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# Economic Assessment of Policy Interventions in the Water Sector

17<sup>th</sup> of March, 2006



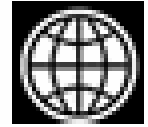
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# Motivation



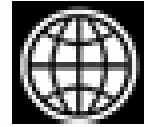
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- ☑ Water, a limiting factor for the economic development of Mexico.
- ☑ Decisions of water use and allocation have micro and macro effects
- ☑ Agriculture is the major water consumer in Mexico:
  - ☑ 81% of surface water
  - ☑ 71% of ground water





# Main objective



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- The study assesses implications of
  - water reductions and
  - policy interventions
- ...
- on Mexican
  - farmers
  - agricultural regions, and
  - on the whole economy of Mexico





# The models



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Two economic modeling approaches built separately but linked through their results

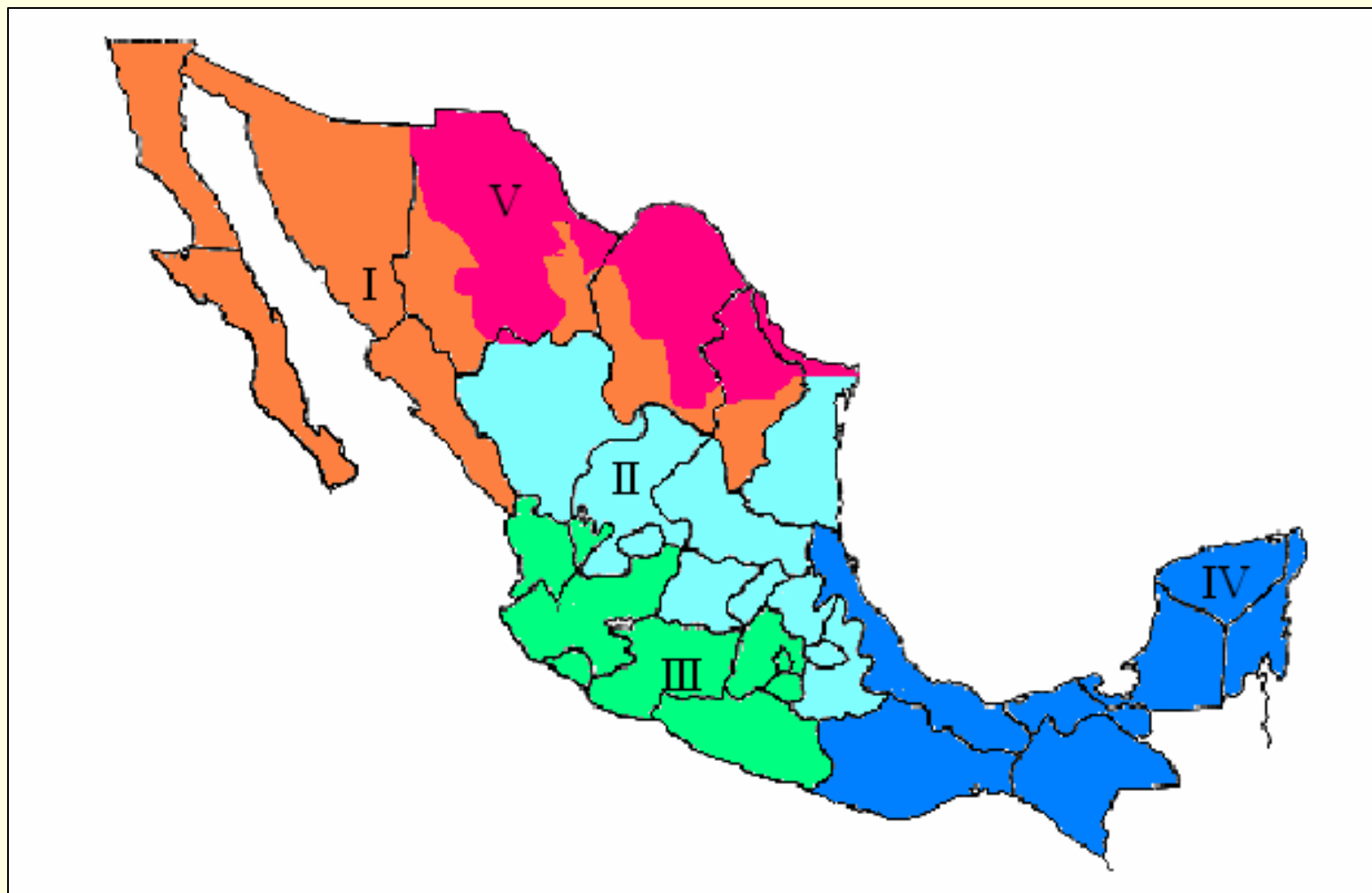
- ✧ Microeconomic for farmers in the Rio Bravo Basin (RBB).
- ✧ Macro computable general equilibrium model (CGE), for the whole of Mexico (5 Ag. Regions)



# Agricultural regions of Mexico

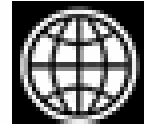


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# Simulations



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- Micro and macro effects of water availability and policy shocks arising from:
  - Drops in superficial water supply for irrigation
  - Higher water costs
  - Investment projects
  - NAFTA ...combined with water shocks and other Agricultural policies
  - ...



# Water related shocks

**CGE effects of reductions in water supply for irrigation**

**Rural/  
Agriculture**

**Urban/  
Manufactures**

**↑ Water shadow Value**

**Pushes resources out of irrigated Ag.**

**↓ Food processing  
↑ Other manufactures**

**↑ WUA savings**

**Factor demand varies according to Crop & region**

**↓ Wages**

**Investment for efficient Use of water**

**↓ Wages & Land rents**

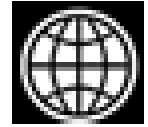
**Small ↓ in**

- Real GDP
- Household incomes (rural rich, the biggest losers)

**↑ Exports & Imports**



# Water related shocks



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- ✧ Bigger effects of reductions in water supply for irrigation on
  - farmers, and
  - Mexican agriculture
- ✧ than changes in water costs to users ... because of,
  - ❖ Total surface water costs are low,
  - ❖ Water is not fully valued
  - ❖ Low opportunity cost
- ✧ The North and RBB the Ag. regions suffer the most



# Economy-wide effects of AG TRADE LIBERALIZATION (NAFTA)

Rural

Urban

△ domestic prices  
↓ non competitive  
↑ competitive

Pushes resources  
Out of non-competitive  
In of competitive

Small negative  
effects

↑ Water shadow prices  
↑ WUA savings

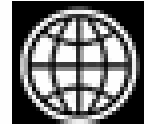
↑ Factor prices  
Wages  
Land rents

↑ Factor prices  
Wages  
Land and capital rents

↑ Household income



## CGE results:



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### Agriculture Trade liberalization (NAFTA) plus water supply drop

- ✧ Positive consequences of an agricultural freer trade with no water restrictions diminish.
- ✧ However, the GE impacts of restricting water availability for irrigation are low in a NAFTA context



# Policy implications



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In the current environment of low costs of water leading to over-exploitation

↪ Policy option. Reductions in water supply for irrigation

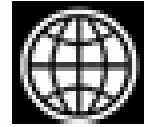
↪ To control water supply more plausible than rising energy-related water costs for irrigation.

↪ Projects for a more efficient water use in agriculture





# Development of Water markets



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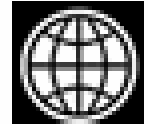
## CURRENT LIMITATIONS

- The National Water Commission has to allow farmers (WUA) to trade their water allocations
- Property rights on water have to be clearly established





# Conclusion



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Different impacts of water and policy shocks  
on:

- ✧ Farmers (size and crop)
- ✧ Agricultural regions
- ✧ Rural households

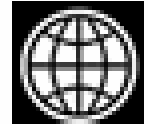
... rich Mexican farmers of North and RBB suffer the most

*Focalized policies are required*





# Conclusion



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◆ De-centralization efforts in the appropriate direction ...

but...

◆ in the short run, some economic actors will be negatively affected by policy changes and water restrictions

So, implementing them requires a  
*strong political will*

