

# Economic Models and Climate Impact Assessment

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# Themes

- Economic models
- Putting weather & climate into economic models
- Key challenges in using economic models for climate assessment
- The global and regional integrated assessment framework: multiple scales & disciplines

# Economic models

## ■ Macroeconomic

- national employment, aggregate price levels, interest rates, monetary & fiscal policy

## ■ Trade policy

- market equilibrium (“real”) prices, production, consumption & trade
- partial or general equilibrium, sub-national to multi-national spatial scales for supply, demand

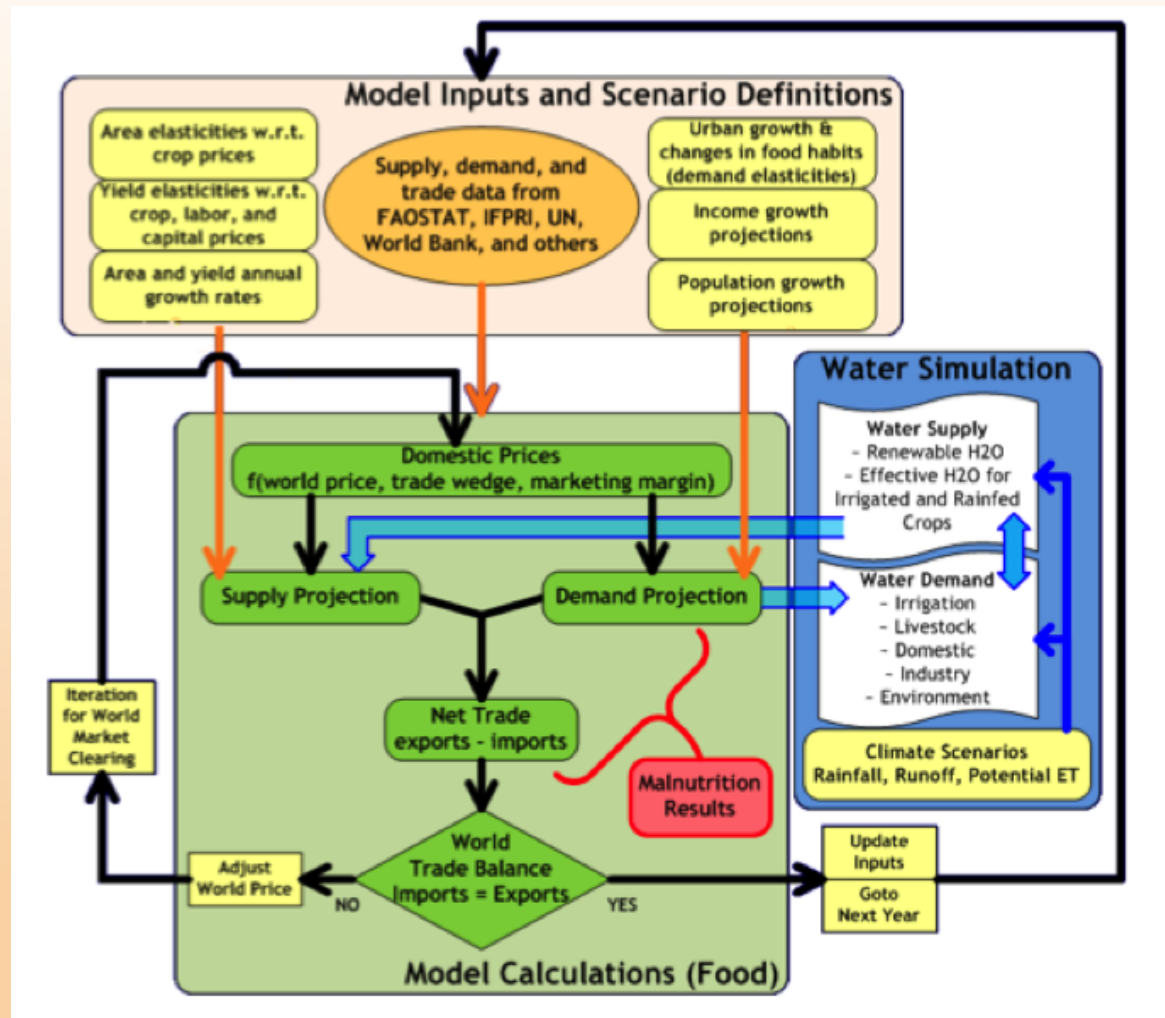
## ■ Microeconomic

- “price-taking” models of farm household decision making, regional land use and other resource allocation
- technology adoption, farm production, income, consumption, other “social” indicators of well-being (gender, nutrition, health)
- individual “representative” household, household population
- community (village), sub-national region, national

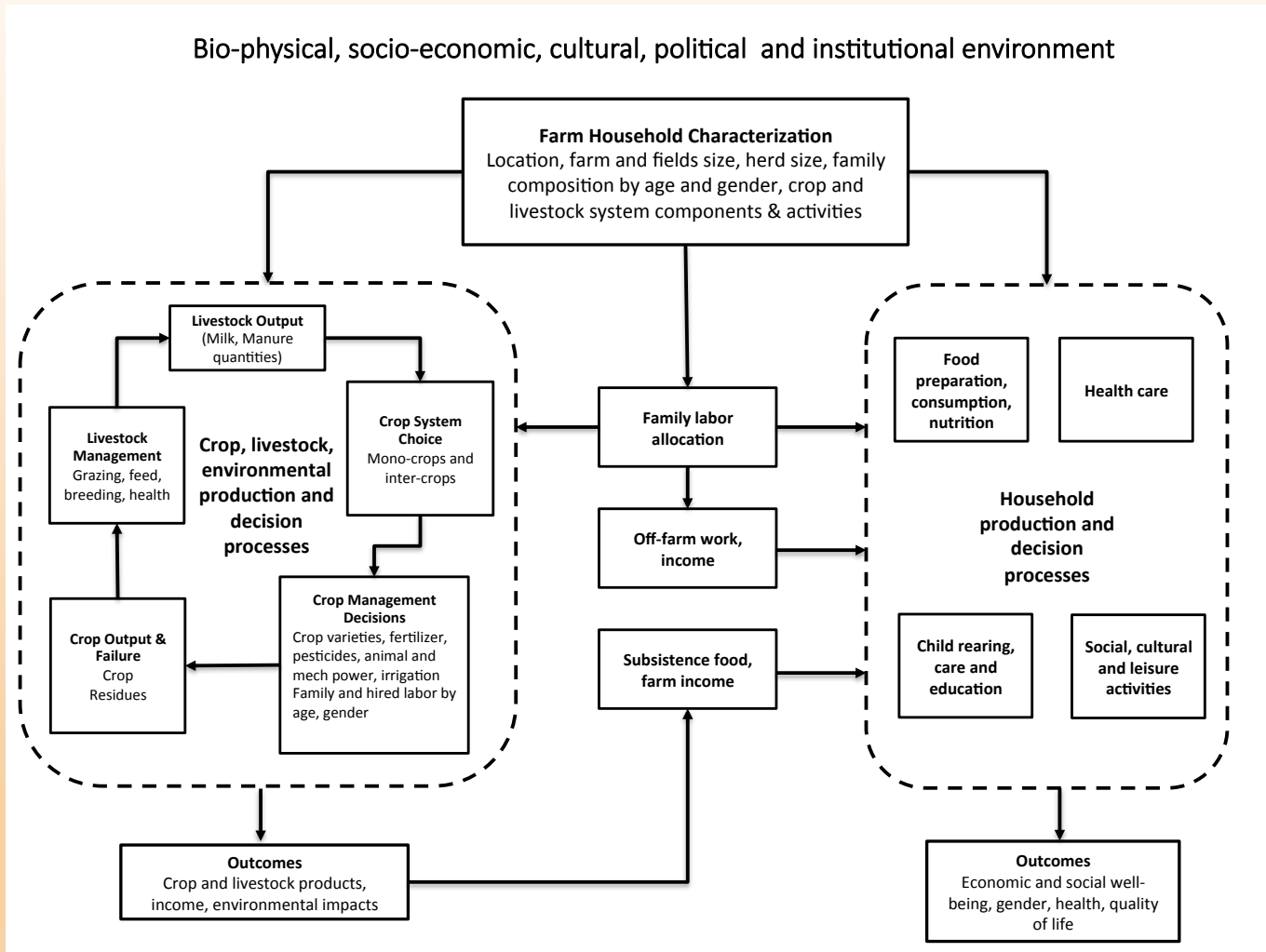
# Putting weather & climate into economic models: production functions and supply

- Economic production function
  - capital, labor, energy, materials, technology => output
  - agriculture:
    - “land”, labor, seeds, nutrients, chemicals
    - soils & water
    - weather – random “error” versus explicit input
- Trade policy models:
  - production function => commodity supply curve
- Household models:
  - production function => production system supply curve

# The IFPRI “IMPACT” Model: partial equilibrium trade policy



# Household Farming System Models: optimization or simulation of farm-level decision making



# Key challenges

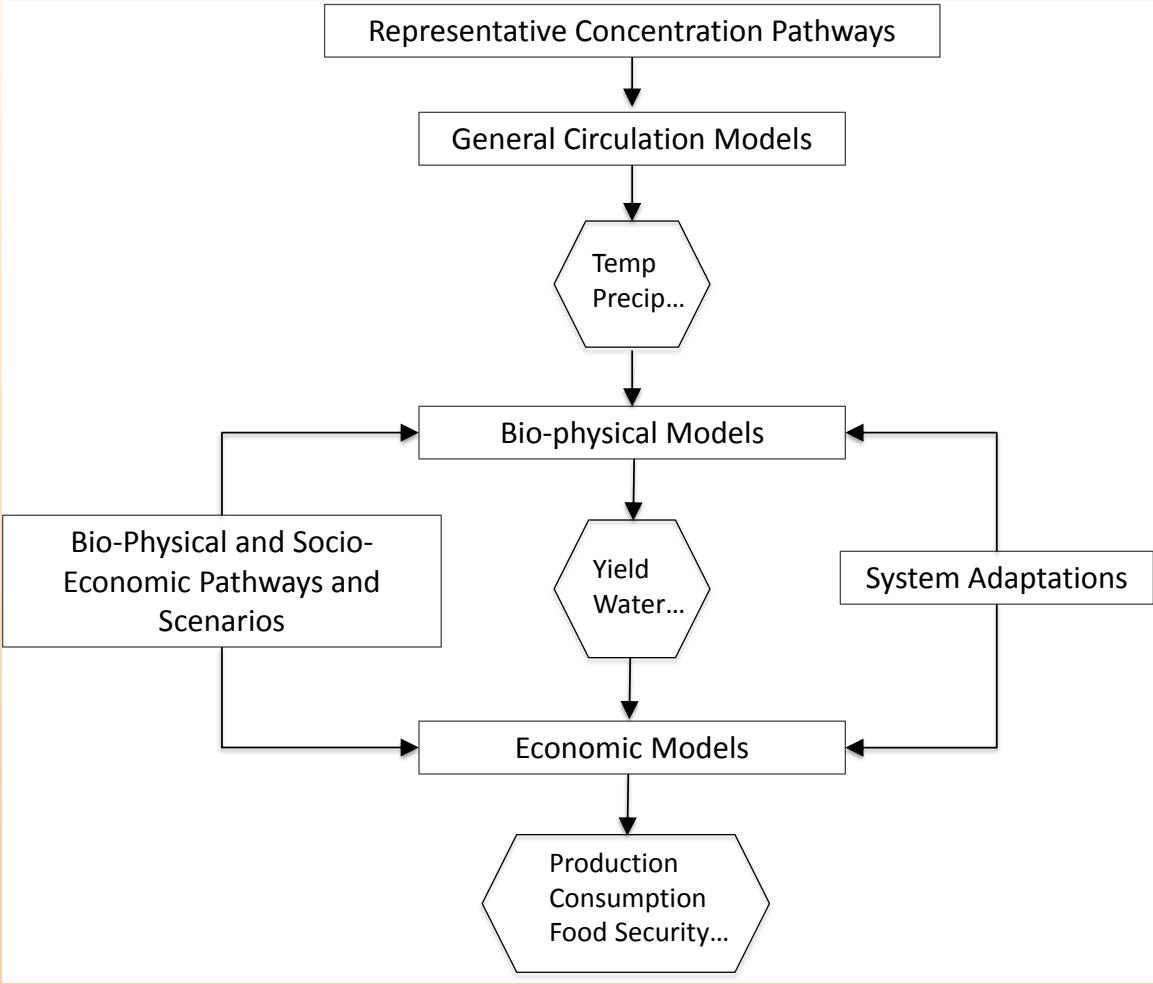
- Putting weather & climate into economic models
  - climate = weather distribution
  - farm and aggregate supply = functions of weather/climate
  - “hybrid” structural models: link bio-physical & economic production models
- Linking global trade models to household farming system models: bridging scales & complexities
  - trade models: various spatial/temporal scales, commodity market supply & demand
  - household farming system models: complex systems with detailed inputs, costs of production, outputs, behavior

# Key challenges (cont.)

- How to “predict” or “project” out of sample?
  - where do we get the “drivers” or exogenous variables?
    - => pathways and scenarios
  - are model parameters stable over time & space?
- How to evaluate model uncertainty?
  - AgMIP study: global economic models show substantial differences in baseline projections, climate impacts
  - household farming system models have not been systematically compared!



# Integrated Assessment: one scale, multiple disciplines



# Integrated Assessment: multiple scales and disciplines

