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Puzzling Over Water Resources

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Water in Texas presents a perplexing and unsolved puzzle.

Abundant water in many areas of Texas stimulated tremendous agricultural and industrial development in the state. But the water demands brought by this development and the accompanying population growth have just about exhausted the state's reserves. In some areas of the state, demand already far surpasses the amount of fresh water the areas receive each year.

For the past 30 years; researchers associated with the Texas Water Resources Institute (TWRI) have helped Texans solve their water puzzles. They have designed ways to protect the water resources in the state and ways to use it more wisely. They have also studied methods to better distribute and allocate the state's available water and ways to alleviate some of the dangers of the floods and droughts which threaten the state almost annually.

Located on the Texas A&M University campus, the Texas Water Resources Institute identifies and assesses the state's water research needs. It then sponsors, coordinates, and administers research aimed at meeting these needs.

The Institute began as the Water Research and Information Center back in the 1950s during the state's worst recorded drought. In 1964, the agency became part of a network of 54 state water resources research institutes. Federal legislation establishing the institutes, called the Water Resources Research Act, mandated that each institute "assist in assuring the nation at all times of a supply of water sufficient in quantity and quality to meet requirements of its population."

The Texas Water Resources Institute meets this challenge in a water short state by funding research at public and private universities in the state. The Institute has provided

funding to university researchers in over 20 scientific disciplines to find better ways to use and manage the state's water resources.

The Institute cooperates on a continuing basis with scientists interested in water related research at many of the public and private universities in the state and with state and local water resources agencies. This cooperation provides a channel of communication within the state to disseminate information about ongoing research efforts and about emerging water problems.

Through the years, the Institute has supported projects at Baylor, Lamar University, North Texas State University, Rice University, Texas A&M University, Texas Tech University, University of Houston, University of Texas at Austin, University of Texas at El Paso, and University of Texas at San Antonio. In addition to research conducted on the main Texas A&M campus at College Station, TWRI has funded projects at research centers in Amarillo, Beaumont, Chillicothe-Vernon, Dallas, El Paso, Lubbock, Pecos, Stephenville, Temple, Uvalde, and Weslaco.

Institute-supported activities not only provide valuable scientific information and new technology, but also help to produce scientists and leaders who will find solutions to future water resources problems in the state. Graduate students from all over the world have received valuable training while working with university professors funded through the Institute.

The Institute encourages high ability graduate students in their water-related studies through the W. G. Mills Fellowship Program. The Shell Foundation Fellowship, also administered by the Institute, is designed to encourage outstanding students in groundwater hydrology.

Many students who have worked on Institute funded projects or who have received financial support from one of the fellowship programs now fill professional positions with water agencies or universities and play major roles in solving water problems now facing the state.

One of the Institute's major purposes is to make information about water resources available to interested Texans and to make results of research known to potential users. Through the years, the Institute has sponsored conferences on water resource problems and has sponsored various research seminars and workshops. Eighteen Water for Texas Conferences on the TAMU campus have served as platforms for Texas' leaders to discuss the most important water-related issues facing the state.

In addition to conference proceedings and special reports published and distributed by the Institute, a technical report series presents results of each research project conducted through Institute funding. The Institute staff publishes a bimonthly bulletin called Texas Water Resources on water resource issues in the state and a quarterly publication called Water Currents on water-related research conducted by the Institute and The Texas Agricultural Experiment Station.

Fitting the pieces together in the state's water resources puzzle will become increasingly important as water resources diminish and demands for them increase. Water-related research conducted by the Texas Water Resources Institute can help Texans find precise answers to their puzzles involving water use, supply, distribution, and quality. The following research projects are examples of efforts to solve problems facing the state now and in the future.

Applying irrigation water more efficiently continues as a top priority in the Institute program. A current project looks at the possibility of irrigating rice fields with sprinkler systems instead of the traditional method of flooding rice fields. Led by Garry McCauley, an agricultural engineer stationed at the Texas A&M University Research and Extension Center near Beaumont, the research has the potential of saving a great deal of water along the Texas Gulf Coast.

Another current Institute project concerns an irrigation application method called surge irrigation. Ernest Smerdon, a civil engineer at the University of Texas at Austin, has received Institute funding to evaluate the hydrodynamics and infiltration rate in connection with surge irrigation. Surge is a method of "pulsing" water down a furrow rather than flowing the water at an even rate.

More flexible allocation of reservoir storage is the research objective of TAMU civil engineer, Ralph Wurbs. Existing reservoirs have been built with specific allocations of space for conservation storage and for floodwater storage. Wurbs' research, however, takes into consideration seasonal variations of available water and regional needs for water as he studies alternatives to present procedures of reservoir storage.

Don Reddell, a professor in the TAMU Department of Agricultural Engineering, has directed several projects for the Institute on the movement of groundwater pollutants. His present project with the Institute evaluates the use of air pressure to force soil moisture stored above an aquifer down into the saturated zone of an aquifer.

These four projects indicate the diversity and complexity of water research issues in Texas today. Research projects funded by the Texas Water Resources Institute will continue to help Texans manage and protect their most valuable ---and perhaps their most vulnerable---natural resource.

In the past Texans solved their water quantity and water quality problems by drilling another well or building another dam. Solutions to water puzzles facing the state today are not as simple.

After 15 years as director of the Texas Water Resources Institute, Jack Runkles retired in October of 1983. Now a rancher in San Angelo, Runkles says he will try the water conservation practices he has preached for so many years. The Texas Agricultural Experiment Station honored Runkles at a dinner in December for his leadership in establishing national and statewide water research priorities and funding for water research. The new TWRI director is Wayne Jordan. Jordan came to College Station from

the Blacklands Research Center in Temple where he served as resident director for The Texas Agricultural Experiment Station. A plant physiologist, Jordan joined the Texas A&M University System in 1968, first in the Department of Plant Sciences and then at the Blacklands Research Center in 1975. He has authored or coauthored more than 50 articles or chapters dealing with plant-water relations, drought resistance, and efficient use of water in crop production.