Assuring Global Food Security

Under the Challenges of Resource Scaricity and Climate Change

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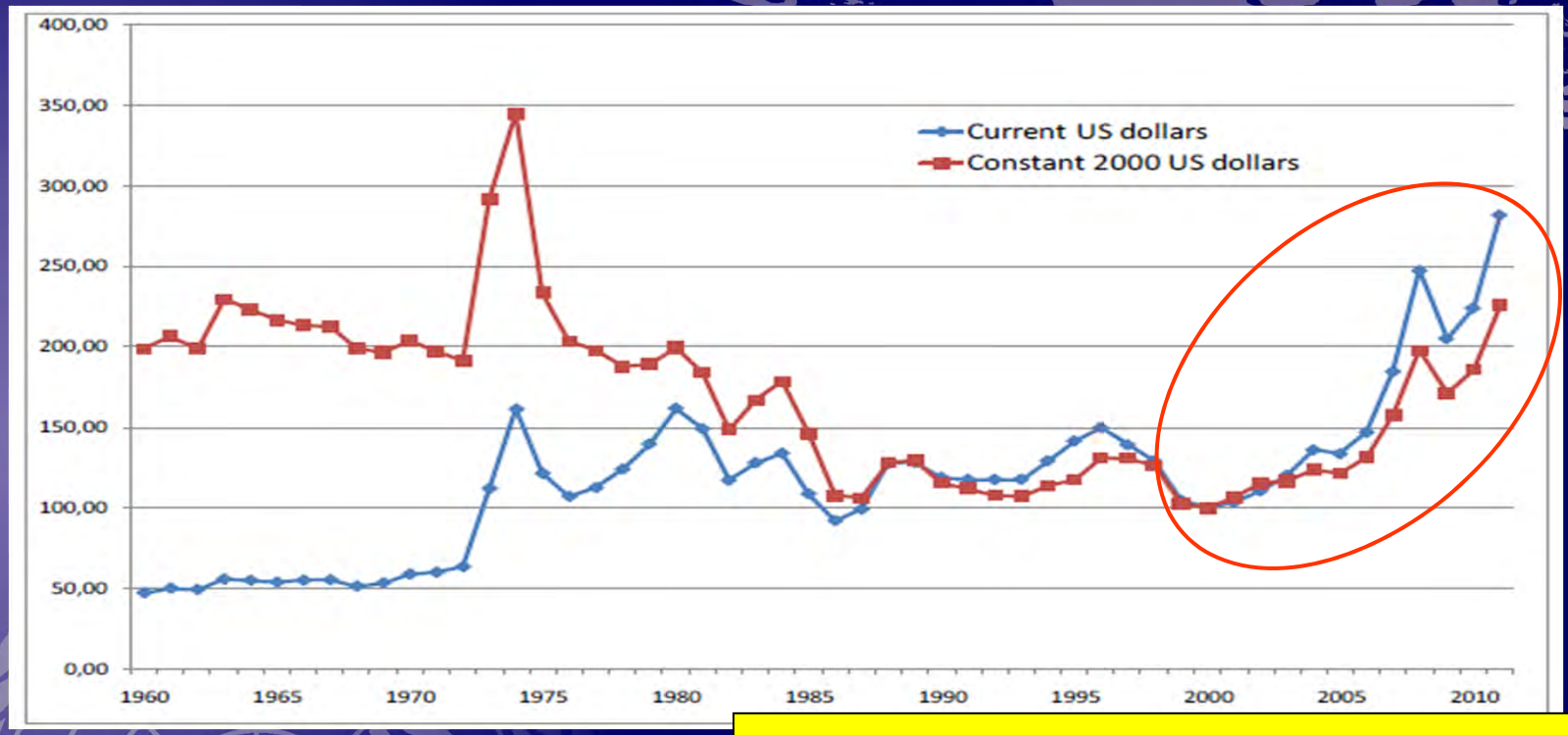
Deep-routed Structural Problems and Distortions of Ag

- Per-capita growth of global food production has never been higher, yet number of hungry is not decreasing.
- Considerable and increasing share of cereal production is being diverted into non-food and animal-feed usage.
- Turn of the century seems to have marked the end of a long period of structural over-production, based on a strategy akin to "resource mining".
- Although agriculture plays a significant role in virtually all DgCs, only a small fraction of public expenses is devoted to it.
- Access to modern energy services remains a serious problem (1.4 bn people have no access, 85% in rural areas).
- Huge post-harvest losses (30-40%). Elimination of losses could feed a 50% higher global population by 2050.
- Prevailing globalization approach has not been successful in reducing hunger. With energy, agriculture remains the most distorted market.
- Existing external-input-intensive industrial agriculture is biggest source of GHG emissions driving global warming.
- Climate change will be the biggest future challenge for food security.

Evolution of Food and Agricultural Input Prices

Food Price Index (nominal and real), 1960 – May 2011, 2000=1000)



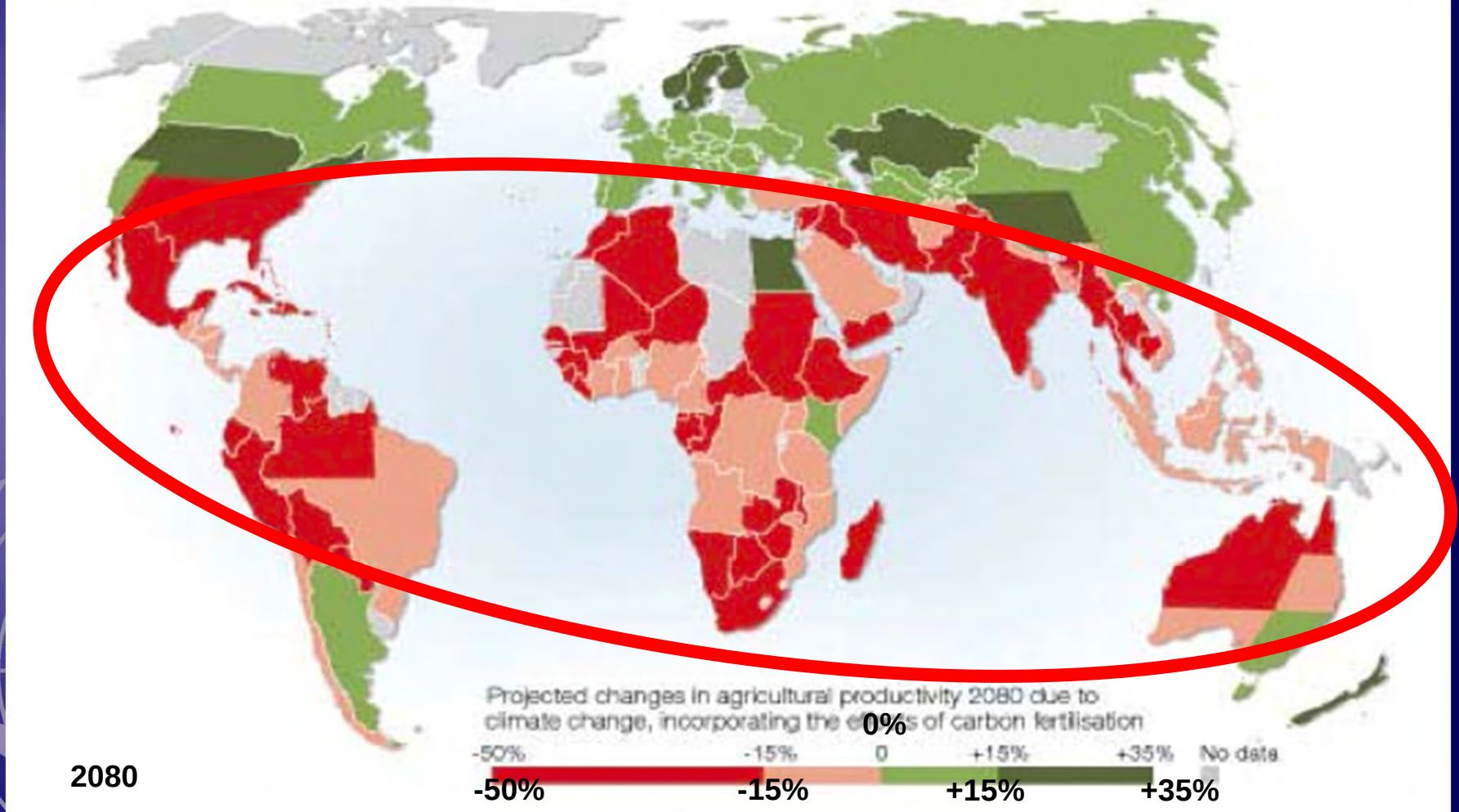
Source: World Bank, 2011

Ratio of food output to agricultural input prices

Source: FAO, 2010

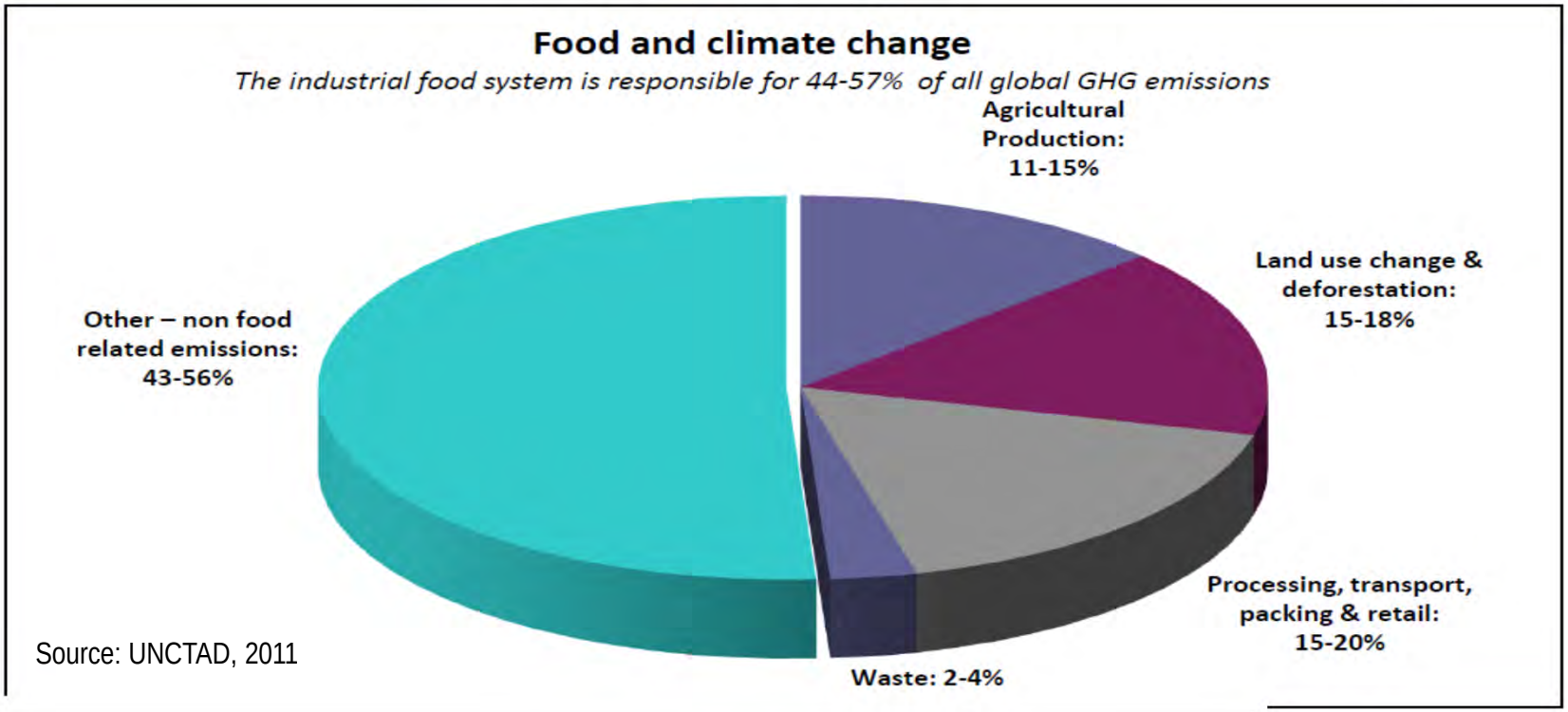
Likely climate-change-induced Productivity Losses

Figure 8 **Projected losses in food production due to climate change by 2080.**



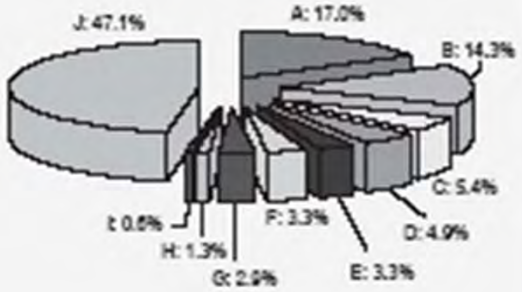
Source: The environmental food crisis - the environment's role in averting future food crises. A UNEP rapid response assessment. United Nations Environment Programme, February 2009, www.grida.no, page 46, quoting: Cline, W. R. (2007). Global warming and agriculture: Impact estimates by country.

Contribution of Agriculture to Global GHG Emissions



Source: UNCTAD, 2011

Sources		Million tons of CO_2-eq
Nitrous oxide emissions from soil	A	2,128
Methane from cattle enteric fermentation	B	1,792
Carbon emissions from biomass incineration	C	672
Methane from rice production	D	616
Methane emissions from manure	E	413
Carbon emissions from fertilizer production	F	410
Carbon emissions from irrigation	G	359
Carbon emissions from farm machinery	H	158
Carbon emissions from pesticide production	I	72
Carbon emissions from land conversion to agriculture*	J	5,900
All direct and indirect sources		12,530



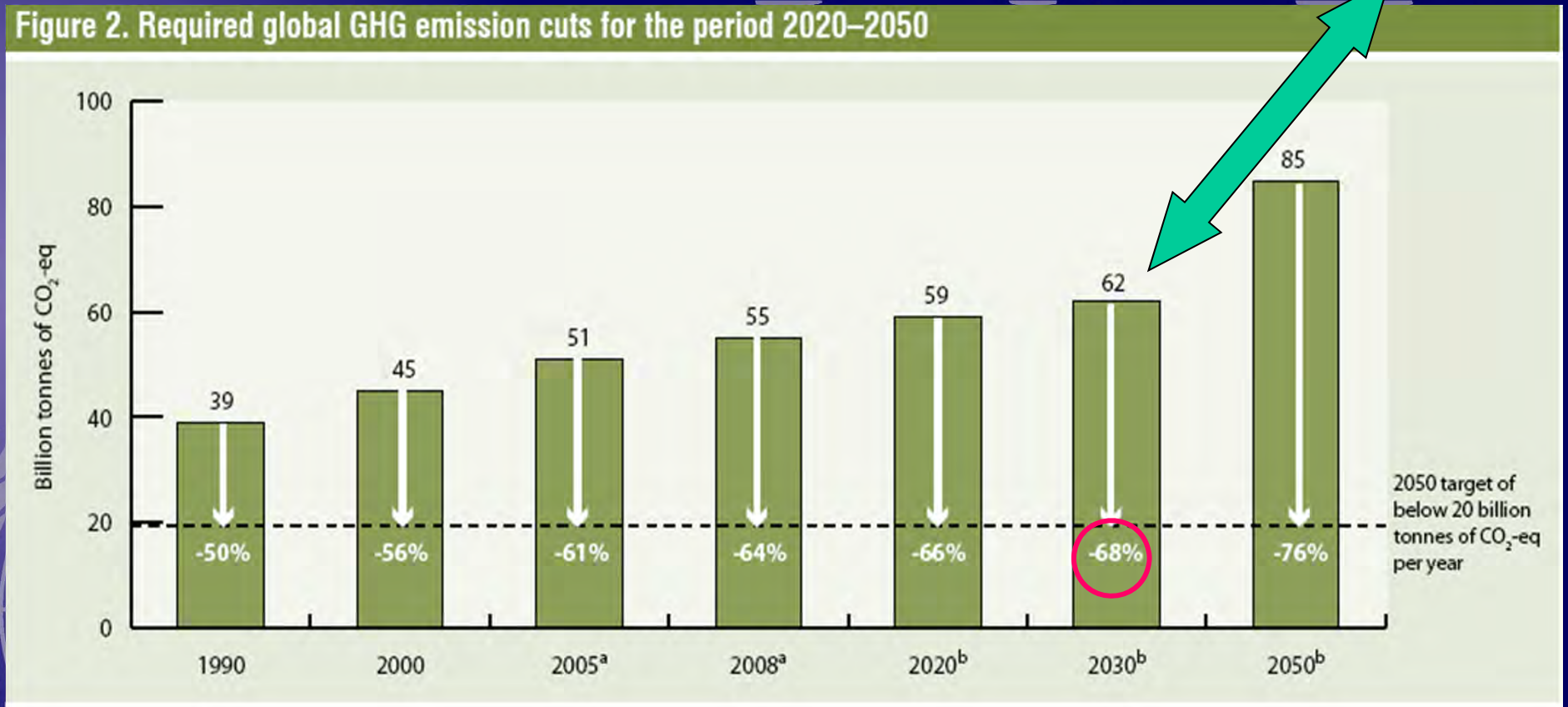
Source: Bellarby et al. (2008)

D DEVELOPMENT

GHG Emission Dynamics of Agriculture

- Increase of non-CO_2 agricultural GHGs in 1990-2005: 14%
- Projected increase of non-CO_2 agricultural GHGs in 2010-2030: 35-60%

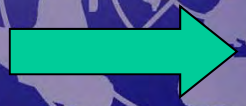
Figure 2. Required global GHG emission cuts for the period 2020–2050



Source: The Climate Group, 2008: 19.

Terrestrial Carbon Sequestration – More than a Silver Lining

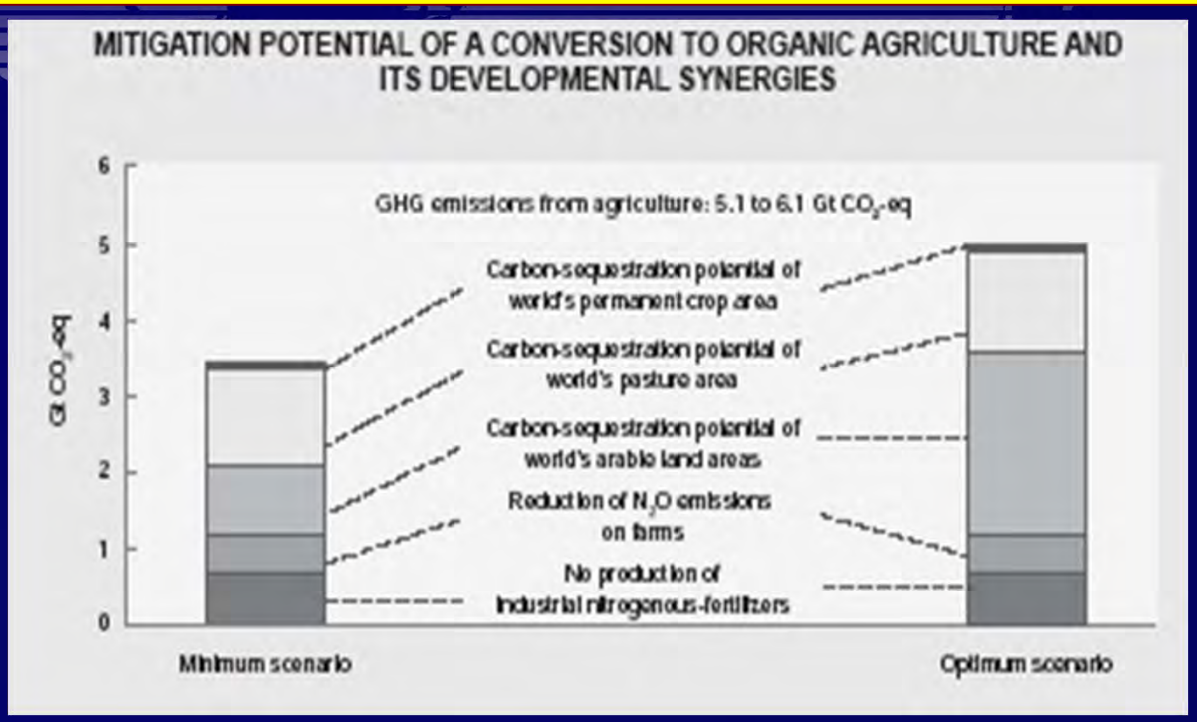
- Land makes up ¼ of the Earth's surface, and its soil and plants hold three times as much carbon as the atmosphere.
- Agricultural land: 1.6 bn ha cropland and 3.4 bn ha grassland/savannah (a significant part used for pasture).
- Land/soil degradation: annual loss of about 10 million ha of cropland.
- Estimates suggest that top soil in key agricultural producing countries has lost some 7-10% of its carbon content in the last 50 years.
- Key task: Continuously building up soil organic matter – will result in:
  - Huge carbon sequestration of soils
  - Improving soil fertility
  - Enhancing water-holding capacity
  - Improving soil biodiversity preservation



Thus enhancing resilience of production

Building up Soil Organic Matter through Organic Agriculture

- Results of earlier FAO research assuming carbon sequestration of 0.2-0.5 t/ha/yr.
- Findings: organic agriculture can be “climate neutral”.

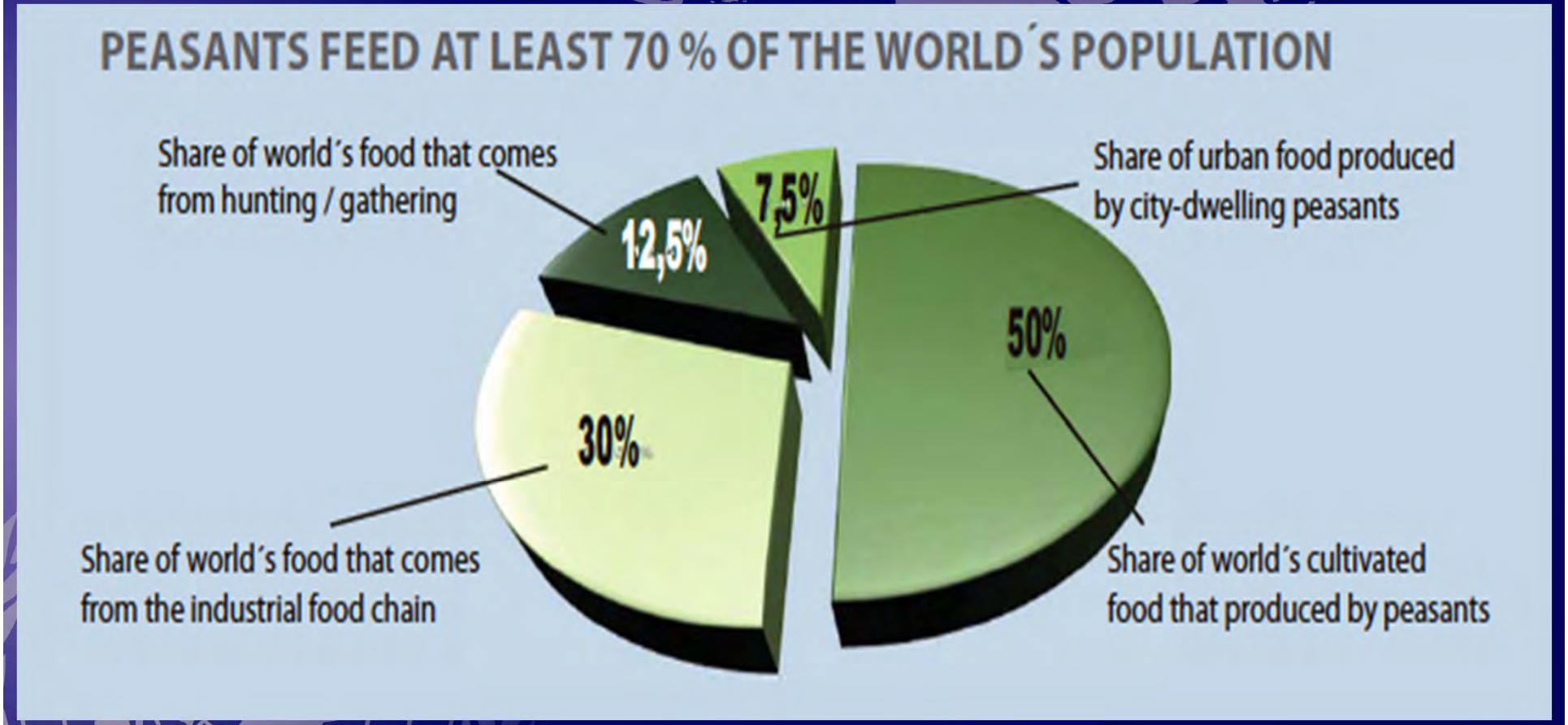


- More recent IFOAM and Rodale Institute analyses arrive at considerably higher figures for soil carbon sequestration through building up soil organic matter: 2-30 tons per ha per year.
- Giving also higher importance to carbon uptake by grassland through integrated crop and livestock management (while biomass of forests expands by 10% annually, that of grassland expands by 150%).
- Annual carbon sequestration could be as high as 110-120 Gt CO2-eq

Conclusions

- Building up soil organic matter is an effective way of removing large amounts of carbon from the atmosphere, effectively checking the growth of global GHG emissions.
- Skills and technology are readily available, but flanking R&D and extension systems required for up-scaling.
- Soil carbon sequestration is one of the most inexpensive sequestration methods.
- No other sector in the global economy has potentially the same weight in climate-change mitigation and has all means readily available.
- Building up soil organic matter will have many catalytic (pro-poor) developmental effects.
- However, this will require a fundamental transformation away from external input dependent and agro-chemical intensive agriculture to eco-functional intensification and integrated forms of sustainable agriculture, fully using the potential of smallholders.

Importance of Small Peasants for Global Food Security



Source: IAASTD, 2008

THANK YOU

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