More with Less: Agricultural Water conservation and Efficiency in California
Special Focus in the Delta

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Starting Points

Agriculture accounts for 80% of Delta water consumption.

Recent water shortages from pumping restriction and drought resulted in total farm losses estimated as high as $245 million as of mid-summer 2008.

New vision of the Delta's future is one in which "a profitable and sustainable agricultural sector thrives, while water withdrawals from the Delta are significantly reduced."

The study does not address the question of how water is withdrawn from the Delta.

Scenarios

Report considered 4 scenarios for increasing Ag water-use efficiency with a focus on the Delta:

1. **Modest Crop Shifting** – shifting a small % of lower value, water intensive crops to higher value, water efficient crops
2. **Smart Irrigation Scheduling** – using irrigation scheduling information to help increase irrigation precision
3. **Advanced Irrigation Management** – such as regulated deficit irrigation
4. **Efficient Irrigation Technology** – shifting small % of crops from flood irrigation to sprinkler and drip systems

Evaluation was done on three hydrologic regions – Sacramento River, San Joaquin River, Tulare Lake and compared against a baseline

Baseline – adopts DWR assumptions about irrigated crop acreage and agricultural water use for the year 2000 from the 2005 California Water Plan Update

Findings from the study are summarized in Figure 1 and Table 1.

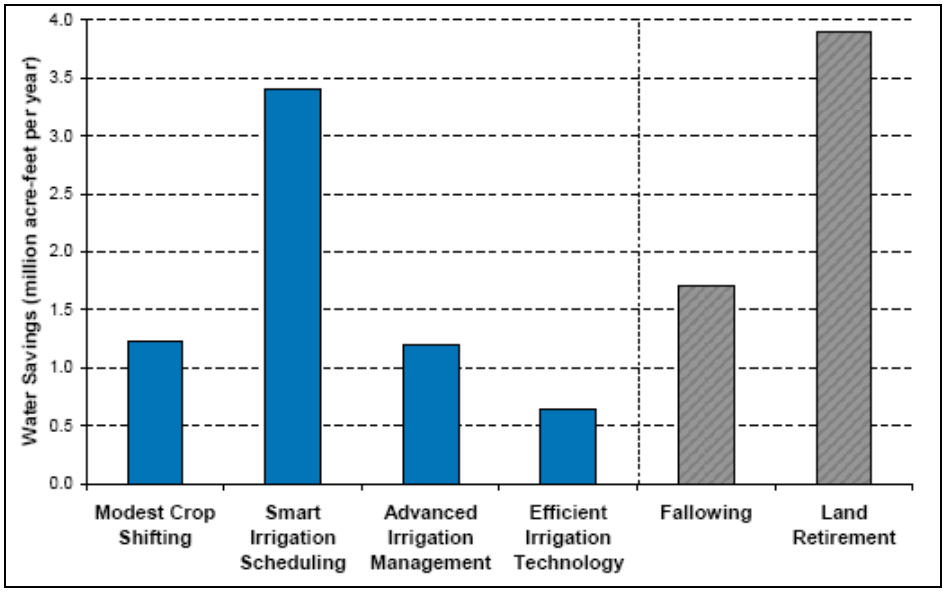

Figure 1: Potential Water Savings Associated with Each Water Efficiency Scenario compared to Fallowing and Land Retirement

Table 1: Scenarios and Results

Scenario	Assumption	Water Withdrawals (MAF)	Production Value (2005 $ Billions)	Notes
Baseline	2000 a "normal" water year as base year	26.5	$12.80	
Scenario	**Assumption**	**Change in Water Withdrawals (MAF)**	**Change in Production Value (2005 $ Billions)**	
Scenario 1: Modest Crop Shifting	Assume shifting 25% of field crop acreage to vegetable crop acreage	-1.23 (-5%)	$5.1 (40%)	These water savings exceed the 1.1 MAF of groundwater overdraft in the three hydrologic regions examined in the study. By shifting to higher value crops, production value increases by $5.1 billion.
Scenario 2: Smart Irrigation Scheduling	Assume based on literature review - A survey of 55 growers across California who were using CIMIS to determine water application, the use of CIMIS increased yields by 8% and reduced water use by 13% on average (Source: DWR (1997). Fifteen Years of Growth	-3.45 (-13%)	$1.0 (8%)	8% production value increase is based on the yield increase as found in the survey cited. On-demand water is required to achieve this method therefore "district-wide infrastructure investments may be needed to achieve these water savings".
Scenario 3: Advanced Irrigation Management	Focus solely on regulated deficit irrigation (RDI). Assume based on literature review, a 20% average applied water savings to almonds, pistachios, and citrus trees and a 39% average applied water savings to vines. Assume no orchards or vineyards are curr	-1.23 (-5%)	$0 (0%)	Deficit irrigation is defined as the application of water below the level of traditional full crop ET. While deficit irrigation is uncontrolled, regulated deficit irrigation (RDI) is practiced during stress-tolerant growth stages in order to minimize neg
Scenario 4: Efficient Irrigation Technology	Assume flood irrigation acreage reduced from 50% to 25%, and sprinklers and drips are used on 45% and 30% of irrigated acreage, respectively. No change in crop types.	-0.64 (-2%)	$0 (0%)	Irrigation technologies are only methods to distribute water. Effective management is also essential to achieve the water savings of an efficient irrigation system.

Conclusions

Agricultural withdraws from the Delta can be reduced substantially with existing technologies, improved management practices, and changes in educational and institutional policies.

Recommendations

Better combined land and water planning is needed.

Provide sales tax exemptions or rebates on efficient irrigation equipment to help offset capital investments for these systems.

Develop new legal mechanisms by which municipal water or state or local wildlife agencies could invest in farmers' irrigation systems in exchange for some portion of the water conserved.

The state, federal government, and/or energy providers should offer rebates or incentives to farmers who implement on-farm conservation measures that result in a net energy savings.

Reduce or realign subsidies from low-value, water-intensive crops to less water-intensive crops.

Provide greater emphasis on water conservation and efficiency improvements within the federal Environmental Quality Incentives Program and expand funding for these initiatives.

Implement new water rate structures that encourage efficient use of water.

Revise and expand "Efficient Water Management Practices" for agricultural water agencies.

Make agricultural "Efficient Water Management Practices" mandatory and enforceable by the State Water Resources Control Board.

Expand the development and deployment of efficient irrigation technologies and new crop types.

Develop institutional mechanisms to increase the reliability of agricultural water deliveries to users meeting high standards of water-use efficiency.