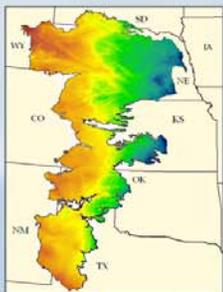


Evaluation of Policy Options Aimed at Achieving a Reduction in Groundwater Consumption in Western Kansas

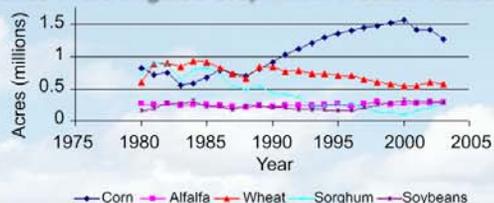
Project Justification



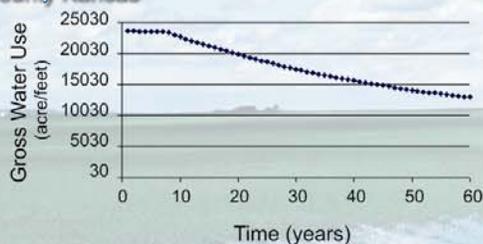
The Ogallala aquifer underlies approximately 174,000 square miles in the states of Texas, New Mexico, Oklahoma, Colorado, South Dakota, Wyoming, Kansas, and Nebraska. Over the past 30 years there has been significant increase in the number of irrigated acres in western Kansas, and an increase in the acres of water intensive crops, such as corn. In many areas over 40% of the predevelopment saturated thickness has

been used which will physically curtail water in the near term. Several policy options have been implemented to extend the economic life of the aquifer. This project provides research associated with two policies and discusses several unintended consequences that may accompany water conservation policy.

Trends in the Irrigated Crop Mix in Western Kansas



Expected Water Use Decline in Portions of Sherman County Kansas



Technology Cost Share Program

The technology cost share program was aimed at conserving groundwater by increasing irrigation efficiency. The policy was administered by the Kansas State Conservation Commission (SCC) and the Natural Resource and Conservation Service (NRCS). Under this program, irrigators within the Ogallala aquifer region of western Kansas were reimbursed a portion of the cost of adopting irrigation technologies. Most cost share funds have been expended on the adoption of low pressure with drops technology and conversion from flood technology to center pivot technology.

- A very detailed micro level database was used to evaluate before and after water use at the farm level.
- Over 1,000 producers participated in the program which affected nearly 150,000 acres.
- The state expended \$2.7 million taxpayer dollars and did not achieve a significant reduction in groundwater usage.
- In some cases, the adoption of efficient irrigation technology actually increases groundwater consumption as producers elect to use the "saved" water to grow crops that require a higher conservative use and/or increase the total amount of acres irrigated.

Conservation Reserve Enhancement Program

A second mechanism for reducing the current overdraft on the Ogallala aquifer is the Conservation Reserve Enhancement Program (CREP). CREP is a voluntary program for agricultural landowners. CREP will permanently retire water rights based on the fair market value of the water right. This research focuses on estimating the fair market value of water rights.

- A CREP has been implemented in southwest Kansas.
- Contrary to conventional wisdom and published literature, the value of a water right appears to be increasing in both nominal and real terms.
- The results could be used to set the maximum acceptable bids and/or assess the reasonableness of a particular bid. The data might also be useful in program budgeting and/or predicting program success.

Percentile Table for the Estimated 2006 Fair Market Value of Water Rights (\$/acre)

County	Mean	Std. Dev.	Percentile								
			10%	20%	30%	40%	50%	60%	70%	80%	90%
FINNEY CO	\$570	\$44	\$514	\$533	\$547	\$559	\$570	\$581	\$593	\$607	\$626
FORD CO	\$533	\$124	\$374	\$429	\$468	\$502	\$533	\$565	\$598	\$637	\$692
GRANT CO	\$357	\$112	\$214	\$264	\$299	\$329	\$357	\$385	\$416	\$451	\$500
GREY CO	\$517	\$157	\$317	\$386	\$435	\$478	\$517	\$557	\$600	\$649	\$718
HAMILTON CO	\$332	\$283	-\$91	\$94	\$183	\$269	\$332	\$404	\$481	\$570	\$695
HASKELL CO	\$494	\$141	\$313	\$375	\$420	\$458	\$494	\$530	\$568	\$612	\$674
KEARNEY CO	\$455	\$109	\$322	\$368	\$400	\$428	\$455	\$481	\$509	\$541	\$587
MEADE CO	\$556	\$154	\$359	\$427	\$475	\$517	\$556	\$595	\$637	\$686	\$754
MORTON CO	\$361	\$96	\$238	\$281	\$311	\$337	\$361	\$386	\$412	\$442	\$484
SEWARD CO	\$451	\$166	\$316	\$362	\$395	\$424	\$451	\$478	\$507	\$540	\$586
STANTON CO	\$406	\$121	\$251	\$304	\$342	\$375	\$406	\$437	\$470	\$509	\$561
STEVENS CO	\$583	\$98	\$458	\$501	\$531	\$558	\$583	\$607	\$634	\$665	\$707

The predictions are based on an average county irrigated parcel with 1.0 acre-feet of average annual water usage, less the parcel's implied value as nonirrigated land.

Before and After Comparison of Conversion from a Conventional Center Pivot Sprinkler Package to Drop Nozzle Technology

	Before	After	Increase	Statistically Significant
Irrigated Acres	141.11	144.29	2.25%	Yes
Acre-Feet Pumped	163.90	185.83	13.38%	Yes
Proportion of High Water Use Crops	0.73	0.71	-2.62%	Yes
Proportion of Mixed Crops	0.14	0.12	-13.11%	Yes

All statistically significant mean comparisons had P-values less than 0.01.

Before and After Comparison of Conversion from Flood to Center Pivot with Drop Nozzle Technology

	Before	After	Increase	Statistically Significant
Irrigated Acres	141.11	144.29	2.25%	Yes
Acre-Feet Pumped	163.90	185.83	13.38%	Yes
Proportion of High Water Use Crops	0.73	0.71	-2.62%	Yes
Proportion of Mixed Crops	0.14	0.12	-13.11%	Yes

All statistically significant mean comparisons had P-values less than 0.01.

Summary

The implementation of a conservation strategy for the Ogallala aquifer is a complex problem. Policy makers and stakeholders must weigh the potential water savings vs. the implementation costs and potential impacts on the regional economy. Failure to understand and account for relevant factors can lead to strategies that may not achieve goals. 'Companion policies' must be identified to insure water conservation schemes avoid unintended consequences. Tentative results suggest that policy makers and taxpayers are willing to continue funding voluntary and incentive based programs that result in a reduction of groundwater consumption. Producers are willing to accept companion policies (additional restrictions) in order to maintain funding. The State has incorporated and cited this research in their planning process for the cost share program modifications, and has included it in the Pawnee-Buckner-Sawlog Subbasin intensive groundwater use control area planning process. The State incorporated and cited this research in their revised CREP proposal to the USDA.

