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Collaborative Stakeholder-Driven Water-Energy-Food Resource Modeling and Planning

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Resource planning is more complicated and more critical than it has ever been

- Increasing population
- Increasing resource consumption
- Decreasing resource availability
- Increasing stakeholder involvement
- Increasing appreciation of the complexity
  - multi sector/discipline
  - many variables, interdependencies, feedbacks, time lags

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One solution: Collaborative Stakeholder-Driven Modeling, Roadmapping and Planning

- Engage multi-sector, multi-disciplinary experts
- Collect knowledge, data, information
- Build computer simulation models for
  - evaluating tradeoffs
  - developing consensus
  - educating stakeholders, policy makers, community, public
  - planning future strategies
- Ongoing efforts: modeling improves management, experience improves the model

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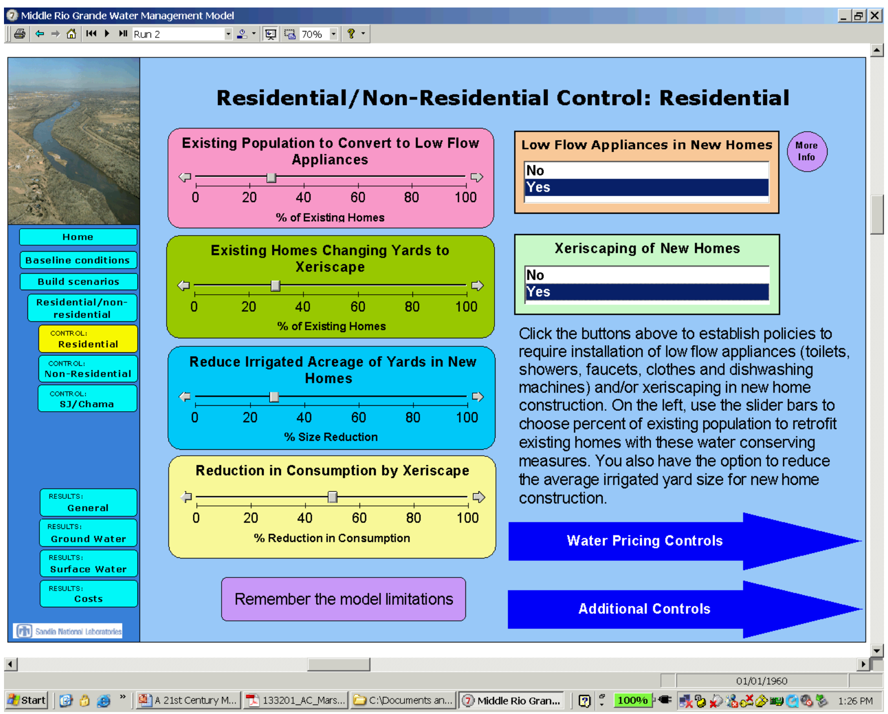
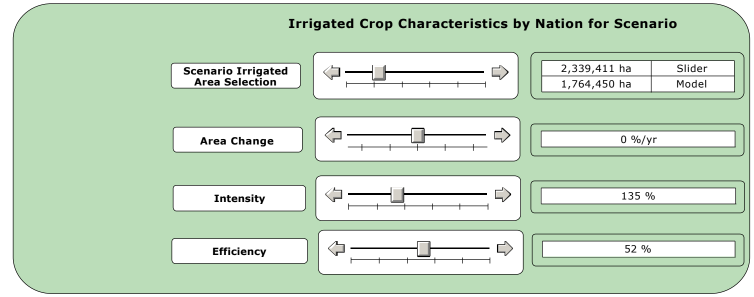
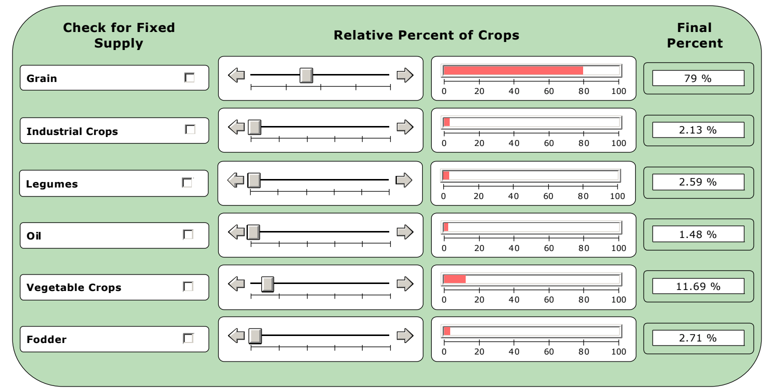
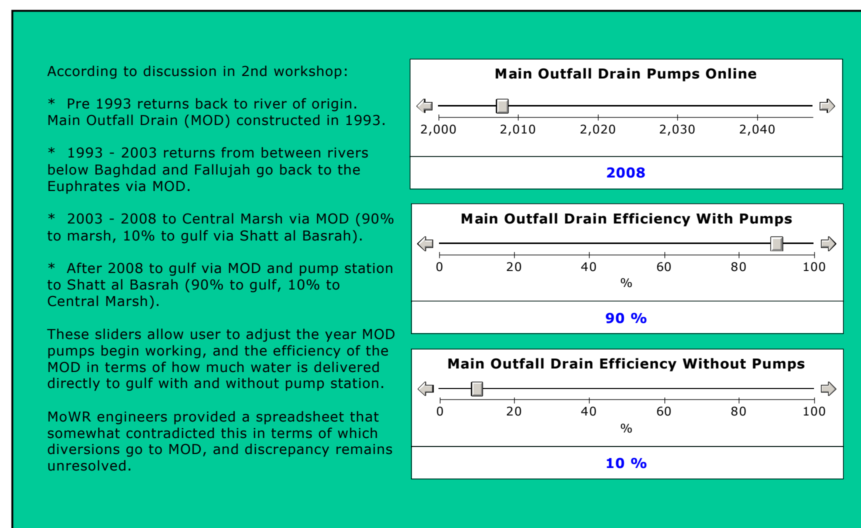
INTERACTIVE, USER FRIENDLY MODELS

Allows for real time construction and evaluation of competing development strategies









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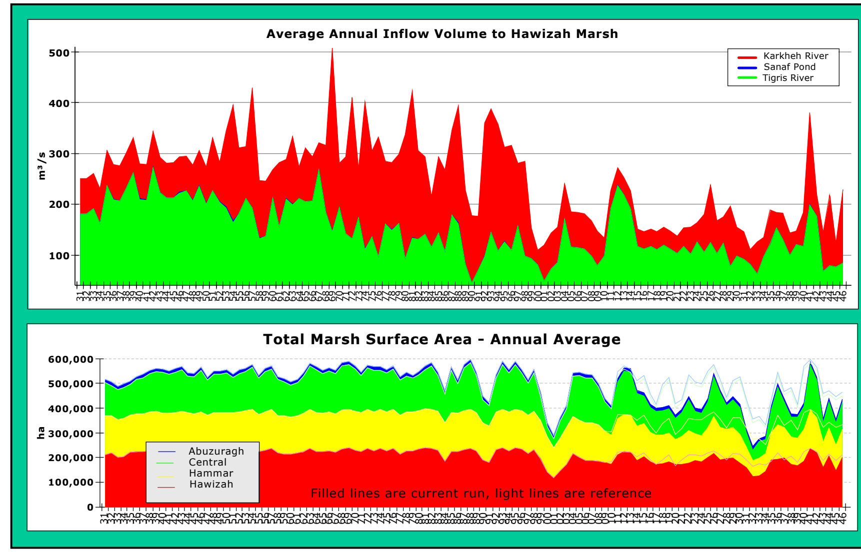
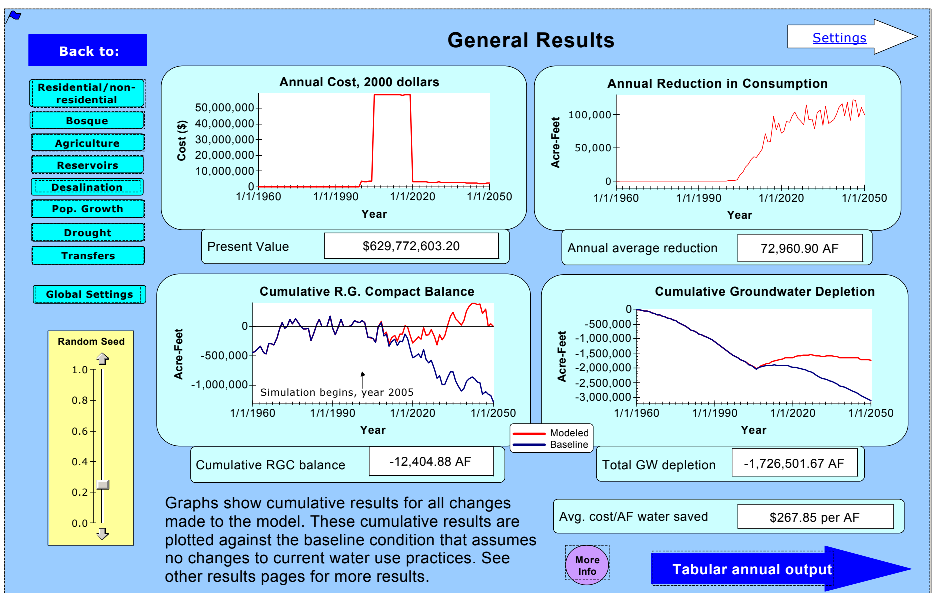
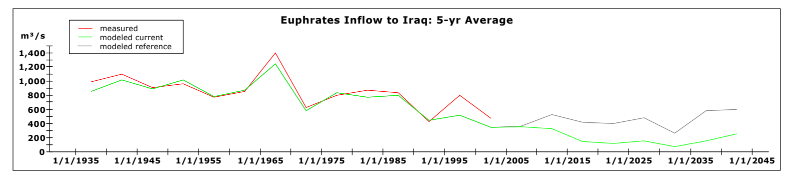
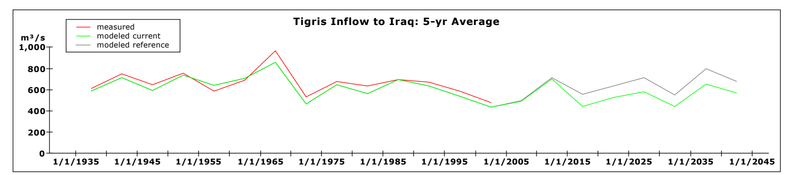
GRAPHICAL OUTPUT

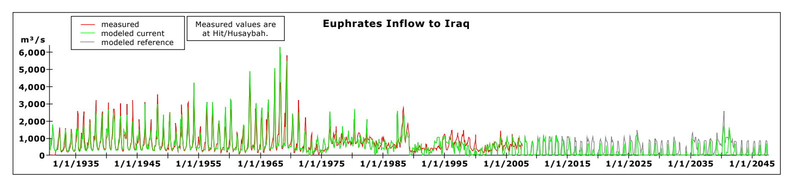
Allows real time comparison of alternatives, education of stakeholders and policy makers, and development of rigorous, quantitative development plans

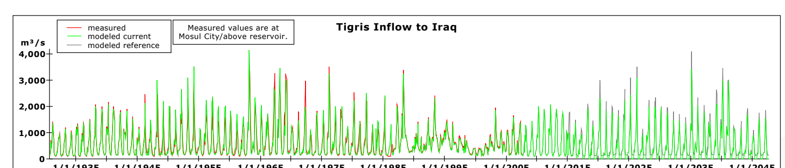












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Collaborative Stakeholder Involvement

- Collaborative stakeholder involvement is key
  - Brings together experts from across disciplines and sectors
  - Over months or years they work together to better understand interdependencies among systems
  - Their collaborative experience is captured in a quantitative model
  - Model is clearinghouse for best data and knowledge
- Model *AND* the collaborative process are both important products of the work
  - Both form the structure for ongoing planning, evaluation of consequences, improvement of models, and so on . . .

Overall advantages of the approach

- Reduces guess work associated with large-scale infrastructure planning projects
- Can include climatic variability, demographic patterns, economics
- Provides rigorous and quantitative evaluation of outcomes
- Provides a user-friendly, interactive tool perfect for educating policy makers and the public
- SNL projects include capacity development
  - Modeling and planning skills stay after SNL leaves

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SNL decision support systems:

	Active projects (as of November 2010)	Past projects beginning in 1992
Domestic	• Upper Rio Grande Simulation Model • Energy, Power & Water Simulation Model • SunCity Model • Water, Energy and Carbon Sequestration Model • Gila Basin-Az Water Settlement Model • Electrical Grid Storage Valuation Model • Alternative Liquid Fuels Simulation Model • Electricity Generation Cost Simulation Model • Virtual Water Market Model • Geothermal Energy Tradeoff and Scenario Analysis Model •Transition to Renewable Energy – County of Maui •Cut-off Grade Determination for Potash Mining in New Mexico •Validation and Verification of VISION Civilian Nuclear Fuel Cycle Model	• U.S. Energy and GH Gas Model • Sandia-GM Biofuel Deployment Model • Renewable Energy Systems & Learning Model • String of Pearls Model • Middle Rio Grande Cooperative Water Model • Nambe Pueblo Water Budget Model • Hydrogen Futures Simulations Model • Barton Springs Urban Growth and Groundwater Sustainability Model • US-Mexico Border Permeability Model • Upper Rio Hondo Water Availability Model • Biofuels Feasibility Modeling & Analysis Project • Algae Biofuels Techno-Economic Modeling and Analysis Project • Climate Change Risk Assessment Model •Willamette Basin Temperature TMDL Model •Insurgency as a Business Enterprise
International	• Strategy for Water and Land Resources in Iraq Model • US-Canada Algae Biofuel Co-Location Model • Libyan Water-Energy-Food Model • Strategic Water Allocation Demonstration Model for the Canterbury Region of New Zealand •Spent Fuel Management – Taipower Taiwan	• China Energy and GH Gas Model • India Energy and GH Gas Model • Electricity Generation Cost Simulation Model • Iraq Water-Energy-Food Model • The US/Mexico Water Management Model • The Rainy River Model

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