SLIDES: Smart Fallowing: New Strategies in Ag Forbearance

Bonnie Colby

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Smart Fallowing: New Strategies in Ag Forbearance

Dr. Bonnie Colby
University of Arizona
Natural Resources Law Center Conference
June 2011
New strategies urgent:

- Climate change
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- Feds, states and cities are broke
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- Feds, states and cities are broke
- Ecosystems in decline, dependent on "leftovers"

Photo credit: Colorado River Water Users Association

Photo credit: Science Faction
New strategies urgent:

- Climate change
- Feds, states and cities are broke
- Ecosystems in decline, dependent on "leftovers"
- Ag-env-urban linked in regional economies
  
  "an inextricable web of mutuality"

Photo credit: Colorado River Water Users Association

Photo credit: Science Faction
New strategies urgent:

- Climate change
- Feds, states and cities are broke
- Ecosystems in decline, dependent on "leftovers"
- Ag-env-urban interdependent in regional economies
- **Must reduce “waste”** in forbearance arrangements

Photo credit: Colorado River Water Users Association

Photo credit: Science Faction
“Waste” in forbearance programs?
“Waste” in forbearance programs?

- Costs high per unit of water obtained
  - Imprecision about how much water really freed up
  - Payments > 300% of crop net revenues foregone
  - High costs of conflicts and delays
“Waste” in forbearance programs?

- Costs high per unit of water obtained
- False Alarms - fallowing implemented, water not needed
  - Unnecessary water acquisition costs
  - Loss in crop production, linked econ flows
“Waste” in forbearance programs?

- Costs high per unit of water obtained
- False Alarms - fallowing implemented, water not needed
- **Avertable Costs** - fallowing not implemented, shortage occurs
  - Env & urban losses
  - Dampened regional economy
“Next Gen” Forbearance Arrangements

- Adapt with improved hydrologic info
  (snowpack: Jan 1 vs April 1 vs May 1)
Next Gen Forbearance Arrangements

- Adapt with improved hydrologic info
- **Standardized process to set forbearance payments**, indexed to crop prices, fuel costs, etc
Next Gen Forbearance Arrangements

- Adapt with improved hydrologic info
- Standardized process to set forbearance payments
- Pay per AF of reduced ag consumptive use (NOT per acre of fallowed land)
Examples: Next Gen Forbearance Arrangements

- **Seasonal fallowing** – land irrigated only in most profitable part of growing season
# Seasonality of Major Crops

## Usual Planting & Harvesting Dates - Yuma County

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<th>Crop</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>June</th>
<th>July</th>
<th>Aug</th>
<th>Sept</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
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<td>10</td>
<td>20</td>
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<td>Fall Lettuce</td>
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<tr>
<td>Spring Lettuce</td>
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Examples: Next Gen Forbearance Arrangements

- Seasonal fallowing – land irrigated only in most profitable part of growing season

- **Deficit irrigation** – crop produced with reduced water applications
Crop Water Production Function: crop yield changes due to changing water applications

Photo credit: Peggy Greb
Next Gen Forbearance Arrangements

Measurement & monitoring of reduced water consumption is key to success

(and problematic in most forbearance programs)
Measurement and Monitoring

- Must be cost-effective
- Must be objective, trusted

Artist’s Depiction of Landsat 7, Credit: NASA

Photo credit: Anderson, Kustas and Norman
Measurement and Monitoring

- Must be cost-effective
- Must be objective, trusted
- **Remote sensing** allows new possibilities

Artist’s Depiction of Landsat 7, Credit: NASA

Photo credit: Anderson, Kustas and Norman
Remote Sensing (RS) currently used by water managers

Example: Lower Colorado River Accounting System
Evapotranspiration and Evaporation Calculations
Advances in RS allow tracking of crop CU at finer spatial and temporal scales:

- field, sub-field scale
- week-by-week

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

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

Compare two alternatives:

- **Offer farmers average net revenue/acre for their area**
  - offer framed in $/acre
  - farmers enroll fields based on average offer
Setting Forbearance Payments

Compare two alternatives:

- Offer farmers average net revenue/acre for their area
  - offer framed in $/acre
  - farmers enroll fields based on average offer

- OR use RS to make offers
  - use field-specific yields and CU
  - offer framed in $/AFCU
  - target fields with lowest net revenues per AFCU
lettuces yield and net revenue variability across field

adapted from Kurt Nolte, University of Arizona

yield: 700 cwt/acre
$11,900 net

yield: 800 cwt/acre
$14,100 net
Setting Forbearance Payments

Compare two alternatives:

- Offer average net revenue/acre ($/acre)
- Use RS to make offers ($/AFCU)
- **Targeted RS approach can reduce costs 15-20%**
  (California study, Medellin et al, 2011)
Setting Forbearance Payments

Compare two alternatives:

- Offer average net revenue/acre ($/acre)
- Use RS to make offers ($/AFCU)
- RS approach can reduce costs 15-20%
- RS needs to be “ground truthed”
  - field experiments in each region for major crops
Moving Ahead

Typical forbearance programs:
Costly per unit of water obtained
Inflexible - hard to change course
Moving Ahead

What’s needed?
Lower cost per unit ($/AFCU)
Nimble - quick response to new conditions

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Thank you!

bcolby@email.arizona.edu
Four guidebooks on water acquisitions

- Water Banks: A Tool for Enhancing Water Supply Reliability, January 2010
- Dry-Year Water Supply Reliability Contracts: A Tool for Water Managers, October 2009

To find link and download, google: Colby water guidebooks
OR go to: ag.arizona.edu/arec/people/profiles/colby.html
(guidebook links are midway down page)
Climate change - shifting means, fatter tails
Shifting mean temperatures, snowpack
Fatter tails – more extremes; drought, flood

Affects both water supply AND demand