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Underground Water: going...going...

By Lee Pilgrim, Editor, Texas Water Resources
To provide a decent level of nutrition for the world's people, the world food production will have to be doubled by 1980 and tripled by 2000, it has been estimated by the Food and Agricultural Organization of the United Nations.

Texas is expected to assume a major part of the burden of feeding the world's hungry, as well as helping the United States meet its balance of payments. Agriculture is the state's number one industry, Gov. Dolph Briscoe pointed out in his 1975 State of the State address. The Governor called agriculture a "major weapon in America's economic arsenal."

To accelerate agricultural production--or just to keep the present rate--Texas needs a never-ending supply of water; yet it faces a grave water depletion problem. Massive pumping from underground aquifers threatens the life of these ancient water-bearing formations which provide the major portion of water used in the state's agriculture. Anxiety over the diminishing supply of underground water is felt throughout the state.

Threatens Economy

Exhaustion of ground water supply creates a threat to Texas' agricultural economy, and will have an adverse effect on the economy of the state and nation as well. The United States depends on agricultural exports for its favorable balance of trade. Of the $11.8 billion favorable trade balance in 1974, $10 billion is attributed to farm products; and Texas ranks third in total U.S. agricultural cash receipts.

Irrigated crop production value in Texas in 1973 was estimated at $1.83 billion or 72 percent of the value of the state's total crop production. The figure takes into account 20 crops, including cotton, fruit, wheat, corn, sorghum grain, rice, soybeans, and vegetables. The statewide economic impact of irrigation is $6 billion when product inputs, processing, distribution and transportation of the products are counted.

Irrigation Stabilizes

Irrigation has stabilized the state's agricultural economy, freeing 8.3 million acres from the yearly gamble on rainfall.

Stressing the importance of irrigation to crop stabilization, Agriculture Commissioner John C. White asserted, "Texas has become a major U.S. producer mainly because of the conversion of dryland farming to irrigation."

The near drought in 1974 which wiped out many dryland farmers would have had the same devastating effects on all the High Plains agriculture except for irrigation, he pointed out.

"Practically all dryland wheat planted was lost, close to 3 1/2 million acres," he said. "Final yield figures on dryland wheat stand at 18 bushels per harvested acre." This is in contrast to the average irrigated acre yield of 40 bushels.

"Estimates on wheat losses in the dryland area run about $160 million, and as much as 20 percent of peanut acreages in High Plains went unplanted," he continued.

White also called attention to Texas' obligation to remain a vital source of food for millions abroad.

"Texas is a large exporter of sorghum, wheat and rice," he pointed out. "By 1985, it is projected that the grain import needs of developing countries will reach 78 million metric tons, if demand for meat continues to rise."

Dwindling underground water supply threatens more than farmers in Texas. Municipalities and industry also depend on underground water. In fact, it was massive pumping in the upper Gulf Coast region that brought on the serious and costly land subsidence problem. Efforts now are being made to switch from underground to surface water as a means to halt subsidence.

Trinity Aquifer

Municipal and industrial use is also causing a decline in the Trinity aquifer in Dallas-Fort Worth area. Although the two major cities use surface water, the aquifer is sucked by small municipalities and industry (and to a small degree, irrigation). At present, the water level is 400 feet below land surface, so deep that the cost of pumping is expensive. The lower the water table the higher the cost of pumping.

Deep pumping is also necessary in the Carrizo-Wilcox Aquifer, which underlies the Winter Garden region of south Texas. To maintain a high yield of citrus fruits, vegetables, and nuts, some farmers must drill 400 feet to find water because of the decline of artesian pressure. At that depth, a profit is still possible, but the cost to produce farm products will rise as the well shaft plunges deeper. It is predicted that water levels

will drop another 120 feet by the year 2020, with pumpage remaining the same as today. Cost increases must eventually threaten economic feasibility of irrigation. Approximately 95 percent of pumped water in the area is used for irrigation.

The Edwards Aquifer, although capable of natural recharge, faces depletion as San Antonio's population burgeons. The Edwards provides domestic water for three cities and many small municipalities. Besides well-pumpage, water is drawn from the Edwards Aquifer through spring flow. The beautiful New Braunfels, Comal, and San Marcos natural springs flow from the Edwards, providing important tourist attractions. Escalating well-pumping decreases springs' flow and threatens their existence.

Ogallala Aquifer

Because of its size and its effect on the economy the Ogallala is the most talked about of all Texas aquifers. The Ogallala, overlain by the High Plains "bread basket," has undergone serious depletion. Wayne Wyatt of the Texas Water Development Board reports a computer study figure of 340 million acre-feet of groundwater now in the aquifer. According to Wyatt, the distribution of the ground water resource is uneven. Some areas are very thin (less than 100 feet) and others very thick (more than 900 feet). Severe depletion occurs in the thin section; whereas, the thick sections have resources to support irrigation for many decades.

The study shows a projected volume for the Ogallala in the year 2020 to be 126,989,000 feet or 37 percent of the 1974 supply.

More than 65 percent of the total irrigated acreage in Texas is in the High Plains. In 1972 approximately 6 million acres of agricultural land in the area were irrigated, producing 54 percent of the state's cotton; 29 percent of the soybeans; 69 percent of the corn; 98 percent of the sugarbeets; and 97 percent of the castor beans.

Economic Impact

Continued depletion--the Ogallala does not have sufficient natural recharge by percolation to compensate for the pumpage--will have major adverse effects on the region, according to a study by Economist James E. Osborn of Texas Tech University, Lubbock. Reduction in agricultural production will have a major impact on these sectors: ginning and compressing, agricultural services, chemical, banking and credit, agricultural supplies, feedlots and meat processing. Total estimated economic activity by 2010 attributed to crops, feedlots, and meat processing will decrease 8.1 percent from 1970 as the water supply continues to decline. The negative impact will be seen in the level of incomes paid to labor force, number of jobs in the area, incomes paid to resource owners, taxes paid, increase in payments to the unemployed, and the decline in demand for goods and services.

Since most of Texas sits on top of a natural water supply, it is not possible to discuss each aquifer, except to say that large or small, studies show that most have been over-pumped.

A sudden awareness of massive depletion has brought on a cautious attitude. Texans are finally responding to the axiom "As you drink from the stream, forget not the spring."

If that had been the motto for the past century, topics like artificial recharge, importation of surface water, and improvements in efficiency of water use would have little significance. But today they are vital considerations for providing "ammunition" for the "major weapon in America's economic arsenal." These topics will be discussed in future issues of Texas Water Resources.

Depletion Threat: if, when, what then?

Coffee flows freely in the manager's office of New Deal Co-op Gin. Conversation too. And the topic is usually the not-so-freely-flowing water wells in the area.

"In 1948 I had two 10-inch wells pumping at 140 feet. Yield was around 1500 gallons a minute. Well, a 6-inch pipe will pump all they have right now, and they are set at 270 feet," remarked Clayton Enger who partially irrigates 1500 acres with 1 6 wells. " I hate to be a pessimist, but I'm afraid the water supply is getting away mighty fast. In another five or six years, we're going to run out of water. It gets weaker and weaker every summer."

"Nothing to be scared of," broke in Paul Tinsley, heavy equipment operator. "It's a certainty--just like death; it's coming for sure. During your lifetime--if you don't have a heart attack and die now--you'll see this area in dryland farming again."

Carroll Teeter, who irrigates 50 percent of his 1200 acre farm, reported it took five test holes before he found water for a new well. "Gets expensive," he added, "a dollar a foot and you have to dig from 165 to 200 feet each time." Teeter feels that 50 percent dryland farming is gearing him for the future when it might be 100 percent.

This reporter spent several days recently talking to people on the High Plains about the if, when, what then and what now aspects of the threatening depletion problem.

Farther up the Plains, farmer-stockman A. G. Flippen, Route 1, Vega, expressed doubts and fears. "Not many farmers will talk about the end of water because it scares you to think about it," he said. "I don't think people realize how serious this water situation is - except those who are pumping. Some say the wells will be exhausted in 1985; some say 2000. I say sooner. "For instance, let's say I have 500 acres and five wells. In five years those five wells will pump enough for only 200 acres; and in another five years, 100 acres. Reducing all the time. Not just my locality. All over the High Plains."

Jack Cloude, director of the High Plains Research Foundation, estimates that by present day rate of depletion "there is approximately 20 years of water" still available on the research farms, located east of Lubbock near Olton.

J. W. Buchanan, general manager of North Plains Ground Water District, admitted, "We realize we are mining and don't have any recharge."

Economy Built On Water

"We could cut pumpage back. We'd kill the economy by doing that, and we've built a tremendous economy on this water. If we cut back--say to a third--we couldn't even make a crop," he continued. "Shall we go ahead and use this resource and get the maximum benefit and seek a supplemental source to replenish, or should we start tapering off? If we don't try to maintain it where we are, we start deteriorating. It's kind of like zero population. If it's me, I'm not for it. The question is 'Who will you stop?'

"We do realize we're depleting, and we're trying to get maximum benefit. We use about one-and-a-half foot of irrigation water per acre. We're probably getting the most for our water investment.

" Four years ago we ran a study that showed we are catching 67 percent of our irrigation water. Today it's probably 90 percent. It's a matter of storage and timing, and we are doing more and more toward conservation," he explained. At one time farmers allowed water to run off the fields into ditches and playa lakes where it soon evaporated. Now it is returned to the system immediately and used again.

Optimistic that the dwindling supply will be replaced, Buchanan avowed, "We're not gonna go out of business tomorrow. Each $1 from agriculture production turns over several times in the area, and no telling how many times outside the area. If you kill the goose--no more eggs."

Frank A. Rayner, general manager of the High Plains Underground Water District in Lubbock, agrees that the water level is declining at such a rate that it will not be economically feasible to pump water for agriculture forever, but says the Ogallala Aquifer will never be totally depleted.

Faced with the uncertain availability of irrigation water, Don Workman, vice-president of First National Bank of Lubbock, says the strictly economical approach would be to reduce the use of water. "If the farmer would limit his irrigating to two waterings, that would make the water last twice as long and would reduce the crop yield by only one-third to one-fourth," he said. Workman says the critical water problem has caused some drop in land prices over the whole plains, but more severely in the south plains.

Everything But Water

"I'm not sure we're doomed when we go back to dryland farming," Workman commented, "but with adequate water we could make this area a garden. We could produce whatever the world needs. We have the soil, climate, technology, equipment and resources. It wouldn't make sense to throw these all away for lack of water."

Lubbock farmer-stockman J. Frank Gray will not feel the shock of a dried-up aquifer as strongly as his counterparts because he has a unique operation which cuts his use of the aquifer to near zero. His operation is watered with the effluent from the Lubbock sewage system. Gray remembers, however, in the '40s and early '50s most wells had 8-inch pipes, and now many pipes are only 1 1/2 to 2 inches.

To prolong the life of the aquifer, Gray sees the need for prompt application of new, efficient methods of irrigation and for widespread recharging of rainfall and playa lakes.

Efficient use, not cutting back pumpage, is the present intent. Cutting back would kill the economy, and, as Buchanan expressed it, "We don't want a treeless Appalachia."

It Happened in New Deal

The fickle nature of underground water is personal knowledge to all 800 residents of New Deal, Lubbock County. One day Last June they turned on the taps and' no water gushed out. Didn't even trickle. The town's three wells pumped 2 million gallons in April and 3 million in May, but on this rare day in June, there was nothing to pump. Pumping from a cavernous limestone formation, the municipal wells had suddenly gone dry.

The dry period was short. The city was able to tie onto a farmer's well by the third day. In three month's the city wells were pumping again. But John McNew, director of the New Deal Water Supply Corporation, says the town is taking no chances. It has purchased an emergency well to tide over until a government-supported water plan can be accomplished. With a $158,000 grant and a $170,000 loan, New Deal will dig wells on 20 acres of sand 3 1/2 miles east of town, put in a 100,000 gallon reservoir, and install an 8-inch pipeline to the 50,000 gallon reservoir in town. Cost to users will be $12 minimum for 3000 gallons. The price has been $6 for 3000 gallons.

According to McNew, this plan should insure 8 to 10 years of water. But just in case there comes another dry day in June, New Deal is joining four neighboring towns in a scheme to buy water from White River Authority.