

Global Food Security and Climate Change

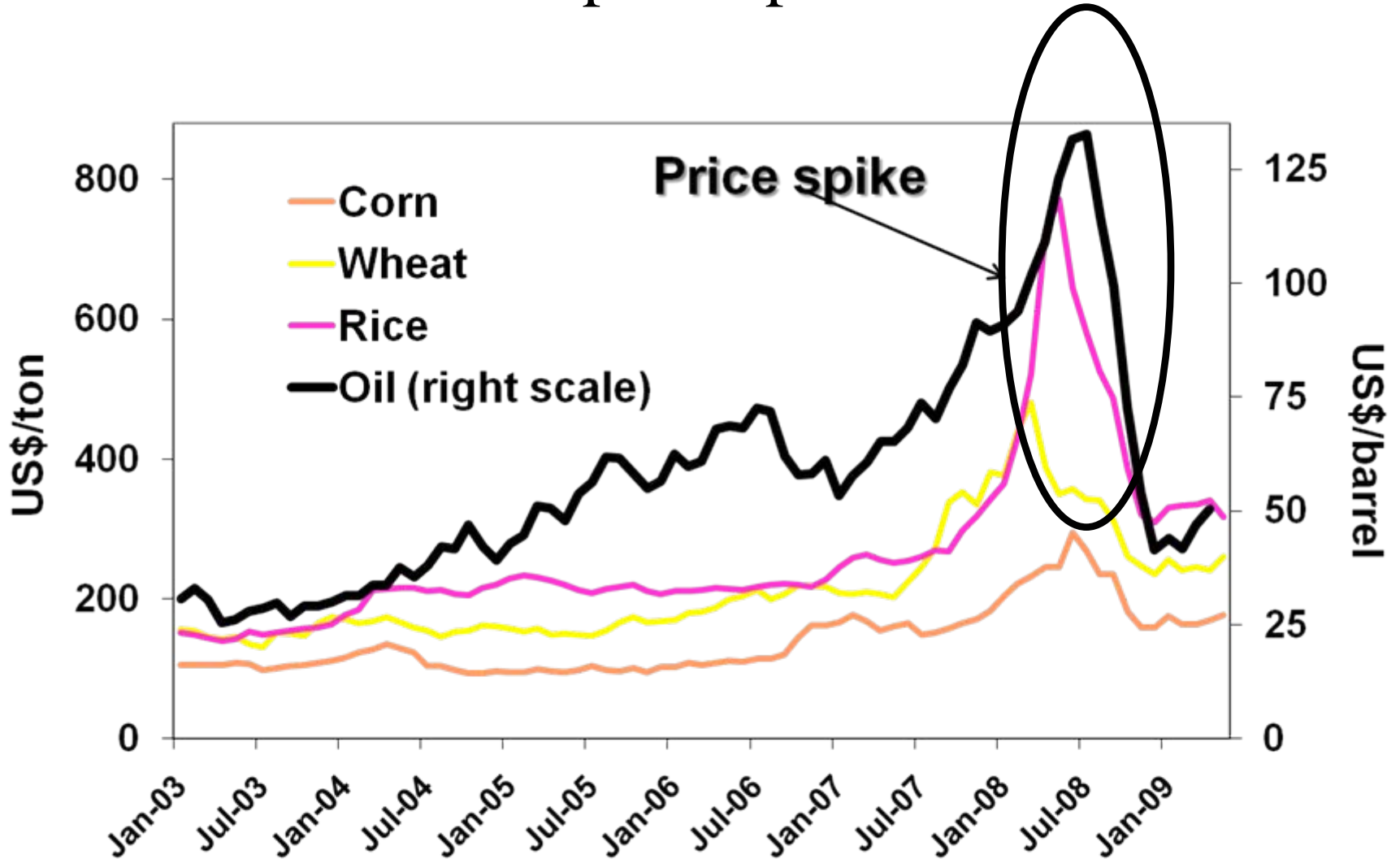
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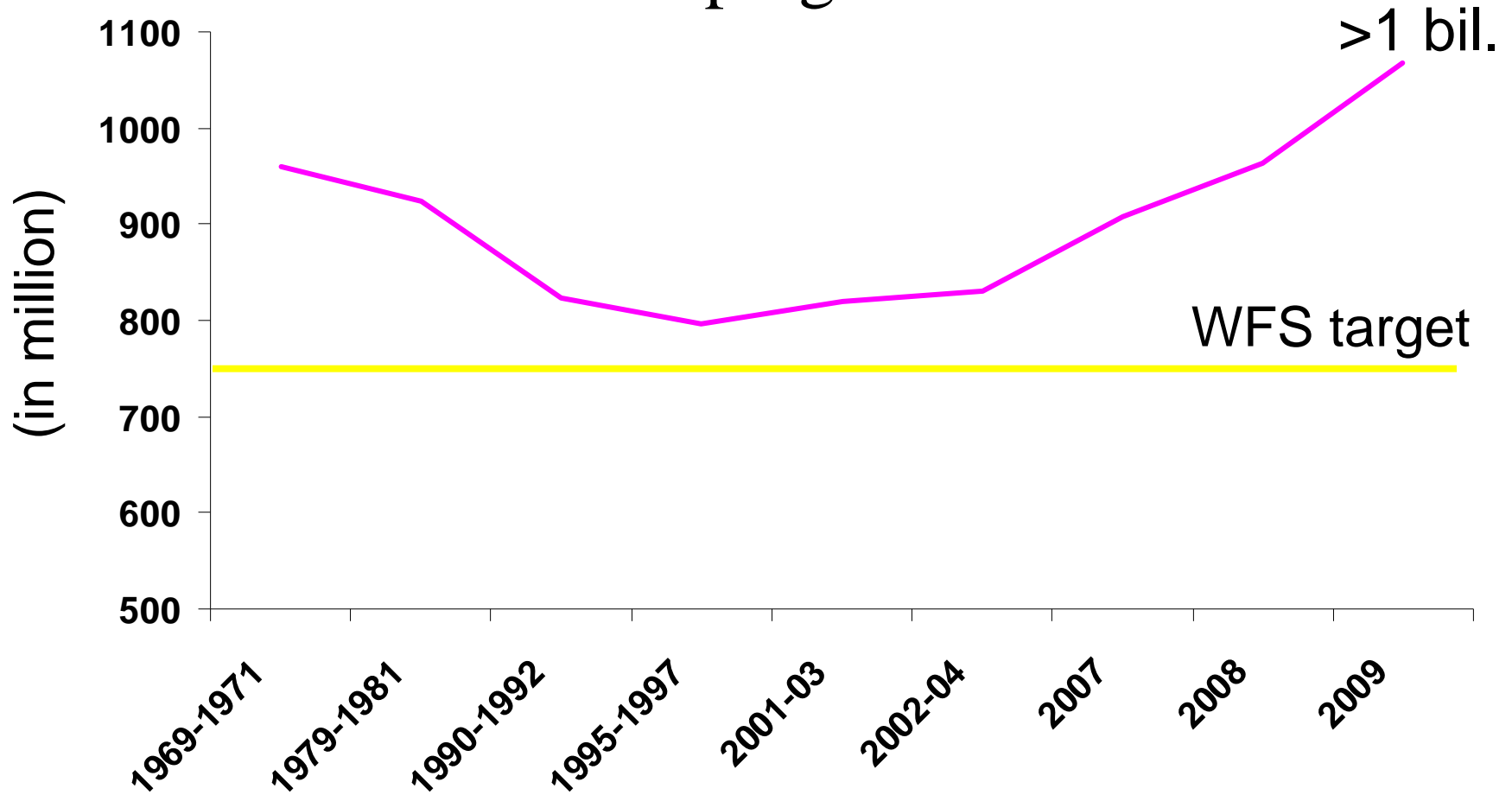
1. Recent Food Crisis

- It was directly caused by increased oil prices, use of maize for ethanol, commodity speculation, export bans of rice by India and Vietnam,.....
- *There is a strong linkage between oil price and food price, because increase in oil price increases fertilizer prices.*
- Increased biofuel demand increased grain price by 30% (IFPRI).

Food crisis - price spike 2007-08



Rising number of hungry people in the developing world



More Fundamental Cause

- Complacency or over-confidence on global food supply-demand
 - Underinvestment in irrigation, research, extension, and other measures to increase food production
 - Even without climate change, food prices are bound to increase, which is reflected in decreasing food stocks in the early 2000s.

What can we learn from food crisis?

1. Strong energy-food nexus:

Food price increases when energy price increases. **Note that energy price will increase dramatically in future when we try to reduce the use of fossil energy.**

2. Increasing “food shortage” or food price hike even without climate change due to complacency and population growth (6.8 billion in 2009, but will reach 9.1 billion by 2050)

3. Strong food-poverty linkages

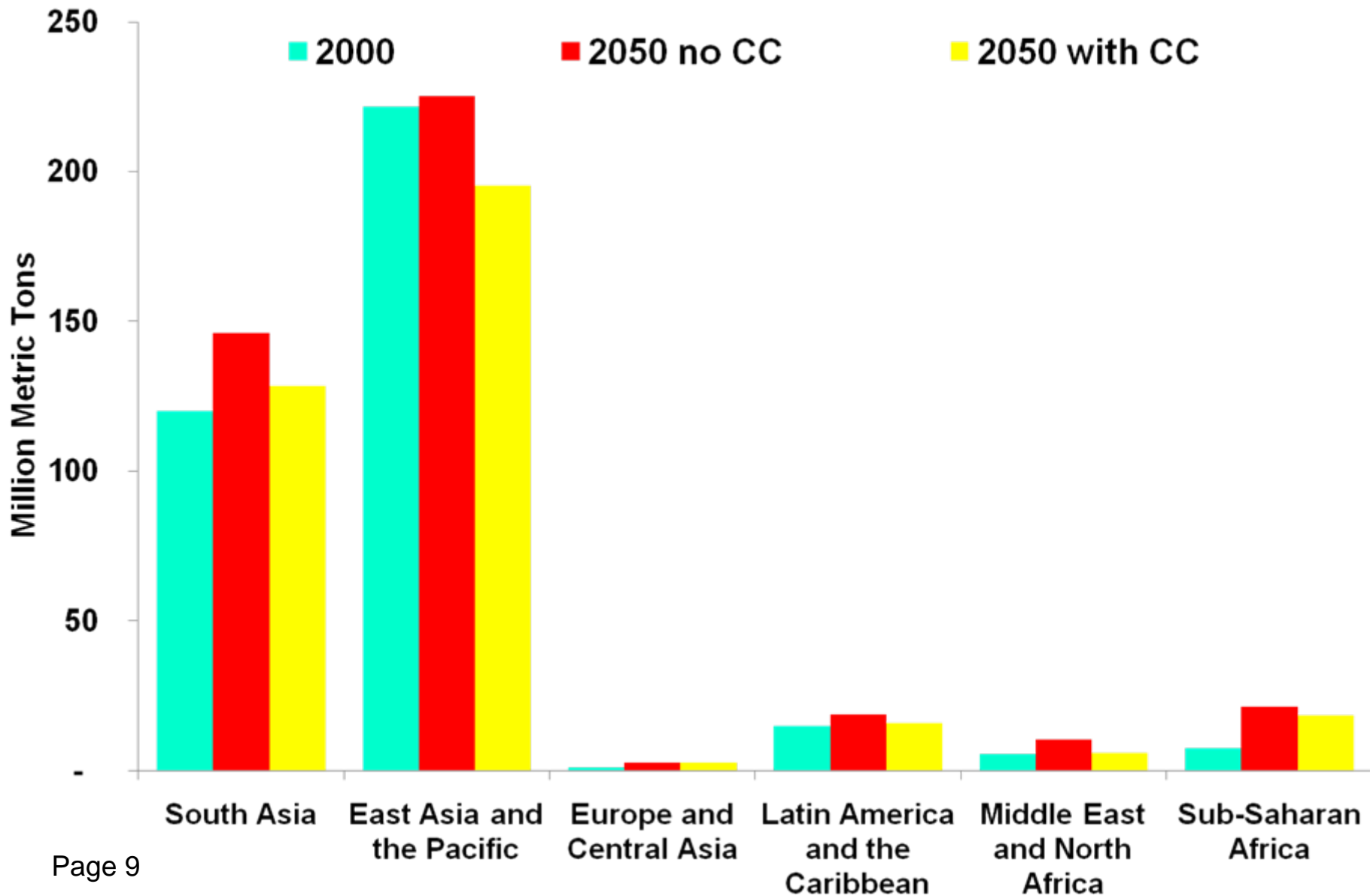
2. Impacts of Climate Change

- Expected changes
 - Higher temperature, sea level rises, frequent flood, drought, and outbreak of pests and diseases, use of farmland for bio-energy production,
- Climate change and agriculture
 - Agriculture is the sector most vulnerable to climate change because of its high climate dependence. Indeed all “the expected changes” enumerated above will lead to reduction in food production.

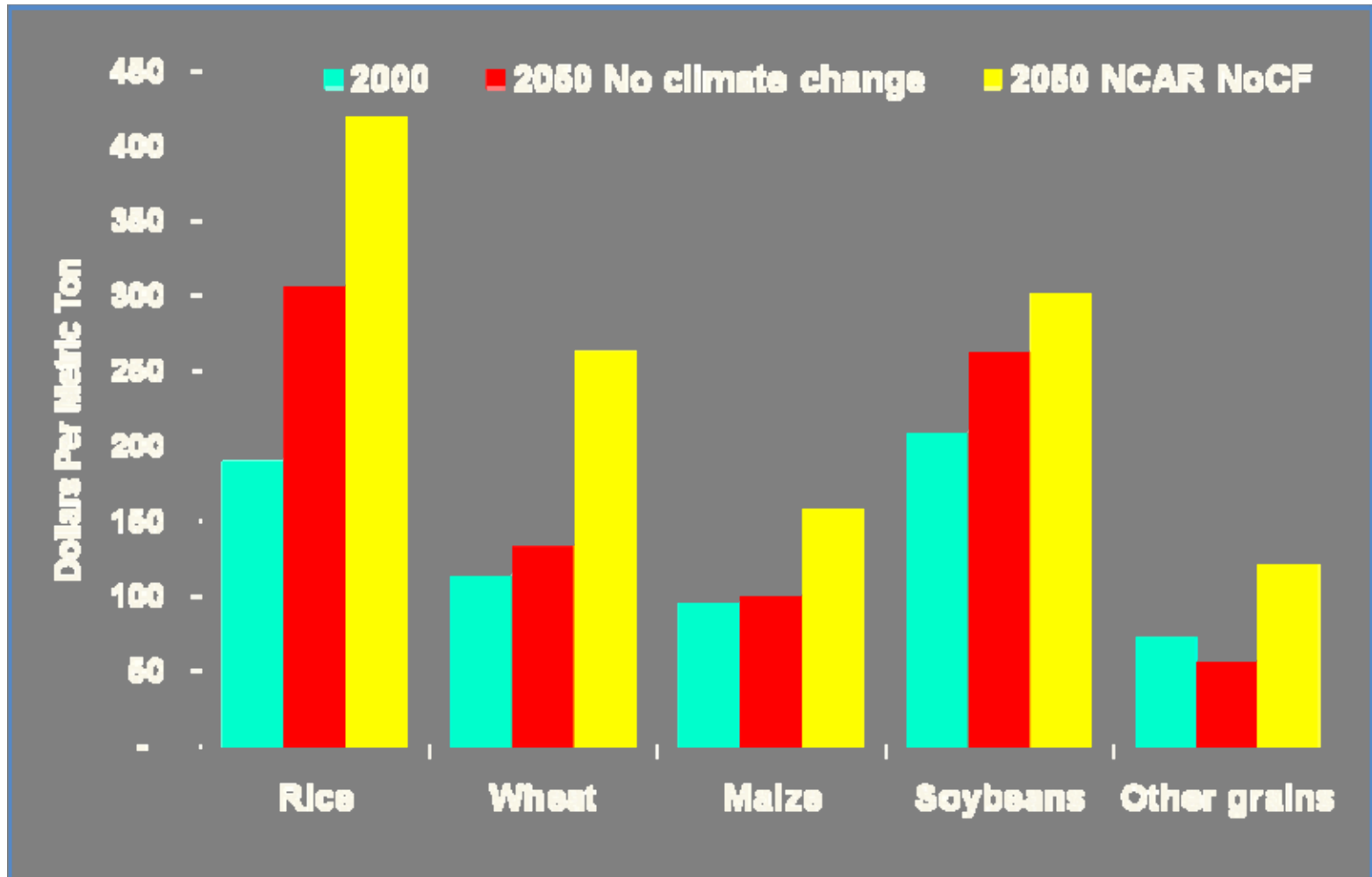
Food Supply and Demand Projections by IFPRI

- Future climate scenarios in 2050 from IPCC
- Crop model to assess the impacts of increased temperature and changes in rainfall pattern
- IFPRI IMPACT Model (global food supply-demand model) to assess the impacts on prices, production, and consumption

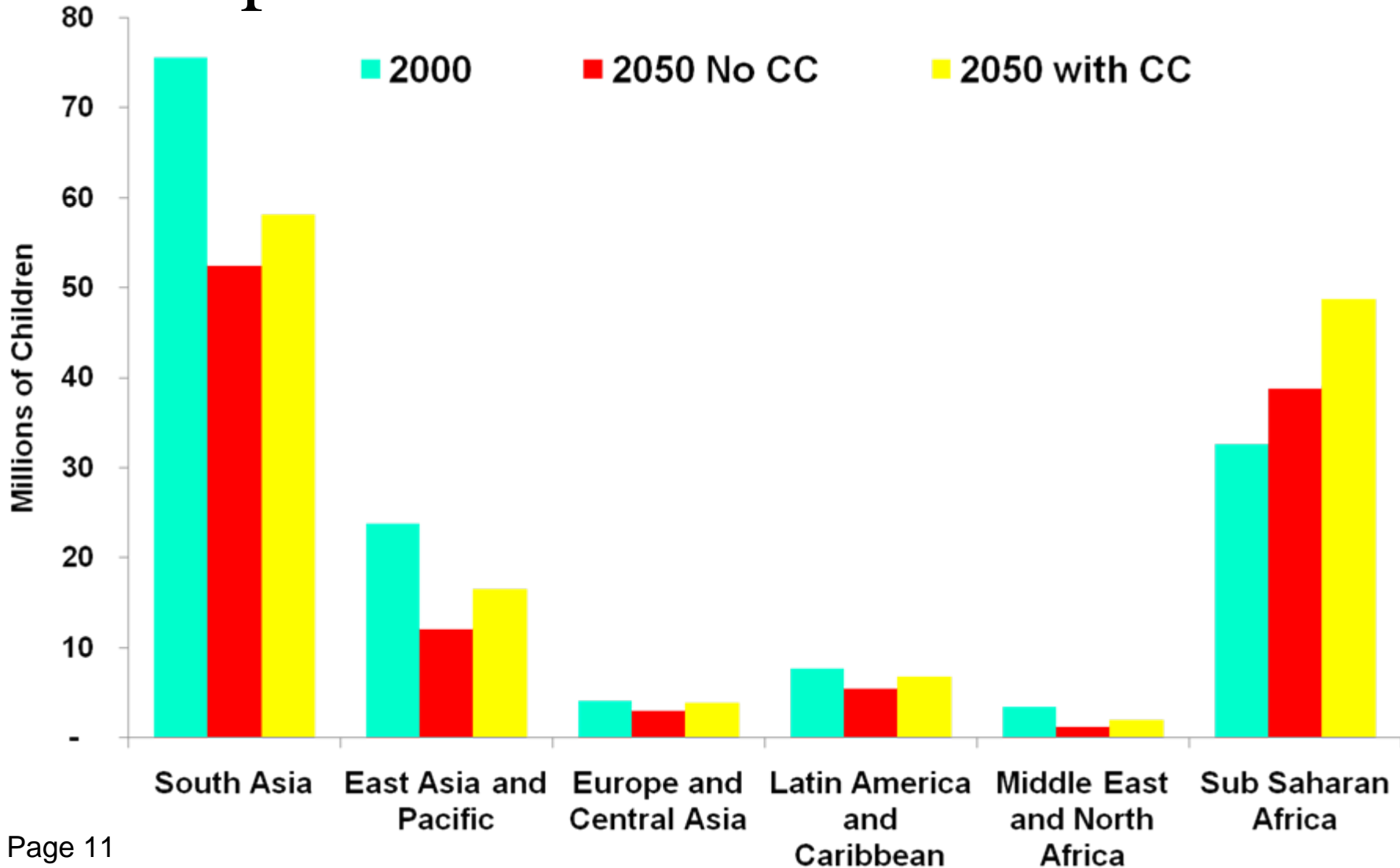
Impact on Rice Production



Impact on International Food Prices



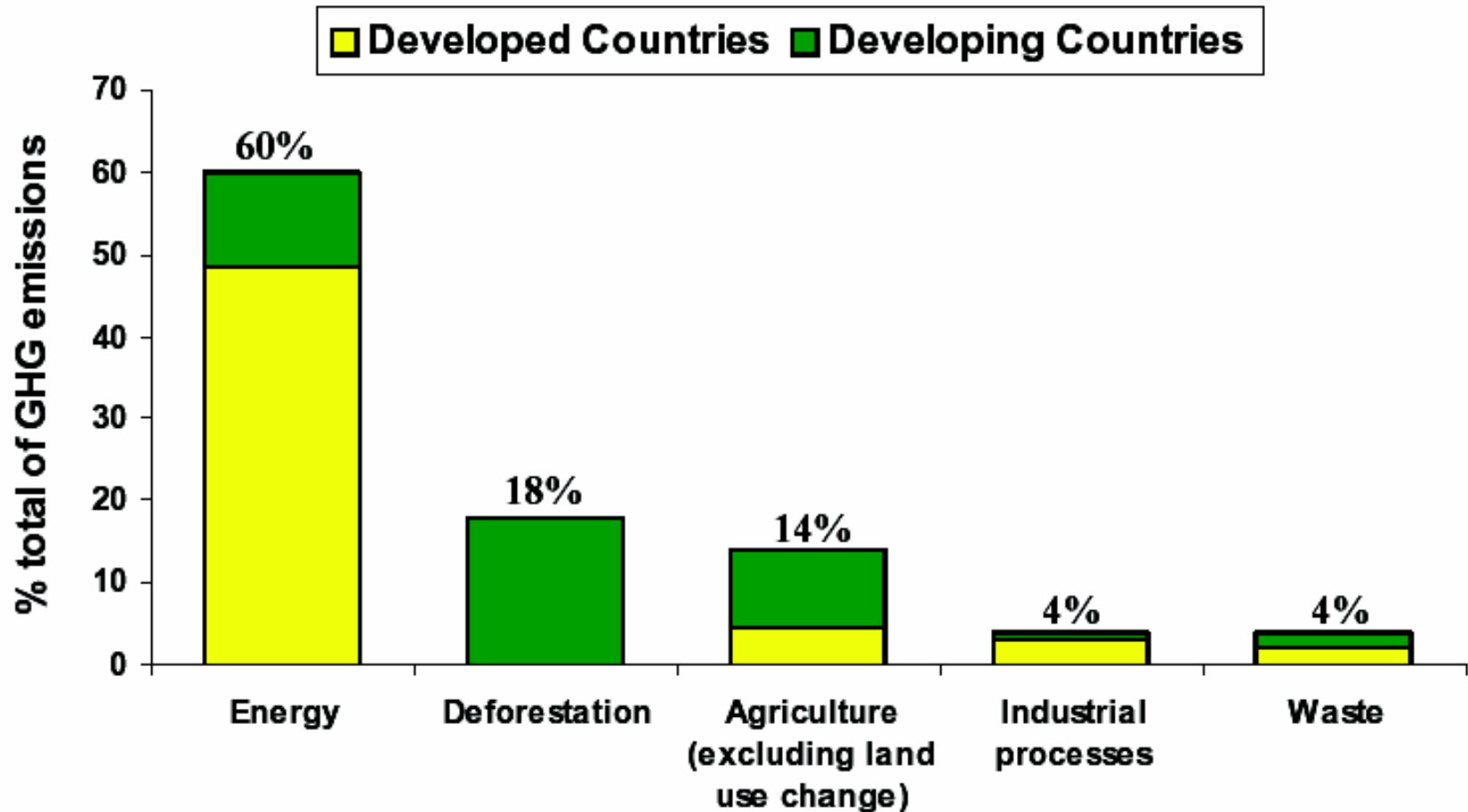
Impact on Childhood Malnutrition



3. Agriculture in developing countries and GHG emission

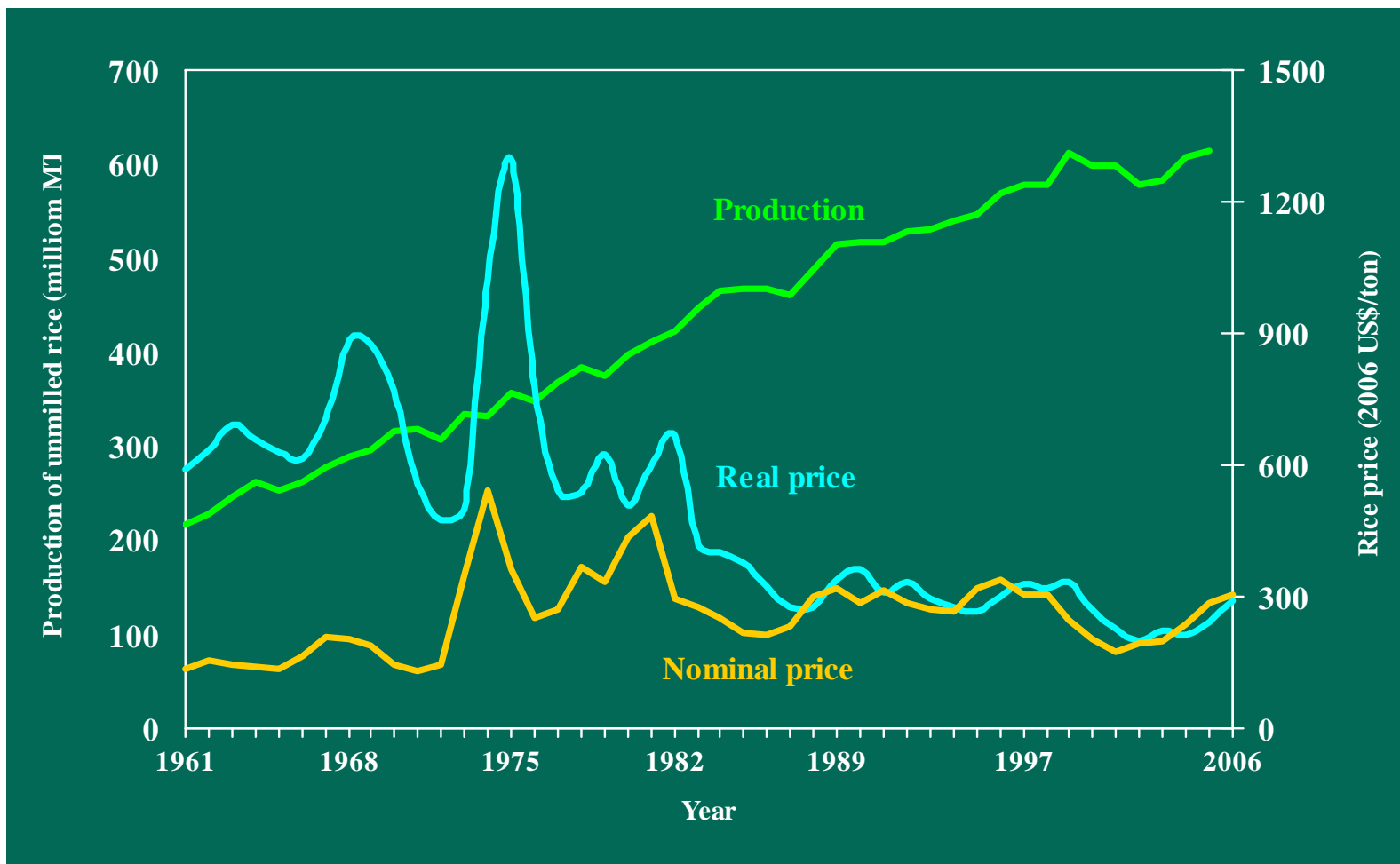
- Deforestation to expand cultivation areas, which leads to flooding and unstable water supply
- Emission of methane and nitrous oxide
 - Emission of these GHGs is more pronounced in developing countries

Sources of GHG Emission



Sources: World Resources Institute 2007; World Development Report 2008

Trends in world rice production and real rice price, 1961-2006



Source: Production: FAOSTAT Electronic Database, FAO.20Apr2006 update.

Rice Price: Relate to Thai rice 5%-broken deflated by G-5 MUV Index deflator (adjusted based on 1 March 2007 data update)

Source: www.,WorldBank.org

Asian Rice Green Revolution, which tripled rice production, creates environmental benefits

- **If rice yields today were the same as in 1965, more than 135 million additional hectares of land would need to be devoted to rice to maintain production at current levels.**
- **The results would have been massive deforestation or widespread hunger and malnutrition.**

4. Importance of Agriculture in the Context of Climate Change

1. Agriculture will be a major target of adaptation
 - Adaptation reduces vulnerability by reducing the impacts of climate change
 - Specifically we need to reduce downward risk of production by developing heat-, drought-, pest- and disease-resistant, and submergence- and salinity-tolerant technologies, particularly in developing countries, which are more vulnerable to climate change.
 - More challenging is the development of chemical fertilizer-saving technology.

Importance of Agriculture in the Context of Climate Change (continued)

2. We need to enhance water control by irrigation investment etc.
3. We should reduce GHG emission from agriculture (e.g., methane and nitrous oxide) by developing monitoring system to reward the effort to reduce GHG emission in agriculture – participation of agriculture in CDM and carbon trade.
4. We need to develop agriculture in general so as to maintain or improve the food security.

5. Key Challenges in Agriculture

1. Develop water-saving technology to release water from agriculture to urban and industrial uses.
 2. Develop drought-tolerant technologies to increase food production in dry and drought-prone areas in Asia and almost the whole region of sub-Saharan Africa, where people are particularly poor.
 3. Develop chemical fertilizer-saving technology.
- * We have to invest a lot in agricultural research.**
4. Invest in irrigation, roads, and other infrastructure.

Thank you very much for your attention