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### SLIDES: New Era of Water Banking and Refined "Water Accounting"

Bonnie Colby

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# New Era of Water Banking and Refined “Water Accounting”

Professor Bonnie Colby

Agricultural & Resource Economics, University of Arizona  
June, 2015, Law School, University of Colorado

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



# Water bank:

- legally authorized to conduct temporary & intermittent changes in place/purpose of use
- offers streamlined procedures, “pre-approved” menu of transfers, alternatives to “buy and dry”
- can be managed by state, federal or local agency, special district or private firm

# Why Water Banks?

- reduce economic losses of curtailment
- supply reliability – M&I, high-value crops
- compact compliance
- habitat restoration, environ. Flows
- “pressure relief valve” in regional water system

# Water Banks & Transaction Costs

- costs of finding trading partners, negotiating price, obtaining approval, implementing
- water bank must keep TC “reasonable”
- high TC make seasonal and temporary trading impractical:

Purchase of 500 af @ \$14,000/af = \$7M deal

Lease of 500 af @ \$100/af = \$50K deal

# Why Water Banks? ... California ....

'Almond shaming' targets California growers for water use.

“Drought villains?” the Los Angeles Times asked.

National Public Radio called almond farmers “a rogue’s gallery” of water users.

Boston Globe Associated Press April 20, 2015

# Water shaming – get over it

- Households and communities have their preferences – *almonds, tall fountains, kentucky bluegrass, kayaking racecourses ...*
- Focus on transmitting water scarcity signals
- Use direct pricing signals where possible
- Active water banks transmit value signals - by season, dry-wet years and location

# Refining Water Accounting

- Tighter accounting justified with rising \$\$/afcu
- Pay for water on consumptive use basis
- To participate in bank – “opt-in” to water accounting
- Voluntary agreements: juniors pay, seniors receive payment and reduce consumptive use
- Benefits of trading provide incentive to accept new accounting system

# Approaches to CU Accounting

- General area-wide: use average crop CU per irrigated acre for area, best available science
- Field-specific: based on crop history of the parcel providing water
- California DWR Water Transfer Program – most detailed and specific CU protocol. Disallows CU credit for alfalfa fallowing: when deprived of surface water, alfalfa roots tap groundwater.

# Water Bank Transaction Types

- Contingent contracts to provide replacement water when curtailment occurs
- Seasonal leases based on following
- Mid-season irrigation suspension – quick response to curtailment, habitat needs, pipeline breaks

# 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
- Provider of replacement water temporarily reduces consumptive use to free up water

# Contingent contract examples

- summer hay fields irrigation suspension, triggered by low flows, high temperatures for fish
- field crop irrigation forbearance to sustain orchards, triggered by curtailment for juniors
- fallowing for compact compliance, triggered by low reservoir levels

# 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

# Part season irrigation suspension

- Not consistent with how water rights administered, water applied vs consumed
- BUT requires less sacrifice of net farm revenues
- Can remote sensing make monitoring these arrangements practical?

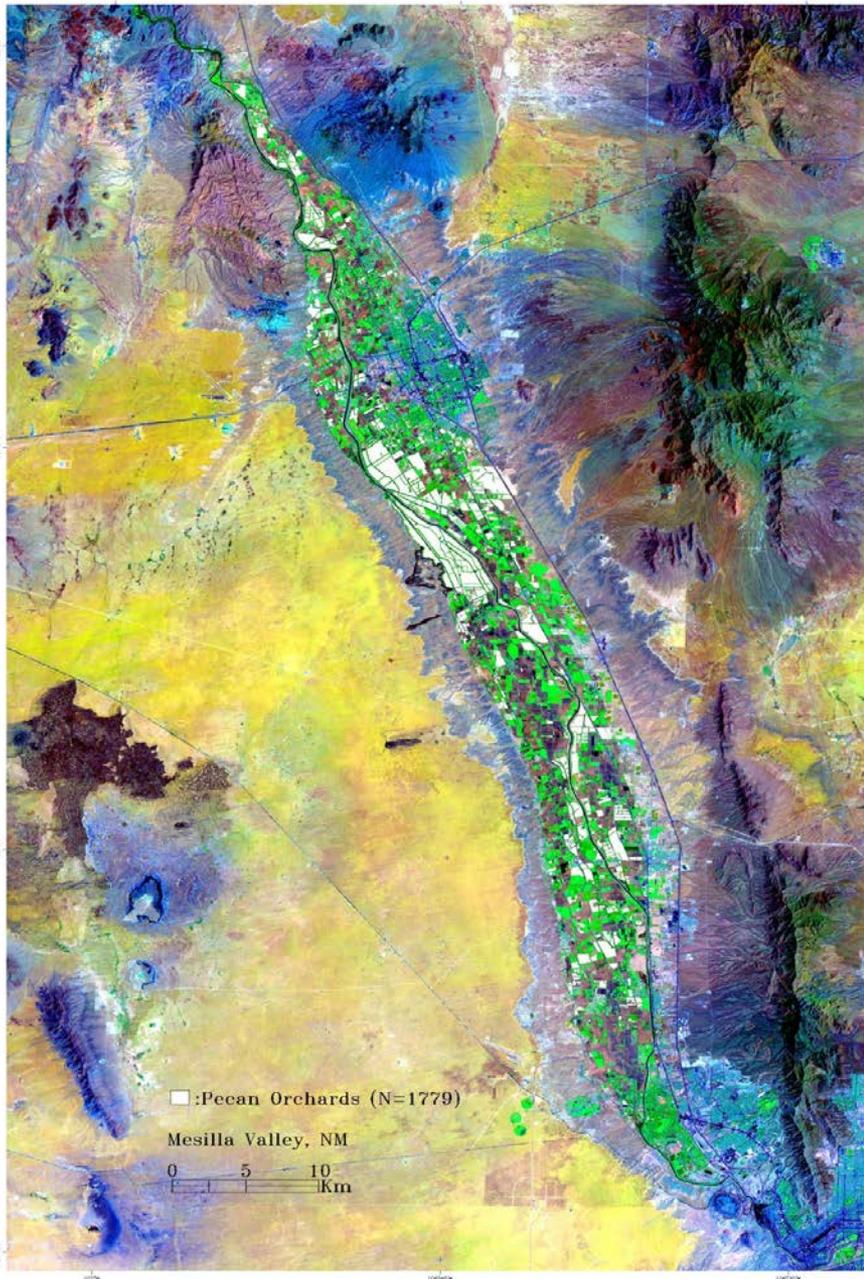
VALUE: one Landsat scene can include \$500M in water assets

track crop CU

- field, sub-field scale
- 2+ observations per month

Mesilla Valley, New Mexico.  
Landsat-7, pecan orchards (white polygons).

From New Mexico WRR Technical Completion Report No. 357  
ESTIMATING WATER USE THROUGH SATELLITE REMOTE SENSING



# Prize for identifying Landsat scene containing largest water right value

- Likely in California or Colorado
- Landsat scene is approx 115 miles x 106 miles
- Boulder is located in 3rd-most downloaded Landsat 8 scene worldwide (*Landsat Image Gallery*)

# Cutting Edge Examples in US West

# Nebraska Platte Basin NRDs

- NRDs must meet flow targets: compacts, ESA
- Farmers paid per acre-foot reduced depletion to river (calculated using basin models)
- Twin Platte NRD: online trading platform calculates transferrable quantities, matches buyers and sellers
- Central Platte NRD: paying \$8,000 per acre-foot depletion in 2014, up from \$3,750

# Nebraska Platte Basin NRDs (cont)

- online water trading system managed by private firm
- online system accounts for spatial difference in impacts on river flows
- water users well aware that broad regulatory reduction in water use likely if trading system proves ineffective

# 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 for streamflow improvements
- LARGE benefits to ag from water bank
  - drought losses in farm profits reduced 80%
  - most water bank trades are ag-to-ag

# Colorado: Upper Rio Grande

- control GW depletion, protect Rio Grande
- USDA pays approx 50% farm conservation costs
- incentives funded by feds, state and local sources
- target reduced ag use where most advantageous for preserving river flows (bonus zones)
- Farm Service Agency administers, partnering with NRCS, Colorado DWR, Rio Grande WCD

# Water banks and refined water accounting – tools for the long haul



Roman Aqueduct,  
Pont du Gard,  
France

***Thank you!***

[bcolby@email.arizona.edu](mailto:bcolby@email.arizona.edu)

# 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**

**Bonnie Colby and various co-authors, University of Arizona, Department of Agricultural and Resource Economics.**

**Google: Colby water guidebooks**

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