Marketing Conserved Water: Lessons from Australia for the Western United States

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The Problem

- Property rights regimes for water can be inflexible, protecting historic rights at the expense of present needs.
- Property rights in water are too often defined in ways that make it hard to buy and sell them (non-fungible).
- Agricultural users fear loss of dominant position and are wary of change.
- Political systems tend to protect agricultural rights regimes.
Another view of the problem

How do we move water from ag to urban use?
A proposed solution

- Recognize as Australian did that (some) water rights must be defined in fungible units of trade
  - For the Western U.S. this means defining water in terms of *water consumption*
  - For political reasons, limit water marketing to schemes that protect agricultural communities
    - By allowing the transfer of “*conserved water*” only farmers can keep farming
What is “conserved water”

- It’s not water that was being reused by others
  - For example, changing inefficient irrigation practices that provide return flows to downstream users
- It’s water that is saved by reducing consumption
  - Crop switching
  - Deficit irrigation
  - Rotational fallowing
Water savings from crop switching

<table>
<thead>
<tr>
<th>Crop</th>
<th>Crop water need (mm/season)</th>
<th>Mean crop water need (mm/season)</th>
<th>Potential water savings from alfalfa baseline (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>alfalfa</td>
<td>800-1600 (508-1200)</td>
<td>1025</td>
<td>0</td>
</tr>
<tr>
<td>soybeans</td>
<td>450-700</td>
<td>575</td>
<td>44%</td>
</tr>
<tr>
<td>barley</td>
<td>450-650</td>
<td>550</td>
<td>46%</td>
</tr>
<tr>
<td>bean</td>
<td>300-500</td>
<td>400</td>
<td>61%</td>
</tr>
<tr>
<td>beets</td>
<td>250-380</td>
<td>315</td>
<td>69%</td>
</tr>
<tr>
<td>cantaloupe</td>
<td>350-500</td>
<td>425</td>
<td>59%</td>
</tr>
<tr>
<td>maize</td>
<td>500-800</td>
<td>650</td>
<td>37%</td>
</tr>
<tr>
<td>potato</td>
<td>500-700</td>
<td>600</td>
<td>41%</td>
</tr>
<tr>
<td>sugar beet</td>
<td>550-750</td>
<td>650</td>
<td>37%</td>
</tr>
<tr>
<td>sunflower</td>
<td>600-1000</td>
<td>800</td>
<td>22%</td>
</tr>
<tr>
<td>sweet potato</td>
<td>250-350</td>
<td>300</td>
<td>71%</td>
</tr>
</tbody>
</table>
## Water savings from deficit Irrigation

<table>
<thead>
<tr>
<th>Crop</th>
<th>Potential Water Savings</th>
<th>Potential Yield Reductions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alfalfa</td>
<td>up to 33% (varies by region)</td>
<td>~25% (varies by region)</td>
</tr>
<tr>
<td>Maize</td>
<td>24% (55-60% during early vegetative stages)</td>
<td>no significant reduction</td>
</tr>
<tr>
<td>Rapeseed</td>
<td>40%</td>
<td>8%</td>
</tr>
<tr>
<td>Almonds</td>
<td>11%</td>
<td>little decline, but slightly smaller kernel size</td>
</tr>
<tr>
<td>Pistachio</td>
<td>23.20%</td>
<td>no reduction</td>
</tr>
<tr>
<td>Citrus</td>
<td>25%</td>
<td>no decrease in profits (reduced yield, but higher quality)</td>
</tr>
</tbody>
</table>
Rotational Fallowing

<table>
<thead>
<tr>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year 6</td>
<td>Year 7</td>
<td>Year 8</td>
<td>Year 9</td>
<td>Year 10</td>
</tr>
<tr>
<td>Year 6</td>
<td>Year 7</td>
<td>Year 8</td>
<td>Year 9</td>
<td>Year 10</td>
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<td>Year 1</td>
<td>Year 2</td>
<td>Year 3</td>
<td>Year 4</td>
<td>Year 5</td>
</tr>
</tbody>
</table>

- 10% of land fallowed; 10% of water can be marketed
- Patterns may vary but generally fallowed lands are rotated
- Less productive lands can be fallowed
- Periodic resting of lands restores nutrients
- Palo Verde Irrigation District (PVID) example
Translating savings to marketable water

- In stressed water systems and absent transaction costs, conserved water should have a high market value.
- But legal regimes in the Western U.S. make transfers difficult and expensive (high transactions costs).
  - “No injury” rule
  - In most states no legal right to sell conserved water
- Quantifying marketable units poses challenges.
Lessons from Australia

- Australia sets a cap at sustainable levels of water use
- Water rights are separated from land rights
- Water rights are defined in fungible (tradable) units
- Vast amounts of water are traded quickly and efficiently
  - Temporary (seasonal) trades typically take 5 days or less
  - Permanent rights are traded in 20 days or less
- The process is entirely transparent with prices and trading information available on the MDBA website
Applying the lessons to the American West

▶ Despite its attraction, capping water rights in much of the American West is politically impractical, especially in the short term
  ▶ But water rights could be redefined in fungible units
  ▶ Instead of solely by diversion amounts *by the amount historically consumed*
  ▶ States could then allow the transfer – temporary or permanent – of any water not consumed over a given period
What would it take?

- Limiting transfers to “conserved water” might gain better acceptance in the agricultural community
  - Except in California will require legislation

- Will require administrative agency to define baseline water rights AND quantify conserved amount

- Must be a transparent process with a deferential standard that discourages challenges
  - Keep transaction costs low and afford the public confidence in the integrity of the process and numbers
Improve verification systems

- Employ drones and on the ground inspections to verify changes in crops and land fallowing
- Require audits of lands subject to deficit irrigation
- Make reporting and inspection information transparent to other water users and the public on the internet
Conclusion

- Allowing farmers to market conserved water might flip current incentives to over-consume water
  - Will require defining rights as fungible units
  - Streamlining/reforming the transfer process is critical

- A viable market could free cities of the current practice of hoarding water

- Additional research needed to verify potential water savings