Trading Water and Money to Manage Economic Risk During Shortage

Professor Bonnie Colby
Agricultural & Resource Economics, University of Arizona

Workshop on Water Banking in the Lower Rio Grande, New Mexico
Las Cruces, NM, November 2015

The organizations indicated below provided support for work summarized in this presentation.
Disclaimer

- Under contract May 2013 to June 2015 with NM ISC, to conduct water bank scoping for LRG Basin
- Financial support for participation in today’s workshop provided by Lower Rio Grande Water Users (LRGWU)
- Presentation based on expertise with water trading programs to mitigate drought impacts on regional economies
- Presentation does not represent perspective of ISC, LRGWU or any other party
Water bank: A solution to ease drought?

McClatchy – Tribune Business News
December 11, 2013
Yakima County water bank will help ease supply problems

Northern Colorado Business Report
October 19, 2012
Water bank: A solution to ease drought?

The Oregonian
March 6, 2004
Interior backs water bank for Klamath fish, farmers

McClatchy – Tribune Business News
February 11, 1992
Metropolitan Authorizes Purchase of Emergency Water Bank Supplies

The Fresno Bee
September 5, 2010
Wells go dry; water bank faces lawsuits Kern Co. districts, others say deals were illegal

Boston Globe
May 08, 2008
Water bank aims to lesson demand on Ipswich River
What is a water bank?

• every bank custom-crafted to address specific regional issues
• “water bank” is generic term
• water banks vary in scale from multi-state to neighboring water users in small basins
• managed by state, federal or local agency, irrigation district, special district or private firm
What is a water bank?

• temporary & intermittent transfers that serve mission of bank (compact compliance, etc)
• alternative to “buy and dry”
• streamlined procedures for temporary trading
• can include groundwater, surface water, reclaimed water, desalinated water – or any subset of these
All water banks are ...

• progeny of shotgun weddings between diverse, litigating water interests
• born out of conflict
• motivated by threats to regional water supply and to regional economies
Simple Water Bank

- **Contract to provide water**
- **Water Bank**
  - Sets up transactions, handles money, arranges verification
- **Make payment**
- **Receive payment**
- **City, Orchard, Industrial Water Users**
  - Curtailment = High Costs
- **Verification of deliverable water**
- **Water Bank**
  - Provides verification services
- **Ag District/Farmer**
  - Willing to accept less reliable water for payment
- **Reduced ag consumptive use**

Why Water Banks?

• Reduce regional economic losses when curtailment looms
• Protect regional economy during drought, compact calls
• Local perspective – reduce impetus for fed & state mandates
Example: generating economic benefits

- Pecan grower seeking replacement water
- Row crop farmer providing fallowing
  Pecans ~ $260/afcu net returns
  cotton/alfalfa ~ $135/afcu net returns
  (NMSU 2012)
  (trades also likely for onion, pasture, cotton, lettuce, chile acres)
- voluntary agreements, juniors pay, seniors receive payment
Who benefits?

- Junior water users facing curtailment acquire “replacement water”
- Farmers paid to fallow
- Regional businesses and economic vitality
- Land values
- Tax base and public services
How BIG Are Regional Econ Benefits?

- Estimated using hydro-economic models
- Idaho models show ag-to-ag water banks reduce drought impacts on farm profits by 80%
- California models show water bank reduces losses from curtailing GW by $2-3B per year
- Ward NMSU model provides projections for LRG
Water bank as risk management tool

- Variability in water supply
- Fallowing payments reduce variation in farm net income, provide another revenue stream
- Banking contracts can provide M&I users more stable water supply AND water cost
PECAN PRICES

ALFALFA PRICES

Source: Brian Gould, Price Received of Alfalfa, 2015, Web: http://future.aae.wisc.edu/data/monthly_values/by_area/2053?area=ARIZONA&grid=true&tab=feed
CROP ACRES INSURED IN NEW MEXICO, USDA PROGRAMS

Net Acres Insured

*Crop: apples, barley, chile pepper, corn, cotton, cotton-extra long staple, dry beans, grain sorghum, onions, pasture/rangeland/forage, peanuts, pecans, pistachios, potatoes, and wheat

Source: USDA, 2014, "New Mexico Crop Insurance Profile"
NEW MEXICO FIFTEEN YEAR CROP INSURANCE HISTORY*

- **Losses ($million)**
- **Loss Ratio = (Losses / Premiums)**

*Crops: apples, barley, chile pepper, corn, cotton, cotton-extra long staple, dry beans, grain sorghum, onions, pasture/rangeland/forage, peanuts, pecans, pistachios, potatoes, and wheat

Source: USDA, 2014, "New Mexico Crop Insurance Profile"
Transaction Costs

• the “friction” in the system
• grit in the gears, hassle factor
• costs of finding trading partners, determining price, obtaining approval, implementing
• high TC erode impetus for offering to fallow and for acquiring replacement water
Transaction Costs

First collaboration with NM OSE, 1985

Explaining TC to Steve Reynolds and Water Rights Division staff
Transaction Costs

high TC make seasonal & temporary trading impractical:

Purchase of 500 af @ $10,000/af = $5M deal
Lease of 500 af @ $1000/af = $500K deal

temporary/intermittent transfers require low cost, streamlined approval procedures
To Succeed A Water Bank Must

• serve diversity of water uses with varying WTP to reduce risk of curtailment
• provide “replacement water” with low TC
• provide timely response to curtailment of juniors
• maintain hydrological integrity – “the ratio”

(WTP = willingness to pay)
Two most crucial elements in water bank design

1) pricing fallowing and replacement water
2) “the Ratio”

_reduction in CU due to fallowing_
allowable CU by party paying for fallowing

(apologies to those who are not water geeks)
Water bank prices must:

• be high enough to attract farmers to enroll acreage
• avoid being so high as to dampen regional economy, discourage new businesses
Regional economy

- Highly interdependent
- Farm sector depends on services provided by thriving non-farm sector
- Water bank pricing policies affect land values, regional economic vitality
- Prices must balance rewarding farmers who fallow and assuring “reasonable costs” to those needing replacement water
Methods to establish water prices

- “matched” online
- fixed offer price
- auctions and bidding
- multi-year fallowing agreements, price indexed
- case-by-case negotiations between those offering and seeking water
- Reclamation project water has been priced by all these methods around western U.S.
Pricing mechanism needs to:

• reflect changes in supply conditions
• reflect changes in farm profitability – crop prices, yields, input costs
• if not – costly gaps between water needed and water made available through fallowing
Pricing: “index approach”

• Calculate average net farm returns per acre for past 4 years for typical row crop mix
• Offer 3x that amount
• Vary amount regularly to capture changes in net farm returns, water supply conditions
• All data available from NMSU, a spreadsheet exercise
Key issue #2

• The Ratio

reduction in CU due to fallowing allowable CU by party paying for fallowing
The Ratio

- varies across water banks
- greater than 1.0 in basins needing to restore system hydrology
- some banks allow gradual “payback”, fallow near river when distant junior pumping reaches river

_reduction in CU due to fallowing_
allowable CU by party paying for fallowing
Approaches to CU Accounting

• General area-wide: use average crop CU per irrigated acre for area

• Field-specific: based on crop history of the parcel fallowed (California DWR Water Transfer Program)

• Field-specific adjusted for precip, temp as well as field’s crop history (Lower Colorado River Accounting System)
Balancing CU: pitfalls to avoid

- “fallowed” deep rooted crops consume groundwater (Cal DWR disallowed fallowing alfalfa to create tradable water in some areas for this reason)

- changes in irrigation technology and management shift portion of water applied that is consumed (ex: flood to sprinkler)
Balancing CU: the Ratio

• Start by using CIR and monitor over time
• Lands fallowed will not be “average” row crop farms
• Monitor actual cropping history of lands fallowed – compare to CIR
• Rising water values justify tighter accounting for CU
• “the Ratio” likely to need to change over time
Looking ahead: case studies

• Why bother when every case is so unique?
Case studies: common challenges

• Balanced pricing mechanism
• The Ratio, hydrological integrity
• Timely responsiveness
• Keeping transaction costs and hassle low
Desirable characteristics of water bank

• Encourages productive farms to stay in business (minimize buy and dry)
• Rotate farmer benefits of participating
• Aims to keep transaction costs low
• Provides price and volume traded info
• Balanced pricing
• Prices reflect changing econ and water supply conditions
A-plus features in EBID Offset Plan

• Rotates farm participation – 3 consecutive years, encourages continued farming
• 20% max on acreage fallowed – protects ag economy
• EBID member groups for fallowing – reduces TC, incentive to fallow least productive land
• Acreage enrollment deadline occurs when good snowpack info available (March 31)
Assets in process ahead

• Well trained, experienced professionals in public and private sectors – hydrology, ag sciences, law, econ
• 2008 Settlement Agreement framework
• Years of litigation – lots of modeling
• NMSU – technical expertise and training next generation of professionals
  (Bobby Creel Scholarship Fund)
Thank a Texan today!

- Lawsuit forcing progress that will benefit LRG communities for generations
Water trading to protect regional economies – for the long haul

Farmer in training, western U.S  

Thank you!

bcolby@email.arizona.edu


MacEwan, D, R. Howitt, “Water Value under the Sustainable Groundwater Management Act”, University of California Davis, draft, October, 2015

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