Water Grand Challenges:Water Conservation

Agricultural Irrigation Conservation

Background–Adriving force behind economic success in Texas is astrong and fertile agricultural industry.Irrigation is vital for productive agricultural practices. Roughly two-thirds of Texas surface and groundwater use is accounted for through irrigation.[1]Irrigated agriculture adds $4.7 billion in economic value to the state annually and provides the dominantarea of employmentfor many rural areas.[1]While the entire state benefits financially from agricultural success, certain regions depend upon it. Agricultural production accounts for 15 percent of the entire region's economy in the High Plains, and adds 103,000 jobs directly from crop production.[2]

Due to regional difference the effects would be felt more severely in different areas if changes to agricultural methods were enacted. In the Texas High Plains, the total regional economic impact of converting all irrigated acres to non-irrigated dryland farming would be an annual net loss of over $1.6 billion of gross output, over $616 million of value added, and nearly 7,300 jobs. Loss of irrigation in the Winter Garden (Frio, Medina, Uvalde, and Zavala counties) would result in a loss of $55 million in vegetable and melon production, $22 million in additional economic activity, and 872 jobs. In Uvalde County alone, total economic impact of irrigated agriculture is estimated at $44 million and supports 600 jobs.[1]

In light of persistent drought and increasing competing water use demands from the municipal sector, irrigation conservation techniques are paramount to long-term agricultural and water sustainability. To tackle the environmental and economic concerns surrounding irrigation in Texas, continued innovative irrigation techniques are necessary.[1]

Irrigation Techniques – Since the mid-1970's, improved irrigation technology has greatly enhanced crop yield while maintaining constant water application rates over the last four decades. Cotton yields, which have more than doubled since 1978,despite this rise, water use has remained unchanged. Irrigation efficiency has gone from 60% in the 1970s to 88%–95% in much of the state today, allowing agricultural users to get a higher output and value fromirrigatedwater. This increase in productivity has been accomplished through a combination of innovative technological approaches to managing and transferring irrigation water, as well as geneticallymodified crops. Many irrigators now use high-efficiency advanced irrigation technologies including low-pressure center pivot sprinkler systems and subsurface drip irrigation to remove the amount of water lost to evaporation.[3]

While positive steps have been taken, in order to meet the demands of the twenty-first century,additional advancements need to occur. Due to current progress, water used for irrigation has been in decline since the 1950's.(fig.1).[3]The urbanization of Texas has reduced the amount of land available for crop production, further emphasizing the need for high yield crops. Furthermore, the need for improved water conservation techniques is underscored by the realities of a rapidly increasing population, water hungry industry practices such as hydraulic fracturing, and the ever-present possibility of serious drought. Many research organizations such as the Texas A&M AgriLife Center, the Texas Agricultural Irrigation Association, and the Texas Water Resources Institute are searching for new and innovative ways to be more efficient. In additional the state offers irrigation conservation incentives in the form of grants to political subdivisions if conservation techniques are implemented.[4]

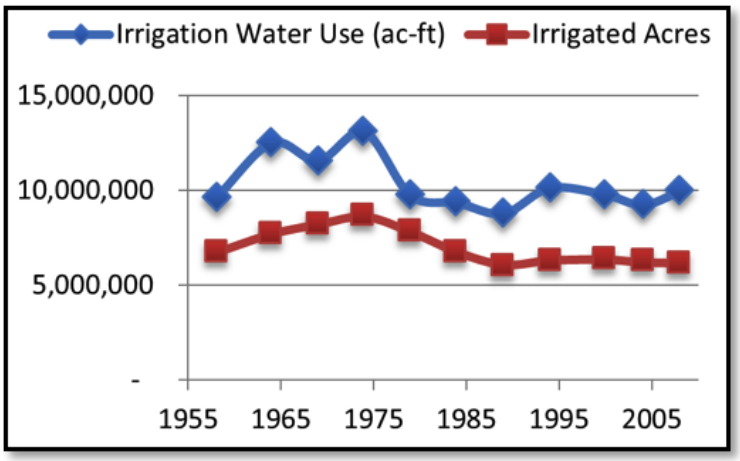

Figure 1: Trends in water use for agricultural irrigation[3]

Impact of Drought–One of the most serious threats to the sustainability of agriculture in Texas is the potential for ongoing drought across the state. Currently, Texas is under severe drought conditions and is already experiencing an estimated deficit of 3.1 million acre-feet for irrigation crops.Agricultural losses from the 2011 drought alone have been estimated at $5.2 billion and indirect losses add another #3.5 billion to the toll.[5]Future projections show that this deficit will continue to increase. Both groundwater and surface water are utilized for irrigated crops; however, groundwater makes up 72.3% of water use for irrigation. Groundwater supplies are projected to drop by 32% due to declining levels in the Ogallala Aquifer and the Gulf Coast Aquifer, both major suppliers for irrigation water.[6] Reduced rainfall necessitates increased irrigation and increased municipal withdrawals, but also decreases the amount of collection from watersheds and ultimately results in reducing overall groundwater supplies.

[1]Kalisek, Danielle. *Water use, economic value of irrigated agriculture examined in new report*. Texas Water Resources Institute. TxH20 Winter 2013.
[2]Barnett, M. Economic Impact of Agriculture is Texas' Best Kept Secret. Texas Agriculture Talks. Texas Farm Bureau, 2012.
[3] Wager, Kevin. *Status and Trends of Irrigated Agriculture in Texas*. Texas A&M AgriLife Research Extension, 2012.
[4]Texas Water Development Board. Agricultural Conservation, Austin, TX 2013.
[5]Combs, S. The Impact of the 2011 Drought and Beyond. Texas Comptroller of Public Accounts. 2012
[6]Gertson, Ronald. *Impacts of the current drought and water policy on agriculture*. State Bar of Texas 14TH Annual Changing Face of Water Rights, 2012.