

Valuing Remotely Sensed Data for Integrated Water Management

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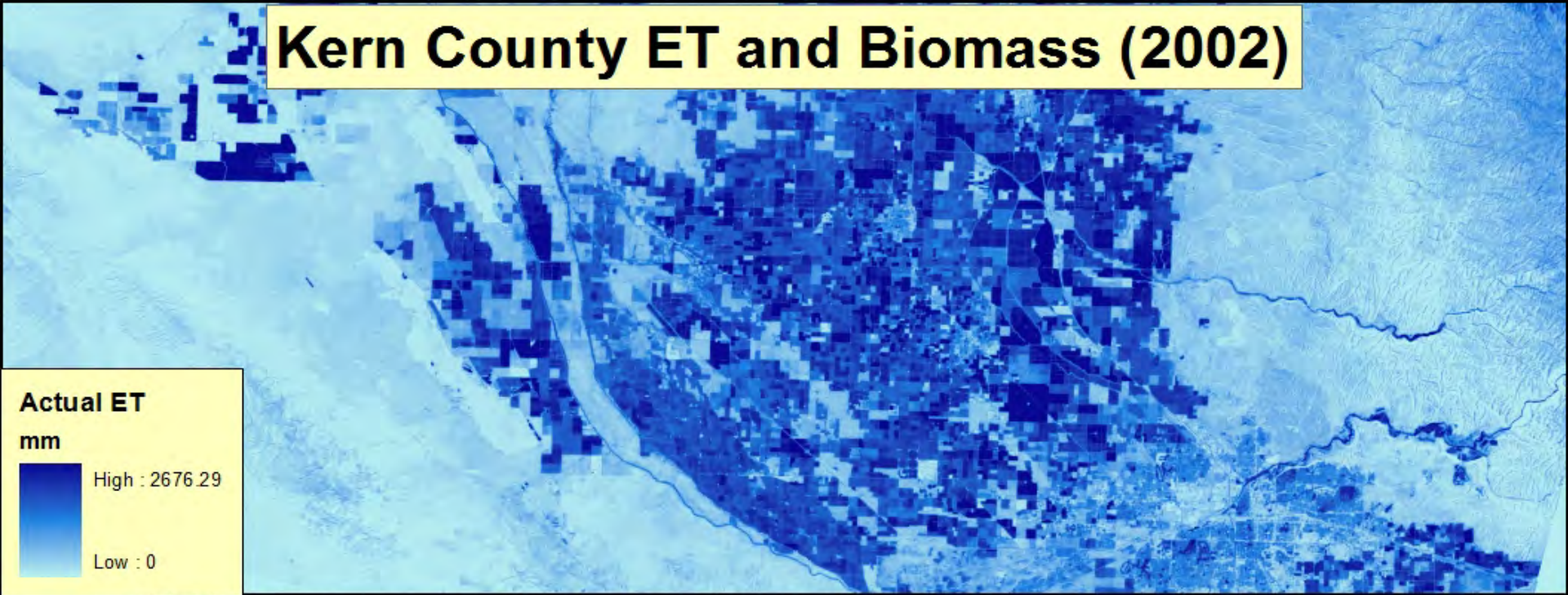
Context for Remarks

- Within State water management
- Economic and hydrologic information
- Remote sensing and Smart water markets
- A Statewide water information consortium

Remotely Sensed Data & Smart Water Markets

- Current western water markets are usually based on data averaged over space and time
- Water values differ widely over space and time
- Remotely sensed data measures detailed spatial and temporal observations .
- Consistent sampling and timely information.

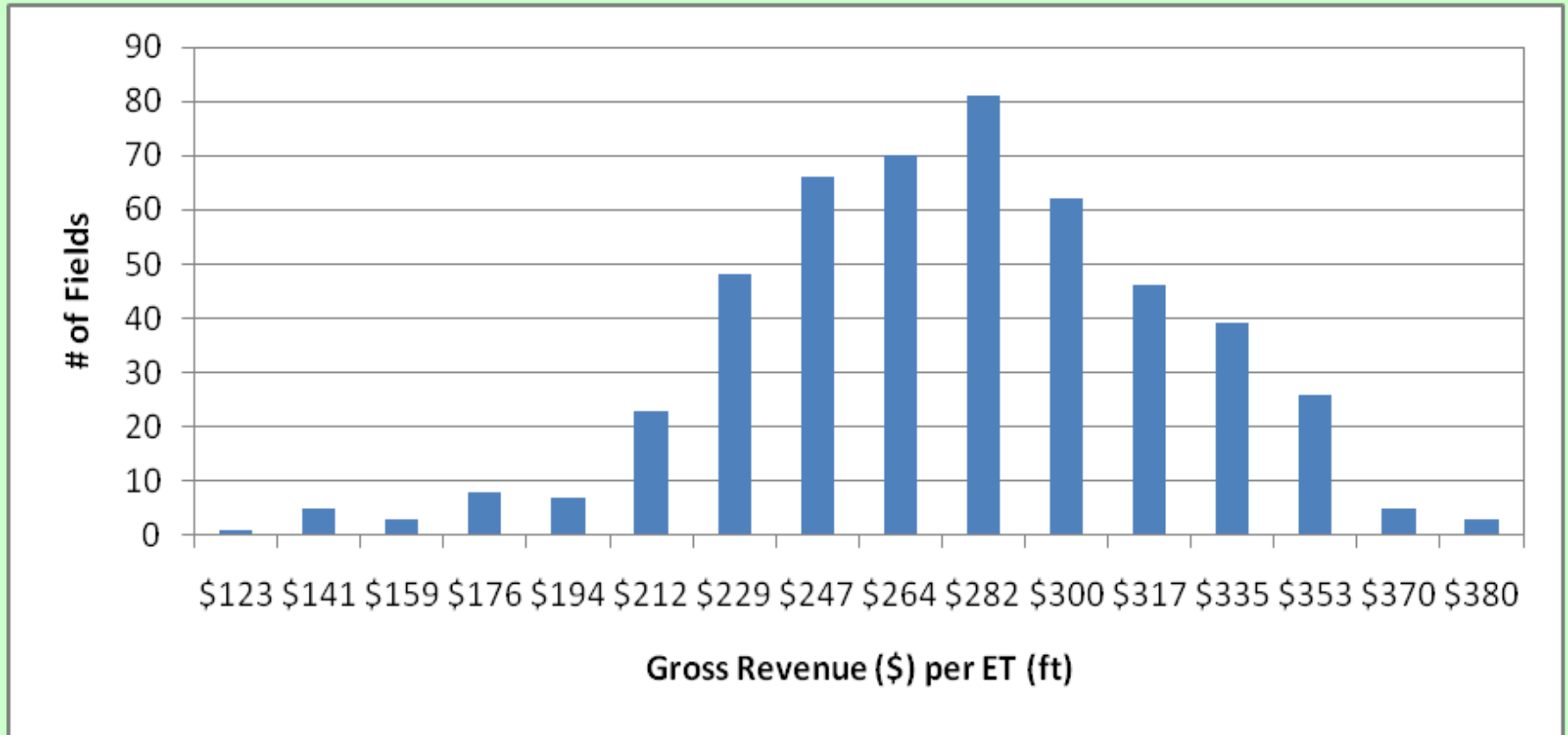
Kern County ET and Biomass (2002)



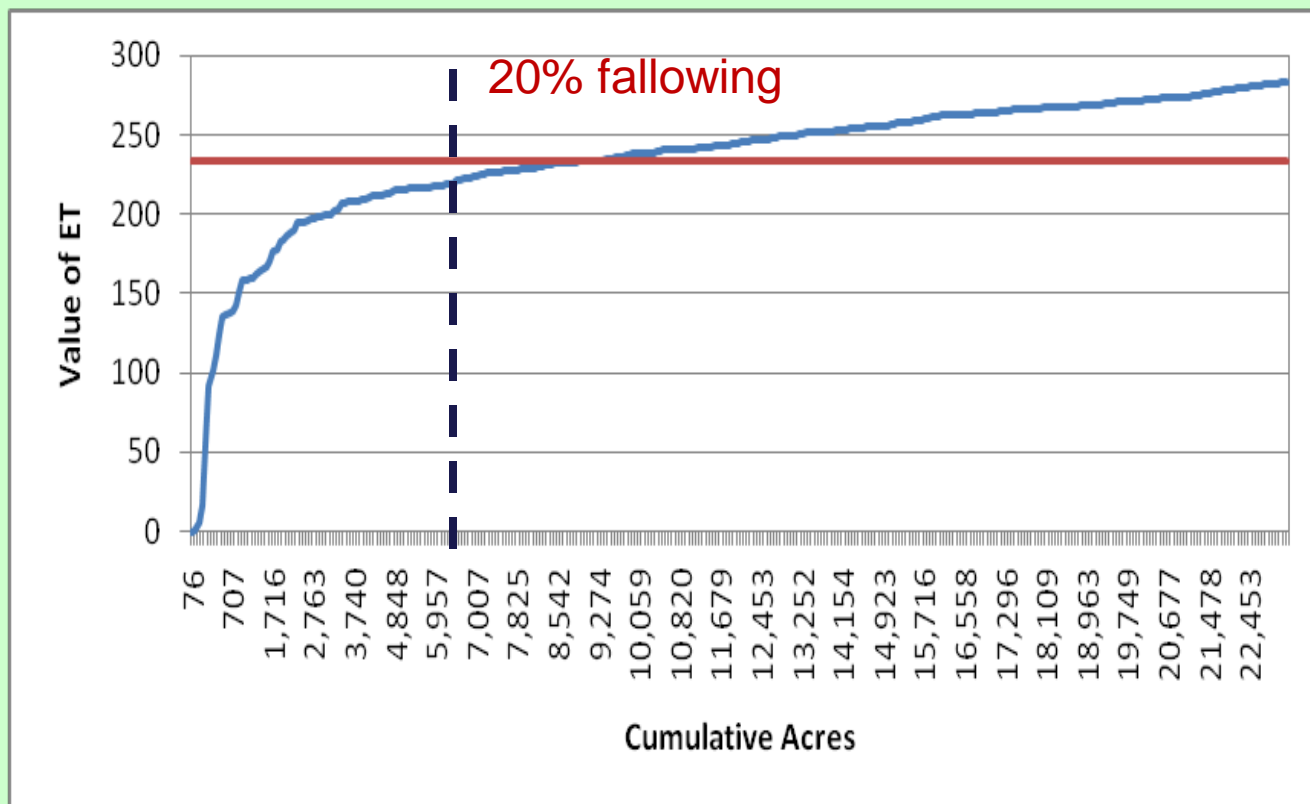
Smart Water Markets

- Consider two alternatives:
 - Offer the average revenue per acre (\$232/ft ET)
 - Allow farmers to choose to buy into the program
 - Assumes no knowledge of actual distribution of value across acres
 - Use remote sensing information to determine exact value per acre
 - Policy maker is able to use varying prices to target low marginal water value fields
 - Use SEBAL dry biomass as a proxy for yield

Distribution of Crop Revenues per Ft of Actual ET



Average and Estimated Revenues per foot of ET versus cumulative Acres



The gross revenue per ft of actual ET for the 7000th acre is about \$220/ft ET

Program Cost Estimates

Policy	Cost with County Data	Cost with Remote Sensing Information	Cost Reduction
Average Flat Rate Price	\$1,624,000	\$1,540,000	\$84,000
Revenue Discrimination	\$1,624,000	\$1,325,254	\$298,746

Note: The value of remote sensing data (in terms of saving of excess payment) in this example is bounded between \$84,000 and \$298,746

A State-wide Water Data Consortium

- California has one federal & two state agencies that use information on water use
- Current data is assembled from reports and checked for consistency by models, but rarely directly measured
- Assembling and ground-truthing remotely sensed data has strong scale economies.
- Consistent remote sensors have the potential for updated estimates and learning over time.

Landsat Rows & Passes



Costs for a Central Valley Consortium

- Analysis & interpretation of 4 Landsat rows & passes monthly for an 8 month water year
 - \$80,000
 - Yields ET & DM by month and pixel
- Use Cal DWR survey field boundary layer and GIS to get field level ET and DM
- Use NAAS pixel NDVI data for field level crop identification

Consortium cost ideas

- Establish a system for ground-truthing crop type, irrigation technology and yield.
 - \$120,000
- Annual total cost \$250,000
 - Cost per acre foot = \$0.016
 - Cost per irrigated acre = \$0.054
- Repeat for at least 3 years to allow learning
- Total 3 year cost....\$750,000