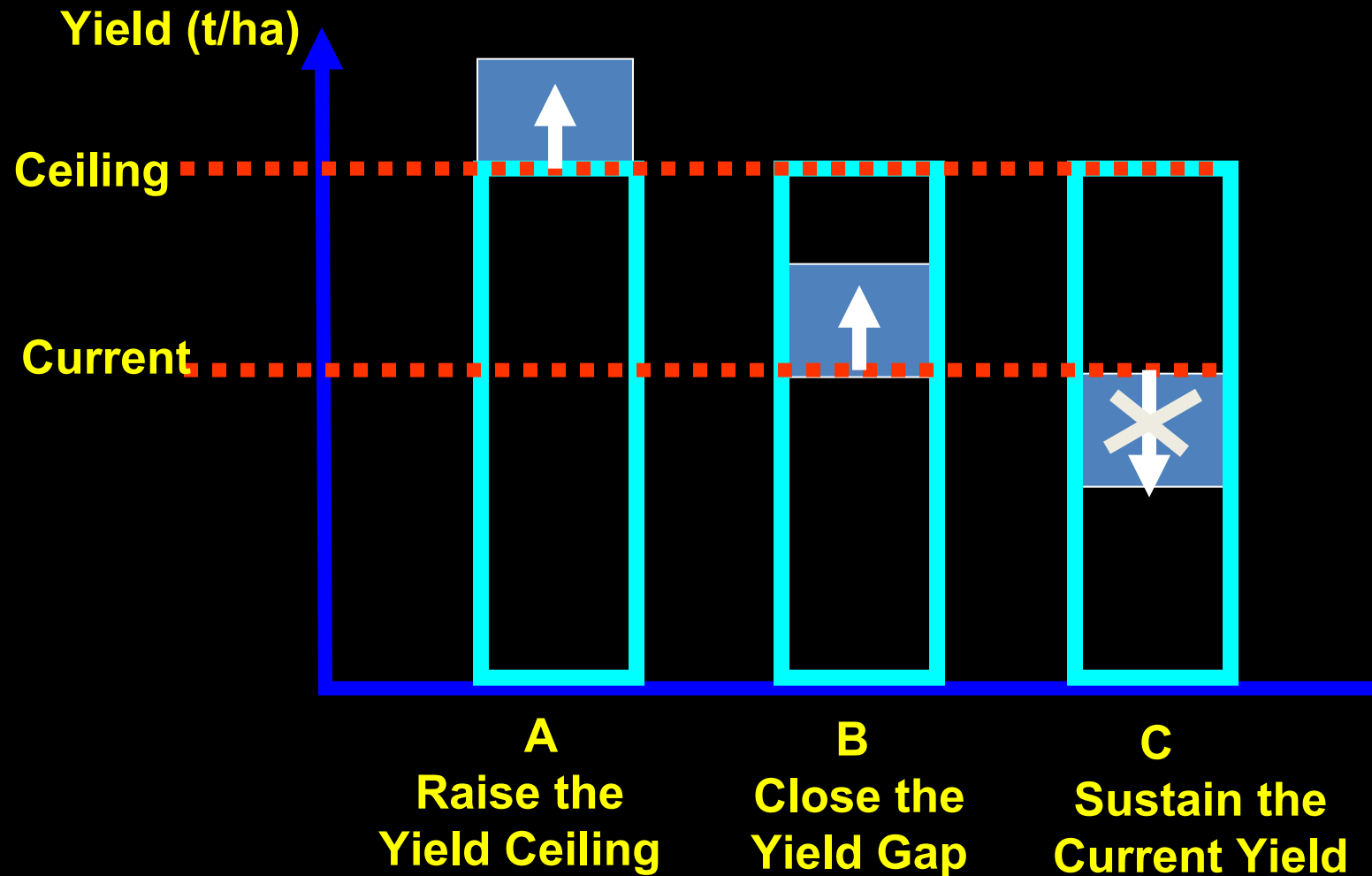
Three Themes in Rice Research for Increased Production



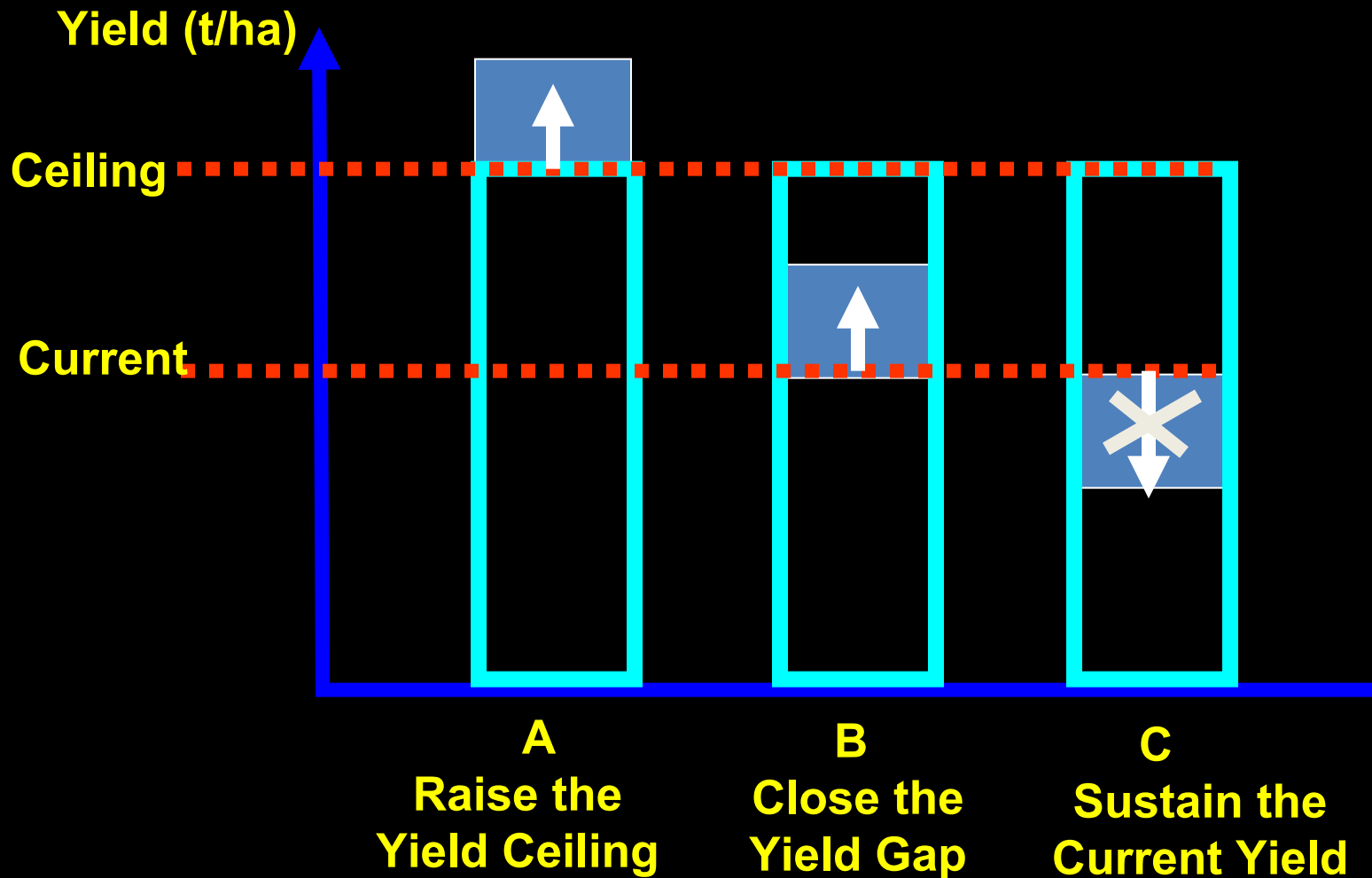
Three Themes in Rice Research for Increased Production



Three Themes in Rice Research for Increased Production

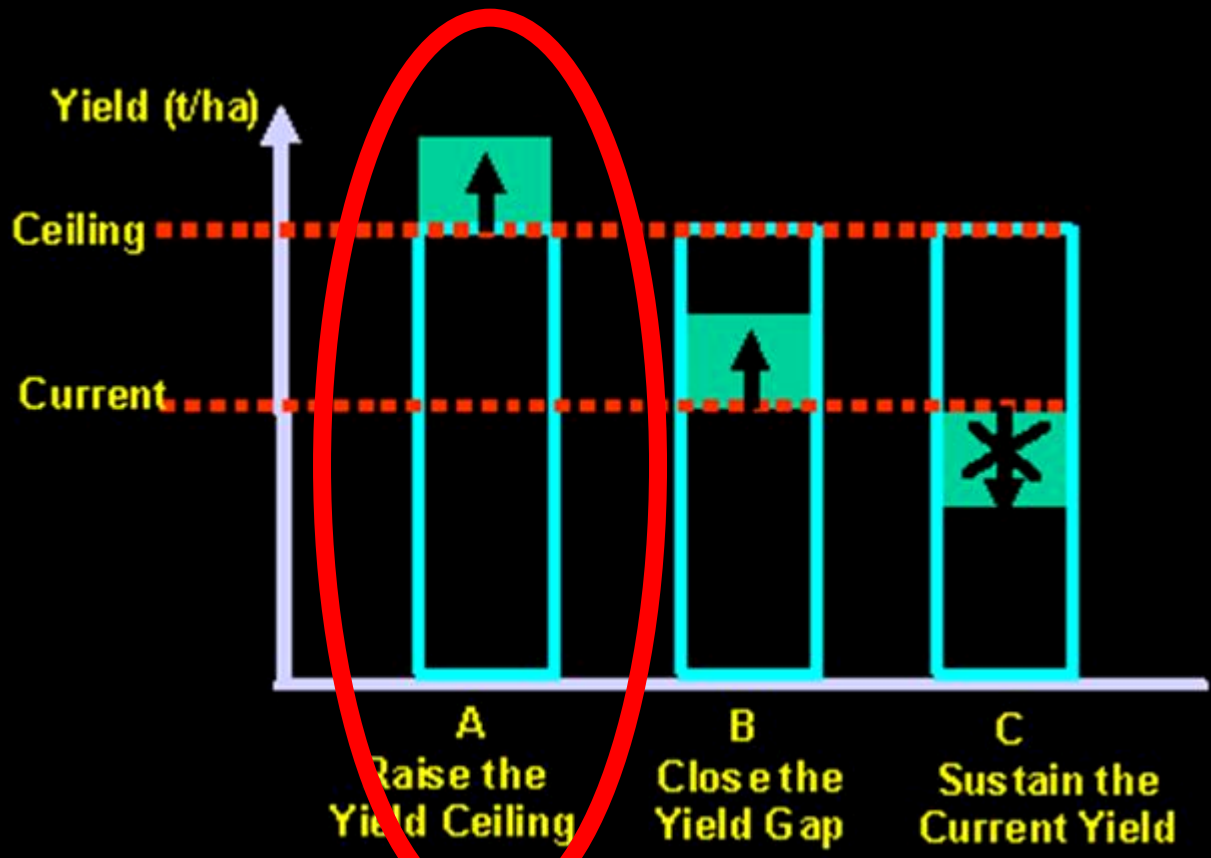


Three Themes in Rice Research for Increased Production



Let's take them by turn

Technologies for Increasing the Yield Potential



Source: Gurdev Khush, Lecture at BioVision Lyon 2005

Different Plant Types of Rice

Conventional

Improved

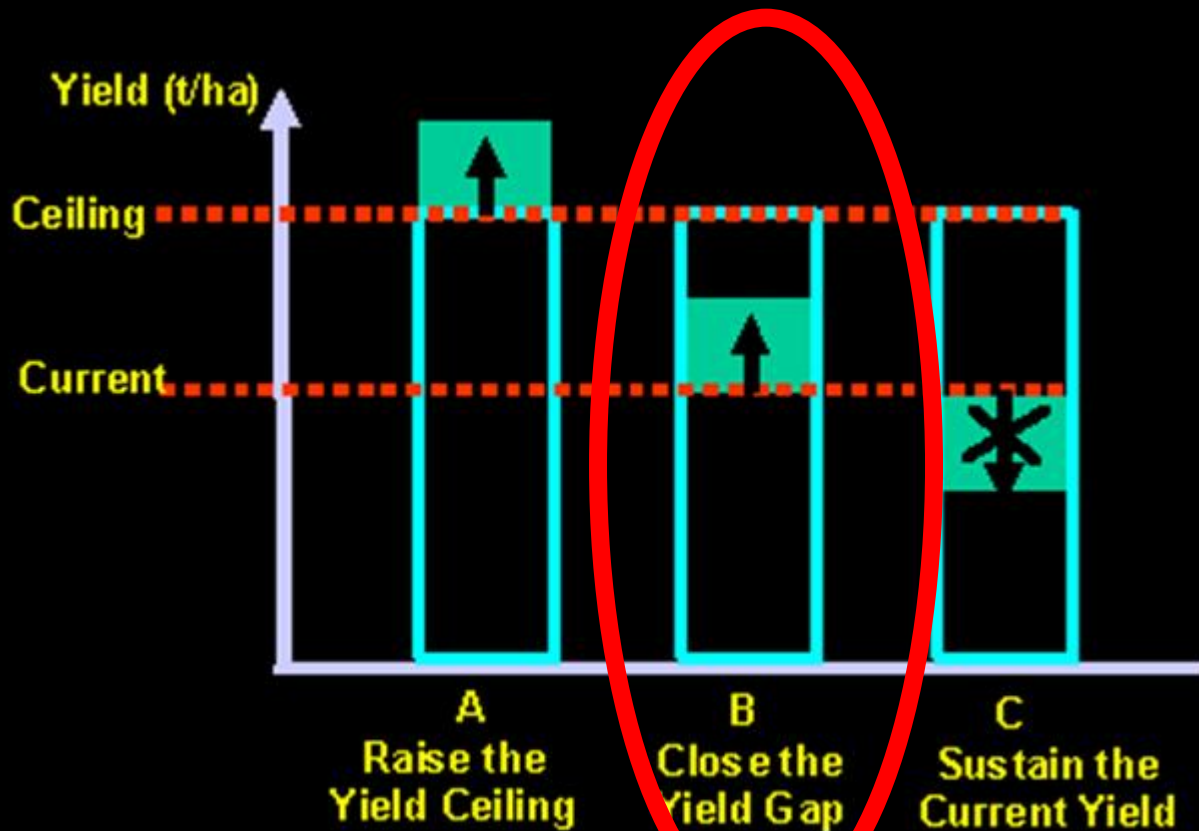
NPT



New Plant Type Rice



Technologies for Closing the Yield Gap



Source: Gurdew Khush, Lecture at BioM, Lyon 2005

Biological cost of weeds, Diseases and Insects

Crop	Percent of Yield Potential		
	Weeds	Disease	Insects
Rice	10.6	9.0	27.3
Wheat	9.8	9.5	5.4
Maize	13.1	9.6	12.9
Millets & Sorghum	17.9	10.3	9.5
Barley	8.8	8.3	3.9

Biological Control



The rich and diverse wealth of biological agents such as predators, parasitoids, insect pathogens and their natural *in situ* interactions can be exploited as key components of IPM



IPM: Working With Nature



- Bio-control
- Pheromone trap
- Need-based chemicals
- Host-plant resistance
- Etc.



Reaction to Bacterial Blight

Resistant **Susceptible**



Stem-Borer Larvae from Transgenic Rice (top) and Control (bottom)



4. Raise Agricultural Productivity

- Productivity must rise faster than price declines to generate surpluses for the small-holder farmers and reduce their poverty as their cheaper products help reduce the poverty in the cities
- Measure in terms of Total Factor Productivity (land, water, labor, energy and chemical inputs)

Technologies Needed For:

- **increasing the yield potential**
- **closing the yield gap, including pest management**
- **Soil, water & nutrient management**
- **Labor & capital input management**
- **developing nutritious crops (more later)**

The Role Of Science

- Land
- Water
- Plants
- **Animals**
- The Role Of Aquatic Resources





The Role Of Science

- Land
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- **The Role Of Aquatic Resources**



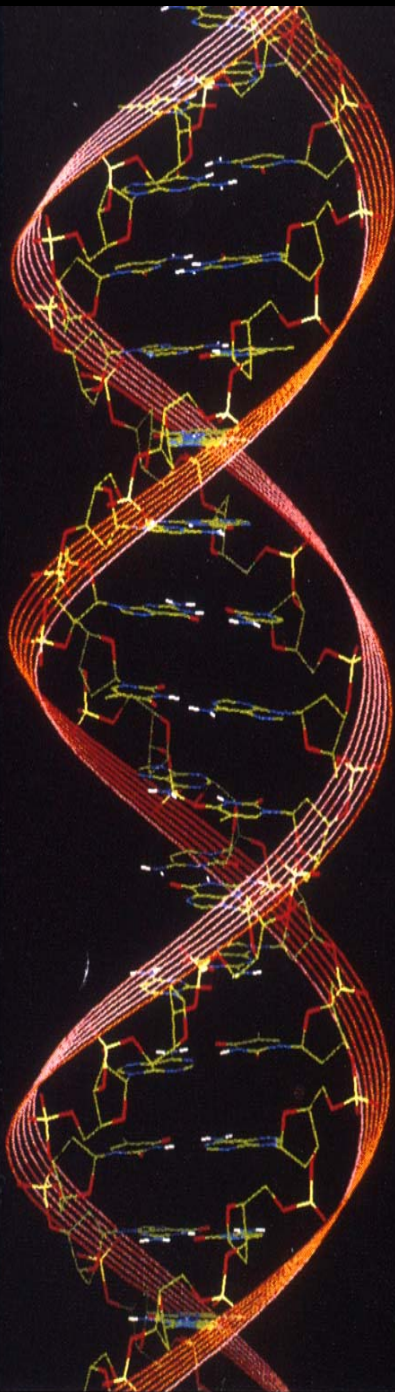
Source: William S. Alevizon, *Pisces Guide to Caribbean Reef Ecology*, Gulf Publishing Company (1994).

The Role Of Science

- **Land**
- **Water**
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- **The Role Of Aquatic Resources**

The Role Of Science

But
What about
Biotechnology
?

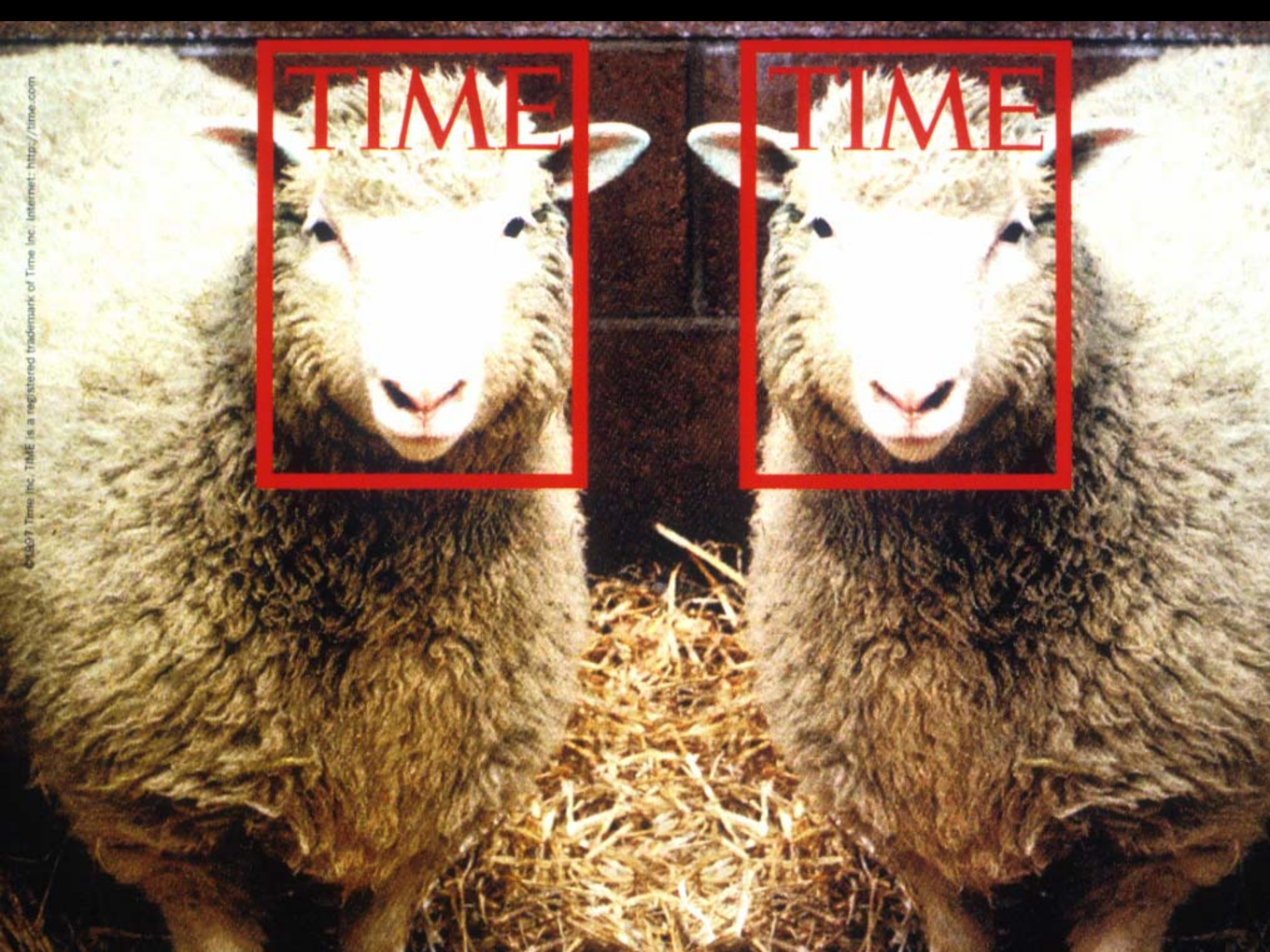


Biotechnology

- **Promise and perils**
- **Partnerships for benign applications**
- **Public-private**
- **CGIAR-NARS-AROs-NGOs**

TIME

TIME



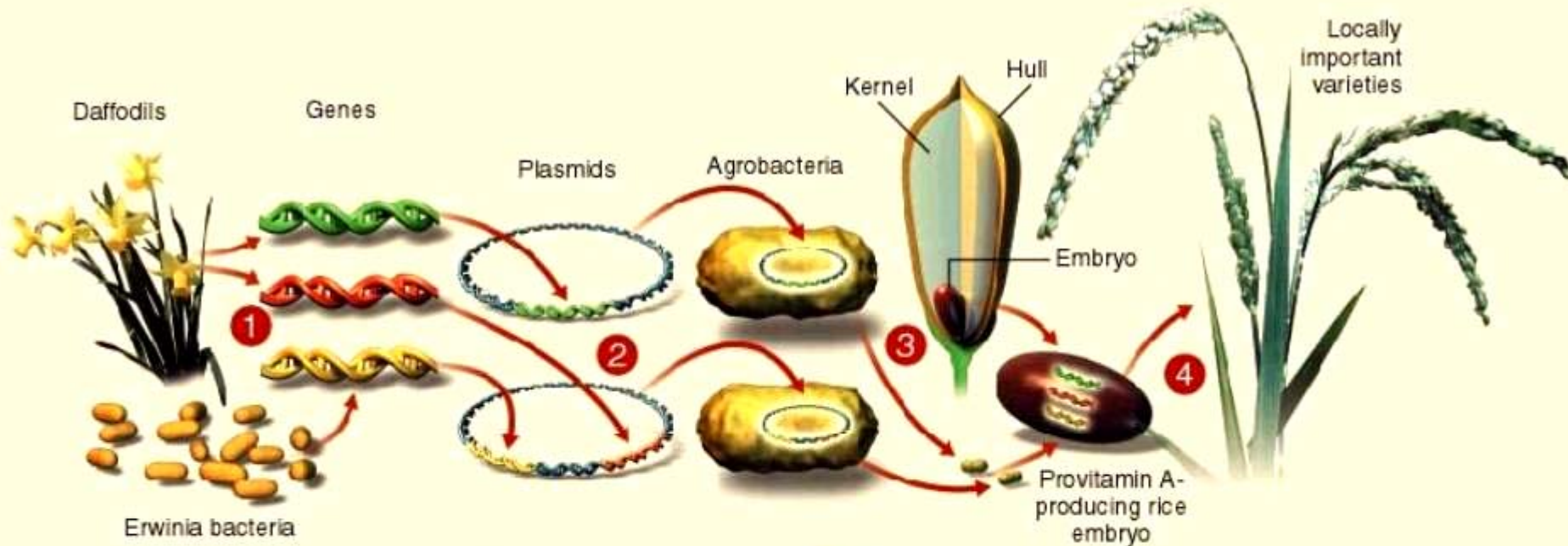
Modern biotechnology

- **Raises profound issues**
- **Despite controversy, has enormous promise**
- **Can do things we cannot do by conventional breeding – e.g. Vitamin A rice**

White and Golden Rice



Golden Rice

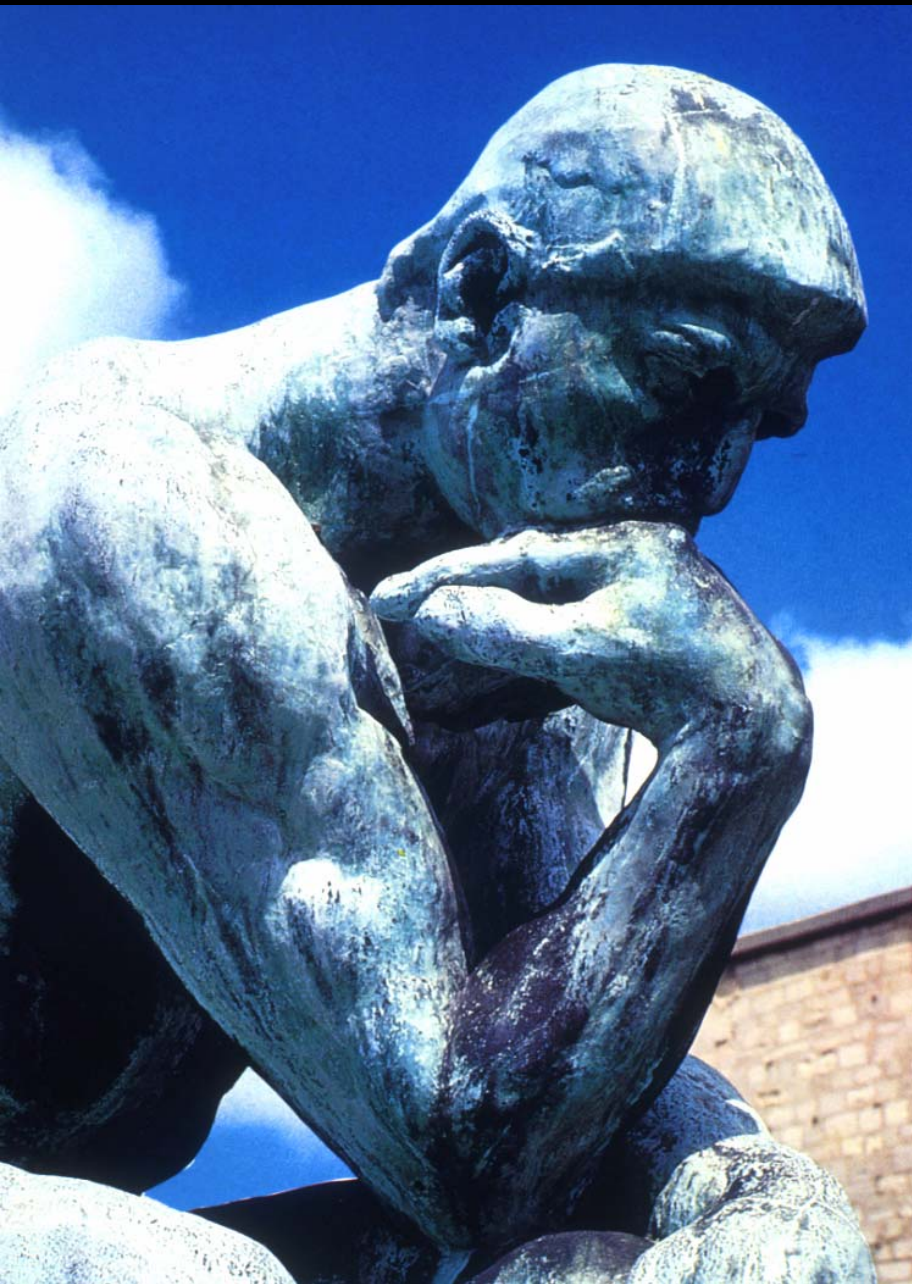


1 The genes that give golden rice its ability to make beta-carotene in its endosperm (the interior of the kernel) come from daffodils and a bacterium called *Erwinia uredovora*.

2 These genes, along with promoters (segments of DNA that activate genes), are inserted into plasmids (small loops of DNA) that occur inside a species of bacterium known as *Agrobacterium tumefaciens*.

3 These *agrobacteria* are then added to a Petri dish containing rice embryos. As they "infect" the embryos, they also transfer the genes that encode the instructions for making beta-carotene.

4 The transgenic rice plants must now be crossed with strains of rice that are grown locally and are suited to a particular region's climate and growing conditions.



Issues

- **Ethics**
- **Intellectual property rights**
- **Safety**

**It is a tool, like any other.
It should not be demonized nor
assumed to be a miracle.**

The Role Of Science

Science is where
collaboration and
partnerships is most
possible and most needed
to produce **innovations**

RESEARCH PAPERS

Score, on a 100-point scale, based on science papers in top journals (Digital Science, 2011)

PATENTS ISSUED

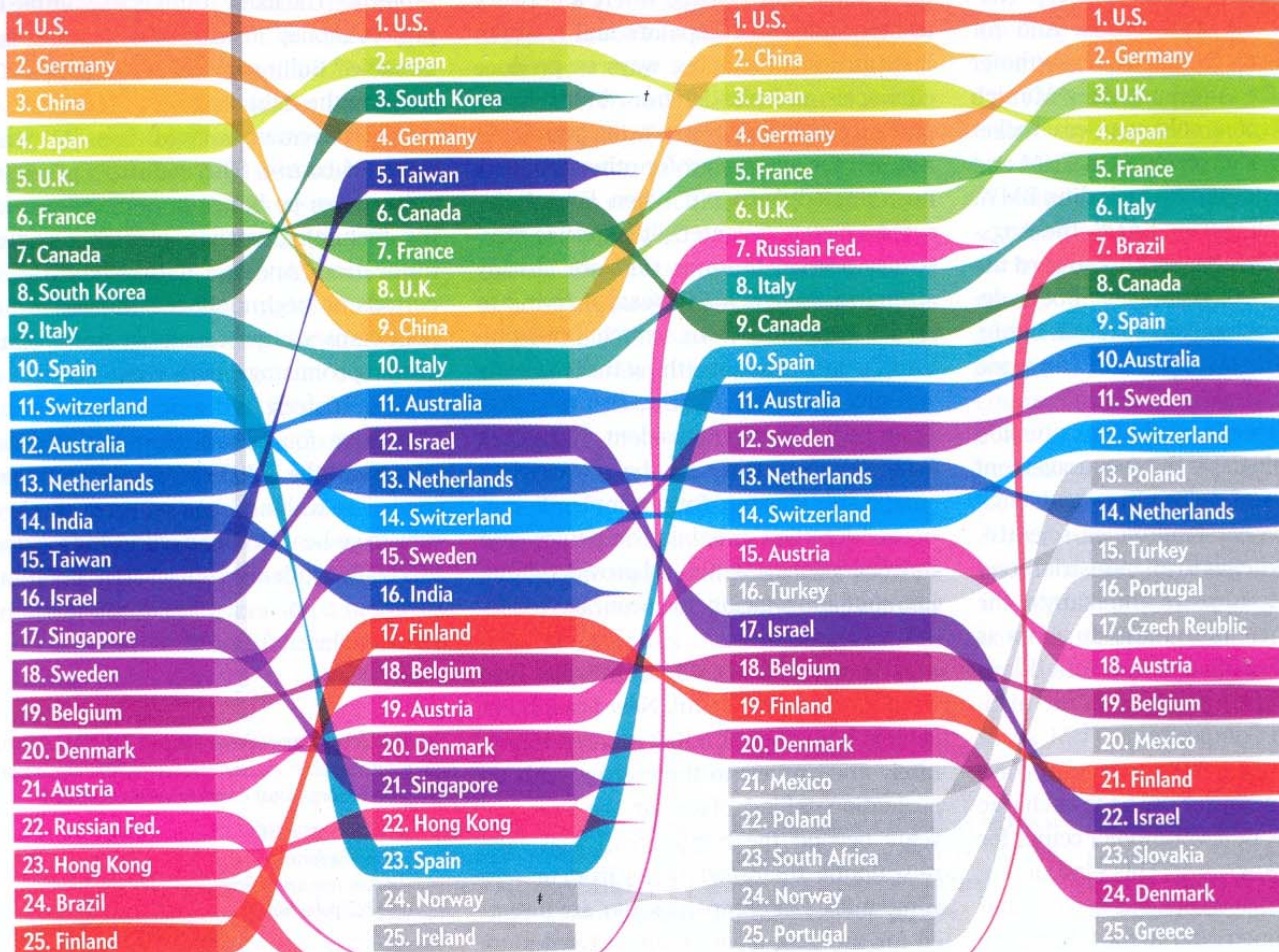
Number of patents (U.S. Patent and Trademark Office, 2011)

EXPENDITURE

Gross domestic expenditure on research and development (2009*)

HIGHER EDUCATION

Number of science and engineering doctoral degrees awarded (2009*)



*Data set is primarily limited to Organization for Economic Co-operation and Development (OECD) member countries. Some values are from 2007 or 2008.

†Country is not a part of the OECD data set for research and development and/or doctorates.

‡Countries in gray do not rank among the top 25 for research papers.

Interactions between countries in scientific research

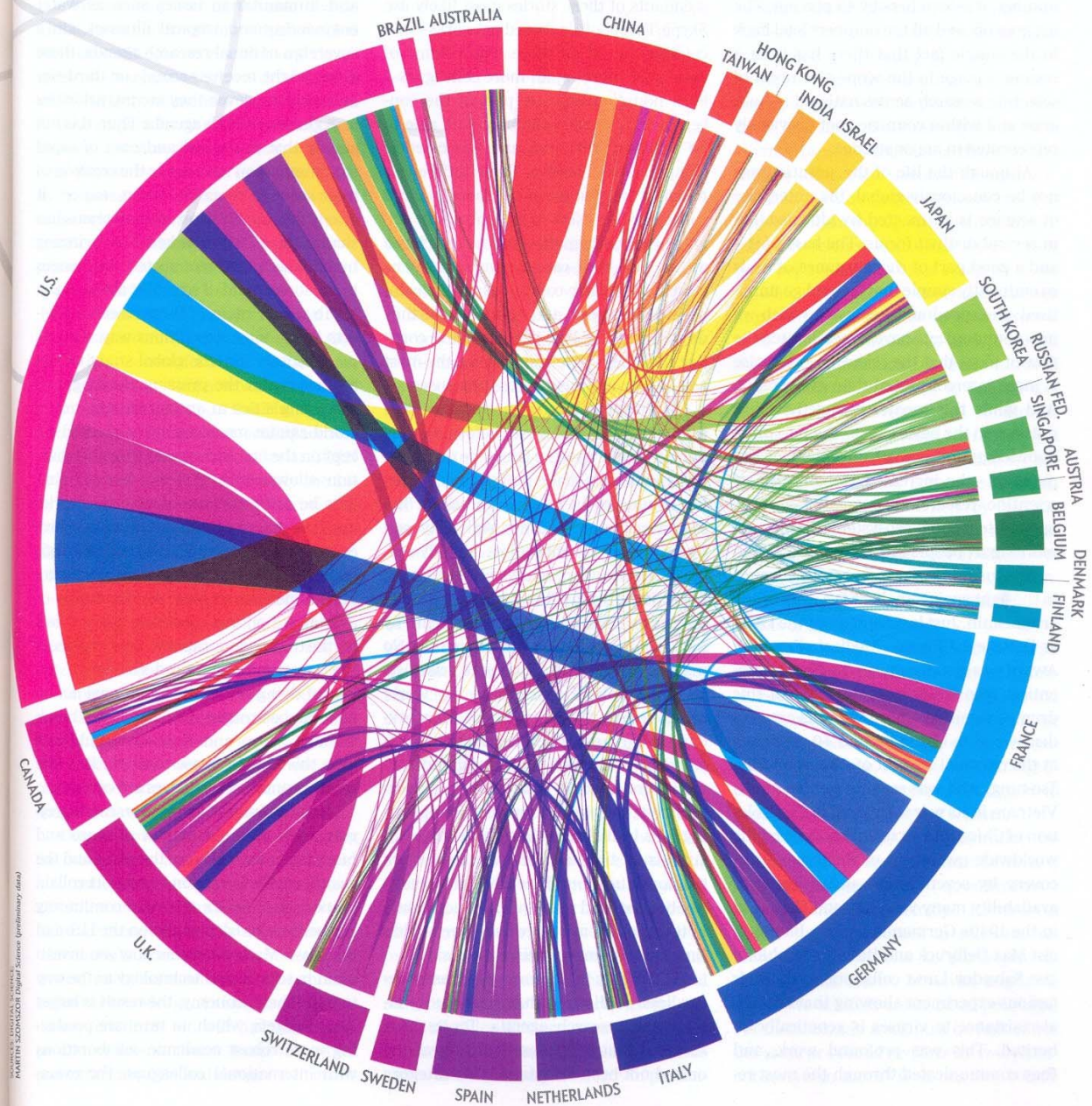
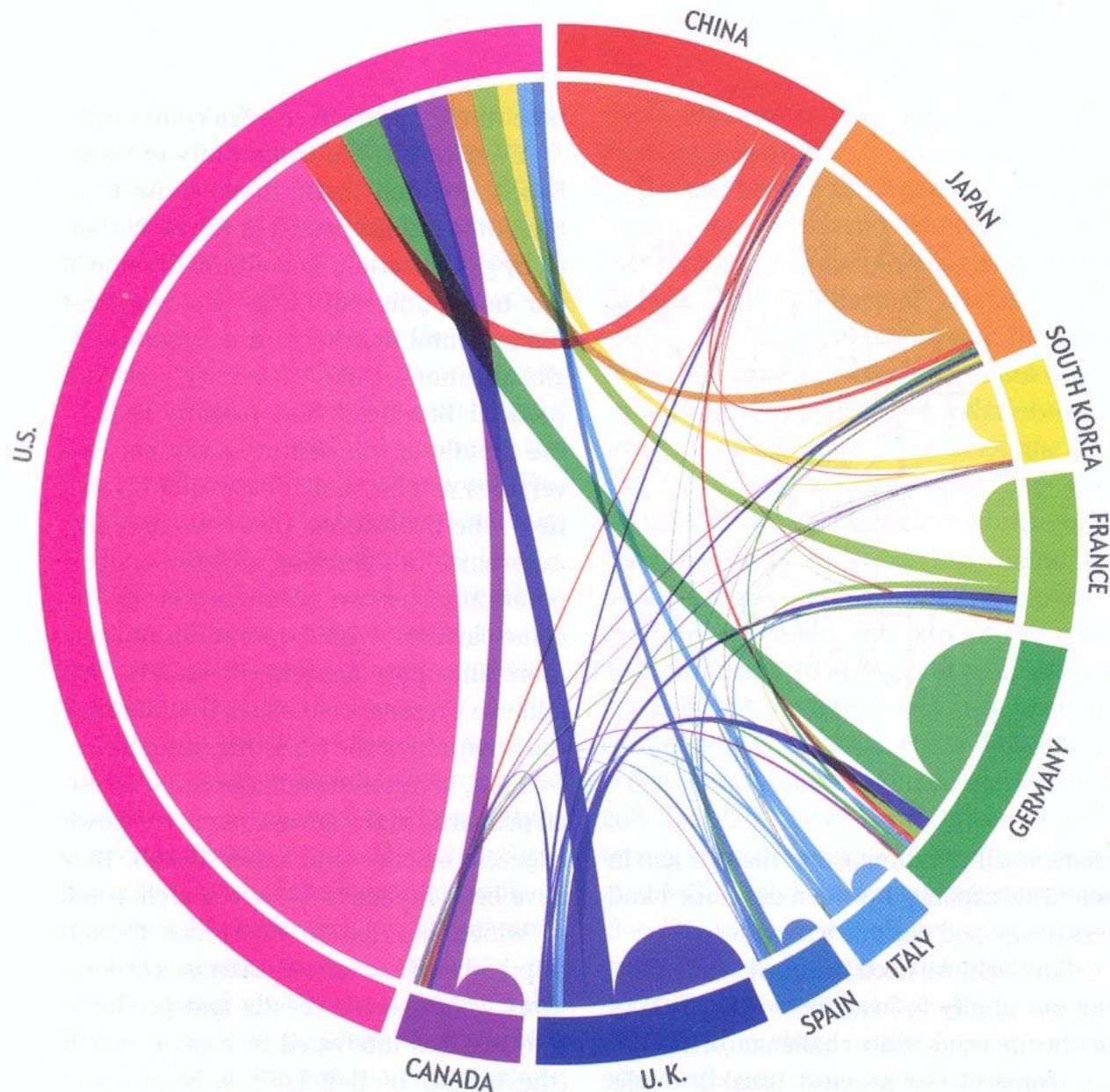


PHOTO: GETTY IMAGES; SCIENCE; MARTIN SZCZANSKI/Digital Science (preliminary data)

**Collaborations
between
scientists within
and outside
same country**



WITHIN: Plot includes internal collaborations in the 10 nations with the highest science output. U.S. researchers work with one another more than with outsiders.

Transforming Global Agriculture

Ten Commandments For Global Agriculture



The Ten Commandments For Transforming Global Agriculture

- 1. Reform Policies And Markets**
- 2. Focus On Small-holder Farmers**
- 3. Husband Natural Resources**
- 4. Raise Agricultural Productivity**
- 5. Improve Nutritional Content**
- 6. Address Short-term Vulnerability**
- 7. Empower Women**
- 8. Reach Out To The Ultra-poor**
- 9. Support Science**
- 10. Translate Rhetoric Into Action**

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1. Reform Policies And Markets

- **Globally:** Fair trade

1. Reform Policies And Markets

- **Globally:** Fair trade
- **Locally:**
 - Remove urban bias (educ., health, etc.)
 - Improve access to markets
 - reduce post harvest losses

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**So, dealing with global poverty
requires that we address rural
poverty...**

AND

**A special focus on small-holder
farmers in developing countries in
particular to address the problem of
food security**

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3. Husband Natural Resources

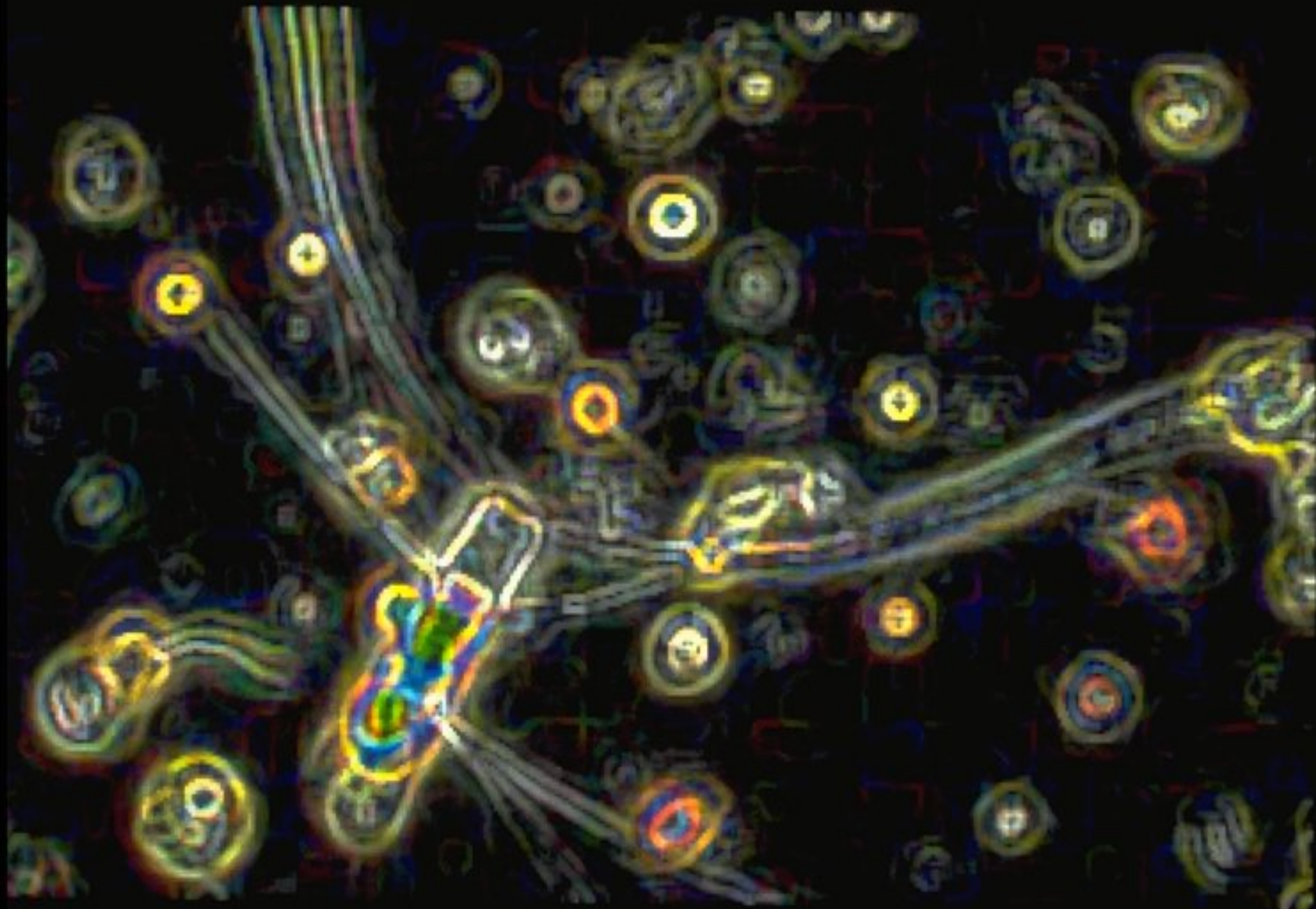
- **Agriculture is the major interface between people and nature**
- **Sustainable development is beneficial for all**
- **Resource degradation hits the poor worst**



**The Most Important Environmental
Action Is to Reduce the Need for
More Land Under Cultivation**

A photograph of a dense forest with large tree trunks and lush green foliage. The scene is filled with various shades of green, from deep forest greens to bright highlights where sunlight hits the leaves. Several thick, dark tree trunks are visible, some with lighter patches or textures. The overall atmosphere is that of a healthy, mature forest.

**It will preserve habitats and
biodiversity**



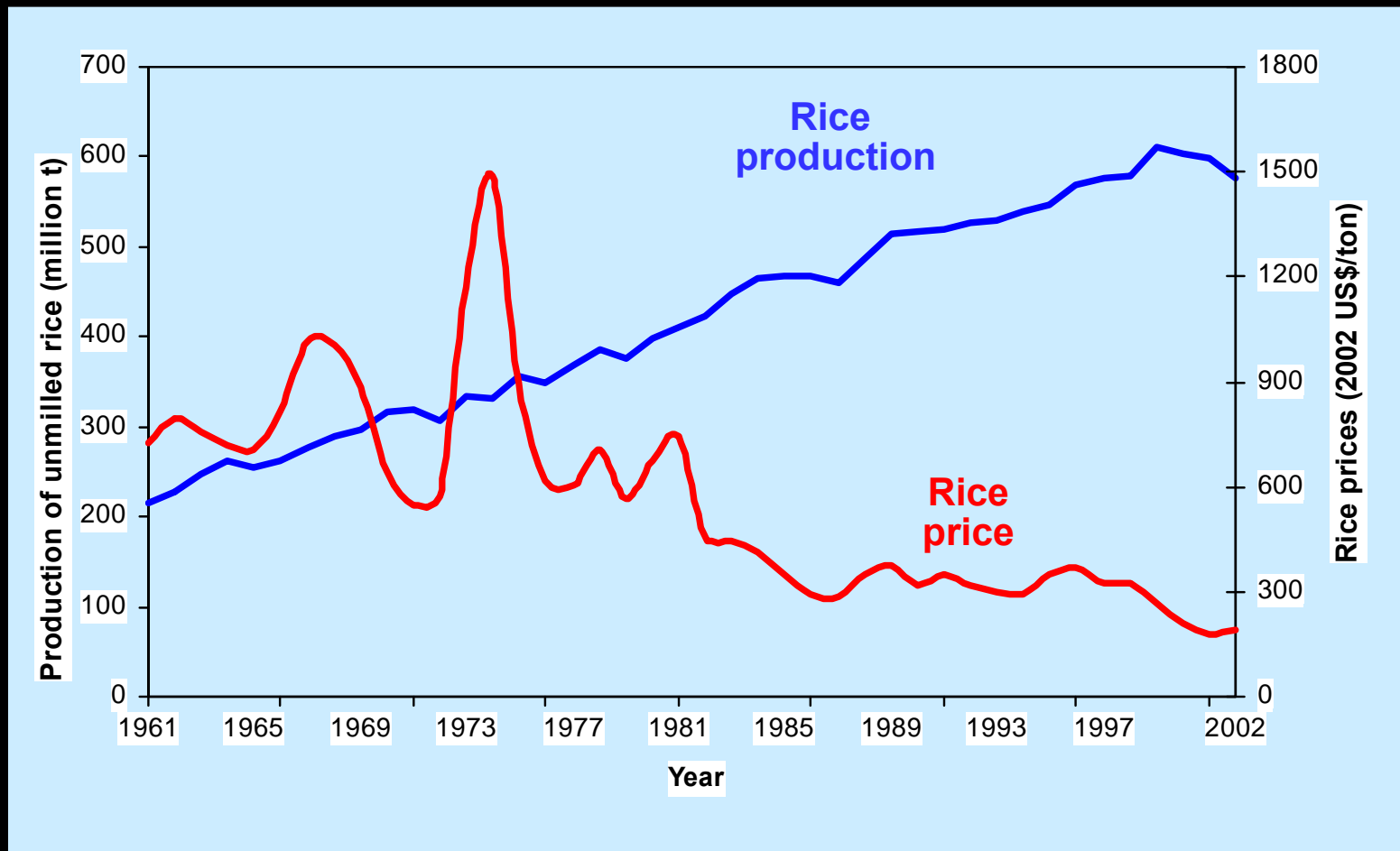
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4. Raise Agricultural Productivity

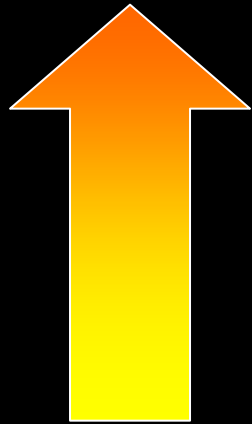
- **Productivity must rise faster than price declines to generate surpluses for the small-holder farmers and reduce their poverty as their cheaper products help reduce the poverty in the cities**
- **Measure in terms of Total Factor Productivity (land, water, labor, energy and chemical inputs)**

Trends in world rice production and price adjusted for inflation, 1961-2002



Source: World Bank Quarterly Review of Commodity Markets

Future Challenges



To Produce
More Food

Less Water
Less Land
Less Labor
Less Chemicals

Increasing
Population



New World Record in Potatoes in India: 72.9 t/Ha (March 2012)

- Bihar farmer, who happens to share the name of Chief Minister Nitish Kumar.
- Managed to raise **72.9 tons** of potatoes per hectare beating the previous world record of **45 tons per hectare** established earlier by the Netherlands.



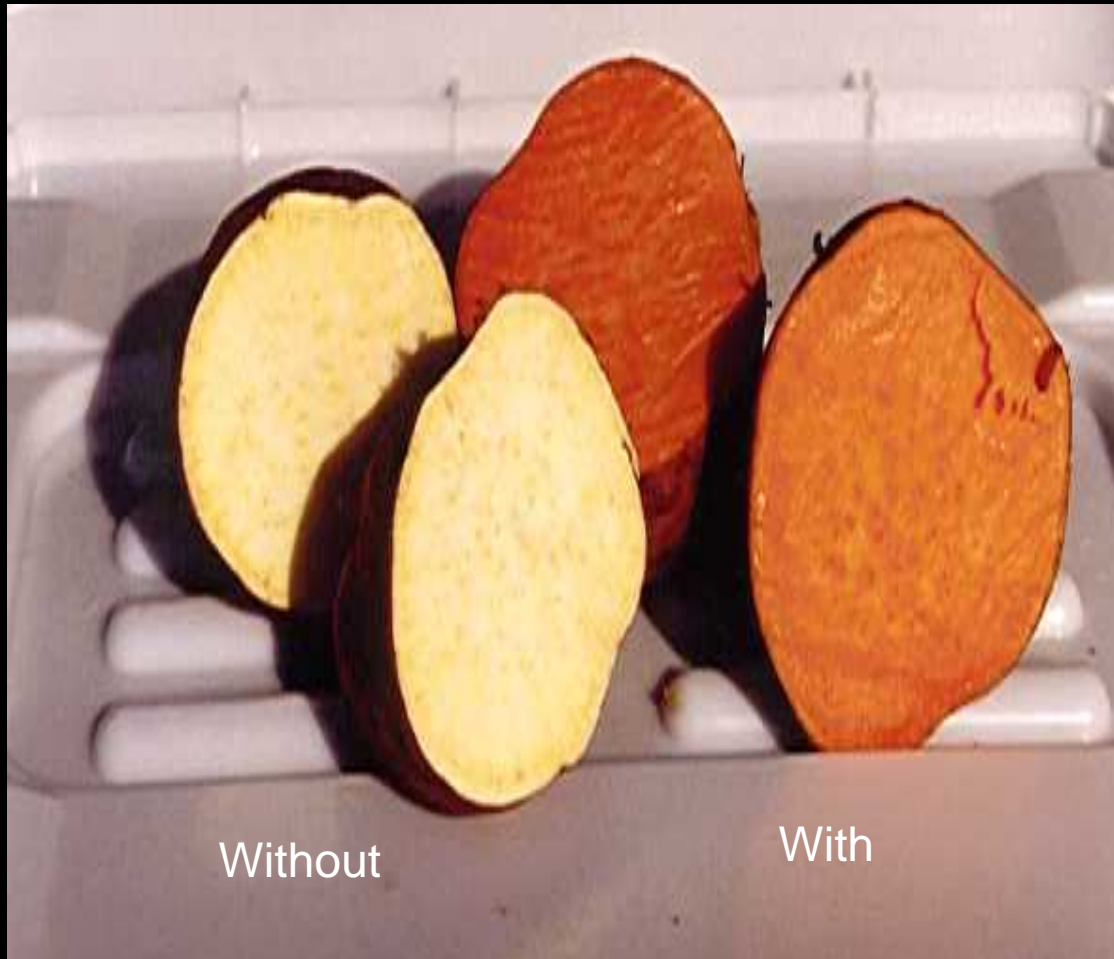
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5. Improve Nutritional Content

- **Enormous health benefits**
- **Bio-fortification is just the beginning**
- **Edible vaccines?**

Sweet Potatoes with and Without Beta-Carotene



Without

With



Longer, More Productive Lives



The Ten Commandments For Transforming Global Agriculture

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6. Address Short-term Vulnerability

- **Most farmers live precariously**
- **Downside is devastating**
- **Climate change is increasing vulnerability**









**AND ...
Reduce conflicts and
ensure Humanitarian Aid
where needed**



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7. Empower Women

- **Essential to recognize the gender dimension of agriculture**
- **Empowering Women results in major improvements in infant mortality, school enrolments, child morbidity**



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8. Reach Out To The Ultra-Poor

- **Market incentives do not work for the ultra-poor**
- **Trickle-down does not work**
- **Special Programs will be needed**





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9. Support Science

- We need more support for science in developing countries
- Not just technology
- We need **partnerships & collaborations**
- That is how meaningful **innovations** will come about to solve food security problems



The scientists of the world want to promote collaborations and partnerships to advance innovation



Launch of the InterAcademy Council report
Inventing a Better Future
United Nations, New York, 5 February 2004

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Rhetoric
Declarations
Plans
Targets



Action

***“We have the capacity to
eliminate hunger from the
face of the earth in our
lifetime.***

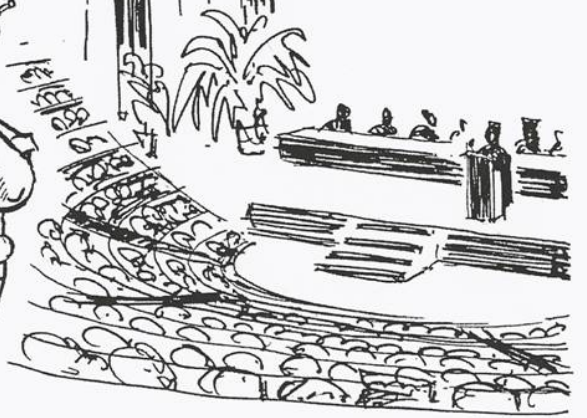
We need only the will.”

**President John F. Kennedy
World Food Congress 1963**

WE'RE STILL MISSING A
KEY TRANSLATOR...



A.U.
LAUNCH



9.7.02
SOWETAN E.
ZAPIRO

The Ten Commandments For Transforming Global Agriculture

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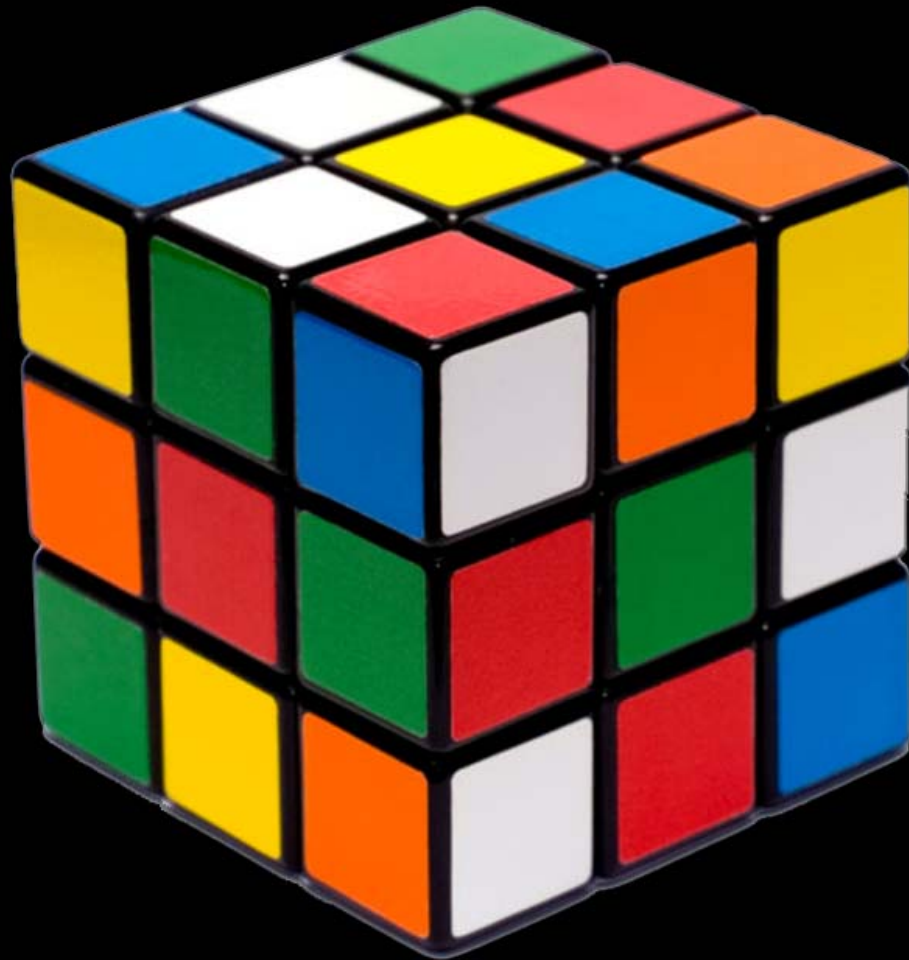
Envoi



**All the Parts Are Essential:
They Reinforce Each Other**



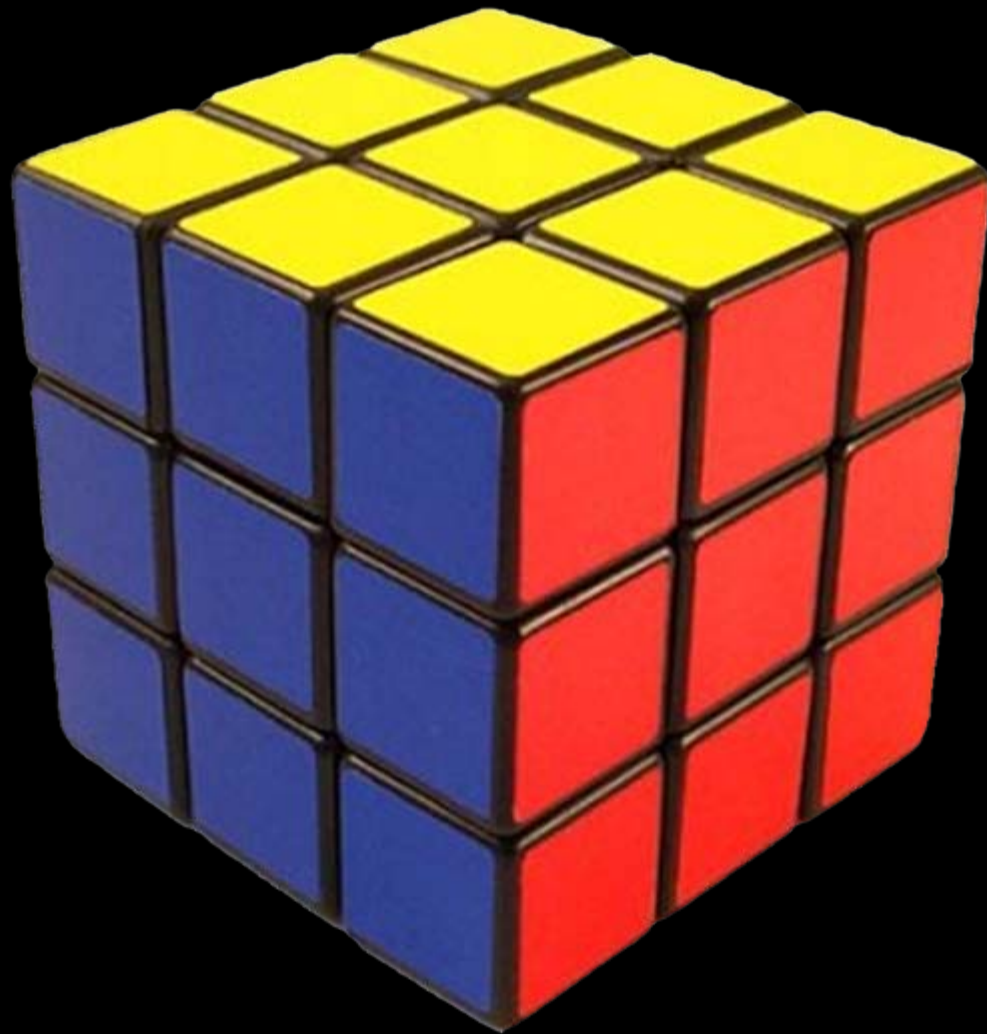
**The Whole Is More Than
the Sum of the Parts**





It can be Mastered and Solved





Dare to dream!

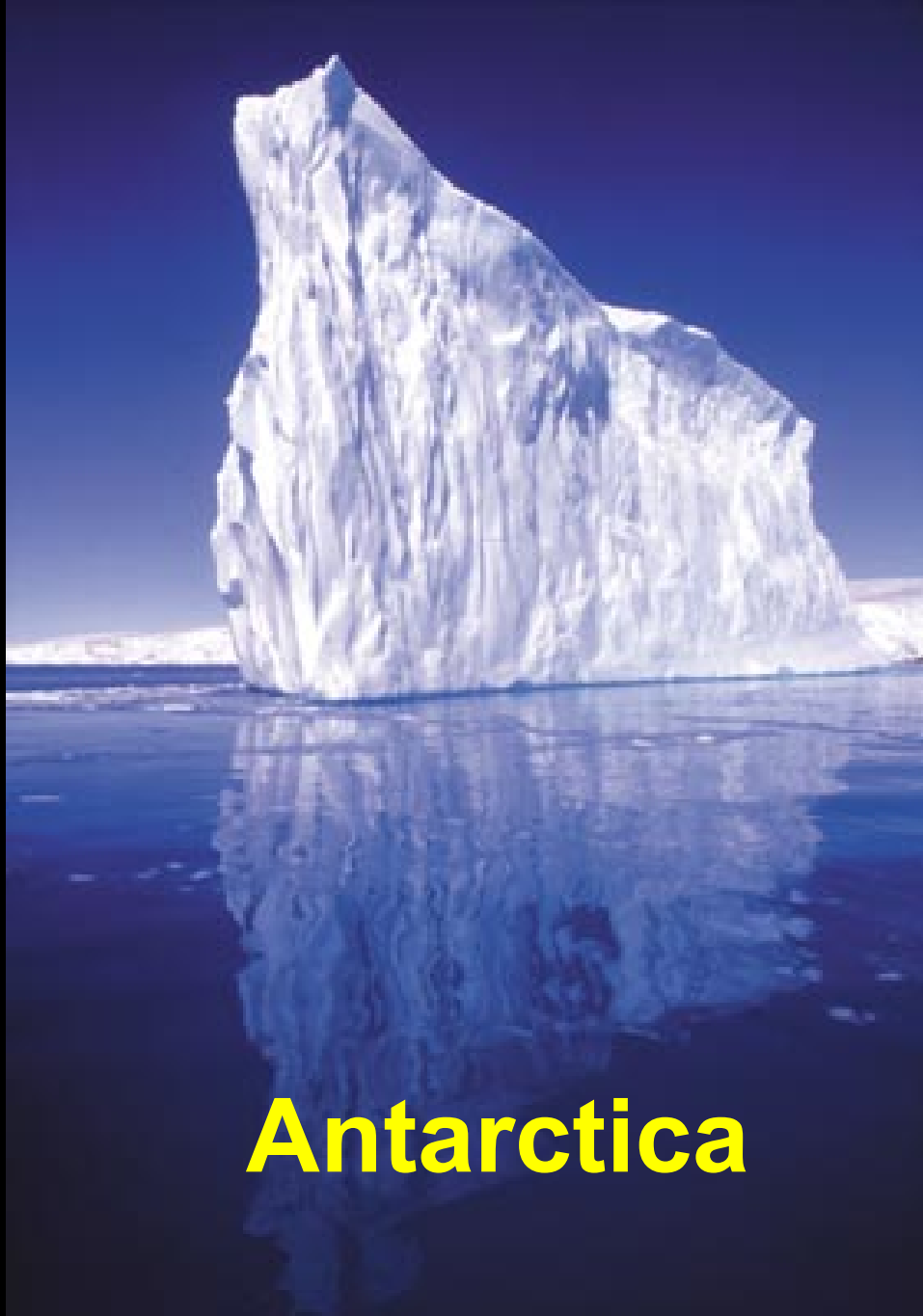
Dare to be bold!

We can abolish Hunger



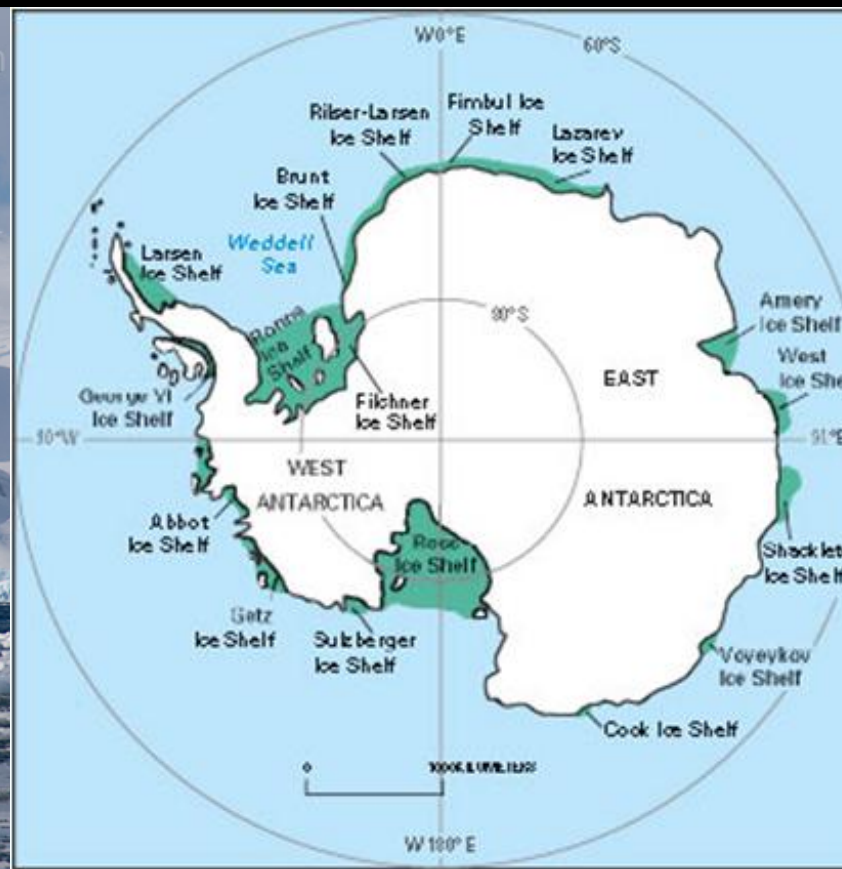
The world must go beyond wild capitalism





Antarctica

© Tom Dempsey / Photoseek.com



Bring in the Bulldozers!

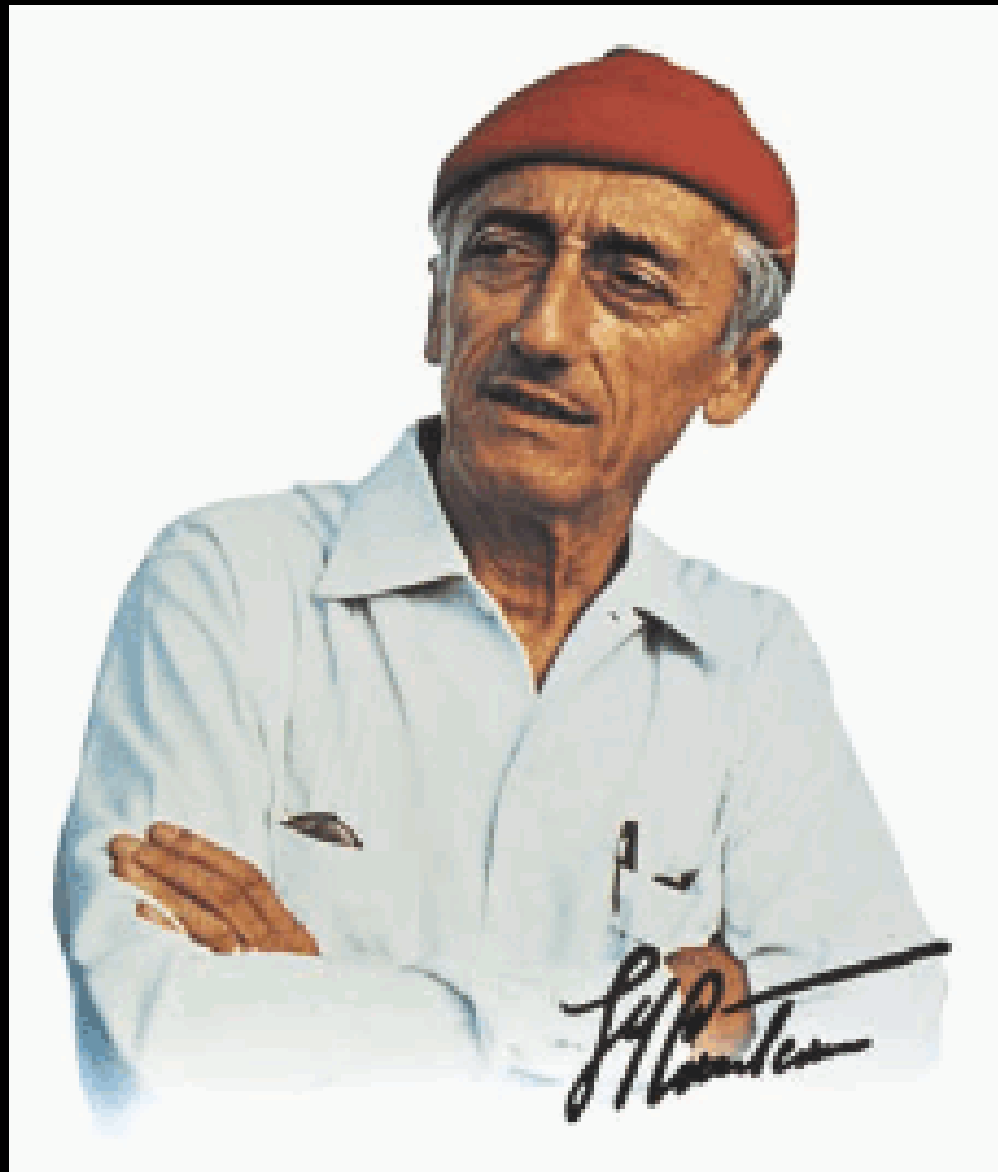






Money!







1963



“We have the capacity to eliminate hunger from the face of the earth in our lifetime. We need only the will.”

President John F. Kennedy
World Food Congress 1963

1963



**“I have a
dream...”**

I Have A Dream...



**“I have a dream that
my ...children will one
day live in a nation
where they will not be
judged by the color of
their skin but by the
content of their
character”.**

Dreams can be realized!



“The Audacity Of Hope”



Elected 2008, Re-Elected 2012

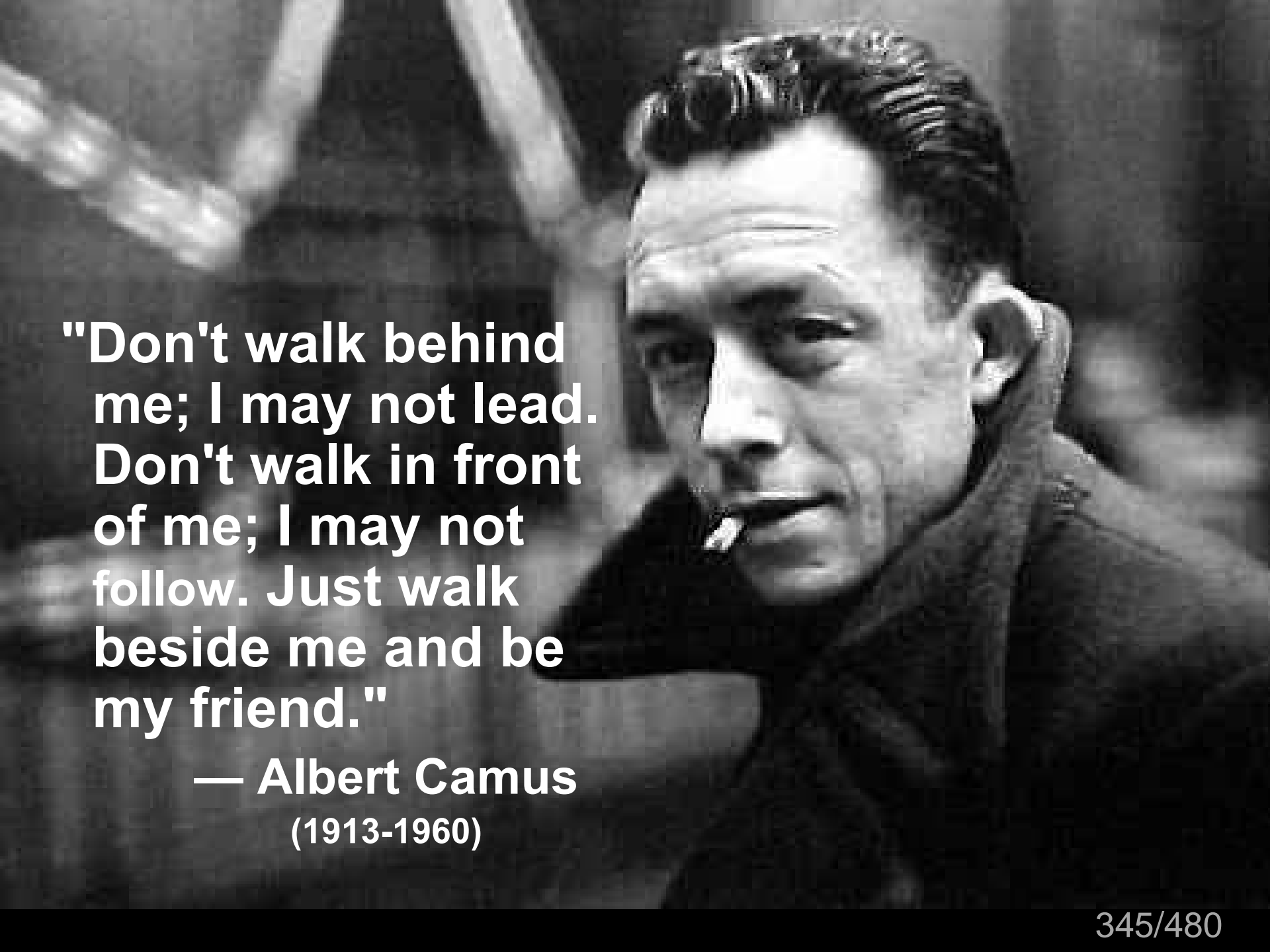


“ Never doubt that a small group of thoughtful, committed citizens can change the world; indeed it is the only thing that ever has”.

– Margaret Mead

Partnerships and collaborations



A black and white photograph of Albert Camus, looking slightly to the left with a cigarette in his mouth. The background is blurred, showing what appears to be a crowd or a public setting.

**"Don't walk behind
me; I may not lead.
Don't walk in front
of me; I may not
follow. Just walk
beside me and be
my friend."**

**— Albert Camus
(1913-1960)**





**There is
so much
we can do
for a
whole
generation**



For The Whole World...



Thank You

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