

Panel 4. Scenarios

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3 papers with Carlos Lopez-Morales in *Economic Systems Research* (2011, 2012, 2015)

1. “Policies and Technologies for a Sustainable Use of Water in Mexico: A Scenario Analysis”
2. “Do Water-Rich Regions Have a Comparative Advantage in Food Production? Improving the Representation of Water for Agriculture in Economic Models”
3. “Achieving Water Sustainability: Analyzing Scenarios Restricting Water Withdrawals from Surface and Underground Sources with an Inter-Regional Model of the Mexican Economy”

Structure of the model (WTM)

- 13 hydro-economic regions of Mexico
- Constrained optimization model
- Minimizes production costs
- Endogenous choice of irrigation technologies

1. Fees or caps on water extraction

- Policies can induce technology adoption to achieve water sustainability
- Price of agricultural output rises 5% to 8% relative to baseline levels
- Pricing water for irrigation can generate enough public revenue to cover the full costs of technology adoption.

2. Comparative advantage....

- Examine “trade in virtual water” hypothesis as applied to Mexico: Do the water-rich regions have a CA in food production?
- Water-rich regions of Mexico are relatively high-cost producers of food
- When low-cost regions are water-constrained instead resort to increased rainfed production in medium-endowed regions with 36% increase in unit price.

3. Distinguishing surface and groundwater reveals groundwater depletion

- Sustainable scenario restricts withdrawal from each to smaller of sustainable supply and capital capacity to withdraw
- Outcome reduces groundwater withdrawals, increases (but by less) surface water withdrawals, expands use of rainfed land
- Sustainable use of water, but 27% increase in unit price.

Next steps

- Distinguish by crop
- Increase capacity in some regions for extraction
- Additional scenarios for increasing productivity
- Situate within global economy with imports endogenous to see relative price increases.
