

Opportunities and Challenges of Transboundary Water Cooperation

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Expert Scoping Workshop on
Quantifying the Benefits of Transboundary
Water Cooperation

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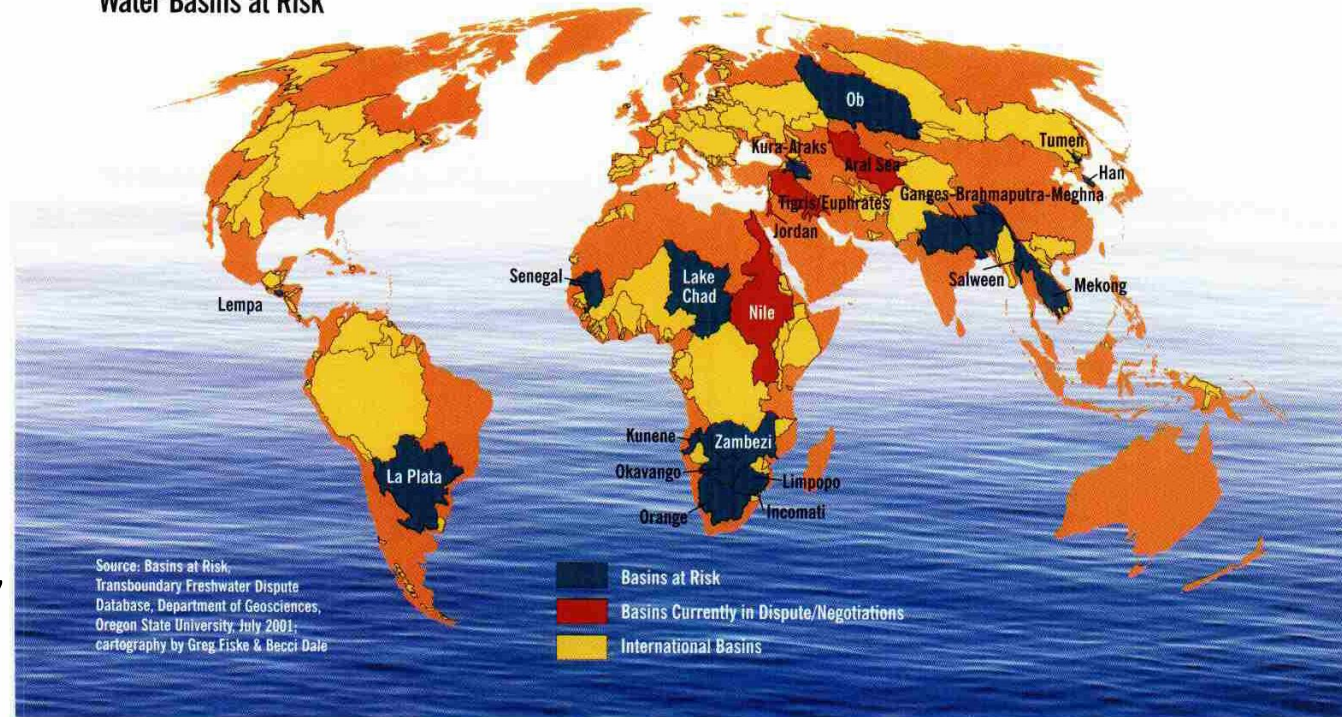
Amsterdam, the Netherlands



Outline

263 Transboundary Basins

Water Basins at Risk



- Africa: 59
- Asia: 58
- Europe: 73
- Latin America: 61
- North America: 17
- Oceania: 1

- ~ 1/3 shared by more than 2 countries

- 19 basins involve 5 or more countries:
 - 5 basins - 9 and 11 countries
 - 13 basins - 5 and 8 riparian nations

- Danube River - 18 riparian nations
- becoming depleted, almost to the crisis level

Foreign Policy – September/October 2001

Transboundary Water Cooperation

- Nationally
 - Water rights and institutions are devised to rationally and equitably develop and use the resource
- Internationally
 - Water rights don't exist between countries
 - Laws are enforced by international agreements between countries, not by an overarching authority

International Water Law

- Guidelines for sharing transboundary water
- Sharing Information
- Notifying and consulting with neighbors
- Utilizing water in equitable and reasonable manner
- Cooperating in use, development and protection
- Preventing significant harm
- UNECE Convention
 - “Convention on the Protection and Use of Transboundary Watercourses and International Lakes” (1992)
- UN Convention
 - “Convention on the Law of the Non-navigational Uses of International Watercourses” (1997)

Legal and Institutional Frameworks

- Member States (who are they?)
- Geographical Scope (what is covered)
- Functions (what does it do?)
- Organizational Structure
- Data Sharing, Exchange, and Harmonization
- Decision Making (how are decisions made)
- Benefit Sharing
- Participation (civil society, youth, private sector)

Some Examples

Syr Darya Basin

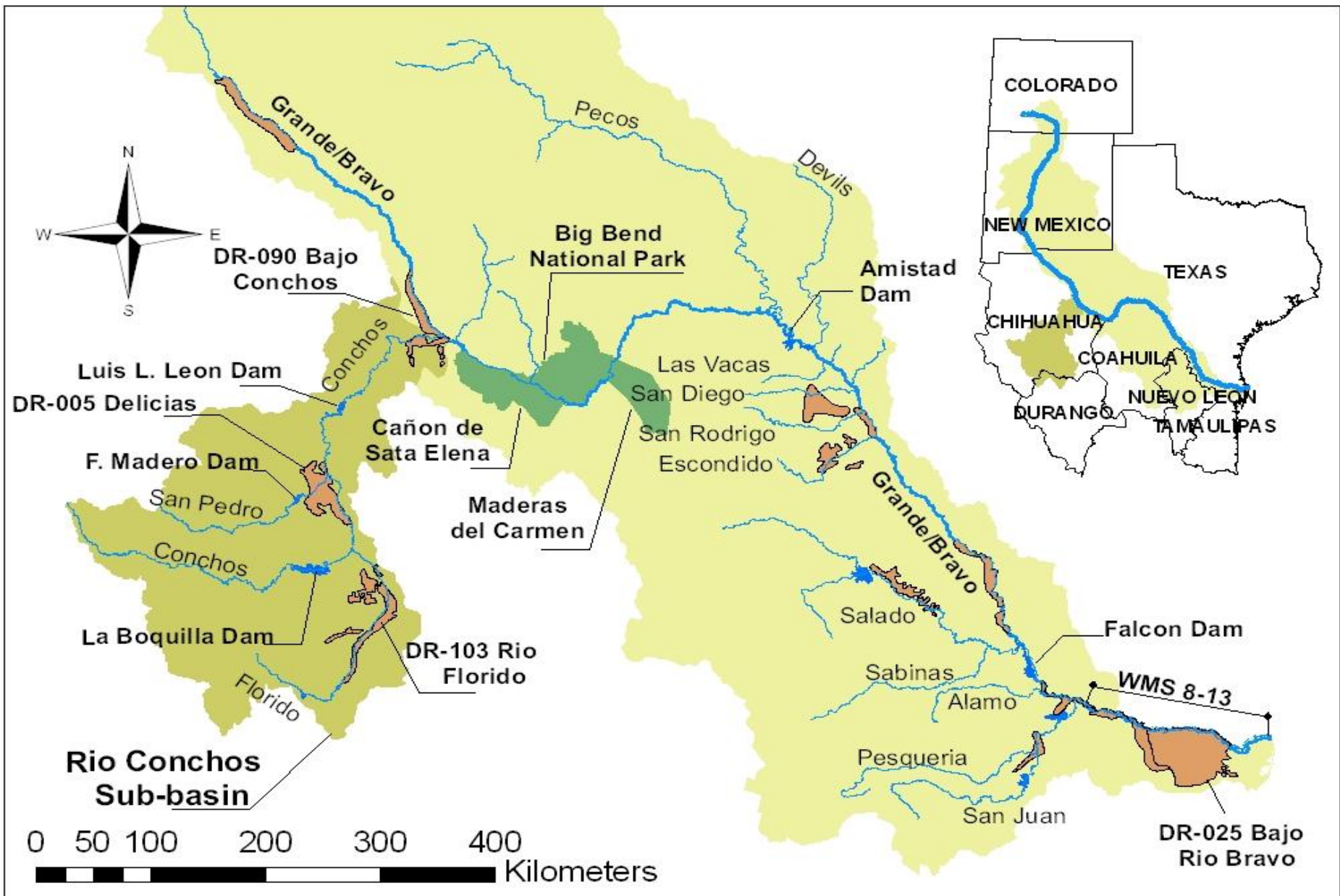


Rio Grande Basin



Water Stress ($\text{m}^3/\text{person}/\text{year}$)

Rio Grande Basin



Treaties on the Rio Grande

- International Treaties

- 1906 Convention (US and Mexico)
 - Divided water above El Paso
- 1944 Treaty (US and Mexico)
 - Divided water below El Paso

- Inter-state Compacts

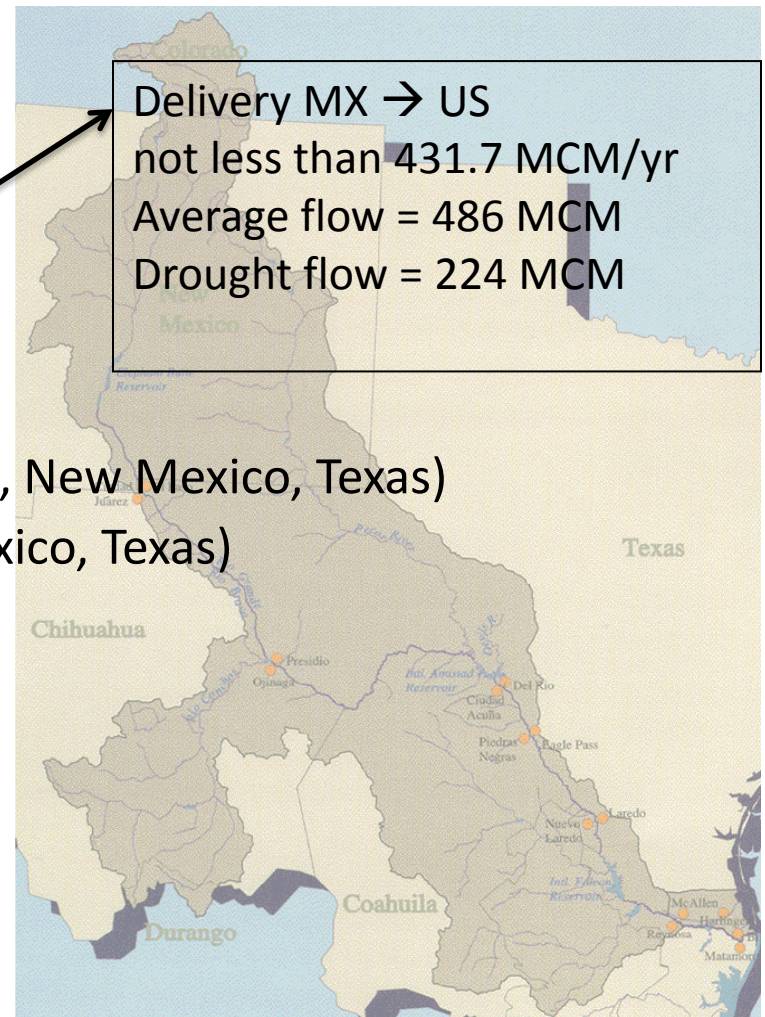
- 1938 Rio Grande Compact (Colorado, New Mexico, Texas)
- 1948 Pecos River Compact (New Mexico, Texas)

- National Law

- Mexican Water Law

- State Law

- Texas Watermaster Rules



Opportunities in the Rio Grande Basin

- Equitability
 - Yes
 - Remember Colorado River (MX wants water)
 - MX Delivery over 5-yr cycle
- Reasonableness
 - Yes, but
 - Must recall 66% expected delivery reliability
- Avoid harm
 - Yes, but
 - Water deficits are damaging to farmers



Opportunities in the Rio Grande Basin



- Share information
 - Separate monitoring
 - Data is shared
 - Notification and Consultation, but new infrastructure is limited
- Joint projects
 - Two major international dams
 - Flood control system
 - Irrigation system improvements
 - Water quality improvements
- > 7 decades of cooperation

Challenges in the Rio Grande Basin

- No basin management plan
 - Simply fulfill the demands of users
 - No IWRM
- Over-allocation of water rights
 - Both countries issued excess water permits – none for past 20 years
- Major droughts
 - “Extreme drought” undefined
 - Allocation not based on % of flow
 - Last > 10 years
 - Not possible to satisfy treaty
 - MCM versus % of flow



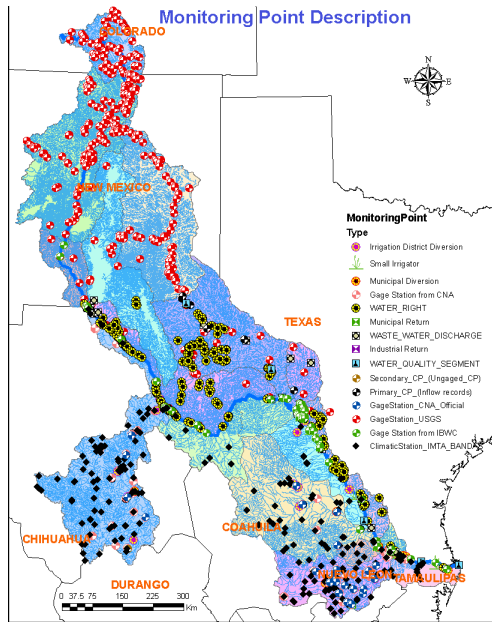
Challenges in the Rio Grande Basin

- Participation and transparency
 - Slowly developing in the basin
- Poor water quality
 - Inadequate monitoring
 - Inadequate treatment
- Environmental flows
 - Not yet developed for the basin
 - Many protected areas
- Climate change
 - Some analysis, little planning
- Groundwater
 - Mostly unknown

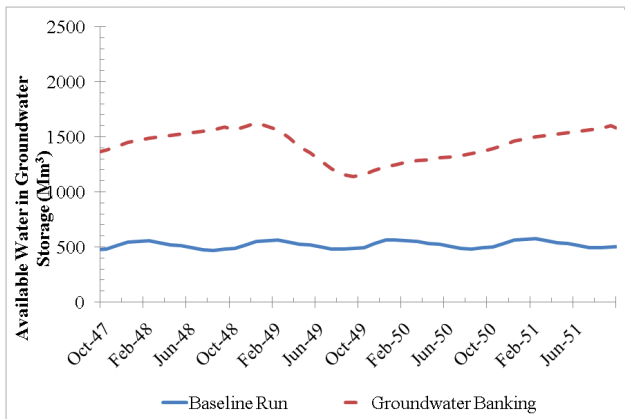
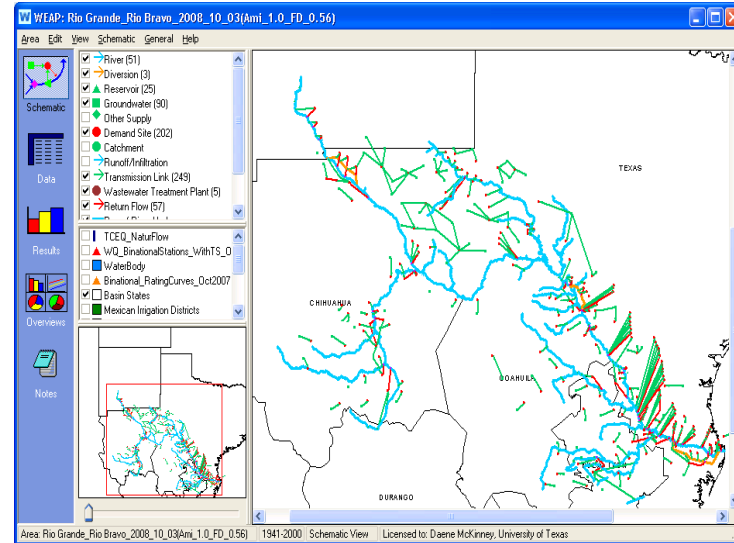


River Basin Management

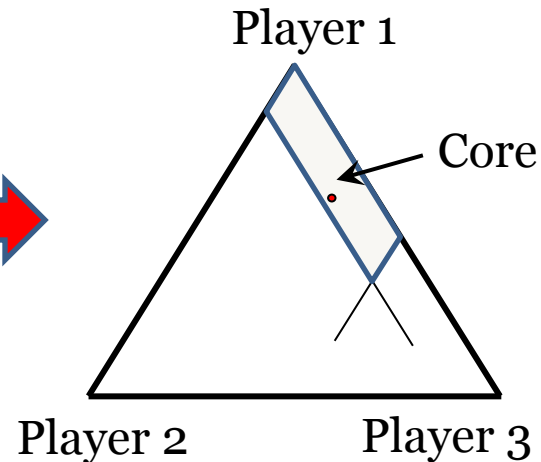
Shared Basin Data



Shared Basin Model



Scenario Simulations



Cooperative Allocation

Syr Darya Basin



1992 Almaty Agreement

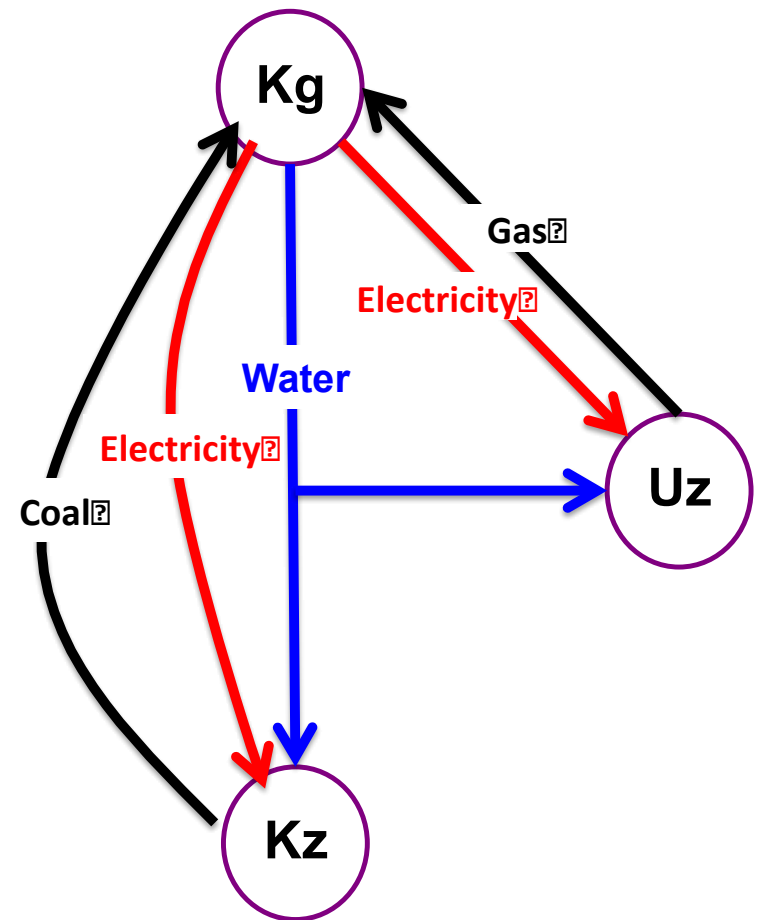
- Established Interstate Commission for Water Coordination (ICWC)
 - Includes all 5 Aral Sea basin countries
 - Covers 2 main rivers – Amu and Syr Darya
 - Determines regional water management policy
 - Regulates use and protection of transboundary water
 - Administers Basin Management Organizations
- Approved prior water allocations (% of flow)
- No harm clause
- Provision for “extremely dry years”
- Required information sharing
- Promotes joint research and efforts to resolve Aral Sea “problem”



ICWC founders (from left to right): M. Zulpuyev, N. Kipshakbayev, A. Ilamanov, A. Nurov, R. Giniyatullin, April 6, 1992, Ashkhaba

1998 Syr Darya Agreement

- Established management of Syr Darya cascade of reservoirs
 - Annual negotiation
 - Reservoir releases for irrigation
 - Surplus electricity delivered to Kazakhstan and Uzbekistan
 - Fuel compensation to Kyrgyz
- River Basin Organizations and Regional Electricity Grid Operator implement water releases and energy transfers



Opportunities and Challenges in the Syr Darya Basin

- *Despite 2 decades of cooperation, problems exist*
- No joint basin management plan
 - Short-term planning
 - Reservoir release schedules only
 - No comprehensive IWRM
- Water allocation based on previous regime
 - Prior allocations favor downstream countries
 - No analysis of adequacy, efficiency, or fairness of allocation

Opportunities and Challenges in the Syr Darya Basin

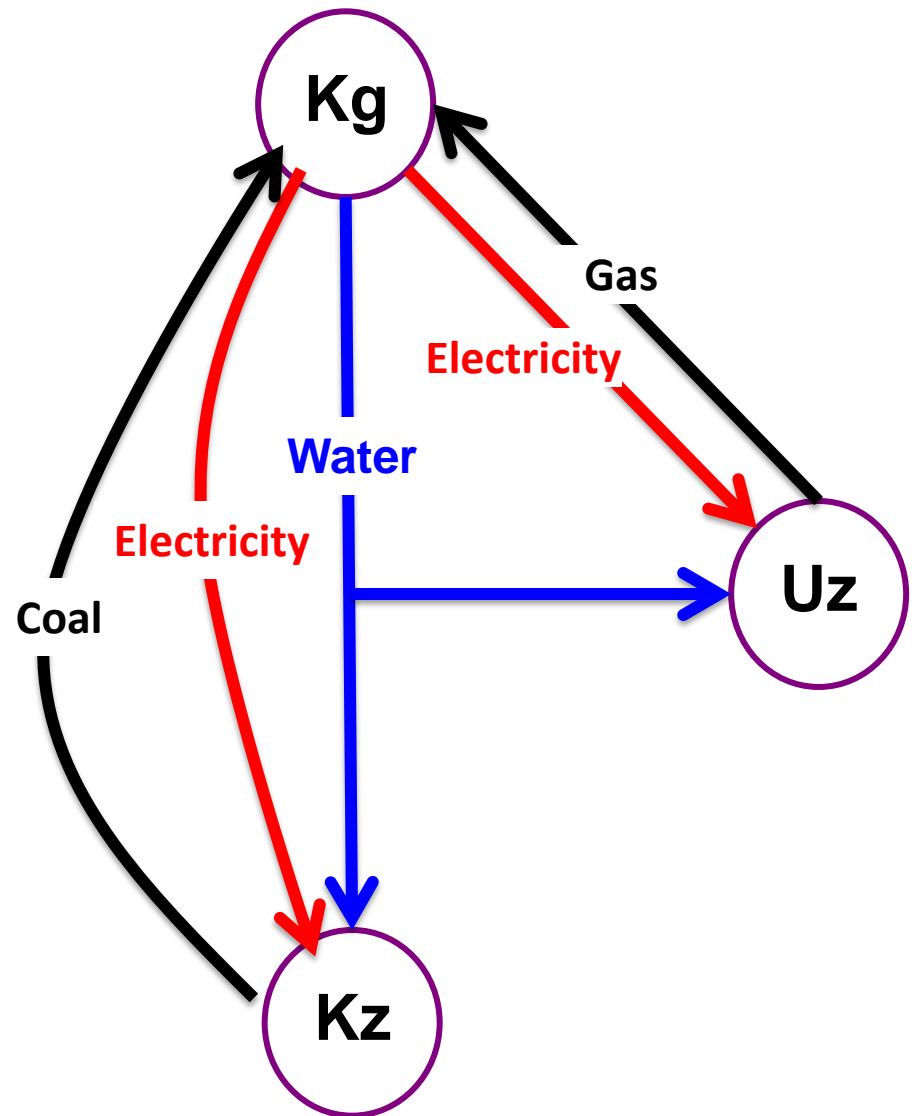
- 1998 Agreement
 - Deficient fuel deliveries to Kyrgyz
 - resulting in winter releases for heating
 - cause flooding in Kazakhstan
 - Hydrologic fluctuations not considered
 - Wet year – downstream demand decreased, store water in reservoir
 - Dry year – downstream demand increased, release water from reservoir
 - Storage services not valued
- Upstream development
 - New infrastructure not envisioned in agreements
 - Little analysis done
 - Little consultation or information sharing

Cooperation in Transboundary Basins

- **Non-cooperative** – countries maximize benefits through independent actions
 - Kyrgyzstan could (try to) generate all of its energy from hydropower
 - Downstream countries left to react to this
- **Cooperative** – countries maximize benefits through cooperation
 - 1998 Agreement and proposed revisions
 - Share water (releases and storage)
 - Compensated compromise (energy transfers) between summer irrigation and winter hydropower water uses

1998 Agreement - Implementation

- Kyrgyzstan (KG):
 - + Fuel to cover energy deficit
- Uzbekistan (UZ):
 - + Agricultural production
 - + Electricity from KG
 - Gas for KG energy deficit
- Kazakhstan (KZ):
 - + Agricultural production
 - + Electricity from KG
 - Coal for KG energy deficit

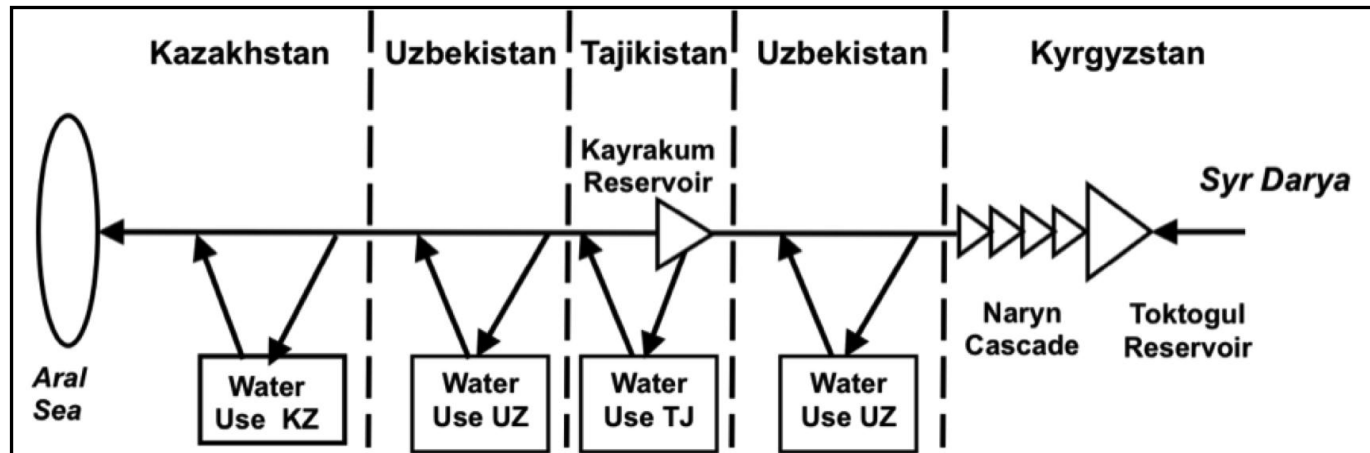


Issues:

- Different valuation for electricity
- Different costs for gas and coal
- Different net margins for agricultural production

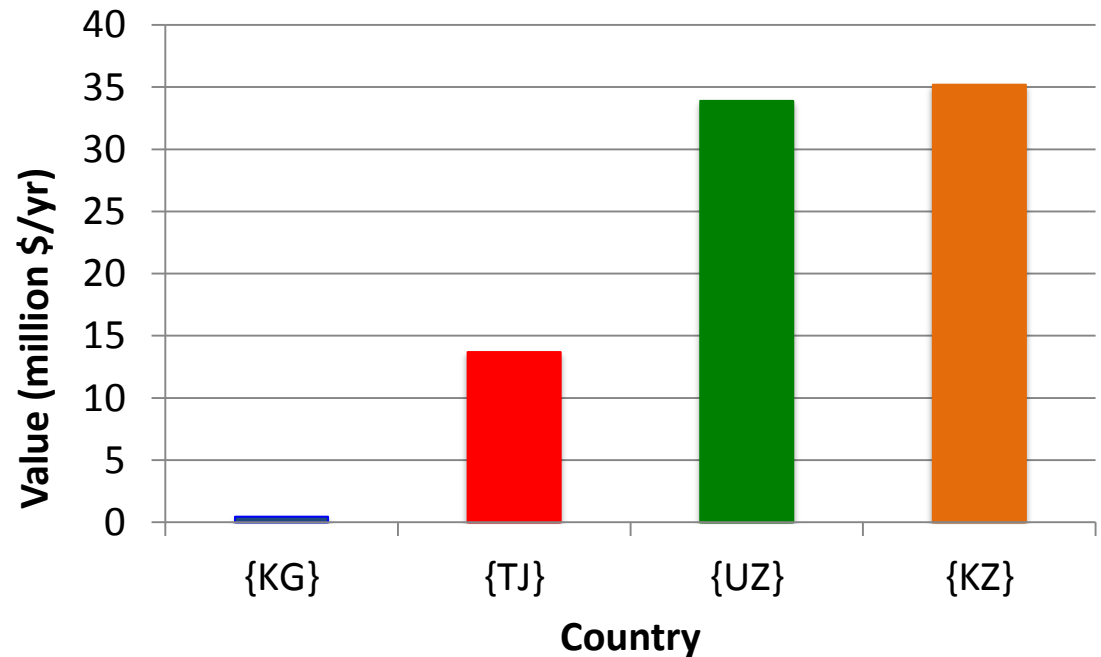
Quantifying Benefits of Cooperation

- **Model: Operations & Cooperation**
- GAMS Optimization model of basin operation
- 10 years of flows
- Calculate benefits to various coalitions
- Game theory model of cooperation



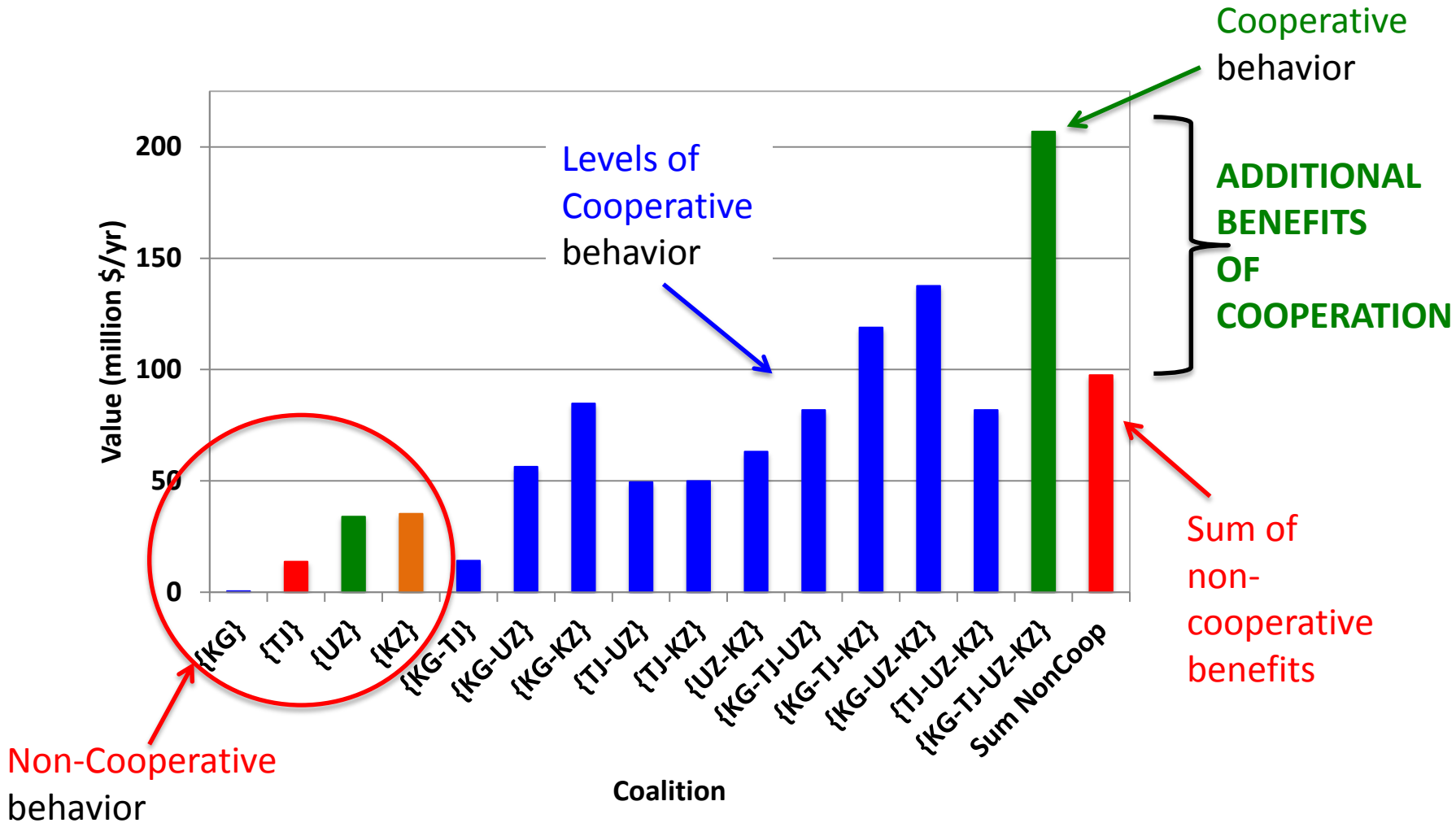
Non-Cooperative Behavior

- Kyrgyzstan acts independently
 - Releases water to generate electricity to cover own energy demands
 - Does not release water for downstream use



- Why should Kyrgyzstan cooperate?
- Why should Uzbekistan or Kazakhstan cooperate?
What would they gain?

Cooperative Behavior



How should countries share the increased benefits from cooperation?

Some Common Themes and Conclusions

- Multi-decade cooperation
- Performing monitoring
- Sharing (some) information
- Climate change planning
- Lack IWRM and basin plans
- Allocations need revision
- Treaty compliance difficult under hydrologic extremes
- Participation and transparency lacking

Some Common Themes and Conclusions

- Treaty terms undefined
 - “Extreme drought”
- Harm - not always avoided
 - Flooding
 - Deficit
- Environment neglected
 - Water quality
 - Environmental flows
- Groundwater under-utilized