# *Developing New Water Conservation Technologies:*
## *An Investment in the Future of Kansas*

F.R. Lamm, L.R. Stone, A.J. Schlegel, R.M. Aiken
Kansas State University

Water is the lifeblood of the agricultural economy in Kansas. This is particularly true in western Kansas where dependence on irrigation from the declining Ogallala (High Plains) aquifer has a tremendous effect on the economic viability of producers and their communities. There are few that would argue that a transition to less pumping from the Ogallala is not a reality. However, the way we get to that point and the timeframe is still within our powers to control. Many tools are presently available to start us on this process, but it would be foolish to discount the possibility of the development of new water conservation technologies that could further cushion the transition period.

There are three significant study areas that the authors have immediately identified where new technology development could make significant contributions towards saving water and making a smoother, less economically disruptive transition:

- Irrigation macromanagement
- Improving water use efficiency through advanced irrigation management
- Cropping systems research to reduce irrigation requirements

Irrigation macromanagement is defined as process of determining the initiation and termination of the irrigation season and the decision process about dormant season irrigation. These three decision points can have a significant effect on water use. Two studies are proposed:

**Improved strategies for initiating the irrigation --** 4 year timeframe, $35,000/year. Tensiometers which measure a physically-based soil water measurement would be used to initiate the irrigation season with the effect of reducing significant deep percolation water losses.

**Reducing producer uncertainty at the end of the irrigation season --** 4 year timeframe, $25,000/year. Better understanding of the combined biological and physical responses to late season water stress would be used to develop better termination criteria thus reducing unnecessary late irrigations.

Improvements in water use efficiency are easily obtainable through the combination of advanced irrigation systems with advanced management. Two studies are proposed:

**Advanced control of SDI to improve water use efficiency --** 4 year timeframe, $35,000/year. Crop physiological processes can be potentially improved through high frequency irrigation/nutrient management using subsurface drip irrigation (SDI) by providing a more consistently stable environment while at the same time saving water.

**Partitioning the evaporation and transpiration components --** 4 year timeframe, $25,000/year. A better understanding of the partitioning of evaporation (a water loss) and transpiration (a legitimate crop water use) can help focus producer's current efforts and future research on technologies that can better "manage" the components.

Water use varies by crop type. Opportunities exist to better manage water through utilizing alternate crops and also by rotation of crops among seasons. Initially, one study is proposed:

**Crop rotations to utilize limited irrigation --** 4-year timeframe, $20,000/yr. Determine optimal crop rotations to utilize limited amounts of irrigation by evaluating various crops (corn, sorghum, soybean, sunflower, and wheat) at several levels of deficit irrigation under no-till management.

Additional specific details for the proposed studies can be found at http://www.oznet.ksu.edu/irrigate/wc.htm