

The Land Report

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Cover: Terry Evans. A former farm, now a residential development and golf course, from *Revealing Chicago*. This work will be shown at downtown Chicago's Millennium Park in summer 2005. The cover photo and those accompanying Wes Jackson's essay beginning on page 3 are courtesy of the Openlands Project, Metropolis 2020 and the Chicago Department of Cultural Affairs.

Above: Scott Bontz. Grasshopper on prairie cone-flower in fall.



Our Mission Statement

When people, land and community are as one, all three members prosper; when they relate not as members but as competing interests, all three are exploited. By consulting nature as the source and measure of that membership, The Land Institute seeks to develop an agriculture that will save soil from being lost or poisoned while promoting a community life at once prosperous and enduring.

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Chicago as a Product of its Hinterlands

Wes Jackson

Chicago's circular seal displays the stars and stripes, an Indian, a sailing ship and an infant in a pearl shell symbolizing the city's future as the "gem of the ocean." There is a sheaf of wheat, the motto "I will" and *Urbs in Horto*, meaning "City in a Garden."

But the seal cannot tell us—without seal overload—that the Chicago Board of Trade is the world's largest grain market, that the city has been our country's greatest steel producer and rail hub, the Midwest's center for business and industry—what Carl Sandburg called the "City of Big Shoulders": "Hog butcher, tool maker, stacker of wheat, player with railroads and freight handler to the nation."

While Chicago's business and social life dazzle us, the Native Americans who carried their canoes for millennia over this ground between the Des Plaines River and Lake Michigan are seldom in mind. Louis Joliet and Father Jacques Marquette, who crossed these lands in 1673, are rarely mentioned around corporate tables or at the local bar. Jean Baptiste Point du Sable, the black man who established a trading post on the north bank of the river more than 100 years later, in 1779, is not a household name. We care little whether he was an anomaly or a foreshadowing of the enterprise to come.

Only the lives of the natives met the highest standard of sustainability for the region. The two French explorers and the black trader were artifacts of civilization and, therefore, members of an economy extracting irreplaceable resources, however lightly. When those pioneers set the stakes for civilization, they issued both themselves and us a license to become participants in what was to become a highly extractive economy.

After the trading post, the first artifact of civilization here was Fort Dearborn, built in 1803. Torched during the War of 1812 by Indians on the British side, it was rebuilt in 1816. This frontier outpost, this protection against whatever stood in civilization's way, attracted settlers. In 1830 town boundaries were established. By 1848 the Illinois and Michigan Canal linked LaSalle and Chicago. Now farm products from 100 miles west of Chicago could be shipped eastward via the Great Lakes. The city grew from 20,000 to 30,000 in two years. A mere decade later, in 1860 when the Republican Party nominated Abraham Lincoln for president in Chicago, the city could claim 112,000 souls.

From the second building of Fort Dearborn to the present, it has been the railroads and the waterways that received most of the credit for the city's growth. The foresight and energy that developed the water, rail and roadways have been praised because civilized humans

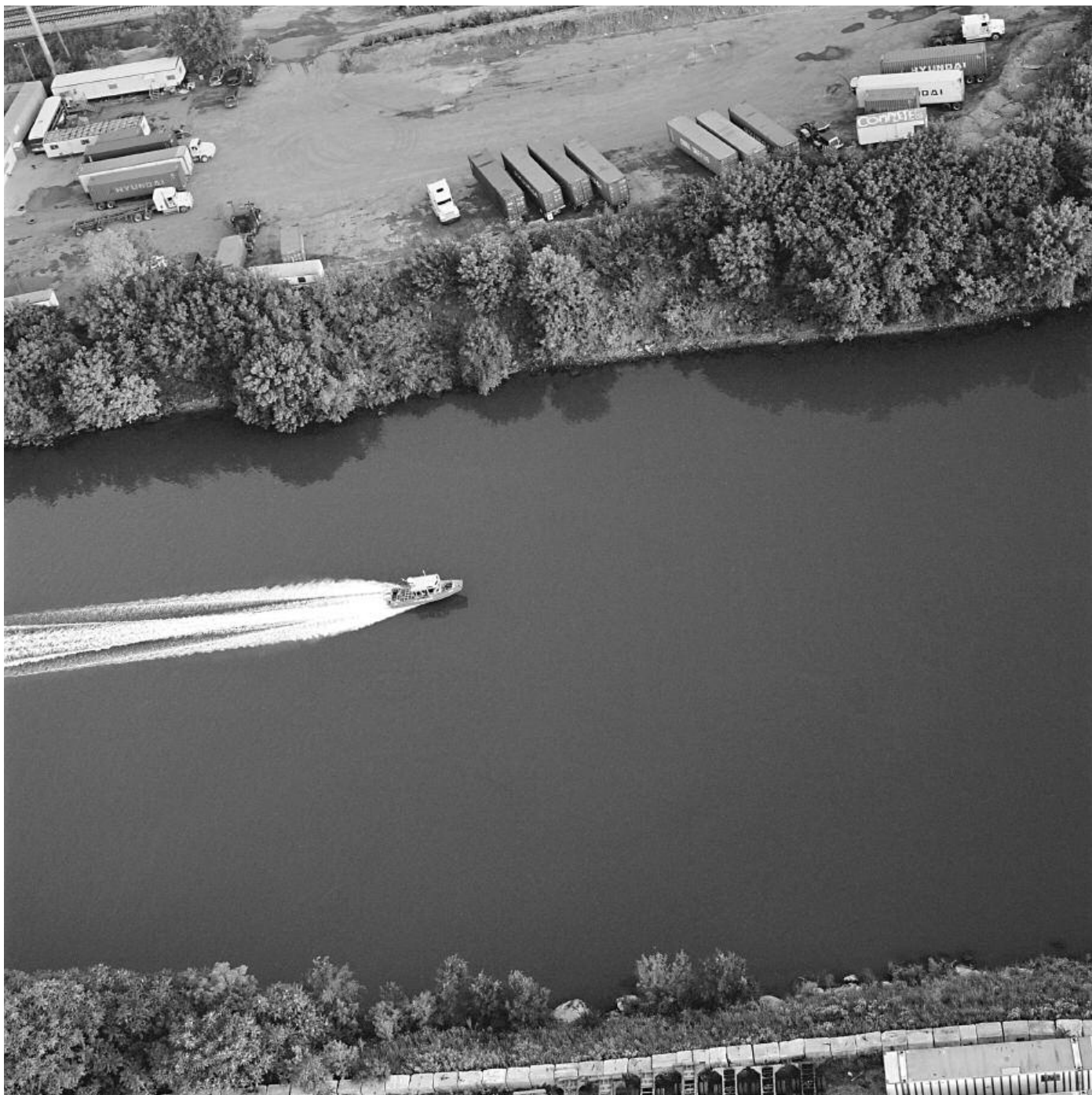
—maybe all humans—reward enterprise. Nature's ecosystems in early stages can reward colonizing or enterprising species and feature an excess of potential energy used inefficiently. More mature ecosystems, such as a prairie or forest, tend otherwise.

Let's go back to the seal and think again about the garden around this city. Several factors made this garden possible. The most recent primary geologic event was the Pleistocene, that Ice Age which featured several advances and retreats over 1.7 million years. Halfway through the Pleistocene, about 900,000 years ago, the ice finally reached into what became our contiguous 48 states. Four ice lobes pushed their way into Illinois, three of them almost from end to end. In order they came and went: Nebraskan, Kansan, Illinoian and Wisconsin. The last one was the least ambitious in Illinois, covering about half the state. As the ice advanced and retreated, its grinding released an unimaginable bounty of the land-based elements essential for life.

This geologic event, as essential as it was, wasn't enough to account for today's high agricultural production. The region also experiences a fortuitous climate, most especially moisture from the Gulf of Mexico reaching through the entire upper Midwest with no mountain barriers. The lakes also make their contribution to precipitation in what we can call solar irrigation. Finally, there is the favorable temperate latitude as a major contribution to plant growth. This is the combination that the living world could work with to build the largest expanse of the finest soils of the world. This is why the seal can rightly boast "City in a Garden." Without these soils, if the region's greatest city could sponsor a seal at all, the motto would be different.

For good or bad, the city's garden expanded far beyond Illinois, beyond the land that experienced the Pleistocene's ice. Where I live at The Land Institute near Salina, Kansas, the Great Plains begins. Here the landscape has a hard time deciding whether it is tallgrass or midgrass prairie. Precipitation determines. The primary geologic parents of these soils are the two major uplifts of the Rockies more than 400 miles to the west.

Some 25 miles east is Abilene, where Dwight Eisenhower was raised from infancy until he left for West Point. Less than a quarter-century before Ike was born, Illinoian Joseph G. McCoy, in 1867, bought 250 acres near the railroad for a stockyard. At his instigation, Texas ranchers appropriated the Chisholm Trail, a former native trading route, to bring cattle to Abilene. Texas longhorn herds had grown during the Civil War



*Terry Evans. Illinois and Michigan Canal, for **Revealing Chicago**. The waterway allowed farm products to go east via Chicago—and fed the city's rapid early growth.*

and needed thinning. McCoy thought city people could eat more beef. He loaded the first railroad shipment on September 5 that year, some 20 cars, and they headed for Chicago. The city's magnet intensified its attraction deep into the heart of Texas.

The cattle drives and rail shipments from both Texas and the Great Plains were the end of one era and the beginning of another. The slaughter of bison in Kansas peaked between 1870 and 1873. The railroads and the market teamed to send hides from the short-grass country to be tanned in eastern cities. More than 4 million hides came from the southern Great Plains alone. Meanwhile, cattle filled pens along the Kansas Pacific as it crept steadily westward. Enterprise combined steel and ancient sunlight in the form of coal to end the ancient wildlife drama featuring millions of bison across vast stretches of prairie. This is a small part of a major theme of William Cronon's fine book *Nature's Metropolis: Chicago and the Great West*.

Chicago increasingly appropriated the fertility stored in the Rocky Mountain debris with each tie laid to handle the rails of the Iron Horse. The take-home message is that this city has been a primary beneficiary of this land. Less understood is that it has been by a series of mining economies. Before there was a Chicago, the natives mined flint, but a little flint can go a long way in making arrowheads, scrapers and knives. There was plenty of it to go on for millions of years. We must count the cattlemen as miners of soil nutrients with each animal shipped out of the region. Later, oil and natural gas were discovered and the fossil carbon miners became richer than the ranchers. Those who appropriate sun energy pooled over millions of years are certain to have economic advantage over those who harvest a scant supply of contemporary sunlight in the form of crops or grass-fed livestock.

The plowing of the prairies, most notably during World War I, turned the settlers and their descendants into soil miners. The Dust Bowl years of the 1930s were a major consequence of this Great Plowing. Next the

water miners, with their Chevy and Ford engines burning fossil carbon, sucked down the Ogallala aquifer, a reserve accumulated in geologic time. This fossil water irrigates corn in arid country for feedlot beef. Within a century, Dodge City, Kansas, went from being the shipping point for millions of salted hides to the site of mammoth feedlots. The cattle are slaughtered there, too. So now rather than animals arriving alive in Chicago, dismembered carcasses leave Dodge boxed and in refrigerated semitrailer trucks for Chicago and elsewhere.

Chicago has been the primary beneficiary of the grass, soil and water of the great prairie. The accelerated extraction, which continues to this date, has been made possible largely by oil, gas and coal.

As our planet nears the peak and decline of oil and natural gas production while demand for fossil energy is the highest in history and increasing, countless and severe economic adjustments await us. Current food production requires petroleum to produce fertilizer, pesticides and herbicides. No substitute, let alone one that is sustainable, matches cheap fossil fuels. Future energy will be more expensive. Less well known is that whatever natural soil fertility is left, along with the water available, will largely determine the land's potential for sustainable farming. Given that the U.S. Department of Agriculture reports continuing soil erosion and degradation, and that the reports from many other countries are worse, the prospect for abundant food is discouraging.

Worldwide, 70 percent of the calories that humans eat come directly or indirectly from grains whose ancestors were wild grasses and legumes. Those grains stand between us and widespread starvation. To develop a way to produce them sustainably will require time and a clear mission. The early work to demonstrate the feasibility of this mission, this new paradigm, took place over the past 25 years at The Land Institute. The mission will be difficult, but it is achievable. It is necessary, because it is now clear that modern efforts to achieve a sustainable grain agriculture have either failed or



*Terry Evans. Skyway, for
Revealing Chicago. Trains,
barges and automobiles, all part
of the circulation taking energy
from the prairie and beyond to
sustain the city.*

experienced only infrequent success. The reason is simple. Rather than annual plants which live and die in one growing season, perennial plants whose deep, extensive roots live for years are necessary for efficient management of nutrients and water.

A summary of the bad news:

1. Ten millennia ago most of the land of the planet was covered with ecosystems featuring perennial plant mixtures. Annual one-species plantings are the opposite. Humanity got away with the degrading consequences of annual monocultures in industrial time by subsidizing agriculture with energy-rich fossil carbon—oil and coal.
2. In the near future, discoveries of oil will no longer keep pace with increased demand. Our consumption of energy-rich carbon makes this the most unusual period of human history. A person born in 1936, two-thirds of a century old, has been alive while 97.5 percent of all the oil ever pumped has been burned.
3. No alternative technology matches the quantity and convenience of liquid fossil fuels.
4. The recent food supply of humanity has depended, to a large degree, on such fuels.
5. The biodiversity of the planet is in decline, mostly by destruction of ecosystems that hold answers to agronomic and economic questions we have not yet learned to ask.
6. A cultural barrier exists between agricultural scientists who are burdened with being prescriptive—how to grow food—and ecologists who have the luxury to be descriptive—to learn how ecosystems work.
7. Funding in university departments, particularly in agronomy and crop science, has withered as biotechnology has expanded. Offices, laboratories, growth chambers, greenhouses and acreage are still all in place, but with little money to support the research of plant breeders, plant pathologists and soil scientists.

A summary of the good news:

1. Knowledge accumulated in ecology and evolutionary biology over a century is available to be taken off the shelf and applied to agriculture. Pasture management, including fire and grazing, is established, well understood and easily translated to manage perennial grain polycultures.
2. Molecular markers, chromosome “painting,” and embryo and ovule rescue are available to geneticists and breeders as they select perennial plants with good grain production from hybrids between species that had previously been considered incompatible. This does not involve transgenetic manipulation, just crossing.
3. Computational power has increased the ability of researchers to analyze data.
4. To the ecologists who argue that saving biodiversity will require intensifying agriculture, we can present a mission that will bring the processes of ecology from the biodiversity of the wild to the farm.

Chicago, like all the other great American cities, has been a source of the best of our civilization. Civil liberties are given high standing. Democratic institutions have been strengthened here. There has been a remarkable outpouring of science and technology from the Chicago area. The most notable down side is growth mania. A shift from quantitative growth to qualitative growth is both possible and necessary. It won't be easy, but if our people are to eat, drink and be merry 100 years hence, a combination of civic and agrarian thought will be necessary. To make this transition will require a commitment to the kind of thought for which the precedent is limited.

Let us hope that in the near future economists and others will want to learn how materials cycle and energy flows in nature's economy, nature's ecosystems. After all, these are processes that have gone on for millions of years. When that day arrives, economics will become a subdiscipline of ecology. Though these words have a common Greek root, economics is dominated by the

human invention of exchange values, trading abstractions such as money, that have weak attachments to particulars. Nature, with no opportunity for speculation, employs only use values: existent material and energy. Attention to nature's economy is a beginning point for thinking about a different economic order.

When we ask the civic leaders of Chicago about its responsibility to its hinterland, there is potential to stir instincts that are patronizing rather than partnering. Patronizing must be resisted at all costs, because in the future, the hearts and minds of everyone must become both civic and agrarian.

We can dream of a time when Chicago will count itself as the Pleistocene's most favored cultural product, or perhaps the most favored city of the Pleistocene's prairie. Its citizens will acknowledge that Chicago was a prodigal spender, a squanderer of its inheritance like cities everywhere. Chicago's leaders will look back on those today and thank them for becoming students of the history of agriculture over the landscape it has appropriated. These agrarian minds will praise those who asked and acted on the question: "How can Chicago invest in the possibilities of a sustainable future?"

Chicago can take the lead to help build an agriculture across the hinterland that more nearly mimics the prairie that the city's appetite helped destroy. Civic and agrarian responsibility will become one as the first steps are taken toward adopting mileposts to measure year-to-year progress of independence from the extractive economy.

An effective way to get started would be a commitment by Chicago to fund a center for Natural Systems Agriculture at The Land Institute. A start-up cost of \$5 million and an annual budget of \$5 million, \$2 million of it to fund continuing researchers at other institutions across the country, would signal universities about the values of Chicago.

We could have done without the Copernican revolution, done without Newton's calculus and his laws of gravitation, Einstein's equations or knowledge of plate tectonics. We did not need to know that the elements that appear on the periodic chart in our chemistry classrooms had their origin in a dying star, that we as products of that star have been cycled through a supernova twice. But we can't do without soil and an agriculture that saves the soil by learning from ecosystems that the planet featured 10,000 years ago. Soil made possible the knowledge accumulated by civilization. To retain soil, we need a new agriculture.

Prairie Festival Companionship

David Korten, author of *When Corporations Rule the World*, sounded reluctant.

He is busy. He didn't want to travel and a talk again at a gathering that lacked the mass and energy for change.

But The Land Institute persuaded him. Then we redoubled effort to arrange and promote our 25th Prairie Festival September 26-28.

The results: An eclectic slate of speakers, plus Kansas-grown food prepared by a California chef, drew over 600, more than twice last year's attendance, from 34 states and Canada. Some 15 percent were students, after a campaign with professors to reach more young people with our ideas.

Korten talked of replacing capitalism with a more humane economy. Wendell Berry observed changes to farm culture in Italy and at home, and related his view of life as a miracle. A deadpan Charlie Melander engendered great laughter and finally a standing ovation for telling how he reversed his thinking about field trash and how to farm. Wes Jackson forecast agriculture 100 years hence, with the institute's ideas developed and in action. Winona LaDuke walked listeners through Indian farmers' tragicomic struggles with corporate interests

and land grant school researchers. Peach grower Mas Masumoto brought warmth and aroma with stories and a sampling of jam.

All of these speakers, plus artist Priti Cox and many others, shared their thoughts and works with no compensation but travel expenses and food.

In conjunction with the festival was a display called *recollection* at Salina Art Center, featuring photos of natural history specimens by Terry Evans and paintings by Mary Kay (see page 24).

It was the first Prairie Festival that institute managing director Ken Warren recalled having listeners ask for speech texts—especially Korten's, for which there is a link on our Web site, www.landinstitute.org. For tapes of all the talks, see page 26.

As in the past, festival-goers sought connections to more information, for which the institute is able and glad to be a clearinghouse. After supper by chef Donna Prizgintas—who will donate her talent again next year—they even asked for recipes.

With a festival turnout that had barn dancers spilling out under the stars, Warren teasingly asked Korten, "Are there too many activists here?" He said Korten answered, "Just about right."



Scott Bontz. Winding down from the Prairie Festival, chef Donna Prizgintas hams with Wes Jackson and Wendell Berry.

Can You Handle the Truth?

“Dick Cheney”

Confusion over the reasons behind the United States’ invasion and occupation of Iraq has prompted a wide range of reactions across the country. How do you think Americans would respond if vice president and energy policy-maker Dick Cheney were to deliver the following address on national TV, outlining what we feel was the root motive for our actions?

—Stan Cox and Marty Bender

My fellow Americans:

Tonight I have been authorized by our president to tell you the truth. We have been reluctant to do this, because, as that movie actor once said, we didn’t think you could handle the truth. But we have become concerned that your support for the Iraq effort is wavering, and we cannot let that happen.

So we’re going to tell you the truth, because, to be frank, we’ve tried just about everything else and you still don’t seem satisfied.

In recent years, you, the American people, have demonstrated your toughness. You have shown that you can deal resolutely with horrifying attacks on our country, with terror alerts, and with seeing your sons, daughters, and spouses sent off to war in Asia. You have stoically accepted—most of you—some adjustments in your constitutional rights. You have tolerated floods, droughts, forest fires and a massive electrical blackout.

You have worked your way through many difficulties, but there is one blow that has not yet struck you—a blow the full force of which, we are convinced, you simply could not withstand. It is a challenge that we must confront head-on or else be crushed. I am talking about a sharp and permanent rise in the price of petroleum.

Now I don’t mean that we are fighting a “war for oil” in the sense that the anti-war malcontents in our society use that term. This isn’t about which corporations get contracts or how much salary your vice president might have received from one company or another. We are in Iraq and we have to stay there because, in the words of President George Herbert Walker Bush—a man whom I am proud to have been serving at the time our troops began their involvement in Iraq twelve years ago—“The American way of life is not negotiable.”

Despite all the rumors, our Iraq policy is not being dictated by think tanks or in the bowels of the Pentagon. You yourselves have dictated it, and we have responded. You want to keep your way of life, you want national prosperity, and you want to believe that when the United States steps into the world arena, we do so only

with the noblest of motives. This year, with our victory over Saddam Hussein, you came very, very close to getting all of those things.

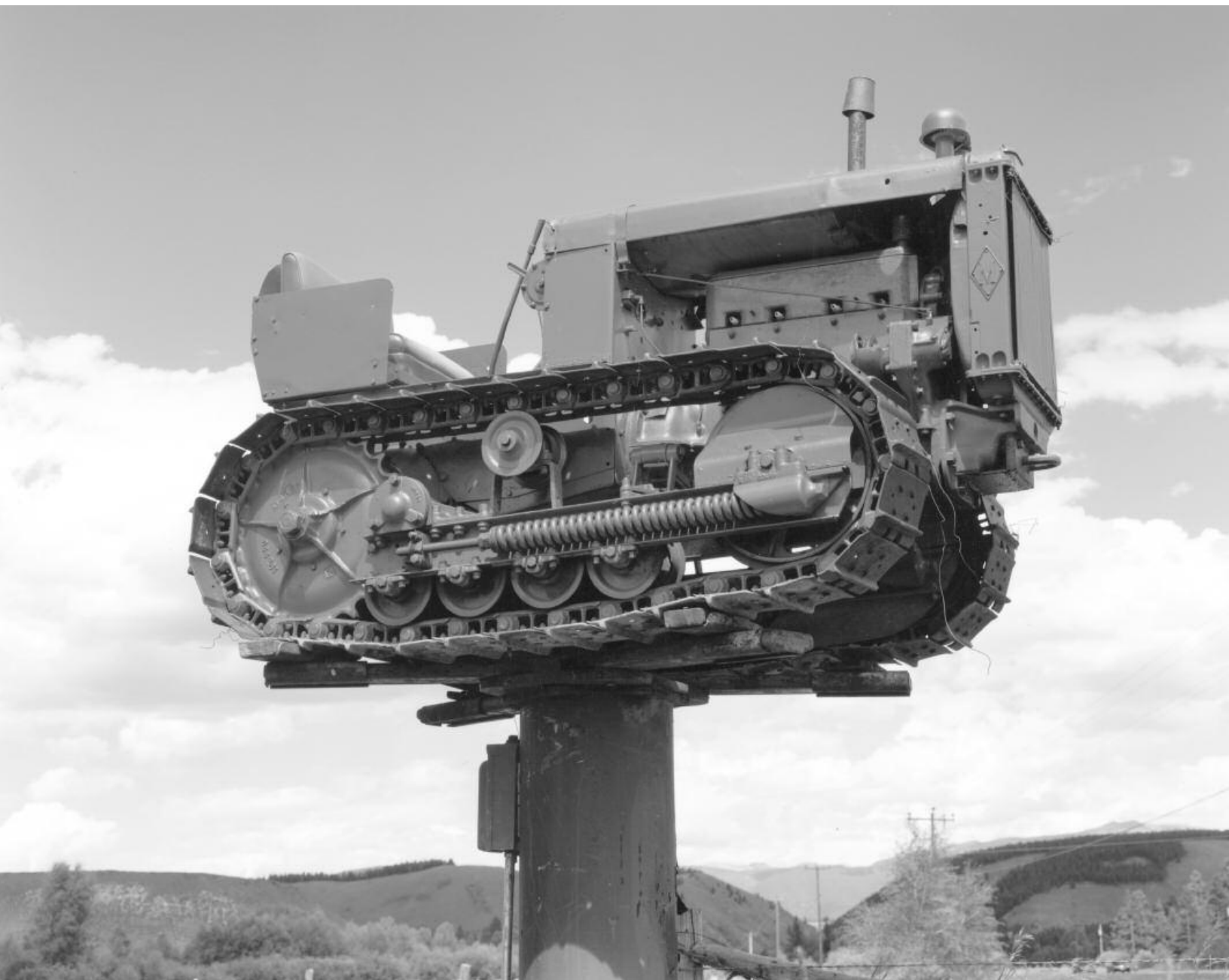
But now, as you know, very serious challenges have emerged in Iraq, made worse by the carping of armchair critics. If we are to tough this thing out, we have to stop kidding ourselves. To secure our energy future and thereby preserve our way of life, we, as loyal Americans, have to go the distance in Iraq. And that means growing up a bit, letting go of our illusions, and getting down to business. That means securing our supply of oil and natural gas, not just in the immediate future, but for decades to come.

Our country’s production of oil hit its peak in about 1970, and it has been declining ever since. In the late ’90s, we began importing more oil than we produce, and that’s the way it’s going to be from now on. And, in this decade or the next, the world’s oil production will reach a peak, level out for some time, and then begin an irreversible decline.

Geologists and economists certainly don’t agree on the precise year when the peak will pass. Some say world oil production could begin declining by 2010. Some say it’s already falling. Some hold out the hope that we’ll find miraculous, huge new reserves of oil, but even they admit that we’ll pass the peak before 2030. And when the world’s oil production begins its decline, we will never again see a period of increasing oil supplies.

World demand for petroleum is accelerating, thanks largely to increased consumption in countries like China and India that want to emulate our way of life. When world production starts heading downward, and world demand for oil continues to strain upward, the shock to the global economy will be devastating. But note that I am talking about worldwide production and consumption. A large, powerful nation that has secure access to a generous share of Middle Eastern oil—two-thirds of the world’s remaining oil, and the easiest to pump—will be able to continue meeting its own needs and even prospering for decades, leaving the rest of the world to worry about declining supplies.

That lucky nation will be the United States of America, thanks to our decisive action in Iraq. We have secured Iraq’s enormous oil and gas reserves—the second biggest on the planet—we continue to work with our friends in Saudi Arabia—the biggest—and if we remain resolute, we will have shown the rest of the world who calls the shots in the Mideast. At this stage of the game, we simply cannot afford to falter.



Those of you over the age of 40 or so may think that you saw catastrophic oil shocks in the 1970s. But those were Sunday afternoon picnics compared with what we would be facing had we not secured Iraq. We recovered from the stagflation and long gas lines caused by that earlier crisis, as soon as the flow of cheap oil resumed and increased. A future oil shock would be much nastier, and it would be permanent.

Let me paint you a picture of a future in which we've reached the far side of the world oil peak with the Middle Eastern wellheads still in foreign hands:

A full tank of gas whenever you want it, that comfortable ride to work with only your stereo system for company, cheap flights to Grandma's at Christmas, a camping trip in your RV—with the next oil crisis, these would become only fond memories, or at best occasional luxuries. That big, beautiful, three-ton investment

Peter Goin. Tractor in sky along Highway 34 northwest of Denver, 1996.

parked in your garage? How would it feel to have to let it just sit there, day after day, except when you have to haul something?

Today, the average American travels more than 17,000 miles by car and plane every year, and every mile of that is powered by relatively inexpensive fossil fuels. We can keep that way of life. But if we were to let Iraq slip away, your life could start to seem like one long ride on a crowded bus or maybe an eternal carpool, trapped in the backseat of a Neon with your loudmouth neighbor.

If we were to stumble blindly over the oil peak, everything—and I mean everything from fresh vegetables in the winter to trash pickup—would become much more expensive. Look around your house. How much plastic do you see? How much came from China? Most of your household goods are shipped from abroad, and even the average American-made item travels about 300 miles before you buy it and drive it home. Moving people and goods from one place to another accounts for 11 percent of our economy. Almost all of that transportation depends on petroleum—and, of course, most of those goods are at least partly composed of petroleum products. Let oil go to \$50 or \$100 a barrel, and Wal-Mart can take down its “Always Low Prices” signs.

And to those of you who recycle and drive those little 40-mile-per-gallon cars: Don’t feel too smug. Once on the downhill side of the oil peak, you’ll find that you’re just as hooked as your neighbor with the Suburban and the snowmobile.

There is no energy source equivalent to that Persian Gulf oil that fairly spurts out of the sand. Ethanol and hydrogen? Those aren’t energy resources—they are just fuels that are handy for running vehicles. To generate enough energy to make enough alternative fuels to run our growing fleet, we’d have to use a lot of oil or coal or natural gas—which will have its own peak—or build more nuclear plants—which you’ll complain about, of course—or install millions of acres of photovoltaic solar arrays, and/or devote most of our arable land to energy crops. Even then, we couldn’t keep up.

With a reduced supply of energy for transportation, Detroit would have to switch to making those little, funny-looking, efficient cars, and all of you would have to drive a lot fewer miles every year, and we’d have to sink a fortune into mass transit, and—well, it just wouldn’t look much like America anymore.

And what if we wanted to use renewable resources to replace the oil and gas we use every year just to produce petrochemicals like plastics, synthetic rubber and solvents? That would require the entire yearly growth of all of our forests! Trouble is, we’re already consuming that growth.

Americans know that the best defense is a good offense. I’ve spent many years in the energy industry.

It’s an often unpredictable business, but there is one certainty: No one has ever lost a dollar betting on the U.S. public’s lack of interest in energy conservation.

You may recall that in early 2001, I headed President Bush’s Energy Task Force. I have resisted the release of any records relating to our deliberations, but not, as has been charged, to protect myself or my colleagues. In shielding you, the American people, from the details of our energy planning, I was trying to allow you to keep both your way of life and your pride in America as a moral leader in the world. But now I’m putting all the cards on the table, so you will have to bear the same burden that the president and I do—the knowledge that we are fighting for economic survival, not principle.

The task force received truckloads of expert advice, and from it we learned that we had no choice but to move quickly to guarantee our access to Mideast oil and gas, regardless of the consequences. We were provided no better description of the current situation than one compiled by my friend James Baker III and his Institute for Public Policy. Let me share with you what their report called our “central dilemma” when it comes to energy:

“The American people continue to demand plentiful and cheap energy without sacrifice or inconvenience. But emerging technologies are not yet commercially viable to fill shortages and will not be for some time. Nor is surplus energy capacity available at this time to meet such demands. Indeed, the situation is worse than the oil shocks of the past because in the present energy situation, the tight oil market condition is coupled with shortages of natural gas in the United States, heating fuels for the winter, and electricity supplies in certain localities.”

The report went on to point out that “Iraq remains a destabilizing influence to U.S. allies in the Middle East, as well as to regional and global order, and to the flow of oil to international markets from the Middle East.”

We met the challenge. A few short months ago, Iraq was a “destabilizing influence.” Now it’s our ace-in-the-hole, our key to happiness and prosperity. Things may be rough right now, for us and for the Iraqis, but our central mission—future oil security—has been accomplished.

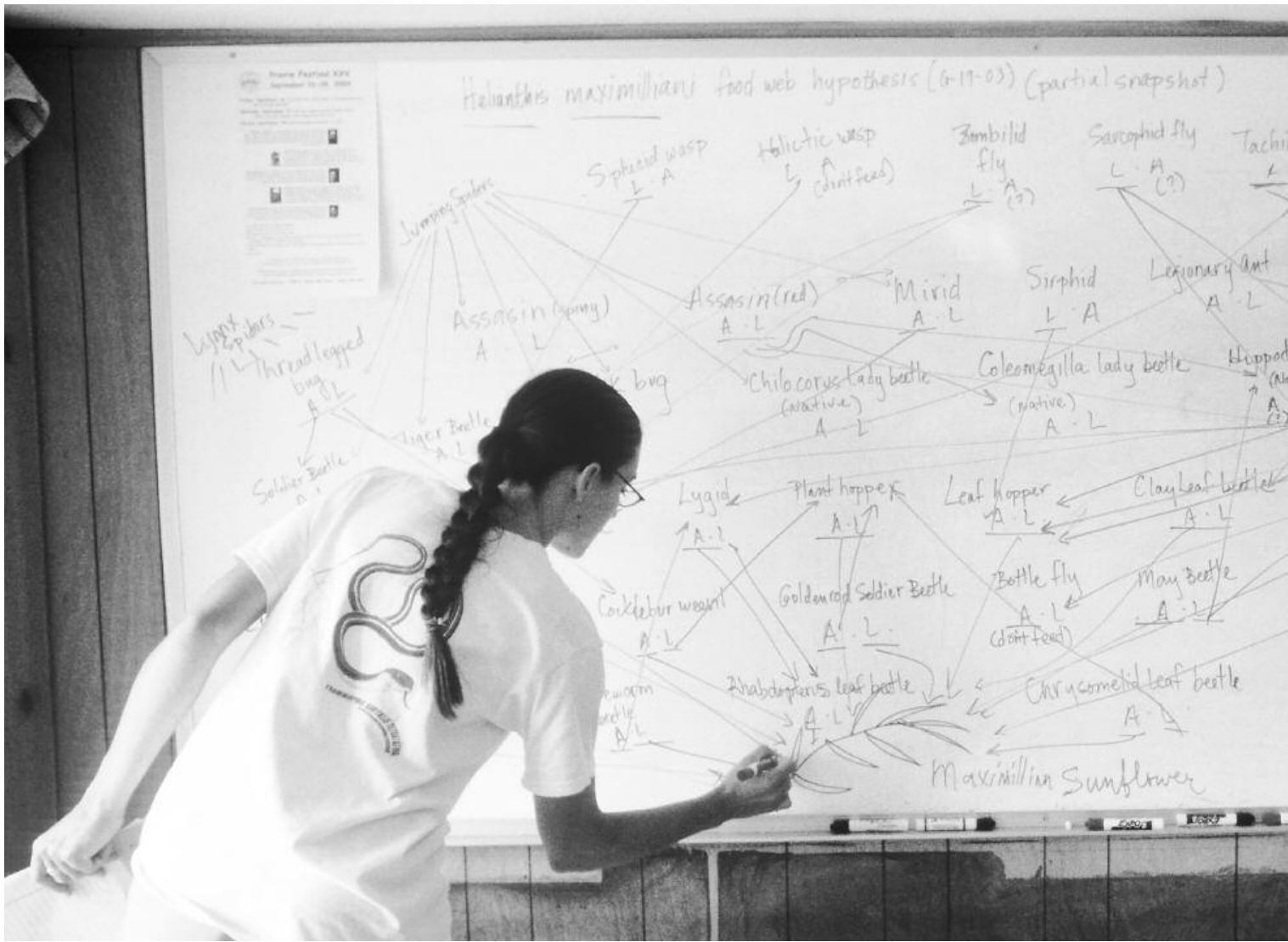
Now that we’ve had this free and honest discussion of the situation, I am confident that you and those you’ve elected to Congress will keep funding our work in Iraq as long as is necessary. It’s an investment you can’t afford to pass up. And that’s the truth.

Thank you, and good night.

This article, as it originally appeared online with embedded links to information sources, can be found at <http://www.counterpunch.org/cox09232003.html>.



*Peter Goin. Bravo 20 Bombing
Range, Carson Sink, near
Stillwater National Wildlife
Refuge, Nevada, 1987.*



Scott Bontz. Caterina Nerney maps who eats whom in the sunflower plot.

Connections

Caterina Nerney

Plants are many things to many creatures. To a human, a plant may be a beautiful sight or a nice shade to nap under. To an herbivore it may be food. To a parasitoid wasp, it may be hunting ground for a caterpillar to lay eggs in. To a predatory insect, it may provide nectar and shelter—and enjoy reciprocal control of herbivores. Plants are the base of a beautifully intricate web of life.

The importance of non-herbivorous players in this web has not been as closely studied as herbivory. What is the role in plant growth of the predators and parasites that feed on herbivores? What are the plant's strategies for maintaining allies that will control herbivores? When these interactions are taken into account, the picture becomes much more complex—and much more interesting.

With these questions in mind, I set out to take a snapshot of the food web that is based on Maximilian sunflower, one of the plants that The Land Institute is working with to make perennial grain crops. I call this a snapshot because a food web's players are very likely to change from day to day and even from hour to hour. With time, different insect life stages emerge, and there is migration from one food plant to another.

I collected insects and observed their interactions in a patch of Maximilian sunflower at The Land Institute over four days of late June. I found 49 species of insects and spiders. After identifying the players, I tried to map how they interact and affect each other.

The diagram I drew to help me picture this has a Maximilian sunflower at the base, and the herbivorous, carnivorous, omnivorous and parasitic insects and spiders that I found linked by arrows. These arrows connect one species to another in the direction of who eats whom. Under each name, I wrote "A" and "L" for adult form and larvae, since they often have different eating habits.

Sitting in the sunflowers for long stretches, I saw predation by assassin bugs and spiders, nectar feeding by adult ladybird beetles, herbivory by caterpillars, weevils and beetles. Some of the interactions I did not see, but know from natural history studies.

I realized that there is much more happening in the Maximilian food web than I could hope to understand in the few days I looked. But this is a great source of joy for me. I believe that striving to understand the connection of plants and their enemies and benefactors will be of great use in developing agriculture patterned after ecosystems.



Rock Phosphate

Jim Minick

Once a month I hike the half-mile hill to my neighbor John's. Retired from 45 years of strawberries and cattle, he now lives on cable TV and Social Security. For 70 years he beat the sun every morning, but these days he sleeps in until 11 and stays up till 2 at night. His 80-plus years of loving fatback and pinto beans show in his growing belly.

John only gets out every four weeks to buy groceries, so when he has company, an avalanche of stories pours forth. "You know, I never give advice," his sly grin skews. Then he starts, telling me how to grow tomatoes, interpret the Bible or deal with women, despite his two failed marriages. Cricket, Lulu and Puff, along with several other Chihuahuas, surround him. In his stuffed armchair, Cricket reigns queen, pinched between his left thigh and the chair. Bluey, her daughter, sits on top of her, and Lulu perches on the other leg. They growl and yap at each other and me and any noise outside, which every 10 minutes they investigate. Down from the throne they scamper to scratch at the screen door, which he dutifully opens and out they go barking. The whole routine doesn't slow John one nip as he continues talking about the latest political scandal or his own education, where he graduated at the top of his class of 12 in a one-room school house.

Every visit, we talk religion, pornography and fertilizer, always fertilizer. John will quote St. Paul next to Julius Caesar, then Shakespeare next to the Cornell University Berry Bulletin. Often the quote gets followed by a "He's full of crap" and a black slip of spit into the coffee-can spittoon beside his chair. When he puts in a new dip, the tiny spoon slows his banter a moment, but his next words come out veiled by a brown dust-cloud of snuff. I always sneeze.

John's "advice" usually focuses on farming—"You just want to farm like my grandmother did, Jim, no spraying, no fertilizer, no nothing." Then he praises the modern chemicals that kept him in the red fields of strawberries so many years. "Just a little Roundup won't hurt." Several times he has told me about using DDT in the 1950s, following the directions, fogging the whole kitchen to kill the flies. He knows the danger, wonders why he never got sick, questions why a neighbor, who in his words was "100 percent organic," died in her late 30s to cancer.

But John can't fathom our new ways of farming, keeps thinking "organic" is how he was raised, so many dirt-poor years ago. Rock Phosphate especially gets him; he can't forget it even after eight years. He

remembers helping us spread organic fertilizer before the berries were planted. As he rode in the back of the pickup, directing our use of his spreader, he kept chiming in about the waste of time and money on these "powders." He read the bags, knew the numbers were small. "Rock Phosphate—never heard of that. But Jim, it only is 0-3-0, only 3 percent phosphorous!? Good golly, my 10-10-10 has 10 percent phosphorous. Now that has punch. Sure you don't want to try it?"

At first I patiently try to explain how the organic fertilizer lasts longer and works differently than the petroleum-based fertilizers, but soon tire of countering his jabs. Eventually, out of respect, I avoid the subject, say "no" politely every time he offers. He loves to argue, but fertilizer is just too sacred to both of us, and I value his friendship more than the debate.

Sarah and I do use his advice often, though. Our new road has a better grade, thanks to his observation. And because of him, we use orchard grass as a ground cover in the aisles, between the berries. He helps us identify weeds, commiserates about the deer and coons, and always fills in our history of this place. His stories about the abandoned homesteads which border our properties people the piles of fallen-in log cabins.

John knows little about blueberries, though, and this he hates to admit. He pulls out his old manuals, orders catalogs, and reads what he can on blueberries, to quiz me about pruning, yields and of course, fertilizer. Despite our nutrient-belief differences, he admires our field, respects our hard work and success. He only visits the field a few times, but he still knows from his own experience the amount of work. In later years, before we move away, he often jokes about our early "enthusiasm" and how it seems to have played out in the last year or two. Of all the people who visit the field, he recognizes best our "perfectionist" ways. He knew before us of our overzealousness in weed-pulling and mulching. In these last visits, he likes to recall our "religious fervor," rub in our youthfulness, make me admit I might have overdone it on the mulching. But never on the fertilizer.

We have a photograph of him in the field, probably from 1996 or '97. He is our first "customer," walking the field of then-small bushes, admiring their green vigor and small crop of blue. He picks a nickel-sized one, holds it up to the camera, and then samples. His over-alled belly hasn't spread yet, but his smile is as it is now, huge, warm, and mischievous.

Right after the photo, I remember him asking, "How's the phosphorous in these babies?"

Some Further Words

Wendell Berry

Let me be plain with you, dear reader.
I am an old-fashioned man. I like
the world of nature despite its mortal
dangers. I like the domestic world
of humans, so long as it pays its debts
to the natural world, and keeps its bounds.
I like the promise of Heaven. My purpose
is a language that can repay just thanks
and honor for those gifts, a tongue
set free from fashionable lies.

Neither this world nor any of its places
is an "environment." And a house
for sale is not a "home." Economics
is not "science," nor "information" knowledge.
A knave with a degree is a knave. A fool
in a public office is not a "leader."
A rich thief is a thief. And the ghost
of Arthur Moore, who taught me Chaucer,
returns in the night to say again:
"Let me tell you something, boy.
An intellectual whore is a whore."

The world is babbled to pieces after
the divorce of things from their names.
Ceaseless preparation for war
is not peace. Health is not procured
by sale of medication, or purity
by the addition of poison. Science
at the bidding of the corporations
is knowledge reduced to merchandise;
it is a whoredom of the mind,
and so is the art that calls this "progress."
So is the cowardice that calls it "inevitable."

I think the issues of "identity" mostly
are poppycock. We are what we have done,
which includes our promises, includes
our hopes, but promises first. I know
a "fetus" is a human child.
I loved my children from the time
they were conceived, having loved
their mother, who loved them
from the time they were conceived
and before. Who are we to say
the world did not begin in love?

I would like to die in love as I was born,
and as myself, of life impoverished, go
into the love all flesh begins



Scott Bontz. Contrails.

and ends in. I don't like machines,
which are neither mortal nor immortal,
though I am constrained to use them.
(Thus the age perfects its clench.)
Some day they will be gone, and that
will be a glad and a holy day.
I mean the dire machines that run
by burning the world's body and
its breath. When I see an airplane
fuming through the once-pure sky
or a vehicle of the outer space
with its little inner space
imitating a star at night, I say,
"Get out of there!" as I would speak
to a fox or a thief in the henhouse.
When I hear the stock market has fallen,
I say, "Long live gravity! Long live
stupidity, error, and greed in the palaces
of fantasy capitalism!" I think
an economy should be based on thrift,
on taking care of things, not on theft,
usury, seduction, waste, and ruin.

My purpose is a language that can make us whole,
though mortal, ignorant, and small.
The world is whole beyond human knowing.
The body's life is its own, untouched
by the little clockwork of explanation.
I approve of death, when it comes in time
to the old. I don't want to live
on mortal terms forever, or survive
an hour as a cooling stew of pieces
of other people. I don't believe that life
or knowledge can be given by machines.
The machine economy has set afire
the household of the human soul,
and all the creatures are burning within it.

"Intellectual property" names
the deed by which the mind is bought
and sold, the world enslaved. We
who do not own ourselves, being free,
own by theft what belongs to God,
to the living world, and equally
to us all. Or how can we own a part
of what we only can possess
entirely? Life is a gift we have
only by giving it back again.
Let us agree: "the laborer is worthy
of his hire," but he cannot own what he knows,
which must be freely told, or labor
dies with the laborer. The farmer
is worthy of the harvest made
in time, but he must leave the light
by which he planted, grew, and reaped,

the seed immortal in mortality,
freely to the time to come. The land
too he keeps by giving it up,
as the thinker receives and gives a thought,
as the singer sings in the common air.

I don't believe that "scientific genius"
in its naive assertions of power
is equal either to nature or
to human culture. Its thoughtless invasions
of the nuclei of atoms and cells
and this world's every habitation
have not brought us to the light
but sent us wandering farther through
the dark. Nor do I believe
"artistic genius" is the possession
of any artist. No one has made
the art by which one makes the works
of art. Each one who speaks speaks
as a convocation. We live as councils
of ghosts. It is not "human genius"
that makes us human, but an old love,
an old intelligence of the heart
we gather to us from the world,
from the creatures, from the angels
of inspiration, from the dead—
an intelligence merely nonexistent
to those who do not have it, but
to those who have it more dear than life.

And just as tenderly to be known
are the affections that make a woman and a man
their household and their homeland one.
These too, though known, cannot be told
to those who do not know them, and fewer
of us learn them, year by year.
These affections are leaving the world
like the colors of extinct birds,
like the songs of a dead language.

Think of the genius of the animals,
every one truly what it is:
gnat, fox, minnow, swallow, each made
of light and luminous within itself.
They know (better than we do) how
to live in the places where they live.
And so I would like to be a true
human being, dear reader—a choice
not altogether possible now.
But this is what I'm for, the side
I'm on. And this is what you should
expect of me, as I expect it of
myself, though for realization we
may wait a thousand or a million years.



Scott Bontz. Brown thrasher.

Read by the author at The Land Institute's 2003 Prairie Festival. Published in American Poetry Review, May-August 2001, and The Best American Poetry 2003.

Ecology Gadfly Garrett Hardin, 1915-2003

Garrett Hardin, ecological pioneer and influence on The Land Institute, has died.

Hardin and his wife, Jane, who were in poor health, planned and carried out their deaths Sept. 14 at home in Santa Barbara, California. He was 88, she was 81.

Hardin was a pioneer who wrote controversially and influentially on abortion, immigration, foreign aid and other prickly issues.

He was best known for his essay *Tragedy of the Commons*. He argued that we must limit freedoms if we are to not ravage the Earth, and so its own ability to live, with overpopulation, resource depletion and pollution. He called for mutual coercion, mutually agreed upon, as the only alternative. The article appeared in the journal *Science* on Dec. 13, 1968, and has since been used in more than 100 anthologies.

In its death notice Oct. 3, *Science* said, “His hard-headed approach to the competition for resources won him notoriety as well as fame—as when he suggested that if rich people let poor people into their ‘lifeboat,’ all will sink. ‘The human species viewed as a whole has been a disaster for the Earth,’ he said in a 1996 interview.”

Although he had what some considered harsh views, Hardin surprised people with his gentle demeanor.

“He had a rare gift, sitting with a group of students, faculty or friends, and with a gorgeous, grandfatherly smile, asking questions that made you think and hurt,” said Barry Schuyler, an environmental studies professor at University of California, Santa Barbara, and longtime colleague.

Land Institute President Wes Jackson said, “Garrett Hardin was a tough but clear thinker. Often at odds with some of his positions, I was always a different man at the end of one of our conversations. He remained a strong supporter of our work to the end.”

Hardin was an emeritus professor of human ecology at Santa Barbara, where he taught for three decades until his retirement in 1978. He remained active, and in 1986 the Hardins helped found Californians for Population Stabilization. He wrote 27 books and 350 articles.

Hardin was frail from polio and suffered from a heart condition. Jane Hardin had a form of amyotrophic lateral sclerosis, also known as Lou Gehrig’s disease.

They were both members of the Hemlock Society and felt very strongly that they wanted to choose their own time to die, one of the couple’s four children, Sharon Clausen, told the Santa Barbara News-Press.

Hardin was born in Dallas, grew up throughout the Midwest. After earning a doctorate in biology from Stanford University in 1942, he joined the Carnegie

Institution’s plant biology lab, where he tried to create food from algae. The Los Angeles Times reported that most of the lab’s products were foul, both in taste and smell. But what eventually turned Hardin off was his growing belief that creating any large-scale food source would ultimately only worsen overpopulation. In 1946, he joined the small liberal-arts college that became UC Santa Barbara, and in 1960 he developed a course in human ecology to address population and environmental concerns.

The lifelong Republican pushed to make abortion on demand legal, arguing across the country for the need to free women from compulsory pregnancy. He argued to fellow conservatives that the cost of raising an unwanted child far exceeded the price for an abortion. He joined an underground network that helped Americans obtain abortions in Japan and Mexico.

In 1974, Hardin wrote about immigration as a threat to population control in an article titled “Lifeboat Ethics: The Case Against Helping the Poor.” This drew the ire of the left.

The News-Press reported that those who knew him said he enjoyed making a stir. One former student, Ed Maschke, said, “He certainly made you question everything, and that in my mind is the essence of true teacher.”



Garrett Hardin Society. Hardin at home in 1968.

Their Bodies are Needles

David James Duncan

I conjure a day in October 1968 that took a sudden unexpected turn toward the primordial. I was 16, my big brother was recently dead, and the Vietnam war was raging, scaring me witless; fear made me wild and unschoolable; my grades grew too crappy for college; the draft was a year and a half away. Something in the autumn air pierced my worry, though, and moved me to drive, without purpose, up to the Columbia gorge in my old '55 Buick.

The big river was at its Indian summer low, leaving it broken, downstream of the dams, by hundreds of long, beautifully sculptural sandbars. Picking the longest such bar in sight, I began walking toward the tip to try and see what it was pointing at.

In the center of a two-mile-wide stretch of river, I ran out of finger. No one in sight. No wind. No sound but the river's near silent slide. No waders with me, but I eased in up to my pockets, the better to feel the big seaward sliding. Sopped my wallet, though I didn't know it yet.

Junkie for fish that I am, I'd brought a rod, and started throwing one of those big spinners of the day with the fluorescent orange golf tees on 'em—a ridiculous means of seeking salmon. I hooked the nothing I deserved. But who cares when it's just you and two miles of empty river, even measuring sideways: you and two thousand miles, measuring lengthways. Seeing a fish or two roll, I kept casting for a time. But as the air turned eveningward, turned magic, my lure started looking to me like a shot-up bomber going deservedly down over North Vietnam. I stopped casting. I just stood there. What an incredible good fortune it's been to have learned, so early in life, that rivers always reward the man, woman or child who just stands there.

The gift came this time, just shy of dusk, when all across that vast plain of water, beneath a still vast dome of orange and blue, every salmon I couldn't catch, in accord with some invisible signal, began to jump and roll. And there were thousands! The entire face of Chewana, the Great River, became a miles-wide cauldron: great chinooks and bright coho; sockeyes and huge Idaho steelhead too, in those days; all but two of the dams in place, the extinctions coming fast, yet still the river put on her ancient show.

And the sound! The body language. Salmon dance and salmon drumming. Coho slashing the surface so close by they made me yell, then laugh at myself. Huge chinook leaping so far off that their bodies had long since vanished when the cymbal crash arrived. Ocean energy, mountain born, boiling and flying, roiling and

spiraling, both directions, as far as the eye could see.

For those who've never seen them in their rightfully vast numbers, my words, all these years later, might sound like one more bitter elegy to wonders glimpsed, then lost forever. But this is not elegy. This is invocation. The gifts nature keeps trying to bequeath us are astounding, if we merely greet those gifts with a watershed and world that enables them to be.

To see a magnificent ocean fish, in fresh water, is always like a dream. And in a dream, everything is inside you. A piece of my interior will never leave that sand fingertip amid the salmon-shattered orange and blue. Salmon are a light darting not just through water but through the human mind and heart. Salmon help shield us from fear of death by showing us how to follow our course without fear, and how to give ourselves for the sake of things greater than ourselves. Their mass passage from the sea's free invisible into the river's sacrificial and seen is not just every American's but every Earthborn man's, woman's and child's birthright.

Their bodies remain the needle, their migration the thread, that sews this vast, broken region into a whole. No kilowatt can replace this, no barge can transport it. The Columbia that Industrial Man has given us is dying. The rivers least touched by man thrive. The finned, winged, and four-leggeds watch, waiting to join us, or not, in the world we do or do not create.

So make your offerings, campadres. Columbia, Cowlitz, Grand Ronde, Deschutes, John Day, Clearwater, Bitterroot, Salmon, Skagit, Soleduck, Snake, Spokane, Metolius, McKenzie, Yakima, Umatilla, Humptulips, Klickitat, Klamath, Kalama, Clackamas, Malheur, Minam, Blackfoot, Nestucca, Wallowa, Owyhee, Payette, Powder, Boise, Flathead, Okanagan, Coeur d'Alene, Elwha, Quinalt, Clark Fork, White Salmon, Willamette, Washougal, Wind. Roll on.

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A Conservatism That Once Conserved

Richard Manning

The rural, rocky chunk of Michigan that raised me rested on the backside of a hill, my father's share of my great-grandfather's farm. Local lore said this pitiful piece had remained in the family only because the hill hid it from view. That is, my grandfather only kept it because he needed a place where he could farm on Sunday out of sight of the neighbors.

As a boy growing up in the '60s, I also remember being instructed in the operation of our Farmall H tractor, particularly to make straight furrows. I dared to question this requirement, wondering what difference "straight" made to the oats. I was not-so-gently instructed as to the degree of shame that crooked furrows would bring on the family.

My grandfather may not have been as churched as the neighbors, but he was every bit as conservative, and then some. Beyond conservative, he was obstreperous and tough. Nonetheless, he still cared what the neighbors thought of him. These are not separate matters. Respect for local opinion was what enforced rural America's conservatism a generation ago.

Those of us who live in rural America today face one of two sets of conditions, both radically changed since my grandfather's time. We either live in places that are rapidly depopulating or places that are rapidly populating with sprawl. My bit of rural Montana falls in the latter category. My gulch has suburbanized in about 10 years.

During that time, I've gotten to know a few of my neighbors. Just a few; that's the way the world works now. Many of those encounters arose through heated conversations, all with the same theme. For example, once I politely complained to a man that his rotund and rottenly spoiled child was using his filthy, obnoxious dirt bike to cut furrows up the side of my land, and it was not their crookedness that upset me. The man said, "We moved out here so my boy could ride his dirt bike wherever he wanted."

The odd part is that this man and many of the rest of my neighbors call themselves conservative. I am not assuming; one only need read the stickers and flags covering their SUVs. Yet what is the foundation of this conservatism if it disregards what the neighbors might think, that is, ignores the community standard?

This is not a small matter. A misguided notion of freedom lies at the heart of the suburban cancer on the landscape. My neighbors will tell you they moved



because in rural America you are free to do as you please. Where did they get this idea? Rural America, at least when there was a functioning rural America, never advertised any such freedom. Just the opposite.

All of this would be only so much personal vexation if they didn't extend their disregard of community standards to the natural community. Miss the blue-grass lawn you had in New Jersey? No problem. Rip up that stand of Montana

short grass prairie. No rain? Pump the aquifer dry to keep it green. Like horses? Go ahead. Fence that pasture big enough to feed 2.5 percent of one horse then put four in and graze it to rocks.

If you are oblivious to the natural community's feedback, you can get away with these things for a while. You'll not notice the elk disappear, the streams dry up, the noxious weeds creep up the dirt-bike trails. You'll not hear these complaints if your relationship with community is fed through a satellite dish.

I can't help but imagine my conservative grandfather would have been terribly appalled by all this. He thought that to let the land suffer was a truly sorrowful thing.

Actually, I don't believe I have to imagine what my grandfather would have thought. A few weeks ago I met a man in his 90s who had cowboied all his life in Montana. We happened to be driving past a typical suburban horse pasture, four forlorn horses standing in an acre of dust and rocks. I asked him what he thought of his neighbors. He shook his head, but he couldn't speak. He was silent. It was simply unspeakable.

With the Prairie Writers Circle, The Land Institute invites, edits and distributes essays to newspapers. For all essays as they are released, see our web site, www.landinstitute.org.

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Liz Granberg. This bumblebee was one of scores of paintings by Lindsborg, Kansas, artist Mary Kay in an art show visited during the Land Institute's Prairie Festival.

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Nancy Vogelsberg-Busch and family
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Festival Programs

Wendell Berry
Priti Cox
Terry Evans
Bob and Jane Fleck
Amy Fleury
Mary Kay
David Korten
Winona LaDuke
Mas Masumoto
Charlie Melander
Donna Prizgintas
Salina Art Center
Bill Sheldon
Angus Wright
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Prairie Festival Tapes

From September 27-28, 2003, at The Land Institute

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Natural Systems Agriculture Round Robin <i>Land Institute scientists</i>	_____
The End of Empire <i>David Korten</i>	_____
Reading from <i>Citizenship Papers</i> <i>Wendell Berry</i>	_____
An untitled talk <i>Winona LaDuke</i>	_____
Writers Corner with <i>Angus Wright, Amy Fleury, Bill Sheldon and Wendell Berry</i>	_____
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The Writers and Photographers

Marty Bender studies energy in agriculture for The Land Institute and ran its 10-year Sunshine Farm project.

Wendell Berry is a writer and farmer in Kentucky. His most recent book is *Citizenship Papers*, from which he read at The Land Institute's Prairie Festival.

Scott Bontz edits *The Land Report*.

Stan Cox is The Land Institute's senior research scientist. He aspires to be a speech writer for the Republican Party.

David James Duncan is the author of the novels *The River Why* and *The Brothers K*. The essay here is from a collection called *My Story as Told by Water*.

Terry Evans is a Land Institute board member and the arts associate for *The Land Report*.

Peter Goin is professor of art at the University of Nevada, Reno. His most recent book, co-authored with C. Elizabeth Raymond, is *Changing Mines in America*, about the historical evolution and cultural meaning of mining landscapes.

Liz Granberg is Wes Jackson's assistant and associate editor of *The Land Report*.

Wes Jackson is president of The Land Institute and

author of *Becoming Native to this Place*.

Richard Manning is a member of The Land Institute's Prairie Writers Circle. His most recent book is *Against the Grain: How Agriculture Has Hijacked Civilization*. He lives in Lolo, Montana.

Jim Minick farms and writes in the mountains of Virginia, and teaches English at Radford University. The essay here is from an upcoming book, *The Blueberry Years*, about his family's organic you-pick blueberry farm.

Caterina Nerney is a graduate student in insect ecology at the University of California, Berkeley, and became a Land Institute graduate fellow this year.

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Scott Bontz. Steven Lancaster harvests seed of Illinois bundleflower from The Land Institute's 160-acre prairie. In the prairie, Illinois bundleflower grows mixed with other perennial plants, similar to the perennial polycultures we envision for

farms. We harvested an abundance of clean bundleflower seed, demonstrating the feasibility of harvesting grain from perennial polycultures. The seed will be used in experiments at the University of Minnesota.



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