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**Dust Bowl Blues: Saving and
Sharing the Ogallala Aquifer**

by

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ARTICLES

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Dust Bowl Blues: Saving and Sharing the Ogallala Aquifer**

Today, I want to talk to you about the Ogallala Aquifer in the American Great Plains. There are two things that I want you to know. First, the Ogallala Aquifer is the largest aquifer in North America and supports one-fifth of all agriculture in the United States.¹ So even if the aquifer lies outside your region, this resource affects you. Second, by almost all accounts, at current usage rates, the Ogallala Aquifer will be gone in twenty to thirty years.² We are talking about a resource with a shorter life span than Social Security.³ We must resolve to save this magnificent resource and learn to share its waters of life more equitably.

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** This speech was presented as part of the *Journal of Environmental Law & Litigation* Symposium on Water Law, held on March 5, 1999. I borrow my title from Oklahoma native, Woody Guthrie. See WOODY GUTHRIE, *Talking Dust Bowl Blues*, on DUST BOWL BALLADS (Rounder Records Corp. 1988).

¹ See Erla Zwingle, *Ogallala Aquifer: Wellspring of the High Plains*, NATIONAL GEOGRAPHIC, March 1993, at 99, 100 (noting that the Ogallala is the largest aquifer in North America); Jim Goeke, *Geologic and Hydrologic Overview of the Aquifer*, in THE GREAT PLAINS SYMPOSIUM 1997: THE OGALLALA AQUIFER—MANAGING FOR DROUGHT AND CLIMATE CHANGE 6, 6-9 (Lori L. Triplett ed., 1997) (noting deletion date) (on file with the author); JOHN OPIE, OGALLALA: WATER FOR A DRY LAND 5-6 (1993).

² See Zwingle, *supra* note 1, at 99-100.

³ Social Security funds are predicted to survive until the year 2032, as they are currently managed. See BOARD OF TRUSTEES, FEDERAL OLD AGE AND SURVIVORS INSURANCE AND DISABILITY INSURANCE TRUST FUNDS, 1998 ANNUAL REPORT 4 (1998).

I currently serve on the board of The Great Plains Foundation, which is a small grass-roots organization founded by a former student of mine a few years ago. The Foundation primarily educates people about water resources on the Great Plains. For the past five years, it has organized annual symposia on the Ogallala in which a variety of stakeholders—farmers, agency officials, tribal members, activists—come together to discuss ways to conserve this resource.

At the moment, I am also working on an academic research project involving John Steinbeck, ecology, and law. John Steinbeck, as you may know from your high school American Literature class, brought international attention to the water issues of the Great Plains in his novel, *The Grapes of Wrath*.⁴ Here is how John Steinbeck introduces the effects of the Dust Bowl drought of the 1930s on the book's opening page:

The sun flared down on the growing corn day after day until a line of brown spread along the edge of each green bayonet. The clouds appeared, and went away, and in a while they did not try any more. The weeds grew darker green to protect themselves, and they did not spread any more. The surface of the earth crusted, a thin hard crust, and as the sky became pale, so the earth became pale, pink in the red country and white in the gray country.⁵

What follows, of course, is an ecological disaster of Biblical proportions, which Steinbeck's Old Testament-style narrative foreshadows. An exodus to the California Promised Land begins. The Joads load up the truck and abandon their barren and arid land in favor of what turns out to be a flooded and hostile land. The ensuing combination of ecological and social upheaval causes untold suffering and despair.

I will return to the Joad family soon enough, but at this point, suffice it to say that with this simple description, Steinbeck lays the foundation for a theory about the role of geography in human development. Now, his theory had been simmering for awhile, bubbling up in earlier works,⁶ inspired previously by his early Stanford studies and by lively "bull sessions" with the young mythologist Joseph Campbell and the marine biologist Ed

⁴ JOHN STEINBECK, *THE GRAPES OF WRATH* (Penguin Books 1992) (1939).

⁵ *Id.* at 3.

⁶ *See, e.g.*, JOHN STEINBECK, *TO A GOD UNKNOWN* (1933).

Ricketts.⁷ What Steinbeck's writing, I think, suggests is that the tragedy of the Ogallala, and, indeed, of the entire Great Plains, is our failure to see that human progress should not and cannot divorce itself from physical geography. We must recognize geography as an unavoidable aspect of the human community, and as a necessary context for human-made laws. Our blindness to geography in our technological, social, and legal thinking creates so many of today's ecological and economic problems, including those involving the Ogallala Aquifer. Let's look, then, at the geography of the region, the historical development there, and the current reaction to aquifer depletion. Any hope of a solution involves these three issues.

Look at a United States map and you will see that the Great Plains states constitute a large and geographically unique part of the country.⁸ The Plains make up about a sixth of the contiguous United States. Unlike the more varied and wooded terrain of the coastal states, the Plains states present an apparently endless continuum of land and sky, with more sun and treelessness than white Americans could once imagine, and where, in the words of William Least Heat-Moon, the winds "blow[] steadily as if out of the lungs of the universe."⁹ Lewis and Clark came upon the Plains and thought that they were in Eden. William Clark described what is now Nebraska's Council Bluffs area as "the most butifull [sic] prospects imagionable [sic]."¹⁰ Meriwether Lewis rhapsodized about the area for *pages* in his journal.

Now, the truth is, Lewis and Clark saw a Plains that none of us will ever see. They saw the tallgrass prairies before they were destroyed, when they contained more cellulose and animal life than America's temperate forests. They saw prairie dogs, deer, and bison in numbers literally too large to count. As a transplant from the West to the Midwest I must drop this footnote:

⁷ See JACKSON J. BENSON, *THE TRUE ADVENTURES OF JOHN STEINBECK, WRITER* 223-24 (Penguin Books 1984) (1984).

⁸ The original speech was accompanied by projected maps and photographs, which, unfortunately, cannot be included here. I have adapted the text to better explain some points in the absence of visual aids.

⁹ WILLIAM LEAST HEAT-MOON, *PRAIRYERTH (A DEEP MAP)* 12 (1991).

¹⁰ STEPHEN E. AMBROSE, *UNDAUNTED COURAGE: MERIWETHER LEWIS, THOMAS JEFFERSON, AND THE OPENING OF THE AMERICAN WEST* 150 (1996).

Lewis and Clark *hated* the Pacific Northwest.¹¹ There was not a place on earth that they would have rather avoided. It was cold. It was soggy. They were sick as dogs.¹² GoreTex, of course, would eventually change all of this. But back then, it was the Great Plains that captured the ideal of natural wilderness in the European-American mind.

I should point out one more thing about the early explorations of the Plains: in the 1850s, when European Americans began to explore the area more fully, they did not consider it a plain at all. It was a "desert," or, as it was once described on maps, "The Great American Desert."¹³ While beautiful, the land was deathly dry and inhospitable. At that time no one believed anybody in his or her right mind would choose to live there permanently. Certainly the Plains Indians never did; they migrated as the seasons changed. In 1920, a member of Stephen H. Long's expedition to the region wrote, "I do not hesitate in giving the opinion, that it is almost wholly unfit for cultivation, and of course uninhabitable by a people depending upon agriculture for their subsistence."¹⁴

The truth is the area is very prone to drought. A recent study suggests that cyclical events called megadroughts occur in the Great Plains.¹⁵ In the past such massive droughts appear to have lasted twenty years or more.¹⁶ Megadroughts are thought to arrive in three to five hundred-year cycles.¹⁷ The last one occurred in the sixteenth century, for those who are counting.¹⁸ In addition to megadroughts, there are the more common regional droughts, of which the Dust Bowl of the 1930s is an example. Regional droughts commonly occur every fifty years or so.¹⁹ Evidence suggests that such droughts occurred in the 1750s, the

¹¹ See *id.* at 320-21. Ambrose writes that because of bad weather, illness, and sheer boredom, Lewis and Clark considered Fort Clatsop, Oregon "a miserable place that they couldn't wait to get out of." *Id.* at 321.

¹² See *id.*

¹³ See John C. Hudson, *The Geographer's Great Plains*, (Inaugural lecture before the Department of Geography, Kansas State University (Sept. 13, 1996) (on file with the author).

¹⁴ Zwingle, *supra* note 2, at 91.

¹⁵ See Curt Suplee, *Past Pattern Suggests a Future "Megadrought,"* WASH. POST, Dec. 21, 1998, at A3.

¹⁶ See *id.*

¹⁷ *Id.*

¹⁸ *Id.*

¹⁹ *Id.*

1820s, the 1880s, and, as noted, the 1930s. The 1980s saw a similar drought, but modern irrigation techniques mitigated the worst effects for consumers and farmers.

Lewis and Clark and other explorers of the time could not have known what we now know about the Great Plains. First, the Great Plains are neither technically nor functionally a desert. In fact, they are an oasis—an *upside-down* oasis, for what is underneath the Great Plains is the Ogallala Aquifer.²⁰ The Ogallala is, by almost any standard, gigantic.²¹ The aquifer underlies eight states, 184 counties, and 174,000 square miles.²² It holds a quadrillion gallons of water—enough to fill Lake Huron.²³ If the Ogallala were suddenly drained, “it would take 6,000 years to refill.”²⁴ “Ogallala,” incidentally, is a Sioux word which means “spread throughout,” an apt description.²⁵

Though large, the Ogallala is also relatively static—its waters move laterally only a few feet per day.²⁶ Thus, the aquifer is not, as some might imagine, an underground bathtub full of water. It is, instead, a mass of saturated sand and soil—what a journalist for *National Geographic* once described as a “titanic underground sponge.”²⁷ The Ogallala provides water for millions of beef cattle and hundreds of millions of bushels of corn and other foodstocks.²⁸ In 1980, 170,000 wells pumped eighteen million acre feet to irrigate fourteen million acres of agricultural land.²⁹ Twenty percent of irrigated agricultural land in the United States is nourished by the Ogallala Aquifer.³⁰

As geography would have it, this water is not evenly distributed. Nebraska lays claim to the lion’s share of underground water, with saturated thicknesses varying from 100 to 1,200 feet

²⁰ See Zwingle, *supra* note 1, at 83.

²¹ See Zwingle, *supra* note 1, at 83.

²² The states are: Colorado, Kansas, Nebraska, New Mexico, Oklahoma, South Dakota, Texas, and Wyoming. See OPIE, *supra* note 1, at xii. Technically, the Ogallala defines the largest aquifer of a larger network of aquifers collectively called the High Plains Aquifer. See Zwingle, *supra* note 1, at 83. Most geologists, however, use the terms “Ogallala Aquifer” and “High Plains Aquifer” interchangeably, as I do here. See Zwingle, *supra* note 1, at 83.

²³ See Zwingle, *supra* note 1, at 83.

²⁴ Zwingle, *supra* note 1, at 83.

²⁵ See Goeke, *supra* note 1, at 7.

²⁶ See OPIE, OGALLALA: WATER FOR A DRY LAND, *supra* note 1, at 3.

²⁷ Zwingle, *supra* note 1, at 83.

²⁸ Zwingle, *supra* note 1, at 83.

²⁹ See Goeke, *supra* note 1, at 6.

³⁰ See Goeke, *supra* note 1, at 6.

throughout much of the state.³¹ The western half of Kansas also lies over significant reserves, while lesser accumulations lie beneath eastern Wyoming, eastern Colorado, western Oklahoma, eastern New Mexico, and northern Texas.³² In Colorado and New Mexico, saturated thickness seldom rises above 100 feet.³³ Generally speaking, the water lies anywhere from 1,200 feet to 65,000 feet underground,³⁴ although in a few spots,³⁵ Ogallala water can be seen percolating to the surface.³⁶

In the counterintuitive physics of hydrology, a rising tide does not necessarily raise all boats. In the 1980's, above-average rainfall caused modest increases in Nebraska's underground water supplies, while at the same time those in New Mexico plummeted over 100 feet.³⁷ Not surprisingly, this unequal distribution incites interstate squabbling, as water-poor states attempt to seize greater shares from the water-rich. If we are unlucky, the point will be moot. In 1982, the *High Plains Ogallala Aquifer Region Resource Study* funded by the Department of Commerce, predicted depletion of the Ogallala by the year 2020 unless current usage patterns changed dramatically.³⁸ Today, more than fifteen years later, usage patterns have yet to change in any significant way.

Well, I told you that this was going to be a story about the separation of human beings from their natural geography. Steinbeck explored such alienation in *The Grapes of Wrath* and in many of his other writings.³⁹ He warned about separating technology from geography. In *The Grapes of Wrath*, when diesel tractors come to demolish the Oklahoman sharecroppers' homes, Steinbeck describes the machines as "snub-nosed monsters" with a goggle-eyed robot in the seat.⁴⁰ Indeed, the misuse

³¹ See David E. Kromm & Stephen E. White, *The High Plains Ogallala Region*, in *GROUNDWATER EXPLOITATION IN THE HIGH PLAINS* 7, Fig. 1.2 (David E. Kromm & Stephen E. White eds., 1992).

³² See *id.*

³³ See *id.*

³⁴ See *id.*

³⁵ Nebraska's Sand Hills region is one example.

³⁶ See Zwingle, *supra* note 1, at 88-91.

³⁷ *Ground Water Problems*, in *GROUNDWATER EXPLOITATION IN THE HIGH PLAINS*, *supra* note 32, at 44, 47.

³⁸ See Zwingle, *supra* note 1, at 99-100.

³⁹ See, e.g., JOHN STEINBECK, *AMERICA AND AMERICANS* (1966); JOHN STEINBECK, *EAST OF EDEN* (1952); JOHN STEINBECK, *TO A GOD UNKNOWN* (1933).

⁴⁰ STEINBECK, *GRAPES OF WRATH*, *supra* note 4, at 47-48.

of technology (for I am not against technology per se) is historically tied to Plains geography. As far back as the 1860s, the U.S. encouraged farmers to homestead in the inhospitable Plains region. Farmers brought with them the technology of “sod busting,” which continued through the 1970s. That method of ripping up the tallgrass prairies and ploughing the land under destroyed one-sixth of the contiguous United States. Ancient tallgrass prairies are today nearly nonexistent in the United States. A swath of American tallgrass still covers the Flint Hills in Nebraska, Kansas, and Oklahoma, but that is virtually all that remains.⁴¹ To my knowledge, no tallgrass prairie exists in any of our National Parks, which is a shame.

In addition to sod busting, midwestern farmers introduced monoculture growth techniques and Russian wheat to the region.⁴² Despite the arid landscape, farmers continued to grow vast acres of corn, which required thirty inches of rain each year, just as they had done in the damper Northeast. Such mismanagement—much of it encouraged by governmental and commercial policies—turned a cyclical drought in the 1930s into the tragedy of the Dust Bowl, one of the most dramatic examples of human and ecological suffering in our nation’s history. Things that should never have happened to the earth or to human beings—the scarring of fields, the starving of children, the bloody fighting among otherwise decent Americans—shocked the country and suggested to many that a schism existed between commercial success and all that was natural and decent in the world. Of course, the tragedy also resulted in some of the great American art of the twentieth century: *The Grapes of Wrath*, the songs of Woody Guthrie, and the photo-journalism of Dorothea Lange. Ironically, however, the Dust Bowl Blues further alienated us from geography. It led us to mine the fields for water.

It is hard to overestimate what irrigation did to the Great Plains region. Irrigation made it possible to grow crops once again. Dry farming did and does exist in the Plains, but irrigation propels today’s miraculous agricultural production. In the 1950s Americans started drilling for water in Texas; in the 1950s and

⁴¹ See HEAT-MOON, *supra* note 9, at 12.

⁴² See John Opie, *Does Its History Doom the Plains to Failure? Putting Chaos Theory to Work*, in THE GREAT PLAINS SYMPOSIUM 1996: THE OGALLALA AQUIFER—SHARING THE KNOWLEDGE 5, 5 (Cathy Bruce & Lori Triplett eds., 1996) (on file with the author).

60s Kansas followed; in the 1970s, Nebraska. Through hard work and ingenious plumbing, midwesterners managed to create a virtually "climate free" agricultural system—a system divorced from the geography it occupies.

The Ogallala Aquifer, unlike many other aquifers, is essentially a separate geological structure. While the aquifer draws from surface runoff in areas called "recharge zones," to a large extent the Ogallala exists in isolation from the soil that lies above.⁴³ Pump-based irrigation thus joined two worlds—one above and one below—that had never interacted on any widely perceptible scale. The result was a farm-friendly climate virtually independent of nature. This was not quite Steinbeck's Eden, as some in the 1940s realized. One newspaper in 1947 went so far as to characterize the pumping of the Ogallala as "soil murder and financial suicide."⁴⁴ But it was to be a long suicide—more like smoking cigarettes than holding a gun to your head.

Nonetheless, the manipulation of nature in the Great Plains proves enormously seductive. Because of irrigation and other farming technologies, our stunning agricultural production requires the work of only two percent of the population.⁴⁵ Three hundred thousand people in the United States account for eighty percent of agricultural production. Half of those people are on the Plains. One farmer in the Great Plains is responsible for feeding *eight dozen* people. This is a technological achievement that cannot be discounted.

The problem is that this level of production is not ecologically sustainable, nor is it good for the human community. Because of the centralized nature of today's agriculture, the family farm is almost an anachronism. Half of family farms rely on outside jobs from other family members and this trend is on the rise.⁴⁶ Furthermore, the scarcity of water resources drives a wedge between well meaning citizens. Environmentalists will not talk to industrialists, who will not talk to irrigators, who will not talk to agency officials, because none agree on what they want. Envi-

⁴³ This is not to say that *no* relationship exists between the Ogallala and the natural ecosystems above. Groundwater feeds important rivers and wetlands on the High Plains that provide habitat to migratory birds, including the sandhill crane. See Zwingle, *supra* note 1, at 105-08.

⁴⁴ See Opie, *Does Its History Doom the Plains to Failure? Putting Chaos Theory to Work*, *supra* note 42, at 9-10.

⁴⁵ See *id.* at 13.

⁴⁶ See *id.*

ronmentalists want clean water, industrialists want cool water, irrigators want lots of water, recreationists want wild water, agency officials want water they can quantify. Yet all of these people must be brought to the table and convinced that talking and conserving is better than watching the well run dry.

Ninety percent of the Ogallala Aquifer is now used for farming.⁴⁷ But despite this geographic fact, the law pays relatively little attention to groundwater. No federal legislation regulates the Ogallala Aquifer. The Clean Water Act has been interpreted to exempt ground water almost entirely.⁴⁸ The House of Representatives just recently appointed an Ogallala Study Group,⁴⁹ and I hope that something productive will come of that. There is even less attention given to the fact that this tremendous resource is *shared* by eight states. There are no regional interstate compacts involving the Ogallala. And while there is little precedent for an interstate compact among so many states, this may yet be the most promising option.

The problem, of course, is that the states all have different interests and their independent legal systems encourage officials to pretend as if the Ogallala were bounded by their state borders. Texas water law, for instance, is still based on the theory of “capture,”⁵⁰ or what some call the “use it or lose it” rule. Thus, water molecules are like foxes running underneath the land⁵¹—although these “foxes” move at less than a few feet a day. The system encourages immediate consumption, lest someone else appropriate the resource first. In contrast, Nebraska water law is much more bureaucratic and is controlled by powerful water districts.⁵²

Similarly, the overlying states have different approaches to the Ogallala’s expected depletion. New Mexico follows an “unlimited use” consumption strategy “to support full economic devel-

⁴⁷ Zwingle, *supra* note 1, at 105.

⁴⁸ See *Kelley ex rel Michigan v. United States*, 618 F. Supp. 1103 (W.D. Mich. 1985); *United States v. GAF Corp.*, 389 F. Supp. 1379 (S.D. Tex. 1975).

⁴⁹ See Lori L. Triplett, *The Ogallala Aquifers: Living in the Present, Planning for the Future*, in THE GREAT PLAINS SYMPOSIUM 1999: THE OGALLALA AQUIFER-STEPS TO SUSTAINABILITY 13, 14 (Lori L. Triplett ed., 1999) (on file with the author).

⁵⁰ Lloyd V. Urban, *Texas High Plains*, in GROUNDWATER EXPLOITATION IN THE HIGH PLAINS, *supra* note 31, at 204, 213-14.

⁵¹ See *Pierson v. Post*, 3 Cai. Cas. 175 (N.Y. Sup. Ct. 1805) (applying the law of capture to a fox hunt).

⁵² *Id.*

opment."⁵³ Oklahoma has decided upon "planned depletion in fifty years"⁵⁴—if it lasts fifty years. Kansas adheres to a policy of "zero depletion," a system by which consumption would gradually be reduced to match the aquifer's natural recharge rate.⁵⁵

At the Great Plains Foundation, we are pushing for some kind of planned sustainability. The recharge rate is very slow; varying from fractions of an inch in some places to five inches per year.⁵⁶ The water being sucked out of the ground today has, in most cases been there for over a thousand years. We need a system that can bring people together to look beyond state borders and to see geography as a system that is part of who we are and what we do. The possibility of depletion is frightening, but not yet inevitable. We have not yet been flattened by the snub-nosed tractor of technology.

Which brings us back to John Steinbeck. I close with a powerful scene from *The Grapes of Wrath*, where members of a tenant family watch in bewilderment as a bug-like man on a tractor comes to raze their house. The family members are ragged and starving, but they have decided to stand up to that tractor. The father has a rifle out, you see. He is ready to kill. Here is what the driver of the tractor says to him:

'[L]ook—suppose you kill me? They'll just hang you, but long before you're hung there'll be another guy on the tractor, and he'll bump the house down. You're not killing the right guy.'

'That's so,' the tenant said. 'Who gave you orders? I'll go after him. He's the one to kill.'

'You're wrong. He got his orders from the bank. The bank told him, Clear those people out or it's your job.'

'Well, there's a president of the bank. There's a board of directors. I'll fill up the magazine of the rifle and go into the bank.'

The driver said, 'A Fellow was telling me the bank gets orders from the East. The orders were, Make the land show profit or we'll close you up.'

'But where does it stop? Who can we shoot? I don't aim to starve to death before I kill the man that's starving me.'

'I don't know. Maybe there's nobody to shoot. Maybe the thing isn't men at all. Maybe, like you said, the property's doing it. Anyway I told you my orders.'

⁵³ See Triplett, *supra* note 49, at 14.

⁵⁴ *Id.*

⁵⁵ *Id.*

⁵⁶ See Goeke, *supra* note 1, at 7.

'I got to figure,' the tenant said. 'We all got to figure. There's some way to stop this. It's not like lightning or earthquakes. We've got a bad thing made by men, and by God that's something we can change.' The tenant sat in his doorway, and the driver thundered his engine and started off, tracks falling and curving, harrows combing, and the phalli of the seeder slipping into the ground. Across the dooryard the tractor cut, and the hard, foot-beaten ground was seeded field, and the tractor cut through again; the uncut space was ten feet wide. And back he came. The iron guard bit into the house-corner, crumbled the wall, and wrenched the little house from its foundation so that it fell sideways, crushed like a bug. And the driver was goggled and a rubber mask covered his nose and mouth. The tractor cut a straight line on, and the air and the ground vibrated with its thunder. The tenant man stared after it, his rifle in his hand. His wife was beside him, and the quiet children behind. And all of them stared after the tractor.⁵⁷

Here is the challenge I offer you today: do more than stare after the tractors that threaten our habitat. Stare them *down*. Thank you.

⁵⁷ STEINBECK, *GRAPES OF WRATH*, *supra* note 4, at 47-48.