Seed Grants Grow One Agronomist's Program Seeking to Extend the Life of the Ogallala Aquifer

By Brittany Davis

The Ogallala aquifer is the largest aquifer in the United States. It is critically tied to our nation's economy, as it provides irrigation water for crop production from South Dakota to Texas. Over the past few decades, the water level in the aquifer has severely declined. In the 1970s, scientists discovered that the aquifer declined 4-6 feet every year due to its use for irrigation and its extremely low recharge rate – only half an inch was being replenished annually.[1] Since then, efforts have been directed towards creating solutions to extend the life of the aquifer – which is where the Oklahoma Water Resources Center and Dr. Jason Warren come in.

The Water Center is partially funded through the United States Geological Survey (USGS) State Water Resources Research Act program. The Center uses a portion of this funding to provide financial support and opportunities for water resources researchers in Oklahoma. Each year the Water Center awards $25,000 to two to three projects as seed money to kick-start smaller projects or support a portion of larger projects. "It is amazing to watch how such small investments in research yield such significant benefits," says Dr. Kevin Wagner, Water Center director.

Dr. Jason Warren, an associate professor in Plant and Soil Sciences at Oklahoma State University, had just reached a new stage in his career when he received his first Water Research Grant through the Water Center in 2013. Up to that point, his career had revolved around soil research, oftentimes working towards preserving water resources. The grant from the Water Center allowed him to broaden his scope and reach—searching for ways to prolong the life of the Ogallala aquifer and the agricultural production that depends on it.

Dr. Jason Warren collects instrument readings in a corn field
Image by Todd Johnson

Upon receiving the grant, Dr. Warren began studying water requirements of corn and milo (grain sorghum) crops in the Oklahoma Panhandle. He took advantage of existing field equipment, as irrigation systems were already setup and needed only a small amount of money for service and maintenance. The research grant supported student research, aiding in the professional development of the student technicians involved and helping fund the education of four undergraduate students and four graduate students through research assistantship positions.

While this initial grant was important, the second and third grants Warren received were even more impactful to the research. In these subsequent projects, Warren brought on agricultural economists who analyzed crop finances. They found that the option that could extend the life of the aquifer is also the best long-term option economically. The economic component to the research is valuable to farmers as it helps them understand the financial benefits of using less water. Because these findings are applicable to growers and landowners across the Southern Great Plains, they could ultimately play a part in extending the life of the aquifer.

Warren's research starts the conversation with farmers about extending the life of the Ogallala Aquifer and provides options on how to do so. It demonstrates two options to growers: 1) grow water-intensive corn or 2) grow water-sipping milo. Either way, both options are profitable. Corn decreases the net value of the land because it requires more water, but more crop can be grown in a smaller area, so it requires less total land than milo. However, if producers collectively opted to grow milo, the life of the aquifer could be extended by 40 - 60 years.

Already, some producers have changed farming strategies based on this research. Some have begun to utilize more milo, while others are considering other water-efficient crops, such as cotton. Cotton, which was not included in this research project, requires less water and currently grosses higher revenue than either corn or milo. Future studies could use knowledge from these Center-funded projects and investigate cotton or other crops that could simultaneously sustain the aquifer and production.

Irrigated crop fields in the Oklahoma Panhandle
Image from Google Earth

Most importantly, this grant solidified Warren as a trusted source for research and Extension in the Oklahoma Panhandle. Recently, he was asked to join the Ogallala Water Coordinated Agriculture Project. This project brings together researchers from several states with their data and knowledge to collectively find mitigations against the continual depletion of the aquifer. People living over the aquifer are hopeful that solutions to the high outtake/low recharge can be found soon. Warren hopes policymakers will take his research results into account when creating strategies for groundwater usage.

"I can't say enough about this grant giving us the opportunity to be a part of the solution," Warren exclaimed. "It's a great return on a small investment." The Water Center's support helped Warren's team be more competitive for larger grants and take part in greater projects—something that would not have been possible if this seed grant had not initiated the process back in 2013.

For more information about Dr. Warren and his research, please visit http://water.okstate.edu/connect/faculty-members/warren. More information about this impactful grant may be found at http://water.okstate.edu/opportunities/funding/ok-grants.

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[1] Little, Jane Braxton. "The Ogallala Aquifer: Saving a Vital U.S. Water Source." Scientific American. March 01, 2009. Accessed November 21, 2018. https://www.scientificamerican.com/article/the-ogallala-aquifer/.