

# Bioenergy Development and Integrated Water-Energy Management in Pan America

- This session featured 6 papers, including:
  - A synthesis paper reviewing field-scale hydrologic studies and basin-scale hydro-economic models.
  - A review of studies measuring water use by bioenergy feedstocks.
  - A study of water quality impacts of sugarcane production in Brazil.
  - Three papers addressing economic aspects of expanding biofuel production in Brazil under conditions of water scarcity and market competition.



# Research Gaps

- Water resources impacts of many bioenergy systems, particularly forest-based systems, are not well known.
  - Few studies on woody plantations and no long term observations.
- Water quality impacts of bioenergy systems have not been widely studied.
  - Expected to be similar to those of other agricultural systems, where best management practices can greatly reduce impacts.
  - However, cumulative impacts of large-scale bioenergy development at watershed scales may be difficult to avoid.
- Many studies of bioenergy water footprints and expansion potential have been conducted at inappropriate scales.
- The effects of market forces and government policies on bioenergy development are not well known.





# Data Needs

- Agronomic data for bioenergy feedstocks
  - Yield potential (thresholds)
  - Water-yield relationships
  - Effects of soils, management practices
  - Cold and drought tolerances, particularly for introduced species
- Watershed-scale data
  - Hydro-climatic data
  - Water quality data
- Socioeconomic data
  - Price elasticity of water for different uses
  - Distributional effects
- Input-output data for second-generation conversion technologies



# Research Opportunities

- Studies of water use by biomass plantations
- Development of efficient irrigation technologies
- Economic studies to support policies for rational and efficient water use
- Increased use of satellite remote sensing data for watershed studies
- Data clearinghouse for water use and water quality studies of bioenergy systems
- Learn from good experiences/concerns in Brazil
  - Improved water efficiency through public-private partnerships
  - Increases in sugarcane productivity from irrigation
  - Trade offs between local and global environmental impacts
  - Educate and understand the role of consumers

