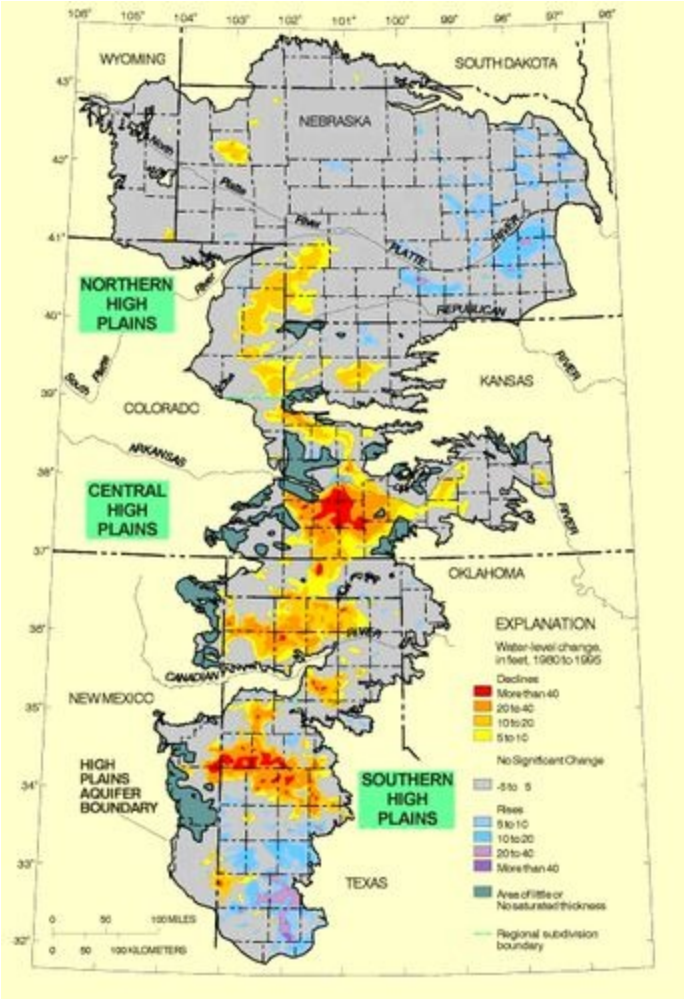
High and Dry

by Kirsten Weir



changes in the Ogallala aquifer from 1980 to 1995

High Plains residents are draining their hidden water supply.

The state of Nebraska gets its name from the Native American word for the "flat water" that flows across its plains. Today we call that water the Platte River. Turns out the state name is more fitting than those early Nebraskans imagined. The state sits atop a vast pool of underground H2O known as the High Plains *aquifer*.

An aquifer is an underground layer of rocks or soil that holds significant amounts of water. The High Plains aquifer, also called the Ogallala aquifer, is one of the largest groundwater reservoirs in the world. It lies under nearly the entire state of Nebraska, as well as parts of Colorado, Kansas, New Mexico, Oklahoma, South Dakota, Texas, and Wyoming.

For decades, residents of those states have been extracting water from the aquifer. But all that pumping has taken a big toll. Could the huge store of groundwater be tapped dry one day?

Major Pileup

The High Plains aquifer was born from the action of wind, water, and a really big crash. About 65 million years ago, two *tectonic plates* began to collide along the western edge of North America, slowly pushing the Rocky Mountains high into the sky. Tectonic plates are enormous sections of Earth's rigid shell. Even as the mountains were being pushed skyward, wind and water began *weathering* (gradually breaking down) the peaks and carrying away the *sediment* (bits of sand and rock), says James Goeke. Goeke is a *hydrologist* at the University of Nebraska in Lincoln. A hydrologist is a scientist who studies water on or below Earth's surface.

Rivers and streams carried sediment from the mountains eastward, where it slowly built up to form the High Plains in the western-central United States. In the process, water was trapped underground. That all happened between 5 million and 20 million years ago, says Goeke, and the aquifer has existed ever since.

The thickness of the High Plains aquifer varies from place to place. In some spots, it's a few feet thick. In others, it's 1,000 feet. In some areas, the aquifer is largely gravel, with a lot of room for water between the rocks. In others, the aquifer is essentially tightly packed sand that holds less water.

Since the 1940s, when pumping began, 88 trillion gallons of water have been extracted from the aquifer, estimates Virginia McGuire, a U.S. Geological Survey scientist. Enough water to equal the volume contained by 18 Colorado Rivers is sucked from the aquifer every year.

America's Breadbasket

Where does all that water go? "Over 95 percent of the water that's pumped is for irrigation," McGuire says. Nineteen percent of the country's wheat, 19 percent of its cotton, and 15 percent of its corn are grown in fields overlying the aquifer. The High Plains states make up the heart of "America's breadbasket," the Midwestern region whose grains feed millions of people. Without irrigation, the High Plains crops would wither and die.

Already, farmers are feeling the pinch of the dwindling groundwater. In parts of Texas and Kansas, water levels have dropped more than 45 meters (150 feet). Farmers in those areas have to dig more and deeper wells to extract enough water for their fields, Goeke says. "As the water levels drop, you have to pull the water from ever-greater depths," he says. "It's more expensive to irrigate." In some places, farmers have abandoned their wells altogether.

Water does make its way back into the aquifer. Rain trickles into the soil and becomes groundwater. Surface water also helps restore the aquifer. In some places, water from rivers and streams seeps through layers of rock until it, too, joins up with the groundwater. But people are taking out water much faster than nature is able to replace it. If the pumping stopped today, it would take 6,000 years of rainfall to replace the water that has been removed. Meanwhile, the pumping continues.

High Plains farmers and researchers are looking for ways to save water. Some farmers have switched from corn, a very thirsty plant, to other crops, such as wheat and sunflowers, that don't need as much water. Plant researchers are trying to create new varieties of corn that thrive in drier conditions.

New irrigation systems also can reduce water consumption. Traditional irrigation systems spray water over an entire field, but much of it evaporates before the plants can soak it up. Newer drip irrigation systems supply water directly to the plants' roots so that less water is lost to evaporation.

The situation in the High Plains isn't unique. Aquifers are a source of water for billions of people around the globe. We need to conserve them, says Goeke. "In many cases, I don't think we use water as wisely or efficiently as we might be able to," he adds. "Water is so critical to our existence. We can't afford to waste it."