Agricultural Applications of ET

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The Colorado River Valleys of Southern Arizona and California represent more than 700,000 acres (280,000 ha) of irrigated cropland. This region produces more than 95% of the nation’s vegetables during the fall-winter-spring season each year. Many of the water rights on the lower Colorado have high seniority. Colorado River resources are over-subscribed. USBR is responsible for delivering water, managing salinity, and meeting US/Mexico treaty obligations. Remote sensing of ET has a role in assessing current water use and helping to manage water in the future.
Irrigation Districts for the Yuma Arizona Region

- Bard Water District
- North Gila Irrigation District
- Yuma Irrigation District (Or South Gila)
- Yuma Mesa I&DD
- Unit B Irrigation District
- Yuma County Water Users Association
- Wellton-Mohawk I&DD
Declining Irrigation Water Deliveries to Yuma County Farms

The chart shows the decline in irrigation water deliveries to Yuma County farms from 1970 to 2010. The y-axis represents water deliveries in acre feet, and the x-axis represents years from 1970 to 2010. The chart compares gross delivery to farms and delivery per acre. The trend indicates a significant decrease in water deliveries over the years.
Improved Water Management

- Laser leveling
- Concrete lined ditches
- High turnout gates
- Sprinkler irrigation
- Length of irrigation runs, furrow geometry, and manipulation of cutoff distance and time
- Cropping system shifts
Yuma County Crop Production Shift to Vegetables
Irrigable Acres in Yuma County Dedicated to Multi-Crops Increased 5x since 1970
Water Conservation by Reducing Summer Month Cropping
Improved Water Management Practice: Flood -> Sprinkler

The water intensive practice of “subbing” up vegetables by maintaining water in field furrows for 7-10 days has been replaced by sprinkler irrigation.
Farm Management Practices have Increased Application & Crop Water Use Efficiencies from ~55% to ~75%

**Application Efficiency: Crop ET/Water Applied**

**WUE: Crop Yield/Water Applied**

All Crops

Lettuce
Elements of Irrigation and the Role of ET Monitoring

- Irrigation Scheduling: Timing and Required Depth
- Adjustment of Required Depth for Salt Management (Leaching)
- Irrigation Design and Management (Efficient & Uniform Application of Required Depth)
- Accuracy of water usage still a major question
Role of Remote Sensing of ET for Agriculture

• ET models can reasonably estimate seasonal water use
• Crop & region specific water use values for irrigation district management
• Useful remote sensing of ET needs to be at daily time steps, <100m resolution, and accessible to farmers and their advisors.
Agricultural Applications of ET

- ET uses/losses are the single largest unmeasured water flux
- New, updated water use baselines needed in the US Southwest
  - Scarcity & Farm vs. Urban Users
  - Salinity management
- Knowledge of ET would improve in-season forecasting of water requirements
- ET-based tools would be used if accurate, consistent, and easy-to use
Temperature Responses vs. Water Deficits

Temperature vs. Time of Day

Surface-Air Temperature Difference vs. Time of Day