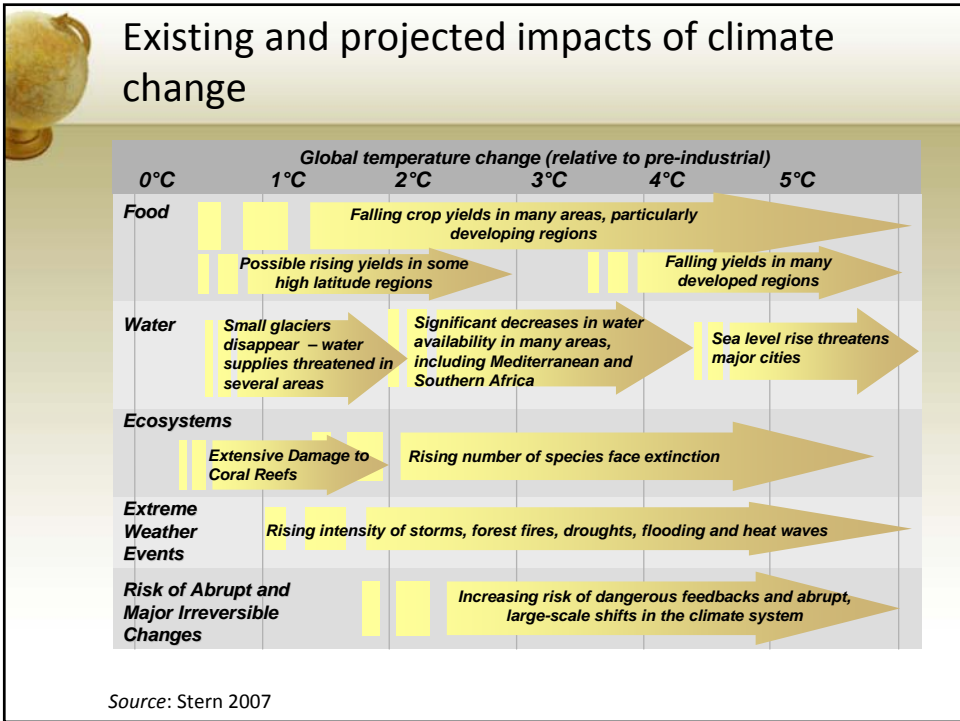


## CLIMATE CHANGE IMPACTS ON AGRICULTURAL TRADE TRENDS AND THE RESULTING POLITICAL-ECONOMIC EFFECTS

Dominique van der Mensbrugghe  
DECPG/The World Bank

Climate Change and Agriculture Trade:  
Risks and Responses  
Washington, DC  
September 22-23, 2009



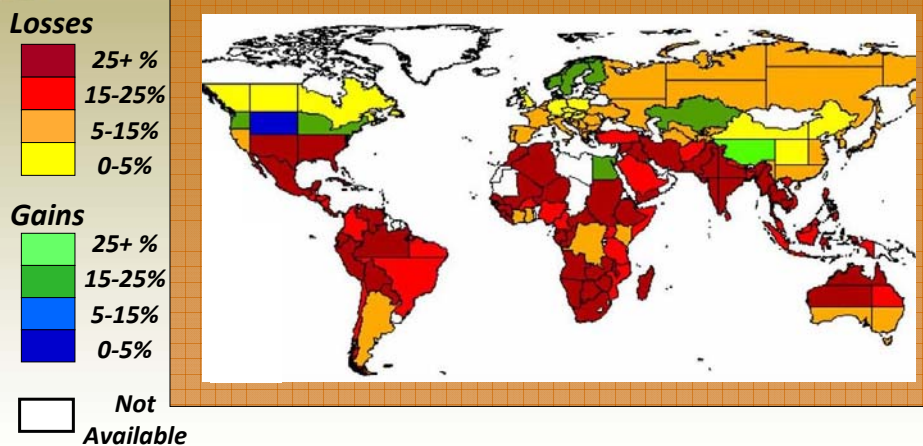


## Key design characteristics

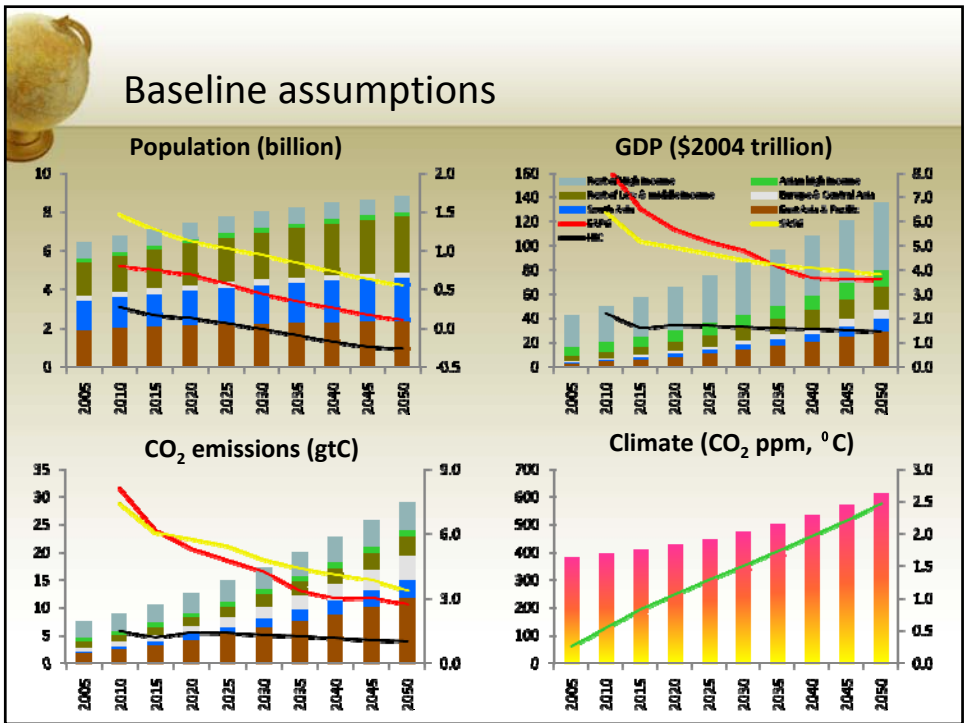
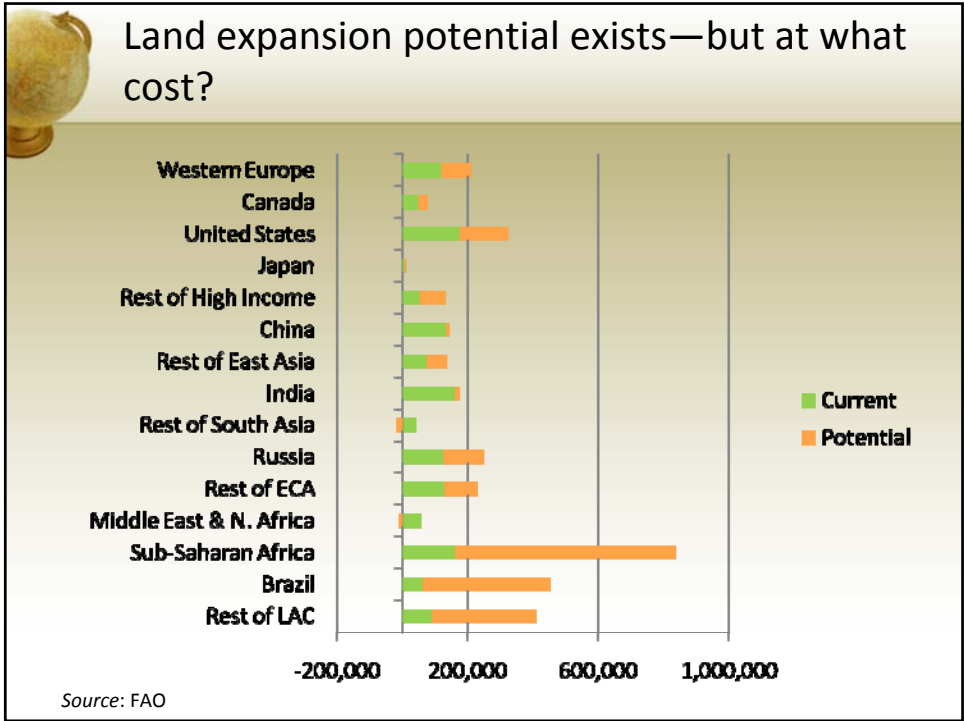
- **ENVISAGE** dynamic multi-sector global CGE model with climate module, i.e. Integrated Assessment Model (IAM).
- **Time frame:** 2004-2015, 2015-2050 ( $\Delta 5$ ).
- **Dynamics** driven by population/labor force growth, demographic-sensitive savings function, sector-specific productivity growth.
- **Natural resources** are limited. Depletion modules for oil and gas. Logistic supply functions for land and hydro.
- **Greenhouse gases** include CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O and the F-gases (but excludes for the moment LUC).
- **Climate module** converts atmospheric concentrations into changes in radiative forcing and temperature.
- **Damage functions** link temperature changes to productivity impacts

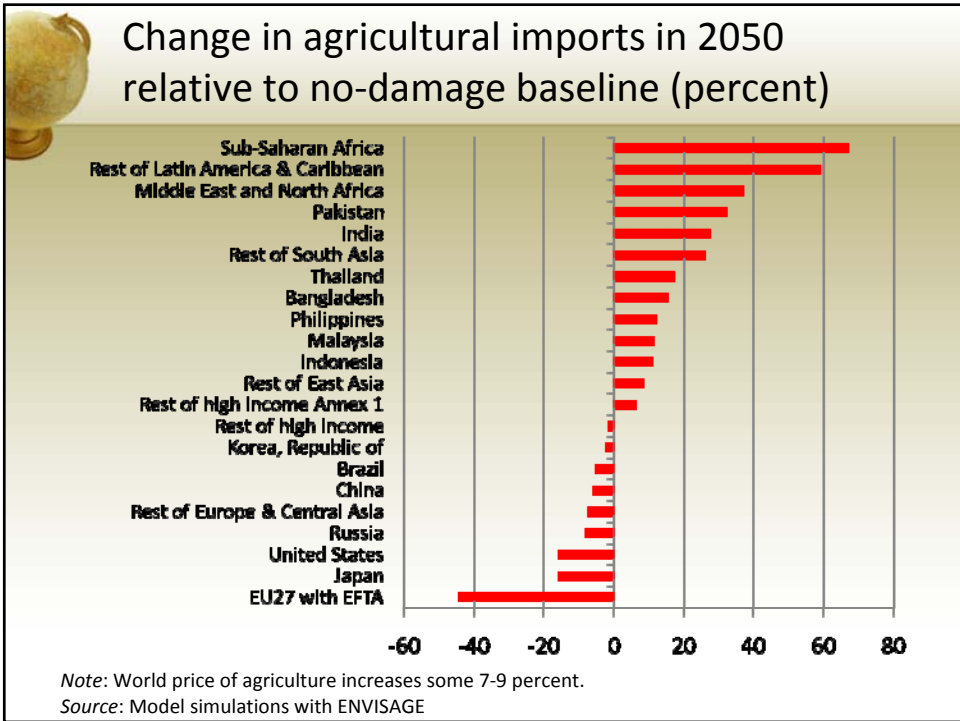
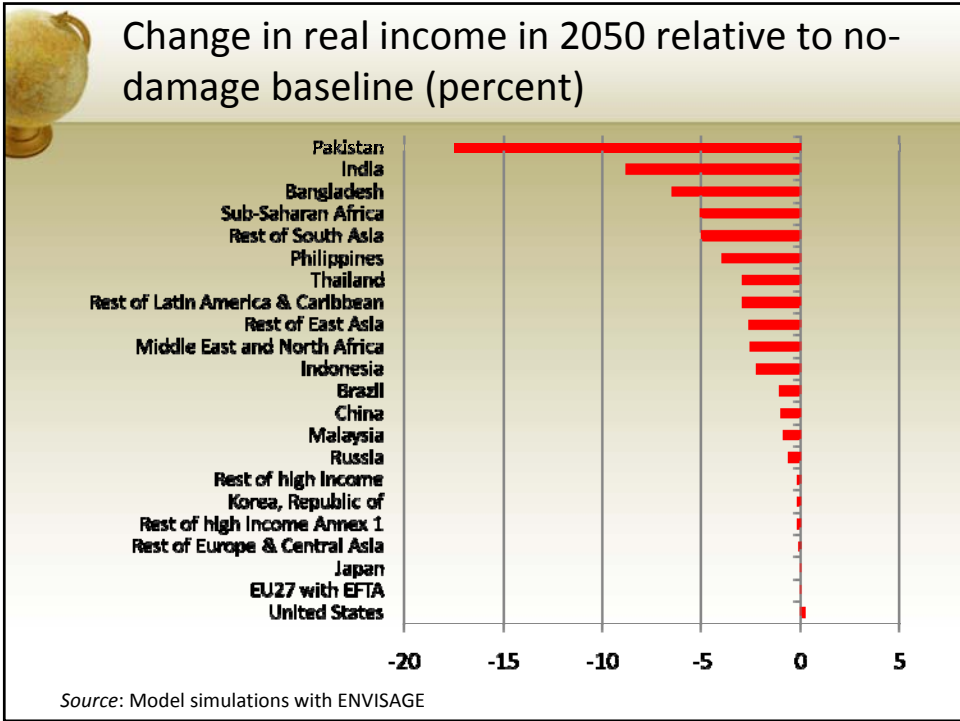


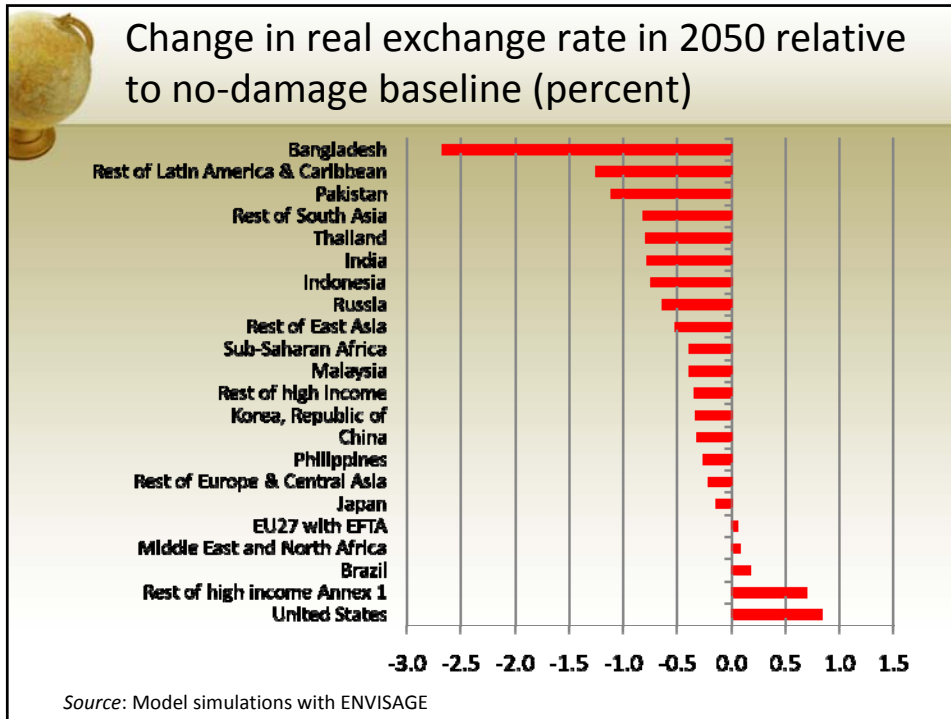
## Climate Impact : Agriculture 2008-2080 without Carbon Fertilization



Source: Cline, William R. (2007), *Global Warming and Agriculture: Impact Estimates by Country*.







- ### Further research
- Interaction between mitigation options and other development objectives:
    - Bio-fuels and food security and affordability
    - Bio-fuels and carbon sequestration
    - Forestry, food security and carbon sequestration
  - Carbon taxes and impacts on agricultural production, prices and trade



## Take away messages

- **Agriculture** is most likely the most vulnerable sector—and will have the largest aggregate impacts for most countries
- **Greenhouse gas emissions** are currently on a ‘worst-case’ path leading to early damage in agricultural sectors
- **Developing country agriculture** is most vulnerable to rising global temperatures
  - Higher domestic prices and lower production
  - More agricultural imports
- **Adaptation strategies** need to be designed today to deal with impending climate impacts on agriculture
  - R & D, water management, reducing vulnerability (infrastructure, safety nets, diversification, etc.)