Texas Water Resources Institute

September/October 1983
Volume 9
No. 5

Fine Country

By Lou Ellen Ruesink, Editor, Texas Water Resources

"This," said the newcomer to the plains, "would be a fine country if we just had water."*

Today many areas of Texas are virtual Gardens of Eden where there is water to supplement the undependable rainfall. Lush cotton fields grow in semi-arid areas of Texas; dense citrus orchards stand in the hot, dry Lower Rio Grande Valley; and grape orchards thrive in the unlikely climate of the Southern High Plains.

The first record of irrigation in Texas--and perhaps the first in U.S. history--came from Spanish explorer Coronado in the 1500's. His report describes Indians diverting water from the Rio Grande to their crops near the present city of El Paso.

Other early references to irrigators in Texas include Indians in the vicinity of Wichita Falls and Spaniards who founded the city of Laredo. San Antonio history includes Spanish settlers constructing canals in the early 1700's to move irrigation water from springs feeding the San Antonio River to mission crops near San Antonio. Other early irrigators were Franciscan fathers who established the San Saba Mission and built canals along the San Saba River in 1756.

Settlers in the Pecos River Valley have the distinction of planning the first recorded irrigation development to exceed its dependable water supply. When railroads extended into their valley, the settlers began more irrigation projects than the river could supply. Some projects were never even completed.

Farmers in the Lower Rio Grande Valley irrigated as early as 1876, but they had little incentive to irrigate until a railroad came through the area in 1904 to carry produce to markets.

Around Beaumont, farmers hand-planted small patches of rice as early as 1850, but could not make it a commercial crop until an irrigation company began pumping water from Taylor's Bayou in Jefferson County in 1891. Seven years later the county had 3,000 acres of rice, miles of irrigation canals, and a rice mill.

The motorized pump greatly accelerated irrigation development in the state in the early 1900's. No longer were irrigators limited to land adjacent to river beds. Pumps could move water "uphill" over stream banks and other high ground to quench thirsty crops in distant counties. Early in this century, pumps also lifted water from underground and brought irrigation potential to scarce surface water areas such as the Winter Garden and High Plains.

Irrigation began in the High Plains with the completion of the first successful irrigation well in 1911. Development of the vast groundwater resource of the High Plains progressed very slowly for about 20 years, but in the 1930's a combination of drought and improved efficiency of pumps and power units stimulated interest in irrigation. Irrigation farming then expanded from the early centers around Plainview, Hereford, and Muleshoe into every county of the High Plains.

The real irrigation boom in Texas came after World War II when irrigation development on the Texas High Plains and in many other areas increased at a phenomenal rate. From 3.1 million acres in 1949, irrigated acreage in the state reached a peak in 1974 of 8.6 million acres. In 1978 there were 70,000 irrigation wells on the High Plains alone; over 90,000 irrigation wells in the state.

Sprinkler Systems

Not only have water supply and conveyance systems grown in number and sophistication, but there have been tremendous advancements in irrigation equipment. Sprinkler systems, for instance, spread water much farther and faster than early "gravity flow" systems.

The availability of lightweight aluminum pipe after the war was perhaps the major factor in the increase in sprinkler systems in the late 1940's and 1950's. The invention of the deep well turbine pump and the thousand-gallons-per-minute well also contributed to making sprinkler irrigation a standard practice in the 1950's in many areas of the state.

Farmers found early sprinkler units to be quite labor intensive. Each section of aluminum pipe, 30 or 40 feet in length, had to be carried and locked to the end of another section. Irrigators improved handling methods by devising skids for the pipes and dragging them with a tractor, but handling pipe still required a great deal of labor.

They also made other improvements by positioning irrigation pipe off the ground and above the crop. They placed pipe on wheels and attached a motor at the side of the field to move the entire line of pipe. Side roll systems required less labor, but early side-roll systems had hand-operated ratchet type lever movers. Men still had to haul and join all the pipe and crank up the engine each time a new area was to be irrigated.

In the 1960's irrigation system designers introduced the center pivot system with sprinklers attached to a metal frame rotating from a stationary motor. Farmers welcomed this automatic, self-propelled sprinkler system and its lower demand for farm labor.

In the six years between 1971 and 1977 the number of center pivots in operation on the Texas High Plains increased from 885 to 3,645 units.

Sprinkler systems eliminated the problem in furrow watering of deep percolation at one end of a furrow with insufficient penetration at the other end of the row. Sprinkler systems, however, also required extra energy and lost more water through evaporation than did furrow irrigation.

"The most efficient water conservation and energy efficient system to be developed to date," reports the High Plains Underground Water Conservation District in *The Cross Section*," is called LEPA or Low Energy Precision Application System." LEPA appears to be the sprinkler design of the future, says the District, because it distributes water directly to the furrow at very low pressure. The system moves continuously and delivers water just above ground level. LEPA was designed by Bill Lyle, an agricultural engineer stationed at The Texas Agricultural Experiment Station in Lubbock.

New techniques in furrow irrigation also reduce labor requirements and save energy and water cost. Lined canals and pipes deliver water to crops with less water loss than unlined ditches and canals. Automatic, computerized systems now available to irrigators use the latest in technology to measure soil moisture and determine when and how much to irrigate. Modern systems can also operate automatic gates and regulate flow.

Irrigation Today

Irrigation is no longer simply a last resort against crop failure, but a businesslike approach to making the best use of all available resources. In addition to over two billion dollars of irrigated production annually, irrigation plays a major role in providing stability not only to the crop production but to the Texas' associated agri-business industry as well.

Irrigated acres, while only a third of the state's total cropland, produce more than half of all harvested crops in the state. Irrigated acres grow more cotton than any other crop in Texas; other leading irrigated crops are grain sorghum, wheat, and corn.

About 65 percent of all the irrigation in Texas occurs in the High Plains. Other concentrated areas of irrigation are the Gulf Coast rice producing area, the Lower Rio Grande Valley, the Winter Garden district, the Trans-Pecos area of West Texas and the peanut producing area in North Central Texas. The most common method of irrigation--furrow--applies water to 75 percent of Texas' irrigated fields; sprinkler irrigation occurs on most of the remaining acres. A small number of acres, however, receive irrigation from drip or trickle systems.

Seventy-six percent of the state's total water budget--about 13 million acre-feet of water--flows onto irrigated fields annually. More than three-fourths of this irrigation water comes from groundwater sources.

The most current statewide irrigation figures come from a Texas Department of Water Resources (TDWR) report published in 1980. This irrigation inventory presents figures collected approximately every five years since 1958 by the TDWR and the Soil Conservation Service, U.S. Department of Agriculture. The inventory compares acres of irrigated land with those in past years as well as cropping patterns, amount of water applied, rainfall received, and percentage of irrigation water from groundwater and surface water. Other types of information printed include the number of lined irrigation ditches, underground pipelines, on-farm impoundments, irrigation operating units, previously irrigated acres, and potential irrigation acreage.

Irrigation acreage in the state, according to TDWR figures, increased each year from 1900 to 1974, but statewide irrigation surveys show a decrease in irrigated acreage between 1974 and 1980. The decline in irrigated acres is mainly due to the energy costs associated with delivering water to crops. Another major factor in declining irrigated acres is increasing competition by industries and cities for the state's diminishing groundwater resources. Because of these problems, farmers turn formerly irrigated fields each year into dryland production or sell them for urban development.

The future of irrigation in Texas depends directly on how efficiently irrigation systems can deliver water to crops. Farmers across the state--from the Rice Belt near Beaumont to cotton fields around El Paso--know that they must reduce water and energy costs of irrigated production.

Texas farmers also know that without irrigation water theirs would not be as fine a country.

---

*Walter Prescott Webb. 1931. The Great Plains. New York: Ginn and Company, p. 320.

Historical References

Agricultural Resources Related to Water Development in Texas. 1968. College Station: Texas Water Resources Institute, Texas A&M University.

Evolution of Irrigation: *The Cross Section* (August). 1981. Lubbock: High Plains Underground Water Conservation District No. 1.

Inventories of Irrigation in Texas, Report 263. 1981. Austin: Texas Department of Water Resources.