Innovations in Water Banking to Improve Supply Resilience

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New Needs In Water Transfers

• spatially & temporally specific, intermittent
• motivated by
  - flexibility - drought, infrastructure failures
  - compact and treaty compliance
  - environment. & recreation flows
Typical transfer: high cost per unit, inflexible, hard to change course

What’s needed: Lower cost per unit, responsive to changing conditions, achieve location and time-specific effects
Water Bank:

- every bank is custom-crafted
- temporary & intermittent transfers
- alternative to “buy and dry”
- streamlined procedures
- managed by state, federal or local agency, ID, special district or private firm
Why Water Banks?

• Reduce economic losses when juniors curtailed

• Local control – reduce impetus for fed & state mandates
Example: mitigating shortage losses

- orchard & row crop farmer (central AZ)
  - junior: pistachios ~ $320/afcu net farm income
  - senior: cotton/alfalfa ~ $130/afcu
- voluntary agreements, juniors pay
- other types of participants: Irrig district, municipal water provider, habitat protection program
To Succeed A Water Bank Must

• serve diversity of water uses with varying WTP to reduce risk of curtailment
• cost-effectively provide seasonal, temporary “replacement water”
• provide timely response to curtailment of juniors
• maintain hydrological integrity in water accounting

(WTP = willingness to pay)
Water Bank Transaction Types

• Contingent contracts to provide water when shortage occurs
• Seasonal leases based on cropland fallowing or deficit irrigation for specific weeks of summer
• Mid-season irrigation suspension – quick response to curtailment, habitat needs
Contingent Contracts Address Curtailment Risk

- Multi-year contracts negotiated in advance of need
- Rapid response when replacement water needed
- Motivated by differences in cost of being curtailed
- Triggered by a pre-specified indicator — reservoir level
- Can rotate farm participation — a farm only falls for 1-2 years at a time
Potential methods for creating “replacement water”

- full season of cropland fallowing - easiest to monitor
- change in crop mix to alter crop CU
- change in irrig technology & practices
- regulated deficit irrigation
Western U.S. Water Bank Examples
Idaho Snake River Basin – 60 years of water banking

- motivated by salmon recovery, hydropower
- Use remote sensing to facilitate and monitor changes in ag CU
- LARGE benefits to ag from water bank - most water bank trades are ag-to-ag
Colorado: Upper Rio Grande

• 2012, new program to reduce irrigation CU, reduce groundwater overdraft
• 20% reduction in CU needed to stabilize aquifer, assure compact compliance
• Federal, state and local partners and funding
• Targets reduced ag use where most spatially advantageous (bonus zones)
Colorado River System Conservation Program

• 2014 agreement: Reclamation, CAWCD, MWD, Denver Water and SNWA, $11M

• pilot projects to boost reservoir levels, improve “overall health of river system”

• water saved = “system water” => boost reservoir levels
Challenges

• Pay for reduced consumptive use – NOT per acre
• Defining baseline to measure reduced CU
• Document crop yield and profitability changes, not only changes in irrig. acreage
• Design contracts to prevent slippage (slippage: enrolled water bank acres fallowed BUT idle acreage (not enrolled in bank) brought back into production
Approaches to Water Accounting

- General area-wide: use average crop CU per irrigated acre for area
- Field-specific: based on crop history of the parcel providing water
- California DWR Water Transfer Program – detailed field-specific CU protocol
- Lower Colorado River Accounting System – adjusts for precip, temp as well as farm crop history
Consumptive Use Water Accounting

- Rising $/afcu justifies tighter accounting
- Pay on consumptive use basis
- Reconcile with water rights administration?
- To participate – “opt-in” to CU water accounting
- Revenues from trading = incentive to accept new accounting
- Remote sensing imagery provides data
Water Bank “Maturing Process”

- Edwards Aquifer bank, mid-1990s: unmarked vehicles, high attorney fees, costly process
- As banks mature: transaction costs fall, better price info, clearer trading protocols
- Today: dozens of water banks operating in western US, regular online transactions, business as usual in managing GW-SW connectivity
Water banks – management tools for the long haul

Roman Aqueduct, Pont du Gard, France

Thank you!

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Guidebooks: Innovative Water Trading

- Prioritizing Water Acquisitions for Cost-Effectiveness, 2013
- Measurement, Monitoring and Enforcement of Irrigation Forbearance Agreements, 2012
- Entendiendo el Valor del Agua en la Agricultura: Herramientas para Negociar Intercambios de Agua, 2012
- Understanding the Value of Water in Agriculture, 2011
- Water Banks: A Tool for Enhancing Water Supply Reliability, 2010
- Dry-Year Water Supply Reliability Contracts: A Tool for Water Managers, 2009

Mo O’Donnell (now at UNM), Bonnie Colby and various co-authors, University of Arizona, Department of Agricultural and Resource Economics.

Google: Colby water guidebooks
References


New Mexico State University, College of Agricultural, Consumer and Environementla Sciences, Cost and Return Estimates for Farms and Ranches 2013 http://aces.nmsu.edu/cropcosts/