Sustainable Intensification of Food Supplies

CARL HAUSMAN
Vice Chair
CGIAR Consortium Board

Managing Director
Global Government and Corporate Affairs
BUNGE, Ltd.

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Ever greater competition
GHG
Water
Globalization
Investment
Land
Nutrition
Wealthier population
NINE
REDUCE FOOD WASTE
Research
CLIMATE CHANGE
Extension
Price Volatility
BILLION
Financial resources for farmers
Deforestation
Food production constraints
Technology & Information
ENERGY
PEOPLE
CHOICE
Trade
Natural resource degradation
Market Integration

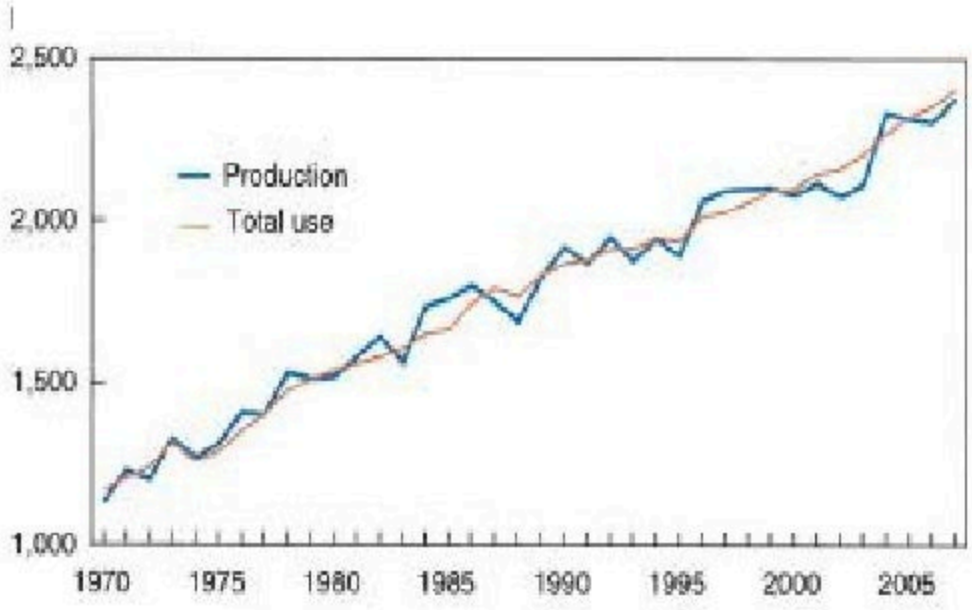
Farmers around the world grow enough food

2050

Sustainable intensification may be the answer to their continued success

World grain and oilseed production and use

Million Metric Tons



Source: USDA

With New Imperatives

- Produce more of better quality
- With fewer resources & less pollution
- Reaching 3 billion more customers -- including today's billion who go hungry & 2 billion persons yet to be born
- Safe, affordable, healthy & desirable options
- On time
- In a more crowded, complex, mostly urban environment

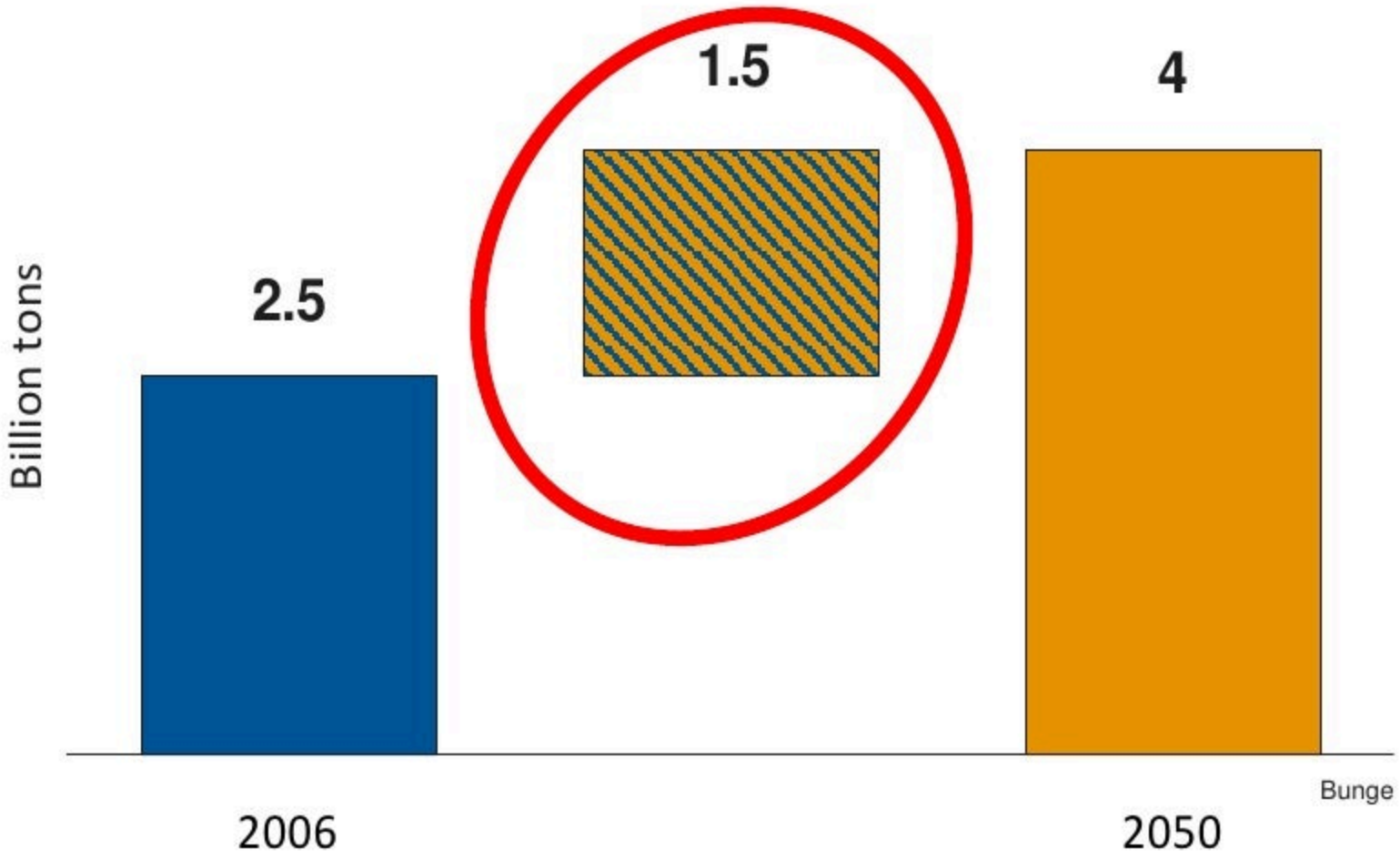
The challenge

A 70 percent increase in global food production is needed to feed more than 9 billion people

FAO

The challenge, in context…

The world needs to grow more grain and oilseeds…and do this sustainably



Bunge estimate : Grains: rice, corn, wheat, barley, sorghum, rye and oats. Oilseeds: soy, canola, sun and peanuts.

Productivity must double in many areas

LAND

Increased acreage has been a major factor keeping global food production ahead of demand.

Large future gains will not come from new land, but from application of knowledge.

WATER

Four in 10 live in water-scarce areas today. That number climbs with climate change, urbanization & population growth.

Sixty percent of all crops today rely on rain. Efficient water management is vital.

LABOR

Highest agriculture productivity correlates most with inputs & access to knowledge & roads.

Labor will migrate to better paid, off-farm opportunities.

INVESTMENT

Technology & infrastructure are indispensible. Seed developed for local conditions boosts production, but lags where its needed most. Infrastructural gaps encircle the world.

“Sustainable intensification”

Addresses

Climate change

Natural resource degradation

Reduction of food losses/waste

Changing diet patterns

Economic returns

- Producing more output from the same area of land
- Reducing the negative environmental impacts – to land, water, air, biodiversity
- Increasing contributions to natural capital and the flow of environmental services

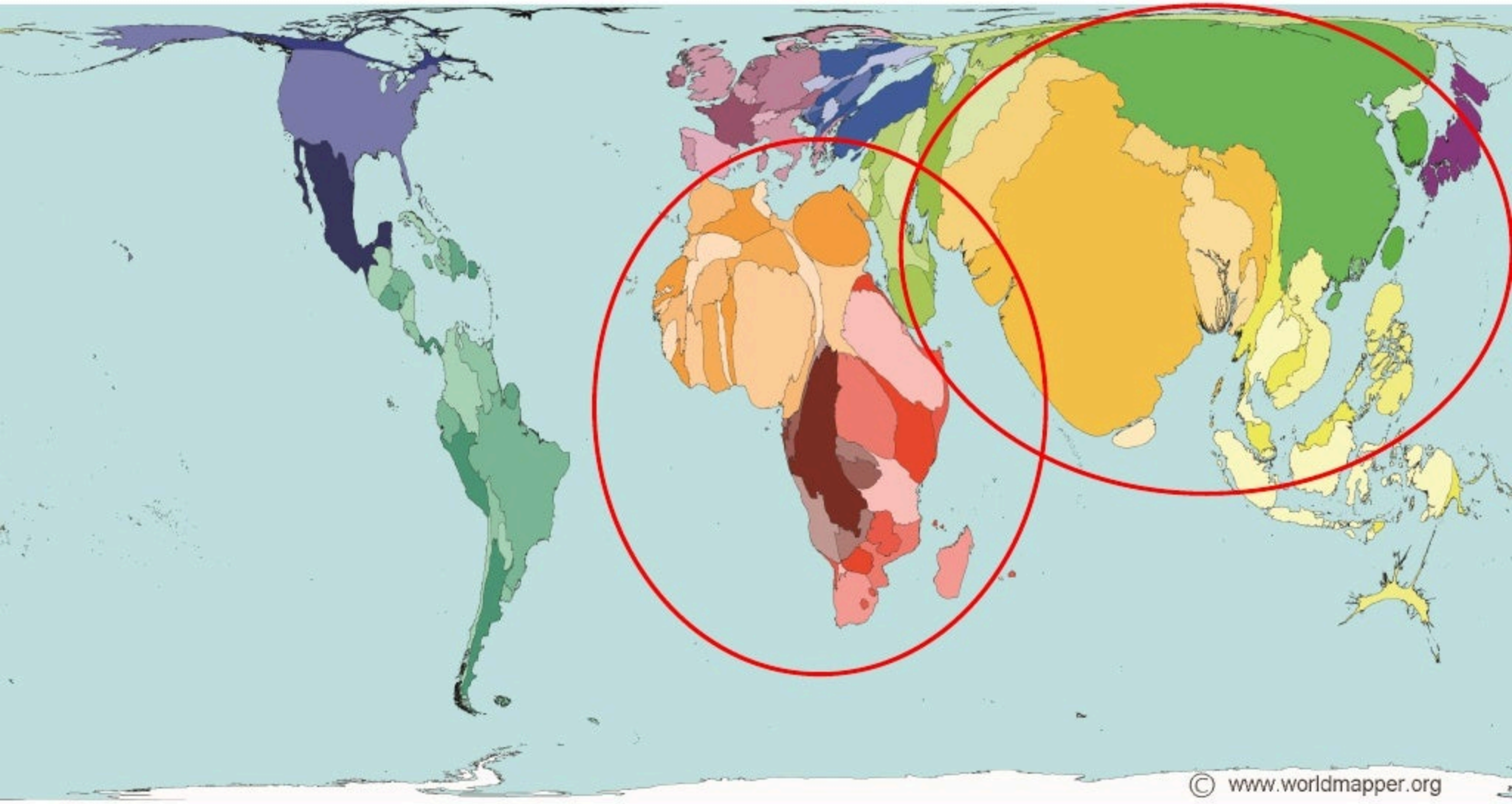
(Royal Society, 2009; Godfray et al., 2010).

But it is not a simple matter. If one picture is worth a thousand words…

Selected Worldmapper graphics tell a more complete story succinctly

Asia, Africa see greatest population increases

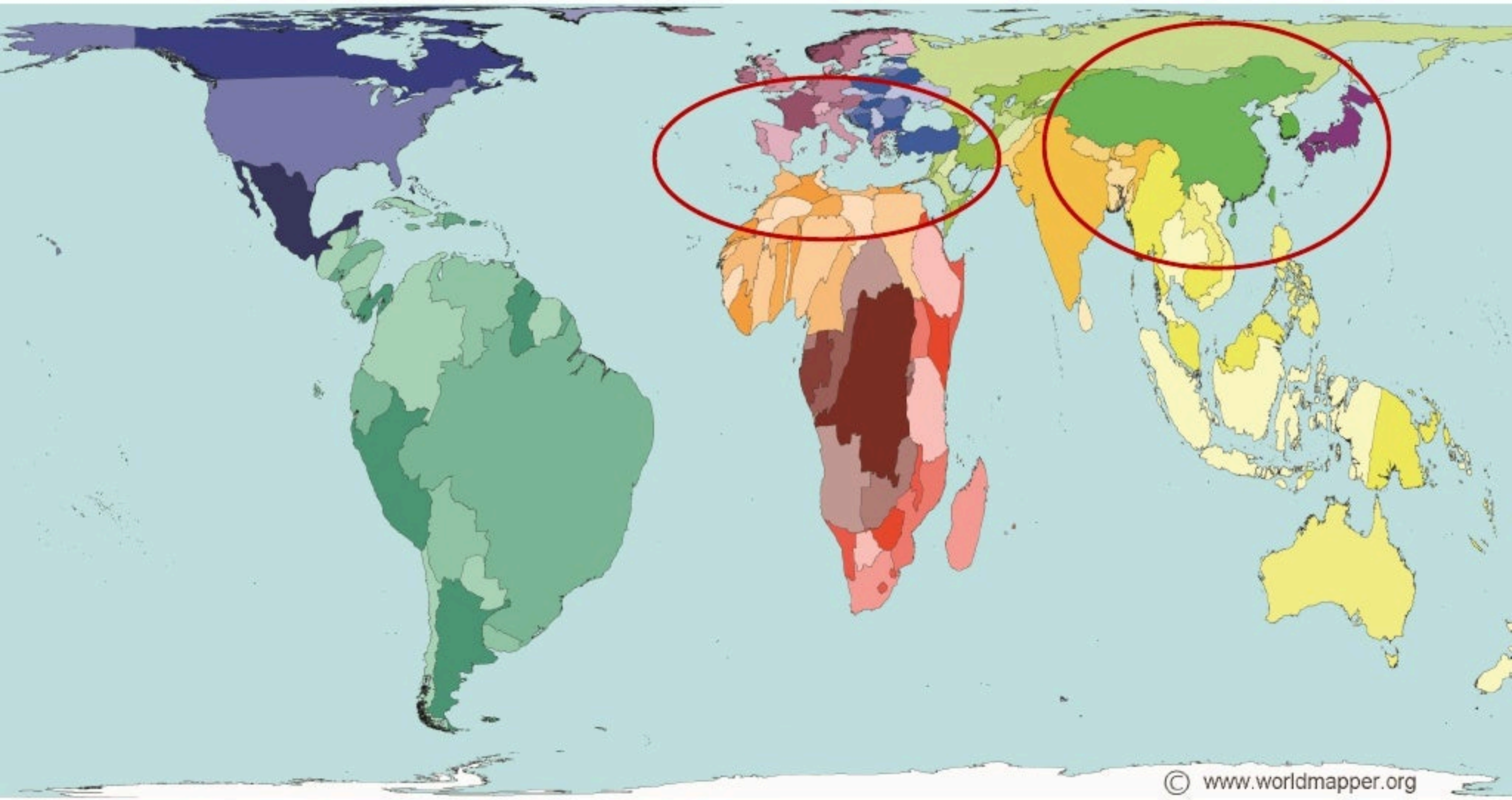
Population projections for 2050



Data: United Nations Population Fund, 2005

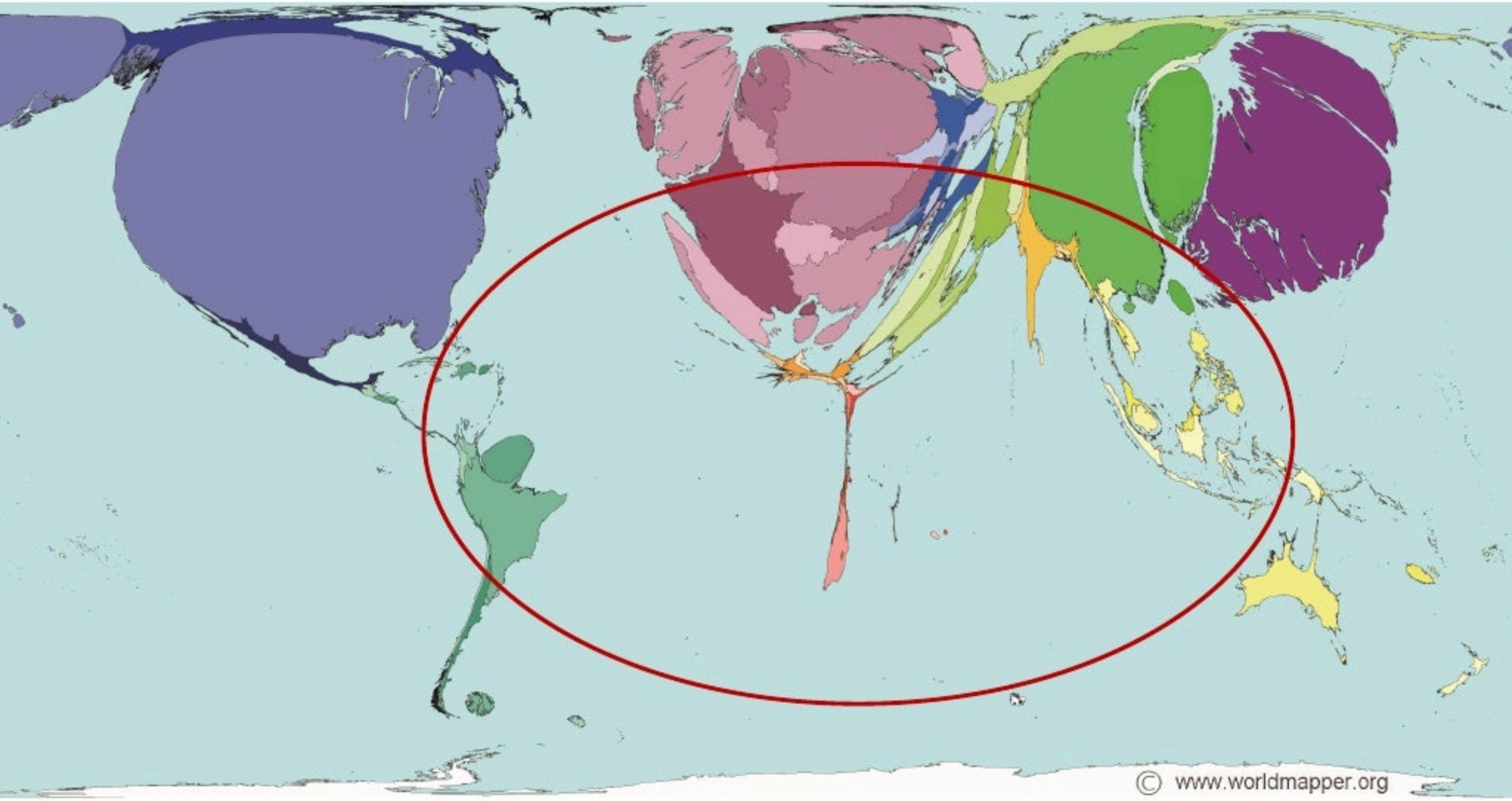
Rainfall: volumes do not track with population

Densely populated areas often located in drier areas



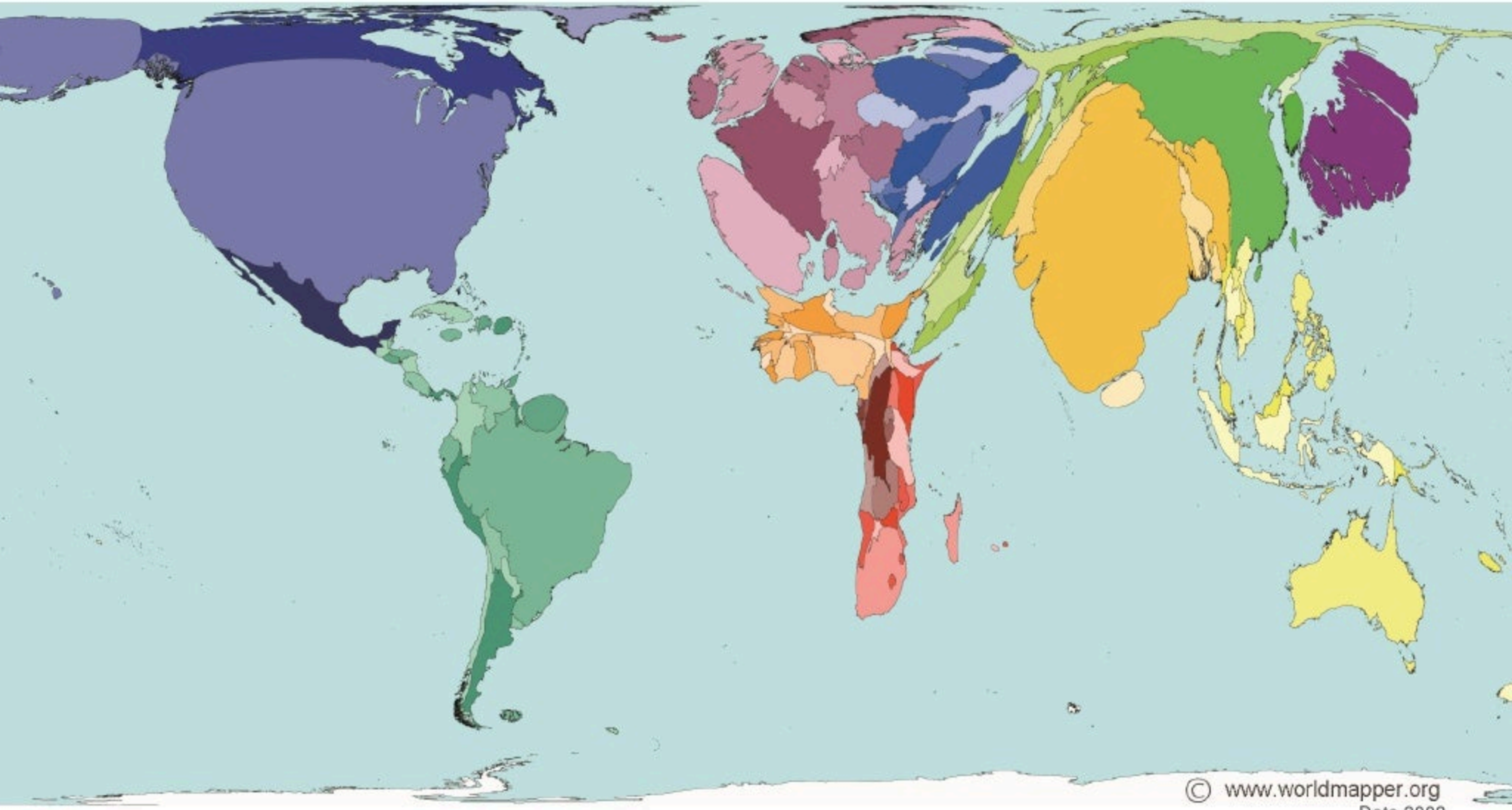
R&D expenditures lag where needed most

Sustained investments starting now needed to double production

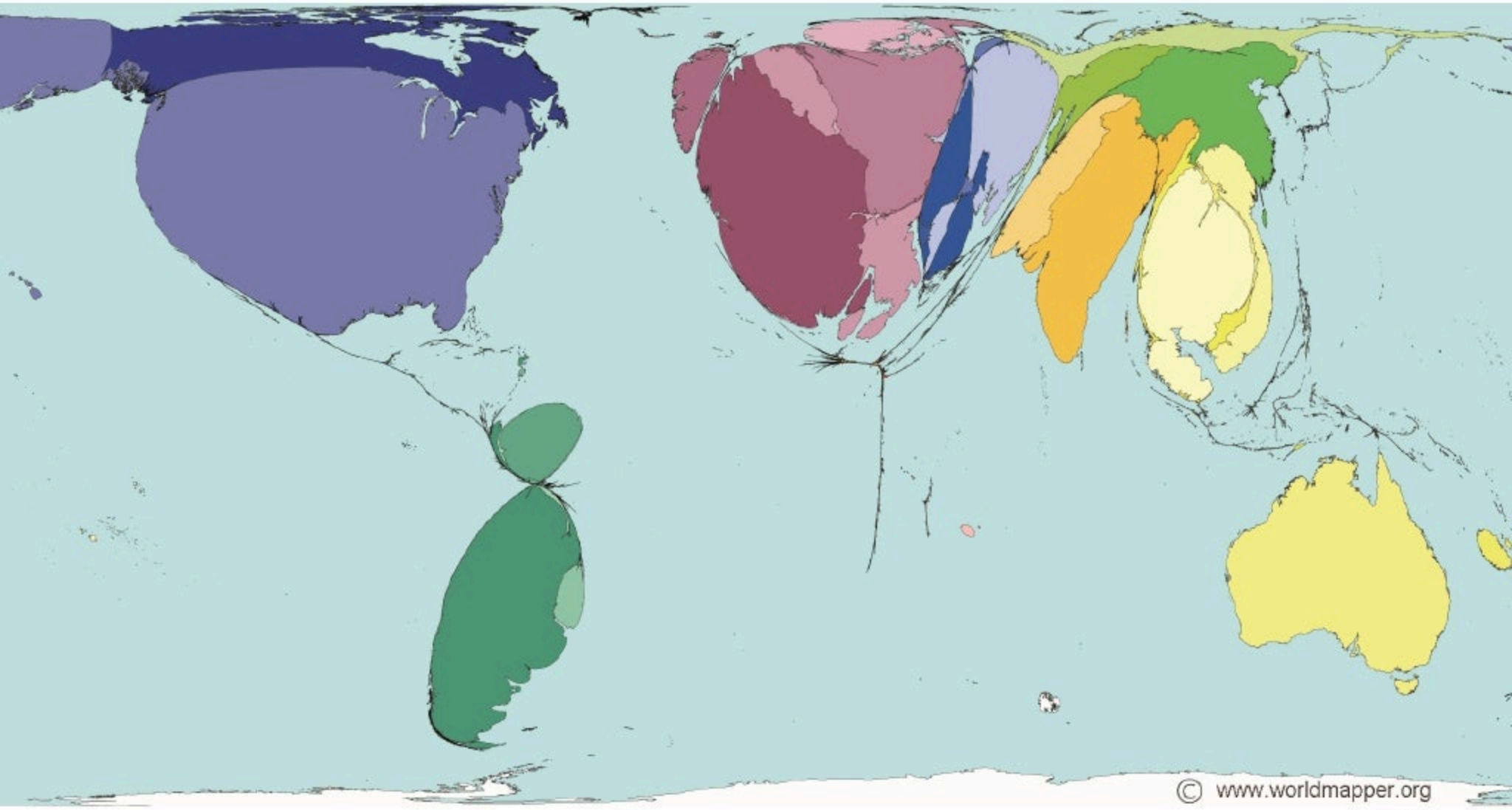


Access to roads ties to economic opportunity

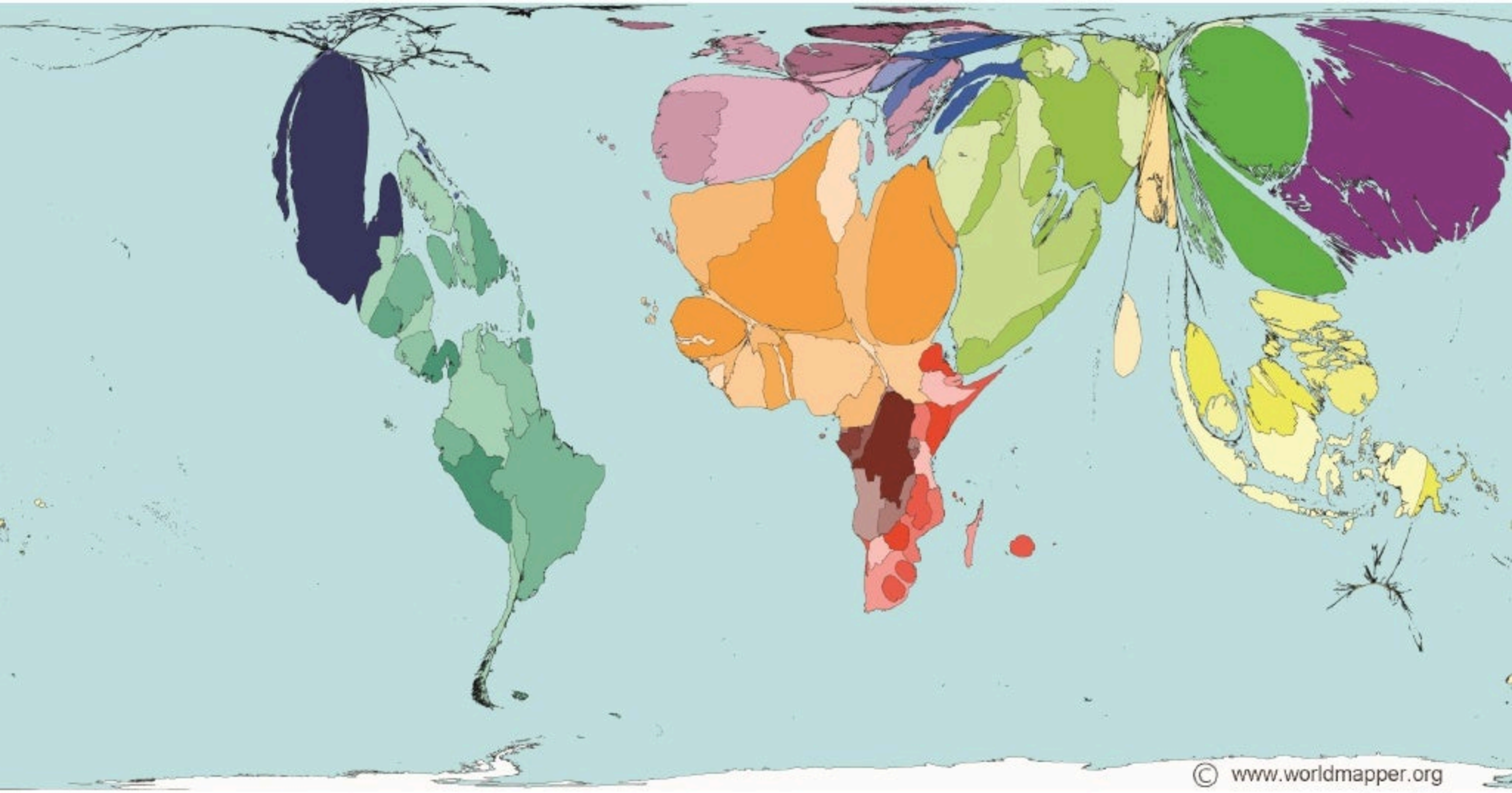
Higher agricultural productivity allows broader economic development



Good land, water, climate allow cereal exports



Cereal imports complement local production

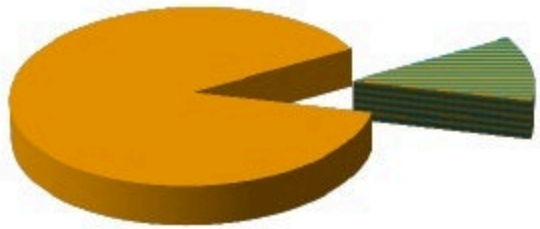


Data 2002

Cereals and oilseed markets today

7 billion people rely on 2.5 BMT of cereals and oilseeds

2.5 BMT Global Production



International Trade

Local/Regional

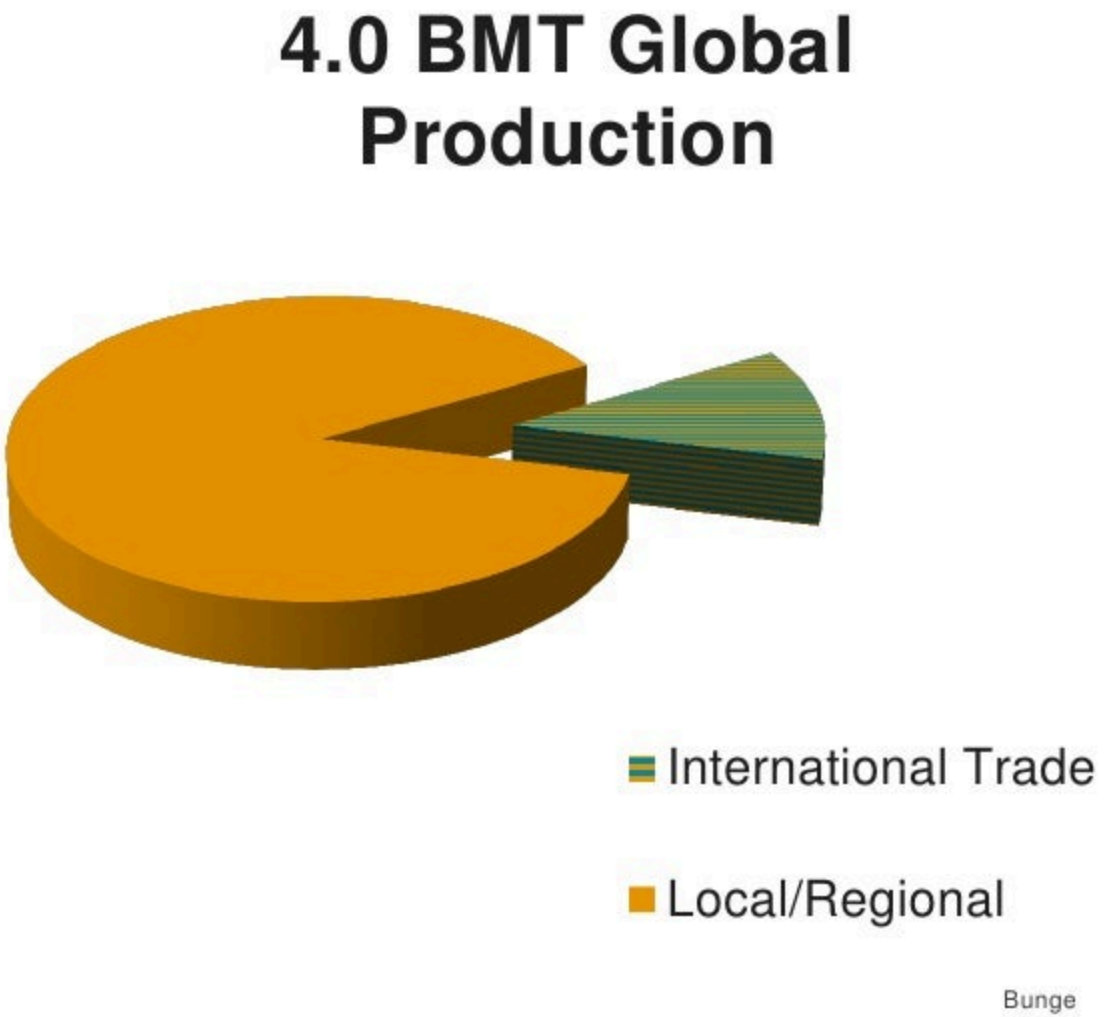
Bunge

Source: Bruinsma, Jell. "The Resource Outlook to 2050"
FAO Expert Meeting on How to Feed the World in 2050

- Roughly 300 million metric tons – about 12 percent of total demand – enter into world cereal & oilseed trade, improving diversity of foods, improving nutrition & filling food needs in deficit areas
- World food trade helps assure adequacy of diet for nearly a billion people today by complementing local & regional supplies

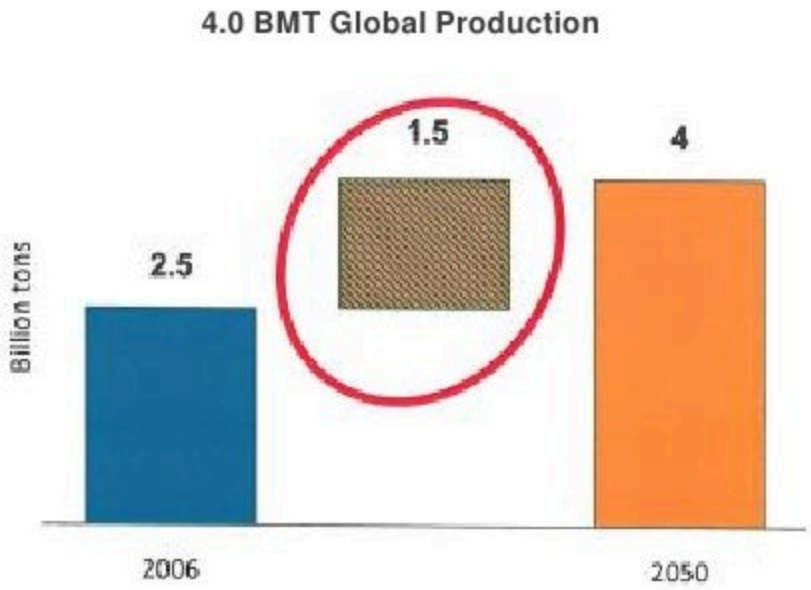
International trade will play a larger role

Carrying food to a more urban population

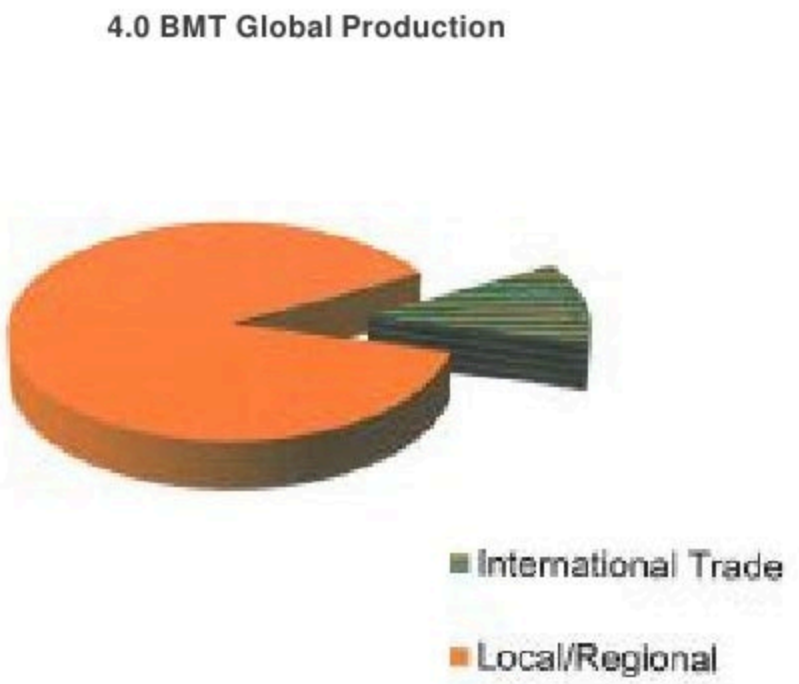


- Trade's complementary role grows more crucial, & will outplace market growth
- 1.5 BMT more from the world's bread baskets & other areas is needed
- Areas of optimal land/water may contribute most with least environmental stress
- An estimated 600 MMT of grains & oilseeds from areas of surplus – about 15 percent of total production – will be transformed & delivered for consumer needs.

Consider production need and trade potential



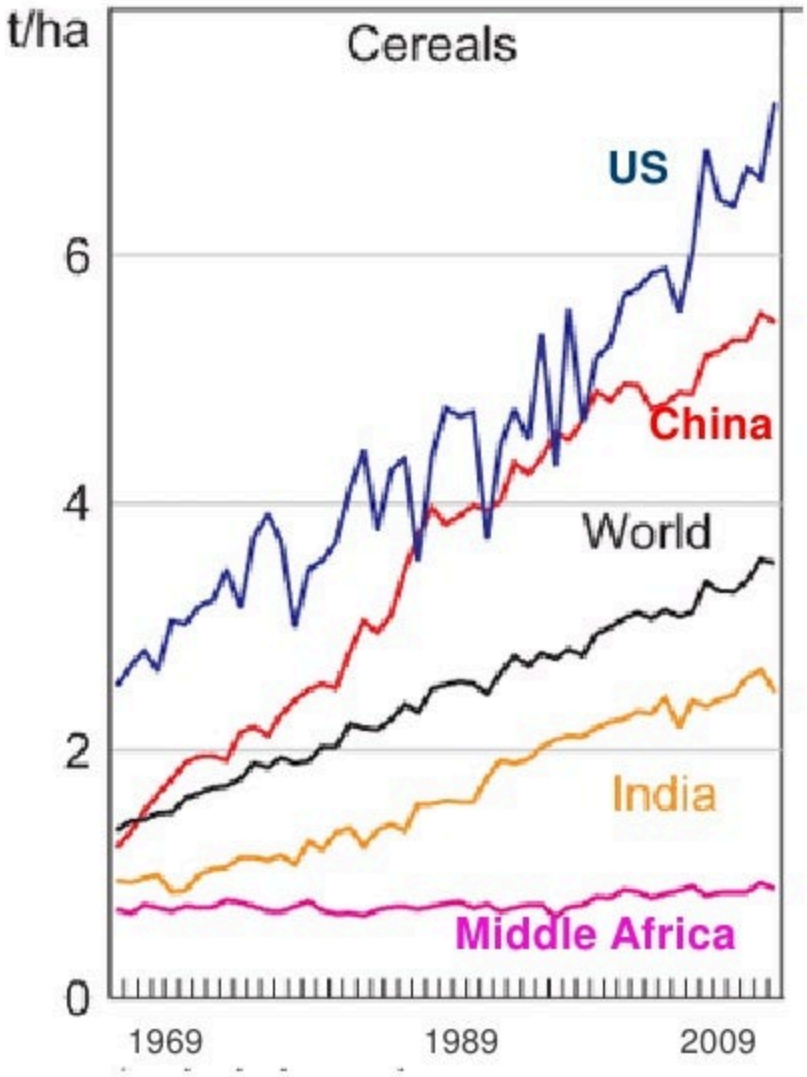
2050 Food Need



2050 Trade Potential

Cereal yield gaps are significant

- Middle Africa* has gone without yield improvement in four decades
- In general, Africa has
  - Damage from efforts to expand arable land
  - Depleted soil nutrients from reduced fallow periods
  - Low fertilizer usage -- 1/10th of Europe's
  - Low investment in irrigation – 4 percent
  - Very little scientific plant breeding for Africa
- "*Africa fails to keep up not because it has exhausted its potential but because too little is invested to develop its potential.*" Rob Paarlberg



Source: FAO

* Middle Africa includes Angola, Cameroon, Central African Republic, Chad, Congo, Democratic Republic of the Congo, Equatorial Guinea, Gabon, Sao Tome & Principe

Despite high rates of return, R&D lags

Global productivity growth will be determined by today's investments in agricultural R&D

- Underfunding is problematic everywhere & targeted more broadly than on on-farm productivity
- Private multinationals have contributed significantly focused on commercial farmers in developed regions & food product development
- Public investment in the developing world remains low relative to need to produce more & better food
- NGOs use are a new force, using nontraditional matrices and focused on poverty alleviation

- International collaborative research is of special benefit to smaller, poorer countries
- CGIAR is well recognized for its work

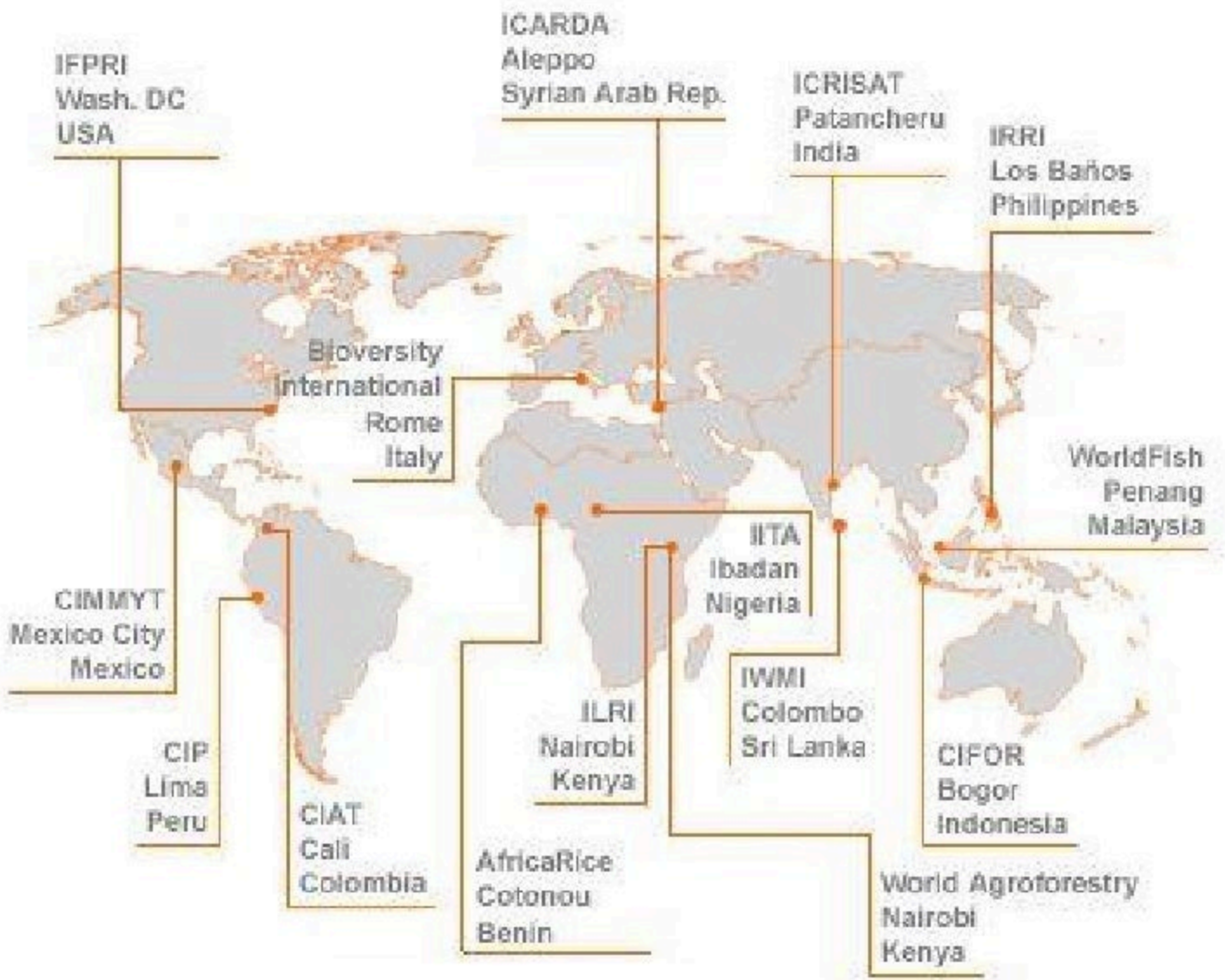
A strategic partnership dedicated to advancing science to address the central development challenges of our time:

- **Reducing rural poverty**
- **Improving food security**
- **Improving nutrition and health**
- **Sustainably managing natural resources**

Its research is carried out by 15 International Agricultural Research Centers, working in close collaboration with hundreds of partners worldwide.

www.cgiar.org

CGIAR Centers and Locations



CGIAR

Delivering on the Vision:

SRF and CGIAR Research Programs

CGIAR's leverage points

- Integrate food security and sustainable agriculture into global and national policies
- Raise the level of global investment in sustainable agriculture and food systems in the next decade
- Sustainably intensify production while reducing greenhouse gas emission and other environmental impacts of agriculture
- Develop specific programs and policies to assist those that are most vulnerable to climate change and food insecurity
- Ensure basic nutritional needs are met and foster healthy and sustainable eating patterns worldwide
- Lower food loss and waste
- Create comprehensive, shared, integrated information systems that encompass human and ecological dimensions

CGIAR's Commission on Sustainable Agriculture and Climate Change

Population growth in less rich, food deficit areas

Calls for responsible & optimal use of resources

Source: Microsoft

- **Research** to improve our food & agricultural systems to deliver better nutrition & relieve stress on the environment
- **Extension** that shares knowledge so that people may apply it successfully
- Accepting the benefits of **trade**
- **Making investments** in infrastructure
- **Leadership** by governments & businesses to make strategic decisions in time

$40 trillion investment needed in infrastructure

And that covers only the mere basics for 2050

Planning & preparation take years before building & becoming operational

- Food security, climate change adaption, energy, water, environmental & public health security all require appropriate infrastructure
  - Link farmers to consumers, users to knowledge, people to social institutions that advance human wellbeing
  - Public roads, river locks, ports, bridges, water systems, power
  - Private railroads, warehouses, vehicles, transparent commodity exchanges
  - Key to reduce post-harvest waste and food safety

To summarize

We can feed the world. The challenge calls on us to make strategic decisions now

- Raise productivity globally, & especially in developing countries
- Higher productivity on acres already under cultivation implies more knowledge-based, market-based & capital-intensive agriculture
  - Traditional & local knowledge part of the solution
  - More research & extension
- New land into production in a way that avoids deforestation, destruction of biodiversity, over-exploitation of water resources & other environmentally destructive practices
- Accept additional food supplies from those parts of the world that have the optimal combination of land, water, climate & innovation to meet additional demand
- Food for 1 billion hungry & an additional 2 billion people born into developed & less developed areas requires substantial investment in infrastructure to price, process & deliver to consumers

Thank you.