

New Mexico Environmental Flows Workshop

Climate Change, Streamflows, and Water Management Implications in the Upper Rio Grande Watershed

Brian H. Hurd

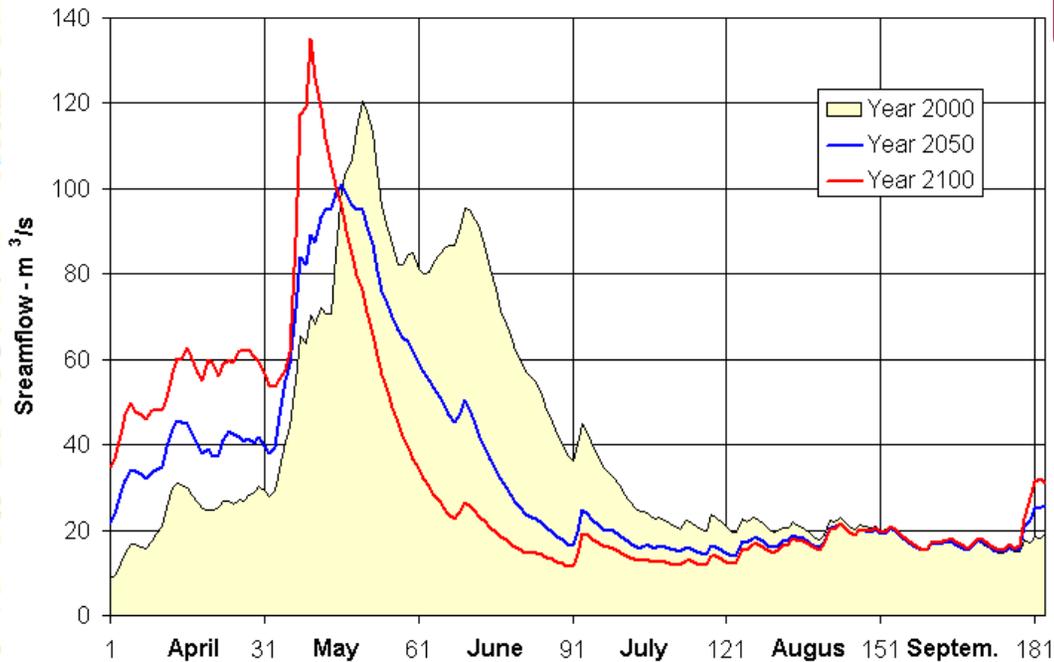
New Mexico State University

Albuquerque, NM

March 15, 2010

What if ... Streamflows Change?

Rio Grande at Del Norte - Climate Change Simulation



Model assumptions

temperature ↑ 4°C

Precipitation ↑ 10%

source: Al Rango (usda/ars)
using Snow melt Runoff Model (SRM)

What does it mean for?

- Water storage and distribution systems?
- Urban and rural water users?
- Water quality?
- Hydropower?
- Recreational and cultural functions?
- Riparian ecosystems and migratory patterns?

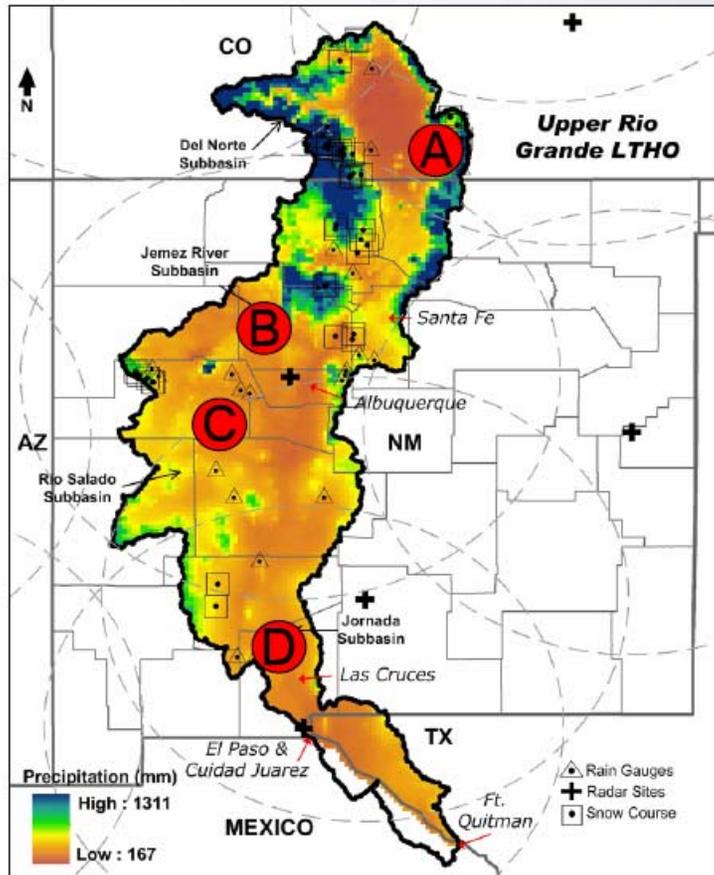
0

250 miles

Upper Rio Grande



RIO Spatial Variability



Decreasing Precipitation

Forest to Desert Gradation

Increasing Salinity and Nutrients

Source: Enrique Vivoni, AZ State Univ.

2001-08

What are the Risks?

The health of New Mexico's rural economy, blend of cultures, and unique ecosystems is tightly hinged to water.

With no water to spare, the Rio Grande is a highly vulnerable watershed where virtually all surface waters are consumed by people, plants, and evaporation.

Projections of less water and more people heighten the need for more finely tuned systems of water use and management.



Wildlife and Culture



250 miles



Key Findings

Water Supply Changes

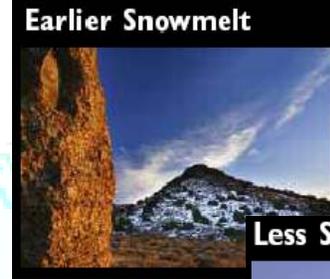
1. Earlier snowmelt and peak runoff, greater evaporation losses.
2. Runoff is reduced by as much as 1/3 under drier scenarios. Even under 'wetter' scenarios total runoff falls due to higher evaporation rates.

Water Demand Changes

3. Rising populations and lower water supplies will raise pressure to tighten and fine tune water management systems. Systems with limited storage capacities are most vulnerable.
4. Projected economic losses range from \$13 million to \$115 million by 2030, and from \$21 million to over \$300 million by 2080.

Rural and Environmental Stress

5. Traditional agricultural systems and rural communities are most at risk, and may need transitional assistance.
6. Losses to New Mexico's residents, tourists, and wildlife could go well beyond such market-derived figures, including losses to the environment, water quality, and quality of life.



250 miles

Forward Progress

Goal: Create a context in which communities, organization, and individuals can make smarter decisions & wiser choices

1. Quality Data and Information is Key

Strengthen adaptive management capability
Monitor and measure
Reduce uncertainty

2. Climate Aware Strategies

Mitigate (reduce) GHG emissions
Build adaptive capacity
e.g., policy, planning, partnerships

3. Shared Responsibility, Shared Burden

Cities → reduce outdoor water use, xeriscape
Farms → timing, technology, best management practices

250 miles



Forging a Community-Based Context for Adaptive Action

- **Define societal goals and objectives**
 - Mixture of economic growth, sustainability and equity, resource conservation, resource protection, economic efficiency
- **Identify means and methods**
 - Technical and management capacity, financial and resource availability
- **Develop frameworks for behavior, process and procedure**
 - Legal, constitutional, and ethical frameworks
 - Notions of fairplay, due process, justice, equal protection, respect, dignity, duty

March 10, 2010



NEWS RELEASE

Release No. 0115.10

United States Department of Agriculture • Office of Communications • 1400 Independence Avenue, SW
Washington, DC 20250-1300 • Voice: (202) 720-4623 • Email: oc.news@usda.gov • Web: <http://www.usda.gov>

Contact:
USDA Office of Communications (202) 720-4623

SECRETARY VILSACK ANNOUNCES DETAILS AND OBJECTIVES OF USDA'S OFFICE OF ENVIRONMENTAL MARKETS

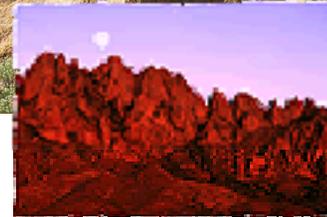
WASHINGTON, March 10, 2010--Agriculture Secretary Tom Vilsack today announced new details about the functions and objectives of USDA's Office of Environmental Markets (OEM). OEM, now part of USDA's Natural Resources and Environment mission area, will work to carry out USDA's climate and rural revitalization goals by supporting the development of emerging markets for carbon, water quality, wetlands and biodiversity.

"Environmental markets leverage private investments that result in cleaner air, improved water quality, restored wetlands, and enhanced wildlife habitat," said Vilsack. "These markets have the potential to become a new economic driver for rural America, exactly what we need to support a bold, creative future for America's farmers, ranchers and rural communities."

The 2008 Farm Bill's Conservation Title directs the Secretary to facilitate the development of environmental markets and ensure the participation of America's farmers, ranchers, and forest landowners. As set forth by Congress in the Farm Bill, OEM will work across government and in consultation with experts and stakeholders to build a market-based system for quantifying, registering, and verifying environmental benefits produced by land management activities.

"Over the past several years, USDA has seen great advances in ecosystem services research and market potential," said Harris Sherman, Under Secretary for Natural Resources and Environment. "We will build on this innovation and coordinate across USDA and with our partners to develop these promising new markets."

More information can be found at:
<http://agecon.nmsu.edu/bhurd>



250 miles



Win-Win Strategies and Other Low Hanging Fruit

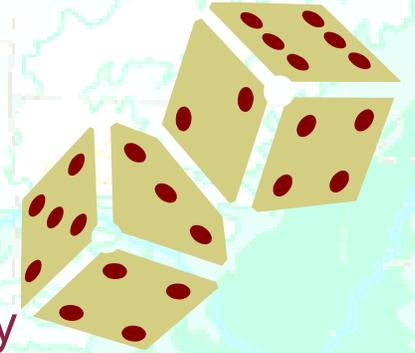
- **Improve science and information development, integration, and dissemination**
 - Integration of climatology, hydro sciences, and resource management
 - Strengthen institutional capacity, cooperation & collaboration
 - Establish strategic partnerships between State-Univ.- Nat. Labs. – Local Gov't
- **Develop appropriate risk management institutions and policies**
 - Climate-risk sensitive policies and regulations
 - Appropriate insurance and disaster recovery incentives
 - Greater 'risk sharing' rather than 'blanket protection' from climate risks
 - Enhance stakeholder awareness and decision-making participation
- **Increase the use of resource markets and incentive-based policy designs**
 - Compensate for the value of 'saved' water
 - Increase voluntary and cooperative solutions to improve water use efficiency and compliance, conversely limit use of regulatory 'stick approaches'
- **Add flexibility and safety to infrastructure design and assessment**
 - Greater flexibility in design
 - Wider safety margins and tolerances
 - Enhance water supply opportunities – e.g., desalination, aquifer mgt.
- **Consider climatic factors in land use planning and building codes**
 - Risk appropriate zoning
 - Conservative building code enforcement
 - Increase public awareness of risks and responsibilities e.g., flood plains and levee tolerances



250 miles

Coping With the Uncertainties of Climate Change

- Changing climates are like a game of chance where the deck is stacked and dice loaded
 - It is difficult and uncertain to assess changes in climatic probabilities
 - We can hope that they are gradual and incremental
- Decision heuristics or 'rules of thumb' may be necessary
 - Revise risk beliefs accordingly – using subjective or expert opinion as necessary
 - Play as if you knew how the odds were changing as though you were counting cards or playing with loaded dice
- Small changes in risk beliefs MAY only require small changes in strategies/actions
- However, anticipatory structural changes may be the 'best' overall strategy, enhancing system
 - Reliability, flexibility, failure tolerance



0

250 miles