

## Recharging the Aquifer Via the Playa Lakes

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Playa lakes play an integral part in the recharge of the Ogallala Aquifer. With decreasing levels in much of the Ogallala, researchers are trying to determine how to assist in replenishing it, which will aid this region's future as well as the life of the aquifer.

Playa lakes are local depressions that occur about one per every square mile or two. The soil within the playa differs from the more sandy soil found in the surrounding watershed.

Randall clay, a grayish colored soil, covers the lake bottoms. This clay type typically shrinks when it dries and expands when wet to hold in the moisture.

Large desiccation cracks exist when the playa is dry.

"Often when the playa has been dry and when we do get a rain, the runoff initially flows down through the cracks and, if we are lucky, can recharge the Ogallala," said Ken Rainwater, a Texas Tech University professor in civil and environmental engineering and Director of the Water Resources Center. "When the playa clays swell shut, it is harder for water to seep down, but it will infiltrate, just at a slower rate."

Research is currently being conducted on several topics concerning the Ogallala

Aquifer, including playa recharge. The research started with the mapping of the changes in storage of water within the Ogallala for the High Plains of Texas, Oklahoma and New Mexico.

Director Kevin Mulligan and Associate Director Lucia Barbato and their staff at the Center for Geospatial Technology created maps to show the groundwater levels and how they have changed from 1990 to 2004.

These maps can be compared to show where the water is being used most quickly in the Ogallala. Irrigation locations are obvious.

"There are some places where people irrigate heavily and the decline in the aquifer is

significant," Rainwater said. "There are other places though that people don't irrigate because it's the wrong type of soil or the topography isn't what they need for irrigation practices. In those places, the water levels have stayed where they are and in some cases gone up a little."

The second part of the research is associated with the recharge of the aquifer through playa lakes and the impacts of the land use around the playas. The research team also includes Drs. Rick Zartman and Wayne Hudnall in the Texas Tech department of plant and soil science, Dr. Dennis Gitz from



the U.S. Department of Agriculture-Agricultural Research Service, and Dr. Loren Smith, chair of the department of zoology at Oklahoma State University. Playas, depending on their soil conditions and the adjacent land use, tend to hold water for different lengths of time. For example, those playas surrounded by rangeland have less cultivation of the soil, likely receive more runoff, and thus might hold water longer than those that are surrounded by cropland.



“When we have rainfall events that take water to the playas, they can also bring sandier sediment from the cultivated area and could help fill up the playa, possibly making the playa less deep and filling up the desiccation cracks with more permeable soil. The playas might not hold water as long,” Rainwater said.

The third type of land that surrounds a playa (besides rangeland or cropland) is land that is in the Natural Resource Conservation Service conservation reserve program (CRP) where the landowner is encouraged to grow grasses to discourage erosion.

In the study, sites are distributed in 10 counties with three playas each where researchers are trying to determine how the water is getting into and leaving the playa. Each county has a playa that is surrounded by cropland, one surrounded by CRP land, and one surrounded by rangeland. Instrumentation is used to determine the meteorological characteristics that determine the amount of local evaporation, as well as to observe and record changes in the water level in the playa. Based on a water budget

for the playa, the amount of seepage is estimated as the difference between the observed change in water volume and the amount of water evaporated from the playa water surface.

The hypothesis is that playas surrounded by cropland, because there



is looser soil and it is not vegetated all of the time, will not recharge as much as those playas left in a more natural state. If true, then farmers would be encouraged to manipulate a buffer zone around the playa to stop the sediment from going into the playa. “Water is a finite resource. It has shared value, and we need to take advantage of the tools we have to understand its rate of depletion,” Rainwater said.