Water and food security: The art of coping with uncertainty

Side event:

Global water crisis, food and agriculture in an era of climate change

Jean-Marc Faurès, FAO

1 200 million people are poor and vulnerable

75% live in rural areas

their livelihood is linked mainly to agricultural production

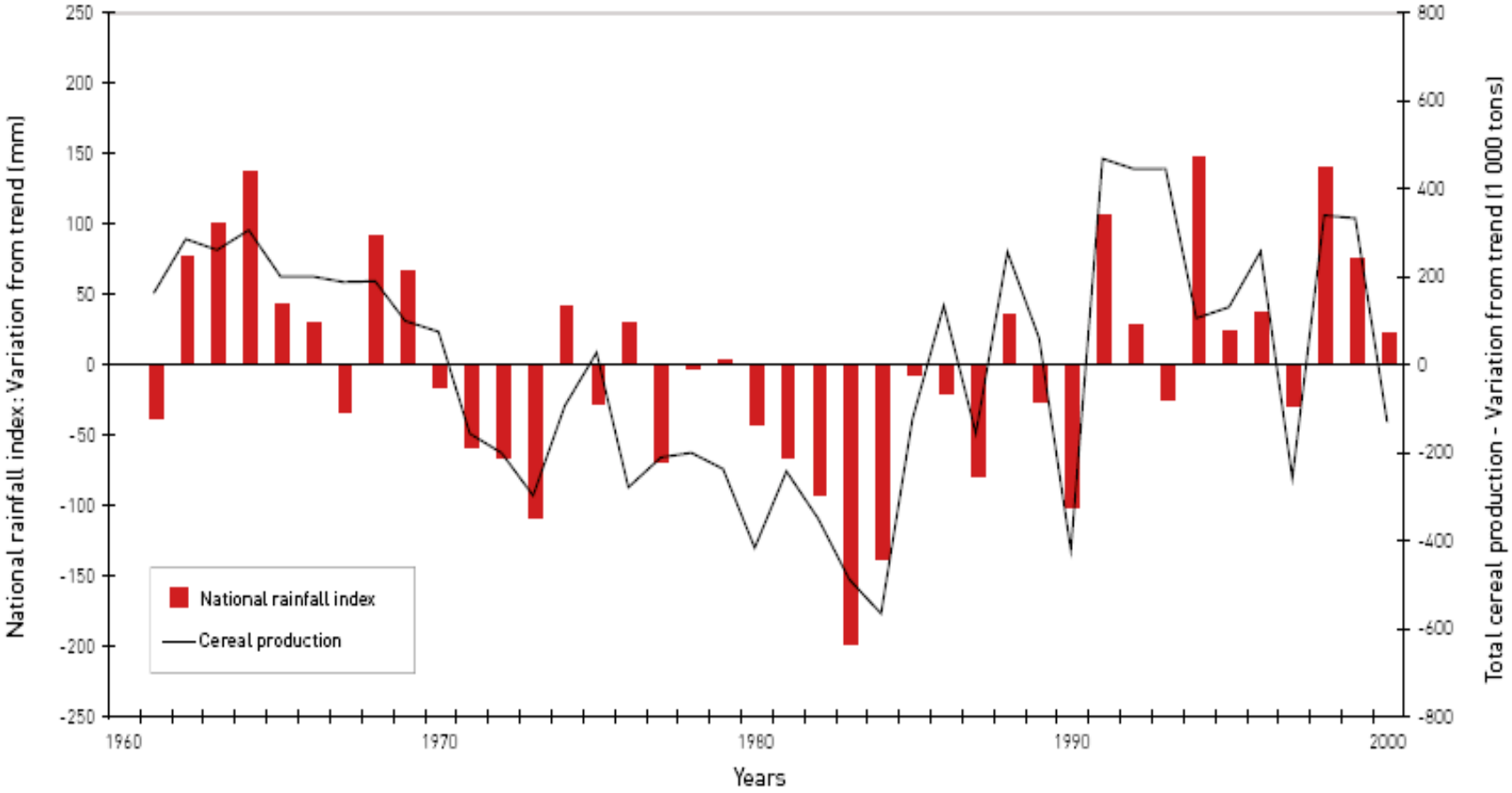
Alleviation of poverty implies sustained agricultural growth

Water is the prime input for agricultural production

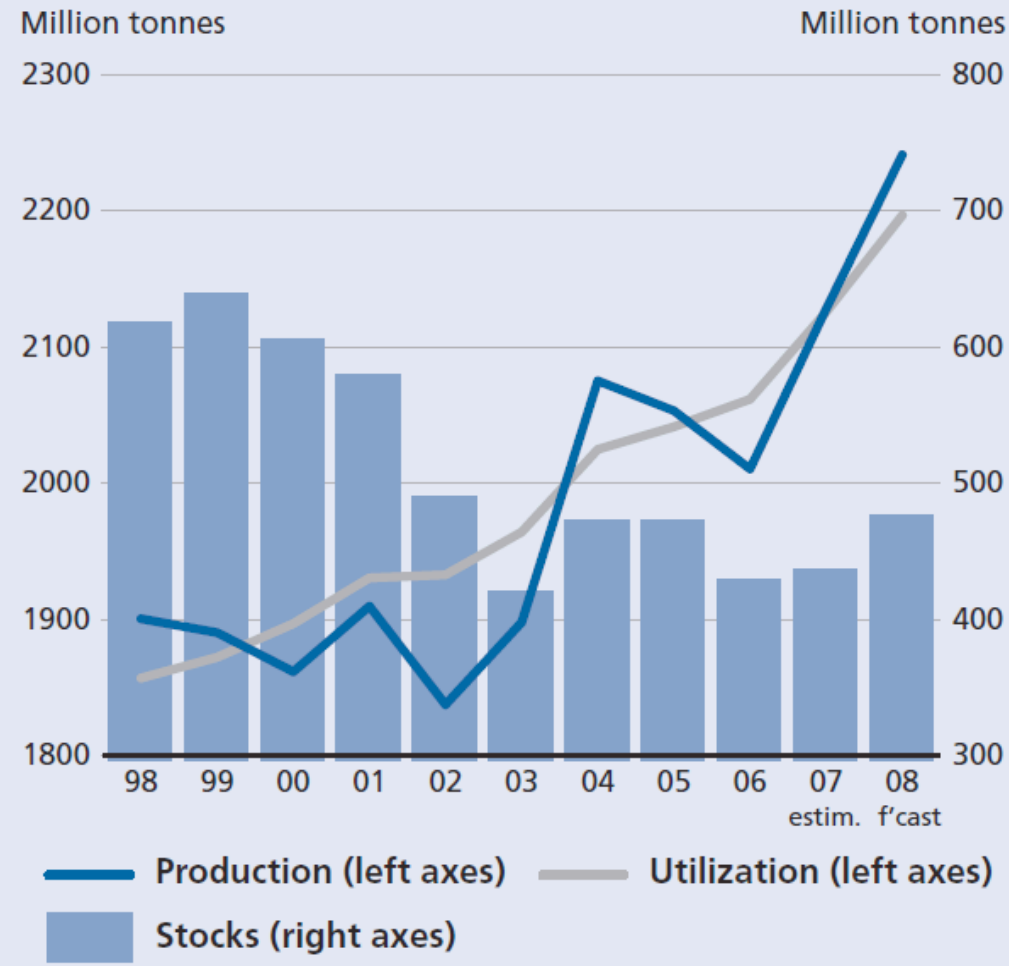
→ Need to reduce risks related to the uncertainty of the water supply

Vulnerability to climate variability

Burkina Faso: rainfall and cereal production



Cereal production, utilization and stocks



Global food crisis

Causes

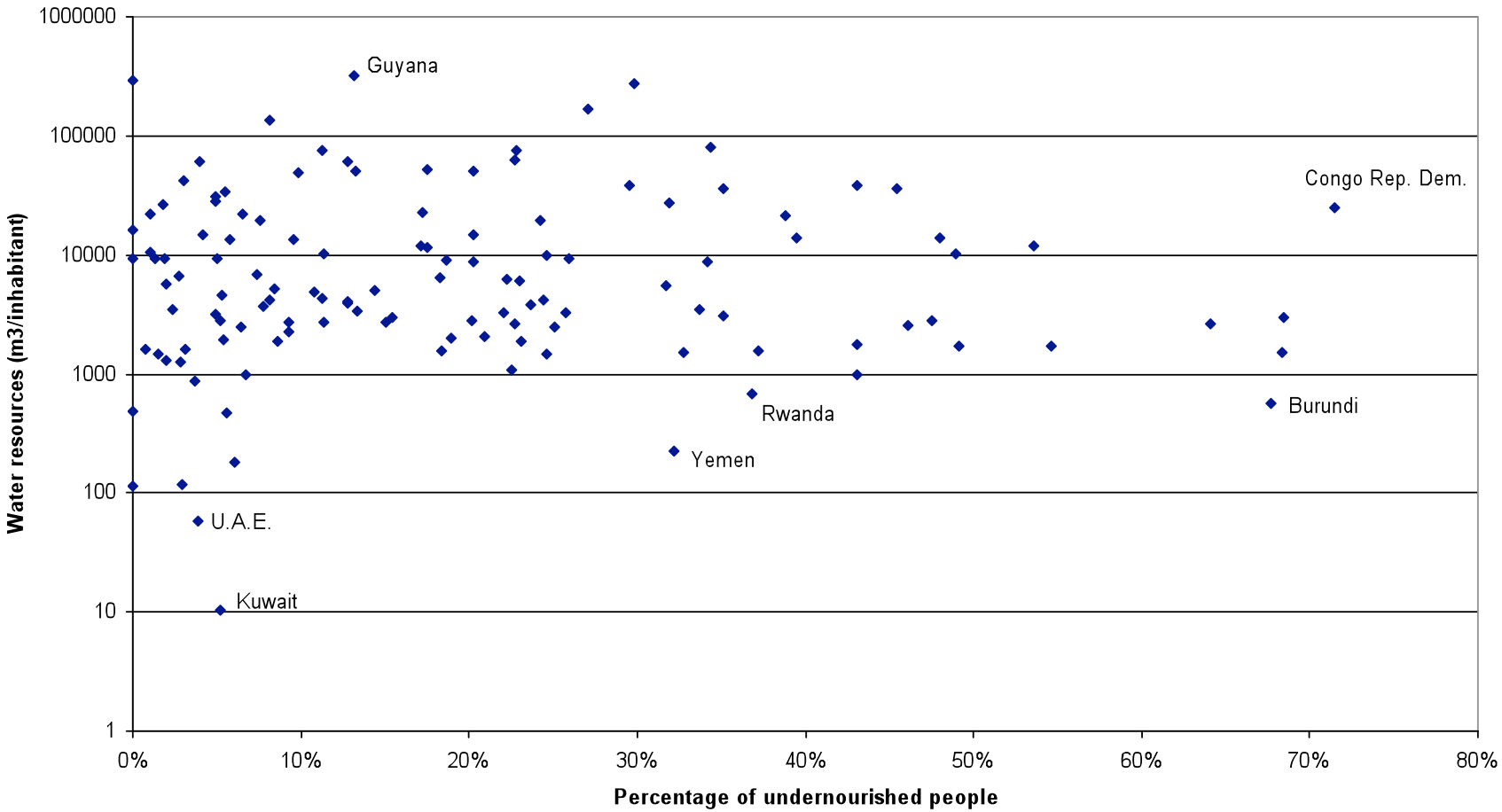
- Reduced stocks
- Sustained increase in demand from emerging economies
- Low production in several major exporting countries

- Bioenergy subsidies in US and EU
- Speculations

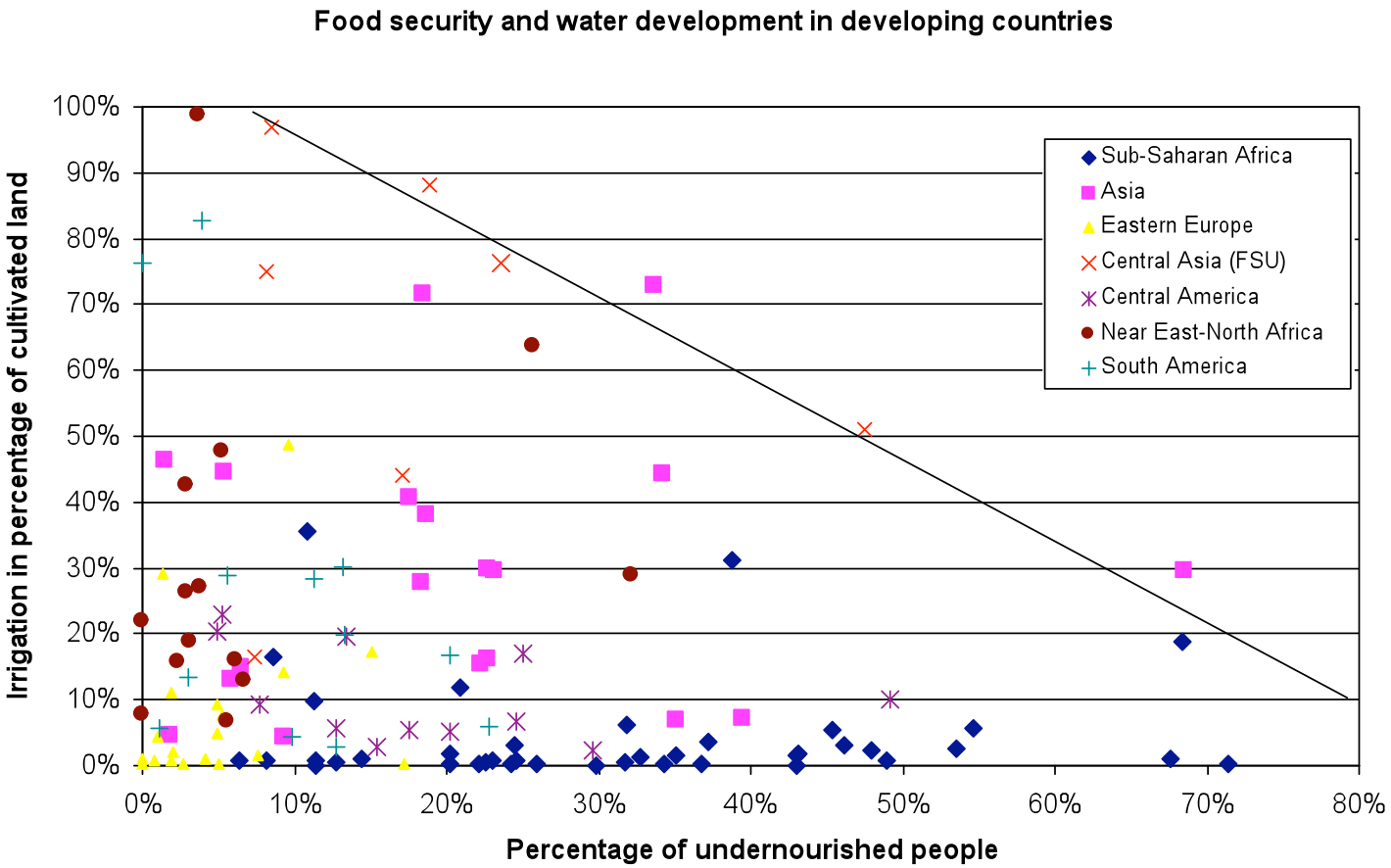
- ... and the link with energy price.

Water and food security – the missing link ?

Water Resources and food security in developing countries



The situation: Irrigation and Food Security



What is the role of water ?

Main factors affecting poverty and vulnerability of rural people:

- Access to land
- *Access to water*
- Education
- Health
- Research and extension
- Roads
- Markets
- Etc.

Access to water is one of several factors that contribute to reducing people's vulnerability

Adapt the approach

Alleviating water scarcity for vulnerable people requires changes in:

- Policies
- Laws and institutions
- Water management
- Water control technologies

For technology to serve the poor, it needs adequate incentives and institutions

Climate Change

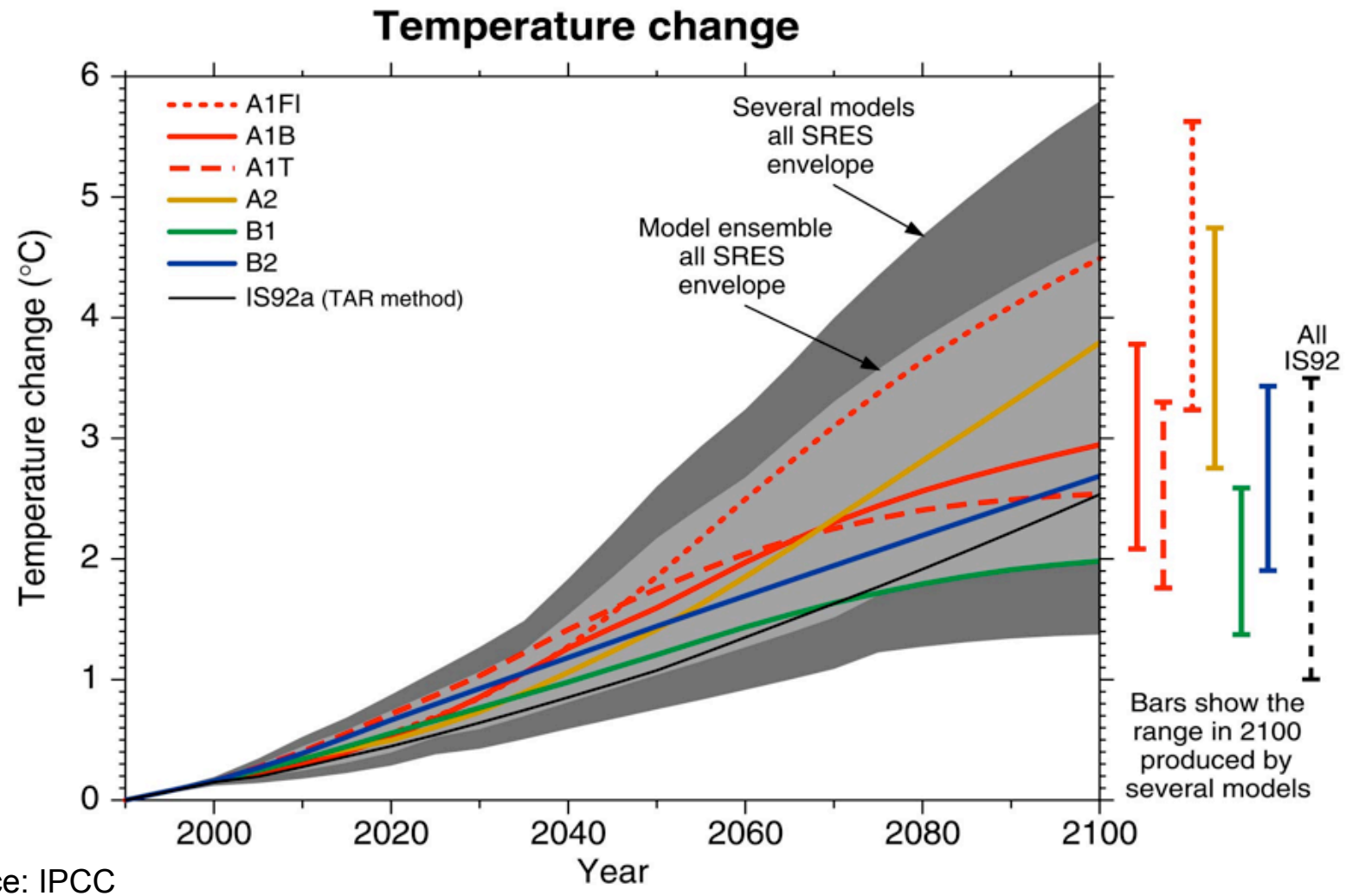
"If our global **energy** habits are the focus for **mitigation**, the way we use and manage our **water** must become the focus for **adaptation**"

Global Water Partnership, 2007

Impacts of climate change on agricultural water management:

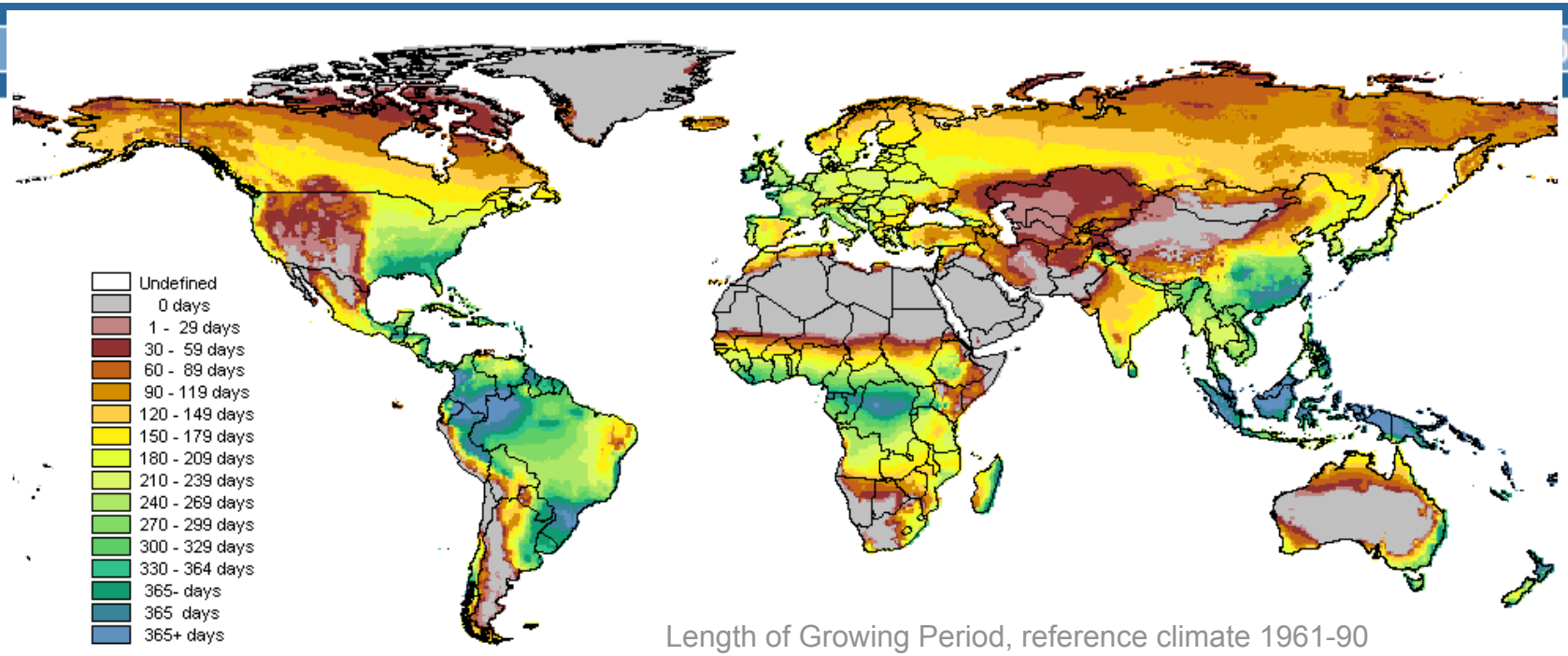
- Irrigated agriculture (40 % prod.)
  - Precipitation, Evapotranspiration, Runoff, Recharge
- Rainfed agriculture (60% prod)
  - Precipitation, Evapotranspiration
- Other agricultural systems
  - fisheries, aquaculture, forests, rangeland

IPCC Scenarios

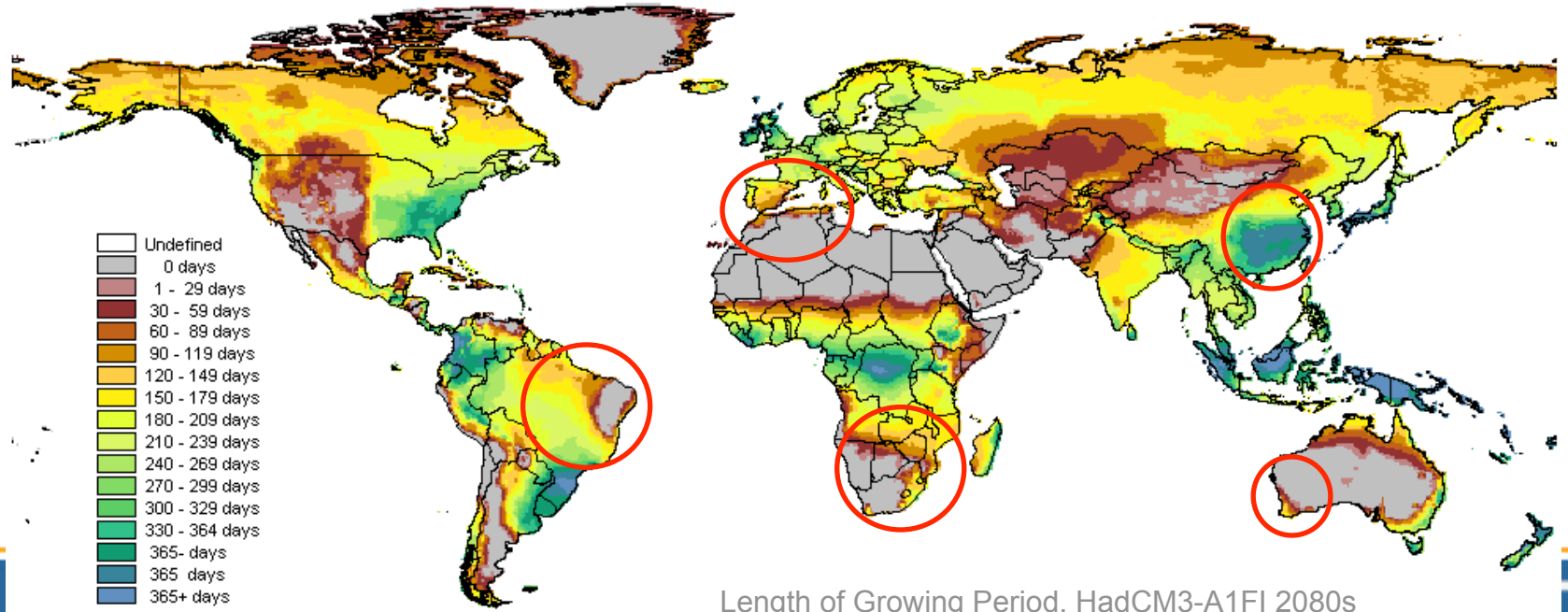


Source: IPCC

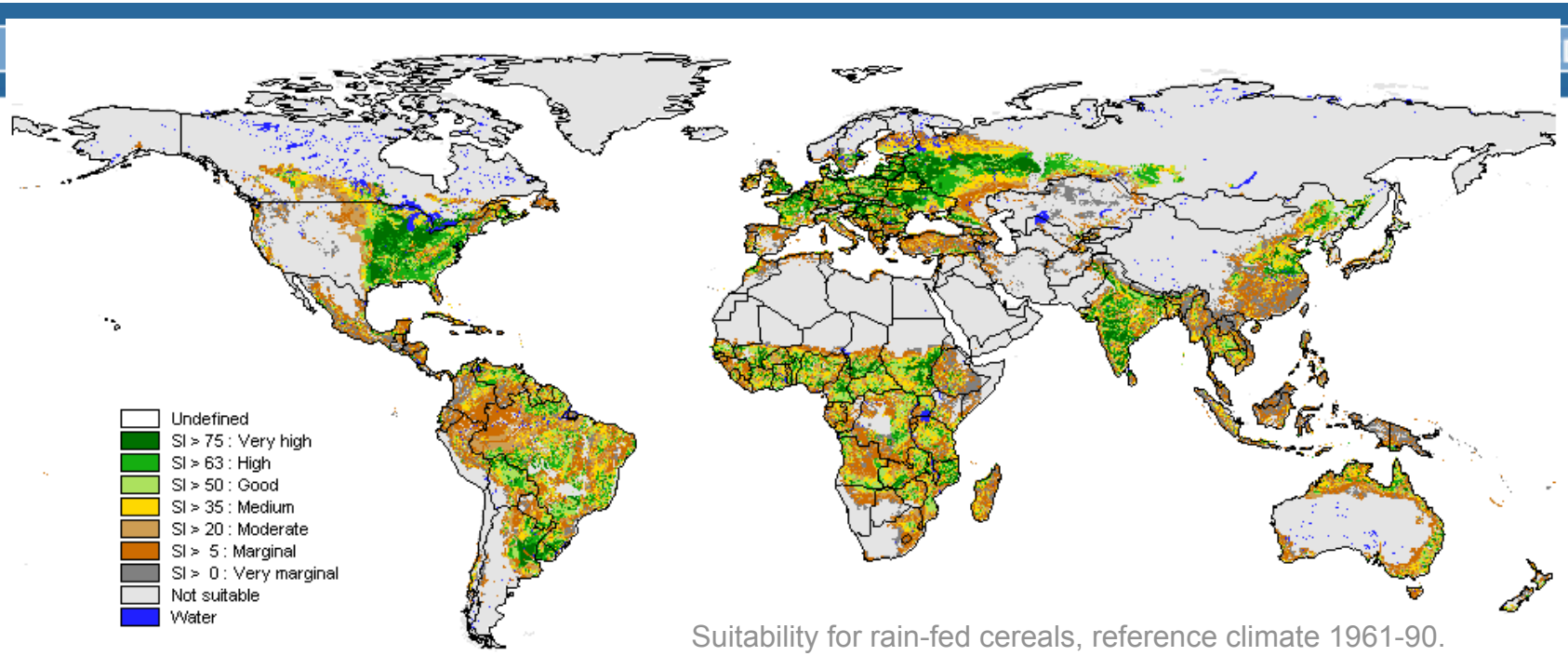
Rainfed agriculture



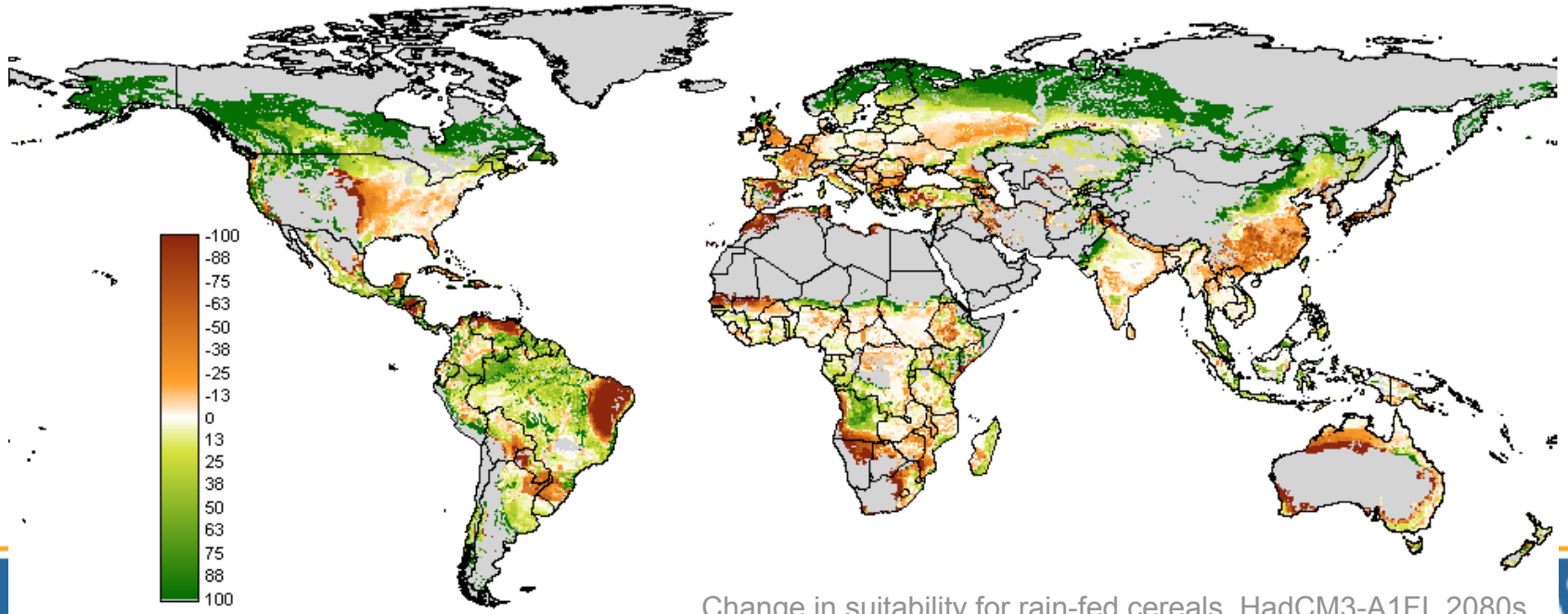
Length of Growing Period, reference climate 1961-90



Length of Growing Period, HadCM3-A1FI 2080s

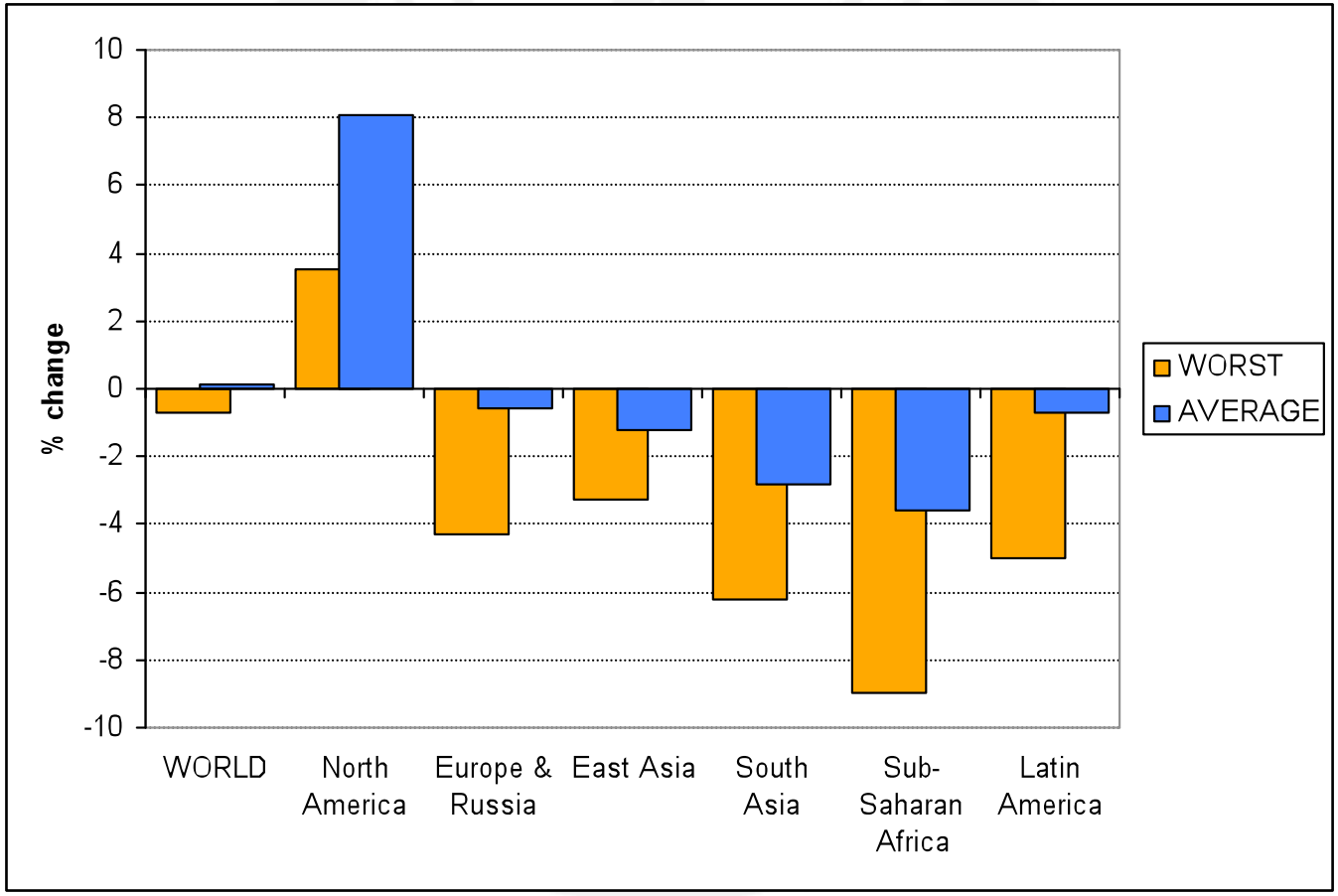


Suitability for rain-fed cereals, reference climate 1961-90.



Change in suitability for rain-fed cereals, HadCM3-A1FI, 2080s

Simulated Impacts of Climate Change on Regional Crop and Livestock Production – 2080s



Source: Shah *et al* (2008). Note: percent changes relative to SRES A2 reference projection without climate change. The diagram is based on food system simulations using climate projections obtained from four climate models for the IPCC SRES A2 emissions scenario.

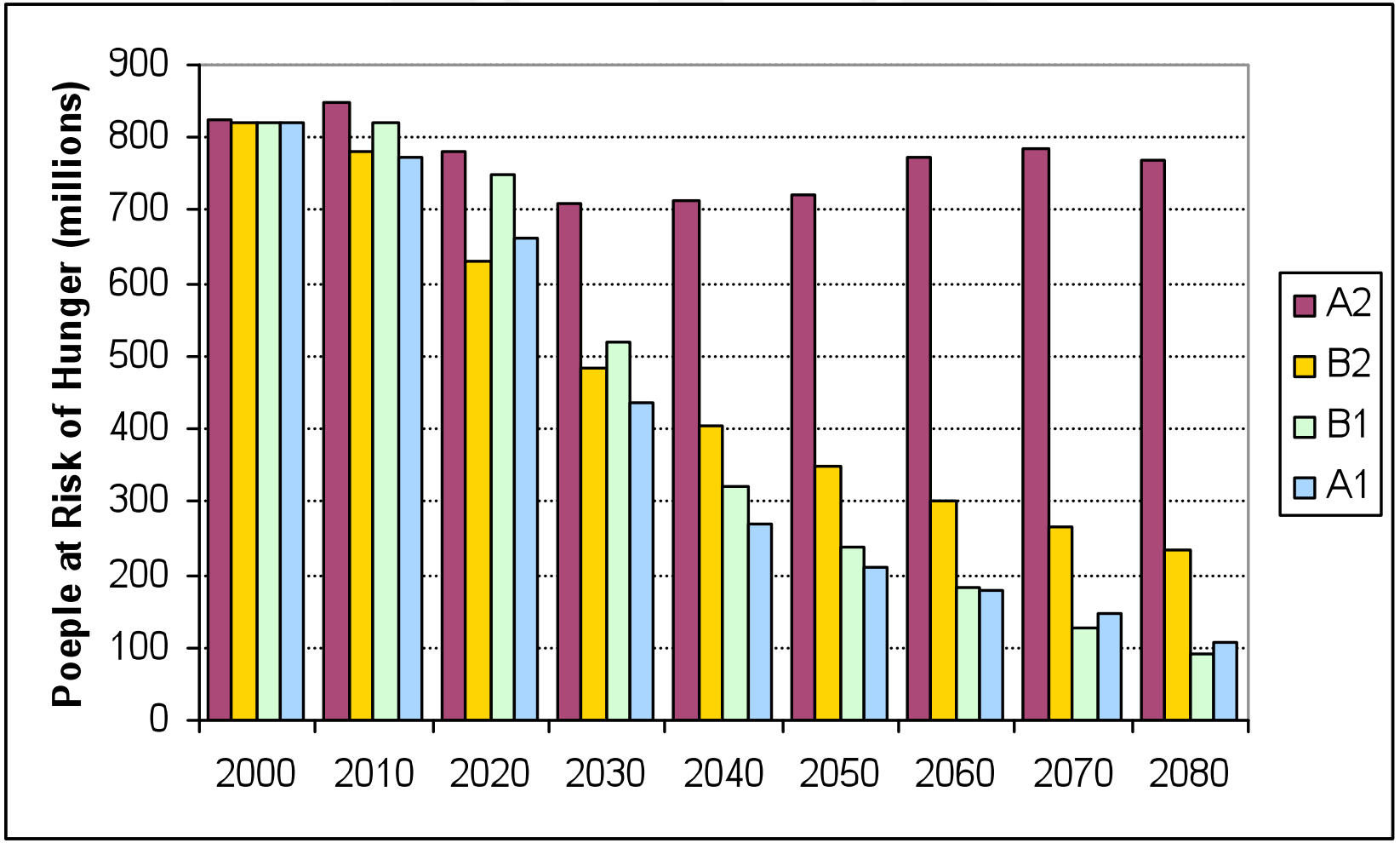
Projected climate change impact on agricultural Gross Domestic Product (GDP) and cereal production in 2080

Region	Percent change in agricultural GDP	Percent change in cereal production
World	-1.5	-1.4
Developed	-0.5	+2.8
North America	+7.5	+1.3
Europe	-14.7	-3.4
Developing	-1.9	-3.9
Sub-Saharan Africa	-4.9	-0.6
Asia	-4.3	-8.6
Latin America	+3.7	+15.9
Change in world market prices	All crops: +10.5	Cereals: +19.5

Source: International Institute for Applied Systems Analysis (IIASA, 2008)

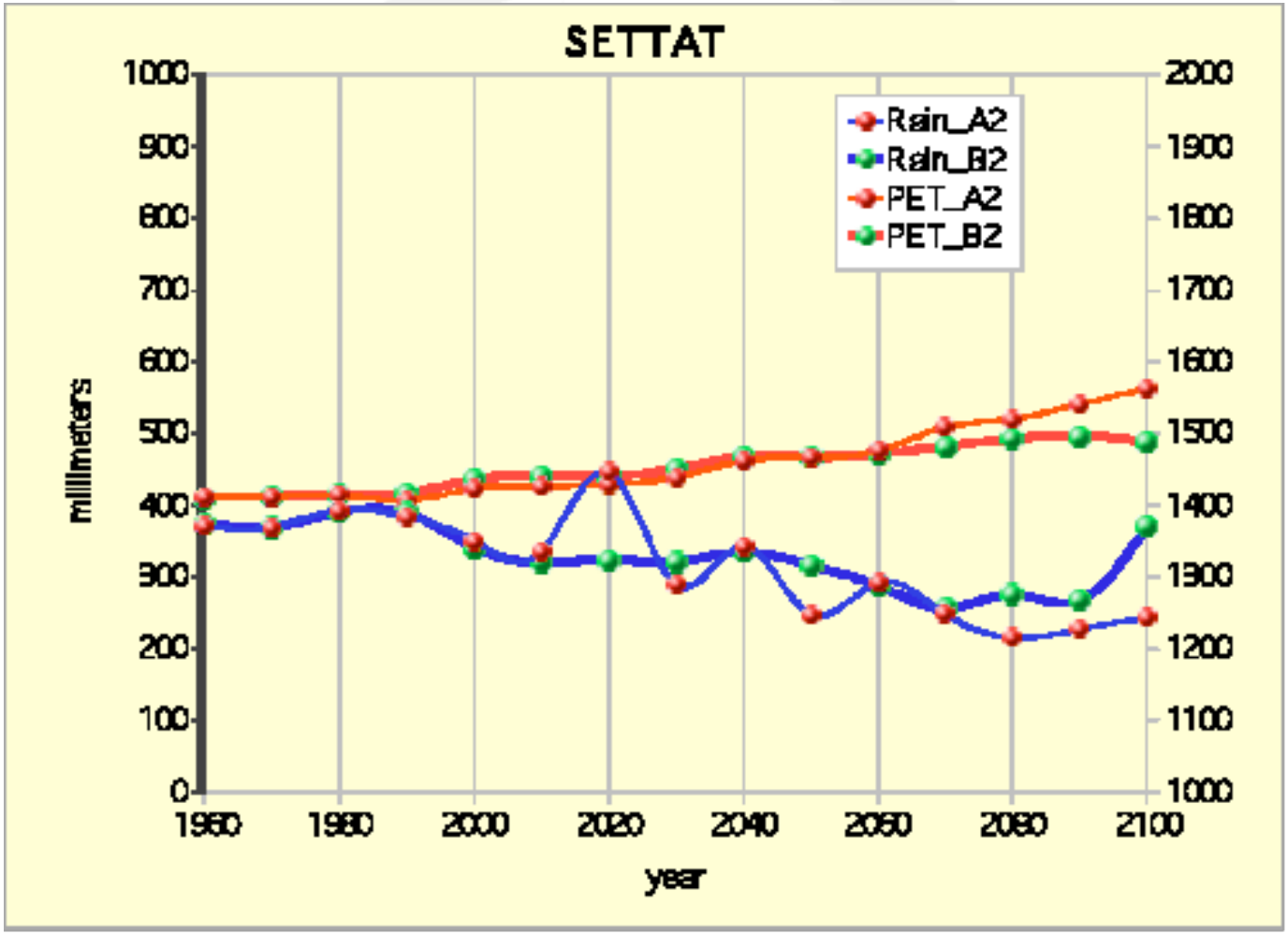
Number of People at Risk of Hunger

projected for different IPCC economic development paths

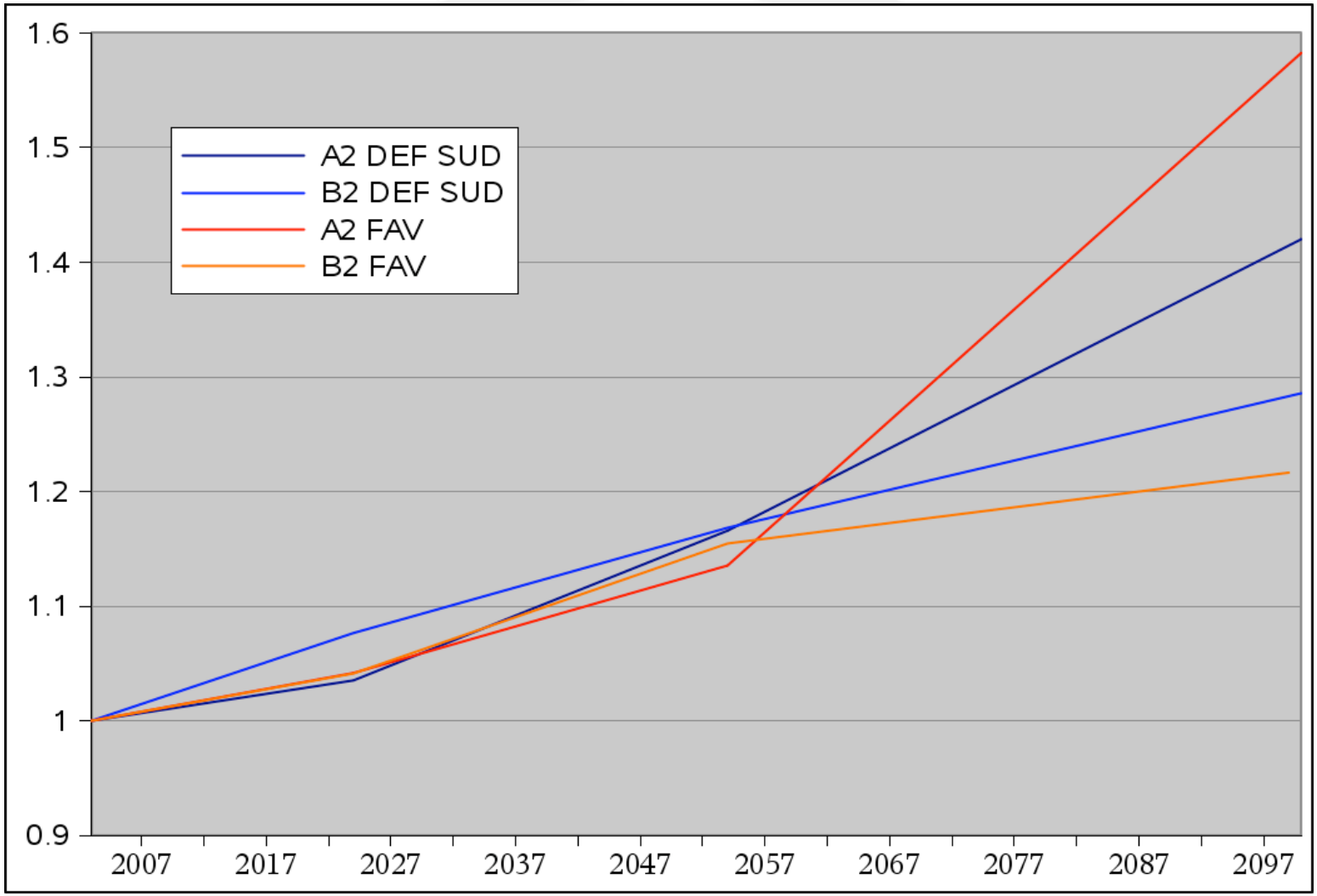


Source: Fischer et al., 2002. IIASA

Morocco: Precipitation and evapotranspiration

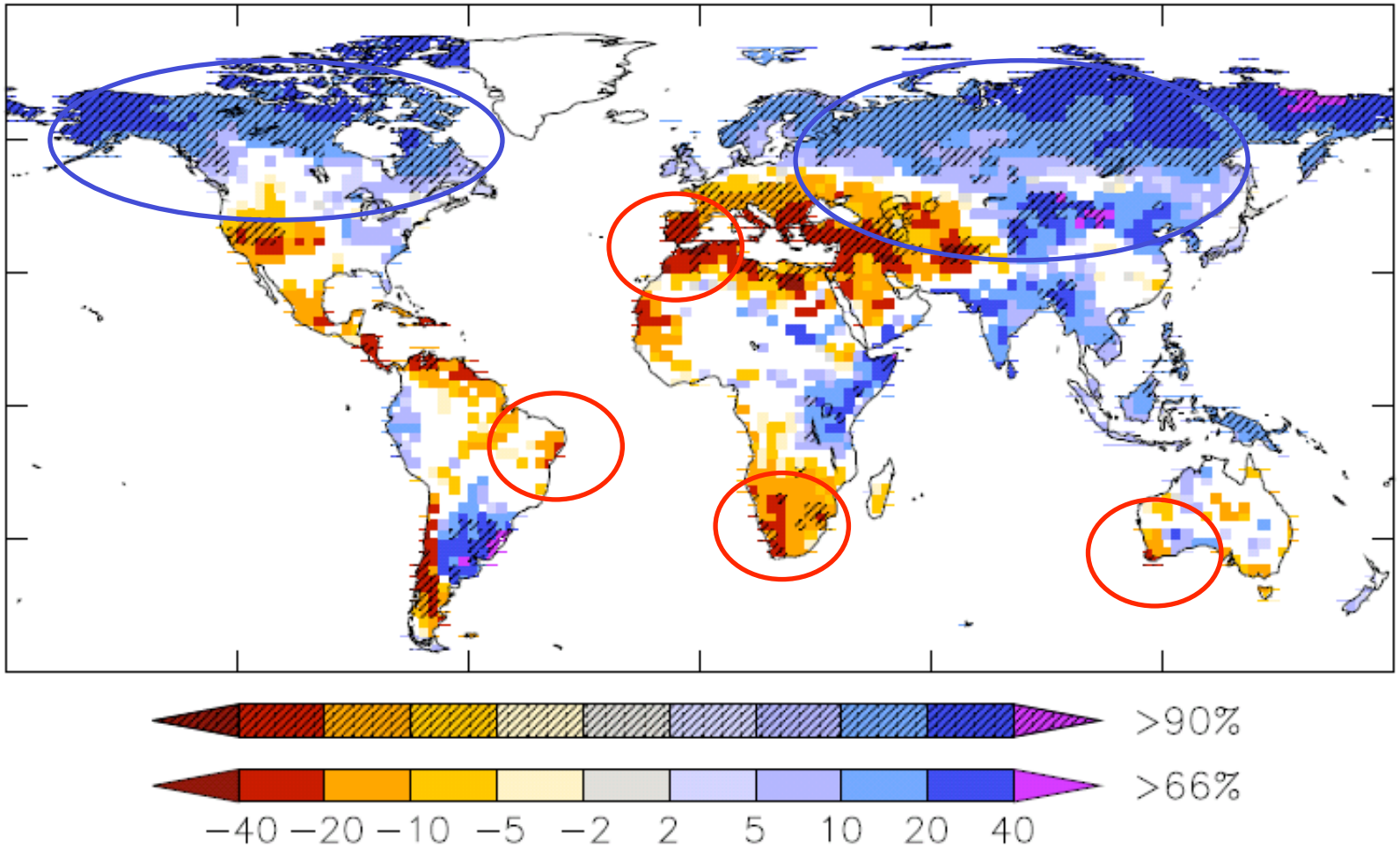


Morocco: water requirements for cereals



Irrigated agriculture

Expected change in annual runoff - 2060



Multimodel mean changes in annual runoff by 2060, in percent, indicating also degree of agreement between the 12 models used Scenario A1B, i.e. very rapid economic growth, convergence among regions and technological change in energy systems. Illustration from Milly et al 2005.

Impacts of climate change on main agricultural water management systems

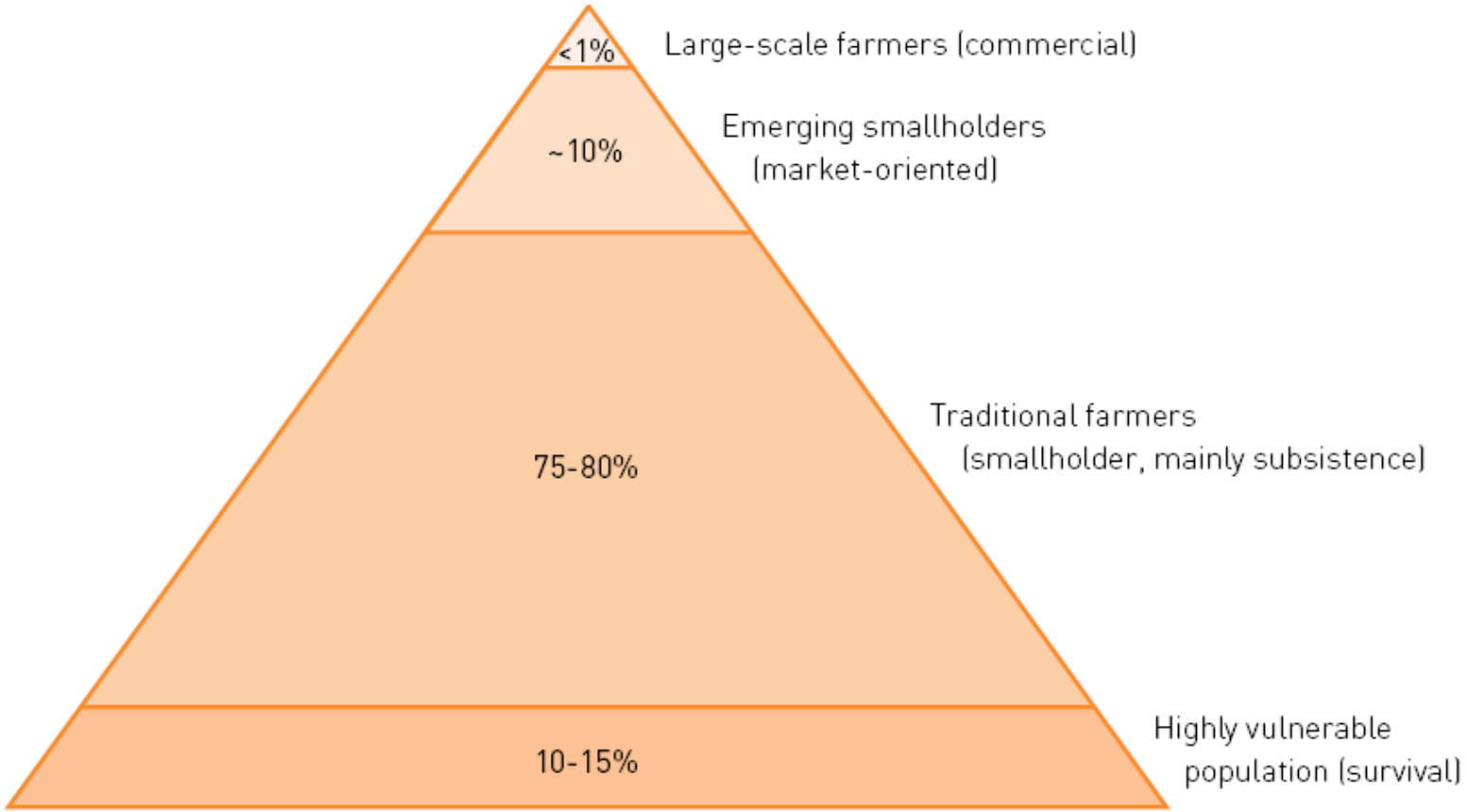
Main system	Climate change drivers	Vulnerability
Snow melt river systems	20 year increasing flows followed by substantial reductions in surface water and groundwater recharge. Changed seasonality of runoff and peak flows. More rainfall in place of snow. Increased peak flows and flooding. Increased salinity. Declining productivity in places	Very high (run of river); high (falling groundwater tables); medium (dams), with global implications on food demand and prices
River deltas	Rising sea level. Storm surges, and infrastructure damage. Higher frequency of cyclones (E/SE Asia); Saline intrusion in groundwater and rivers; Increased flood frequency. Potential increase in groundwater recharge.	Very high to high, heavy population pressure, floods, cyclone
Semi-arid and arid tropics	Increased rainfall variability. Increase frequency of droughts and flooding. Lower rainfall, higher temperature. Decreasing runoff	Very high to high. Declining yields in rainfed systems. Increased volatility of production.
Humid Tropics (southeastern Asia)	Increased rainfall. Marginally increased temperatures. Increased rainfall variability and occurrence of droughts and floods	High
Mediterranean	Significantly lower rainfall and higher temperatures, increased water stress, decreased runoff, loss of groundwater reserves	High to medium
Small islands	Sea water rise; saltwater intrusion; increased frequency of cyclones and hurricanes	High to medium

Findings from FAO expert meeting on water and climate change

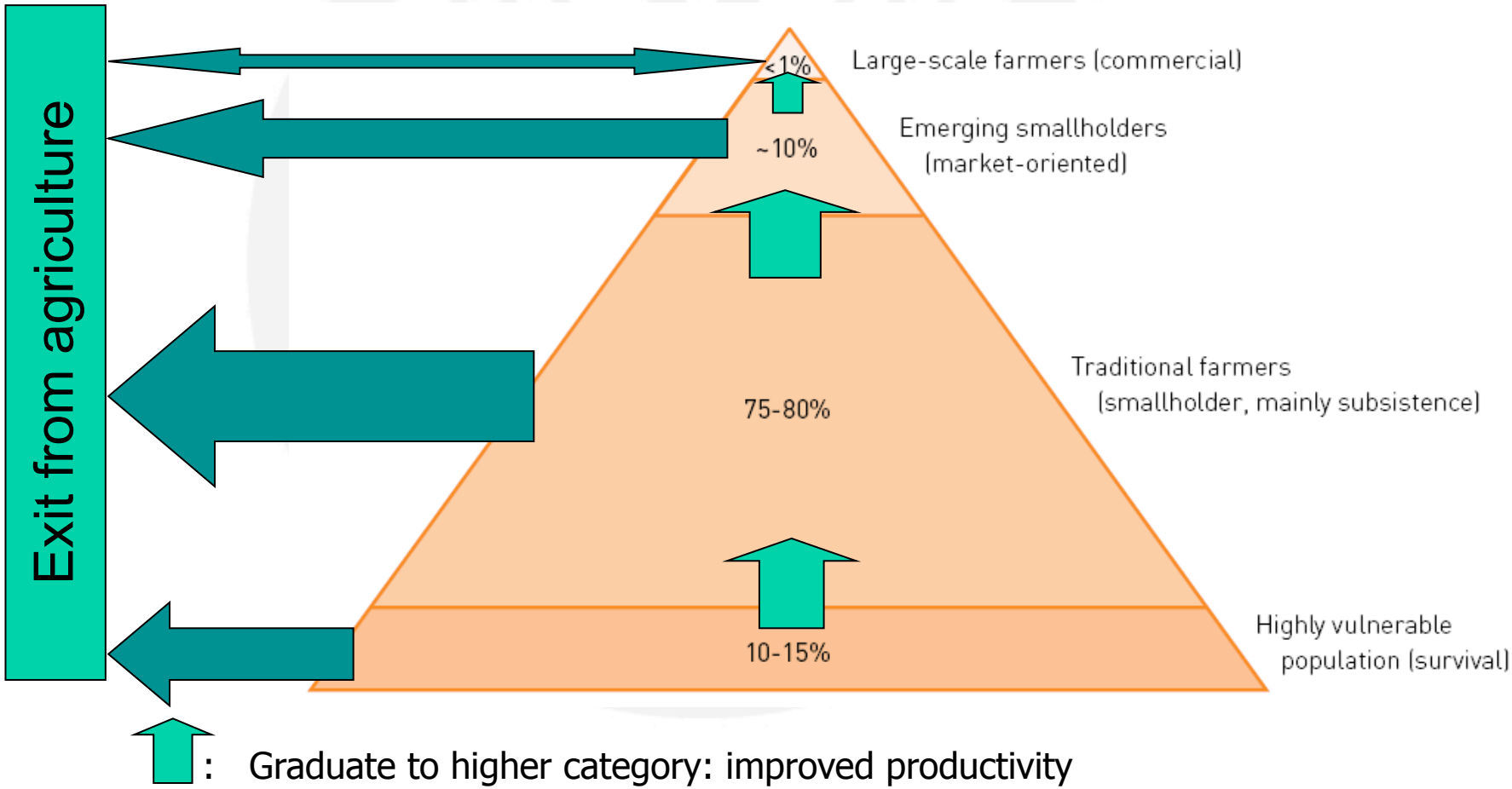
- Water is already under heavy pressure from agriculture, cities and industries. Climate change will exacerbate an already difficult situation
- Intensive food production systems are at risk from climate change impacts:
  - A combination of reduced base flows, flooding and sea-level rise will hit irrigated areas, and in particular productive lowland deltas (Indus, Nile, Ganges).
  - In key food-insecure areas (Sub-Saharan Africa, Peninsular India), anticipated reductions in current rainfed production may have multiple impacts including loss of livelihoods and displacement. This will put further pressure on irrigated production.
- Globally, agricultural production will have to deal with more variability in water inputs and more competition for water from other sectors
- Notwithstanding gaps in data and research, progressive adaptation across land and water systems are justified on a “no-regrets” basis.

Different people, different needs

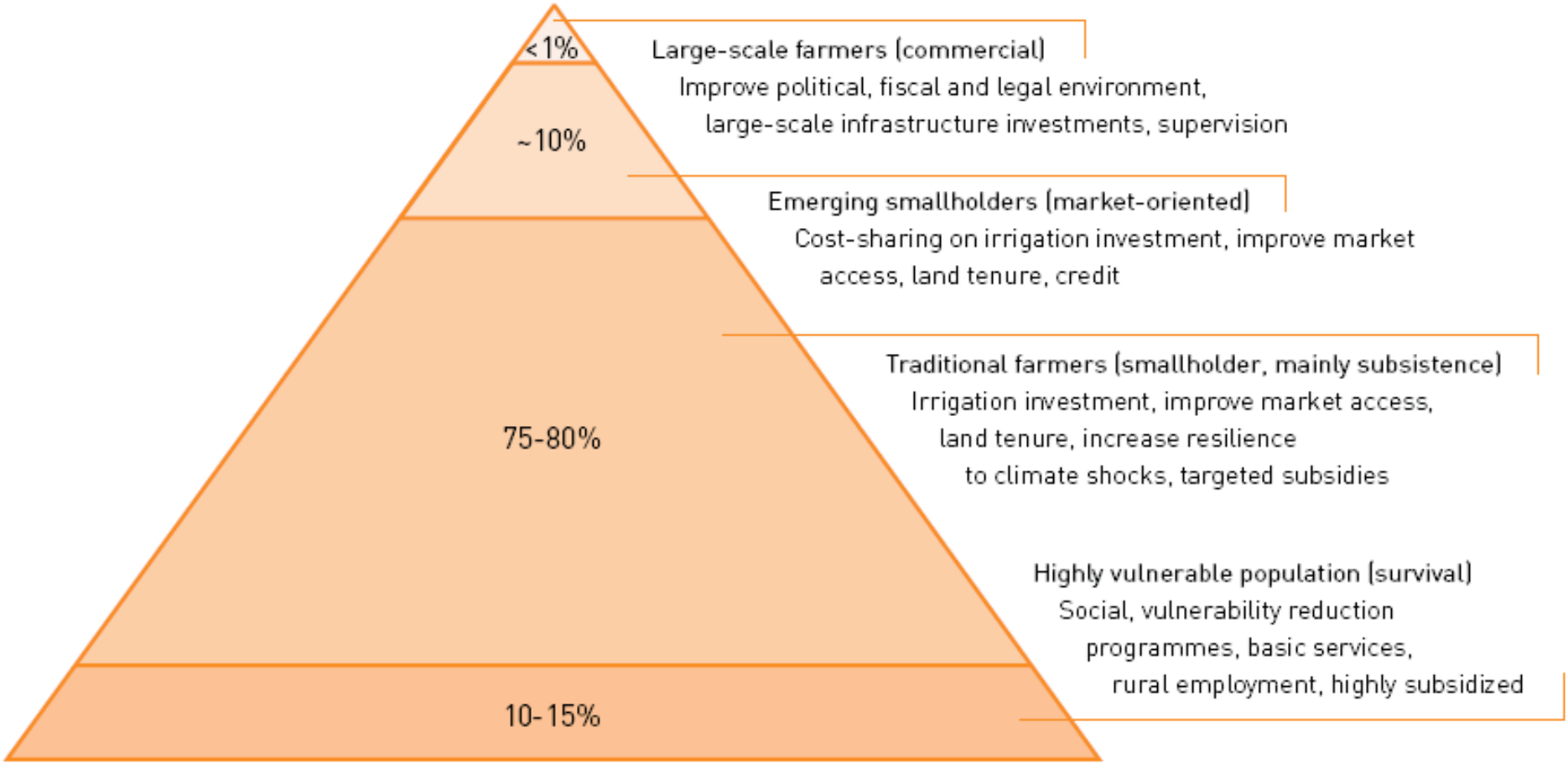
A necessary focus on smallholder farmers



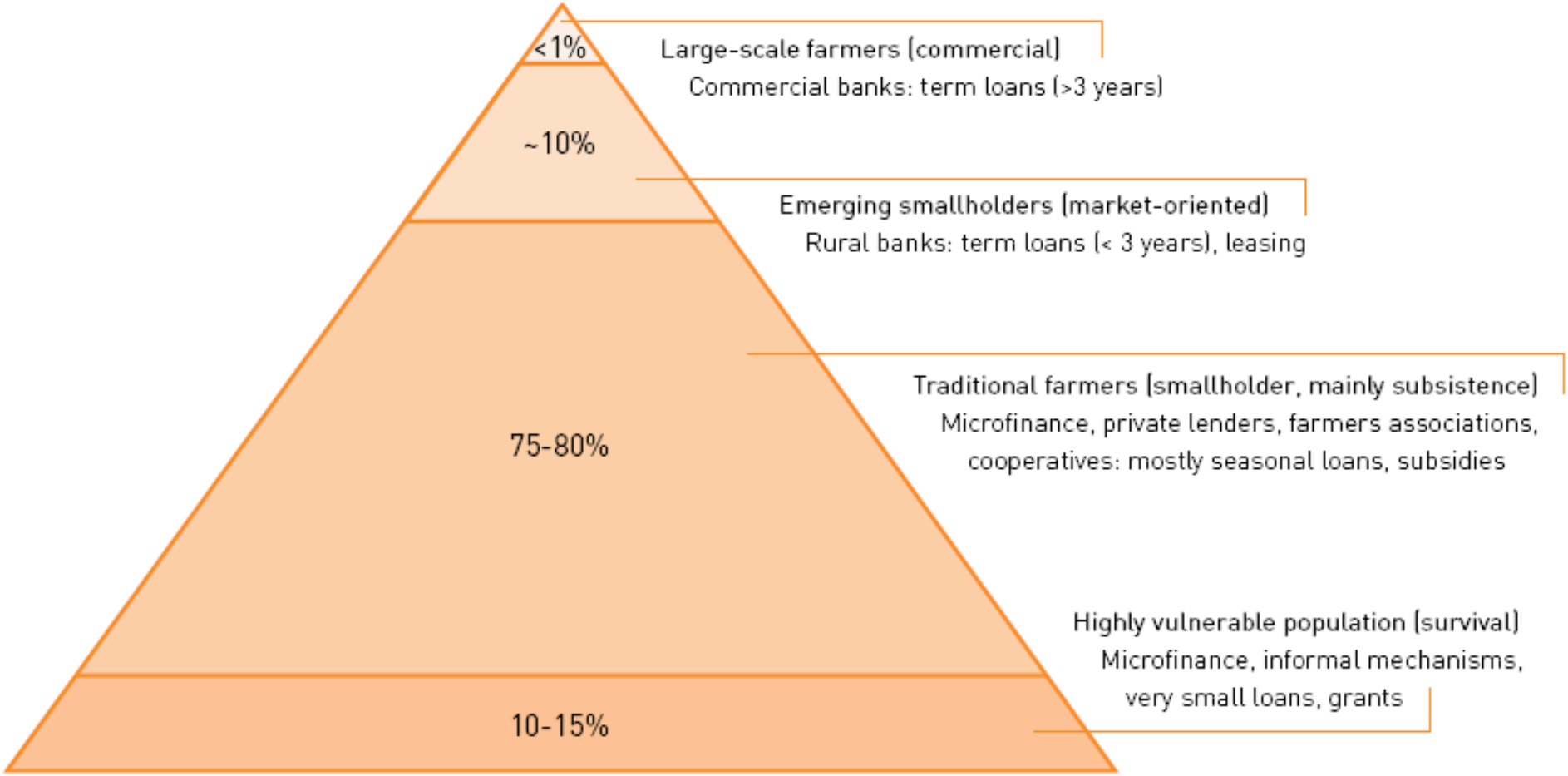
Adapting agricultural support strategies



Adapting agricultural support strategies



Adapting financial services



Adapting approaches to smallholder's conditions

- Operational simplicity
- Reduced number of users
- No need for external support for operation
- Low maintenance requirements
- Limited physical and financial capital requirements
- Not always low cost or best B/C ratio

Small, divisible, farmer controlled water supply systems

Thank you

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