Valuing Colorado's Agriculture: A Workshop for Water Policy Makers

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The William and Flora HEWLETT FOUNDATION
World Bank
NOAA
WaterSustainability
CLIMAS Climate Assessment for the Southwest
RECLAMATION Managing Water in the West

New approaches: alternatives to buy and dry

CWCB's Alternative Methods for Ag Transfers Program

Water Bank Working Groups – Colorado and Upper Basin

- Why water banks?
- Regional problem-solving capacity
- Specific goals – every bank is unique
    - compact compliance
    - water for highest value crops
    - M&I supply reliability
    - habitat restoration

temporary irrigation forbearance

- temporarily reduce crop CU to provide for dry-year habitat and urban needs
- contracts limit frequency of ag fallowing
- seasonal, temporary trades easily dampened by high monitoring costs
- Remote Sensing provides cost effective measurement of changes in CU

(CU = consumptive use)

Remote Sensing for Cost Effective Consumptive Use Monitoring

Idaho DWR - Landsat thermal data, METRIC ET model

Costs to monitor 3,830 irrigation wells
using power consumption coefficients = $120 per well

Using Landsat thermal data, cost = $30 per well

RS data significantly higher accuracy, as well as less expensive.

Cost Comparison For Monitoring Irrigation Water Use:
Landsat Thermal Data Versus Power Consumption Data
Anthony Morse, William J. Kramber Idaho Department of Water Resources

VALUE: one Landsat scene can include $500M in water assets ($2K – $10K per afcu)

track crop CU
- field, sub-field scale
- 2+ observations per month

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

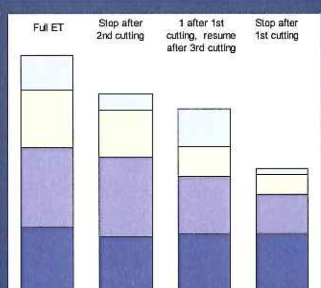
From New Mexico WRRI Technical Completion Report No. 357
ESTIMATING WATER USE THROUGH SATELLITE REMOTE SENSING

CSU Study – Alfalfa Deficit Irrigation

(courtesy of James Pritchett, Department Agricultural & Resource Economics, Neil Hansen Soil and Crop Sciences, CSU)

- State of art linear irrigation system, alfalfa stand established in 2005
- Four comparisons in 2006
  - Full irrigation
  - Stop after 1st cutting
  - Stop after 2nd cutting
  - Stop after 1st cutting and then resume after 3rd cutting

Alfalfa Regulated Deficit Irrigation: Example of Varying Economic Returns



Income	$838	$722	$726	$490
Costs	593	545	536	474
Return	**245**	**177**	**190**	**16**

(courtesy of James Pritchett, Department Agricultural & Resource Economics, Neil Hansen Soil and Crop Sciences, CSU)

CSU Preliminary Conclusions – Water Conserving Cropping Methods

- Alfalfa yield highly responsive to irrigation input
- Can go dormant and then recover when water is available
- Limited irrigation of alfalfa can be profitable
- Cautionary note: alfalfa deep-rooted – can draw from groundwater when not irrigated
- Incorporating dry land crops into rotation looks promising

- (courtesy of James Pritchett, Department Agricultural & Resource Economics, Neil Hansen Soil and Crop Sciences, CSU)

Third Party Impacts of Transfers

- local impacts are small % “value” of transfer
- establish standard method for calculating third-economic impacts/compensation, varies by county and crops
- burden of proof on those objecting to standardized calculations
- reduces transfer review costs

Agricultural Economics Panel

Water Bank Work Group

Photo credit: Richard Doly

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Denver, November 2012

CLIMAS Climate Assessment for the Southwest

USDA

NOAA

U.S. Department of the Interior Bureau of Reclamation

Key Points

Water bank design elements

Managing variability, sharing risk

Soliciting Participation

Reminder - Why Water Banks?

- Simpler, lower cost than change water right process
- Shared regional problem-solving capacity
- Specific goals – every bank is unique
    - compact compliance
    - M&I supply reliability
    - habitat restoration
    - ESA and CWA compliance

Limiting transaction costs, delays

- Transaction costs: costs of engaging in transfer of water entitlements, beyond price paid to seller/lessee
    - hydrologic and engineering studies
    - verifying title/ownership
    - identifying suitable entitlements/owners
- Water bank procedures MUST reduce costs and delays in satisfying requirements for transfer approval and implementation. If not, bank will not be widely used.

Elements of designing a water bank :

- Cost effective water acquisition
- Accomplishing policy goals
- Effective operation over time
- Financing bank's operations/staff

Initial bank design important

AND

- all water banks evolve over time
- we learn and adapt as we go

Key Water Bank Design Elements

- Mission, goals, governance
- Pricing Mechanisms
- Soliciting Participation
- Sharing Risk
- Contracting with irrig districts and/or farmers
- Monitoring changes in consumptive use
- Evaluation, Adaptive Learning

General Pricing/Contracting Principles

Fixed price approach least desirable

Pay per AF of reduced ag consumptive use (NOT per acre of fallowed land)

For multi-year contracts – include escalator clause, payments adjust based on neutral index (CPI)

Sharing Supply Reliability Risks – Contingent Contracts

- Multi-year contracts negotiated in advance of need
- Rapid response when water needed
- Motivated by differences in cost of shortfalls
  - Temporarily reduce crop CU to free up water
  - Contract with ag districts and/or farmers

Contingent contract examples

- 2-4 weeks of summer irrig. forbearance for salmon streams - triggered by low flows, high temp
- Seasonal field crop forbearance to sustain orchards and vineyards
- Conveyance system outage, keep city supplied
- Compact compliance in dry periods

Contingent contract triggers

- reservoir levels
- groundwater levels
- soil moisture conditions
- snowpack conditions
- forecasts, water supply projections

Soliciting Participation

- Publicize statewide economic benefits of bank – costly crises averted
- Benefits extend across rural, urban, environmental and recreation sectors
- Plan water bank pilot projects, community involvement
- Clearly defined eligibility criteria for farms leasing water to bank

ELIGIBILITY CRITERIA - examples

Eligibility Standard	Description
Total farm consump. use must decrease	Cannot enroll one field, then use more water on other field
Minimum size for fields enrolled	Minimum field size requirement (10 acres) to control program administration costs
Crop production documented	5 year documentation of crop production
Land ownership or lease	Fields owned by enrolling party, or documented consent from field owner
Seniority	High priority dates on water right
Control over water delivery	Enrolled fields have lockable head gates, pumps

GIS and Remote Sensing Capacity

Water bank needs highly trained professional staff

Benefits:
- lower cost to accomplish water bank mgt and accounting tasks
- improved timeliness and precision in tracking CU
- transparency, reduced conflict

Partner with universities - training, capacity building, outreach

Share staff with State Engineer Divisions?

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One final recommendation

0.5% admin. fee assessed on price paid for water
(half of one percent)

Example: 500 afcu for 20 years, $4K per afcu
Payment = $2M

Admin fee = $10,000

Admin fee based on price paid:
- provide funding for water bank admin
- providing public info on water prices improves trading

Six Guidebooks: Innovative Water Trading

- *Prioritizing Water Acquisitions for Cost-Effectiveness, 2012*
- *Measurement, Monitoring and Enforcement of Irrigation Forbearance Agreements*, 2012
- *Understanding the Value of Water in Agriculture*, 2011
- *Entendiendo el Valor del Agua en la Agricultura*, 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

http://www.climas.arizona.edu/projects/innovative-water-transfer-tools-regional-adaptation-climate-change