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BOOM AND BUST ON THE GREAT PLAINS: DÉJÀ VU ALL OVER AGAIN

SANDRA ZELLMER†

INTRODUCTION

Two books published in 2006 provide a compelling portrait of the “boom and bust” cycles that have plagued the Great Plains since European settlement. The Worst Hard Time: The Untold Story of Those Who Survived the Great American Dust Bowl and Ogallala Blue: Water and Life on the High Plains stand beside Mark Reisner’s classic study of western water resources, Cadillac Desert, and Wallace Stegner’s tribute to one of America’s greatest conservationists, Crossing the Next Meridian: John Wesley Powell and the Second Opening of the West, as “must read” books for anyone who cares about the future of the American West, particularly the Great Plains.

New York Times reporter Timothy Egan gives voice to the survivors of the Dust Bowl in The Worst Hard Time: The Untold Story of Those Who Survived the Great American Dust Bowl. Egan covers the region most affected by the Dust Bowl, from the Texas and Oklahoma panhandles to southeast Colorado, Kansas, and Nebraska. His retrospective, constructed from interviews, journals, and newspaper accounts, depicts how drought, together with improvident agricultural and settlement policies and the Great Depression, combined to impose “the nation’s worst prolonged environmental disaster.”

† Professor of Law and Co-Director of the Water Resources Research Initiative, University of Nebraska. I am thankful to Professors Sheri Fritz and Anthony Schutz for their comments on this article. The quip, “It’s like Déjà vu all over again,” is attributed to Lawrence (Yogi) Berra, a New York Yankee known as well for his malapropisms as for his induction to the Baseball Hall of Fame. See The Hall of Famers, National Baseball Hall of Fame & Museum, http://www.baseballhalloffame.org/hofers/detail.jsp?playerId=110925 (last visited Dec. 24, 2007).

5. EGAN, supra note 1.
6. Id. at 10.
Meanwhile, in Ogallala Blue, William Ashworth, an environmental historian, provides a collection of contemporary case studies set in various places throughout the Great Plains region. Through his vivid portrayals of local landscapes and the individuals that populate them, Ashworth captures the deep-rooted sense of place of Great Plains communities. Their stories are deftly interwoven against a backdrop of geologic time and scale, situated (precariously, in some cases) above the vast Ogallala (High Plains) Aquifer. He demonstrates the importance of “this bounty of buried water” to residents as well as the nation at large. The fourteen million acres of crops overlying the aquifer comprise over one-fifth of the total annual harvest in the United States, and the vast majority of those crops rely on groundwater for irrigation. Ashworth explores the billion dollar question—what will happen to the crops and the people who rely on them when the Ogallala Aquifer goes dry, as portions of it are likely to do within our lifetimes.

This Article reviews The Worst Hard Time and Ogallala Blue, situating their stories within the context of American law governing western settlement, agriculture, and soil and water management. In the wake of the Dust Bowl, federal, state, and local laws evolved and began to require more sustainable farming practices to control soil erosion. This evolution, and the events that fostered it, are described in Part I, below. Part II considers the post-World War II reliance on groundwater pumping to irrigate crops in the Great Plains region, as described in Ogallala Blue, and the law’s tepid response to overdraft and its adverse effects. Finally, in Part III, the Article turns to the latest economic boom—ethanol production—and assesses its implications for the Great Plains and its human and natural communities. The Article concludes that the recently adopted federal Energy Bill, which requires increased reliance on biofuels, particularly corn-based ethanol, raises the specter of another “boom and bust” for Great Plains soil and water resources—déjà vu all over again.

I. BOOM AND BUST I: CONQUERING LAND, CONQUERING PEOPLE

No one need be in doubt about the sharp change in climate that occurs somewhere between the 96th and 100th meridians. It can be felt on the lips and skin, observed in the characteristic plant and animal life, seen in the clarity and/or dustiness of the atmosphere, determined by measurements of

7. Ashworth, supra note 2.
8. Id. at 10.
9. Id.
rainfall and evaporation, tested by attempts at unaided agriculture. Practically every western traveler in the early years remarked the facts of aridity. In 1803, President Thomas Jefferson sent Meriwether Lewis and William Clark on an expedition along the Missouri River in hopes of discovering an all-water route to the Pacific Northwest to secure the nation’s Manifest Destiny—“an integrated nation that stretched from sea to sea.” Lewis and Clark found an immense “storehouse of biodiversity” as they traveled through the northern Great Plains. Far from discovering “a great waste, a wilderness unpeopled with any beings except wolves and wandering Indians,” as skeptics had predicted, the expedition encountered numerous American Indian tribes, some of which provided them with guidance, food, and shelter, and hundreds of new species of plants and animals. On the return trip in 1804, members of the expedition marveled at the vast grasslands of the Great Plains, especially the expanses of twelve foot high bluestem, “well calculated for the sweetest and most nourishing hay.”

Despite its endemic biological and cultural diversity, early maps labeled the Great Plains region “The Great American Desert,” and subsequent explorers continued to call it “a desolate waste of uninhabited solitude... wholly uninhabitable by a people depending on agriculture for their subsistence.” Yet it was a region uniquely suited to its occupants. Bison and antelope grazed on native prairie grasses that were well adapted to climatic extremes, such as drought, wind, fire, and freezing weather. “As long as the weave of grass was stitched to the land, the prairie would flourish in dry years and wet. The grass could look brown and dead, but beneath the surface, the roots held the soil in place; it was alive and dormant.”

The nation’s dreams of Manifest Destiny, however, called “for the consumption of land and resources on an unprecedented scale” and

16. Id. at 22.
17. STEGNER, supra note 10, at 399.
18. EGAN, supra note 15, at 112.
motivated the United States’ policies of wildlife eradication and Indian removal. 19 Although American Indian tribes were the “undisputed possessors of the soil, from time immemorial,” 20 the “conquest” and appropriation of tribal lands during the nineteenth century was deemed necessary to clear the way for western settlement. 21 By the late 1800s, the U.S. government had virtually eradicated both the buffalo and the Indians that had relied on the buffalo for nearly all of their subsistence needs. 22

Meanwhile, an early U.S. Geological Survey report proclaimed, “The High Plains continues to be the most alluring body of unoccupied land in the United States, and will remain such until the best means of their utilization have been worked out . . . .” 23 Indian removal was only one part of the plan. Settlers—farmers, in particular—were necessary to fully utilize the land. A primary means of promoting utilization was the passage of the Homestead Act of 1862, which authorized settlers to take up residence on 160-acre parcels and, with evidence of occupation and cultivation, receive a patent (title) to the land from the U.S. government. 24

Many homesteaders were driven off the Plains by harsh winters and by recurring droughts in the 1870s and 1890s. 25 In the early 1900s, settlers returned to the area with their dreams and their plows,
encouraged by boosters of dryland farming. Hardy Campbell, author of Campbell’s 1907 Soil Culture Manual, fueled those dreams by arguing that “rain follows the plow.” He was not alone in claiming that the commotion of plowing, along with the use of steam engines by farmers and railroads, would perturb the atmosphere and bring rain. Along with Horace Greeley’s “Go West, Young Man,” Campbell’s slogan induced easterners and European immigrants to move to the Great Plains to attempt to make a living by farming. The railroads provided further enticements with cheap tickets, excursions, and festivities that created the illusion of abundant water resources in various western towns.

The Homestead Act and the boosters were quite successful in stimulating western migration. In The Worst Hard Times, Egan introduces Texas homesteader Bam White, who, like Wallace Stegner’s fictional Bo Mason, hoped to find his “big rock candy mountain” in the American West. Bam viewed his homestead as “the last best chance to do something right, to get a small piece of the world and make it work.” After World War I, it appeared that Bam and other...
steaders had grounds for optimism. Wheat prices were high and rain was relatively plentiful, and settlers were motivated to plow and plant as much as possible.\footnote{Id. at 42-43.} The federal government encouraged them by urging them to break historic records for total crop yields, and they did.\footnote{Id. at 43.}

Across the nation, the feverish "Roaring Twenties," buoyed by the post-war economic boom, took hold. Rural and urban Americans alike spent unprecedented amounts of cash and credit to purchase automobiles and appliances, and more people than ever before engaged in speculation on the stock market.\footnote{PBS, People & Events, The Great Depression, http://www.pbs.org/wgbh/amex/dustbowl/peopleevents/pandeAMEX05.html (last visited Dec. 28, 2007) [hereinafter PBS, People & Events].} Unfortunately, the spending frenzy was based on false premises. "Although businesses had made huge gains—65 percent—from the mechanization of manufacturing, the average worker’s wages had only increased 8 percent."\footnote{Id.} With increased production came a glut on the global wheat market. Prices plummeted.\footnote{Id.} Then the stock market crashed on Black Tuesday, October 29, 1929.\footnote{Id.} Businesses closed, banks went under, and more than fifteen million Americans, representing one-quarter of the workforce, were unemployed.\footnote{Id.} The nation slid into the Great Depression, "the worst economic collapse in the history of the modern industrial world."\footnote{Id.}

Drought came to the Great Plains on the heels of Black Tuesday and persisted until the fall of 1939. Instead of rain, settlers experienced a new kind of weather—a black duster.\footnote{Alice Talmadge, Dust, Drought and Despair, \textit{Forest Mag.}, Winter 2008, available at http://www.fseee.org/forestmag/1001pulp.shtml. "The price for a bushel of wheat dropped to seventy-five cents [in 1929], down from the $2.25 per bushel farmers were bringing in just a few years earlier. The next year saw a bumper harvest, but by then a bushel of wheat was pulling in between twenty-four and thirty cents—one-tenth of what it netted in 1921." \textit{Id.}} The land itself became "an active, malevolent force."\footnote{Id. at 122.} The dusters, formed of loose, dry top soil picked up by incessant winds, caused a deadly respiratory disease in livestock as well as children and the elderly, much like the black or brown lung experienced by miners and textile workers.\footnote{Id. at 173.} Children died of dust inhalation despite the best efforts of their par-
ents, who covered cribs and sealed cracks around doors and windows with wet sheets.\textsuperscript{44}

All told, over one hundred million acres of cropland lost all or most of its topsoil.\textsuperscript{45} The blowing grit scoured paint off buildings and buried anything that stood still—houses, vehicles, trees, fences, and even slow-moving livestock. Static electricity generated by the friction of swirling dust particles represented another hazard. To avoid getting shocked, people drug chains from the axles of their cars during dust storms.\textsuperscript{46}

Reader's Digest magazine published a letter from an Oklahoma woman, describing what her life was like during the month of June, 1935.

In the dust-covered desolation of our No Man's Land here, wearing our shade hats, with handkerchiefs tied over our faces and vaseline in our nostrils, we have been trying to rescue our home from the wind-blown dust which penetrates wherever air can go. It is almost a hopeless task, for there is rarely a day when at some time the dust clouds do not roll over. 'Visibility' approaches zero and everything is covered again with a silt-like deposit which may vary in depth from a film to actual ripples on the kitchen floor.\textsuperscript{47}

Egan, for his part, provides excerpts from diaries of Don Hartwell, a homesteader in Inavale, Nebraska, near the Kansas-Nebraska border. Hartwell began writing on New Years Day, 1936, and kept at it through the entire decade, chronicling a time "when homesteads became graveyards."\textsuperscript{48} Hartwell's wife moved to Denver to work as a maid, but Hartwell himself stayed until the bitter end, even though the bank took his land and he was forced to sell equipment and family heirlooms to survive.\textsuperscript{49}

Mrs. Hartwell was one of many Plains residents who left the region, but the "dusters" and "Okies" were not always welcome in their

\begin{itemize}
\item \textsuperscript{44} Id. at 171, 193. One of the most heart-wrenching stories in Egan's book is that of Hazel Shaw, a homesteader near Boise City, Oklahoma. Initially filled with dreams of life on the prairie, Hazel's optimism died when she lost both her mother and her baby daughter within hours of each other. \textit{See id.} at 120, 193-97.
\item \textsuperscript{45} PBS, Timeline of the Dust Bowl, http://www.pbs.org/wgbh/amex/dustbowl/timeline/ (last visited Apr. 30, 2007) [hereinafter PBS, Timeline]. For additional details, \textit{see DONALD WORSTER, DUST BOWL: THE SOUTHERN PLAINS IN THE 1930's (1979).}
\item \textsuperscript{46} EGAN, supra note 15, at 197.
\item \textsuperscript{47} PBS, Dust Bowl People and Events, The Drought, http://www.pbs.org/wgbh/amex/dustbowl/peopleevents/pandeAMEX06.html (last visited Dec. 28, 2007) [hereinafter PBS, The Drought].
\item \textsuperscript{48} EGAN, supra note 15, at 242-43. After his death, Hartwell's wife attempted to burn the diary, but it was saved and is now kept at the Nebraska State Historical Society. \textit{See id.} at 312.
\item \textsuperscript{49} Id. at 296, 299, 301. Hartwell's entry for July 10, 1939, proclaims, "In Nebraska, you don't have to die to go to hell." \textit{Id.} at 300.
\end{itemize}
new homes. In California, which was desirable both for its fertile fields and for its higher standard of social services, Dust Bowl refugees were met with outright hostility. They were considered a "moral pestilence"—"shiftless trash who live like hogs" and steal jobs from native residents. Although the privileges and immunities and equal protection clauses of the U.S. Constitution provide a right to interstate travel, the parameters of this right were ill-formed and enforcement during this time period was virtually non-existent. People like Mrs. Hartwell had a lasting impact on constitutional law, however, as subsequent cases upholding a substantive right to travel from both public and private interference were founded on *Edwards v. California*, a case involving Dust Bowl migrants. Egan’s colorful language and heart-wrenching stories are an indispensable complement to the stunning photographs of Dorothea Lange, depicting despair-filled faces of displaced Okies and disheartened Dusters in dusted-over homesteads and towns. Like Egan’s stories, Lange’s work and that of other artists commissioned by the Works Progress Administration and the U.S. Department of Agriculture provide an enduring testament to the hardships of Depression Era life.

Desperate to keep their residents and their livelihoods, officials in Great Plains towns like Dalhart, Texas, enlisted rainmakers to shoot TNT into the sky in hopes of bringing moisture. The pyrotechnics sold nothing but empty promises. Like Don Hartwell, thousands of...
homesteaders lost their life savings, their homes, and their farms. For
the Bam White family down in Dalhart, a homestead turned out to be
"a place where dreams took flight on the last snort of a dying horse." gx

Throughout the Great Plains, local efforts at cloud-seeding and
other measures proved to be either ineffective or simply inadequate to
the task of maintaining life on the prairie. On the federal front,
Franklin D. Roosevelt's New Deal Administration was underway, and
it was not long before it turned its New Deal strategies of putting peo-
ple back to work to natural resources management. f One of the New
Deal's first conservation programs took aim at soil erosion caused by
overgrazing on the public lands. f

As early as 1878, John Wesley Powell had argued that, given the
arid western climate and rough topography, ordinary farming and
ranching practices would not work, and he sought federal laws for
"the organization of pasturage districts." Yet his pleas went un-
heard and the number of cattle grazing on the public lands grew expo-
nentially over the next few decades. f

Some thirty years later, President Theodore Roosevelt, himself a
cattle rancher, renewed Powell's recommendations and urged Con-
gress to impose federal control on the public lands of the West. But
it took the Dust Bowl to overcome ranchers' vigorous opposition to fed-

eral control of the public domain. The top soils of the Great Plains blew eastward to Washington, D.C., literally drifting down around the Capitol as congressional members debated the merits of federal grazing legislation. "The devastating storms of the Dust Bowl were... "the most tragic, the most impressive lobbyist, that has ever come to this Capitol." The Taylor Grazing Act of 1934 established grazing districts for millions of acres of public land and placed them under regulation by a new Grazing Service, which has since been folded into the Bureau of Land Management. Permits and minimal grazing fees are still required today, but remarkably few constraints are imposed on abusive grazing practices that cause soil erosion and water pollution.

Attempts to reform cropping practices soon followed, although Congress was even more reluctant to meddle in the affairs of individual landowners than it had been to address ranchers on the public lands. Hugh Bennett, a farm boy from North Carolina who studied soil complexities in college and on his travels abroad, became the national champion of soil conservation. He understood that "the soil of their farm was not simply a medium through which passed a fibrous commodity but also a living thing." He followed the teachings of Aldo Leopold, who published an essay in 1933 that sought treatment of the land and its community of life as an integrated whole.

In contrast to the optimistic claims of Hardy Campbell and Horace Greeley, Bennett recognized that dryland farming on the Plains

66. See Zellmer, supra note 61, at 1026-27, 1036 (describing ranchers' resistance as played out in Supreme Court cases United States v. Grimaud, 220 U.S. 506, 517 (1911) and United States v. Light, 220 U.S. 523 (1911)).
68. Pub. Lands Council, 529 U.S. at 733 (citing 79 Cong. Rec. 6013 (1935)).
73. Id. at 134, 270 (citing Aldo Leopold, The Conservation Ethic, 31 J. OF FORESTRY 635 (1935)). Leopold developed this idea in Aldo Leopold, A SAND COUNTY ALMANAC (1949). He wrote that a "land ethic... reflects the existence of an ecological conscience, and this in turn reflects a conviction of individual responsibility for the health of the land." Id. at 221. More specifically, "A thing is right when it tends to preserve the integrity, stability, and beauty of the biotic community. It is wrong when it tends otherwise." Id. at 224-25.
was, at best, an “imperfect response” to aridity, and that intensive
plowing and planting had “hastened homestead failure” through lost
topsoil and the spread of invasive species.74 As a Pawnee Indian ob-
served while gazing over newly plowed fields, the land was “wrong
side up.”75

Bennett advocated federal and local policies that encouraged sus-
tainable soil management practices. Employing “one part science and
one part showboat,” Bennett convinced Congress to create the U.S.
Soil Conservation Service (“SCS”) within the U.S. Department of Agri-
culture.76 He was assisted by another impeccably timed dust storm in
the spring of 1935, when tons of dust from the southern plains swept
through the Midwest to Washington, D.C.77 The dust eclipsed the sun
and turned the air a dark copper color, just as a Senate committee was
considering the proposed legislation.78 Congress promptly declared
soil erosion “a national menace.”79 For Bennett’s troubles, he became
the first director of the SCS.80

The SCS and related soil conservation programs were initiated in
an attempt to rehabilitate the Dust Bowl by changing the basic farm-
ing methods of the region. Conservation measures included seeding
areas with grass, planting shelter belts of trees to break the wind, ro-
tating crops, and using contour plowing. At first, farmers were defen-
sive of outsiders who criticized their methods, but their resistance
faded when they were paid to put the new farming techniques into
practice.81

Within a year, the new SCS was operating twenty-three ex-
periment stations, working with 454 Civilian Conservation
Corps camps, and conducting 147 demonstration projects us-
ing Works Progress Administration relief workers. The SCS’s
main efforts involved technical assistance to farmers who vol-
untarily sought to protect their land. SCS employees urged

74. EGAN, supra note 15, at 268; Gary D. Libecap & Zeynep Kocabiyik Hansen,
"Rain Follows The Plow" and Dryfarming Doctrine: The Climate Information Problem
and Homestead Failure in the Upper Great Plains, 1890–1925, 62 J. ECON. HIST. 86
(2002).
75. WILKINSON, supra note 71, at 93.
76. EGAN, supra note 15, at 225. The Soil Conservation Service was renamed the
Natural Resources Conservation Service (“NRCS”) in 1994. See NATURAL RESOURCES
CONSERVATION SERVICE (NRCS), U.S. DEPARTMENT OF AGRICULTURE, PRODUCTIVE
LANDS, HEALTHY ENVIRONMENT: NRCS STRATEGIC PLAN 2005-2010, 3 (2005), http://
78. Id. at 228.
amended at 16 U.S.C. §§ 590a–590q-3 (2000)). Congress adopted this phrase from
80. EGAN, supra note 15, at 134.
81. PBS, The Drought, supra note 47.
farmers to adopt... new management practices for land stewardship. Over the next seventy years, the SCS became an established and respected force for land stewardship in rural America.\textsuperscript{82}

A 2004 study on soil conservation is a testimony to Bennett's pioneering efforts: "Getting farmers to enter contracts with a soil conservation district and manage the land as a single ecological unit" helped prevent the land from blowing away again in subsequent droughts.\textsuperscript{83}

Additional conservation programs have since been adopted. According to the last two farm censuses, around thirty-two million acres (seven percent of total cropland) are enrolled under the various federal farm conservation programs.\textsuperscript{84} Two key programs to prevent soil erosion are the Conservation Reserve Program ("CRP") and Sodbuster.\textsuperscript{85} CRP is a voluntary program that helps farmers, ranchers, and landowners plant resource-conserving vegetative ground cover in exchange for rental payments, cost-share, and technical assistance.\textsuperscript{86} Sodbuster strips farmers of their eligibility for some subsidies if they put highly erodible lands into production without a conservation plan.\textsuperscript{87} NRCS (formerly the SCS) provides eligibility determinations, conservation planning, and implementation services.\textsuperscript{88}

Commendable as they are, many of these conservation programs have fallen short, in part because they have been historically under-


\textsuperscript{83} Egan, supra note 15, at 311 (citing Zeynep K. Hansen & Gary D. Libecap, Small Farms, Externalities, and the Dust Bowl of the 1930s, 112 J. OF POLITICAL ECON. (2004)).


\textsuperscript{86} 16 U.S.C.A. §§ 3831-3835 (West 2007).

\textsuperscript{87} 7 C.F.R. § 12.4 (2000). The current version of the Sodbuster program only covers highly erodible land (that which is eight times higher than considered "sustainable"), and only strips the non-complying farmer of eligibility during the production year. 30 U.S.C. § 3811 (2000). Meanwhile, it allows the non-complying farmer to maintain federally subsidized crop insurance to protect against hail damage and other production risks. As a result, when crop prices are high, Sodbuster's disincentives for planting on erodible soils are quite low. See J.B. Ruhl, Farms, Their Environmental Harms, and Environmental Law, 27 ECO. L.Q. 283, 327 (2000) (stating that, due to a "litany of exemptions from ineligibility and a lackluster enforcement record, ... [Sodbuster and similar] programs no doubt have accomplished less than they could have even given their inherent limits").

\textsuperscript{88} Natural Resources Conservation Service (NRCS), Conservation Reserve Program, http://www.nrcs.usda.gov/programs/crp/ (last visited Dec. 31, 2007).}
funded. Appropriations have lagged behind demand and seem to be dwindling as a percentage of overall agricultural spending. During 1996 and 1997, of the total aid monies given out to farmers, twenty-six percent was conservation spending, but this figure fell to only six percent in 2000.89 By 2005, the U.S. Department of Agriculture was spending less than five percent of its total budget to help farmers and ranchers with their conservation efforts.90 The proposed 2007 Farm Bill would continue existing conservation programs and extend the scope of certain wetlands provisions to include riparian areas, but overall funding for conservation programs is still insufficient.91 Meanwhile, despite these programs, a significant rise in crop prices as a result of the recent ethanol boom makes it financially attractive to use targeted lands for production, despite conservation incentives.92

II. BOOM AND BUST II: GROUNDWATER EXPLOITATION

The High Plains . . . [is a] a stubborn and confusing place.93

In Ogallala Blue, Ashworth picks up the story where Egan leaves off, with the rapid expansion of groundwater pumping in the 1950s. In doing so, he follows in the footsteps of others who have written about the Ogallala (High Plains) Aquifer, but, like Egan, he breaks free of the academic mold by telling stories of affected people and landscapes.94 His stories are not quite as dramatic, perhaps because the disastrous effects of groundwater depletion have yet to occur in most

89. Zellmer, et al, McElligot's Pool, supra note 85, at 496.
92. See infra notes 178-225 and accompanying text (describing incentives to produce corn as a biofuel).
94. See, e.g., id; Morton W. Bittinger & Elizabeth B. Green, You Never Miss the Water Till . . . (The Ogallala Story) (1980); Donald E. Green, Land of Underground Rain: Irrigation on the Texas High Plains, 1919-1970 (1973); see also Ian Frazier, The Great Plains 134, 199 (1989) (providing a travelogue of the Great Plains, including descriptions of farming and Ogallala Aquifer depletion). The most recent of these, by John Opie, first published in 1993, is especially notable as both a scholarly environmental history and a kind of "moral geography" of the region. Opie, supra note 93. Opie provides a compelling argument that society should recognize an obligation for water conservation, balanced with an ongoing duty to keep family farmers intact. For a review, see John B. Wright, Ogallala: Water for a Dry Land, 85 ANNALS AM. GEOGRAPHERS 378 (1995) (book review).
of the region, though in some areas of the Great Plains, intensive agricultural usage has caused significant draw-downs and irrigation has become cost prohibitive.\textsuperscript{95}

A. THE USE AND MANAGEMENT OF THE OGALLALA AQUIFER

The Ogallala Aquifer is an immense reservoir of groundwater underlying eighty percent of the High Plains, collected within loose, unconsolidated layers of clay, silt, sand, and sedimentary rock.\textsuperscript{96} It was formed about six million years ago when rivers and streams cut channels from the Rocky Mountains in an easterly direction, and erosion slowly filled the ancient channels with sediment. The entire aquifer is referred to as the Ogallala,\textsuperscript{97} but it includes both older materials, known as Arikaree and Brule Formations, which are found primarily in the North, and younger materials deposited on top of or adjacent to it, including the Nebraska Sand Hills.\textsuperscript{98} The aquifer ranges from zero to over one thousand feet thick, with an average thickness of about two hundred feet, and an average depth from the land’s surface of about one hundred feet.\textsuperscript{99} Recharge is minimal, about an inch of water a year, coming primarily from rain and snowmelt but also from stream seepage.\textsuperscript{100} The lack of recharge means that the Ogallala is virtually non-renewable.

In spite of the New Deal reforms and, in some cases, because of them, farming continued to expand onto sub-marginal lands, motivated in part by the pressures of debt incurred to keep up with ever-increasing mechanization and the post-World War II mentality of “keeping up with the Joneses.”\textsuperscript{101} The availability of cheap electricity through the Rural Electrification Association and more powerful centrifugal pumps, along with center pivot irrigation systems, played

\begin{itemize}
  \item \textsuperscript{95} WILLIAM ASHWORTH, OGALLALA BLUE: WATER AND LIFE ON THE HIGH PLAINS 140-41 (2006). Groundwater depletion has posed tremendous problems in other regions of the United States. Florida, Arizona, and California, for example, have experienced land subsidence, saltwater incursion, and dried-up seeps and springs. For details, see ROBERT GLENNON, WATER FOLLIES: GROUNDWATER PUMPING AND THE FATE OF AMERICA’S FRESH WATERS (2002).
  \item \textsuperscript{97} It was named for its proximity to the town of Ogallala, Nebraska by N.H. Darton in 1899, long before hydrogeologists understood that the aquifer underlies 174,000 mi\textsuperscript{2} (450,000 km\textsuperscript{2}) in portions of eight states. ASHWORTH, supra note 95, at 140-41.
  \item \textsuperscript{98} USGS, Groundwater Study, supra note 96.
  \item \textsuperscript{99} Id.
  \item \textsuperscript{100} Id.
  \item \textsuperscript{101} See ASHWORTH, supra note 95, at 58-59 (discussing American’s post-war faith in technology), 151-52 (describing expansion of groundwater pumping in the 1950s).
\end{itemize}
a big role in agricultural expansion. These factors also played a critical role in the increased reliance on groundwater to irrigate Great Plains crops. It is hard to overestimate the impact that this bounty of buried water has had on American life. If you snack on popcorn or peanuts, you are probably eating Ogallala water; if you dress in cotton clothing, you are probably wearing it .... The fourteen million acres of crops spread across its flat surface account for at least one-fifth of the total annual U.S. agricultural harvest.

Farmers in the Republican River basin are keenly aware of the pressures created by increased reliance on groundwater. The Republican River, which begins in Colorado and runs through northwest Kansas and southern Nebraska, is closely connected to the Ogallala Aquifer in most places, hydrologically speaking. During the 1940s, the three states were motivated to enter into an interstate compact to allocate water supplies from the river. Meanwhile, to address severe flooding on the Republican, Congress approved funds to build Harlan County Lake and to study the development of other reservoirs in the basin. Because state leaders were fearful of the federal government taking “complete administrative control over all western streams,” the Republican River Compact (“Compact”) allowed the states to retain their control of water usage, even as the federal government increased its involvement in providing flood control and reclamation projects on the river. However, the states made a critical oversight when they allocated the “virgin water supply,” and neglected to mention groundwater.

102. Id. at 140-41.
103. Id. at 10.
104. See id. at 193-201, 205-09 (describing the geological, political, and legal landscape of the Republican River).
105. Id. at 199-200.
108. REPUBLICAN RIVER COMPACT, supra note 106, Art. VI-VII, X. See also Aaron M. Popelka, The Republican River Dispute: An Analysis of the Parties’ Compact Interpretation and Final Settlement Stipulation, 83 Neb. L. Rev. 596, 600-01 (2004) (noting that the states of Kansas, Colorado, and Nebraska were motivated to negotiate a compact that would allocate the waters of the Republican and retain state control while securing federal flood control and reclamation projects). President Roosevelt vetoed the initial Compact agreement because the states had characterized the river as non-navigable in an attempt to diminish federal power. Id.
109. ASHWORTH, supra note 95, at 187. See REPUBLICAN RIVER COMPACT, supra note 106, Art. II-III (defining and making allocations based on an average annual “virgin water supply”).
It was only a few years later when Frank Zyback, a Nebraska native, invented the center pivot irrigation system. From 1952 on, groundwater use in the basin and throughout the Great Plains grew exponentially. Indeed, "Zybach's circles would eventually change the face of farming, not just on the High Plains, but over the entire planet."

In 1998, the State of Kansas filed a complaint with the U.S. Supreme Court claiming that Nebraska had violated the Compact by allowing the development of thousands of groundwater wells in hydraulic connection with the Republican River and thereby using more water than its allocation under the Compact. Nebraska sought dismissal of the complaint, arguing that the Compact did not specifically mention groundwater and therefore did not control its usage. A Special Master appointed by the Supreme Court denied Nebraska's Motion to Dismiss and concluded that groundwater was to be included within the allocation and consumptive use computations of the Compact because of its close hydrological connection to the river. The decision motivated the states to reach a settlement, which the Court approved in 2003. Key provisions include commitments to engage in groundwater modeling via a committee of representatives from each state to determine the amount, timing, and location of depletions from groundwater pumping to the river and its tributaries and a moratorium on the construction of new wells. In 2004, shortly after the agreement was reached, Nebraska adopted L.B. 962, a piece of legislation intended to mitigate future conflicts between surface and groundwater users.

Nebraska had struggled with groundwater management for some time prior to L.B. 962 and the Republican River litigation.

110. Ashworth, supra note 95, at 146.
111. See id.
112. Id. While on sabbatical in New Zealand in 2007, I was surprised to find center pivot irrigation systems on the Canterbury plains of the South Island, where pastures and crops are being irrigated to provide food for dairy cattle.
114. Popelka, supra note 108, at 606 (citing First Report of the Special Master (Subject: Nebraska's Motion to Dismiss), Kansas v. Nebraska & Colorado, No. 126, Orig. (U.S. Jan. 28, 2000)).
Ground Water Management Act of 1975 gave the twenty-three local Natural Resource Districts ("NRDs") (entities based roughly on watershed boundaries) the responsibility of regulating groundwater. In 1996, the legislature expanded the Ground Water Management Act and explicitly recognized that "hydrologically connected groundwater and surface water may need to be managed differently from unconnected groundwater and surface water in order to permit equity among water users and to optimize the beneficial use of interrelated groundwater and surface water supplies." Problems persist, however, primarily because surface water is governed by prior appropriation principles of "first in time, first in right," implemented by the State of Nebraska, while groundwater is governed by a separate set of rules based on reasonable use and is managed by local NRDs.

The provisions of the Ground Water Management Act are strengthened by L.B. 962, which requires the State Department of Natural Resources ("DNR") to complete an inventory of the state's river basins and conduct annual evaluations to assess the long-term availability of hydrologically connected water supplies. The determination that a river basin or subbasin is fully appropriated triggers a process that includes a moratorium on new wells and new surface appropriations and a stay on the expansion of irrigated acres while the affected NRD and the DNR develop an integrated surface water-groundwater management plan ("IMP").

The goal of the IMPs is to attain "economic viability, social and environmental health, safety and welfare of the river basin, subbasin, or reach can be achieved and maintained..." The IMPs can utilize voluntary measures as well as regulatory controls, including allocations of groundwater withdrawals, rotation of use, and reduction of irrigated acres. IMPs may also include water supply augmentation plans and may offer incentive programs for the adoption and use of...

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123. Integrated Water Management, supra note 122.
specific water management practices as a means of accomplishing a balance between water availability and use. If disputes arise between DNR and NRDs over the development of an IMP, the Governor will appoint an Interrelated Water Review Board to break the impasse.124

To date, the only NRDs with IMPs in place are the Lower Republican NRD, Middle Republican NRD, and Upper Republican NRD.125 These areas were in advanced stages of planning even before the passage of L.B. 962 because of pressures imposed by the litigation over compliance with the Republican River Compact.126 The plans impose moratoria on new wells, specify the amount of groundwater that can be used per acre within each District, and also seek a property-tax levy plus unspecified amounts from the state to match local dollars used for water management.127 The funding will go toward reducing water use through purchasing water that would otherwise go to irrigators, pumping water into the Republican River to go downstream to Kansas, and clearing vegetation, among other things.128 The plans are backed by new legislation, L.B. 701, adopted in 2007.129

The question remains whether these measures and other local initiatives will be enough to sustain the region’s usage of the Ogallala Aquifer. Ashworth claims that, “[i]f the aquifer went dry, more than 20 billion worth of food and fiber would disappear immediately from the world’s markets.”130 Ashworth is not spouting hyperbole; far from it. It is quite possible that portions of the Ogallala Aquifer will go dry within our lifetimes.131 Although it is in relatively good shape in Ne-

124. Id.
126. 57 Stat. at 86.
128. Jenkins, supra note 127.
130. Ashworth, supra note 95, at 10.
131. Id. at 11-12, 23-24; TIMOTHY EGAN, THE WORST HARD TIME: THE UNTOLD STORY OF THOSE WHO SURVIVED THE GREAT AMERICAN DUST BOWL 310-11 (2006). See also USGS, Groundwater Study, supra note 96 (“Withdrawals greatly exceeded recharge in many areas, causing large water-level declines . . . of more than 100 feet since irrigation began (1940's) in parts of Kansas, New Mexico, Oklahoma, and Texas. In some areas, because of water-level declines, irrigation has become impossible or cost prohibitive.”).
Nebraska, in some areas of Texas, New Mexico, Oklahoma, and Kansas, the Ogallala has been so depleted that it is no longer feasible to extract more water.\textsuperscript{132} This should not come as a surprise. As Ashworth explains, groundwater mining "is not an accident here; it is a way of life... it is also a way of death."\textsuperscript{133}

As on the Republican River, primary responsibility for managing groundwater throughout the United States is vested in state and local governments.\textsuperscript{134} Ashworth embraces local control, preferring "home-grown solutions" to "outside fiat," be they federal or state.\textsuperscript{135} He applauds the formation of groundwater districts in Nebraska and Texas to ensure that resources would be managed by "the consent of the governed."\textsuperscript{136} Yet, the book undermines this stance by depicting how, in case after case, the failure of local governments to ensure efficient, non-harmful uses has resulted in improvident use, surface subsidence, and bone-dry streambeds.\textsuperscript{137} Leading examples can be found in Nebraska, where it took interstate litigation and a mandate from the State to constrain groundwater depletion,\textsuperscript{138} and in Texas, where, despite the ability to form groundwater districts, most of the state has not done so, and in the few places where they do exist, groundwater mining continues apace.\textsuperscript{139} In many cases, irrigators themselves sit on the boards of local groundwater districts, so it is no wonder that they have tended to allow great latitude to exploit groundwater well beyond the point of safe yield.\textsuperscript{140}

Until midway through the twentieth century, the courts stayed out of the realm of groundwater management, viewing underground aquifers as too "secret, occult and concealed" to be subject to the law.\textsuperscript{141} This view rationalized the "rule of capture," which awards the landowner exclusive ownership of water percolating beneath the surface so long as that landowner captures it by pumping.\textsuperscript{142} Today,

\begin{itemize}
  \item \textsuperscript{132} USGS, Groundwater Study, supra note 96.
  \item \textsuperscript{133} ASHWORTH, supra note 95, at 11.
  \item \textsuperscript{134} JOSEPH L. SAX, BARTON H. THOMPSON, JR., JOHN D. LESHY & ROBERT H. ABRAMS, LEGAL CONTROL OF WATER RESOURCES: CASES AND MATERIALS 345 (3rd ed. 2000).
  \item \textsuperscript{135} ASHWORTH, supra note 95, at 80.
  \item \textsuperscript{136} Id. at 76-77.
  \item \textsuperscript{137} Id. at 154-55.
  \item \textsuperscript{138} See supra notes 115-20 and accompanying text (discussing the Republican River controversy).
  \item \textsuperscript{139} ASHWORTH, supra note 95, at 154-55. See GLENNON, supra note 95, at 87-94 (describing depletion of Edwards Aquifer and resulting threats to endangered species and overlying communities).
  \item \textsuperscript{140} GLENNON, supra note 95, at 211.
  \item \textsuperscript{141} Frazier v. Brown, 12 Ohio St. 294, 300 (1861), overruled by Cline v. Am. Aggregates Corp., 474 N.E.2d 324 (Ohio 1984).
  \item \textsuperscript{142} Robert Glennon, Pinching Straws: Reforming Groundwater and Surface Water Law to Protect the Environment, 49 ROCKY MTN. MIN. L. INST. 7A (2003).
\end{itemize}
most states, including Nebraska, have abrogated this rule in favor of groundwater laws based on a concept of reasonable use. These laws are a step forward, but they address groundwater overdraft crudely, at best. Even with modern Geographic Information Systems, groundwater remains a subject of “misinformation, misunderstanding, and mysticism,” all of which can add up to mismanagement.

B. HAS THE FEDERAL GOVERNMENT BEEN ASLEEP AT THE WHEEL?

According to the U.S. Supreme Court, a “consistent thread of purposeful and continued deference to state water law” runs throughout the history of federal-state relations on water resources development. At least thirty-seven federal statutes expressly reserve state water law from federal preemption. While this translates to a pattern of deference to states on groundwater management, however, that does not mean that Congress lacks authority to intervene.

In Sporhase v. Nebraska, the U.S. Supreme Court explicitly stated, “[g]round water overdraft is a national problem and Congress has the power to deal with it on that scale.” Although the Court took pains to applaud the leadership of the state of Nebraska in water resources management, it left no doubt that federal control of groundwater is constitutionally permissible. If Congress acts, preemption of conflicting state or local laws is sure to follow.

143. Sax et al., supra note 134, at 304. Reasonable use is followed in most of the Great Plains states, but Kansas applies prior appropriation to groundwater and Texas still follows the rule of capture. Sipriano v. Great Spring Waters of Am., 1 S.W.3d 76, 80 (Tex. 1999).


148. Sipriano, 1 S.W.3d at 80.


150. See U.S. Const. art. VI, cl. 2 ("This Constitution, and the Laws of the United States which shall be made in Pursuance thereof...shall be the supreme Law of the...")
point, albeit one that sends shivers down the spines of state and local governments and many of their constituents.

On occasion, the United States has exercised power over groundwater pursuit to environmental statutes such as the Endangered Species Act\textsuperscript{152} and the Safe Drinking Water Act.\textsuperscript{153} Federal laws governing the interstate allocation of water through equitable apportionment and interstate compacts play a role in groundwater management as well, as seen in the dispute between Kansas and Nebraska over the Republican River Basin.\textsuperscript{154}

One of Congress' greatest incursions into water resources management is the Clean Water Act of 1972 ("CWA").\textsuperscript{155} Congress constrained states' rights by creating mandatory federal permit programs to regulate discharges of pollutants into waters of the United States,\textsuperscript{156} but the CWA provides that a state's authority "to allocate quantities of water within its jurisdiction shall not be superseded, abrogated or otherwise impaired," and that nothing should be "construed to supersede or abrogate" state-sanctioned water rights.\textsuperscript{157} The CWA also provides states with the power to impose tougher water pollution standards than federally required,\textsuperscript{158} and gives both states and tribes that meet statutorily delineated criteria the authority to administer the permit programs and take enforcement actions against non-complying point sources.\textsuperscript{159} Upon delegation, the federal permit program is suspended but the U.S. Environmental Protection Agency ("EPA") may still veto proposed permits and must periodically review state or tribal administration to ensure compliance.\textsuperscript{160} States also retain almost exclusive responsibility for pollution from diffuse, non-point sources.\textsuperscript{161} Finally, Congress empowered states to condition federally administered federal programs against non-compliance.

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\textsuperscript{153} 42 U.S.C. §§ 300f - 300j-26 (2000). \textit{See, e.g.}, \textit{United States v. Price}, 688 F.2d 204, 214 (3d Cir. 1982) (finding that "Congress, in the endangerment provisions of RCRA and SDWA sought to invoke nothing less than the full equity powers of the federal courts in the effort to protect public health, the environment, and public water supplies from the pernicious effects of toxic wastes," and ordering diagnostic studies and the provision of alternate water supplies).

\textsuperscript{154} \textit{Kansas}, 538 U.S. at 720; \textit{see also supra notes} 113-17 and accompanying text.

\textsuperscript{155} 33 U.S.C. §§ 1251(g), 1365(e), 1370 (2000).

\textsuperscript{156} 33 U.S.C. §§ 1342, 1344 (2000).

\textsuperscript{157} 33 U.S.C. § 1251(g).

\textsuperscript{158} 33 U.S.C. § 1370.

\textsuperscript{159} 33 U.S.C. §§ 1342(b), 1370, 1377 (2000).

\textsuperscript{160} 33 U.S.C. § 1342(b)-(c).

issued licenses on compliance with state water quality standards,\textsuperscript{162} some of which have resulted in fewer withdrawals and enhanced in-stream flows.\textsuperscript{163}

As a result of these provisions, federal and state powers overlap considerably with regard to a broad array of activities affecting coastal waters, inland navigable waters, and adjacent wetlands. While it may not be apparent at first blush, these different types of water bodies are often hydrologically connected to each other and to groundwater systems.\textsuperscript{164} Accordingly, integrated management with federal leadership providing national direction and guidance is critical to effectuating the CWA's ambitious goals of protecting the biological, physical, and chemical integrity of the nation's waters.\textsuperscript{165}

Despite the interrelated nature of the nation's water bodies, the Supreme Court has taken the opportunity to emphasize the states' "primary state responsibility for ordinary land-use decisions"\textsuperscript{166} in two recent cases involving the construction of the CWA's jurisdictional reach to "waters of the U.S."\textsuperscript{167} In both cases, developers championed states' rights in a coordinated strategy to strip the United States of authority to protect isolated wetlands, non-perennial streams, and (by extension) groundwater. In the most recent opinion, \textit{Rapanos v. United States},\textsuperscript{168} the developers found a steadfast friend in Justice Scalia, who cloaked his analysis in the language of federalism:

\begin{quote}
[T]he Government's expansive interpretation would "result in a significant impingement of the States' traditional and primary power over land and water use." Regulation of land use, as through the issuance of the development permits . . . , is a quintessential state and local power . . . . We ordinarily expect a "clear and manifest" statement from Congress to authorize an unprecedented intrusion into traditional state authority.\textsuperscript{169}
\end{quote}

\begin{itemize}
\item \textsuperscript{162} 33 U.S.C. § 1341(a)(1) (2000).
\item \textsuperscript{164} See U.S. Fish and Wildlife Service, Wetlands Losses in the United States: 1780s to 1980s (2000), http://wetlandextension.ifas.ufl.edu/threats.htm (last visited at Dec. 31, 2007) (reporting that ground water supplies and other socio-economic and environmental benefits "are now seriously threatened" due to losses of wetland acreage).
\item \textsuperscript{165} 33 U.S.C. § 1251.
\item \textsuperscript{166} Rapanos v. United States, 126 S. Ct. 2208, 2234 (2006); Solid Waste Agency of N. Cook Cty. v. Army Corps of Eng'rs (SWANCC), 531 U.S. 159, 172 (2001).
\item \textsuperscript{167} 33 U.S.C. § 1362(7) (2000).
\item \textsuperscript{168} 126 S. Ct. 2208 (2006).
\item \textsuperscript{169} \textit{Rapanos}, 126 S. Ct. at 2223-24 (citing 33 U.S.C. § 1251(b), stating "[i]t is the policy of the Congress to recognize, preserve, and protect the primary responsibilities and rights of States to prevent, reduce, and eliminate pollution, [and] to plan the development and use . . . of land and water resources").
\end{itemize}
Spurning arguments that comprehensive federal regulation was needed to achieve the CWA's goals, Justice Scalia speculated, "[i]t is not clear that the state and local conservation efforts that the CWA explicitly calls for . . . are in any way inadequate for the goal of preservation." The evidence does not support this assertion. Like groundwater management, state capabilities for wetlands protection vary tremendously, and some—perhaps most—states have fallen far short of what is needed to maintain and enhance the integrity of water resources. Likewise, states are charged with taking the lead for controlling non-point source pollution from agriculture and other sources of diffuse surface water runoff, and non-point source pollution remains the leading cause of poor water quality.

Notably, in Rapanos, thirty-three states, the District of Columbia, the Association of State Wetland Managers, and the Association of State Floodplain Managers filed amicus briefs on behalf of the United States, seeking to maintain broad federal jurisdiction over wetlands and tributaries. This sends a clear signal that most states believe that preserving wetlands from development is best accomplished by the federal government. Their concern is well placed. In the absence of federal regulation, the contiguous United States has lost over fifty percent of its wetlands since industrialization began, and some states have lost as much as ninety percent. Yet in Rapanos, the Court discounted the states' concerns and gave short shrift to legislative history replete with evidence of congressional intent to extend federal ju-

170. Id. at 2228.
172. Robert W. Adler, The Two Lost Books in the Water Quality Trilogy: The Illusive Objectives of Physical and Biological Integrity, 33 ENVTL. L. 29, 69 (2003). The U.S. EPA lacks direct regulatory authority over non-point sources. 33 U.S.C. §§ 1311(a), 1313, 1319. It may, however, withhold funding for delinquent states that do not take timely steps to address non-point pollution, as provided in 33 U.S.C. § 1319, and it may include non-point sources in its total maximum daily load (TMDL) allocations. See Pronsolino v. Nastri, 291 F.3d 1123, 1129 (9th Cir. 2002) (holding that the EPA could set TMDLs on a river polluted solely by nonpoint source pollution from roads and timber-harvesting operations).
173. Rapanos, 126 S. Ct. at 2208.
risdiction as far as constitutionally permissible in order to achieve the CWA's objectives.\textsuperscript{175}

Despite its far-reaching environmental goals, several lower courts have held that, like isolated wetlands, the CWA does not cover groundwater resources as “waters of the United States.”\textsuperscript{176} The Supreme Court has not had occasion to consider the issue, but the \textit{Rapanos} opinion could be construed as limiting federal regulatory oversight of groundwater depletion and contamination, not as a matter of constitutional law but rather as a matter of statutory construction.\textsuperscript{177}

III. BOOM AND BUST III: ETHANOL

\textit{[C]hronic population growth and arithmetic food production increases \textemdash\textit{will} lead to chronic food shortages, with dire consequences for the future of humanity.}\textsuperscript{178}

President Franklin Roosevelt’s New Deal Administration initiated farm aid as “a temporary solution to deal with an emergency”

\begin{footnotesize}
\begin{enumerate}
\item[\textsuperscript{175}] \textit{Rapanos} 126 S. Ct. at 2253 (Stevens, J., dissenting).
\item[\textsuperscript{177}] Opponents had argued that regulating isolated wetlands would be beyond the federal government’s Commerce Clause powers, but the Court refused to reach that issue, finding instead that the case could be resolved as a matter of statutory interpretation. \textit{Rapanos}, 126 S. Ct. 2208. See also Solid Waste Agency of N. Cook Cty., 531 U.S. 159 (invalidating regulation that defined “navigable waters” to include isolated wetlands used as habitat by migratory birds as beyond the authority granted to the Corps of Engineers under the CWA).
\end{enumerate}
\end{footnotesize}
posed by the Dust Bowl and the Great Depression. By getting people back to work and by curbing soil erosion, farm aid may have served its purposes during the New Deal, but its efficacy is no longer quite as clear today. As Egan explains in his description of a popular agri-business festival in Nebraska:

Our cult of the small family farmer dates back to Thomas Jefferson, who hailed humble “cultivators of the earth” as America’s “most valuable” and “most virtuous” citizens. But at the Husker Harvest Days farm show in September in Grand Island, Neb., it was clear how far American agriculture had come from the days when Cornhuskers husked corn by hand. Jefferson’s “cultivators of the earth” didn’t have genetically engineered seeds or 530-horsepower tractors.

Yet farm aid continues, bigger than ever. Congress had two chances to reform farm policies in the 2007 Farm Bill and the 2007 Energy Bill. Neither resulted in significant changes in the way farmers do business in the United States, other than adding more fuel to the fire of the recent ethanol boom, spawned by the desire to minimize reliance on unstable supplies from the Mid-East and to minimize greenhouse gas emissions from fossil fuels.

Given recent increases in oil prices, about a quarter of the total corn crop produced in the United States in 2007 is expected to be used for ethanol, and total corn production rose to a record 13.3 billion bushels, up from an average of ten billion bushels annually from 2000-2006. Yields per acre in 2007 came in around 180 bushels. In comparison, total annual yields averaged about 3.5 billion bushels during the 1950s, and only 2 billion per year during the mid-1930s. Yields per acre averaged 18 bushels in 1934.

179. Michael Grunwald, Down on the Farm, TIME MAG., Nov. 12, 2007, at 28. See also supra notes 79-82 and accompanying text (describing New Deal soil conservation programs).


181. Grunwald, supra note 179, at 28.


184. USDA, THE SEED INDUSTRY, supra note 178.

Increased yields are due both to farmers switching from grasslands or other grain crops to corn and to increased use of fertilizers and higher yielding seeds. An ethanol marketing company reported that, in 2007, over fifteen million more acres of corn were planted than in previous years.\textsuperscript{187} The acreage increase was facilitated by a twelve million acre decline in soybean plantings, plus fewer acres of other types of beans, wheat, cotton, and sugar beets.\textsuperscript{188}

The nation's increased reliance on corn-based ethanol to meet our energy needs poses two major concerns. First, ethanol demand results in higher corn prices, which drive up food prices.\textsuperscript{189} Higher corn prices affect both livestock producers, who need corn to feed their cattle and pigs, and people. A United Nations' expert on human rights calls the use of corn for fuel instead of food "a crime against humanity."\textsuperscript{190}

In addition, corn-based ethanol production has significant adverse environmental effects. Growing more corn depletes aquifers, especially in arid areas of the Great Plains that require irrigation for this thirsty crop.\textsuperscript{191} Greater corn production also exacerbates fertilizer

\textsuperscript{186} PAGGITT ET AL., supra note 185, at 4.
\textsuperscript{188} Id.
\textsuperscript{190} See Morton, supra note 182 (quoting Jean Ziegler stating, "[i]t is criminal to devote so much corn to fueling cars and trucks while millions of children starve around the globe").
runoff into rivers and streams, resulting in oxygen-deprived “dead zones” in the Gulf of Mexico, Chesapeake Bay, and the Everglades.\textsuperscript{192} Perhaps the most surprising of the unintended environmental consequences of ethanol production is the increased deforestation of the Amazon rainforest, as Brazilian farmers increase their soy production to take advantage of the rise in global prices caused by diminished U.S. production of soy.\textsuperscript{193}

The environmental coup de grâce may be the very thing that promoters of ethanol taut as ethanol’s biggest advantage over oil. Although the nation has encouraged ethanol use as a method of reducing greenhouse gas emissions, the overall effect on global climate change is mixed, at best. While ethanol burns cleaner than oil in cars, the ethanol production process—including emissions from burning fuels to plant and harvest the corn and haul it to the ethanol plant and to power the plant itself—emits significant amounts of carbon dioxide, a greenhouse gas that contributes to global warming.\textsuperscript{194}

The 2007 Energy Bill requires a fivefold increase in the use of biofuels, which will end up benefiting corn farmers and agribusiness at least as much as the subsidies provided in the proposed Farm

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\textsuperscript{192} Jackson, supra note 189, at A9; Grunwald, supra note 179, at 28. Millions of pounds of nitrogen-based fertilizer runs off fields in Corn Belt states, making its way to the Mississippi River and the Gulf, where it contributes to “a 7,800-square-mile patch so depleted of oxygen that fish, crabs and shrimp suffocate.” Jackson, supra note 189, at A9. The Gulf’s Dead Zone has been growing steadily since its discovery in 1985, but more corn production is almost certain to result in faster and perhaps irreversible growth. Corn crops discharge high levels of nitrogen pollution in comparison with soybeans, alfalfa, and other common crops because corn is a “leaky” plant that absorbs less nitrogen. \textit{Id.}

\textsuperscript{193} See Smithsonian Tropical Research Institute, Corn... Fuel... Fire! U.S. Corn Subsidies Promote Amazon Deforestation, http://stri.org/english/about_scri/headline_news/news/article.php?id=736 (last visited Dec. 17, 2007) (reporting increased fires and clear-cutting in Brazil). Since 2006, soy farming fell by fifteen percent in the U.S. and global soy prices have nearly doubled, causing increased production in Brazil, the world’s second-largest soy producer. \textit{Id.}

Indeed, by providing such tremendous incentives to boost production on marginal croplands of the Great Plains, the 2007 Energy Bill is becoming so important to farmers that it could be deemed the New Homestead Act. Although the Energy Bill does not allocate funds for meeting the biofuels mandate, its requirements have dramatically increased market prices for corn and for cropland alike. Meanwhile, continued subsidies for growing crops that can be used as biofuels are provided in current and, in all likelihood, future Farm Bills.

For its part, the 2007 Farm Bill, weighing in at three hundred billion dollars, continues long-standing subsidies to farmers that grow corn and other row crops. According to reporter Michael Grunwald, “our basic farm policies . . . keep funneling money to farmers and pseudo farmers through a bewildering array of loans, price supports, subsidized insurance, disaster aid and money-for-nothing handouts that arrive when times are tough—or not tough.” Proponents of farm subsidies argue that they are necessary to support family farmers. But over sixty percent of the nation’s farmers receive no subsidies, while the top ten percent of subsidized farmers receive almost three-quarters of the federal largesse for growing vast amounts of corn, soybeans, wheat, cotton, and rice.

Just three days after the Senate approved the Farm Bill in December 2007, the World Trade Organization (“WTO”) opened an inves-

195. Mufson, supra note 183, at A1. Although the Renewable Fuels Standard (RFS) was initially offered as an amendment to the 2007 Farm Bill, House and Senate leaders eventually agreed to put it in the new Energy Bill instead. Press Release, Sen. John Thune, House Passes Energy Bill with Important Increase in Renewable Fuels Standard, U.S. Fed. News (Dec. 19, 2007). The Energy Bill requires motor fuels to be comprised of “at least 36 billion gallons a year of biofuels by 2022—most of it in ‘advanced biofuels,’ not a drop of which is being commercially produced today.” Mufson, supra note 183, at A1. It will also raise automobile fuel-efficiency standards (new auto fleets will be required to average 35 miles a gallon by 2020, which represents a 40 percent increase from the current average), phase out sales of incandescent light bulbs, and provide new incentives for energy-efficient windows, equipment, and design in commercial and federal buildings. Id.

196. Professor Anthony Schutz deserves credit for the analogy to the Homestead Act of 1862. See supra note 24 and accompanying text (describing the 1862 Homestead Act).

197. See supra note 189 (describing increased corn prices); Chris Rickert, Farmland Cost Soars in Midwest, Wisc. St. J., Mar. 8, 2008, at C1 (reporting increased cropland values of 16 percent in 2007, “the biggest one-year increase in almost 30 years”).


199. See supra notes 84-92 and accompanying text (discussing farm bill conservation programs). The $300 billion price tag includes payments for food stamps and other relief programs as well. Roll Call Report Syndicate, Budgets, Farm Bill Approved, Aberdeen Am. News, Dec. 16, 2007, at 6A.


201. Id. The perks for corn farmers include “ethanol mandates and tariffs to boost their prices, and tax breaks by the bushel.” Id. For details about annual subsidies paid out to individual farmers, see Environmental Working Group, supra note 180.
tigation to determine whether the United States is violating international trade rules by employing subsidies that drive down prices.\textsuperscript{202} A WTO panel has been tasked with issuing a ruling on the dispute, which was triggered when Canada and Brazil demanded an investigation of subsidies paid to U.S. farmers for corn, sugar, and other commodity crops.\textsuperscript{203} The petitioners allege that the subsidies make it impossible for other countries as well as small U.S. farmers to compete in international markets.\textsuperscript{204} Canada and Brazil allege that so-called countercyclical payments, where the United States sets a target price for corn and other crops, and makes up some of the difference if the market price falls below the set price, distort trade by encouraging farmers to overproduce and then dump the surplus crops overseas at below-market prices.\textsuperscript{205} If they can show that they have been damaged by U.S. farm policies, the affected countries may be allowed to impose retaliatory tariffs against U.S. exports to make up for the losses.\textsuperscript{206}

In 2007, U.S. corn prices hit record highs due to the recent ethanol boom, meaning that fewer countercyclical payments are being issued.\textsuperscript{207} That may be a good thing for the United States as it defends its practices before the WTO. Yet, given the lessons illustrated by Egan and Ashworth, one has to wonder whether this boom, like earlier agricultural bubbles, will burst, leaving Great Plains communities and, consequently, the nation as a whole more impoverished than before.

Although rural communities and family farmers are experiencing short-term gains, the biggest beneficiary of the biofuels mandate is big agribusiness.\textsuperscript{208} At present, Archer Daniels Midland ("ADM") controls about twenty-two percent of the market.\textsuperscript{209} Although almost forty percent of the new biorefineries were locally owned in early 2007, absent the kind of massive infusion of capital that can only come from

\begin{itemize}
\item \textsuperscript{202} Daily Briefing, \textit{WTO to Probe U.S. Farm Subsidies}, \textit{ATLANTA J. CONST.}, Dec. 18, 2007, at D2.
\item \textsuperscript{203} \textit{Id.}
\item \textsuperscript{204} WTO opens U.S. Farm-aid Probe, \textit{WALL ST. J.}, Dec. 18, 2007.
\item \textsuperscript{205} \textit{Seeds of a Crisis: The Senate's Ill-advised Farm Bill could Create a Trade Catastrophe for the U.S.}, \textit{L.A. Times}, Dec. 19, 2007, at 28 (hereinafter \textit{Seeds of a Crisis}).
\item \textsuperscript{207} \textit{Seeds of a Crisis}, supra note 205.
\item \textsuperscript{208} \textit{See The Great Corn Rush}, \textit{MINNEAPOLIS STAR-TRIB.}, Sept. 26, 2006 (hereinafter \textit{The Great Corn Rush}) (reporting that ADM and VeraSun, companies that have partnered with Ford and General Motors to promote ethanol sales, plan to produce millions of gallons of ethanol by early 2008).
\item \textsuperscript{209} Timothy Egan, \textit{Life on the Ethanol-Guzzling Prairie}, \textit{N.Y. TIMES}, Feb. 11, 2007, at 41.
\end{itemize}
ADM and other large corporate backers, some of them are already going under. In December 2007, E3 BioFuels in Mead, Nebraska, which was intended as a closed-loop system that would use methane produced from the manure of an affiliated cattle feedlot as an energy source for its ethanol plant, filed for bankruptcy less than six months after its production began. E3’s spokesperson cited mechanical problems as the primary reason for the company’s failure, but declining prices for ethanol and high prices for corn played a role as well.

Who can blame the citizens of Mead for attempting to promote home-grown solutions to its faltering economic conditions and the continuing population losses that plague the Great Plains? In The Worst Hard Times, Egan describes Inavale, Nebraska, as a ghost town. Inavale is not an isolated example, nor has it experienced the greatest population losses over the years. Inavale boasts 184 residents, according to the U.S. Census, making it larger than more than a few other Great Plains communities. In fact, there are almost four hundred Nebraska towns with fewer than eight hundred residents, and Kansas currently has more “frontier” counties than it did in 1900.

210. Egan predicts that, “With the kind of Wall Street and venture capital money now sniffing around the farm, [advantages for locally owned plants] could change in the blink of a pig’s eye.” Id. In fact, the advantages seem to be waning already. See Art Hovey, Mead Ethanol Plant Files for Bankruptcy Protection, LINCOLN J. STAR, Dec. 3, 2007 [hereinafter Hovey, Mead Ethanol Plant]. This may prove to be another case of “déjà vu all over again” — dozens of ethanol plants were built in the Midwest during the oil embargo of the 1970s, only to declare bankruptcy later. The Great Corn Rush, supra note 208.

211. Hovey, Mead Ethanol Plant, supra note 210; Art Hovey, Ethanol’s Second Surge might be much more Modest, LINCOLN J. STAR, Dec. 26, 2007. Creditors include the 600 residents of Mead, whose town council provided tax increment financing for the project. Hovey, Mead Ethanol Plant, supra note 210.

212. Hovey, Mead Ethanol Plant, supra note 210.


214. U.S. Census Bureau, Profile of General Demographic Characteristics: 2000 http://factfinder.census.gov/servlet/QTTable?_bm=Y&-geo_id=87100US168852&-qr_name=DEC_2000_SF1_U_DP18&-ds_name=DEC_2000_SF1_U (last visited Mar. 21, 2008). Brewster, Nebraska, claims to be the smallest town in the state, at population 22. See Welcome to Brewster, Nebraska!, http://www.ci.brewster.ne.us/index.htm (last visited Mar. 21, 2008). However, at least one other town — Gross — is even smaller, having reported a population of only two in one of the last censuses. See University of Nebraska-Lincoln, About Nebraska. Our Towns, http://www.casde.unl.edu/history/about/page4.php (last visited Mar. 21, 2008).

215. University of Nebraska-Lincoln, supra note 214.

While the latest ethanol boom may temporarily slow the exodus, if Mead is any example, it is unlikely to be a sustainable long-term solution.\textsuperscript{217}

Certainly, biofuels can help diminish our reliance on fossil fuels. But experts predict that, even if 100% of U.S. corn crops were devoted to ethanol production, only 3.5% of gasoline consumption would be displaced.\textsuperscript{218} This is not to say that corn-based ethanol has no place in the United States' energy portfolio. Rather than putting our eggs in one basket, however, the nation should consider diversifying its agricultural and energy outputs, and putting more emphasis on demand side management—conservation. If we learned nothing from the Dust Bowl Era, we should have at least realized that planting the same monoculture crops fencerow to fencerow across vast areas of land, particularly arid land as is found in most of the Great Plains, makes the land, the farmers, and the people who rely on agriculture, \textit{i.e.}, all of us, more vulnerable to changes in the market and in climate, and less resilient over the long run.

Brazil has displaced much of its demand for gasoline by turning cane juice into ethanol.\textsuperscript{219} Brazil uses waste from the cane to fuel its ethanol factories, while U.S. plants typically use natural gas or other non-renewable fuels.\textsuperscript{220} The United States has not taken advantage of this potential fuel source, in part because sugar prices in this country are too high to make ethanol production from sugar cane economic.\textsuperscript{221} Meanwhile, ethanol imports from Brazil are discouraged by steep tariffs, and U.S. ethanol producers have little use for sugar because it would require them to invest in new equipment to modify existing grain-based bio-refineries.\textsuperscript{222} Like corn, growing sugar cane

\textsuperscript{217} In their controversial 1987 essay, Frank and Deborah Popper found that much of the Great Plains was reverting to frontier status under Turner’s definition. Popper et al., \textit{supra} note 216, at 12. Turner declared the frontier “closed” in 1893, but today several hundred thousand square miles satisfy his definition. \textit{Id.} The Poppers proposed that the Great Plains accept the limits imposed by the region’s aridity and topography and become a “buffalo commons.” Although the “idea was too radical for its time”—they now claim that the proposal was a metaphor, not a prescription—in fact much of the Great Plains is reverting to frontier status, due largely to globalization of manufacturing and crop production and to the inability to attract recreation-oriented in-migration in comparison to the coastal areas and the Intermountain West. A. Dan Tarlock & Sarah B. Van de Watering, \textit{Western Growth and Sustainable Water Use: If there are no “Natural Limits,” Should We Worry About Water Supplies?}, 27 PUB. LAND & RES. L. REV. 33, 70 (2006).


\textsuperscript{220} Schmid, \textit{supra} note 191.

\textsuperscript{221} Krauss, \textit{supra} note 219 (noting that the United States limits sugar supplies through production quotas, import restrictions, and price floors, which ends up costing consumers in the form of higher sugar prices).

\textsuperscript{222} \textit{Id.}
has significant environmental effects. Other cellulosic materials might make more sense as biofuels in the United States. New research shows that switchgrass, a perennial, native prairie plant, is a good source of ethanol. Herbicides are necessary only during the establishment phase; from that point on, switchgrass can reseed itself and will grow back from the same rootstock. It is also relatively easy to harvest. As a result of these advantages, each unit of energy used to grow switchgrass results in almost 5½ units worth of ethanol, which is quite a bit more energy efficient than corn-based ethanol.

CONCLUSION

"Water is life . . . (E)ach drop is a benediction." Reformss—especially agricultural reforms—are hard to come by. According to Jim Lyons, a former U.S. Agriculture Under Secretary, "[t]he big commodity groups have a stranglehold on policy. And there's not a lot of stomach for new ideas." William Ashworth points out, however, that the depletion of the Ogallala Aquifer is an impending crisis that we ignore at our own peril. Given that the aquifer produces around twenty percent of the U.S. harvest, the ripple effects of its demise could be cataclysmic, nationally and even internationally.

Many Plains residents and decision makers, however, view major droughts such as the one experienced during the Dust Bowl Era as extreme, isolated events. If the decade-long drought of the Dust Bowl could be characterized as an anomaly in an otherwise unblemished record of bountiful precipitation and temperate climate, the hardships it spawned and, arguably, the lessons learned could be written off in

225. Joyce, supra note 224.
229. Id. at 10, 12; Robert Glennon, Water Follies: Groundwater Pumping and the Fate of America's Fresh Waters (2002).
the historical annals as a mere blip on the radar screen of human habitation.

This is not the case. According to Professor Sherilyn Fritz, co-director of the University of Nebraska Water Resources Research Initiative, geologic records from tree ring measurements, lake sediments, and sand dunes demonstrate that severe droughts are not an anomaly at all, but rather a recurring trend in the Great Plains. At times, such as in the 16th century, major droughts occurred more frequently, whereas at other times, such as the early 1800s, major drought was rare. What is most striking about moisture records from the Great Plains is that drought was prolonged and persisted for multiple decades during some time periods within the last few thousand years. There is widespread evidence from lakes, dunes and wetlands in the northern and central Great Plains for major and persistent drought 800 to 1,000 years ago that was much more prolonged than anything in human-recorded climate history. Yet drought even more severe than that of Medieval times was common in the Great Plains during other periods of the last 10,000 years, particularly within the so-called mid-Holocene, between approximately 9,000 and 5,000 years ago.

As Professor Fritz advises, studying the long-term data can provide a better understanding of both the natural recurrence of drought as well as the potential future impacts of human activity on climate; more effective management can come only with an understanding of coupled human and ecological systems. Fritz concludes that “we clearly can do a better job of water conservation, management and planning to create a society and an economy that are less vulnerable to the natural fluctuations between wet and dry that characterize the semi-arid climate of the Great Plains.”

Good science is only one piece of the puzzle. Legal reform is a critical component of adaptive, sustainable water management as well, but it often takes a major catastrophe to stimulate changes in law. Even then, the inherent forces in favor of the status quo—self-

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230. Sherilyn Fritz, The Great American Desert — A long-term Perspective on Drought History in the Great Plains, Prairie Fire, Dec. 2007, at 1, 15. “Major drought is recurrent and should be considered a natural part of the climate variability of the Great Plains.” Id. at 23.
231. Id. at 15.
232. Id. at 23.
233. Id.
interest, investment expectations, existing infrastructure, and entrenched power structures—are so strong that movements for reform often muddle around without much effect. Effectuating change in existing legal regimes will not occur unless decision makers and stakeholders are convinced that the status quo is untenable and cannot hold.

Decision makers and stakeholders in the Great Plains and throughout the West, however, are characterized by people like Bo Mason and Bam White, who cling to their "unbounded optimism about the future, careless disregard of nature's limits and uncertainties, [and] uncritical faith in Providence. . . ." Our federal, state, and local water policies reflect this "unbounded optimism." In many parts of the western United States, water policy was codified during times when the climate was unusually wet, so the perception that rainfall was abundant biased the calculations of "normal" water availability as well as the commitments that were based on those calculations.

Disaster, like the droughts and dusters of the 1930s, and litigation, like Kansas' suit over Republican River usage, can both serve as catalysts for re-examining old assumptions and, ultimately, for making improvements in the law. But Congress should not wait for another Dust Bowl or for contentious interstate litigation to adopt meaningful conservation-oriented reforms in water and soil management.

Worldwide, soil degradation is accelerating. The International Union for the Conservation of Nature's Environmental Law Program ("IUCN") recently highlighted the need for international action to combat soil degradation.

235. Email from Irma S. Russell to Envlawprofs listserv (Nov. 13, 2007) (on file with author).
236. Id.
238. Fritz, supra note 230, at 15. The 1922 Colorado River Compact, Boulder Canyon Project Act, Pub. L. No. 70-642, 45 Stat. 1057 (1928), is a leading example. Compact negotiators divided the waters based on an assumption that the available flow was fifteen million acre-feet per year when, in fact, it is closer to fourteen million acre-feet per year. JOSEPH L. SAX, BARTON H. THOMPSON, JR., JOHN D. LESHY & ROBERT H. ABRAMS, LEGAL CONTROL OF WATER RESOURCES: CASES AND MATERIALS 696, 700-01 (3rd ed. 2000).
[The crisis in soils and the current climate crisis are linked. Healthy soils play a major role in carbon fixing, thus softening the climate change impacts of industrial development. Soil degradation, on the other hand, leads to the transfer of massive amounts of carbon fixed in soil to the atmosphere and thereby contributes to greenhouse warming.]

To assist governments and stakeholders, the IUCN issued a draft Protocol for the Conservation and Sustainable Use of Soil, which provides a template for assessing the efficacy of existing laws. Although the United States has made great strides since the Dust Bowl Era, application of the IUCN template reveals continuing vulnerability. The weakest link in the nation’s erosion control efforts is its dependence on local initiatives and voluntary action. Moreover, the USDA’s agricultural programs have experienced chronic enforcement problems, which seem to go hand in hand with the nation’s fragmented approach to soil erosion, wetlands loss, and groundwater contamination.

The United States’ piecemeal efforts reflect the attitudes of the 1930s, which focused only on erosion to the exclusion of other soil problems, and which, in spite of Hugh Bennett’s best efforts, failed to “view soil as a living resource, but [rather] as land—an inert piece of property.” In particular, the nation’s soil programs fail to address water quantity issues, continuing losses of nutrients, and other attributes of sustainable land use. Meanwhile, the nation’s water pollution programs fail to rectify non-point source pollution and wetlands losses.

William Futrell, former president of the Environmental Law Institute and the Sierra Club, argues that the United States can do far more to meet IUCN goals by bolstering enforcement mechanisms and


242. Hannam et al., supra note 240.

243. See Futrell, supra note 239, at 99 (stating “the United States has a superb technical agency [in the Natural Resource Conservation Service], excellent data and monitoring programs, and solid citizen participation and... has made recent strides in preventing erosion by a system of expanded grants”).

244. Id. at 129. See also supra notes 137-40 and accompanying text; John H. Davidson, Sustainable Development and Agriculture in the United States, 32 ENVTL. L. REP. 10,543, 10,556 (2002) (“[T]hose who are conservation-minded from the outset tend to participate while those with erosion-prone land and a disinclination toward conservation remain untouched. The latter group has the clear majority.”).

245. Futrell, supra note 239, at 129.

246. Id. at 101.

247. Id. at 128.

248. See supra note 174 and accompanying text (describing failures to address non-point source pollution and wetland losses).
by requiring better program integration. He suggests that, if Congress were to require the states to protect the nation's investment in soil conservation with strengthened regulatory controls at both the state and county level, "perhaps by barring distribution of conservation funding to farmers in states that do not adequately enforce their erosion and sedimentation laws," progress could be made.  

Reminiscent of the arguments made by Bennett and his contemporary, Aldo Leopold, Futrell concludes that "[t]he beginning of an effective approach to land use law in the U.S. will be entwined with the recognition of soil as an ecological resource—no less vital and no less vulnerable than air and water."  

Another idea worth exploring with far more vigor and fortitude than we have to date is to finely tune federal subsidies to encourage farmers to grow crops most suitable for their region's topography and climate. Why not grow corn, a thirsty crop, on land where soils are less vulnerable to erosion and where rainfall is plentiful, as in Iowa, Illinois, Indiana, and Ohio, while growing drought-tolerant crops, like certain types of wheat, sorghum, and switchgrass, in drought-prone areas? This smacks of land-use planning—zoning, even—an activity that many rural communities are loath to support. Yet the Center for Rural Affairs and other groups that support family farmers are beginning to recognize that subsidies should be tied much more closely to sustainable crop production. Precipitation could serve as a crude yet expedient measurement. If you grow corn in areas that receive, on average, twenty to twenty-four inches each year, you are eligible for

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249. Futrell, supra note 239, at 127. Futrell notes that Congress could also "charge the USDA with a duty to consult with the EPA on funding [farm] conservation grants, much as it charges the Corps of Engineers with coordinating with the EPA on wetland permits." Id. See also 33 U.S.C. § 1344 (2000) (requiring coordination between the Corps and EPA on dredge and fill permits that affect certain wetlands and other waters of the United States); see also 16 U.S.C. § 1539 (2000) (requiring consultation to prevent jeopardy to federally listed species).

250. Futrell, supra note 239, at 128.


252. According to Chuck Hassebrook, executive director of the Center for Rural Affairs, a nonprofit research group in Nebraska, "government incentives should be tied to promoting local ownership and producing the crop in a way that is environmentally sustainable." Timothy Egan, Life on the Ethanol-Guzzling Prairie, N.Y. Times, Feb. 11, 2007. See also Center for Rural Affairs, Campaigning for a Better Farm Bill, http://www.cfra.org/ (last visited Jan. 2, 2007) (seeking "meaningful reform that benefits family farmers and ranchers, small rural businesses and rural communities").
price support payments, subsidized insurance, and disaster relief payments.\textsuperscript{253} If not, you are not.\textsuperscript{254}

For his part, Ashworth highlights an innovative range management experiment on the Knife Chief Bison Range to show that progressive reforms are possible and can be accomplished in culturally sensitive, economically sensible ways. The Pine Ridge Indian Reservation, through a course offered at the Oglala Lakota College, has curtailed intensive grazing practices by cattle ranchers, torn down fences, and introduced a free-ranging bison herd. Within a short time, springs, seeps, and lush prairie grasses appeared in places where they had not been seen for decades. Acknowledging that such a conversion is not in the cards for all ranchers, and that it would make little difference in places where groundwater overdraft has already occurred, Ashworth nonetheless uses the example to make his point: there is no one-size-fits-all solution, but there are solutions.\textsuperscript{255}

By contrast, Egan is more pessimistic. In a recent article in the New York Times, Egan was especially critical of current farm policies, including incentives to produce ethanol.\textsuperscript{256} As for the lessons of the Dust Bowl, they are as faint as "a distant war, forgotten in a new rush to spin gold from straw."\textsuperscript{257} According to Egan, the federal government still treats the Great Plains "like throwaway land, the place where Indians were betrayed, where Japanese Americans were forced into internment camps during World War II, where German POWs were imprisoned."\textsuperscript{258}

Reviewer Kelly Helm Smith takes issue with Egan's assessment, arguing that, "like the roots of the native prairie, the strengths of Plains culture are not immediately visible to outside investigators."\textsuperscript{259} According to Smith, a Nebraska resident, "[w]e've got groundwater, we've got the Huskers (no matter what), we've got space, and we're a

\begin{itemize}
\item \textsuperscript{253} Precipitation needs—enough water to avoid significant moisture stress on the crop—vary greatly depending on the climate (including evapotranspiration rates and the timing of precipitation events), topography, and soil type. Therefore, this figure, which is a nation-wide average, should be adjusted for regional variations. David Bennett, \textit{It Takes a Lot of Water to Grow a Corn Crop}, SE. FARM PRESS, Dec. 28, 2007, \texttt{available at http://southeastfarmpress.com/grains/122807-corn-water/}; Emails from Suat Irmak & Ray Supalla to Sandra Zelmer (Jan. 9, 2008) (on file with author).
\item \textsuperscript{254} For suggestions on reforming floodplain management policies related to farming and other land uses, see Christine Klein & Sandra Zellmer, \textit{Mississippi River Stories: Lessons from a Century of Unnatural Disasters}, 60 SMU L. REV. 101 (2007).
\item \textsuperscript{255} \textbf{ASHWORTH, supra note 228, at 262.}
\item \textsuperscript{256} \textbf{TIMOTHY EGAN, THE WORST HARD TIME: THE UNTOLD STORY OF THOSE WHO SURVIVED THE GREAT AMERICAN DUST BOWL 41 (2006).}
\item \textsuperscript{257} Id. 256, at 10.
\item \textsuperscript{258} Id.
\item \textsuperscript{259} Kelly Helm Smith, \textit{Book Reviews — The Worst Hard Time: The Untold Story of Those Who Survived the Great American Dust Bowl by Timothy Egan}, \textit{PRAIRIE FIRE}, Dec. 2007, at 4-5.
\end{itemize}
great place to raise kids." Be that as it may, Smith concludes with an apt warning: "We need to learn to fully appreciate our resources—water, land, space, sky—and to find value in their intrinsic worth..." Recognizing and safeguarding the intrinsic worth of the endemic Plains communities once lauded by the Lewis and Clark expedition takes both forward-looking thinking and a long-term historical perspective. Jim Lyons is right—agricultural reform will not come easy, but it is not impossible. The growth of agri-business notwithstanding, most of the nation's agricultural production still comes from "family farmers who like to play in the dirt." Today's farmers have to be more than the stalwart "ploughmen of yore;" they must also be "land managers, soil scientists, hydrologists, veterinarians, mechanics, commodity traders, exterminators, meteorologists and highly sophisticated businessmen." If farmers must get smarter and develop more diverse forms of expertise to stay in business, we should ask no less of our governmental institutions and decision makers. Egan and Ashworth make this point loud and clear in *The Worst Hard Times* and *Ogallala Blue.*

260. Id. at 5.
261. Id.
262. See *supra* note 227 and accompanying text.
263. GRUNWALD, supra note 227, at 28. Grunwald reports that only two percent of U.S. farms are corporate-owned. Id.
264. Id.