

The Land Report

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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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On the Front Cover: Aerial photo of the recently-purchased Wauhob land

Arches, Spandrels, and Genomic Architecture

Wes Jackson

My friend and Friend of the Land, Professor Charlie Sing, in the Department of Human Genetics at the Medical School at the University of Michigan, has helped me understand what follows.

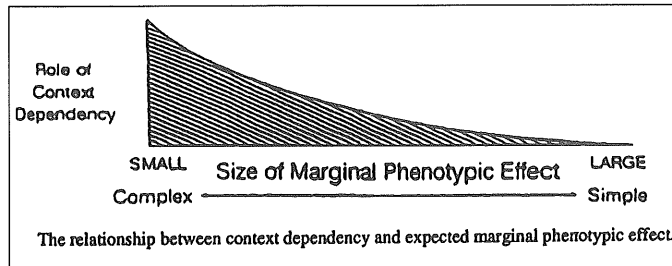


Figure of the Folded Gaussian Distribution

Imagine, if you will, a normal distribution, what's called the Gaussian distribution. Now fold it to yield half of this statistical distribution. Look to the left in the above figure. This is the distribution for a genome, and here we see that most of the genes of that genome (the entire genetic complement) are small-effect genes. Few are for large effects. Whether we are dealing with humans or corn plants, this is the general architecture, a reality with important implications. According to Dr. Sing, for humans only ten percent of the breast cancer cases, ten percent of the prostate cancer cases and less than five percent of the heart disease cases are due to large-effect genes. This is amazing considering what we read in the press and hear while listening to President Clinton's State of the Union message—someone has found a gene for this kind of cancer or that kind of cancer or this kind of heart disease or whatever. We hear talk about large-effect genes, and it is never mentioned that there is a very small contribution of such genes to our overall health.

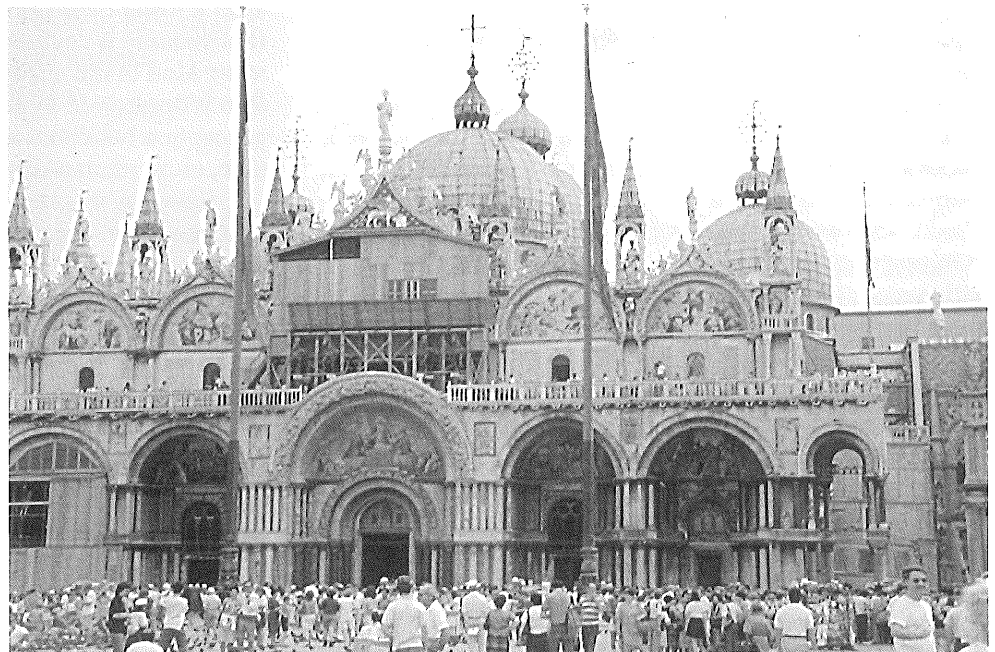
At the left in the figure with all of these small-effect genes we have what might be considered a shock absorber. When some alien gene comes in, either from long or short evolutionary distance, these small-effect genes absorb the shock, but this absorption forces a change in the genetic profile, which is to say, a change in the architecture of the genome—overall an important consequence. I suspect that what we are look-

ing at here is the very basis of homeostasis. It is one of those times that we say, "Aha, this must be the way that multicellular creatures of this planet have managed to be resilient to the perturbations coming at them in a world that is fundamentally unknowable!" This is Darwinian evolution at the most basic level.

Various cathedrals are known for their wonderful arches, the structures responsible for supporting the roof. The space between the arches is called a spandrel; in churches it is bricked in. The spandrel is a derivative, a place between the arches. In biological systems, that which is under genetic selection at one point may be analogous to that arch. The spandrel, once bricked in, is likely to be plastered over and then painted with a fresco. At this point the story changes. The spandrel takes on greater significance when visitors from a town in Tuscany or Umbria arrive in Venice and say, "We want our church to be like that. We want to be able to paint a fresco on the plastered spandrel." At this point the spandrel itself, indeed the fresco, is an object of natural selection.

This analogy helps explain how some characteristics may be only a consequence of a derivative. The spandrel as derivative of the arch can now have an adaptive value, meaning it is consciously subject to selection.¹

Let's say a group from a chemical company turning to biotechnology arrives with an interest in having a fresco, and being bottom-line people, they set out to find the gene for fresco-hood. Now comes the basis for a moral,



San Marcos cathedral in Venice

for if one hunts for the gene for fresco-hood and *only* fresco-hood, one had better be prepared to bring along many other traits because a change will be forced on the overall architecture of the cathedral.

For a couple of decades corn dramatically responded to an increase in nitrogen fertilizer. Breeders were selecting for "fertilizer-response" genes. At least this was the

language of the breeder and understandably so. But what was happening at a biological level was the *elimination* or neutralization of the genes responsible for the plant's ability to discriminate in the rate of fertilizer uptake. The biological reality was assigned another name, "fertilizer-response genes." That era of fertilizer-response flattened, but now it is climbing again. What is going on? I suspect that it is climbing because breeders are working with a different genetic ensemble responsible for that response. All genes interact. And as selection pressure is applied, as when we seek an improved wheat variety or corn variety or improved beef cow or sheep, we are restructuring the genome of this miniature ecosystem. We can get away with this, for a while. We have gotten away with it for a long time now just as we have with farm pesticides. With ordinary plant breeding, breeders get away with these modifications because they are forced to deal with phenotypes (the way traits are expressed) and unavoidably drag along genotype (the genetic code). With gene splicing it is the other way around.

As the agricultural revolution began and advanced in various places around the world, eight to ten thousand years ago, the genomes of our crops and livestock—miniature ecosystems really—were altered. With alteration came a degree of dependency on the species responsible for the alteration, *Homo sapiens*. Of course, we became dependent on the altered species as well. Interdependence evolved as these early agriculturists altered the genetic architecture of some wild species and established, not a one-way dependency, but a two-way dependency. To be anthropomorphic for a moment, the various plants and animals were saying, "Look what we have to offer." And we effectively said, "Oh yes, we would like to have that. If you provide us with a more or less assured abundant grain supply or meat supply or cream or egg supply, we'll take care of you. With you grain producers, however, we have to make some changes. Your seeds shatter. We don't want to pick them off the ground one by one, so those among you that tend not to shatter we'll pick as parents for our future crops."

This shameful anthropomorphic version should not minimize the importance of the consequences of something so modest as the selection for shatter resistance. As wild species they were independent of us, but those first few cuts of selection for something as simple as shatter resistance must have *greatly* truncated and changed the genetic profile. Interdependency likely arose very early in domestication. Without us the corn plant won't live, nor the wheat plant, nor nearly any other domestic crop or livestock.

The agricultural revolution as a genetic revolution heightened dependency, heightened interdependency, and domesticated us as we domesticated the crops and livestock. The nano-ecosystem (miniature, miniature ecosystem) of all involved species was altered. The Chicago Board of Trade genes, the fossil fuel well-head genes of the industrial era, and now increasingly the computer genes—surrounding us and in us—are all ensembles of genes that would not be here if it were not for the reality of the Board of Trade, fossil fuels, computers. All of these realities have forced a change in the architecture. It is a Darwinian reality.

When a bioengineer splices in genes from long evolutionary distance, such as genes from bacteria into corn, it is done at a speed for which there is no precedent in the long tradition of plant and animal breeding. Traditional breeders at places like Iowa State and Pioneer Seed Company select for phenotype (the way something looks) and are forced to drag along genotype. Again, with gene splicing it is the other way around. Not so long ago I talked about this problem to Dr. Don Duvick, former Senior Vice-President and head of research at Pioneer Hi-Bred International, Inc. He mentioned that such introduced genes eventually "act like tar is being smeared over them." In other words, after a while their expression falters. The architecture of that genome is changing; the background shifts. There is some kind of incompatibility at work, and the new expression is disallowed by the nano-ecosystem. But this absorption has come at a cost—very likely a more vulnerable, more human-dependent genome.

Humanity was responsible for altering the wild plants to make the major crops available several millennia ago. As mentioned, those crops become dependent upon us as we become dependent upon them. And so, is it not worth considering that the *corporation* which brings the genetic changes in the genome will create a dependency on itself or some comparable corporate entity? In other words, the scientific and technical arrangements that a corporation is capable of are not available to the run-of-the-mill breeding program. Hence, a more specialized brand of dependency on a particular kind of economic situation is now developing.

¹ This idea of arches and spandrels as analogies for understanding selection process can be found in Gould, S. J. and Lewontin, R. 1979. "The Spandrels of San Marco and the Panglossian Paradigm: A Critique of the Adaptationist Programme." Proceedings of the Royal Society, vol B205, pp. 581-98, and in Daniel C. Dennett's book *Darwin's Dangerous Idea* (Simon and Schuster, 1995).

The agricultural revolution as a genetic revolution heightened dependency, heightened interdependency, and domesticated us as we domesticated the crops and livestock.

From The Land Institute . . .

Kate Worster

Natural Systems Agriculture Program

Natural Systems Agriculture Presented as Part of Lecture Series and Conferences. Natural Systems Agriculture philosophy and research were featured in several presentations this past winter. Wes Jackson lectured at the Library of Cornelia in Cornelia, Georgia; the Northern Plains Resource Council in Billings, Montana; and Byron Colby Barn at Prairie Crossing north of Chicago.

In a meeting arranged by Professor Charlie Sing of the Department of Human Genetics at the University of Michigan Medical School in Ann Arbor, Michigan, 17 scientists, including Wes Jackson and David Van Tassel from The Land Institute, met to discuss how to relate our view of the problems of understanding nature to a reductionist culture.

Professor Don Worster, University of Kansas Environmental History Professor and chair of the Board at The Land Institute, and Wes Jackson were visiting professors at the University of Michigan in Ann Arbor. Their course was entitled "Rethinking Agriculture in the Age of Ecology."

During a three-day visit to Madison, Wisconsin, Wes Jackson was interviewed for Wisconsin Public Radio, Earthwatch Radio, and *Progressive Magazine*, and gave two lectures at the University of Wisconsin: "The Oneness of the Creation: From Genomes to Ecosystems to Human Communities" and "Natural Systems Agriculture: A Truly Radical Alternative."

Rural Community Studies

The Matfield Green Consortium. The Matfield Green Consortium, formed in the summer of 1997, is a cluster of schools that collaborate to promote place-based education in their rural districts. The specific methods in each

school may vary, but each school works toward the common goals of promoting 1) the integration of school and community, 2) local history and culture studies, 3) understanding of prairie ecology, and 4) student equity and empowerment. The participating educators seek to make their schools vital contributors to the general welfare of their communities and to give young people a stake in the future of their localities. They view the human and natural communities that surround them as rich sources for schooling their



children. The participating Kansas schools are Baldwin Experiential Charter School in Baldwin City, Cassoday Elementary School in Cassoday, and Chase County High School in Cottonwood Falls.

Miscellaneous News

Members of the Board of Directors met at The Land Institute on December 7. Paul Johnson, former Chief of Natural Resources Conservation Service, was elected to be a new board member. A proposal was accepted to preserve The Land Institute's archival materials at the Kansas Historical Society.

Visitors

A number of visitors came to The Land Institute over the past four months. Bob Herendeen, professor at the University of Illinois-Champaign/Urbana, and his graduate student, Todd Wildermuth, presented their preliminary brainstorming and plans for Ecological Community Accounting as part of the Rural Community Studies Program.

Several agricultural groups also visited, including the Kansas State University Horticultural Research Center conference group; Kent Blaxley, a vocational agriculture instructor and in-service director for agriculture teachers at Ellenwood High School; and several agriculture instructors who were in Salina for a conference of the Kansas Association of Colleges and Teachers of Agriculture.

The Paul Winter Consort, including Eugene Friesen on cello, Glen Velez on percussion, and Robert Faust, dancer/maskmaker, performed for the public in The Land Institute classroom.

Upcoming Events

Prairies, Plants, and People of the Flint Hills A Workshop in Prairie and Community Studies at Matfield Green, Kansas

Sponsored jointly by

Emporia State University and The Land Institute's Rural Community Studies Program
Sunday, June 14 to Thursday June 18, 1998

Topics and activities include: Identification and uses of prairie plants, interpreting prairie landscapes, geologic history of the Flint Hills, Native American life on the Plains, collecting native fibers, using natural dyes, weaving with natural fibers, and preparing edible plants.

We encourage the participation of educators, environmentalists, community leaders, and other individuals interested in learning more about the Kansas tallgrass prairie through a series of experiences in the Flint Hills. Cost: \$200 (includes lodging and meals). For more information call Bev Worster, Director RSCP, at 785-748-0896 or Emily Hunter, Coordinator, at 316-753-3405.

Walking the Wauhob

Jeff Empfield

Before coming to Kansas I was living in the Willamette Valley of Oregon where I spent considerable time thinking about alternative approaches not only to agriculture but also to transportation. I pursued the latter by using my bicycle and a homemade trailer for most of my daily locomotion. The most significant lesson of this experience was that bicycling does not solve the problem of transportation. I learned that for me the solution lies in how I structure my life—by reducing my need to go places. I was pleased, then, when Ken Warren offered to rent me the Wauhob house, located just across the river and only a few minutes' walk from The Land Institute.

One of the most tangible benefits of walking to work is getting to know the landscape through daily observation. I enjoy the sensual richness of the activity. For several minutes each morning I listen to nothing but squawking crows, the wind blowing through the bare trees, or the sound of flowing water as I cross the bridge over the Smoky Hill River. The low morning sun is my favorite part of the walk. This morning I saw two raptors flying north over the fields in a deep orange light. I turned and walked backwards to watch the second one displace a crow, which in turn flew towards the Wauhob place.

The bungalow-style house, built in 1905, has six rooms, hardwood floors, and about 1,300 square feet of space. Most of the house is not presently habitable as it is being restored by Jack Worman and Luke Matthews. With an intact kitchen and a back room added in recent decades, the house is very comfortable. It sits back from the road and, like most good houses, has a front porch. I'm looking forward to listening to crickets and maybe a whip-poor-will from the porch on humid nights this summer. Already I enjoy the trill of an eastern screech-owl living in the woods to the west and the regular, almost

daily sighting of a northern harrier—what I want to call a marsh hawk. I've been quite impressed with the amount of wildlife in the area.

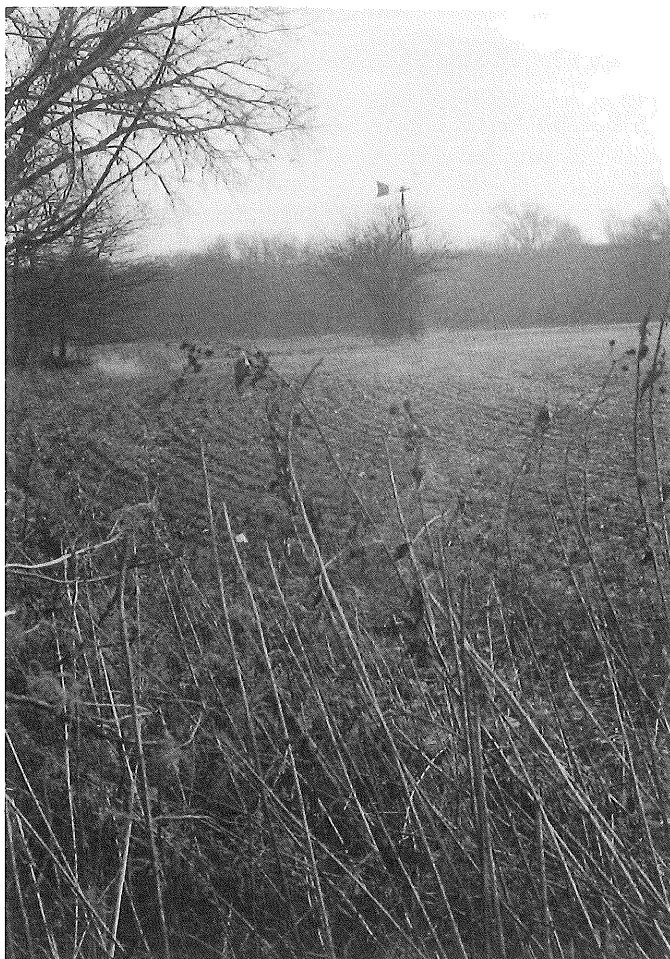
I walked through the Wauhob Prairie a few days ago and followed a well-used deer trail for a while. Those who have visited here will likely recall the 8.3-acre native

prairie that Loyd and Bessie Wauhob began leasing to The Land Institute in 1985. I saw recent deer tracks which were most likely left by three whitetails I had earlier spotted bounding between the classroom and the Krehbiel House office. It was a pleasant mid-day surprise to watch them cross the road and head into the prairie. Because I see deer in the neighborhood so regularly, I suspect they are concentrated here in the river-bottom, or it may simply be that I am seeing part of a large population in the region. After all, Kansas has a reputation for tasty cropped venison—something I learned recently from several men who had traveled all the way from Virginia to hunt for Kansas whitetails.

The deer I see are usually traveling parallel to the river, which is likely serving as a corridor for them to move about the country. The river runs south to north through the newly-acquired Wauhob land and, like most rivers, is the defining feature

of the surrounding landscape. It has been known to flood in spite of the work by the Corps of Engineers during the 1950s to reroute the river and remove many of its natural meanders. It is surreal to walk in the old river bed. It has the shape and feel of a river, but it is full of young trees and a thick layer of duff. Without water it looks empty, neglected, and forgotten. The existing river bed is unnaturally straight but not perfectly so. Without being told, one might not guess that it has been so drastically altered.

Most of the Wauhob land, including the housesite, is in the flood plain. The soils are primarily silty loams, except for some silty clay on the east side of the river.



Wauhob land east of the Smoky Hill River and north of Water Well Road



Looking south up the Smoky Hill River as it passes under the Water Well Road bridge

Almost daily their stickiness impresses me. If the ground isn't frozen, I usually avoid crossing the fields in order to keep the mud from accumulating on my shoes and weighing them down. The land has been leased for years to area farmers who have typically grown wheat, soybeans, and grain sorghum. Currently it is in alfalfa. Wes Jackson and David Van Tassel are making plans to expand Natural Systems Agriculture research onto the Wauhob land over the next few years.

Along the two river beds and scattered around the fields and remaining prairie are about 20 acres of timber—mostly cottonwoods, slippery elms, hackberry, and bur oak. The trees remind me of Western Pennsylvania, where I grew up. They also represent an edge where the wide openness of the western Plains and the deciduous forests of the Midwest blend together. It's an excellent place to observe how the continent is a continuous matrix of ecosystems, despite the borders we imagine for it. The next time you come to visit us here in the nation's center, you might want to make time to walk the Wauhob and see for yourself the two rivers, the mingling of forest and prairie, and the animals that inhabit this land.

Thanks to a grant last summer from the Foundation for Deep Ecology, we were able to purchase 92 acres of river-bottom land on both sides of East Water Well Road and the Smoky Hill River adjacent to The Land Institute. The acreage was sold at auction by the estate of Bess and Loyd Wauhob, good neighbors of The Land Institute since its founding, and so has become known as "the Wauhob land." With development in the Salina area moving south and east towards The Land Institute, the Foundation for Deep Ecology's grant helped us safeguard this prime agricultural land from such pressure. The Wauhob increases our acreage for experimental crops and other research in Natural Systems Agriculture. We are deeply grateful to the Foundation for its timely help last year and for its long-standing support of our efforts.

Natural Systems Agriculture Graduate Research Fellowship

David Van Tassel

The Natural Systems Agriculture (NSA) Fellowship is a new program of The Land Institute made possible by The Geraldine R. Dodge Foundation (see sidebar). To borrow from Scott McVay, the Foundation's Executive Director:

[The NSA Graduate Research Fellowship] will work with students from top universities and colleges in order to assemble, educate and encourage a cadre—and ultimately an extensive web—of young people dedicated to building upon and instituting the fundamental tenets and research of The Land Institute.

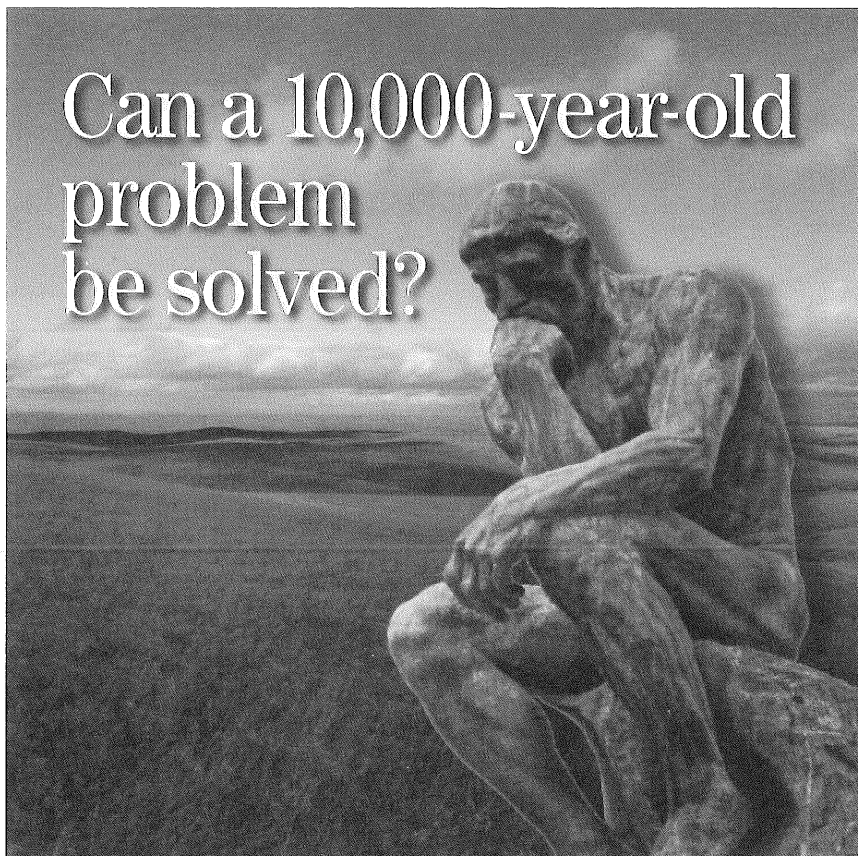
Graduate students in agronomy, botany, genetics, ecology, and related fields are encouraged to apply for the fellowships, which range up to \$6,000 in 1998 for research projects related to Natural Systems Agriculture. Research may be done either at the fellow's home institution or at The Land Institute, and there is the possibility of renewal for a subsequent year. A second provision of the fellowship is an expenses-paid summer workshop in which fellows, Land Institute scientists, and invited scholars will

study and discuss scientific paradigms, the origins of agriculture, and the intersection of ecology and agriculture.

We hope that these students, after stepping back and re-examining the dominant Cartesian culture and paradigm in which they've been immersed, will re-enter their fields with a new perspective and enthusiasm for scientific research that is informed by considerations of public interest and ecological sustainability.

We see great potential in the Natural Systems Agriculture Graduate Research Fellowship. Its "multiplier effect" should be considerable, as the selected young scientists will undoubtedly be working in their fields for many years, not only doing research but influencing colleagues and shaping public policy as well.

Fellows will be selected on the strength of their research proposals and their qualifications. The postmark deadline for proposals is April 1, 1998. More information and application forms are available from The Land Institute or from our website (www.midkan.com/theland/).



Top portion of the poster announcing the new fellowship

Since 1995 The Land Institute has enjoyed the generous support of the Geraldine R. Dodge Foundation, a New Jersey-based philanthropy. Both Scott McVay, Executive Director of the Foundation, and Robert Perry, Program Officer, have visited The Land Institute and become familiar with our ideas. With their help, we have been able to show how our efforts address the Foundation's concern for a sustainable society. In the fall of 1997, we presented to the Foundation the idea for a program to attract graduate students in agronomy, botany, genetics, ecology, and related fields to Natural Systems Agriculture. Hence was born the Natural Systems Agriculture Graduate Research Fellowship. We are very grateful to the Geraldine R. Dodge Foundation for its support, and along with the Foundation we are eager to get the program up and running this summer.

It's What We Teach

Jeff Empfield

The word "education" comes before "research" in most descriptions of what we're about at The Land Institute. It's understandable, then, that we begin most days here with morning classes before moving on to the work of tending research plots, operating an experimental farm, and maintaining our facilities. If you were an intern here, a typical day might include making a one-hour presentation of your choice during the morning "warm up." The subject could range from a paper in plant biology to your favorite selections of poetry. Then a discussion of assigned readings from Gary Snyder, D.H. Lawrence, or Stuart L. Pimm might follow during the class period.

After lunch, you might walk the Texas longhorn pasture to check or move fence, or you might take soil samples at the Sunshine Farm. After work, you could choose to spend time in the intern garden located outside the classroom before heading off to a potluck dinner with other interns and staff. The integration of theory from reading and discussion with hands-on learning through manual labor is the hallmark of the The Land Institute internship.



Staff and interns discussing teosinte, a perennial relative of corn

Although the curriculum generally is designed to complement the physical work performed by interns, it is primarily intended to lay a strong foundation for them to contribute to Natural Systems Agriculture (NSA) both now and in the future. With this focus we are examining the history and ideas which have led to the current work of The Land Institute, concepts essential for performing research, and the projected role of perennial polycultures in the future. We also want to identify the cultural implications and challenges of establishing a new agricultural paradigm. We address these themes in morning classes held three or four days per week during the spring and fall semesters. In the summer, interns are more fully involved in research and farm work, but we will still meet once a week to discuss relevant topics in art, literature, and science.

Our organization of weekly subject material is intended to reflect NSA's ecological mimic of native prairies. By weaving in recurrent themes and striving for a weekly, or even daily polyculture of authors, ideas, and disciplines, we hope to use our medium of discourse to convey our message that complexity is both natural and necessary. To do this we have spread out core readings and folded in new and related works. For instance, the early chapters of Judith Soule and Jon Piper's *Farming in Nature's Image* were the subject of the first class discussion in February, but the interns will not finish reading and discussing the

book until mid-May. This serves to unify the spring semester's investigation of ecology and agriculture like a continuous strand of DNA, to borrow a simile from David Van Tassel, our plant scientist. Likewise, instead of reading Donald Worster's *Nature's Economy* in one week, as in the past, we will rely on it for a full month to tie together the roots of ecology, evolution, ecological ethics, and the holistic implications these hold for agriculture. For example, one week we will read the part of *Nature's Economy* dealing with evolution, excerpts from Darwin's *Natural Selection* (the larger manuscript from which *The Origin of Species* emerged), selections from Jonathan Weiner's cogent *The Beak of the Finch* wherein the author reveals how quickly evolution occurs in our midst, and N.W. Simmond's *Principles of Crop Improvement*, which approaches plant breeding as an extension of evolutionary processes.

In the first semester we are studying the history of agronomy and ecology and their marriage under the current NSA project. In February we began by examining the problem of agriculture and some background on what has guided The Land Institute's approach to solving that problem. Our current studies of the history of agriculture are focusing on Paleolithic and Neolithic conceptions of nature, the development of original

agricultures, and the detriments associated with modern industrialized farming. In addition to old standards such as Riane Eisler's *The Chalice and the Blade*, Alfred Crosby's *Ecological Imperialism*, Wendell Berry's *The Unsettling of America*, Donald Worster's *Dust Bowl*, and selections of Wes Jackson's writings, we are introducing Max Oelschlaeger's *The Idea of Wilderness*, Gary Nabhan's *Enduring Seeds*, and Frieda Knobloch's *The Culture of Wilderness*, which frames agriculture as a mechanism for subduing nature and relates the treatment of land to that of marginalized groups (see review, page 21).

We will soon begin discussing the history and growing importance of ecology from the nineteenth century to the present. To highlight its significance, we will look at several examples of how ecological consciousness is driving political and ethical trends in our culture—what historian Roderick Nash in *The Rights of Nature* calls the "widening circle of ethical relevancy." First, we'll examine ecofeminism through the writings of Carolyn Merchant and Susan Griffin. Then we'll look at proposals to expand the scale of the American conservation tradition to accommodate continental ecosystems. In particular, we'll look at responses to the problems associated with island biogeography (habitat fracturing) such as Frank and Deborah Popper's idea of a "Buffalo Commons" and the work of The Wildlands Project to connect wildland preserves. In studying the history of ecology we will sample texts of

Henry D. Thoreau, Charles Darwin, Aldo Leopold, Sir Albert Howard, and Rachel Carson.

We will finish the spring semester with a preview of the fall by pressing the increasingly overworked idea of "sustainability" for any ecological validity it still contains and by examining ecological paradigms of the future. We will look at bioregionalism and restoration ecology through the writing of Stephanie Mills, ecological education as prescribed by David Orr, and the economics of Herman Daly and John Cobb. And although The Land Institute is not about "going back to the land," we're going to read some of proto-homesteaders Helen and Scott Nearing's writings to see where this movement fits in with our larger themes.

Along the way we'll seek to deepen our understanding of place here in Kansas and the Plains. We'll spend some time in class on geography, prairie communities,

soils, and climate. But mostly we're going to get out and walk the land and talk to some locals. Several classes will be held in Matfield Green to better understand the Rural Community Studies Program. We also hope to make a number of field trips whenever we can get away without compromising our farm and research work. As you read this, thousands of sandhill cranes are arriving on the Platte River. We'll be going there soon ourselves. My good friend Jake Vail, formerly both an intern and employee of The Land Institute, tells me the sights and sounds of their migration should not be missed. So if you're feeling a little anxious these days, a little spring feverish, perhaps in need of some migratory behavior yourself, then maybe you should head out to the mighty Platte as well for a lesson on how the natives do it. If you go, perhaps we'll see you there.

The Land Institute's 1998 Interns

Melissa Arthur, originally from Manhattan, Kansas, attended the University of Washington and The Evergreen State College, where she received a BA with emphases in Ecology, Ethnobotany, and Ecological Agriculture in 1997. She volunteered at The Land Institute for a week in July 1996, helping with grain harvest and plant identification. She has also been active in community garden and education projects in Washington. Her future plans include higher education in her areas of interest, which include botany, entomology, prairie preservation and restoration, and "managing the landscape for food production."

Kelley Belina graduated from the University of Wisconsin-Madison in May 1997 with a BS in Biological Aspects of Conservation and Botany and a Certificate in Environmental Studies. From May 1996 to June 1997 she worked in the UW-Madison Agronomy Department studying soybean herbicide/weed ecology and forage grass. Her future plans include attending graduate school to obtain a degree in plant breeding.

Jennifer Fraulo, a 1996 graduate of Harvard University in the field of biology, comes to The Land Institute with an interest in the "health of human and non-human living communities," which she wishes to work towards through agriculture and scientific research. Her past experiences include expanding a garden in Trinidad, cattle ranching in Wyoming, and testing water samples in Long Island Sound.

Katie Goslee graduated from Earlham College in 1996 with a BA in Peace & Global Studies and Biology. During college she worked on a vegetable farm and taught a course on sustainable agriculture. Since graduating, she has taught environmental education and natural history, and has led backpacking, biking, and skiing trips. Her future plans include conservation biology, ecology, and agriculture.



Back row (l to r): Jennifer, Melissa, Kaelyn, and Kelley; front row (l to r): Terry, Katie, Courtney, and Claire

Claire Homitzky received a BS in Natural Resources Management and Agroecology in May 1997 from Cook College, the agricultural and environmental branch of Rutgers University. At Cook College she took a number of classes concerning agriculture and natural systems. She has worked on projects involving plant identification and mapping, and has grown and marketed organic produce. Her goals include becoming a County Agent in Cooperative Extension.

Terry Loecke, a native of Iowa, recently graduated from the University of Northern Iowa in the field of biology. He has been involved with Future Farmers of America and 4H and has worked on a hog, dairy, and grain farm. While on an exchange program at Montana State University he studied the aquatic ecology of the Greater Yellowstone Ecosystem. Recently he has worked closely with Dr. Laura Jackson, a member of The Land Institute's

Natural Systems Agriculture Advisory Team, on incorporating native plants into a rotationally grazed pasture.

Courtney Smith graduated from the University of California at Berkeley in May 1997 with a BS in Conservation and Resource Studies. Her past experiences include a nature writing course while backpacking in the Canyonlands of southern Utah and studying solar technology and sustainable forestry at the Aprovecho Institute in Oregon. At Cal-Berkeley, she was active in urban gardening, reviewed a proposal for a center for sustainable agriculture, and did lab work on an Integrated Pest Management project.

Kaelyn Stiles is a 1997 graduate of Oberlin College with a BA in Biology and a minor in Environmental Studies. She has studied both ecological and agricultural issues in several US states and abroad—from Florida and Minnesota to India and The Philippines. Before coming to The Land Institute, she was working as a land management intern in New Jersey and also pursuing her interest in studio art.

More detailed profiles of the 1998 interns will appear in the next issue of The Land Report.

The Land Institute is pleased to announce the 1999 Intern Program.

Each year approximately eight students with recent college degrees receive paid internships at The Land Institute. The internships are ten months in duration, from mid-February to mid-December. Please consider applying or show this announcement to a friend or relative who might be interested.

Who should apply?

College graduates or upper-level undergraduates. Some agricultural or biological field experience is preferred.

Intern Study and Work:

Study:

- **History and ecology of agriculture.**
- **Natural and environmental history of the North American prairie.**
- **Issues in sustainable agriculture and sustainable culture.**
- **Natural Systems Agriculture**
Plant life-history strategies, community assembly and ecology, soil ecology and nutrient cycling, insect and pathogen ecology, biodiversity, crop evolution, plant genetics and biotechnology.

Work:

- **Interns operate the Sunshine Farm** with the farm manager. Farmwork includes pulling weeds, making and storing hay, moving and watering livestock, building fence, maintaining equipment, and harvesting.
- **Interns work as field and lab assistants** to the research staff. Most of the Natural Systems Agriculture and Sunshine Farm experiments are long-term projects. As research assistants, interns may plant and weed the experimental plots, hand-harvest experimental crops, thresh and weigh harvested grain, wash glassware and pots, identify species in community assembly plots, take soil samples and perform a number of soil quality tests, and enter and process data on the computer.
- **Interns maintain the buildings and grounds.** Tasks include mowing, painting, landscaping, and cleaning. Interns are also provided space, seeds, and equipment for their organic vegetable garden, mostly an after-hours project to grow their own food.

- **Interns help host public programs**, such as the annual spring Prairie Festival and fall Visitors' Day, and give tours to our many visitors.

Schedule:

Spring and Fall: Classes three or four mornings per week plus reading assignments, afternoon work.

Year-Round: Work, special seminars, speakers, and field trips.

Finances:

- **Intern stipend:** \$598 per month.
- **Tuition:** None.
- **Room and board:** Interns find their own housing in Salina and provide their own meals. Produce is available seasonally from the garden and orchard.

Requirements:

Good health, stamina, and a love of working outside in sometimes extreme conditions are essential. Interns will be expected to complete assigned readings on their own time and participate in class discussions.

To Apply

Write an essay of 750-1000 words outlining your past academic and job experiences, major interests, and goals for the future. Describe what involvement you have had in agricultural, environmental, or related political issues and what reading you have done concerning sustainable agriculture. Include any practical experience and skills you think we should know about. Explain why you want to be an intern at The Land Institute in 1999. Have a copy of your transcript(s) and two letters of recommendation sent to The Land Institute. Finalists will be interviewed by phone. Include a phone number where you can be reached in October and November. Applications must be postmarked by October 15, 1998; candidates will be notified by December 1, 1998 whether they have been accepted.

Send applications to:

Intern Program, The Land Institute, 2440 E. Water Well Road, Salina, KS 67401

The Land Institute does not discriminate on the basis of gender, race, religion, sexual orientation, national origin, or ancestry.

A Landmark of My Life

Melisa Myers Kaiser

There have been certain landmarks of my life that I describe in conversations on long road trips, at dinner parties, or other times when I introduce myself. These landmarks are those places and times at which I have veered one direction or another on my journey. Many people I meet on these occasions say I have had the most interesting life. I imagine that all of my fellow Land Institute alumni get this same gushing response when describing their respective paths that led them toward and away from The Land Institute.

It was June 1980. I was a recent graduate of Mount Vernon College in Washington, D.C., when I began a telephone relationship with Wes Jackson, querying him whether I had *the right stuff* to be an intern. At the time, I was working for the Environmental Protection Agency in the office of the Agency Administrator, Douglas Costle. Co-worker Maka



Melisa "with her hands full" in her intern days

Grogard (1981 intern) and I were working to create the parameters for a new initiative called Public Participation. This initiative was especially important as the nation was embarking on a big new program known as "Superfund."

Although it was very important to me that the public be involved in all aspects of environmental decision-making, I was aching to move back to Kansas. The

desk-job lifestyle was not for me. I felt extremely unsettled. After speaking to Wes, I was drawn to the characters, the liveliness, and the spirit of "The Land." I arrived in Salina one steamy August evening to meet my new roommates, Paul, Tom, and Ed—three young men who were as intense as I was. Each day we trekked up to The Land Institute by bike. We were always filled with questions and arguments and then more questions for Wes. Each night we returned to our home and prepared to go out "dumpster diving," our term for collecting "imperfectly" good food from the dumpster behind the local grocery store. Climbing in a huge dumpster, flashlight in hand, we waded through refuse

Each night we returned to our home and prepared to go out "dumpster diving" . . .

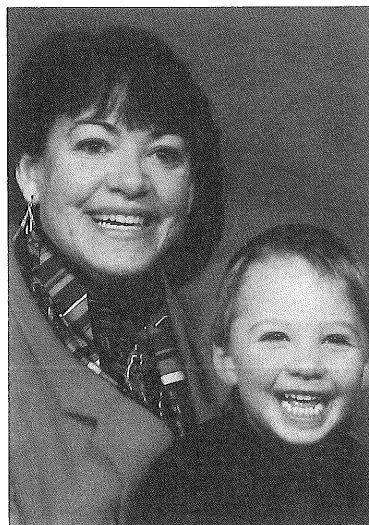
and salvaged useable food for ourselves, our friends, and the food bank.

I liken my intern experience to going through an industrial factory "scrubber," not unlike polluted air. I was cleaning some of the polluted thinking I had accumulated from two decades of American-style consumerism.

During those days I was steeped in the writings of Wendell Berry as well as Amory and Hunter Lovins. As an intern, I was introduced to these authors in person when they visited The Land Institute. This opportunity was truly inspiring and has stayed with me. Wes told stories of his time spent

with E. F. Schumacher and that, too, was food for my soul, hungry as I was to connect with people of like thinking. I soaked up Wes' words and was quite taken by his range of intelligence. I tried to learn what these wise people had to teach, understand the rhythm of the land, and then behave accordingly.

My time as an intern served me well when I once again became unsettled in 1983, uprooting myself from graduate school and choosing to take a position in Mali, West Africa as a Peace Corps Volunteer. My field of work was Appropriate Technology, and we were trained to build wells and mud stoves. Unfortunately, the Peace Corps ethic was closer in line with conventional American cultural beliefs than those of our host country. Many volunteers bragged of the number of stoves or wells built in the shortest amount of time. One of the most important



Melisa and her son, Kelen

lessons I re-learned in Africa was to move to the rhythm of the Malians. By doing so, the least amount of damage would be done by me, an outsider. My attempts to "develop" them were fruitless if I did not engage them in the creation.

Since my return to America, I have enjoyed starting a family and working for a series of non-profit organizations in Montana. Now, 18 years later, as I reflect on my intern experience, I

realize those people whom I've often described as "such characters" were really people of very high character who worked to produce sanity for our world. The daily liveliness was the result of people living their lives to the fullest

each moment. The spirit of The Land Institute comes from people who are awed by the world we are in—reverent and grateful for this wonderful world. I reflect fondly upon the inspiring company I found myself in as an intern. Those moments spent with special people have enriched my life and serve as a very memorable landmark.

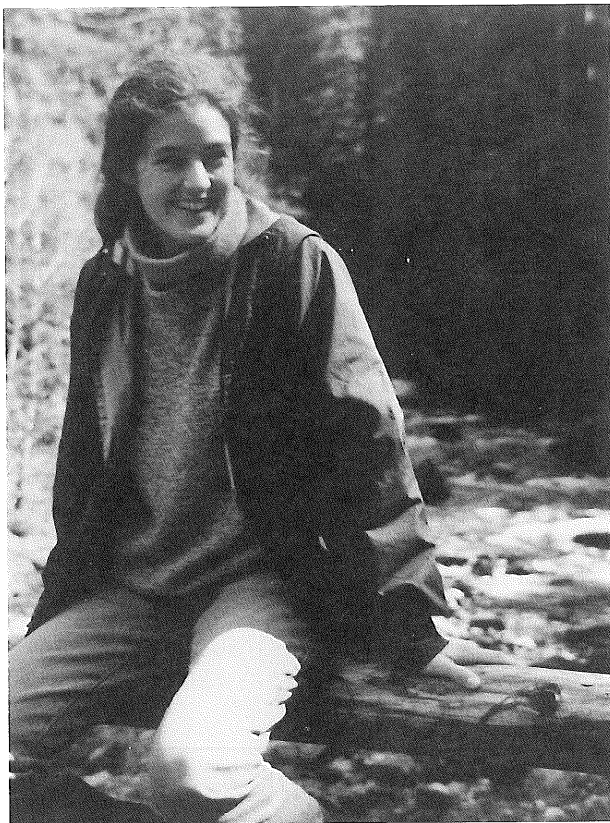
Melisa Myers Kaiser was an intern at The Land Institute in 1980. She currently lives in Montana with her five-year-old son, Kelen. In addition to her love of parenting, she is working on a book of spirituality using the earth's core in metaphors, spending time at St. Paul's United Methodist Church, and designing interiors. She makes a bit of a living at furthering Montana non-profit organizations with her fundraising, marketing, and public relations skills.

Closing the Gap

Tracy Noel

A friend mailed a package, a large stack of brochures, clippings, and advertisements about exciting opportunities throughout the country, even around the world. I remember picking through it carefully until I picked out a Land Institute intern brochure. I read it once, then again, announced "That's what I want to do," and put the pile away.

Agriculture was a virtual unknown for me. I knew it existed, and that's about it. I was a city girl, an animal rights advocate, a budding environmental activist. Masanobu Fukuoka's *One Straw Revolution* was my little pinky toe in the door of sustainable agriculture, and I had never heard of Wes Jackson. What attracted my attention was what seemed to be an ideal balance of research, physical labor, casual intellectual interaction, the opportunity to acquire and use multiple skills, and community. Despite memories of loud whining about hours of "Hoeing again!?!!" in the hot summer sun, I believe this balance existed. It is, in my mind, what made so much intensive learning possible. Learning was part of every moment of life at The Land Institute. Whether in the form of reading the great writers of agricultural and social thinking, observing seed head characteristics, planting a windbreak, taping sheetrock, building composting toilets (and using them), discovering poison ivy, cooking with garden-fresh vegetables, writing research results, engaging in exciting "warm-up" discussions, weathering hail storms, or endless hours bent over tiny plants on parched earth collecting seeds, weeding, counting, etc.—it was always learning.



Tracy in the Opal Creek Wilderness, Oregon Cascades

It's been said before that an internship at The Land Institute is one of those experiences which changes a person in profound ways not easily described or measured. That is certainly true of my experience. Nearly every day I make decisions based on values that were developed at The Land Institute or influenced by some learning there. These can be choices about daily life (do I ride the bike eight miles in the Oregon rain or take the pollution mobile otherwise known as the car?), consumption (do I buy the pricey, locally grown bulk variety or the cheaper packaged stuff trucked up from California?), or lifestyle (do I pursue some semi-meaningful employment at the risk of sacrificing my ability to produce most of my own food?).

Though my life generally is inescapably influenced by my intern experience, one attribute particularly stands out. It is my desire to close the gap between daily life and this other thing called agriculture. These days I am a gardener with a passion for sharing my love and perceptions of the natural world. In so doing, I hope to help others (namely "the next generation") reconnect to things more natural than paved city streets—that is, to their sustenance. The loss of such connection I believe to be the source of many of our ills.

As The Land Institute moves rapidly to reconnect agriculture with natural systems, I watch children in the garden as they slowly find their own connection to nature. Perhaps someday they, too, can be Land Institute interns.

Tracy Noel was a Land Institute intern in 1990. She now lives in Corvallis, Oregon, where she has recently taken a position as garden coordinator at Lincoln Elementary School.

The Tallgrass Prairie National Preserve

Jeff Empfield

Perhaps the most significant aspect of the Tallgrass Prairie National Park proposal is that it symbolizes a transition in philosophy regarding what types of land areas should be granted protection. As the influence of human society expands ever outward, it has become increasingly necessary to protect and preserve entire ecosystems. This shift in attitudes is clearly embodied in the [National Park Service (NPS)] prairie park assessment when it notes that "[a]lthough past natural-resource preservation efforts have been mainly concerned with the spectacular, the unique, and the scarce landscape features of the world, attention has recently been directed towards areas of equal ecological significance, but more subtle visual character." The tallgrass prairie, though scenic in its own right, is undoubtedly one of America's most significant ecosystems.—National Wildlife Federation, 1977

In 1994, the National Park Trust (NPT), a private foundation of the National Parks and Conservation Association, purchased the 10,894-acre Spring Hill/Z Bar Ranch located in the Flint Hills of Kansas. Last year, the NPT donated a small portion of this Chase County property to the federal government to be administered by the NPS beginning in 2000. After over three decades of political effort to add this ecosystem to the nation's parks, the new Tallgrass Prairie National Preserve represents a step towards the protection of prairies. If ecologically conscious Americans are to proceed with this effort, however, they need to understand who opposes them and why. The struggle over tallgrass prairie land in recent years, after all, does not follow the expected pattern of long-established local residents fighting to save their land from condemnation by eminent domain. Instead, the point of contention seems to be simply whether available land will be administered by federal bureaucrats or by private corporate bureaucrats, both of whom typically value either recreation or grazing over the health of natural systems. A brief review is useful for understanding how far we've come and also how far we have to go in protecting prairie ecosystems.

Since the early 1950s there have been numerous proposals for establishing a Tallgrass Prairie Preserve or National Park. The proposed sites have ranged from Illinois to Kansas and from the Canadian border to Texas—the 400,000 square mile area originally covered by tallgrasses. It is estimated that only about one percent (or about 2.56 million acres) of the original tallgrass prairie

remains, spread today throughout the Plains in isolated locations.² The Flint Hills of Kansas, unplowable due to rocky soils, contain some of the largest of these stretches of native vegetation. In 1975 three proposed preserve areas in Kansas were studied by the federal government. These included 100,000 acres in Chase County; 98,000 acres in the Osage area on the Kansas-Oklahoma border; and 79,000 acres in the Wabaunsee area just west of Topeka.³ In the late 1970s both those favoring and those opposing a tallgrass preserve were talking about a 180,000-acre proposal. These figures are reported here to emphasize scale. The victory of 1997, which secured a total of 180 acres to be administered by the Park Service, can only be regarded as symbolic.⁴ Due to regional opposition to federal land ownership, the National Park Trust (NPT) leases its remaining 10,714 acres to a Texas billionaire cattleman in order to meet its financial realities without political constraints.

The American fixation with private property takes on new meaning in the Flint Hills region. When the NPT made its offer in 1994 to buy the Spring Hill/Z Bar Ranch, the chairman of the foundation which was selling the ranch would not support the sale until "it was made sure that there [would] be no federal acquisition."



Limestone schoolhouse on the Tallgrass Prairie Preserve

Likewise, the Kansas Grass Roots Association, an organization dedicated to defending "private property," remained skeptical because the National Parks Trust had sold land to the National Park Service elsewhere in the country. The Chase County Farm Bureau also pointed to examples of other parks that "seemed to continually grow year after year." Tension over the sale was sufficiently high that most local ranchers simply refused to talk about it.⁵ Even now, homemade roadside billboards proclaim the citizenry's desire for "Private Lands in Private Hands."

These positions seem refreshingly moderate, though, compared with earlier perceptions of what a tallgrass preserve might be. In the 1970s the Kansas Farm Bureau opposed the national park idea and demonstrated the extent to which it missed the point by suggesting instead that a state agency establish rest areas, observation towers, and "other maintained facilities" along a "Prairie Parkway."⁶ Members of the *pro-park* Tallgrass Prairie Committee supported a preserve plan which would dedicate 40 percent of the land to recreation and the remaining 60 percent to native grasses and *oil exploration*. They were reacting to the energy crisis briefly emphasized during the Carter administration.⁷ More typical were the statements of Kansas Representative Joe Skubitz, who predicted environmentalists would turn the grasslands into "uncon-

trollable weeds and scrub oak." After all, Skubitz claimed, it was the cattlemen who had kept the native prairie beautiful, peaceful, and productive for generations.⁸

But for how many generations? Transience and absentee landownership have characterized the Euro-American relationship to the land in the region. When Steven and Louise Jones moved to Chase County in 1878, they had already lived in Texas and Colorado. Using local labor, they built several limestone structures—the striking house, impressive three-story barn, and one-room schoolhouse—which remain as emblems of the area's history. They also tellingly changed the name of their newly acquired "Langston Farm" to "Spring Hill Ranch" and specialized in breeding and grazing transient cattle. The big and little bluestem, Indian grass, and switch grass on which they depended, had been at the core of the prairie ecosystem since the boreal forests of the Pleistocene receded. These species remain today because they are compatible with cattle ranching. In stark contrast to these natives, the Joneses sold out and moved on after only 12 years.⁹ Over the past century the ranch has changed owners many times. For the past several decades, the property hasn't even been in the hands of private individuals but rather has been controlled by corporations such as the Davis-Noland-Merrill Grain Company, which merged with the Z Bar Cattle Company in 1975.¹⁰ Former Land Institute intern Kelly Kindscher of the Kansas Biological Survey and the University of Kansas has studied property trends in the region. He has found that approximately 18 percent of the Flint Hills land suitable for preservation has been in the same family since the 1940s. The remaining 82 percent is either corporately owned or belongs to absentee landowners.¹¹

There seems to be less opposition to outsiders controlling land in the region when cattle ranching is to be continued. Ed Bass, the Texas cattleman who paid \$2 million for his 35-year grazing lease on the preserve, has helped to quiet both sides of the controversy. In addition to keeping the land in business-as-usual beef, Bass has donated \$1 million to help the NPT restore the Spring Hill/Z Bar. While this donation has softened the blow to preservationists, it causes one to question how much 10,000 acres of prime Flint Hills prairie is worth over the next 35 years. In any case, even a skeptic has to appreciate the calming public relations effect such a move has had.

If absentee ownership is the norm, then why have the residents of the Flint Hills region resisted the park idea? Opposition to the park had to do with feelings that the uncrowded ranching lifestyle would be threatened by tourism.¹² This is understandable. The problems associated with what Edward Abbey called industrial tourism are well documented and empirically familiar to most Americans. Like sprawl, shopping malls, communities without sidewalks or bicycle lanes, and even the ubiquitous cookie-cutter style of "new home" architecture in North America, esthetically-impoverished tourism reflects a fundamental problem in our consumer culture. It is a problem that can be addressed, though, through

open dialogue, planning, and zoning. Another local concern was an eroded tax base. The Spring Hill/Z Bar represents over two percent of Chase County's total acreage and if owned by the federal government would cause a corresponding reduction in revenues. The NPT, as a non-profit organization, is exempt from taxes but continues to pay them voluntarily.¹³ A third point of opposition was the perception that any land acquisition by the federal government would lead to further acquisitions. This point requires a creative solution. The goal of restoring and protecting the prairie ecosystem has remained strong for decades and has enjoyed local support despite the opposition. There must be a way to realize this goal without threatening private landowners or requiring centralized control by a large bureaucracy.

Fortunately, there is room for innovation. The most interesting aspect of the current deal is that the terms of the lease reportedly allow the NPT to buy back the grazing rights at any time. Therefore, there is hope for making the preserve more ecologically significant. It will be interesting to see if the Park Service addresses this issue in their General Management Plan to be developed over the next several years. This plan will be informed by various advisors—some from the biological sciences—who will hopefully make bold suggestions for ecologically-sound management of the preserve. Will they challenge the grazing of cattle for ecological reasons and instead recommend the reintroduction of native species, including megafauna? If so, they will need to counter the influence of others on the advisory board such as Bill Haw of National Farms, a large cattle corporation with ties to Ed Bass and a reputation for buying up and overgrazing Flint Hills ranch land.¹⁴

There are already many models that could be implemented to manage this prairie land for ecosystem values. A moderate step in this direction would be to use Management Intensive Grazing (MIG) such as that being tried at The Land Institute and elsewhere. Although we do not yet know the ecological consequences, the technique is intended to mimic the effects of native grazers. Movable electric fences are used to rotate a herd around a pasture. At The Land Institute, Texas Longhorn cattle were chosen because they are the closest domestic analog to bison. This breed has been in North America for over 500 years, longer than any other domestic breed, and has been partly shaped by natural selection of feral ancestors in the Southwest.¹⁵ The obvious criticism of MIG is that it is too labor intensive. A study by the Cooperative Extension Service and Kansas State University, however, has shown that MIG nearly doubles per-acre gain (cattle weight) with actually less time required per animal.¹⁶

A good model for implementing this type of ranching on the Spring Hill/Z Bar is a similarly sized ranch also located in the Flint Hills. The Ferrell Ranch, located near Beaumont, participates in the prairie-finished (as opposed to conventional grain-finished) Tallgrass Beef cooperative and has used a variation of MIG for the past five years. Pete Ferrell raises superior meat without conventional technology such as permanent fences and piped water. Instead he uses a professional herder (on foot, horse, and

mountain bike) to contain a mixed herd of sheep, goats, and cattle and to move it to fresh grass every day or two. The benefits include higher profits, better pasture, less erosion, and rural jobs. As could be expected, he initially faced reluctant clients and reluctant potential employees, who looked at him as if he'd just "landed from Mars," in his words. He now devotes 80 percent of his 9,800 acres to the technique because it has been both economically and ecologically beneficial.¹⁷

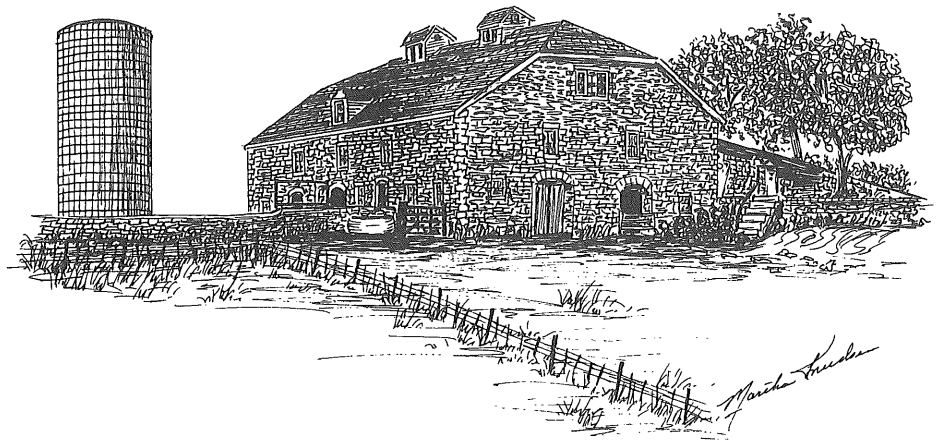
Another option, even closer to the original ecological regime, would be to replace cattle with bison. This is a possibility not only for remaining native prairie but also for the restored prairie of the future.

In *Bring Back the Buffalo!* Ernest Callenbach describes how and why bison ranching is increasingly replacing cattle in the United States and Canada. According to a former cattle rancher quoted by Callenbach, "[W]hat it comes down to is this: bison are half the work and twice the money."¹⁸ Of course, there are many important ecological differences between the two as well. Bison need less supplemental winter feed, less protection from disease or predation, and less assistance in birthing. Most importantly, bison don't require herding to mimic the native species—they *are* a native species!

If the current lessee of the Spring Hill/Z Bar is not prepared to make this transition, there are others who are, including Native American groups now practicing cooperative management of bison on their reservations. Of course, there are concerns associated with domesticating bison. The most egregious is that domestication threatens to eliminate the buffalo's wild character through selective breeding. "Indians choose wildness for their bison without hesitation," writes Callenbach. "[W]hat the white ranching community will choose remains to be seen."¹⁹

In order to restore the prairie ecosystem, ultimately other megafauna should also be returned, such as elk, antelope, and numerous other extirpated species. To do so will require taking down some barriers, both real and imagined, that currently keep us separated from our biological reality. The Wildlands Project, an organization devoted to establishing a network of wild lands across North America, has offered a number of salient proposals for the Plains. Unlike Frank and Deborah Popper's "Buffalo Commons" proposal to restore bison to the Plains by focusing attention on the failure of human economies and communities, The Wildlands Project maintains an ecological focus. It relies on UNESCO's Biosphere Reserve model (290 examples worldwide) which addresses the inherent conflict between establishing nature preserves and the needs of local human populations. This model provides for continued traditional

land uses such as timber harvesting, agriculture, and animal husbandry in cooperative management areas.²⁰ Of course, some reform will be necessary when conventional practices preclude ecosystem health. Change is inevitable, though, as Heraclitus pointed out in the sixth century B.C.: "You cannot step twice in the same river." Therefore, our responsibility lies with guiding that change for the better. And what makes the approach of The Wildlands Project better for Kansans is that it prescribes voluntary participation of landholders. No private property would be seized. Instead, financial incentives (and presumably a lot of patient education) would be used to



Magnificent three-story limestone barn of the Spring Hill/Z Bar Ranch

motivate residents to participate in the preserve without selling out or having to leave their land. One source of money would be the many billions currently being spent on Conservation Reserve Program (CRP) lands which are widely scattered and provide little ecological value.²¹

This kind of far-sighted problem solving, which takes into account both ecological and cultural realities, should be familiar to Friends of The Land. The Natural Systems Agriculture being developed here has obvious implications for restored prairie wildland ecosystems. In fact, Ernest Callenbach frames our anticipated perennial polyculture as a corollary to restoring native grazers and browsers on the Plains. Wes Jackson has also considered the possible relationship and believes that bison herds will be compatible with mixed perennial seed crops of the future.²²

But even if we don't do anything proactive to restore species, they could still return. A Montana bull elk recently traveled 1,800 miles undetected, most likely along the Missouri River, all the way to Kansas City. Earl, as he is affectionately called, may have been demonstrating *exogeny*, a behavior in which individuals split off from their population and travel great distances to relocate. The most obvious benefit to the species when they find another population is improved genetic diversity. If there were only some residual acceptance or even a

passive tolerance of native species behaving in this way, then the region might have a more diverse population of wild megafauna. Instead, we put Earl in a "Hoofed Animal Enclosure" within a county park.²³ Right now, thousands of bison are headed down the canyons which drain the Yellowstone Plateau. They're looking for grass. They've considered their options and figure the risks of civilization are better than starving on sublime beauty. After all, they're used to cars. They're used to people. And they're apparently willing to try to coexist. If they were permitted to, they would graze their way over the imaginary line we've drawn around the wilderness. They would slowly spread out onto the Plains, eating and walking. They might follow the riverbottoms like Earl. Or, if there were a corridor open to them, they might strike out over the prairie as in antiquity. It might take awhile, but they would find their way eventually to the beautiful Flint Hills of Kansas.

¹ *Conservation News*, May 15, 1977, 10-11.

² *New York Times*, Mar. 15, 1978.

³ *Conservation News*, May 15, 1977, 9-10.

⁴ According to Barbara Zurhellen, NPT Preserve Director, and Steve Miller, NPS Superintendent of the new Tallgrass Prairie National Preserve, the General Management Plan being developed by the NPS will cover all of the 10,894 acres. This suggests a complicated arrangement where the NPS controls a small portion of the preserve but has some influence on the remaining majority of the acreage. It remains to be seen how this will play out with the NPT maintaining ownership and leasing the land to a private rancher. Phone interviews, February, 1998.

⁵ *Grass & Grain*, Mar. 15, 1994; Aug. 30, 1994; *Salina Journal*, October 5, 1996.

⁶ *Kansas Farm Bureau News*, 1978.

⁷ *Wichita Eagle*, Dec. 8, 1977.

⁸ *Wichita Eagle/Kansas Edition*, Nov. 17, 1977.

⁹ Martha Knudsen, *Kansas Barns* (Taylor Printing, Inc.: Pratt, Kansas), 45; *Tallgrass Times*, No. 2, Sept. 1977, 3.

¹⁰ Ron Welch, "Prairie Preserved," *Kansas!*, 3rd issue, 1995, 2-5.

¹¹ Kelly Kindscher, "Land Ownership and Tenure of the Largest Land Parcels in the Flint Hills of Kansas, USA," *Natural Areas Journal*, 17(2), 1997, 131-5; phone interview, February, 1998.

¹² The points of opposition discussed in this paragraph are commonly cited by employees of both the NPS and the NPT.

¹³ Angie Hummel of the National Parks Trust, phone interview, February, 1998.

¹⁴ Charles Benjamin, "Tallgrass Prairie Preserve: Reality or Illusion?" *Kansas Natural Resource Council Journal*, Winter 1997-98.

¹⁵ Marty Bender, personal interview, Feb. 1998.

¹⁶ *High Plains Journal*, Jan. 15, 1996.

¹⁷ Pete Ferrell, "Implementing Sustainable Agricultural Practices, Producer Grant Program," 1994; phone interview, February, 1998.

¹⁸ Ernest Callenbach, *Bring Back the Buffalo! A Sustainable Future for America's Great Plains*, (Washington, D.C.: Island Press, 1996), 122.

¹⁹ *Ibid.*, Chs. 5,3.

²⁰ Tony Povilitis, "The Biosphere Reserve: A Sleeping Giant For Protecting Nature?" *Wild Earth*, Spring, 1992, 71.

²¹ PJ Ryan, "American Serengeti," *Wild Earth*, Summer, 1991, 79; PJ Ryan, "Mad Cows and Montanans," *Wild Earth*, Fall, 1996, 74-77; Daniel S. Licht, "The Great Plains: America's Best Chance for Ecosystem Restoration, Part 1," *Wild Earth*, Summer, 1994, 47-52.

²² Callenbach, 180-4.

²³ Richard Manning, *Grassland: The History, Biology, Politics, and Promise of the American Prairie*, (New York: Penguin Books, 1995), 11-12, 28-29, 286-287.

Community Assembly and Perennial Polyculture: 1997 Natural Systems Agriculture Research

David Van Tassel

Perennial Polyculture as an Assembled Plant Community.

Andrea Leach continued the "community assembly" study begun in 1994. In these experiments, mixtures of seeds of perennial prairie plants were broadcast into small plots. The subsequent vegetation in the plots was allowed to develop, year after year, without human interference. This study reveals how the plant community changes each year. The perennial plants comprise more and more of the vegetative cover, and the weedy annual species lose ground. Thus, the plant community assembles itself, and the structure more closely approximates a stable, complex community.

Of great interest in this study is the finding that perennial polycultures can reduce the degree of domination by weeds without the use of herbicides or extensive hand-weeding. Eventually, the perennials will take over and form a stable community. Even more interesting is that increasing the species diversity can speed up this process. The number of species used to establish the plots ranged from 4 to 16. In each case, the proportions of legume family, sunflower family, warm-season grass and cool-season grass species were the same. Andrea found that the 1997 data confirmed the trend for the percentage of the ground covered by annual plants ("weeds") to decline faster in plots with 8-16 plant species than in plots with only 4 (Fig. 1). It will be interesting to see if this

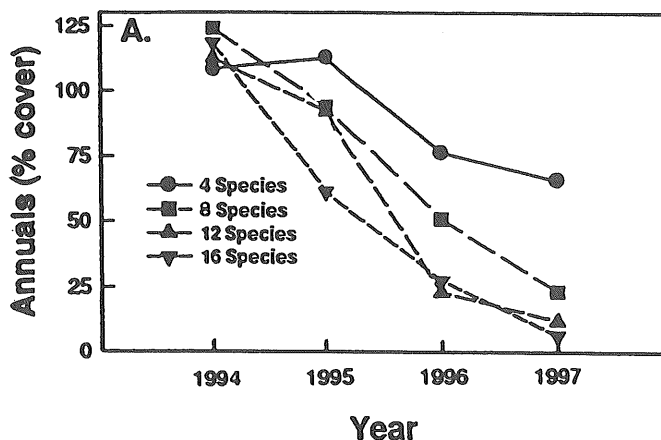


Fig. 1. Decreasing percent cover of annuals as a function of perennial species diversity

trend continues in future years and in a duplicate experiment started more recently in a different location.

Seed yield of four perennial grain candidates in monocultures and polycultures.

The prairie, like most natural systems, includes many species of plants growing together in mixtures. In contrast, most agricultural systems plant a single species in each field and expend considerable time and energy to

keep other plants out. Many scientists believe that it is important to preserve species diversity (biodiversity). However, it has been more difficult to articulate the advantages of species diversity. As we have seen from the community assembly experiment described above, one useful aspect of species diversity is the accelerated formation of stable, complex plant communities. A second benefit of species diversity is likely to be increased productivity. A mixture of species—each with different growth habits, nutrient requirements, and seasons of growth—can utilize the available resources more efficiently than a single species grown in monoculture. Previous studies at The Land Institute have confirmed that mixtures of perennial species out-yield monocultures of the same species.

Caroline Brock's results tell a different story. In 1997 the two-year-old polycultures underyielded—that is, they produced less than the monocultures of the same species. Does this result contradict our earlier conclusions? Not necessarily. This is the first polyculture experiment to include Maximillian sunflower. Although Maximillian sunflower is a high-yielding perennial grain candidate, it is extremely aggressive. It grows very tall and probably produces chemicals in its roots that inhibit the growth of neighboring plants, which might explain the poor yields of the other three species in the 1997 polyculture plots. This result highlights the need for further experimentation.

Already, a new experiment is underway in which the same four species are grown separately (monocultures) and in pairs (bicultures). Data from this second experiment should give us a better picture of how specific crops interact either positively or negatively. Future experiments should be designed to see if there are better ways of managing an aggressive crop such as Maximillian sunflower, or if genetics can be used to manage this kind of plant. It may be possible to breed a less aggressive peren-



Caroline in a community assembly plot

nial sunflower; it may also be possible to breed companion crops that are adapted to growing next to such a competitive neighbor. Eventually, we may find that a crop like perennial sunflower must be planted at a lower density than we have used in our experiments to date. Although the polycultures in our experiments have had sunflowers in every fourth row, sunflowers are almost never that abundant in the prairies of central Kansas.

Update from the Sunshine Farm

Marty Bender

As part of The Land Institute's mission to use nature as the measure for developing sustainable agriculture and culture, the Sunshine Farm Project is exploring the possibilities of farming without fossil fuels, fertilizers, or pesticides. Instead, it uses renewable energy technologies and innovative practices to raise crops and livestock typical of



Marty giving a tour to members of the Kansas Vocational Agriculture Teachers Association

the Great Plains. With its fifth field season completed, the project has achieved results in the following categories: energy accounting, renewable energy technologies, intern research projects, biological design, and demonstration.

Energy accounting on the Sunshine Farm will allow us to reassess the extent to which modern farms can run on sunlight. Currently modern farms use far more inputs than they did before fossil fuels were widely used. During the past five years, we have collected data on the energy, materials, and labor in every task on the farm and have entered it into an accounting framework set up on a computer database. From energy budgets designed on the computer, the data shows that 1.75 Btus of caloric energy could have been sold in crops and animal products from the Sunshine Farm for every 1 Btu of energy that was imported directly and indirectly as production inputs onto the farm. The 1.75 Btus of caloric energy represent food for humans and farm animals, but a crucial question in a sunshine future is where society will get the 1 Btu of cultural energy to produce the imported farm inputs.

We have gained some important insights from the renewable energy technologies on the Sunshine Farm. From the use of the biodiesel fuel and the photovoltaic array, we have learned that these projects should not be about self-sufficiency but about reducing agriculture's dependency on fossil fuels. The utility grid makes a good storage system for the electricity generated from the photovoltaic array, and biodiesel fuel should be produced by farmers' co-operatives instead of on-farm. One reason is

that it is not easy to produce high-quality biodiesel fuel on the farm; another is that tractor manufacturers will not guarantee their diesel engines against every farmer's home-brew of biodiesel. Economies of scale allow a co-operative to produce biodiesel fuel with a more positive energy balance and much less human labor than on-farm production. Upon recommendation by the Farmer and Scientific Advisory Committees for the Sunshine Farm Project, I reviewed 12 economic feasibility studies on biodiesel fuel and did an analysis of a farmers' biodiesel co-operative near Vienna, Austria. The Austrian government's subsidies enabled the 290 farmers to produce canola oilseed on set-aside land for the co-operative to convert to biodiesel fuel and by-product meal cake at essentially no net cost to the farmers.

Draft horses have been used for field operations on most crops on the Sunshine Farm. The proportion of total field operations for various crops powered by the horses has ranged as high as 43 percent. We have found that horses require no more cropland for animal feed than tractors do for biofuel. At the turn of the century, one-fourth of the US cropland was devoted to feed for draft horses. Likewise, one-fourth of the cropland on the Sunshine Farm must be in soybeans and sunflowers to provide sufficient biodiesel fuel to replace the gasoline and diesel used in field operations and trips to town. Since we are talking about a "sunshine future," this result is on a net energy basis, where the energy to grow the oilseeds and process them into biodiesel has been subtracted from the energy content of the biodiesel and where an energy credit has been given for the by-product meal cake. Hence, horses

are just as efficient in acreage requirements and can be regarded as a viable complement to tractors on the Sunshine Farm.

In order to ascertain the sustainability and to improve the components of the Sunshine Farm, interns work on the following research projects: rotational grazing of beef cattle on pasture and in crop strips, free-range egg-laying hens, portable broiler pen, strip cropping, and soil quality. Our Texas longhorn cow-calf herd is thriving, with 11 calves born during 1997. Building on past data, 1996 intern Sheri Walz and 1997 intern John Guretzky found that rotational grazing has not changed the plant species composition on the native prairie pasture, perhaps because effects are not readily seen after only three years.

With encouragement from our Farmer Advisory Committee and a grant from the Organic Farming Research Foundation in California, 1996 intern Jim Boyd and 1997 intern Sarah Hinnners studied the market finishing of our beef yearlings by grazing them on our crop strips with electric fencing and without grain supplements. This arrangement closes the nutrient cycle by having the yearlings drop their manure on the crop strips. Cultural energy inputs also decline because the yearlings graze their own feed instead of machine-harvested feed. This also eliminates the need to send them to feedlots for fattening. By means of a partial budget analysis, we found that to make a net profit of \$10 per head from the finishing phase alone, our fence and watering system would need to cover at least 220 acres of crop strips with 110 yearlings finished on them annually. Regarding soil quality research, the interns found that the cattle compacted

Table 1. 1993-1997 Sunshine Farm crop yields and Saline County dryland averages.

Crops	Sunshine Farm					Saline County	
	1993	1994	1995	1996	1997	dryland ^{a)} [mean±std. dev.]	Years averaged
Grain sorghum (bu/acre)	38	72	36	62	55	49±20	1980-1995
Soybeans (bu/acre)	14	32	20	46	38	25±10	1984-1995
Wheat (bu/acre)	—	27	25	14	—	30±8	1980-1995
Oats (bu/acre)	35	39	53 _{c)} 71	50	15	47±10 ^{b)}	1988-1995
Sunflowers (lbs/acre)	—	703	319	927	893	997±208 ^{b)}	1990-1995
Alfalfa (tons/acre)	1.2	1.7	1.8	4.7	3.5	3.2±0.5	1980-1995
Forage sorghum (tons/acre)	—	9.1	3.1	4.7	3.3	3.4±1.5	1980-1984

a) Kansas Board of Agriculture 1980-1995.

b) Average for central Kansas district.

c) This was the yield from 13 strips of volunteer oats.

the soil on the crop strips and that their manure resulted in a greater level of soil nitrate, but that these effects did not persist in the crop strips after a year.

Using four years of energy accounting data for broiler production, 1996 intern Thomas Ruppert and 1997 intern Douglas Haynes found that Cornish Cross chickens were twice as efficient in meat production as Rhode Island Reds, long considered dual-purpose chickens (both egg and meat producers). For egg production, the data clearly showed that the caloric and protein production efficiencies of Barred Rock hens increased when they were allowed to range freely and forage for insects in nearby alfalfa patches, compared to when they were fenced in and foraged for insects in large compost piles of old hay and horse manure.

Organic crop yields on the Sunshine Farm have generally matched dryland yields in Saline County, except for sunflowers and alfalfa. There are timing problems with weather when growing alfalfa for only two years in a five-year crop rotation, and organic sunflowers encounter the insects and diseases associated with the native wild annual sunflower from which they were domesticated. Since we have had problems with fall-migrating blackbirds eating our sunflower crop before harvest, we compared a possibly bird-resistant sunflower hybrid with two other sunflower hybrids that did not have the traits for deterring birds from eating the seeds. Even though birds did eat some of our sunflower crop, 1997 intern Jon Jensen found little difference in seed loss between the special hybrid and the other sunflowers.

With three years of data, 1996 intern Tammy Hinman found no yield advantage along the edges of the narrow crop strips as one would expect due to polyculture effects. This is likely a result of the presence of weeds along the

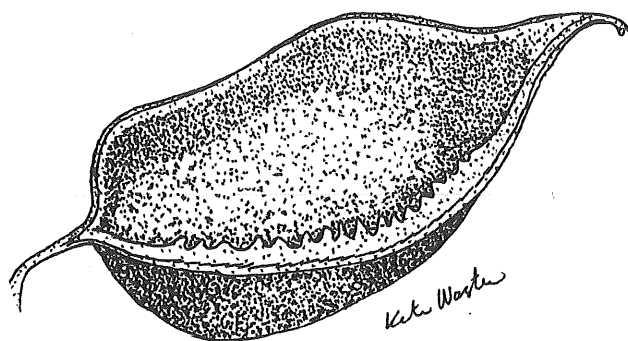
strip edges. On the basis of four years of data, she and Jon Jensen found that annual grains do not perform well when strip-cropped with perennial grain candidates from the Natural Systems Agriculture research at The Land Institute. The reason for this poor performance is that the perennials have already sprouted from the roots in the spring and thus out-compete the annual seedlings in early summer for moisture, nutrients, and light.

Jerry Glover, 1996 intern, and Laura Weingartner, 1997 intern, found that total nitrogen has been decreasing on the Sunshine Farm, a finding now supported by four years of data collection. To reverse this trend, we need to put more legumes in the crop rotation or find more ways to recycle nutrients to the cropland. Jerry and Laura did not find any cropping system effects on the physical or biological properties of the soil, perhaps because more than four years are needed to detect changes. Using the prairie as a standard for the Sunshine Farm, the interns compared our crop strips with a bottomland native hay meadow that has the same soil type. The meadow had twice the organic matter content as our farm soil and higher levels of total nitrogen, total phosphorus, cation exchange capacity (ability to make some nutrients available), water-holding capacity, aggregate stability (ability to resist soil erosion), and earthworms.

Use of biological efficiencies in crops and animals has resulted in increased nutrient cycling and in fewer inputs on the Sunshine Farm. Various examples are discussed above in the intern research projects. Also, to reduce the use of purchased high-protein feed for our poultry, Douglas Haynes began experimenting with a protein diet formulated from grains grown on the Sunshine Farm. Our data shows that this diet will need some adjustment to maintain egg production. To reduce the amount of machine-harvested feed given to our cattle during late winter and early spring, barley is grown to provide some grazing until the prairie pasture begins growing in May.

We feature the Sunshine Farm at The Land Institute's Prairie Festival, Visitors' Day, Farmers' Field Day and numerous tours year-round for visitors. The Scientific and Farmer Advisory Committees for the Sunshine Farm meet once a year to critique the farm and its research. The latter committee is part of the Heartland Sustainable Agriculture Network, a state-wide consortium of farmer groups, administered by the Kansas Rural Center, who share experience in sustainable agriculture.

This year we will continue the long-term intern research experiments discussed above and finish up the analysis of the whole-farm energy budgets. I plan to write papers on the energy accounting for publication in journals and to begin work on various chapters for a book on the Sunshine Farm, to be published in roughly four years.



Wild Indigo

The Culture of Wilderness

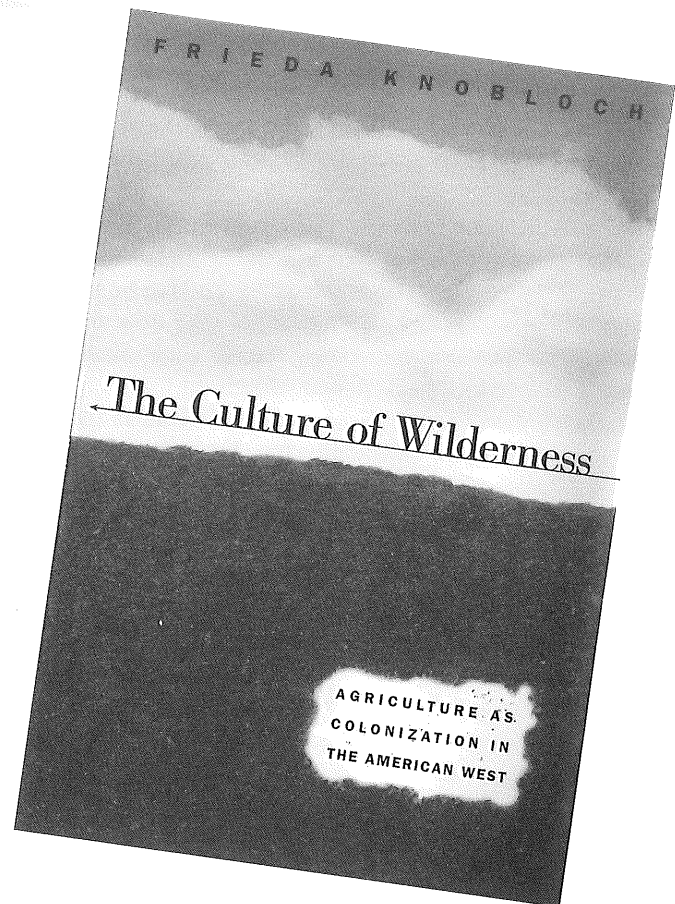
by Frieda Knobloch

University of North Carolina Press, 1996. 204 pages.
\$14.95, softcover.

Reviewed by Jacob Gatschet

Western agriculture is a form of colonization, seeking as it does to domesticate and “improve” nature. So argues Frieda Knobloch in this provocative and interesting book. In her view, both agriculture and colonization attempt to transform what is perceived as primitive or wild into something cultured. Because the Western mind has considered this movement away from the natural and towards the cultivated as inevitable, any thing or person resisting this alleged progress has been forced to the margins, if not annihilated outright. Under the banner of “inevitability,” this transformation is never considered “unwanted, unnecessary, or at least susceptible to critique” (preface, x) and renders the violence perpetrated on “resistors” as “for their own good.” Against this historical backdrop Knobloch sets out a twofold purpose: to demonstrate that agriculture is a deeply socio-political undertaking directed not by so-called progress or any other invisible force but by the choices of actual people, and, secondly, to trace the influence of “colonializing” agriculture on American forests, grass ranges, prairies, and—odd as it might at first seem—weeds.

Colonializing ambitions in American forests have been evident in the state’s assumption of authority over the conditions of the forest’s existence and the maximization of “efficient” use. Knobloch argues that the government’s conservation and preservation efforts in American forests have been routinely misunderstood as “stays to the hand of wholesale forest transformation [by timber companies when] . . . in fact these measures confirm the ambition of the state (however absolutely unrealizable) to control every aspect of the forests within its territory” (20). Not surprisingly, governmental control has excluded previous uses of the forest and any uses not explicitly sanctioned by law. “Whatever agency the forest had to regenerate itself [has been] harnessed to the demands of foresters, to grow timber either for harvest or for ‘wilderness’” (40). The supposed opposition between the public and private sectors has been further blurred by the fact that a great deal of “private” timberland was distributed by the state from the public domain, with much of this land later reverting to the public domain through tax forfeiture (when timber companies abandoned their cutover holdings). Additional evidence of the government’s resolve to control American forests is found in the military’s historical involvement in numerous timber-related activities—production, fire fighting, woods research and technology, the containment of timber labor activism, and the surveillance of forests (which, like timber production, increased dramatically during the world wars).



Knobloch’s “Grass” section reveals a history very similar to that of the forests. Range management and live-stock production—flip sides of the single coin of control—have transformed the grasslands. Native flora and fauna have been pressured to give way to “improved” varieties that maximize yields both of forage material and animal products. And the entire process has been justified as inevitable progress.

The “Plows” section begins with the argument that no technology can be comprehended by its physical properties alone because every tool establishes a set of relationships with those who use it or benefit from it. The history of the plow demonstrates this point all too well. As the dominant agricultural tool in Europe shifted from the hoe to the ard—a dragged tool which opens up the soil without turning it over—and from the ard to the moldboard plow, social and political realities changed as well. Landownership began to concentrate in the hands of fewer and fewer people, who privileged large-scale grain monocultures (for trade purposes and to facilitate the movement of armies) over food production and who extracted rents and surpluses for their own benefit. Women were further marginalized agriculturally and hence socially and politically as well. Food shortages, unbalanced diets, and unprecedented hunger became commonplace (in contradistinction to the venerable

formula that the amount of hunger decreases with the evolution of culture). Medieval people adapted to these changes in part by eating crops that fed livestock—peas, beans, and lentils—and by cultivating small gardens (where women “re-emerged” agriculturally). Knobloch is keen to show that the choice to abandon the hoe for the ard and the ard for the plow (and so on up to the latest agricultural tool) is not natural or inevitable, though “that is precisely how agricultural history tends to be understood” (74).

She also draws attention to the peculiar vocabulary of Western agriculture—its talk of “development,” “improvement,” and “breaking virgin land”—and to the claims and values implicit in such terms. Equally interesting is her exposition of the “imperialist nostalgia” characteristic of vanquishers, their mourning of the past that they have destroyed in the name of progress. Just as agricultural “advances” occasioned a nostalgia for lost nature, now farming (the contemporary equivalent of nature in the popular imagination) is being mourned as the antecedent of “unstoppable” industry. One can only wonder if industry will ever be mourned!

Knobloch’s final section, “Weeds,” shows the slipperiness of this most basic of agricultural categories. A plant becomes a weed, she notes, not because it is ugly or useless or wildly profligate, but because it takes “territory and profit away from agriculture in some way” (114).

Agriculture divides the plant world into weeds (a long list) and non-weeds (a short list) and prescribes a program for excluding the former. But the mindset that ranks plants according to their usefulness to people forgets that what makes a cultivated plant “superior” originated in wild plants now considered “inferior.” It also forgets that the social values determining the perceived usefulness or beauty of a plant vary widely among peoples and times. Plants routinely drift in and out of cultivation, escape, hybridize, and return in a different human category. In fact, some modern-day “weeds” in North America such as yellow toadflax and kochia were introduced as domesticates and then “got away.”

As the scale and technology of agriculture have increased, weeds have become correspondingly more problematic. Methods which work fine on a smaller scale—hand-pulling, hoeing and selective harvesting—become too expensive and “inefficient” for large-scale agriculture. The “progression” of weed management from hand to hoe to larger tools to chemicals and, most recently, to genetic engineering, reflects the desperation of agriculture to keep ahead of its “enemy.” Also of interest is the historical entanglement of military and corporate interests in herbicide research, which has “maintained the

connection between plants and their people, targeting one in order to destroy the other,” as with Agent Orange in Vietnam (140).

The nub of Knobloch’s book surfaces most clearly in “Weeds” where she argues that agriculture, at least in the West:

represents the action of culture against nature, which defines both culture and nature simultaneously . . . The word “culture” names what happens in this history of being born and then separating from nature, improving upon it, and bringing its latent potentialities into being through certain kinds of work in the arts and sciences. Culture exists where nature has been permanently altered, even obliterated, where a society measures its worth by its distance from “nature”—from its birth—all traces of which have been relegated to the past. Nature makes culture possible, and a “culture” looks back with a certain nostalgia to the nature that gave rise to it, at the same time that it is only through the transformation of nature that a culture understands itself as “advanced” (74-75).

Knobloch rightly posits the human-nature relationship as central, but she fails to acknowledge the complexities inherent in it. We can never “merge” completely with

nature because our *human* nature (specifically our self-consciousness and capacity to choose) precludes it. We will always stand at some remove, some distance from the natural world and from ourselves by the very fact that we are able to ponder and choose among several courses of action. The key issue is what will guide our use of these powerful capacities. In her closing pages Knobloch states that there can

be no “going back” to a time of hunting and gathering. But given that impossibility and the impossibility of a wholesale merge with nature, her relative silence regarding reform of the human-nature relationship is disturbing. What should we be doing now, what kinds of questions should we be posing now in order to move our cultural arrangements towards greater resistance to human folly? By withholding from this central topic, Knobloch leaves the reader feeling vaguely guilty for being a “Western accomplice” and feeling rather powerless as well, despite her repeated emphasis on the reality and importance of human choice. Even with this omission, however, *The Culture of Wilderness* serves as a powerful wake-up call that Western agriculture and its attendant cultural arrangements stand in need of radical reform.

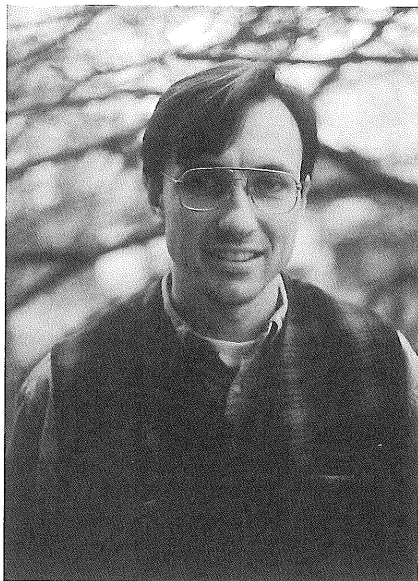
Just as agricultural “advances” occasioned a nostalgia for lost nature, now farming (the contemporary equivalent of nature in the popular imagination) is being mourned as the antecedent of “unstoppable” industry.

New Staff at The Land Institute

Kate Worster

Jeff Empfield

Being an educator has been the focus of Jeff's life for the past several years and continues to be now that he joins us as Education Director. He is particularly enthused about The Land Institute's integration of hands-on learning with the reading and discussions in the classroom. Before coming to Salina this



winter, Jeff worked in a variety of environmental and outdoor educational positions—as an interpretive guide in Grand Teton National Park, Wyoming; as a Resource Instructor for the Washington County Education Service District in Hillsboro, Oregon; and as Natural History Instructor at the Targhee Institute in Alta, Wyoming.

Despite his extensive work and travel in the West, Jeff was born in Western Pennsylvania and raised on the same land on which his father and grandmother were born. Jeff's formal education includes a BA in Industrial/Organizational Psychology from Indiana University of Pennsylvania and an MA in Environmental History from Virginia Polytechnical Institute and State University.

Jeff first began to read and learn about The Land Institute in graduate school, but it was not until he became acquainted with three former interns, Tracy Noel ('90), Karen Finley ('88), and Jake Vail ('88), in Oregon that he received *the facts*. From his conversations with these three, he decided to pursue a position here. So far, Jeff is impressed both by the beauty and openness of the Kansas landscape and by the openness he feels among Land Institute staff towards new ideas and innovations. His involvement in education has led him to take particular interest in the Rural Community Studies Program in Matfield Green, which he considers important in addressing the problems of society in the context of the local community.

Jacob Gatschet

Jacob learned of The Land Institute from his brother John, who dragged Jacob to his first Prairie Festival in 1996. Jacob received a BS in Math from Creighton University in Omaha in 1986 and followed that up with a

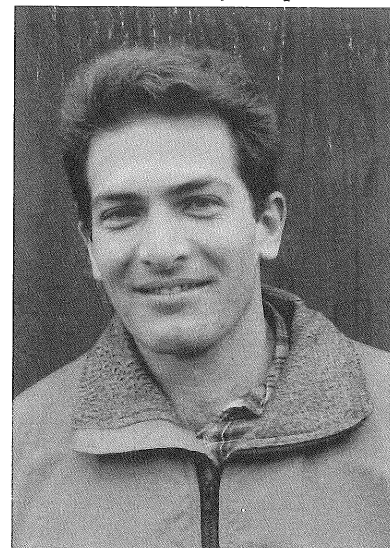
year at Kansas State University. There he studied Engineering because he believed he had to (in order to get a job) and English because he wanted to. After working as an actuarial analyst for two years in Atlanta, he joined the Catholic religious order of the Jesuits. During his seven years with the Jesuits he studied "more philosophy than the USDA recommends" and received an MA in English from Gonzaga University in Spokane, Washington. His memorable experiences from those years include a summer in the Dominican Republic as part of a rural health care team and hitchhiking from the Twin Cities of Minnesota to New Orleans on a pilgrimage.

In the summer of 1997 Jacob moved to Omaha to look for work as an editor or writer. He wrote to Wes Jackson in September to inquire about such positions in the Midwest. Originally brought in as Development Director in October, Jacob is now shifting into writing and doing research for Wes.

Jacob grew up on a farm ten miles northwest of Hays, Kansas, as the youngest of five children, each one year apart. His parents were both professors at Fort Hays State University and farmers with personal livestock, a big garden, and a wheat cash crop. The combination of the academic and the farming lifestyles has been a tangible reality for Jacob. Little wonder, then, that the philosophy and writer-farmer vocations of Wendell Berry have such resonance with him.

Luke Matthews

After a formal and stringent interview process (consisting of riding around in Jack Worman's truck and joining him on the tractor), Luke was hired to be the Farm Operations Assistant in December. Luke comes to us with a



wealth of skills, knowledge, and a plain old "love of tinkering." While attending the University of Wisconsin, where he earned a BS in Philosophy and a certificate in Environmental Studies, he worked as a builder and general maintenance man at a furniture shop in Madison.

Luke was first introduced to The Land Institute through former intern Douglas Haynes ('97). He immediately liked the place and the people during his visits last spring, one of which was over Prairie Festival weekend. Of course, Luke leads a mean waltz, so we know the barn dance was what really won him over.

He is especially glad to be at a place where he can acquire farm experience, fulfill his enjoyment of being an all-around maintenance man, and engage in philosophically meaningful discussions. Philosophy piqued his interest the most in college as the readings and class discussions led to the important consideration of how best to live one's life. Because of their practical treatment of living the "good life," Socrates and Nietzsche are his favorite philosophers. Eventually, Luke would like to have his own custom-built furniture business, a few chickens, and, of course, help solve the problem of agriculture along the way.

Patty Melander

Although Patty just began her employment with The Land Institute as Development Assistant in mid-November, her office is a familiar place. As Patty was



friends with Ann Krehbiel when they attended Southeast of Saline High School, she has slept over in what is now Ken Warren's office. (The Krehbiel House, once the home of the Krehbiel family, now serves as The Land Institute office.) Perhaps these domestic associations, coupled with

her own preference for a small-office atmosphere, are reasons Patty feels at home here.

After high school, Patty attended Fort Hays State University. The past 20 years she has worked in insurance in Kansas City. In June 1996 she returned to Assaria, a small Swedish community nine miles south of Salina, in order to care for her parents.

Patty grew up on her family's farms near Mentor and Assaria with her parents and two older brothers. Her father grew wheat and milo and grazed cattle. The family

also had personal livestock and a garden. Her family and Saline County history has it that her father was the only farmer in the county to run a moldboard plow pulled by nine horses. He also built long stretches of fence, with the cable running through hand-drilled holes in the posts instead of barbed wire wrapping around them. Some sections of these hand-drilled fences are still standing today, 55 to 60 years later.

Patty has no plans for leaving Kansas again (she did once and missed it too much). She likes to fish and garden and often lends knowledge and advice from her experience to the work in our vegetable garden.

Bev Worster

As the new Director of Education for the Rural Community Studies Program at Matfield Green, Bev Worster is a welcome addition to The Land Institute staff. Bev recently retired after 22 years of teaching in hopes of



raising chickens and goats, but (like so many of us) was persuaded by Wes Jackson's ideas and agreed to assume directorship in January.

Bev grew up in Fredonia, Kansas, as one of six children. Her father was a carpenter, and her mother was active both in the school and community. She began her undergraduate studies at the University of

Kansas and later completed a BA in English at the University of Maine. She then went on to receive an MA in English and Education from Boston University. Bev pursued post-graduate studies in English and Writing at the University of California at Berkeley.

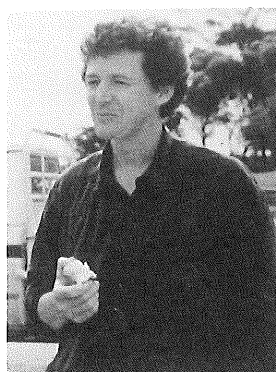
Her accomplishments so far as Director of Education include establishing the Rural Community Studies Team to oversee the program, working with the schools in the Matfield Green Consortium for Place-Based Education and other interested school districts in the state, and organizing a summer workshop (see p.5). After 15 years of visiting and following the work of The Land Institute, Bev is excited to be devoting time and experience to the future of rural education and to pursuing the mission of The Land Institute, which is in part to "promote the enduring prosperity and vitality of rural communities."

The Land Institute's Natural Systems Agriculture Advisory Team

In this issue we profile three more members of our advisory team. As leaders in their fields, NSA team members will assist The Land Institute staff to communicate our ideas and will advise us on our research agenda.

Ted Lefroy

Ted Lefroy is a Research Fellow at the Centre for Legumes in Mediterranean Agriculture (CLIMA), an institute seeking to improve the range and performance of grain and pasture legumes as vital components of the rotations that characterize farming in Southern Australia. His particular interest is the integration of trees and shrubs into dryland farming systems to manage water and nitrogen. His current research involves a comparison of water and nutrient cycling among a conventional cereal/legume crop rotation, a tree/crop system, and a native woodland. The objective is to develop design criteria for farming systems that will manage water and nitrogen to minimize the risk of salinity and soil acidity. Lefroy will submit this research as his PhD thesis in 1999.



In September 1997 Lefroy convened the international workshop "Agriculture as a Mimic of Natural Ecosystems" in Western Australia (see news in *Land Report* #59) because, he claims, "it is patently obvious that current farming systems are hopelessly unsustainable, and nobody seems to have any idea of what to do about it." The work of The Land Institute and of Dr. Jack Ewel in Costa Rica (see profile in *Land Report* #59) introduced him to the alternative notion of basing farming systems on the functioning of natural ecosystems. The idea for the conference was to draw together those who have been attempting ecosystem mimics, those who have studied farming methods in semi-arid environments, and those Australian scientists actively involved in sustainability research.

Before his research at CLIMA, Lefroy spent five years evaluating tree and shrub species for their value as forage plants. This work involved the collection and field evaluation of forage trees and shrubs from southwestern Australia and the Mediterranean basin (Israel, Greece, Spain, and Morocco), as well as economic modeling of a range of farming systems incorporating trees and shrubs. After receiving a BSc in Agriculture in 1973, he worked in agricultural extension in Papua New Guinea and the state of Queensland. In Papua New Guinea he was the Atolls Agronomist on a project aimed at improving the self-sufficiency of food production on four coral atolls outlying Bougainville Island, North Solomons Province. As a Rural

Extension Officer in Queensland he provided technical advice on crop and pasture production to grain and beef farmers.

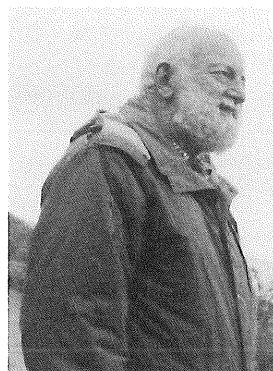
Lefroy has received numerous awards—most recently, the OECD Co-operative Research Fellowship to visit the Swedish Agricultural University in Uppsala. In 1994 he received a Churchill Fellowship to study the integration of trees into semi-arid farming systems in the US, Kenya, France, and South Africa.

Richard Levins

Richard Levins is an ex-tropical farmer turned ecologist, biomathematician, and philosopher of science. He is primarily concerned with processes in complex systems, both abstractly and as applied to evolutionary ecology, economic development, agriculture, and health. He currently holds the position of John Rock Professor of Population Science at the Harvard School of Public Health, where his studies of theoretical complexity have led him to examine the problems of adaptation within the structure of the environment in space and time, the metapopulation concept in biogeography, human physiology as a factor of socialization, and the interpretation of model-building.

In his mathematical research, he has sought to find appropriate ways to visualize complex phenomena. He developed the use of signed digraphs, time averaging, and pre-image sets for qualitative analysis of complex systems.

As part of the board of directors of OXFAM-America and chair of their subcommittee on Latin America and the Caribbean from 1989 to 1995, Levins had the opportunity



to apply his theoretical interests to problems of community development. Working from a critique of the industrial-commercial pathway of development, he promoted alternative development strategies that emphasize economic viability with equity, ecological and social sustainability, and empowerment of the dispossessed. Levins has also participated in the New World Agriculture and Ecology

Group where he helped to develop modern agroecology by concentrating on whole-system approaches to pest management. Levins helped to found and lead the Harvard Working Group on New and Resurgent Disease, which attempts to approach infectious disease as a general phenomenon both of evolutionary ecology and social dynamics.

He studied plant breeding and mathematics at Cornell University, farmed in Puerto Rico, and obtained his doctorate from Columbia University of Chicago before taking his present position. Levins is currently on the advisory board of the International Society for Ecosystem Health and is a

member of the American Academy of Arts and Sciences. He has received awards as a pioneer of the ecology movement in Puerto Rico and for contributions to Cuban agriculture, as well as an Edinburgh Science Medal for contributions to science and the broader society. *The Dialectical Biologist*, co-authored with Richard Lewontin, presented the authors' approach to the study of the philosophy, sociology, and history of science.

Sally Leong

Sally Leong is a native of California, but her father's position as an Air Force officer caused her to move often and live in many places, including Japan, Thailand, Hawaii, and Washington, D.C. She obtained her BA in Biochemistry in 1976 from the University of California, Berkeley and her PhD in Comparative Biochemistry in 1980 from the same institution, studying high affinity iron transport in phytopathogenic bacteria. After a three-year sojourn at the University of California, San Diego studying whether the symbiont *Rhizobium meliloti* makes the heme found in alfalfa leghemoglobin, Sally moved to her current position as Research Chemist in the USDA-ARS Plant Disease Resistance Research Unit and as Professor of Plant Pathology at the University of Wisconsin, Madison.



There her work is focused on the molecular genetics of pathogenicity of plant pathogenic fungi. This work has centered primarily on *Ustilago maydis*, the cause of corn smut disease, and *Magnaporthe grisea*, the cause of rice blast disease. Sally has developed numerous molecular tools such as a gene transfer system, molecular karyotypes, and a fungal genetic map to facilitate this work. Considerable progress has been made in describing the genome organization of *M. grisea*, and recently a gene controlling cultivar-specific interactions with rice has been cloned. Studies of *Ustilago* have focused primarily on how the fungus acquires iron from the environment through secretion of high affinity iron chelators (siderophores). Siderophores are produced by most microorganisms and can effect iron availability to plants and soil ecology.

Sally's work has been acknowledged by the USDA and by the University of Wisconsin through several awards—the Pound Research Award; the 1991 Arthur Flemming Award, scientific category; and her designation as the USDA-ARS 1990 Outstanding Early Career Scientist.

Sally has been a strong proponent of sustainable agriculture and has taken it upon herself to become broadly educated in this area. She has attended the Upper Midwest Organic Conferences, Michael Fields Agricultural Institute Urban-Rural Field Days, the CSPI conferences on policy issues related to sustainable agriculture, The Land Institute Prairie Festival, the Ecology Action workshop on biointensive farming, and many others. In 1992 Sally helped found the Foodshed Working Group, a citizen-

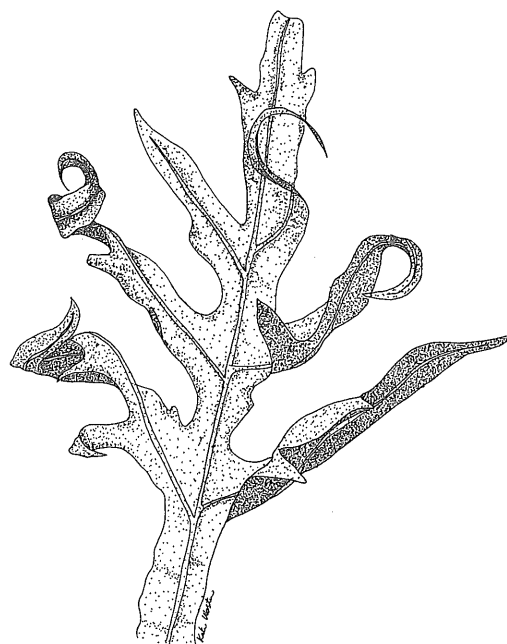
based organization which met for four years to discuss and learn about issues related to our current food system.

Sally and her husband Carl recently moved to a 115-acre farm in Avoca, Wisconsin. There she hopes to develop a model for an economically viable and ecologically sound small-scale farming system.

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The Land Report #58 listed all the members on board at that time, while #59 and this issue include only new additions to that list.



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Prairie Festival 1998 *honoring Aldo Leopold and nearly 50* *years of his A Sand County Almanac*

Aldo Leopold (1887-1948) has been called “an American prophet and the single most outstanding spokesman for conservation the world has produced.” Born in Burlington, Iowa, he went on to receive an MS in forestry from Yale. He then spent the bulk of his professional life in the US Forest Service and, later, as chair of the Game Management Department at the University of Wisconsin, Madison. His book, *A Sand County Almanac*, published in 1949, is “a classic of natural history literature and the conservationist’s Bible.” Leopold’s view of the human relationship with the natural environment is an important component in the philosophy underlying The Land Institute’s program in Natural Systems Agriculture, which begins by taking “nature as measure.” The following quotes are all excerpted from *A Sand County Almanac*.

- There are two spiritual dangers in not owning a farm. One is the danger of supposing that breakfast comes from the grocery, and the other that heat comes from the furnace.
- He who owns a veteran bur oak owns more than a tree. He owns a historical library, and a reserved seat in the theatre of evolution.
- It is a century now since Darwin gave us the first glimpse of the origin of species. We know now what was unknown to all the preceding caravan of generations: that men are only fellow-voyagers with other creatures in the odyssey of evolution. This new knowledge should have given us, by this time, a sense of kinship with fellow-creatures; a wish to live and let live; a sense of wonder over the magnitude and duration of the biotic enterprise.
- Recreational development is a job not of building roads into lovely country, but of building receptivity into the still unlovely human mind.
- [T]here is value in any experience that reminds us of our dependency on the soil-plant-animal-man food chain, and of the fundamental organization of the biota. Civilization has so cluttered this elemental man-earth relation with gadgets and middlemen that awareness of it is growing dim. We fancy that industry supports us, forgetting what supports industry. Time was when education moved toward soil, not away from it.
- Education, I fear, is learning to see one thing by going blind to another.
- The effort to control the health of the land has not been very successful. It is now generally understood that when soil loses fertility, or washes away faster than it forms, and when water systems exhibit abnormal floods and shortages, the land is sick.
- The practices we now call conservation are, to a large extent, local alleviations of biotic pain. They are necessary, but they must not be confused with cures.
- A science of land-health needs, first of all, a base datum of normality, a picture of how healthy land maintains itself as an organism. . . . [and the] most perfect norm is wilderness.
- Ability to see the cultural value of wilderness boils down, in the last analysis, to a question of intellectual humility. The shallow-minded modern who has lost his rootage in the land assumes that he has already discovered what is important; it is such who prate of empires, political or economic, that will last a thousand years.
- There is as yet no ethic dealing with man’s relation to land and to the animals and plants which grow upon it.
- The usual answer to this dilemma is “more conservation education.” No one will debate this, but is it certain



Charles Bradley

that only the *volume* of education needs stepping up? Is something lacking in the *content* as well? . . . [A]s I understand it, the content is substantially this: obey the law, vote right, join some organizations, and practice what conservation is profitable on your own land; the government will do the rest. Is not this formula too easy to accomplish anything worth-while? It defines no right or wrong, assigns no obligation, calls for no sacrifices, implies no change in the current philosophy of values. In respect of land-use, it urges only enlightened self-interest. Just how far will such education take us?

- The extension of ethics to . . . [the land] is, if I read the evidence correctly, an evolutionary possibility and an ecological necessity.
- The land ethic simply enlarges the boundaries of the community to include soils, waters, plants, and animals, or collectively: the land. . . . In short, a land ethic changes the role of *Homo sapiens* from conqueror of the land-community to plain member and citizen of it.
- Perhaps the most serious obstacle impeding our evolution of a land ethic is the fact that our educational and economic system is headed away from, rather than toward, an intense consciousness of land.
- 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.

The 1998 Prairie Festival will be held in Salina May 30-31. (Please note that the festival does *not* fall on the three-day Memorial Day weekend as it usually does.) This year's festival will focus on the work of Aldo Leopold nearly fifty years after the publication of *A Sand County Almanac*.

Our retrospective at the festival will feature reflections and remembrances by three of Leopold's children. In addition, Susan Flader, co-editor of *The River of the Mother of God and Other Essays by Aldo Leopold*, will speak about "Leopold and Environmental Citizenship." Leopold biographer Curt Meine of the International Crane Foundation will address the topic, "'The Inevitable Fusion': Aldo Leopold's Path Toward a Land Ethic." Poet and novelist Mary Mackey from California State University, Sacramento, will read from her published works and discuss the desanctification of the earth in her talk, "The Earth Declares the Glory." Others who have agreed to participate include philosopher Strachan Donnelley, currently president of The Hastings Institute, and Adam Rome, Rhodes Scholar and professor of Environmental History at Penn State University, who will discuss Leopold's legacy at The Land Institute.

Supplementing this program will be updates on The Land Institute's projects, as well as the usual prairie and bird walks, research tours, art, music, barn dancing, food, and children's activities.

We expect a large crowd for this year's festival and, because of space limitations, a cap will be placed on the number of attendees. Friends of The Land are entitled to priority registration until April 30, 1998. To take advantage of the privilege, please complete and mail the registration form below.

REGISTRATION <i>Pre-registration is \$12 and \$17. Registration at the Festival will be \$15 and \$20.</i>	PRAIRIE FESTIVAL 1998 <i>Policy: No Refunds.</i>
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	<u>FRIENDS OF THE LAND (FOL)</u>	<u>OTHERS</u>
<i>You are FOL if date appears on back of this page or if you join FOL with this registration.</i>		
Saturday, May 30	___ x \$12 = \$ ___	___ x \$17 = \$ ___
Sunday, May 31	___ x \$12 = \$ ___	___ x \$17 = \$ ___
<i>Children under 12 register free</i>	___ x \$0	___ x \$0
Sunday lunch	___ x \$8 = \$ ___	___ x \$8 = \$ ___
<i>Vegetarian? ___ yes ___ no</i>		
Enroll as Friend of The Land one year, <i>tax deductible</i>	\$25 \$ ___	
Additional contribution to The Land Institute, <i>tax deductible</i>	\$ ___	\$ ___
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Charge Visa Mastercard Account # _____ Expir Date _____ Signature _____

Names attending: _____

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*We will not confirm your registration.
Program and prepaid nametags and meal tickets will be available at the Registration Desk at the Prairie Festival.*



David crossing Water Well Road on his way to The Land Institute office

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Announcement
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