MODELING HYDROLOGIC-SOCIAL SYSTEMS IN TRANSBOUNDARY REGIONS

ASHLEY PAGE
• **Introduction**: System dynamics modeling
• **Background**: Hydrologic-social system research
• **Summary**: NM WRRI research team efforts
• **Applications**: Modeling for transboundary regions
The purpose of a system dynamics study is to understand the causes of a dynamic problem, and search for the policies that alleviate/eliminate them.

(BARLAS, 2002)
Discovery

- Created by Jay Forester in the 1950s

Strengths

- Understanding nonlinear behavior
- Complex systems

(MIT Sloan School of Management, 2008)
Background

• Malin Falkenmark in 1979
• Resurgence in recent years
• Potential for transboundary regions
  • (Blair and Buytaert, 2016)
A system dynamics approach allows for the analysis of:

- separate, yet intrinsically connected decision-making analysis
- connected hydrologic system
- unintended consequences

(Torres, 2017)
• Sam Fernald, Director
• Transboundary research region:
  • Mesilla Basin
• Research interests:
  • Surface water-groundwater interactions
  • Watershed management effects on runoff and water quality
  • Water and society
  • Transboundary water management

Contact: afernald@nmsu.edu
• Saeed Langarudi, Post-Doctoral Research Scientist
• Transboundary research region:
  • Mesilla Basin
• Research interests:
  • Natural resources management
  • Political economy
  • Public policy
  • Development economics

Contact: lang@nmsu.edu
• Babak Bahaddin, Graduate Researcher
• Transboundary research region:
  • Mesilla Basin
• Research interests:
  • Archetypes and generic structures in water resources management
  • Socio-economic feedback loops in water systems
  • Dynamic mechanisms for closed surface and groundwater systems

Contact: babak@nmsu.edu
Yining Bai, Graduate Research Assistant

Transboundary research region:
  • Mesilla Basin

Research interests:
  • Regional groundwater resilience
  • Agricultural water usage
  • Efficiency of natural resource storage

Contact: ynb@nmsu.edu
• Connie Maxwell, Graduate Research Assistant

• Transboundary research regions: Mesilla Valley and Hatch Valley

• Research interests:
  • Watershed restoration (multi-functional benefits, including flood mitigation)
  • Stormwater harvesting (mitigation of flood energy and aquifer recharge)
  • Community collaboration (working to develop NM WRRI’s Water and Community Collaboration Lab)

Contact: alamosa@nmsu.edu
• Ahmed Mashaly, Graduate Research Assistant
• Transboundary research region:
  • Southern New Mexico
• Research interests:
  • Water-Energy Nexus
  • Implications of water and energy interactions
  • Analysis of integrated water and energy management

Contact: amashaly@nmsu.edu


MESILLA BASIN HYDRO-SOCIAL TRANSBOUNDARY RESEARCH

Research: Evaluating Policy and Management Instabilities in the Transboundary Mesilla Basin Hydro-Social System to Rectify Public Health Concerns

Ashley Page, Sam Fernald, Saeed Langarudi, Sue Forster-Cox, Humaira Rahman

(El Paso Times, 2017)
PREVIOUS RESEARCH

• A Dynamic Hydro-Socio-Technical Policy Analysis of Transboundary Desalination Development

Focus groups

• Key findings
  • Cost
  • Reform
  • Quality
  • *Need for further research*

Created by Robert Sabie Jr., NM WRRI
System Dynamics model

• Hydrologic-social analysis to investigate the systematic instabilities that create a gap between the expressed health needs of the community and their rectification
• Focus on the feedbacks between the hydrologic and social system
• Analysis of unintended consequences
Community
  • Meeting to discuss results from previous focus group
  • Receive updated feedback regarding their water-related and action concerns

Public Health
  • Investigate the impact of arsenic contamination on the health of the community
CONTACT

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