

The Land Report

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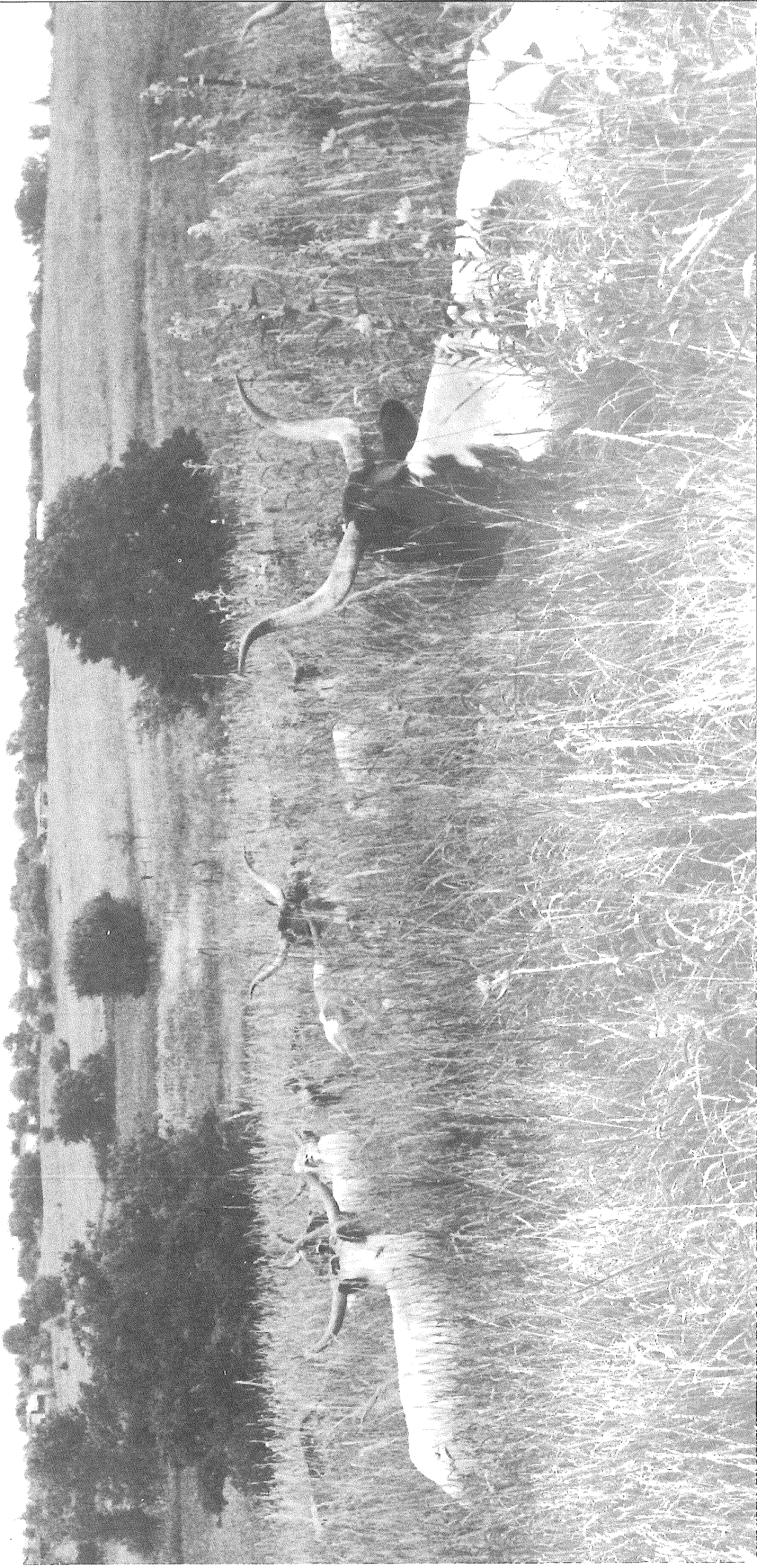


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OUR MISSION STATEMENT

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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Editors: Douglas Haynes,
Bruce Jennings
Assistant Editors: Sarah Jack Hinnners,
Kate Worster
Graphic Design: Arrow Printing
Circulation Manager: Laura Underwood
Photo Editor: Sarah Jack Hinnners
Arts Associate: Terry Evans
Printed by Arrow Printing Company

STAFF: Ron Armstrong, Marty Bender, Jacob Gatschet, Wes Jackson, Bruce Jennings, Cheri Lucas Jennings, Stephanie Krug, Joan Olsen, Tina Ray, Laura Underwood, David Van Tassel, Ken Warren, Jack Worman, Kate Worster

BOARD OF DIRECTORS: Sally Cole, Terry Evans, Pete Ferrell, Charles Francis, Wes Jackson, Rhonda Janke, Eulah Laucks, Conn Nugent, Vicky Ranney, John Simpson, Donald Worster, Angus Wright

INTERNS: Caroline Brock, Alex Crockford, John Guretzky, Douglas Haynes, Sarah Jack Hinnners, Jon Jensen, Andrea Leach, Laura Weingartner

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2440 E. Water Well Rd.
Salina, KS 67401
(785) 823-5376
Fax (785) 823-8728
theland@midkan.com

On the Front Cover: Texas Longhorn cattle relax on restored prairie at The Land Institute

A LETTER FROM THE PRESIDENT

Wes Jackson

On March 13, 1997, the regional newspaper of north central Kansas, the Salina Journal, published a story from Kurilovo, Russia entitled "Russian Workers Cope as Best They Can" by Sarah Mae Brown of the Associated Press. The story begins by describing how "each day, Nikolai and Galya Nikolinko arise in the dark and go about the business of making a living. They milk their cows, feed their pig, gather eggs from their chickens, tend their garden. They live off what they grow and sell the rest for a few rubles here and there. From milk alone, they earn perhaps \$100 a month. And when the sun rises, Nikolai heads off from his simple wooden house to his long-time job as a welder in a state-run auto repair factory. For this, he earns nothing."

The article continues, "People survive on their gardens and their wits, and the official economy primarily is a distraction." After some mention of an impending trade union strike and President Boris Yeltsin's concern about doing something about it the writer says more: "Across Russia, especially in smaller towns and villages, millions of workers have gone months without wages. Both the government and private employers have been unable — or unwilling — to pay them. Even retirees have gone without their pensions. Outsiders tend to ask how this is possible: how can a nation survive when its people are unpaid? Why would a worker show up for a job that offers no wages? Like many Russians, Nikolai Nikolinko — who hasn't been paid in three months — doesn't ask these questions. Why wouldn't he show up for work? 'Where would I go?' he said.

'There aren't any other jobs in this town. I'm too old to look for work in Moscow. This is a one-factory town; we have no other choices. And besides, what if the day I decide not to show up the managers start handing out wages?'

Note that it is the outsiders who ask how these millions of people get by without money income. But an additional message that doesn't get mentioned in the article is that nature's economy in combination with traditional culture continues to feed the people and sustain the industrial economy.

Imagine nearly anyone but the Amish going with no wages in the United States for three months now that our traditional rural economies have been mostly

undone. The collapse of the Soviet Empire represents the first major failure of the industrial mind. We should more or less ignore the differences between capitalism and the Soviet brand of communism here, for both systems have sought to concentrate power and in so doing greatly reduce the number of people on the land and in small communities.

Two important messages come through to me, at least, messages of what we need to do here at home to prevent the eventual likelihood of widespread social upheaval. First off, we need to aggressively consider ways to keep people on the land and in the small towns who are already there and secondly to imagine and implement ways to get some people back onto the land and into more traditional relationships with sun, soil and rural community. We don't have to junk every accouterment of the technological era, but during times of food crisis history has shown that no one is safe whether they have food, grow food or not.

Cultural arrangements of a diverse nature will insure our security. Industrialized pig or chicken factories will not. Whether we are talking about the huge feedlot beef facilities or a central valley of California style of agribusiness to provide us our vegetables, both are brittle forms of food production.

This has all been said before in many ways and at a time of a rising stock market it is easy to deny that anything can or will go wrong with our production system, however well motivated workers may be or however reliable machinery may be.

An analogy comes to mind. Mathematicians and computer wizards at places like the Santa Fe Institute are at work these days on "sand pile dynamics." The elementary model involves a steady stream of sand being poured downward to form a cone. As grain after grain slips onto the pile, nothing dramatic happens other than the cone

becomes larger. At some point, however, a grain of sand will trip a cascade. Which grain it will be is unpredictable. Which grains will be caught in the cascade is also unpredictable, but that a cascade will happen is certain.

Biologists, economists, physicists and others have explored the various social, biological and physical problems of the modern world using the sand pile

...we are seeing everywhere that the resilience of nature is not infinite, cultural stability is fragile, and that the small cascades of the past become predictors for the future.

dynamics model. Whether it is the application of farm chemicals to our land and water, cutting of the tropical rain forest, or overhauling the architecture of the genomes of our major crops and livestock by introducing genes from long evolutionary distances, we are seeing everywhere that the resilience of nature is not infinite, that cultural stability is fragile and that the small cascades of the past become predictors for the future. Meanwhile, we tend to ignore where true resilience lies. The Siberian welder and his family with his garden, pig, and chickens has more to say about a sustainable future than anything the WEB has to offer. This is not an argument that we should empty our cities but rather that we do get more people back on the land in small places, the small communities, and that essentially everyone in the cities be respectful of, if not connected to, one or more farmers in the local countryside. In our educational efforts of the

young it is an argument for teaching the basics about our source. By that I don't mean micro-economics but rather important processes like photosynthesis and the energetics of material recycling.

The Russian couple may not be literate on the internet or even about the chemistry of photosynthesis but they are connected to source. It is ironic that it was the inefficiencies of communism relative to Western capitalism which kept them from undercutting the basis of their current existence.

I have learned to mistrust the too-tidy story, even my own. There is probably an important ingredient left out by the AP reporter. Perhaps there is a small subsidy that comes from the government in the form of a chit or free staples. Even if that is the case, true resilience or security is dependent upon close connection to a land and culture-based *source*.

NEWS FROM THE LAND INSTITUTE

Natural Systems Agriculture Program

The Land Institute in the News. The work of The Land Institute was recently featured in *Nature* (Sept. 11, 1997). An article by Stuart L. Pimm (see profile on page 29) highlighted our symposium in August at the Ecological Society of America Meeting. The Land Institute's quest, Pimm writes, "represents nothing less than attempting a complete revolution of 10,000 years of agricultural practices."

Agriculture as a Mimic of Natural Ecosystems, September 2-6, Perth, Western Australia. Thirty-eight scientists met in a sheep-shearing barn in western Australia for the first international conference addressing Natural Systems Agriculture. Individuals came from all over Australia, the United States, Sweden, Kenya and Spain to examine the idea of creating functional mimics of natural ecosystems as a way to develop sustainable farming systems. The conference organizers were interested in developing a mimic of native Australian flora by asking how to identify key ecological processes and the life forms that carry them out, how to identify candidate species for mimic systems, and how to assemble such systems.

Natural Systems Agriculture Presented as Part of Lecture Series and Conferences.

September 23, Ashland, Ohio, Environmental Lecture Series on Sustainable Agriculture.

October 3-4, University of Northern Iowa, Cedar Falls, Iowa, "Conserving and Renewing Community, Religion, and Environment in the Upper Midwest."

October 6, Kearney, Nebraska. Kellogg Foundation sponsored program for leaders looking at rural development.

October 26-31, Anaheim, California, American Society of Agronomy • Crop Science Society of America • Soil Science Society of America Meeting.

NSA Team Members Visit. Three Natural Systems Agriculture Advisory Team Members visited The Land Institute in August and September: Dr. Jim Manhart, Professor Charlie Brummer, and Dr. Jim Bever.

Rural Community Studies

Furnace finance. Work has begun on the installation of wood-fueled central heating in the renovated grade school in Matfield Green. This project will accomplish our goal of heating the building using renewable fuels and appropriate technology. The school is home to The Land Institute's Rural Community Studies program.

In planning, priority was given to the most economical use of fuel because of the modest wood supply in the area. Energy-efficient storm windows will be constructed on site to tighten the envelope of the

structure, and the furnace will burn a variety of combustible materials. Heat distribution will be zoned to supply only those areas in use at a given time. Care was given to the selection of a furnace whose capacity does not exceed that needed for the 6900 square foot space. When completed, the heating system will extend the season for holding workshops and conferences in Matfield Green. It is also hoped that information learned in the planning, design and operation of the system can be shared with others who have similar goals and needs.

Thanks are due to the Kansas Corporation Commission whose grant is funding our project. Ray Dean, a long-time Friend of The Land and an emeritus professor of electrical engineering at the University of Kansas, designed the furnace project. Ray spent long hours assessing the heating requirements of the building and suggesting appropriate solutions to meet these needs. Thank you, Ray. Kudos are also in order to long-term volunteer Tom Armstrong and to operations manager Ron Armstrong. Both played central roles in planning and will assist in putting the system in place.

Ecological Accounting of Community Agricultural Systems. Robert Herendeen of the Illinois Natural History Survey and Todd Wildermuth, a graduate student in the Department of Natural Resources and Environmental Sciences at the University of Illinois, have begun work outlining their two-year plan as ecological accountants for the Rural Community Study project in Matfield Green. Their general goal is to develop a quantitative picture of how any community interacts with and depends on natural systems and how sustainable that relationship is. With the use of three indices they have developed, they hypothesize they will be able to decide which lifestyles, settlement patterns, and economies are desirable for long term sustainability. The indicators are basically of three types: how much of a particular material or service "X" stays within the community and how much enters or leaves, an indicator which compares human-controlled flows with natural (mostly renewable) ones, and an indicator that compares how fast a non-renewable resource is diminishing relative to its availability. Initially they plan to concentrate on energy, water, and soil nutrients, while indirect linkages require that they are attentive to economics, monetary flows, and social connections.

Kansas Natural Resource Council Annual Meeting. Former Kansas Governor Mike Hayden and KNRC members met October 4th in the Matfield Green schoolhouse. Dinner featured grass-fed beef from Tallgrass Prairie Producers following a one-hour walking tour of the town.

Annenberg Rural Challenge Steward visits Matfield Green. Barbara Poore, regional steward for the Annenberg Rural Challenge, visited school districts who have worked with Emporia State University and The Land Institute on a place-based education program headquartered in Matfield Green. The purpose of the visit was to acquaint Ms. Poore with programs being planned in the Cassoday, Cottonwood Falls, Centre, and Baldwin City schools. The Land Institute hopes that Ms. Poore's visit will lead to an opportunity for these schools and others in the area to apply to the Rural Challenge for a grant to fund place-based education. (See Sue Kidd's article for description of project.)

The Sunshine Farm

Annual Progress Report. Now finishing its fifth field season, the Sunshine Farm has obtained what staff ecologist Marty Bender calls "significant results in its objectives: accounting, renewable energy, component research, biological design, and demonstration." In a 29 page project progress report written this summer, Marty Bender details the on-going research in all these areas and describes his conclusions thus far. Over five years, efficient use of crops and animals has resulted in increased nutrient cycling and fewer inputs on the Sunshine Farm. Energy accounting data has also shown that 27 percent of the cropland in soybeans and sunflowers would provide enough biodiesel fuel to replace all gasoline and diesel used to operate the farm.

Given that 25 percent of U.S. cropland was devoted to feeding draft horses for traction power at the turn of the century, the Sunshine Farm study has shown that horses are a viable complement to tractors for farms running only on renewable fuels. These and other aspects of Sunshine Farm research have been featured this year at three Land Institute public events, on numerous guided tours, on ZDF television in Germany, and on Salina radio station KFRM.

Miscellaneous News

Fall Visitors Day, September 28. Warm sunshine and clear sky welcomed our annual Fall visitors. Speakers included O.S. "Nick" Fent, geologist, on "The Geologic Underpinnings," Harold Reed, avocational archeologist, who spoke on Native American land use in Kansas, and Joe Basso, purveyor of the past, on 19th century farming. Guests took a walking tour of the prairie and Texas Longhorn pasture as well as a horse-drawn wagon tour of the Sunshine Farm and its Natural Systems Agriculture experimental plots. Hand-pressed cider from our orchard and muffins made with eastern gamagrass flour ended the day. (See two-page photo montage on pages 20 and 21.)

The Land Institute Expands Research Area. A grant from the Foundation for Deep Ecology facilitated the recent purchase of 90 acres of bottomland on both sides of Water Well Road and the Smoky Hill River adjacent to The Land Institute. This expansion will increase area for experimental crops and a site for the future Natural Systems Agriculture Center.

Guest lecturers.

- Padruot M. Fried, Zurich, Switzerland
- Dr. Michel Cavigelli, Michigan State University and 1985 Intern

- Christopher Childs, traveling speaker and writer, previously with Greenpeace

Visitors.

- 1997 Bike-Aid cross-country riders
- Professor Dale Nimrod, Luther College, Iowa
- Glen Fell and 10 agronomy students, Mid-America Nazarene College
- Salina Central High School 150-student career class

SUSTAINABLE AGRICULTURE AND THE MONSTER IN THE GARDEN

Bruce Jennings

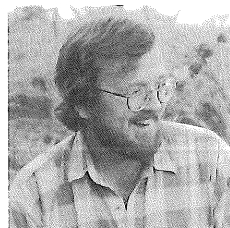
One of the things that most impressed me on my arrival at The Land Institute was the location of the classroom. A view from the front porch of the classroom opens onto the grounds that are at once a garden for the students as well as the surrounding research site for perennial polyculture. Here, the site of intellectual discussion and field practice are but a few yards apart. The classroom suggests, as with much else that operates at The Land Institute, considerations of scale and appropriate technology. The discussions among the energetic staff and interns which take place in the building also take these considerations into account and reflect the thoughts of many notable Friends of the Land. Indeed, this article is partly inspired by a series of exchanges between Don Worster and Wendell Berry, as well as conversations with my canoe guide, Angus Wright.

Among this setting of encouraging intellectual exchange and impressive research applications, I am nevertheless struck with a certain sense of foreboding. In the classroom that has held so many rich discussions are shelves containing a large assortment of contemporary newsletters, pamphlets, and magazines relating to the activities of dozens of activist groups from across the country. Prominent among these are any number of readings promoting sustainable agriculture. It is most specifically in this literature that I identify a source of my unease.

These publications contain many similar themes: how to improve your crops, your garden, your harvesting techniques, your storage and marketing of products. They call us to organic farming meetings to talk about the latest USDA conservation programs and grant opportunities. They announce biointensive mini-farming workshops, symposia for gardeners, land trust rallies, stewardship association meetings, and training seminars. The trouble with all these approaches to sustainable agriculture is that they provide many paths around what we all recognize as a fundamental problem: the monster in the garden.

My point is not to denigrate the fine works that many selfless individuals are making in their community gardens, farmer cooperatives, and organic organizations. While I am among the first to celebrate such endeavors as essential for establishing a new vision of agriculture, I strongly suspect that these activities are not sufficient to overcome the monster. Indeed, to the extent that these activities avert our gaze from the unwelcome beast, we may only be increasing the danger.

The monster I am referring to is probably well known to all Friends of The Land. American agricultural landscapes are the sites of increasing horrors where the monster treads: polluted groundwaters, contaminated air basins, ruined soils, damaged wetlands, and vanishing species. While these manifestations of



Bruce Jennings

the monster are not entirely new, their presence has grown increasingly worrisome. The monster I am talking about is generally recognized as chemically-reliant, technology-dependent, machine-driven, capital-intensive agriculture.

The effects of modern agriculture have expanded in recent times into crises at a global scale. The destruction of atmospheric ozone by methyl bromide, the worsening of global warming by nitrogen, the dramatic loss of groundwater across vast regions, and the harvest of monocultures, including trees, across extensive land areas have led groups of scientists to issue warnings about large-scale changes that appear without historic precedent. The fact that such a series of alterations in global ecology are occurring in tandem is a stunning phenomenon which is virtually unaddressed in popular media. Given that industrial agricultural practices play such an important, if not pivotal, role in these global catastrophes, one might expect people constructing alternative agriculture to be the leading voices in unmasking this monster.

At this juncture proponents of sustainable agriculture frequently seek various forms of refuge. One excuse, despite the vast swath of despoliation, is that the treachery of the monster is in doubt. Some deny that the monster is big enough or strong enough to do this damage alone. The reductionist approaches to agriculture carried out by the land grant universities often promote this denial by endlessly examining minutiae such as plant-soil relationships which obscure any observation of the whole beast. They also deny the legitimacy of scrutinizing relationships that might provide more evidence about the nature of the beast, like the connection between farms and environmental health. The fact that so many land grant universities are fixed in the reductionist paradigm has only further compromised the integrity of scientists who should be at the forefront of ridding the problems of industrial farming from our landscapes. Given that land grant universities have been complicit in engineering this monster, we should probably not be surprised even as we are disappointed with the results of publicly-financed institutions.

Outside of academia, other forms of denial keep sustainable agriculture advocates from confronting the monster in the garden. It's commonly suggested that if we don't let the monster have its way, people in the world will starve, farmers will go bust, national security interests will be compromised, and financial markets will be destabilized. Many groups seek simply to create a small realm that is intended to be less hospitable for the monster (i.e., sustainable practices). For many, sustainable agriculture provides a comfortable refuge; a

transition in which we move from the horrendous specter of modern agriculture to something more benign.

Perhaps it is my early years of growing up in urban America, or my long-time association with organized labor, or even a continued faith in the political process that leads me to question the virtues of parochial politics. My political mentors have long lectured me that perhaps the only authentic manner for dealing with monsters is to confront them with a community that is first and foremost organized and democratic. A corollary lesson argues that various monsters thrive on communities of people who choose to look the other way. The temptation to focus in other directions is particularly attractive amidst landscapes where we know that it is others — and particularly farmworkers — who do the suffering.

A discussion of agricultural alternatives is easily sustained until it comes to the subject of labor. In modern industrial agriculture, labor is characterized by inhumane wages, routinized poisoning, inadequate living conditions, the suspension of basic rights, and social marginalization.

Any vision of an alternative to modern agriculture must be measured against the reality of those persons who are most exploited by the monster, even if it doesn't reside in our own garden. One of the difficult passages for sustainable agriculture is the degree to which it can serve not simply as a collection of ecologically and consumer-friendly practices, but as a movement for confronting the monster in its various guises. The United Nations' acknowledgment of the annual estimated pesticide poisoning of twenty-five million people across the globe illustrates that the wreckage of modern agriculture is more than the result of an unfortunate series of accidents. The recurrence of such negative consequences in modern agriculture suggests that we need to examine a more profound set of questions.

Several years ago, Wes Jackson appeared as a speaker at a gathering of organic farmers at Asilomar, California, along with other nationally recognized supporters of alternative agriculture. At the event's conclusion, a consensus statement, the Asilomar Declaration of Sustainable Agriculture, was issued for which Wes delivered a dissenting opinion. After noting that the Declaration contained many fine points, Wes noted that it failed to address a variety of more difficult questions. Turning to the group, Wes asked, "What about issues of scale?" An audience that had only moments before been united in a common conception of sustainability was instantly divided. Many of the newer members of organic associations who possessed

The tendency to look in other directions is tempting amidst landscapes where we know that it is others — principally farmworkers — who do the suffering.

larger holdings of land and capital than many older members were visibly disturbed by a question that begged further consideration of winners and losers in contemporary agriculture.

The Asilomar Declaration reflects many of the same important tensions that still accompany the discussion of sustainable agriculture in other settings. Because sustainable agriculture so often fails to address who benefits from toiling in the soil, it is little wonder that farmworkers, among other communities, question

the commitment of such practitioners to alter the presence of monsters in their midst. Until there is a unified movement to restore political rights and justice, and not merely soil fertility, many of the casualties of modern agriculture will justifiably suspect that whatever else may change, the agrarian vision will continue to sustain the monster in the garden.

Bruce Jennings is co-director of the education program at The Land Institute and a visiting scholar at the University of California, Berkeley.

Manna

It all begins in a seed
grown and ground and sent
to the table where you knead
solid gritty loaves in the coarse
sound of flour on rough wood.
Your bones are praying
through the dough, a slow song
of thud and slide replaying.

The germ of our subsistence
is this movement and the music
it conceives: a hymn raised
out of praising fingertips, bread
falling from the heavens of the grain.
The folding hands; their hungry refrain.



*Poetry by Douglas Haynes.
Douglas Haynes is a 1997 intern at The Land Institute.*



Poetry by Douglas Haynes.

Sunrise

An hour before sunrise I wake
to the cat's incessant meow
in glowing eastern light.

A pale crescent moon perches low
in the growing cerulean sky,
urging me to sleep on.

But I rise to let the cat in from
his night wanderings, and
we listen together

to the dawn chorus beginning:
first mourning doves
reminding me of loss,

then bobwhites easing my worries
followed by a woodpecker
hammering out a

living, as we all must. Heartened,
I go out to pick apples
for breakfast.

Enter the day in the good faith
that all begins
again.

ON HUMAN NATURE: AN EXCERPT FROM THE ORAL HISTORY OF THE LAND INSTITUTE CLASSROOM

Sarah Jack Hanners

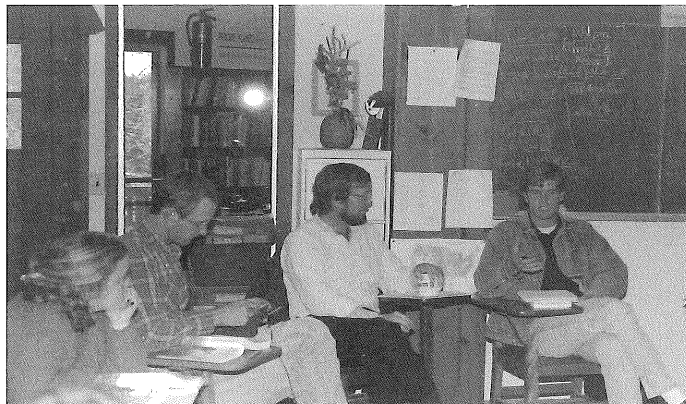
For those who have never seen it, the classroom/library at The Land Institute is a dimly lit room lined with shelves of books and periodicals. Its windows are sheltered by trees from sun and wind, making it a cool oasis in summer, a cozy wood - heated retreat in winter. As in the one-room schoolhouses where the children of the early prairie settlers received their education, interns sit in wooden school desks between the wood stove and the blackboard. We discuss, at times sleepily, at times passionately, everything from daily chores to the fate of the world.

Every class session is focused on a particular reading, but we rarely manage to stay close to the text. The discussion often takes flight and heads off in unanticipated directions. I began to suspect, after a month of observation and participation, that there must be some sort of order to these seemingly random and always interesting diversions. Although the topics covered in class sessions are diverse and often appear unrelated, patterns have emerged over time; subjects we return to again and again, themes that are woven throughout seemingly very different conversations. Since the beginning of classes in September it has been interest-

ing to watch these patterns emerge, and to watch individuals make claim to and defend certain positions on the philosophical playing field. In our small group of eight interns and two education directors, we seem able to cover the extremes of opinion and all gradations in-between. It is becoming easier to predict who will take which position in an argument and who will feel most passionately about a given issue. In preparing to write this article, I sorted through many of the ideas and opinions that flew about the classroom over the last few weeks, seeking, perhaps, some emergent property, so to speak; some conclusion or understanding that becomes evident only through hindsight.

Under the subtle guidance of our new education directors, Bruce Jennings and Cheri Lucas Jennings, who have backgrounds in political science and environmental history, the interns have been exploring the roots of the agricultural and environmental crisis which the work of The Land Institute means, at least partially, to address. The lens

through which we are examining this topic is that ever-relevant issue in the American West, water resources. Upon reflection, however, it became clear to me that we returned again and again to some aspect or other of an even more fundamental question regarding human nature itself. Classroom



In the classroom.

arguments have raged over why humans as a species do the destructive or creative things we do. Are humans fundamentally good or bad, giving or selfish? Here discussion is stalled, with unbudging defenders of both extremes and plenty of gradations in-between. And finally, given this impasse, is there hope for the human race?

The reading we spent the most time on during the month of September, given our water resources theme, was Marc Reisner's bestselling *Cadillac Desert*. This book (which I highly recommend, by the way) chronicles the history and politics of water developments in the American West, and in doing so, tells an epic tale of adventure, pioneer spirit, idealism, and corruption. It is a story of good laws gone bad, and of good lawmakers corrupted by a political system that functions only through dealmaking and the hunger for power and influence. Fundamentally, it is a story of deep injustices perpetrated against citizens in the name of serving those same citizens. Policies meant to help settlers get started on small farms ended up concentrating power, land, and wealth in the hands of the few who found ways around the laws. It is a story of how, somehow, the political and economic system has rewarded dis-

honesty and selfishness. The issue of corruption in politics and the profit-hunger of corporations is not a new one, particularly around The Land Institute. What we found ourselves wondering, however, was what makes people value profit or power over the good of society. After all, wouldn't we all benefit from a just and cooperative society? The immediate response is that it is "human nature" to act selfishly, to maximize benefits for oneself.

We spent one class session discussing a game Cheri has played numerous times with students in which members of the class are given two choices. If they all choose one option they can gain a small reward for all members of the class. If one individual chooses the other option but the rest of the class sticks together, the rebel individual receives a very large reward and the rest of the class loses. Cheri says that no class has ever won. That is, no class has ever managed to choose the smaller reward shared by everyone. There is always at

least one person who chooses to go for the big money. On the other hand, similar games and experiments with slightly different formats have been tried by others on various groups with different results. One example we read of, given by Daly and Cobb in *For the Common Good*, had almost opposite results: most people were

shown to be much more generous in contributing to "the common good" than expected. The main difference between most of these scenarios is the odds of success for the different options and the relative sizes of the rewards for staying with the group or for making the selfish choice. As a class, we decided not to try any of these scenarios on ourselves. We think of our group as being quite tightly-knit, and perhaps we were afraid of what we might find out about ourselves and our friends!

Cadillac Desert and the discussion about the game are only two of the many conversations we had in class in the space of just over a month. Other topics covered included technology, the market, the role and structure of the household, the utility of the scientific method, and much more politics. Most were discussions of the way things are now and the problems therein. And the persistent question, directly related to the human nature question, was, "Does it have to be this way?" Is corruption, environmental degradation, etc. the real way of the world, or are there other alternatives? Can humans behave otherwise?

After having mentally reviewed these discussions and several others, I wondered what we were talking

about each time we said something like, "It's just human nature to behave that way." According to *Webster's Third New International Dictionary*, "human nature" is "the complex of fundamental dispositions and traits of man," (I presume they meant woman, too) "sometimes considered innate." This is the second definition. The first was very different: "the complex of behavioral patterns, attitudes, and ideas which man has acquired *socially*" (my italics). How we define human nature determines how we go about answering the question "Does it have to be like this?" If we see things such as self-interest as innate, then the answer is probably "Yes." If we see all of our behavior as learned socially, then theoretically we are flexible and could create a new culture in which people would behave differently.

How we define human nature has direct relevance to the work of The Land Institute. We often say around here that with the development of a perennial polyculture agriculture, we are addressing the "10,000 year-old problem of agriculture." Agriculture is more than just plants and soil. It is a uniquely human activity that spans cultures and continents. The question raised by the two definitions of human nature is: Did agriculture develop the way it did for a reason that is not just the course of history, but lodged somewhere deep in the human psyche? Or to place the question in the present-day, is there an obstacle to changing the practice of agriculture as we know it that runs deeper than the economic and political forces at work in today's world?

One way to look at human nature is that it has both innate and cultural aspects. In her anthropology classic *Patterns of Culture*, Ruth Benedict describes cultures as selecting certain traits or behaviors from the "great arc of potential human purposes and motivations." Thus, there are a seemingly infinite number of possible cul-

tures, all of which draw upon the same pool of what may be called innate human nature. Benedict's perspective has an important implication for our questions. It is that, in theory, and providing we stay within the range of "human purposes and motivations," we could affect the choices and behaviors of future generations by emphasizing certain ways of thinking. In other words, we could undertake a great project of "social engineering" to create a just, happy, and healthy society. And we could incorporate a way of life built around perennial polyculture agriculture into such a future culture. Benedict never recommends such a project. In her book, she merely says that so far, no one has attempted it. Whether we see such social engineering as

desirable or not, it is likely to remain a merely theoretical undertaking due to the complexity of human culture and society. It does, however, provide an answer to the question of "Does it have to be this way?" The world, according to Ruth Benedict, does not have to be the way it is. There are many possible ways for humans to live on the planet.

This perspective looks promising for our interest in agriculture. It implies that we could organize ourselves to produce food in radically new ways, once such ways are found. We are still left with questions, however. What level of peace, health, human happiness, and ecological sustainability is attainable within the range of human possibilities? What would such a culture look like? And how does such change come about?

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Sarah Jack Hinners is a 1997 intern at The Land Institute

...is there an obstacle to changing the practice of agriculture as we know it that runs deeper than the economic and political forces at work in today's world?

PIGS AND THE PROBLEM OF SCALE

Jon Jensen

Two new residents have settled in at The Land Institute this summer. Agnes and Gertrude have made an old garden plot their home for the five months they will be here. They spend their days removing weeds from the area, fertilizing, and just generally preparing it for expansion of the herbarium or future garden use. Although they do some of the same work, Agnes and Gertrude are not additional interns. They are hogs, "homestead hogs," to be more precise.

We call them homestead hogs because Agnes and Gertrude are not a part of our scientific research here at The Land Institute. Three interns and one member of the staff are raising them for our own use and trying to employ some old homesteading methods in the process. We have them fenced into a small pasture so part of their diet comes from weeds as well as some rye grass and forage rape that we have planted. They help to process our household compost and table scraps in

addition to receiving some milo every day. Our pigs drink out of an old water heater, keep cool by wallowing in the mud, and sleep in a straw bed under a cobbled together lean-to shelter. As homestead hogs, Agnes and Gertrude seem to have a pretty good life here at The Land Institute.

I like to think of Agnes and Gertrude as a sort of experiment, even though they are not part of our formal research. I see them as an experiment because one of my interests in raising pigs is educating myself. Don't get me wrong, I often see visions of pork chops and bacon while walking by the pig pen. Ultimately, however, I care more about what I can learn from raising a couple pigs than the meat we will get. I have learned many practical things in the process, some the hard way, like how to build a fence that will hold pigs. I'll never forget the feeling of seeing the entire staff chasing Agnes and Gertrude through a patch of eastern gamma grass. The main lesson I am learning is less direct, but more important. I've learned a lot about the importance of scale in agriculture.

As is often the case with experiments, most of my insights have come through comparison with another method. This year has offered me an excellent opportunity to compare different scales of livestock production. North Carolina-based Murphy Family Farms, the world's largest hog producer, is currently attempting to expand its large-scale confinement operations into Kansas. Their method typically involves thousands or tens of thousands of pigs which are fully confined in long buildings.

The contrast between Agnes and Gertrude at The Land Institute and a massive hog confinement operation is both stark and enlightening. This comparison is, of course, not entirely fair since we aren't operating a "real farm" and are more concerned with pork chops than profits. (It is worth noting that our raising of hogs is cheaper than buying pork, provided one doesn't count the cost of our labor too high. Since I consider the time I spend caring for Agnes and Gertrude to be both a privilege and a benefit, I see no reason for any labor cost at all in the accounting.) In this case, I do not intend to compare economic viability, but merely to shed some light on the effects of scale on the environmental costs of agriculture.

There are many differences between the two methods of livestock production, such as housing, feed, and especially the handling of waste. Clearly the biggest difference is size, or scale of operation. The typical hog confinement operation raises several thousand times more pigs than we are raising, and the operations are getting bigger all the time. Circle Four, a joint venture of four of the largest North Carolina hog confinement companies (including Murphy) is currently building a massive complex in southwestern Utah. That "farm" is expected to produce 2.5 million hogs annually by the



Jon tempts Agnes and Gertrude with a handful of grain.

year 2,000. That is over a million times larger than our little homestead operation.

These differences in scale have tremendous implications on the sustainability of raising livestock. What happens when the scale of something like raising pigs is increased a thousand or even a million times? The result can be very different as certain positive aspects of the small-scale operation become major problems when the scale is greatly increased. Nowhere is this more evident than in the case of manure, which pigs produce in abundance.

One of the many benefits of our homestead hogs is the fertilizing work they do. By depositing their manure directly on the ground, the soil will be richer next year. In general, manure is a vital organic fertilizer and an important asset on any small farm. I remember well traveling through the Iowa countryside on family trips when I was young and hearing my father describe the wafts of manure smell through the window as "the smell of money." The small farmer's appreciation of manure is summed up well by the Chinese proverb, "All waste is treasure."

When the scale of production is increased several thousand times, however, manure ceases to be such a benefit. The manure which is an asset at a small-scale becomes an environmental nightmare at the large scale. It is a major source of pollution to the air, groundwater, and local streams and rivers. A closer look at the problems which hog confinement facilities in North Carolina have experienced makes clear how problematic manure is on this mega-scale.

The waste from cleaning out the hog confinement barns is stored in large lagoons where the problem begins. It is the terrible smell of these lagoons which is the most common complaint about large hog farms. (I have found that Agnes and Gertrude produce virtually no noticeable smell at all.) This odor is more than just unpleasant, however; it is potentially dangerous to one's health. Toxic quantities of hydrogen sulfide gas have been found at residences near hog manure lagoons in Minnesota. The nausea and headaches that

some people have suffered from continuous exposure to manure smell from nearby hog confinements may be the result of hydrogen sulfide poisoning.

These problems with smell are unfortunately not the most destructive part of the picture. The implications for water quality are even worse. Many Kansas communities already have a problem with excessive nitrates in their drinking water, and hog confinement operations could make this considerably worse. In North Carolina, where there are over 10 million hogs, mostly in a few counties (in Duplin County, the hogs outnumber the people by 70 to 1), there have been numerous problems with pollution from storage lagoons. Nitrates have leached from storage lagoons into groundwater. Ground water supplies have been found to contain several times the allowable quantity of nitrates in some communities. Although research has greatly improved the methods for lining storage lagoons, much is still unknown about the long-term ability of lined lagoons to prevent leaching.

Another more publicized difficulty is the danger of spills from the storage lagoons. In North Carolina, there have been numerous incidents where thousands of gallons of hog waste have escaped into local streams. The results have been devastating to aquatic and riparian ecosystems and also to people who depend upon that water.

The final difficulty is more closely related to Kansas' current problems with nitrates. The waste from the lagoons is sprayed onto nearby fields for fertilizer. Again, while this is a positive practice at smaller scales, there are significant problems with the quantities that are produced from the mega-farms. Ground water nitrate levels near North Carolina fields which are sprayed with confinement hog manure are far above acceptable levels. Adding to the groundwater contamination is a less direct, but no less dangerous mechanism. Bacteria in the lagoons work to break down the feces. One of the byproducts of their work is the release of ammonia gas into the air. Although the ammonia is not sufficiently concentrated to be hazardous to humans who breathe it, there is an indirect problem with its presence in the air. It remains



Agnes grazing on rape/rye mixture.

in the lower atmosphere until the next rain. The rain scrubs the ammonia from the air and falls to the ground in rainwater. Once on the ground, the ammonia is converted to nitrates and exacerbates pollution problems.

So what can we conclude from comparing hog operations on two very different scales? What have Agnes and Gertrude taught me? I hope that it is, at the very least, obvious that there are significant problems resulting from huge increases in the size of hog operations. Significant increases in scale turn positive

aspects of a small operation, like the fertilizer value of hog manure, into serious environmental problems, in this case the pollution of the air and water. Hog confinements provide an excellent example of the problems that arise when agriculture is practiced at an industrial scale.

It seems to me that there is a simpler and more fundamental lesson here as well. The example of hogs shows us, not just that too much manure stinks, but also that scale or size is a

very important dimension of everything we do. Much attention is currently focused on the methods that we use in agriculture, but perhaps the more important consideration is the scale of operation. Asking questions like "what is the appropriate scale?" and "what are the implications of this scale?" may ultimately prove to be the key in determining sustainability.

Although I have used pigs to illustrate the point, the importance of scale goes far beyond hogs or even livestock. Similar, though less dramatic, environmental consequences have resulted from the current mega-farm trend in all types of agriculture. Problems from soil erosion to chemical use in agriculture today are virtually inseparable from issues of scale. Many of our problems in non-agricultural areas are also directly attributable to scale. One cannot

We have made the idea that "bigger is better" our guiding myth, and the vast majority of our problems have arisen... because of our failure to consider appropriate size.

look at urban pollution and transportation difficulties without considering the astronomical size of current cities.

We have made the idea that "bigger is better" our guiding myth, and the vast majority of our problems have arisen, I believe, because of our failure to consider appropriate size. We desperately need to reverse this and begin to rediscover the human scale.

Generally, we do less harm and are more likely to find the appropriate scale when we favor smaller size. We can, however, go too small, and that can cause problems as well. The point here is not simply that "small is beautiful" (although it certainly is in hog production). We need to pay close attention to the scale at which we do everything.

When we first brought Agnes and Gertrude home from the sale barn I had no idea what we were getting

into. I knew that I was in for an education, but in what ways I could not have imagined. As these homestead hogs have doubled and now tripled in size, so has my understanding of the implications of scale. Agnes and Gertrude know very well when the food they receive is not the right amount. I only hope that we can learn as much about the appropriate scale in agriculture.

Jon Jensen is a 1997 intern at The Land Institute.

LEARNING TO BE A TEAMSTER

Tina Ray

When I pulled up the horses at the end of the strip, Gary was waving at me from the fencerow. I looked at the horses. They were breathing heavily from a round of plowing and they were generally willing to stand, so I left them and went over to say "hello." Gary is one of several neighbors whose backyards border the south end of the Sunshine Farm. More than once, I have paused in my work to admire his pigeons or catch up on the news. A few minutes into our conversation, Gary's eyes widened, looking past me. I turned to see that Bob and Stormy were marching off down the strip. Tired of standing, they decided to go on without me. Perhaps they were keeping me honest by ending my "coffee break." I was relieved to catch them quite easily, but dismayed to find that they appeared to be plowing straighter than they did when I drove them. I felt expendable. It was a good lesson; a reminder that horses have a will of their own and perhaps a better eye for the furrow, too.

I've always had a strong affection for horses. Growing up, I worked at a number of riding stables. When I graduated from high school, I put horses behind me. There was something about riding around a ring that seemed frivolous, no matter how much pleasure it gave me. My ambitions and priorities had changed and horses didn't fit. Then I met Jack

Worman, the Sunshine Farm manager and a long-time Percheron breeder. During my year as a Land Institute intern, Jack allowed me to drive his horses, and I was instantly hooked. So when he offered me a full time job on the Sunshine Farm with the possibility of learning to become a teamster, it was an easy decision. Here was a chance to fit horses into my goal of farming in a way that made sense to me.

Jack has been a patient teacher. He's taught me many specific things: how to change the oil in different tractors, how to pivot a row crop tractor on one wheel the correct way, and how to take apart and reassemble a harness. Most importantly, though, working with Jack I have learned how to think. I've learned how to approach a problem and overcome it, or at least go down fighting. A place like The Land Institute often presents unique problems that require creative solutions, and Jack is a master at dealing with them. While I've had a few accidents and made countless stupid mistakes, he usually doesn't yell too loudly. Rather, he



Stormy and Bob.

allows the incident to be its own lesson. When we're working with the horses, he is especially careful, and I am grateful for that. There is a tremendous potential for damage when a team that weighs two tons is paired up with an inexperienced handler who weighs 130 lbs.

At the same time, Jack lets me struggle some on my own. Harnessing was one of the first major obsta-

cles for me: all those straps and buckles, where do they go? It's one thing to see a harness on a horse, another to see it hanging on the wall and to try to visualize how it's meant to work. At seventeen hands high (a hand is four inches), Bob and Stormy are both about five feet, eight inches tall at the shoulder. That is well over my head. So, getting them dressed for



Tina plowing with the horses.

work is still a challenge for me. Try throwing fifty pounds of jumbled leather onto a tall animal, who is not necessarily standing still, and you'll see why. I have often grumbled that we need shorter horses, but Jack tells me I just need practice. I have yet to master the art of graceful harnessing.

The horses have been wonderful teachers and oh-so-patient. There have been times out cultivating, when I became frustrated because they weren't responding to my direction, only to find that they couldn't respond because a line was hooked over the end of the tongue. Some of the lessons are difficult. Last year, I was run over by a startled horse and wound up with broken ribs and a concussion. But most of the lessons come gradually as slow realizations that occur during many hours spent out in the field, or during the day to day routine of caring for them, or observing them on their own time out at pasture. I have much to learn. I am still struggling with longitudinal alignment, and I am humbled every time I watch Jack direct the horses while backing the wagon into the barn.

Certainly, during my time here, I've spent many more hours on a tractor than behind a team. When time is an element, we're likely to fall back on mechanization. While it's possible to farm exclusively with horses, Jack and I don't get to use the horses as often as we'd like. Due to the nature of The Land Institute, we have additional obligations not present on an ordinary farm. Horses are slower without a doubt. Jack says the rule of thumb for plowing is one acre per horse per day. So, a team of two horses can plow two acres in a day. This is definitely a pace more suited to small-scale farming.

When comparing draft animals to tractors, there are advantages to each. The primary advantage of horses is that they run on renewable resources like grain and forages instead of fossil fuels. If they are compared to a tractor that runs on biodiesel, such as

the one on the Sunshine Farm, horses require about the same amount of fuel. Whether feeding a biodiesel tractor, or horses, about one quarter of the cropland will go towards growing fuel. Horses also have a more flexible diet, so if a crop failure occurs, they can eat something else. There are other advantages: horses provide manure for fertilizer, and they don't cause soil com-

paction the way a tractor does by its sheer weight and the rolling pin action of its wheels. They also reproduce, which means more animals for traction, or to sell. I think horses can be important on another level, too. People are drawn to animals. That is something I have observed among visitors to The Land Institute. Perhaps seeing horses at work on a farm will make them think about how farming is usually done, or at least make them come out to see where their food comes from or could come from.

Before my time at The Land Institute, I had never considered using horses for power as a practical or realistic approach to farming. Now that I've seen what horse-farming involves, I know that it can be done, though it may not be easy. However it appears on paper, ultimately, there must be a sincere desire to farm with horses. They require regular care and can't be parked in a garage and left for a week. Sometimes

they're ornery or intimidating. Horses require patience, and farming with them means long hours. But where there is the desire, the rewards can be great. Being with these animals, I am often struck by their friendliness,

their curiosity, the way they play and groom each other. I will always choose horses over a tractor because of their personality, their intelligence, and their willingness; because I enjoy their companionship.

Plowing takes on a new feel when done with horses. There is no rumbling engine. There is only the clink of the heel chains, the sound of the moldboard moving through soil, roots tearing. There is the heavy breathing of the horses as they push gamely ahead. I have time to notice how the sunflowers are doing, to watch the raptors soaring overhead, and to see the gopher snake disappearing in the grass. There is the opportunity to see more intimately the land itself and all that's living on it. This peacefulness, paired with hard work, is what I wish for my own farm.

I will always choose horses over a tractor because of their personality, their intelligence, and their willingness...

These days, I am out feeding the horses before the sun's up. Usually they come in on their own, anticipating food. Sometimes, though, they are still out at pasture in the dim light of dawn. I walk out to meet them, halter in hand. Stormy is the leader. He walks with his nose almost resting on my shoulder. If I were to stop abruptly, he would run right into me. Then,

strung out behind in order of their standing, and in shades of gray from white to black, come Bob, Colby and Jay. I brush Bob and Stormy while they're eating, then harness them, ungracefully. We hitch up to the plow and set out for the fields.

Tina Ray was a 1995 Land Institute intern and is currently the Sunshine Farm operations assistant.

PEOPLE, LAND, AND COMMUNITY IN EDUCATION

A PROGRAM FOR EDUCATORS ON TEACHING STUDENTS ABOUT PLACE

Sue Kidd

Who we are, what we know, and how we act are reflections of our personal experiences. School systems teach children textbook knowledge and help provide them with a foundation for what they can do with the rest of their lives. But children learn about who they are from the places and communities where they are schooled.

The Land Institute, in collaboration with Emporia State University and the Annenberg Rural Challenge, is working to enable school districts to come to a better understanding of the interdependence between our schools and communities. It is fitting that The Land Institute become involved in the education of our students, particularly students in small, rural communities, as an understanding of one's place builds a foundation for good stewardship of that place. The Annenberg Rural Challenge supports "genuinely good, genuinely rural schools to increase their usefulness to their communities." Specifically, the Rural Challenge aims to renew and build communities through the school system. A representative from the Rural Challenge, Barbara Poore, visited all our sites recently and we are hoping for an invitation to present a proposal for funding to further our work.

The goals of the PLACE: People, Land, and Community in Education project are 1) to help students acquire a deeper sense of self, a stronger appreciation of their home place, and a better understanding of their role in the community, and 2) to promote the enhancement of small, rural communities.

In the recent past, we have allowed our schools to be separate from our communities. We have learned to read, write, and "to figure" (do arithmetic), but that was somehow apart from our lives in the community. Instead of using regional resources and dealing with

rural community concerns we have used textbooks that were often the same ones that students throughout the country were using. We've been learning to fit into the industrial model to be good consumers and not to be local problem solvers and community builders. The message most students learn is that to be successful you need to *make money* and this means to *move away*.

We are now learning that to live well means to balance our learning experiences and our living experiences. It is said that life is lived from the inside out. If this is true, then learning how to live must also be from the inside out. We learn who we are and what we can do by doing, then reflecting on our work, and doing again. We learn about community by being in a community. We learn about a place by being in a place. Through these experiences our children will learn to *live well*.

Our communities have supported our schools. As community members, we've paid our taxes and participated in fund raisers; we've donated our time on field trips as "room parents," and we've shown our support by attending class plays and sporting events. But we usually haven't seen the school as a place for lifelong learning, a place where adults could meet to discuss important community topics. Nor have we have included students as a part of the community discussions either to give input or to take responsibility. In order to learn the lessons of living well in a place we need to learn from and about that place. The schools and the community must become interdependent and co-sustaining.

In the beginning phase of this project four districts from the Flint Hills region joined together in June at the Matfield Green schoolhouse to study, learn and share ideas and resources. These included the Baldwin

Unified School District #348, Cottonwood Falls USD #284, Centre USD #397, and Flint Hills USD #492. Teachers, administrators, and community members met for a week-long workshop with staff from The Land Institute and Emporia State University. A group of teachers from Howard, South Dakota who have been working with a Rural Challenge grant under their principal, Jim Lentz, a speaker at the 1997 Prairie Festival, also joined us. Following a model of experiencing, reading, thinking, and talking about the layers of a community and its landscape, we began with the ecology of the prairie and the history of human interactions with the land at the Thurman townsite and at other sites of local importance. We viewed these areas through the eyes of ethnobotanists, ecologists, historians, folklorists, and artists and we came together as a community to gain an understanding of this place. We explored ways of thinking about these issues and ways of integrating this deep knowledge of place into our teaching and living in order to create sustainable rural communities today. It proved to be a transforming

experience for us all.

Each of the groups has gone back to their communities and talked with fellow educators, community members and organizations to develop strong teams of interested supporters. These teams are developing plans to implement the ideas and methods they learned in Matfield Green and to explore other dreams that have come from their continuing community discussions.

Margaret Mead once said, "Never doubt that a small group of thoughtful, committed citizens can change the world; indeed, it is the only thing that ever has." The work that has begun at Matfield Green can indeed change the way we educate our children and can help them to understand the value of and develop the methods for creating a sustainable community.

Sue Kidd is an educator with the Blue Valley School District in Kansas City. She has taught and developed programs in rural communities in both Kansas and Montana. Acts as The Land Institute facilitator for this project.

A DIVERSIFIED LANDSCAPE: NATIVE PRAIRIE AND COOL SEASON PASTURES

John Guretzky

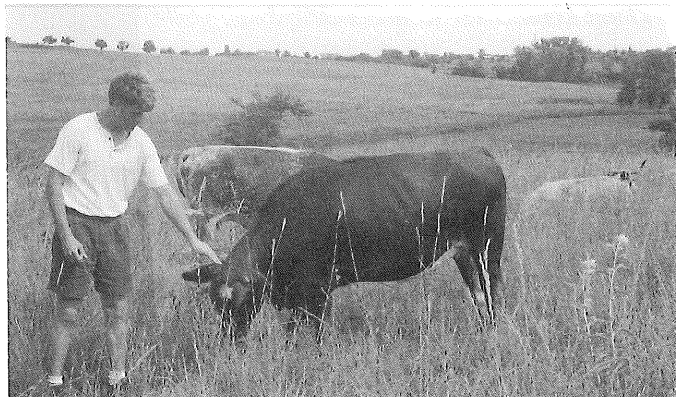
While managing the rotational grazing study of The Land Institute's Texas Longhorn cattle herd on our native prairie range this past summer, I claimed I had the best job of all the interns. Every other day I strolled out through the prairie grass, and I let my mind escape from my tasks. While taking in the fresh air, I occasionally heard a pheasant crow. Often I was startled when I passed a

plum thicket and spooked up a flock of quail. Sometimes I caught a glimpse of a snake slithering between the clumps of grass or mice shuffling under cover. The grass was always lush and verdant and sparkled with a morning's

...we are not trying to maximize forage production or pounds of beef produced, but rather explore sustainable alternatives for cow-calf producers.

dew. My short hike through the prairie allowed me time to reflect and to take in nature's wonders.

However, my day-dreaming couldn't go on forever. It ended when I reached the cattle. My mind became focused on the cattle, and my concerns were on their welfare. They all would stare at me, and Roni, a young cow, always let out a deafening holler. She was eager to taste the fresh grass on the other side of the fence. As I walked the fences preparing to move the cattle, Alice, the oldest cow, followed me every direction I went. I looked back and stared in her eyes, and I would sense the dependence she has on



John fends off the advances of one of the cows.

me. When I opened the gate, she was always the first to get into the next paddock. Then I looked at Wildcard. She didn't care who I was or have sympathy for my sentimental reflections. She was the boss out on the grass, and it was her duty to push the calves and other cows

along by shaking her long horns.

After closing up the fence and providing fresh water, I stopped for a moment to reflect over my integration in these cows' lives. It was my role to provide them green pastures and clean water and keep them healthy. Sure, the cattle could make it if they were left to roam. They have the sense to find the nutritious forage or the distant stream. Remove the fences, and they would adapt. The native buffalo once roamed the North American prairies from Texas and New Mexico up to Canada. If this land was all prairie grass and the buffalo roamed free again, the Texas Longhorn would survive, too. In our agrarian landscape, however, the migrations no longer occur. For this reason, my role as manager must encompass more than the health of our cattle herd; it must consider the health of the grassland ecosystem, as well.

Grazing and What it Means for the Landscape

When agrarian society was introduced to the prairie, we quickly changed the boundaries by developing roads and building fences. The distance the animal travels, the grass it eats, the water it drinks, and the place it sleeps is now determined by how we manage the landscape. Livestock production can be sustainable this way, but it means we must take an ecological approach when designing management schemes. Careless livestock raising can have severe impacts on plants, wildlife, water quality, and the rest of the grassland ecosystem. If we are to sustain the prairie and livestock production, the management practices we adopt must prevent or minimize the degrading effects livestock production can have.

The Land Institute is exploring an ecological approach to livestock production by experimenting with rotational grazing. We are using rotational grazing as a way of mimicking how bison might have once grazed, trampled, and traversed the prairies. Our Longhorns are moved every 1-2 days to fresh grass while the grazed areas are left to rest and recover for



John clearing thistle from a grazing paddock.

about a month before they are regrazed. Controlled rotational grazing is believed to promote nutrient cycling, maintain soil fertility, and increase plant diversity. Over the ten years of this Sunshine Farm study, we are evaluating the prairie to see if rotational grazing has an

effect on the plant community composition over time. If so, we want to know whether the grazing is beneficial or degrading for plant diversity.

Despite rotational grazing of the prairie, we are limited in extending our grazing of the prairie too long into the fall. It is now mid-October, and the weather has changed. The days are shorter, and the nights are cooler. I have become concerned as I listen to the cows bellow as they know the fresh forage is decreasing. The native grass is now mature. It crackles as I walk across the prairie. In recent years, we have planted winter annuals like barley or triticale for the calves to graze during the winter. The problem with using these annuals is that it requires us to dedicate substantial time and energy to periodically disk and prepare the soil for planting. Also, when we do not have a vegetative cover on the soil, our weed problems increase, and soil erosion is a hazard. The erosive potential of soils under minimum cover can also lead to degradation of water quality.

These concerns have prompted us to consider planting a permanent, cool season grass and legume pasture. A cool season grass and legume pasture will complement our native prairie and improve our yearly forage production. By extending our yearly forage production, we will optimize our cattle production with grass growth, reduce overgrazing, lower costly inputs, and develop a production system that builds organic matter and conserves soil and water.

Benefits of Increasing our Yearly Forage Program

The persistence of cow-calf production systems on the landscape is vital to sustainable agriculture. In recent times, however, producers have found it difficult to make a living with these systems. One reason is the high costs of purchased inputs. It is expensive to feed hay in the winter or provide the necessary supplements to keep the herd healthy until the following spring¹. Cow-calf producers often find themselves competing against confined production systems that

operate at a larger scale and feed at a lower cost. By establishing a cool season grass and legume pasture, we are not trying to maximize forage production or pounds of beef produced, but rather explore sustainable alternatives for cow-calf producers. We will explore the use of separate warm and cool season pastures as a means of extending the time we can graze our cattle throughout the year. This will reduce the amount of feed needed during the winter, the energy required in the production of this feed, and the overwintering costs.

An important part of developing sustainable grazing management schemes is to balance the peak growth and nutritional quality of the forage plants with the seasonal forage and nutritional demands of the cattle. Different plants have different rates and patterns of growth, and, in our prairie, the cattle prefer some over others. The Land Institute's prairie consists primarily of warm season grasses. Big Bluestem, Indiangrass, Switchgrass and Little Bluestem constitute about 75 percent of the prairie in any one locale, and the growth distribution throughout the summer varies among these grasses. Generally, these warm season grasses flourish under the warm Kansas summers, and they constitute the bulk of our cattle's diet.

Native tall-grass prairies in Kansas typically do not consist of many cool season grasses. Cool season pasture grasses have typically been introduced from Eurasia. They thrive here in the moist, cool seasons of the year, however, and have been recognized as excellent forage plants in Kansas. Persistent legumes are also a vital component of the cool season pastures. They increase the nutritional quality and diversity of the forage consumed by the cattle, and as they die and decompose, the mineral supply in the soil will increase.

Our cattle performance will improve by extending our yearly grazing schedule in the early spring and into the fall. During April and May our cows are lactating and going through calving season, and they require substantial high quality forage. By having a nutritious, actively-growing cool season grass and legume pasture available to graze from March through June, we will be better able to supply the cows with the nutrients they require during this period. When summer hits, the warm season prairie is ready for grazing. The native grasses will provide abundant grazing, and the calves will put on excellent growth. As summer goes on, though, the native grasses mature, seedheads develop, and their growth rate slows dramatically. Since new growth does not occur

as fast as the existing grass matures, the nutritional quality of the grass declines rapidly. Thus it would be beneficial to follow the summer grazing of our prairie with fall grazing of the cool season pasture. Grazing managed this way will allow us to utilize the grasses at their peak growth rate, productivity, and nutritional quality.

Our forage management, diversified with a cool season grass and legume pasture, will reduce chances of overgrazing by giving us the flexibility to adapt our grazing management schemes to year to year fluctuations in our pasture and prairie's condition. Temperature and moisture availability differs from year to year, and this can shift the timing and rate of growth of our pastures. It is important that grazing does not begin too early on a pasture or prairie because premature leaf removal will result in reduced root development and lowered leaf production through the season². Also late season grazing needs to be avoided as the grazed plants need sufficient rest to accumulate energy reserves before going dormant³. By having separate cool and warm season grass pastures, we will improve the timing of our seasonal movement of cattle from pasture to prairie or prairie to pasture and reduce overgrazing.

Cool season pastures are important to the development of sustainable, low-input, cow-calf production systems. Cattle production can be enjoyable, humane and ecologically sound, but the landscape must be utilized to its potential. It should not, however, overlook the health of the grassland ecosystem for the sake of maximizing production of forage or pounds of beef produced. During our recent Fall Visitors Day, I gave tours of our rotational grazing experiment, and I explained how we are raising cattle on our prairie. We treated our visitors with a wonderful view of the prairie and our Texas Longhorn cattle herd. I hope our visitors went away from The Land Institute aware that there are humane methods of raising cattle and that grazing can be managed in a way that protects the grasslands.

John Guretzky is a 1997 intern at The Land Institute.

¹ Lathrop, W.J.: "A Low Input Cow-Calf System Using Controlled Grazing." *Progress Report 1995*. Kerr Center for Sustainable Agriculture, Inc. July, 1996. Poteau, Oklahoma.

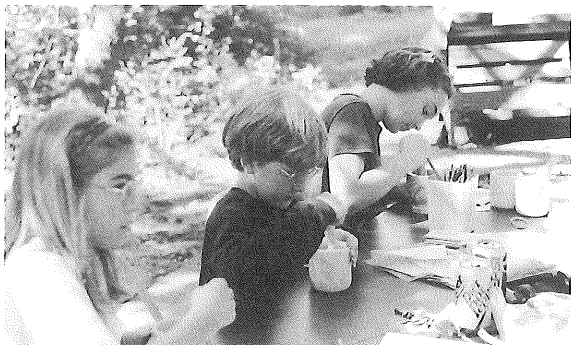
² Rohweder, D.A. and K.A. Albrecht. "Permanent Pasture Ecosystems" in *Forages: The Science of Grassland Agriculture*. 4th Ed. Iowa State University Press. Ames, Iowa.

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SCENES FROM FALL VISITORS DAY 1997

Sarah Jack Hanners

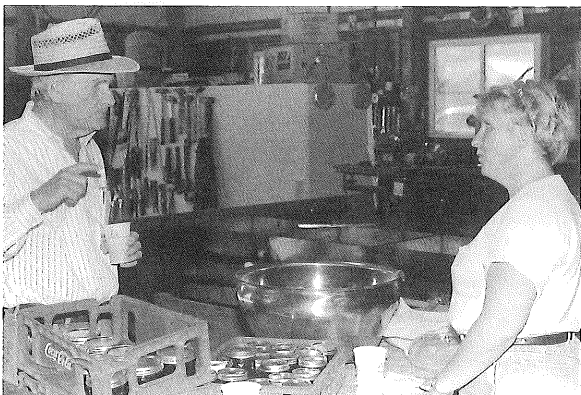
A horse-drawn tour of the Sunshine Farm.



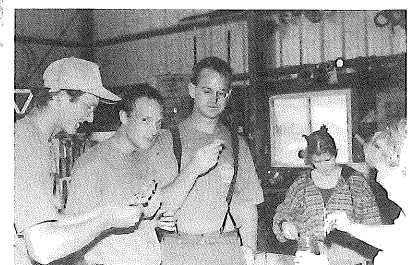
Children grinding herbs to make potpourri.



Pressing the sweet cane.



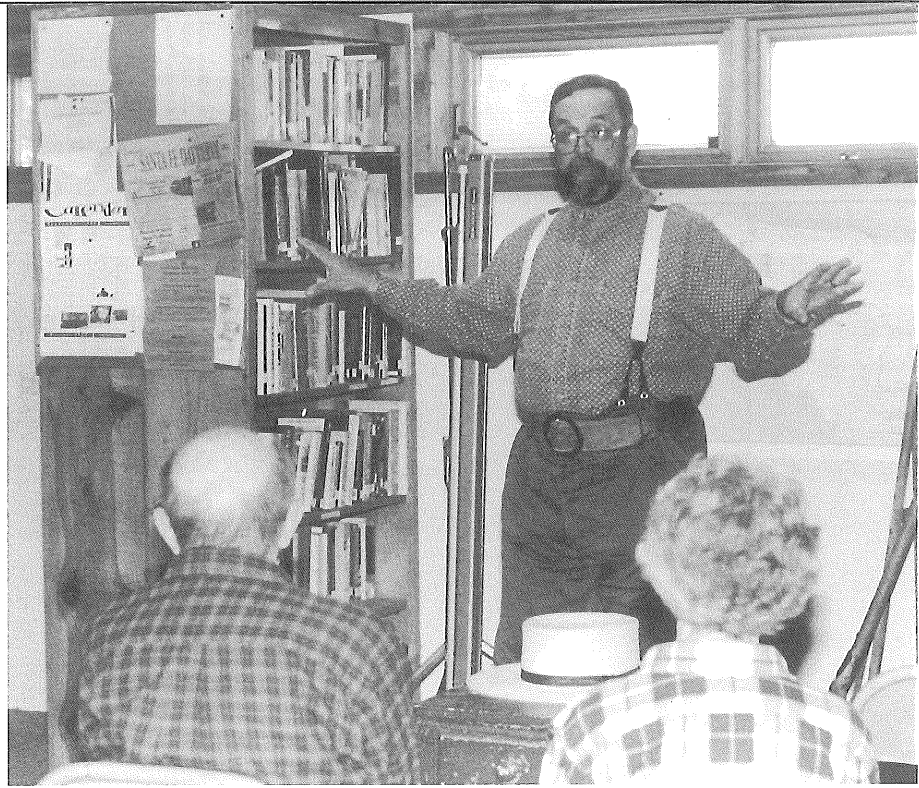
Discussing the fine points of making sorghum molasses.



Hungry interns sampling sorghum molasses.



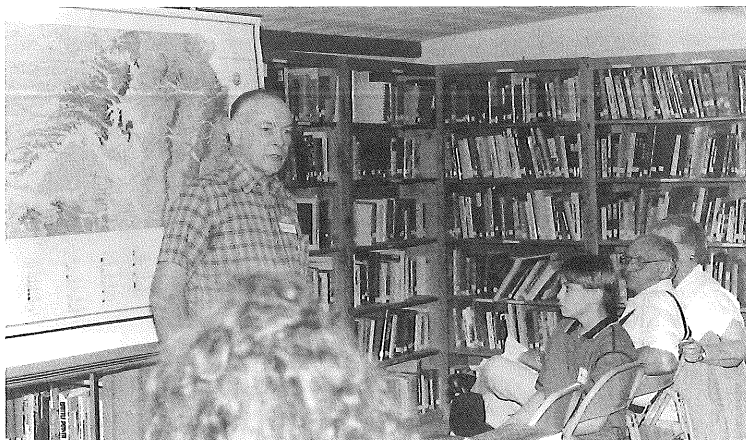
Making the acquaintance of a Sunshine Farm chicken.



Guest speaker Joe Basso on 19th century farming.



Touring the prairie and rotational grazing project.



Archaeologist Harold Reed speaking on Native American land use in Kansas.



Speaker O.S. "Nick" Fent on Kansas geology.

ESTABLISHMENT AND MANAGEMENT OF PERENNIAL POLY CULTURES

Alex Crockford

Bindweed, green foxtail, oxalis, lambs quarters, pigweed, some more bindweed, and then some more foxtail lay in the path behind me. I say their full names quietly to myself as I remove them from the soil: "*Convolvulus arvensis*, *Setaria glauca*, *Oxalis stricta*," and so on. The Land Institute's interns and scientific staff know these weeds intimately, having repeatedly removed them one by one to leave the soil bare again. Pulling each weed tells us something about the nature of the plant. We've gathered their leaves, touched the stem, pulled the roots away from the earth, plant after plant after plant.

After carefully weeding around one 25-foot row of delicate perennial seedlings, of some 2000 rows, one humbly moves on to tidy the next row. In the first of several weeding sessions this year, we covered over 12,500 row feet of experimental plots, roughly 2.5 miles. This gave us plenty of time to talk, joke, and contemplate in solitude repeating "*Convolvulus*, *Helianthus*, *Setaria*." Sadly, I remember these names better than I do the native perennial species, so dear to The Land Institute's philosophy.

Something about weeds gives them the ability to colonize, to quickly expand populations, to subdue the broken landscape. These weeds and other colonizing plants are very important in

ecosystem recovery. After a disturbance, they stabilize the soil from washing or blowing away and generally provide a protected environment for seed germination. Even knowing this, we find it very difficult to consider them our allies in The Land Institute's perennial polyculture research. We are quick to eliminate them in everyday work. Perhaps we need to get beyond this relationship with colonizing species.

As my intern research project, I was given the tasks of determining the current state-of-the-art of perennial establishment, reporting my findings in a document, and offering recommendations for further

action. The Land Institute is working on "community assembly" studies to investigate how the perennial polycultures could eventually evolve. This research has inspired and informed my efforts, but the long-term nature of these studies limits their applicability for my purposes.

After some initial research, I realized there were obvious differences in worldview among those working on perennial pasture, prairie restoration, and community ecology. Perennial pasture establishment, largely influenced by economic constraints, aims for rapid perennial establishment and therefore requires considerable inputs of herbicides, pesticides, fertilizer, and tillage. Prairie restorationists, influenced by preservationism, want only native species and commonly work with heavy tillage and herbicides to eliminate weeds quickly and thoroughly. Community ecology studies, aiming for "scientific credibility,"

often require sterile conditions by using various biocides, or removing portions of the topsoil. The Land Institute is also influenced by economic realities, preservationist ideals, the need for scientific credibility, and public image considerations.

In agreement with the mission of The Land Institute, however, I imposed the following constraints on my recommendations. Natural



First-year (1997) plot with abundant growth of foxtail and other weeds.

Systems Agriculture research should operate in the absence of chemical treatments (herbicides & chemical fertilizers), minimize tillage, and take "nature as measure" in the entire process, not just the end product. Knowing the limitations of my current knowledge of natural systems and agriculture, I am comfortable with providing only a broad statement of possibilities.

The approach for Natural Systems Agriculture will necessarily be synthetic, bringing together various aspects of perennial pasture management, prairie restoration, and community ecology. Ecologically speaking, this happens by affecting various biotic and

abiotic conditions. What does this mean in a practical sense? What are some possibilities?

- (1) We can influence initial biodiversity by efficiently placing a diverse composition of seeds in the environment in such a manner that they will best germinate. Efficient planting involves the conservative use and accurate placement of valuable perennial seeds with implements such as seed drills.
- (2) A nurse-crop is a crop grown with another to shelter it and promote growth. Nurse crops would help the perennials establish and possibly provide an economic return on planting in the form of grain or hay.
- (3) Nurse crops and the perennial cultivars need to be planted according to the season of maximum establishment. This will require that the community is seeded at different times of the year according to the needs of the plants.
- (4) Inoculation of seed could introduce beneficial soil organisms including, but not limited to, various fungi associated with the grasses, free living nitrogen-fixing bacteria, nitrogen-fixing bacteria of legumes, and possibly desirable disease organisms that would attack weeds.
- (5) If the perennial cultivars do not establish well at first, then replanting is necessary. Reseeding through non-destructive broadcast seeding or no-till interseeding can reintroduce the seeds of the absent or rare cultivars without destroying what has established.
- (6) We can weaken annual colonizing species by means of semi-destructive mowing and fire management. Many native perennials are fire or clipping adapted and will persist. Also, if livestock are included in the system, grazing pressure on a particular weed at a vulnerable stage can significantly undermine its persistence.

I can imagine several possible experiments involving some of these ideas. The goal of these experiments



Second-year (1996) plot showing (l-r) Illinois bundleflower, mammoth wildrye, Maximilian sunflower...and relatively few weeds.

is to identify differences among various practices, if only to experience their limitations and identify basic causal relationships. The experiments would probably closely resemble the Land Institute's on-going community assembly experiments but with more intense goal-oriented management. Comparisons will need to be made among various site preparations, seeding equipment, and cover crop species and mixes. The effects of mowing, fire, and grazing management will also need to be examined.

I recommend looking into differences in fall tillage, spring tillage, minimum tillage, and no-tillage systems. Seeding methods (broadcast, no-till interseeding, drop seed drill / corn planter) and management practices (combinations of mowing, fire, and grazing) may show remarkable differences. Lastly, but perhaps most interesting, is the idea of nurse crops for the perennial species. The nurse crops could be single species, or polycultures of annuals, biennials, or perennials, either native or domesticated. There are virtually hundreds of possibilities to be explored.

I thank David Van Tassel for providing me the opportunity to explore these ideas as my research project and hope with time some of these concepts are explored in the fields.

Alex Crockford is a 1997 intern at The Land Institute.

NATURAL SYSTEMS AGRICULTURE: MULTIPLE CHALLENGES TO AN EXISTING PARADIGM

ECOLOGICAL SOCIETY OF AMERICA MEETING,
AUGUST 10-14, ALBUQUERQUE, NEW MEXICO

Kate Worster and David VanTassel

On August 13, 1997, the 82nd annual Ecological Society of America (ESA) meeting hosted its first symposium devoted to Natural Systems Agriculture. Nine scientists convened in Albuquerque, New Mexico and presented papers, including The Land Institute's Wes Jackson and Jon Piper and six members from The Land Institute's Natural Systems Agriculture Advisory Team: Charlie Sing, Jim Bever, Laura Jackson, Andrew Paterson, David Andow, and Stuart Pimm. Alison Power, professor of ecology and systematics at Cornell University, also presented her research. This symposium challenged the existing paradigm of agriculture—the cultivation of annual crops in monocultures—by considering the scientific possibilities for creating an agriculture based on perennial polycultures.

The possibility of developing and using perennial grain crops seems to run counter to the basic concepts of life history theory (LHT). LHT assumes that perennials, which must invest a great deal of energy into establishing and maintaining root mass, consequently would have a limited amount to put into seed production. As seed production increases, plant longevity would decrease. Laura Jackson of the University of Northern Iowa, finds fault with this assumption.¹ Her presentation at the ESA meeting outlined some old observations and introduced some new discoveries. First, fruit trees, shrubs, and vines are extremely productive perennials and many are long-lived. Second, increases in maize yield have not come at an expense to other plant features. And third, in Eastern gamagrass (*Tripsacum dactyloides*) a five-fold increase in seed production, inherited as a single recessive locus, resulted in no change in growth rate and indeed significantly increased below-ground carbohydrate storage. Jackson concluded that selection for greater seed yield can occur without an immediate loss of perenniality, proving the LHT-based assumptions wrong.

Now that theory shows selection in perennial grains can be rewarding, the next step is to carry out this procedure. Andrew Paterson of the Plant Genome

Mapping Laboratory at Texas A&M University has used DNA markers to map genes associated with longevity (perennation) and rhizome development.² Such detailed genetic maps, he has found, can also be used to identify genes associated with domestication including reduced shattering (loss of seeds from the mature inflorescence), day-neutral flowering, and reduced height. These traits, and their interactions with each other and with their environment, are probably complex and multifactorial. Scientists currently studying the domestication of perennial plants have an advantage over peoples who domesticated only annual grasses 10,000 years ago. However, as Charlie Sing of the Department of Human Genetics at the University of Michigan Medical School pointed out at the ESA meeting, living organisms are complex adaptive systems and cannot be reduced to gene sequences. The growth and development of an animal or plant depends on its environment, chance, and history as well as its genes.³

While diverse and complex systems require more attention and study, the benefits of understanding them were made apparent at the ESA meeting. Jim Bever of the University of Chicago Department of Ecology and Evolution studies mycorrhizal fungi. He has found that a large number of soil microbe species interact with plant roots. The composition of the plant community affects the composition of the microbial community. Conversely, species of soil fungi affect plant growth and diversity. These findings have implications for designing agricultural systems in which plant species diversity is a goal and in which symbiotic soil bacteria and fungi are relied upon for mineral uptake and nitrogen fertility.⁴ In addition, studies of plant-pathogen interactions in natural and agricultural plant communities by Alison Power of Cornell University show that viral diseases may spread more slowly in grass mixtures than in single-species stands.⁵

The challenges presented to the current paradigm are revolutionary. Unfortunately, such a revolution in agriculture is not likely to happen overnight nor will it

completely replace conventional practices. David Andow, of the University of Minnesota entomology department, has studied a Japanese agriculture where rice farmers employ both conventional practices (e.g. fertilizers and pesticides) and shizen noho, or natural farming. He explains that two very different agricultural systems can achieve very similar yields, but that to reach peak performance in either system many methods and processes must change simultaneously.⁶ For example, natural farming relies on nematodes to control some serious insect pests. Conventional agriculture relies on chemicals to do the same thing. However, nematode populations take years to rebuild following conversion from chemical-intensive agriculture to natural agriculture. Therefore, simply reducing chemical applications may prove pointless as it might not kill the insects nor allow an adequate nematode population.

The results from these scientific experiments are promising. Researchers asking questions which

challenge conventional agriculture should be encouraged by this entire symposium devoted to Natural Systems Agriculture. The studies presented convincing evidence that the existing paradigm must be altered in some significant ways to ensure the sustainability of food production through agriculture.

Kate Worster is administrative assistant at The Land Institute.

David VanTassel is plant scientist at The Land Institute.

¹ Jackson, L.L. and C.L. Dewald. 1994. Predicting evolutionary consequences of greater reproductive effort in *Tripsacum dactyloides*, a perennial grass. *Ecology* 75(3):627-641.

² Paterson, A.H., Y-R Lin, L. Zhikang, K.F. Schertz, J.F. Doebley, R.M. Pinson, S-C Liu, J.W. Stansel and J.E. Irvine. 1995. *Science* 269: 1714-1718.

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⁴ Bever, James D. 1997. "Mycorrhizal diversity impacts on perennial plant ecology." ESA meeting, 13 August, 1997.

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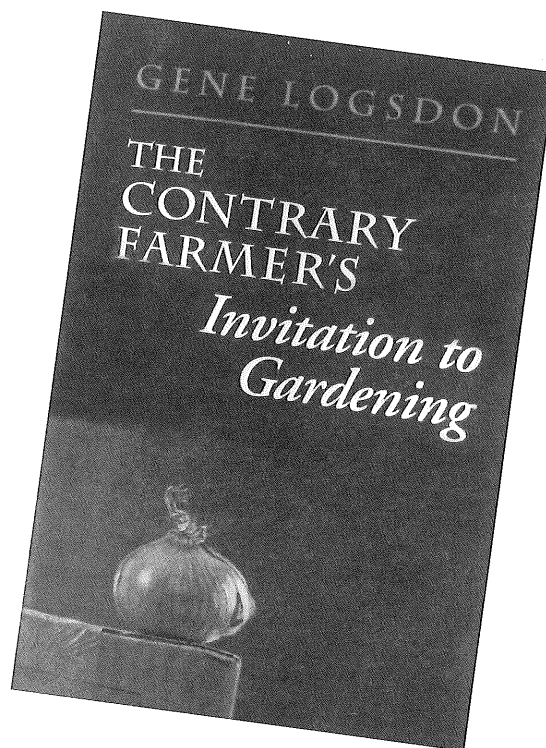
THE CONTRARY FARMER'S INVITATION TO GARDENING

by Gene Logsdon

Chelsea Green Publishing Company, 1997. 170 pages.
\$16.95, softcover.

Reviewed by Andrea Leach

Gene Logsdon's *The Contrary Farmer's Invitation to Gardening* surprises those expecting to find a dry, how-to organic gardening book. Those familiar with Logsdon's works will not be surprised by his informative though irreverent writing style. They will also not be surprised that he denounces agribusiness with one breath and encourages "dancing around corn and bean maypoles in sexual frolic" in the next. Logsdon offers social and political commentary, general life philosophies, recipes, nutritional advice, and recommendations for seed and garden supply catalogs and books. He also details various aspects of organic gardening, including vegetable, fruit, and grain production, garden husbandry, and composting techniques.



Logsdon is a farmer, gardener, and writer who lives and works on his 32-acre family farm in Ohio. He exemplifies that you can still have a rich and varied life by living simply and reducing living expenses. Logsdon stresses that it is not necessary to do things that are unpleasant or that you dislike in your daily life and then search for fun and adventure outside of your job and home. Instead, you can strive to make your home where you want to be, and the money saved from not taking extravagant vacations can be invested in your home and garden; investments that will pay long after a trip is over.

In the beginning chapters of his new book, Logsdon outlines his plan for a new economy. He envisions the widespread establishment of garden-based farms leading to a "realignment of people into smaller and more local complexes" where food safety and security could be procured through the garden. This "economy of Eden," as he calls it, would be based on personal contact between producer and consumer and biological rather than mechanical technologies. When economics forces a downsizing of large industrialized farms and animal factories, Logsdon believes that "the food garden and backyard orchard are capable of taking up enough slack to stave off a serious food crisis."

Logsdon contends that by doing your part to undo agribusiness through gardening, you will also save money. This is true only if you don't buy unnecessary gadgets and machinery that can make gardening an expensive hobby rather than a self-supporting enterprise. You will save money both directly, by not having to buy the food you grow, and indirectly because the time spent in your garden can keep you from spending money elsewhere. He gives practical advice about how to save money in the market economy while bettering your home economy by sharing equipment and tools, trading labor with neighbors, saving seeds, and constructing your own equipment and buildings. Unless you're the entrepreneurial type, he does not recommend organic gardening as a means of making a living, as it can become rather laborious to do so. If you're not in business and your garden is not tied to the money economy, then you are free to experiment in your garden with different plants, animals, and methods.

One of Logsdon's personal philosophies is "don't do for yourself what nature will do for you." This is one reason why he swears by mulch-bed gardening, or the lazy person's version of French biointensive gardening. Mulching mimics the accumulation of organic matter at or near the soil surface, such as occurs in natural systems when plants senesce, until such a litter exists that new plants cannot establish for lack of sunlight. Among other things, mulch-bed gardening controls weeds, prevents the development of a hardpan, retains moisture, and recharges or prevents soil nutrient deficiencies. All this means more and healthier plants per area and hence smaller gardens so that gardening is feasible for suburban and urban dwellers.

Since plants do not exist exclusive of animals in nature, Logsdon's brand of gardening integrates animals into the garden. This increases the garden's diversity. He claims that mimicking nature through the rotation of berries, vegetables, and grains in the garden not only discourages disease, weed, and insect infestations, but helps control pestiferous

wildlife as well. That is, if you don't get carried away with his recipe for raccoon roast and kill them all yourself.

Logsdon takes great pleasure in questioning mainstream gardening information and suggests alternative methods and wisdom. He thinks that tradition, experience, and common sense are better teachers than agribusiness. He debunks the myth that grain is hard to grow and process on a small scale without expensive machinery and extols the economic and additional virtues of using corn to make bourbon whiskey. Even gardeners' favorite seed supply catalogs are not immune to Logsdon's dry wit. He proposes that this statement should preface all seed catalogs:

All the varieties offered herein are the best, most productive, most weather-tolerant, most tasty, and most attractive that we have to offer, or we wouldn't offer them. Otherwise, they are varieties that our stubborn customers demand, even if the results are not all that great. The photos we use to depict fruits and vegetables are merely pretty pictures and do not necessarily look like the variety being offered. Or they represent that variety only in the way you represent yourself when dressed up for a presidential ball.

Logsdon believes that gardening can be a serene, pleasurable, and creative experience for everyone. He doesn't limit his discussion of why, how, and what to garden to himself. He also tells the stories of other contrary gardeners and their sometimes unusual gardens. Whether small or large, simple or complex, edible or not, a garden is defined by the gardener. Logsdon's most inspiring example is an organic gardening rehabilitation program for criminals that led one man from selling crack to selling organic spinach.

Not everyone will agree with Gene Logsdon's political and social commentary, but *The Contrary Farmer's Invitation to Gardening* will make you simply think at worst and dream at best. Logsdon ends his book with a chapter entitled "The Aim is Joy," a point easily forgotten but important to keep in mind. I not only enjoyed reading the book, but I also learned quite a bit in the process. My only frustration now is that I want to start preparing and planning my garden for next year, but I don't yet know where I'll be living.

Andrea Leach is a 1997 intern at The Land Institute.

NEW AND DEPARTING STAFF AT THE LAND INSTITUTE

Kate Worster

Cheri and Bruce Jennings

Bruce and Cheri recently joined as The Land Institute's Fall Education Directors. This husband and wife team met at the University of Hawai'i where they were both pursuing a Ph.D. in political science. They first met Wes Jackson at a gathering of organic growers, having heard many personal stories through their shared long-time friend Angus Wright.

Bruce was raised in the San Francisco Bay Area and received his undergraduate degree from the University of California at Berkeley. At the University of Hawai'i, he completed a dissertation examining the origins of the Green Revolution and published his work, *The Foundations of International Agricultural Research: Science and Politics in Mexican Agriculture*, several years later.

As a senior advisor to the California Legislature for most of a decade, Bruce provided counsel on such issues as sustainable agriculture, environmental health, and toxics. In addition to his current appointment as a visiting scholar at Berkeley, he also serves as a consultant to the University of California's Center for Occupational and Environmental Health.

Cheri is also from northern California and completed her undergraduate degree at the San Francisco campus of the California State University. In addition to teaching for several years on the island of Kaua'i, she has taught for more than twenty years at universities in California, Montana, and Washington. She has received several fellowships with the National Endowment for the Humanities and has recently co-authored a book chapter evaluating environmental policies in California. Cheri commutes between Salina, Kansas and Olympia, Washington where she teaches in the Masters of Environmental Studies Program at The Evergreen State College.

Bruce and Cheri have found The Land Institute interns' discussions of alternative agriculture an exciting and enriching experience. They are impressed that The Land Institute is continually reinvigorated by the enthusiasm and thoughtfulness of its interns.

Tina Ray

The Sunshine Farm operations assistant, Tina Ray, will be greatly missed when she leaves The Land Institute this December. Tina was an intern in



1995 and returned to assist Jack Worman in 1996. Her responsibilities include working with the four draft horses and farm machinery to carry out farm operations. She says she was thrilled to be invited to return and learn more about working the horses and running and maintain-

ing the farm equipment.

Tina grew up in Pennsylvania where she spent a great deal of time working at horse stables, showing and riding horses, and giving horseback riding lessons. She gave up horses for a while to attend Pennsylvania State University where she received a degree in agricultural sciences and international agriculture. During this time she attended the University of Nairobi for one semester and had an internship on a government farm in Kenya. She chose to pursue a degree in agriculture because of her interest in learning and teaching others about how and where their food is produced. In particular, Tina wanted to get involved in and learn about community supported agriculture, sustainable farming, and sustainable communities.

The Land Institute gave Tina the opportunity to incorporate her hobby of horses with her interest in a career involving small-scale, sustainable farming. After her work at The Sunshine Farm, Tina plans to continue pursuing her interests in agriculture and education, and she hopes one day to have a horse-powered farm of her own.

THE LAND INSTITUTE'S NATURAL SYSTEMS AGRICULTURE ADVISORY TEAM

In the last issue of *The Land Report* we featured Donald Duvick, Stephen Jones, and Eugene Odum. In this issue we profile three more members. All NSA team members are experts in their fields and will assist The Land Institute staff in communicating our idea to the public and will advise us on our research agenda.

Rhonda Janke

Professor Janke is an associate professor and extension specialist in sustainable cropping systems in the department of agronomy at Kansas State University, Manhattan, Kansas. Her position was the



first in the history of KSU with a sustainable agriculture mandate. Her research interests include soil quality, especially organic matter fractions that contribute to better water holding capacity, water infiltration rate, and till in Kansas soils. As an extension specialist she participates in training county extension agents and

is developing a whole-farm planning process for Kansas farmers. This fall Professor Janke is organizing a series of workshops to introduce Kansas farmers to whole-farm planning tools that she has developed from a literature review and a distance learning course. She is also involved in providing information to potential growers on the medicinal qualities of *Echinacea* and in a new community development project called "Sustainable Manhattan."

Professor Janke received an undergraduate degree from Kansas State University, and a Master's degree and Ph.D. from Cornell University, all in the field of agronomy, with minors in plant ecology and animal nutrition at Cornell. In 1986 she was hired as adjunct assistant professor at Pennsylvania State University and as an agronomy section leader at the

Rodale Institute, where she eventually became Director of Research. As Director of Research at Rodale, Janke was in charge of horticulture, entomology, perennial grains research, and cropping systems.

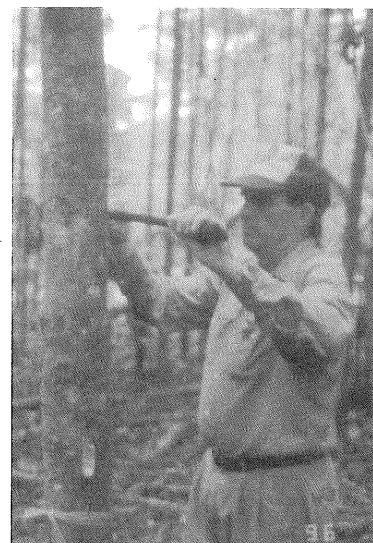
Professor Janke was born in Junction City, Kansas in 1958. She grew up near Chapman, Kansas where she often worked on a local dairy farm.

In December, Professor Janke was elected to The Land Institute's Board of Directors. She also participates in many other organizations outside of the university including Kansas Rural Center, Kansas Organic Producers, and Kaw Valley Heritage Alliance.

Jack Ewel

Dr. Ewel is a research biologist and director of the Institute of Pacific Islands Forestry in Honolulu, Hawai'i. Based in Hawai'i, he guides the institute's programs in restoration, alien species, wetlands, and management services.

The institute staff works in seven political units across the fascinating, remote, resource-limited islands of the Pacific. He received an undergraduate degree in forestry from the State University of New York College of Forestry at Syracuse University and a Master's and Doctorate in ecology from the University of Florida and the University of North Carolina, respectively. He has spent his



35-year career working in the tropics, examining the relationships between natural ecosystems and the successional vegetation that follows shifting agriculture in the humid lowlands of tropical Latin America and the Caribbean.

His research led him to recognize that these natural systems have several attributes that might make them worthy models for the design of sustainable land use systems. He and his co-workers tested this idea by attempting to create a mimic. The success of this research led Dr. Ewel to explore the details of the processes and mechanisms involved. This required simpler systems, containing only one or two life forms. To that end, research plots were set up in 1991 in Costa Rica, and today they constitute an outdoor laboratory in which fundamental questions of ecosystem function are addressed by scholars in various fields. However widely the research has ranged, its focus remains the ecological underpinnings of sustainability.

Previous to becoming director of the Institute of Pacific Islands Forestry in 1994, Dr. Ewel was a faculty member for 23 years at the University of Florida. There he received fellowships from the Fulbright-Hays program, the John Simon Guggenheim Foundation, and the National Science Foundation to travel, teach, and conduct research at Cambridge University in England and Stanford University in California, as well as Costa Rica and the Carnegie Institution of Washington.

Stuart Pimm

Professor Pimm grew up in Derbyshire, England where, as a teenager, he developed a strong interest in birds. During his second year at Oxford, he organized and led an officially sponsored 1970 Oxford University Expedition to Afghanistan and Kashmir. He then went on to receive his Ph.D. at New Mexico State University.

Professor Pimm's major interest is conservation biology. The problems associated with endangered species and introduced species have been the subjects of his long-term theoretical and empirical studies in Hawai'i and Guam. Currently he leads a



project on the endangered Cape Sable sparrow in southern Florida.

Professor Pimm's interests in ecological theory and conservation biology may seem to be quite distinct, but Pimm disagrees. As he explains in his second book, *The Balance of Nature? Ecological Issues in the Conservation of Species and Communities*, a major challenge for ecological theory involves a transition from considering 1 to 10 species for 1 to 10 years over 10 to 100 square meters to understanding the fate of hundreds of species, over decades to centuries, and over the species' entire ranges. These are the organizational, temporal, and spatial scales of concern to those who manage diversity. Pimm contends that conservation biology provides questions of the greatest challenge for ecological theory while, simultaneously, better theories are essential tools for conserving biodiversity.

Currently, Professor Pimm is at the University of Tennessee, Knoxville, in the Department of Ecology and Evolutionary Biology. In 1993, he was awarded a prestigious Pew Scholarship in Conservation and the Environment.

New Natural Systems Agriculture Advisory Team Members

Professor John Blair, Department of Biology,
Kansas State University

Dr. Patrick Bohlen, Institute of Ecosystem Studies,
Millbrook, New York

Professor John Briggs, Department of Biology,
Kansas State University

Professor Todd Dawson, Section of Ecology and
Systematics, Cornell University

Dr. Jeffrey E. Herrick, USDA/ARS Soil Science,
New Mexico State University

Dr. Richard Hobbs, CSIRO Wildlife and Ecology,
Midland, Western Australia

Ted Lefroy, Center for Legumes in Mediterranean
Agriculture, University of Western
Australia

Commissioner William H. Martin, Department of
Natural Resources, Commonwealth of
Kentucky

Dr. John Passioura, CSIRO Plant Industries,
Canberra, Australia

Professor John Pate, Botany Department,
University of Western Australia

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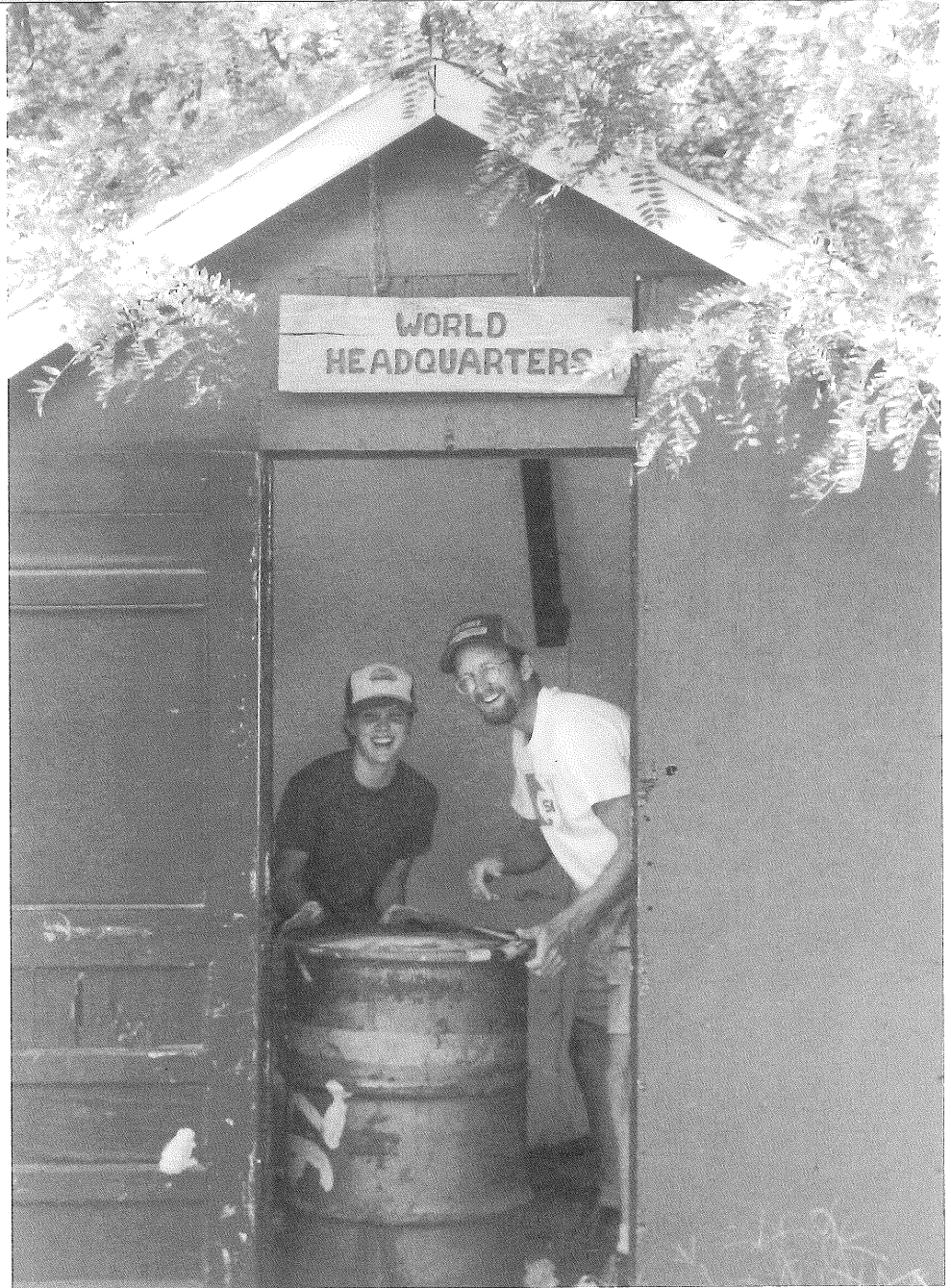
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