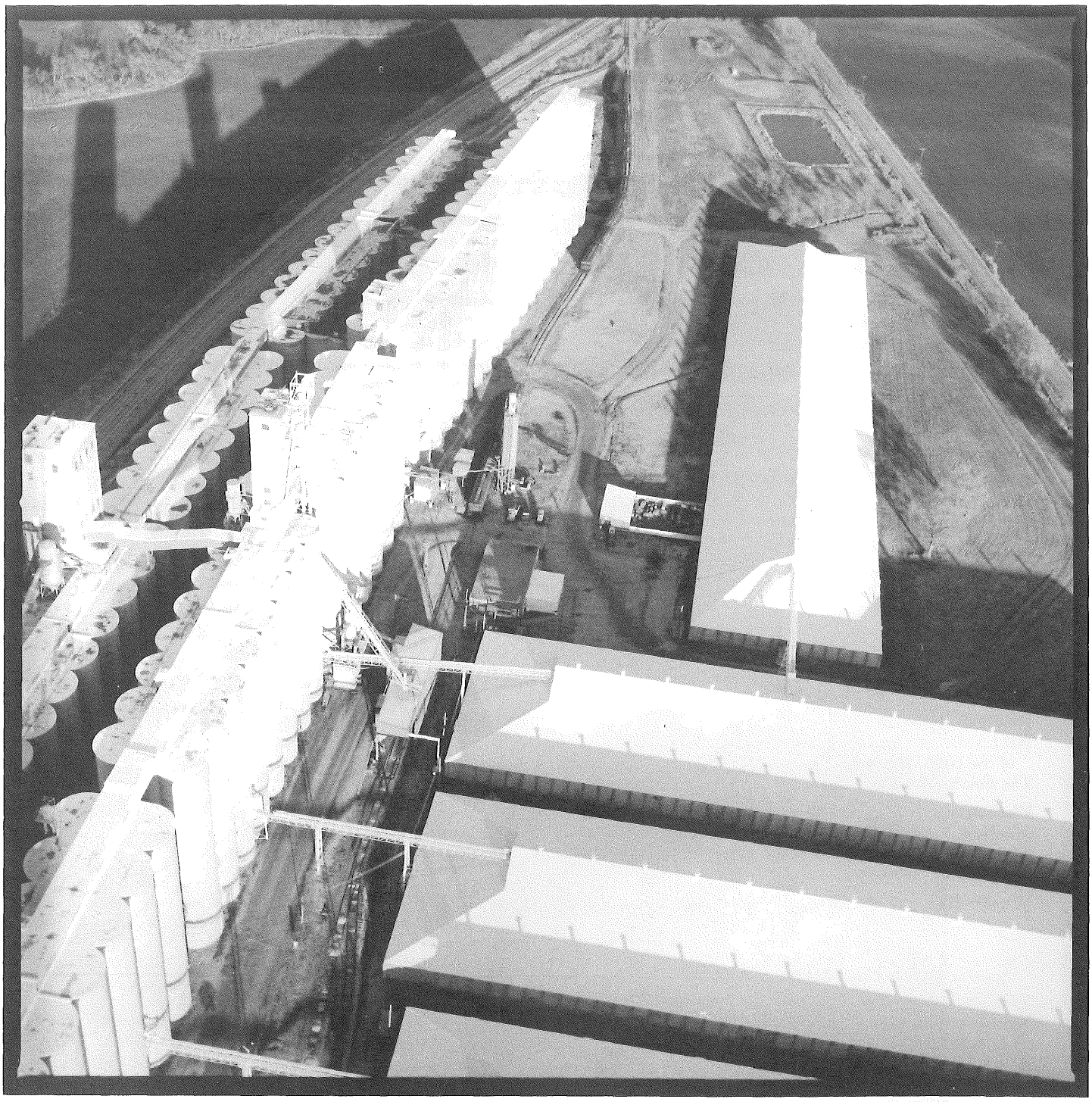

THE LAND REPORT

Summer 1993

Number 47

Contents

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Photographs in this issue were taken by James MacNeil, Laura Sayre, Jeff Shields, and Rexford Sorenson. Darkroom work was performed by Jeff Shields and Rexford Sorenson.

Illustration on page 26 is by Kirsten Bergman.

On the Covers

Representing the two great sides of contemporary agriculture in the Great Plains, the photographs on the front and back covers are entitled "Bunge grain terminal, Saline County, Kansas, April 1993," and "Cattle feedlot, Saline County, Kansas, April 1993." They are the work of Terry Evans, pictured here in front of a portion of an exhibit of her work on display during this year's Prairie Festival.

In This Issue

The floods of 1993 have abated in north central Kansas, at least, returning us to the heat of a normal summer.

We are pleased to bring you news of an infant international sustainable agriculture exchange program in this issue, described by Christian Petrovich on page 4 and Ted Schuur on page 16. The Ekhaga Experimental Farm bears similarities to our Sunshine Farm project in its focus on nutrient cycling in an organic agricultural system and in its effort to create a working farm that is also available for short-term and long-term experiments in various aspects of sustainable agriculture.

On page 11, Marty Bender reviews studies of agricultural productivity and soil condition on a variety of organic farms and research stations in this tradition. Eric Karlstrom provides a general introduction to soil properties, and particular observations on the soils of Chase County, Kansas, on page 23.

Several of the pieces in this issue emerged from Prairie Festival 1993. James MacNeil and Jen Tressler discuss the presentations of Helena Norberg-Hodge and William Vitek, respectively, in the "Considerations for a Sustainable Society" section, and Audrey Barker reviews Sharon Butala's recent novel on page 31. Audio cassette tapes of many of the presentations are still available and may be ordered using the form on page 34.

With number 47 *The Land Report* receives its second change of editor in as many issues. We hope change makes for diversity and freshness.

— LS

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THE LAND INSTITUTE IS A NON-PROFIT EDUCATIONAL-RESEARCH ORGANIZATION DEVOTED TO SUSTAINABLE AGRICULTURE AND GOOD STEWARDSHIP OF THE EARTH

At The Land

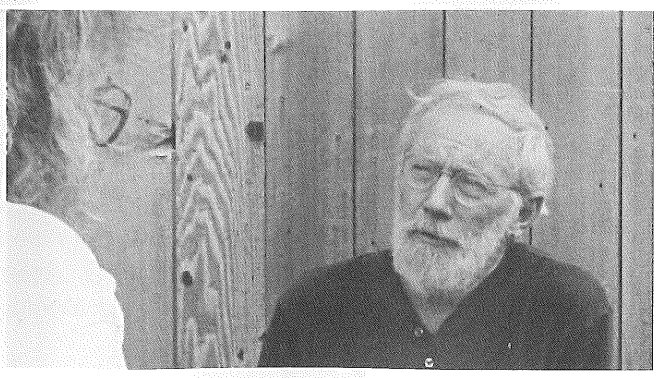
Prairie Festival 1993

The theme of the 15th annual Prairie Festival, held May 29-30, was "Becoming Native: Our Paleolithic Past, Modern Gatherer/Hunters, and Subsistence Farmers." In an otherwise soggy spring and early summer we were lucky enough to have a week of sun at the end of May. We extend our thanks to all who participated, attended, and otherwise made it happen. See you next year!

Jim Huskins, our Sunshine Farm manager and a pastor in the Church of the Brethren, led Sunday morning's celebration of a new day.

The Paul Winter Consort's concert in the big barn. Eugene Friesen, cellist, and Paul Halley, pianist, are pictured. ▼

Dave Foreman, activist and founder of Earth First!, at the podium.



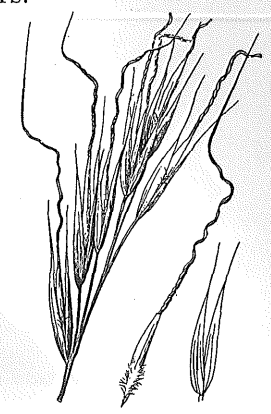
Paul Shepard, author of Nature and Madness, *answers a listener's question after his presentation.*

Visiting Scholars Program to Begin this Fall

A new type of education program is taking shape this summer at The Land Institute. Funded by a $50,000 grant from The Rockefeller Foundation, the visiting scholars program will bring activists and thinkers from a range of disciplines to exchange ideas with Land Institute staff and interns. The program will feature a series of scholars who share The Land Institute's goal of placing the global ecological crisis in a new light.

At The Land Institute this goal has been defined as consulting nature rather than the promises of human cleverness in the search for solutions. This means closely examining systems we know to have succeeded in the past, dynamic complex systems that have persisted through time with little human interference. The Land Institute works to apply this dialectical method of research to our study of agriculture and of community. The invited scholars will be people who are using this method to broaden perspectives in other areas of study, such as medicine, economics, or the arts.

The program will include seven visitors in the fall of 1993 and the spring of 1994, beginning this September with William C. Wimsatt, University of Chicago Professor of Philosophy. Professor Wimsatt will present and discuss his work with non-reductionistic research strategies and their biases in population biology. Final scheduling of the remaining participants is underway at the time of this writing. Portions of the fall curriculum will be devoted to familiarizing interns and staff with the work of each visitor before he or she arrives for the one-week visit. In the week following each guest's seminars, staff and interns will elaborate on the relationship of their work to our own. The sessions are hoped to have an impact that reaches well beyond those few weeks by generating a continuing dialogue about creating an ecological worldview. We will document the seminars and their impact on the future of The Land Institute's research in a series of papers.



Land Institute — Swedish Agricultural University Exchange Initiated

Christian Petrovich

Another step was taken this spring in the development of an exchange program between The Land Institute and the Swedish University of Agricultural Sciences (SLU) at Uppsala, Sweden. Instigated by Dr. Lennart Salomonsson, director of the Unit for Ecological Agriculture at the SLU, the exchange has had three participants thus far. Lennart visited The Land Institute in 1991 as part of a tour of sustainable agriculture organizations of the U.S. and was interested in creating an exchange between students of the SLU and "graduates" of the Land Institute intern program. (For further background on Lennart's work and on the work of Ulrich Nitsch, who holds a position in Sweden's agricultural extension network and who led Lennart to visit TLI, see "Lessons from Sweden," *Land Report* 42.) The idea of this exchange is to foster international cooperation within the sustainable agriculture movement as well as to provide further training and education to students of sustainable agriculture.

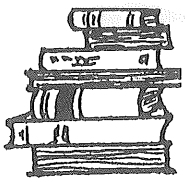
Göran Bergkvist with a hoe in the interns' garden.

For a first-hand account of 1992 intern Ted Schuur's experience on the Ekhaga Experimental Farm near Uppsala, see p. 16. The Land Institute received its first exchange student in the form of Göran Bergkvist, a graduate student at the SLU who arrived at TLI in early May. Göran contributed

to our work and learning in every way. One of his first activities upon arriving was to help interns and Jim Huskins, our Sunshine Farm manager, buck several hundred bales of hay. Göran also worked with Jim to bale hay and cultivate parts of the fields. He helped with our preparations for Prairie Festival, weeding the research plots with the interns, spreading fresh woodchips on the paths, and listening to the interns practice their research talks. He was involved with fine tuning our methodology during the first eastern gamagrass natural populations trips. When all that was done, we spent many hours combing the strawberry fields together in the evenings and went contra dancing at night.

After spending May with us, Göran went on to the University of Missouri at Columbia to conduct his thesis research with the help of Dr. Rob Myers, head of the Alternative Crops Project (a division of the U of M's Food for the Twenty-First Century Research Program). Göran's project attempted to determine an ideal planting density for canola, one of the crops being examined by Dr. Myers's group. Canola densities, like other crop densities, involve a trade-off between the desirable weed control and soil conservation attributes that go along with a full canopy and the higher yields associated with reduced interspecific competition. Göran's interest in canola may derive in part from the fact that esterified canola oil has seen some use in Sweden as a diesel fuel substitute.

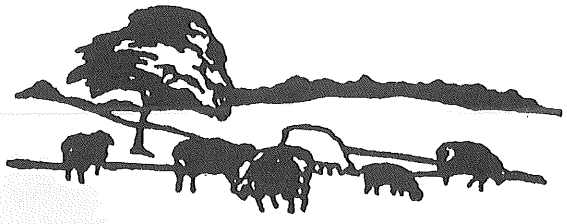
Göran's spirit for learning and his desire to experience as much as he could while he was here were inspiring to us. The friendships forged will never be forgotten. Good luck to you Göran! And thank you.



Classroom Library Reorganized

The classroom library at The Land Institute is in the final stages of a two-year reorganization process. Formerly just grouped by subject, books in the library are now shelved according to the Library of Congress call number system and catalogued on a database that permits searches by subject, author, title, call number, date of publication, or combinations thereof. Hardcopy catalogues by subject, author, and title allow quick searches without getting on the computer. Work on this project was planned and completed by the 1992 and 1993 interns and intern coordinators.

The Land Institute maintains two separate library collections. One is housed adjacent to our research offices, and holds titles pertaining specifically to the natural, physical, and agricultural sciences. The second lines the walls of the classroom building and is more general and diverse in its holdings, with strong sections on gardening, energy issues, public policy, and the history of the American West. The classroom library presently amounts to around two thousand volumes and continues to grow with the help of generous donors. In addition, the library maintains subscriptions to over sixty magazines and journals (from *Agriculture and Human Values* to *Z*) and to over two hundred newsletters covering work on various aspects of sustainability around the United States (from the American Community Gardening Association *Multilogue* to the Zero Population Growth *Reporter*). Our hope is that the holdings of the classroom library will now be more accessible to interns, staff, and visitors alike.



1993 Fall Visitors' Day
1 p.m. - 5 p.m.
Sunday, October 10

The Land Institute invites you to a day of tours, exhibits, and discussions about our work in sustainable agriculture.

The day's special feature this year is the new Sunshine Farm project. Visitors will tour the farm and meet the project designers. Other activities include prairie walks, discussions of our research, and a children's area. Admission is free. Come rain or shine.

Summer Excursions

Corey Samuels

Summer at The Land Institute finds staff and interns on the road for field work, field trips, conferences, and vacations. Whether it is a research survey of an eastern gamagrass population, a day at the Kansas State University library, or a summer road trip to the Black Hills of South Dakota, Land interns will jump at virtually any chance to get a bigger taste of the Great Plains—and staff occasionally manage to get away too.

Conferences and meetings took several staff and interns across the region. A few interns headed north to Walthill, Nebraska, for the Center for Rural Affairs' Twentieth Anniversary Celebration, where Dana Jackson was a featured speaker. In July, plant breeder Peter Kulakow attended the annual meeting of the American Society for Horticultural Science in Nashville, Tennessee. While in Tennessee, Peter also visited the Tennessee River Gorge Trust, a land trust which is beginning a botanical survey of the parts of the river gorge it preserves. Ecologist Jon Piper traveled to Madison, Wisconsin, to present a paper at the annual meetings of the Ecological Society of America.

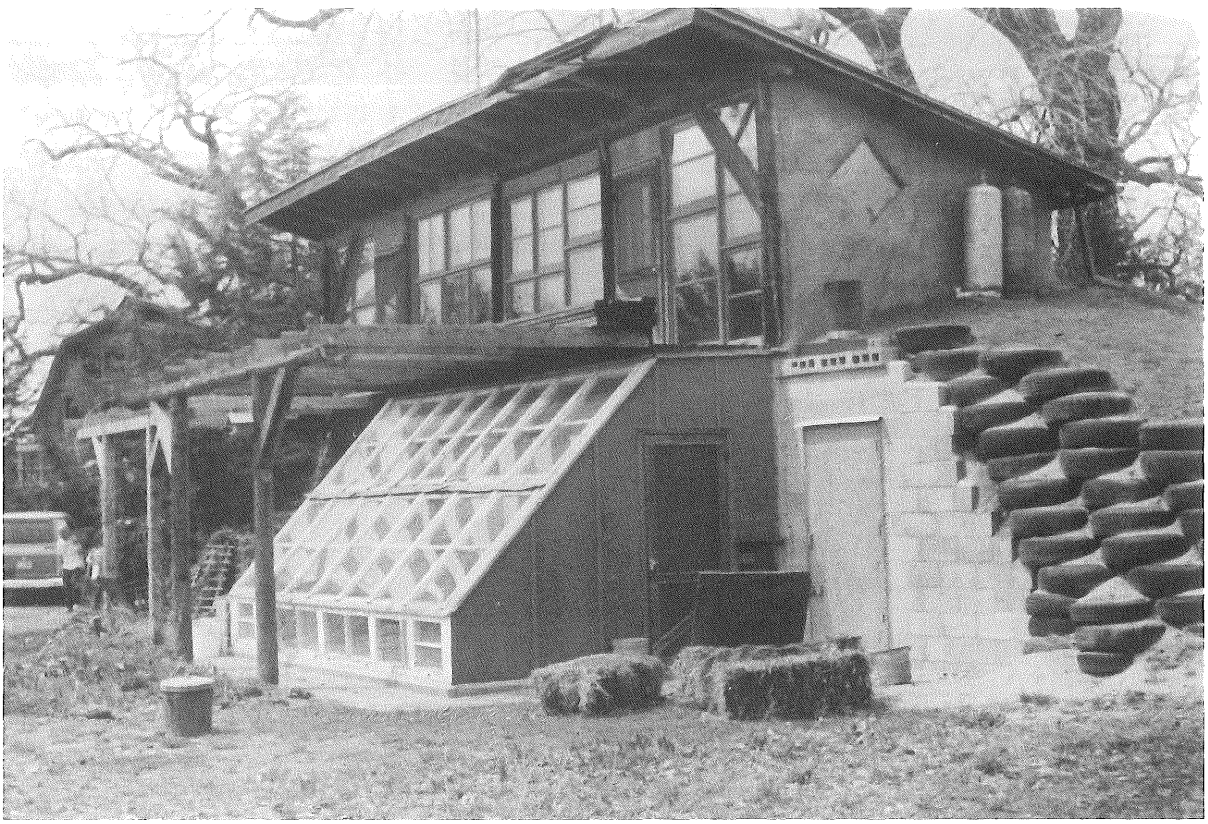
In May, staff and interns enjoyed a windy day trip to the Konza Prairie Research Natural Area, near Manhattan, Kansas. Managed by Kansas State University and owned by the Nature Conservancy, Konza Prairie is one of the largest prairie preserves in the country. While there, we toured the research area with a member of the Konza staff and discussed various strategies of prairie management. A few weeks later, interns returned to the Konza, but this time at three a.m.—in order to hike to the bird blind for a chance to see the prairie chickens "booming."

The research program this year has entailed an unusual amount of travelling. A new study of eastern gamagrass "in the wild" has involved visiting seventeen gamagrass populations in twelve counties across Kansas. These seventeen sites, identified (along with many others) by TLI researchers five to ten years ago, represent the "homes" of the gamagrass accessions that have performed best in our common garden experiments. Touring the sites has been an education in itself: gamagrass habitats range from littered roadsides to glorious meadows. At each site we conducted a point by point examination of the individual gamagrass plants as well as a survey of the other vegetation in and around the population. We can now compare key characteristics of the individuals in our common gardens to the same characteristics of their near relatives in these natural habitats.

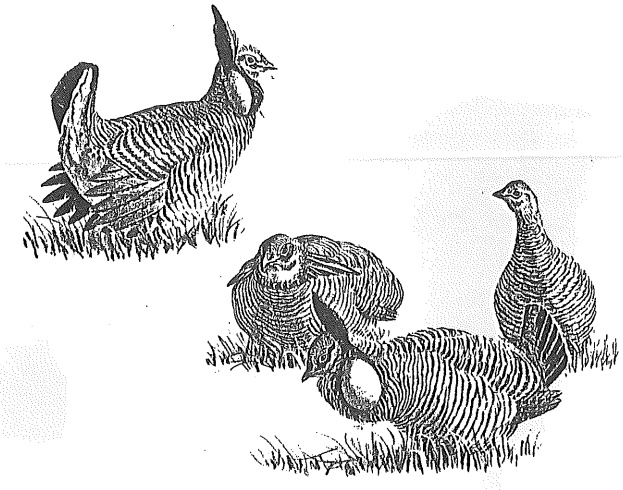
Corey, Christian, and Göran change a flat tire during an eastern gamagrass natural populations trip.

Some memorable experiences away from TLI, by contrast, are only as far as Salina. Interns James MacNeil and Alan Page attended a local conference on grazing practices. Audrey Barker and Kirsten Bergman, also interns, visited Salina elementary school classes to talk about the Sunshine Farm and its draft horses. And in June, interns continued what has become the annual tradition of hosting the "Prairie in the Park" children's activity at Salina's Smoky Hill River Festival, in which kids learn about the prairie and plant a small area of the city's Oakdale Park to prairie grasses and flowers.

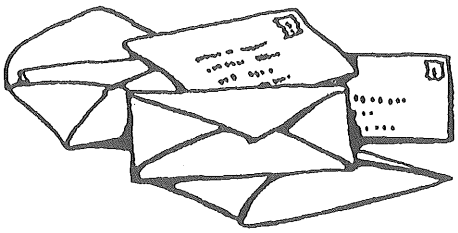
The most enjoyable weekends of the late spring and early summer, however, were indisputably our group trips to Interim Director of Education John Ellefson and his spouse Elaine Morgan's solar-powered home and organic garden in rural Nebraska. Since John made the trip most weekends anyway, and since his garden there was suffering from neglect while he lent his expertise to ours here, groups of interns made the trip on more than one occasion and eagerly helped with the work. We marveled over the hand built earth-sheltered home and John and Elaine's stories of how they acquired the recycled materials that compose it. All of the appliances are powered by solar energy stored in batteries, a real life example of how living simply can also be living in luxury. John and Elaine's place quickly became a favorite spot for intern weekend getaways.



John Ellefson and Elaine Morgan's earth-sheltered home near Columbus, Nebraska.



Letters



Ancient Quotations, New Rivers

I enjoyed [John Ellefson's] article in the Spring 1993 *Land Report* on research problems common to medicine and agriculture. Please note however that it was not Plato but Heraclitus who said we never step twice into the same river (p. 16 [of *Land Report* 46]—actually he said it differently). Indeed Plato represents the arch-essentialist viewpoint, as Ernst Mayr keeps pointing out in his *Growth of Biological Thought.*

Be that as it may, I am much in sympathy with the theme of the meeting.

Best regards,

Harry Rubin
Department of Molecular Biology
University of California
Berkeley

Editor's Note: *At times like these I turn to Bertrand Russell's* History of Western Philosophy. *Russell of course confirms that Mr. Rubin is correct; and he puts the quotation this way: "You cannot step twice into the same river; for fresh waters are ever flowing in upon you" (p. 45). It is this notion of universal flux that Heraclitus is most famous for, although, as Russell also notes, distortions of Heraclitus' ideas may result from the fact that his works are known chiefly through quotations made by Plato and Aristotle for illustration and refutation. We stand corrected.*

More on the Livestock Controversy

The Lynn Jacobs piece "Domesticated Livestock: Boon, Menace, or Inescapable Reality" [in *Land Report* 46] throws not light, nor even heat on the issues of livestock in sustainable agriculture. Rather it throws venom. The facts are apparently irrelevant to this perspective, which strives to cast the blame for modern environmental collapse on domestic animals.

The American Livestock Breeds Conservancy (formerly the American Minor Breeds Conservancy) works to conserve genetic diversity in the livestock species through the protection and promotion of endangered breeds of livestock and poultry. Conservation of these breeds allows for farmers to choose an integrated agriculture which incorporates animal services and products, including the non-chemical control of pest plants and insects, draft power, and manure.

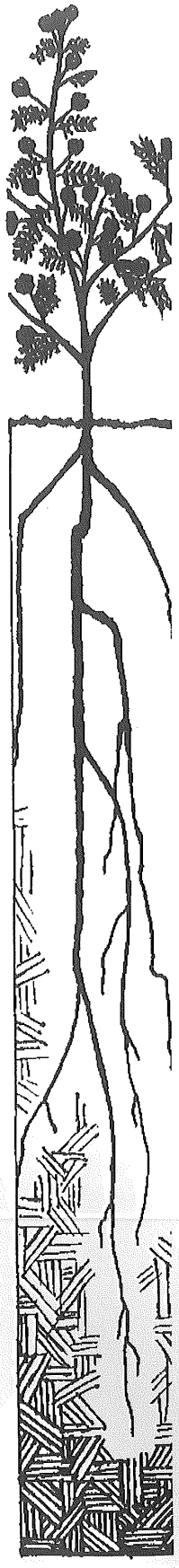
The strength of the sustainable agriculture movement lies in its diversity. By contrast, Jacobs' animal rights fundamentalism seeks to cut off all dialogue and drive a wedge into the sustainable community.

Carolyn Christman
American Livestock Breeds Conservancy
Pittsboro, North Carolina

New Roots for Agriculture

1993 Perennial Polyculture Experiment: Principles and Design

Jennifer Katcher



This spring at The Land Institute, plant breeder Peter Kulakow and I have designed and established a new perennial polyculture experiment. Three native, perennial prairie species compose the polyculture—eastern gamagrass (*Tripsacum dactyloides*), a warm-season grass; Illinois bundleflower (*Desmanthus illinoensis*), a legume; and maximillian sunflower (*Helianthus maximillianii*), a composite. A hybrid sorghum is also included—annual grain sorghum (*Sorghum bicolor*) crossed with its perennial weedy relative, johnsongrass (*Sorghum halepense*)—in order to provide a second warm-season grass species. Researchers and interns at The Land Institute have evaluated all four species in previous studies.

This project begins a new effort to do plant breeding in polyculture. From a geneticist's point of view, this means analyzing genetic influence and environmental effects at the same time. All characteristics expressed by a living organism (its phenotype) are based on a combination of the organism's DNA (its genotype) and the environment in which it lives. In popular thought, this idea is known as "nature vs. nurture"—the question of which characteristics come from one's genes and which come from one's upbringing. For plants, environments can vary in fertility, in moisture, or in the slope of the land, for example. Even field plots near one another can differ widely in these characteristics. Most genetic research, including most plant breeding, is based on the principle of trying to minimize the environmental influence of traits so that the genetic influence is more visible.

For example, this is the principle behind replicating, or repeating, experiments. Each replicate contains the same pattern of plants in its design, and several replicates are located in different field plots at the same time. By placing the same types of plants in different field plots, replications allow the researcher to better understand which differences are based on genotype, and which are environmentally caused. If a given plant does well in various environments, it is likely that its good traits are genetic and will be passed to the next generation, rather than just being dependent upon a good environment. However, replicates do not eliminate all environmental effects, and a genotype that performs well in one environment still may not perform well in another. For our research in particular, this means that genotypes selected for good performance in monoculture may not perform well in polyculture.

Previous polyculture experiments relied on plants initially bred in monoculture. Those plants that showed good agronomic traits in monoculture—such as disease resistance, high seed yield, or shatter resistance—were then advanced to polyculture plots. The largest experiment of this type was planted in 1991. These plots gave ample space to each plant (0.75 m x 0.91 m), and weeds were removed regularly by cultivation.[1] The polyculture planted this spring uses some seed obtained last year from the plots established in 1991.

The 1993 project represents our initial efforts in setting up a design to breed plants directly in polyculture. Specifically, we want to determine what size plots and which planting and cultivation techniques are best suited for breeding in perennial polyculture. The experimental design is built upon those of previous polyculture studies, especially the 1991 planting. In this year's design, however, we have altered three key characteristics which we expect to affect the results profoundly.

First, the 1993 plots were broadcast seeded, or hand-seeded at random. The 1991 study was planted in evenly-spaced rows, using seedlings. We expect the

plants in this year's plots to be patchy, which is closer to the look of native prairie.

Second, the amount of seed planted is expected to double or even triple the density of plants. It will be interesting to see how plants that performed well when given ample space in the 1991 experiment will do when experiencing more competition from nearby plants.

Third, the new plots will not be weeded. Again, this will allow evaluation of the plants under conditions that demand more vigorous competition for water and nutrients. All of the changes in experimental design are efforts to follow the structure of the prairie more closely.

The bulk of this year's work on the experiment has been establishing the parameters that will allow us to study plant breeding in polyculture. The plots are also designed to allow future examination of how grazing affects the plants. The design consists of 12 plots, with two replications, for a total of 24 plots. The 12 plots, in turn, include six different seed mixtures. Each seed mixture contains a different combination of agronomically good seed, such as a disease-resistant variety of eastern gamagrass combined with a high-yielding variety of Illinois bundleflower. Single types of sorghum and of maximillian sunflower are used in all seed mixtures. We planted each of the six seed mixtures in two different species ratios. The first ratio is made up of 30% eastern gamagrass, 30% Illinois bundleflower, 30% maxmillian sunflower, and 10% sorghum. The second ratio includes 70% eastern gamagrass and 10% of each of the other three species. This second species ratio is based on the composition of native prairies as observed by ecologist Jon Piper, in which 80% of the above ground plant mass is growth from warm-season grasses.[2]

Breeding in polyculture will allow the genetic and environmental effects to be studied at the same time. Our study, combining conventional plant breeding with the new environment of a polyculture, is unusual, and it adds a great deal of complexity to the research. Yet ultimately, genetic and environmental factors are inextricably linked in the development of each plant; any attempt to isolate them from one another is, to a degree, artificial. This linkage is an example of the principle of emergent properties—characteristics of the whole that cannot be observed by studying only pieces of the whole. Studying the plants in polyculture plots, combining genotype and environment, may allow us to predict better how the plants will perform in an agricultural system modeled after the prairie.

References

1. Piper, J. K., M. Mack, and V. Wittig. 1991. Interactions within monocultures and mixtures of three perennials. *The Land Institute Research Report* 8:35-39.
2. Soule, J. D., and J. K. Piper. 1992. *Farming in Nature's Image.* Island Press, Washington D.C., p. 178.

Sorghum hybrid and Illinois bundleflower plants compete with weeds with in the 1993 perennial polyculture plot — our first unweeded polyculture experiment.

Agricultural Productivity in a Post-Fossil Fuel Era

Marty Bender

Current U.S. agricultural productivity is dependent on extracted geologic deposits for inputs of nitrogen, phosphorus, and potassium. As these sources become scarce and low in grade, they will require more energy to extract and process and eventually become energetically and/or economically unavailable for agricultural use. I will present data from various studies to argue that agricultural productivity without these extracted nutrients will be lower than yields commonly associated with organic farms. I will then discuss the national implications of this decreased productivity and estimate how much cropland will be required to feed our nation and to grow crops for fueling on-farm traction in a post-fossil fuel era.

It has long been known for organic, mixed crop-livestock farms that feeding crops to animals and returning their manure back to cropland helps maintain soil fertility and crop yields comparable to those on conventional farms. However, as part of normal operations, almost all organic farms import one or more external nutrient sources such as starter fertilizer, animal feed, or manure. Many organic farms have been regarded as self-reliant because the amount of imported nutrients was small compared to typical inputs of commercial fertilizers on conventional farms. These amounts of imported nutrients are not small, however, relative to the nutrient flows on organic farms and thus represent appreciable off-farm subsidies to productivity. Conversely, the animal feed and manure can be important nutrient losses for the farms from which they are exported. Hence, any estimate of agricultural productivity for organic farms should include farms that provide nutrient sources as well as ones that import them.

Since it would be difficult to obtain an average value of productivity across both types of farms, I will instead discuss the productivity of individual organic farms and cropping experiments that neither export nor import nutrients, as a way of representing the overall zero balance of nutrient exchange among farms that import nutrients and those that provide them. As a simple measure of productivity, I will use average grain yields in bushels of wheat-equivalent by weight, computed across various grains in crop rotations on these farms and experiments. This indicator can be compared with the current national average grain yield of 58 bushels per acre for 230 million acres of corn, soybeans, wheat, oats, barley, rye, grain sorghum, and rice.[1]

First, consider grain-based farms without animals and without legume- or grass-based crop rotations. Lands on these farms receive nutrient inputs only from natural processes such as rainfall, dust, and weathering of soil parent material. It is well known from long-term cropping experiments and from the agriculture of many developing countries that average annual grain yields on soils depleted by continuous grain cropping are generally less than 10 bushels per acre in semi-arid regions and 10-20 bushels per acre in humid regions.[2,3] Such cropping systems have existed for many centuries in some Mediterranean and Asian areas, and thus are examples of sustainable agriculture, but at rates of production that are deemed undesirable in heavily populated areas or in the economic systems of affluent countries.

Crop yields on grain-based farms can be increased by using crop rotations that include legume or grass hays. Unfertilized rotations with harvested grain and hay but no animals have been studied in long-term cropping experiments (number of years) in Kansas (42), Missouri (100), Iowa (33), Illinois (100), Indiana (30), Ohio (40), and Pennsylvania (40).[4-11] I will not discuss the many crop rotation experiments of shorter duration because several decades are required for crop yields and soil conditions to approach equilibria indicative of the long-term yielding ability of the land.

In most of the experiments, not every grain grown in rotation was also continuously cropped. Thus, only in the Kansas (corn, wheat) and Missouri (corn, wheat, oats) experiments can average grain

yield for continuously-cropped grains be compared with average grain yield over the entire grain part of the rotation. Average annual grain yields (considering only the first 50 years in the Missouri experiment) were in the neighborhood of 13 bushels per acre for continuous grain cropping in each state and 22 bushels per acre for each of the two rotations in Kansas and three rotations in Missouri.

These yields were for old cultivars that are not as efficient in nutrient use as contemporary ones. Even though contemporary cultivars have been bred and selected in high-nutrient conditions provided by commercial fertilizers, they usually outyield old cultivars in low-nutrient conditions as well.[12] During the second 50 years of the Missouri experiment, continual introduction of improved corn hybrids and wheat varieties increased yields in unfertilized rotations, but not in continuous cropping. Average grain yields during the second 50 years were 10 and 39 bushels per acre, respectively, for continuous cropping and over the three rotations (because oats were not continuously cropped during this period, I have assumed that yields for continuous oats were the same as during the first 50 years). The hay yield was roughly one ton per acre, enough for one cutting.

The Kansas and Missouri experiments were not limed, except one crop rotation contaminated by lime blowing from passing gravel trucks.[5] The Ohio and Pennsylvania experiments showed that application of lime to unfertilized rotations increased average grain yields from 14 to 21 bushels per acre and from 21 to 24 bushels per acre, respectively.[10,11] While the less acid soils in the Kansas and Missouri experiments would not have responded as much to liming, application of lime to soils in more humid areas may be a viable practice in a post-fossil fuel era. In contrast to finite global supplies of fossil fuels, phosphorus, and potassium, limestone is a virtually unlimited source of lime. The question remains whether liming causes an increase in crop yields large enough to produce some food *and* at least as much energy as that required to manufacture and use crushed limestone.

Measurement of soil nutrient levels and topsoil depths in the Kansas and Missouri experiments demonstrated that soil fertility was not maintained by the unfertilized rotations, a result also shown in the Indiana and Illinois experiments.[5,6,8,9,13-15] I believe the main reason for these drops in soil fertility was that the harvesting of hay from the plots removed amounts of nutrients that were appreciable, given that nutrient levels were already depressed by the removal of grain crops in the rotations. The nutrients in hay could have been retained in the cropland by leaving it uncut and plowing it under as a green manure.

The proportion of green manures required in a rotation to maintain soil fertility was demonstrated by an organic grain/green manure farm in the

Farm and operations manager Stan Amick inspects a jam in the combine during oat harvest.

Palouse region of Washington.[16,17] This farm, first plowed in 1909 and maintained without fertilizers or animal manure, practiced a flexible crop rotation in which effectively half the rotation was green manures. A representative eight-year rotation contained three years of green manure and one year of fallow, which is more like a green manure than a grain crop in terms of its effect on soil nutrient levels.

Recent yields of winter wheat and spring peas (67 bushels and 2,000 pounds per acre, respectively) on this farm were similar to those on an adjacent conventional grain-based farm first plowed in 1908. The conventional farm practiced a two-year crop rotation with nitrogen and phosphorus fertilizers and a fallow every sixth year. For various chemical, physical, and biological indicators of soil quality, the soil of the organic farm was superior to that of the conventional one. In summary, annual grain yield averaged 25 bushels per acre over the eight-year rotation in the semi-arid Palouse (I averaged the grain yields over the green manure part of the rotation because no hay was harvested, in contrast to hay harvest in the above long-term experiments). Grain yields for similar rotations in humid areas should be much greater.

Although there have been claims that one cannot farm organically without livestock, the Palouse farm proves otherwise. A few rough estimates show that grain/green manure farms export only a slightly larger proportion of harvested crop nutrients than mixed crop-livestock farms. Generally, three-fourths of the crops on mixed crop-livestock farms are fed to livestock, in which one-fifth of the fed nutrients remain, or 15% of all harvested crop nutrients.[18-21] Along with the one-fourth of the crops sold, this amounts to 40% of all harvested crop nutrients being sold off the farm, which is only slightly less than the half of all crops that are generally sold off grain/green manure farms.

The next logical example would be an organic, mixed crop-livestock farm with no imported nutrients, for which I have found only one study, the 68-acre organic section of the Haughley Research Farms in England.[22,23] Although other recent studies claim that little feed and/or manure were imported onto examined farms, these imported nutrients constituted one-fourth or more of harvested nutrient totals on the farms. In other experiments, animal manure was applied to cropland as a simulation of a mixed crop-livestock farm, but the amount of manure was greater than that which could have come from the given amount of crops fed to animals, plus straw bedding.

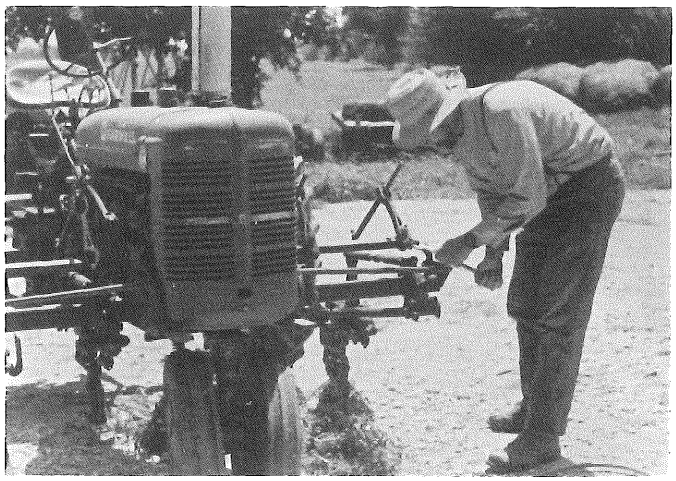
On the Haughley organic farm, livestock were incorporated into the operation a decade after initiation of the crop rotation. The only imports onto the farm were small amounts of mineral supplements for animals, and only livestock produce, mainly milk and eggs, were removed from the farm. The average grain yield of wheat, barley, and beans for the 14 years subsequent to the introduction of livestock was 37 bushels per acre. Organic milk production was greater than that on the chemically fertilized section of the research farms. However, fertilized grain yields were increasing while organic grain yields showed little change, which triggered a controversial decision in the twenty-fifth year to increase organic yields by importing animal manure.

Rotations on organic farms usually include legumes that symbiotically fix atmospheric nitrogen. Thus, the limiting nutrients may be phosphorus (P) and potassium (K). If P and K are not imported, then they are supplied by the deficit approach—reliance on release of these nutrients from soil parent materials (e.g., bedrock or glacial till) by weathering and breakdown from slowly available to readily available forms.[24] As part of the deficit approach, organic farmers raise deep-rooted crops, often as hay crops or green manures. Evidence suggests that deep-rooted crops draw up soil nutrients and accumulate them in the upper part of the soil horizon, a process similar to natural soil-building.[25] Recycling most of these nutrients through feeding livestock and returning manure to cropland reduces the deficit, but P and K budgets still remain considerably negative. While the availability of atmospheric nitrogen is unlimited as far as legumes are concerned, the supply of P and K from soil parent materials is finite and non-renewable. Thus, the long-term effect is exhaustion of P and K within a millennium or longer, depending on farming practices and amount and accessibility of parent materials.

Marty Bender (right) driving stakes with 1992 intern Darryl Short.

Nutrient deficits can be reduced or eliminated by three additional practices that contributed to maintenance of soil fertility in traditional Asian

agriculture for 4,000 years. In 1911, F.H. King, then Chief of the Division of Soil Management for the U.S. Department of Agriculture, observed these practices to be importation of organic nutrients from nearby sources, agricultural production for local use rather than export, and careful recycling of human excreta.[26] On a regional basis, the latter two practices can reduce nutrient deficits while the former can eliminate them. Imported organic nutrient sources were commonly composted by Asian farmers and included materials such as urbanites' excreta, street refuse, canal mud, wood ash, and wild plants. With such practices in Japan



Jim Huskins adjusts the cultivator shovels on the Farmall C.

and China, respectively, dryland wheat averaged 17 and 25 bushels per acre, and dryland rice averaged 18 and 22 bushels per acre.[26]

Imported nutrients are similarly responsible for the high productivity of intensive vegetable gardening. If vegetable farms were in the same situation that I have described for organic farms (some import nutrients and some provide them), then I would not expect their average productivity to be any greater than that of organic farms. This is not to belittle home gardens, which often import nutrients that would otherwise not be utilized and generally yield produce for local consumption. Home gardens may play an important role in a post-fossil fuel era.

Agricultural production for local use rather than export allows local recovery of nutrients in human excreta and food processing wastes. Energy requirements to return wastes become lower as uses are nearer to the croplands from which they came. Thus, efficient recycling of wastes will require decentralization of populations and appropriate management of human sewage. If a substantial portion of the agricultural production of a given area is exported, it is difficult to reduce the resulting nutrient deficit through alternative agricultural practices. For example, a study of a traditional Chinese agricultural community in 1952-54 showed that, in spite of recycled manure and imported organic nutrients, phosphorus removals were more than triple the inputs, mainly because the community exported 45% of its harvested crops.[27]

In a post-fossil fuel era, what will be the national implications of decreased agricultural productivity? To minimize the amount of marginal land brought into production, it will be necessary to shift our international agricultural exports to domestic use and to reduce our consumption of meat. The U.S. should not rely on balancing its foreign trade deficit by shipping nutrients overseas which could otherwise contribute to future soil fertility for food production. Our agricultural exports are used mostly for political purposes and livestock feed. The U.S. can continue to export the small amount required for humanitarian aid and for aid to help countries develop self-reliant forms of agriculture, while yet shifting most of our exports to domestic livestock and human consumption.

If we reduce our consumption of meat by half, then each person will still be eating more than a quarter pound of meat daily, which exceeds the minimum daily amount recommended by nutritionists.[1] We can eat more grains and vegetables to maintain our current per capita diet of calories and protein.

U.S. agriculture as a whole is already a mixed crop-livestock operation: about three-fourths of U.S. grain and forage production is fed to animals,[28] and one-fifth of U.S. cropland is in hay and silage, so that total U.S. crop acreage and its use resembles the mix and use of grain and forage in crop rotations on mixed crop-livestock farms.[1] Thus, the U.S. has an overall mix of crops and farm animals that is appropriate for organic agriculture. In order to maintain soil fertility at the scale of a mixed crop-livestock farm, however, there must be local and regional shifts of crops and animals from larger to smaller farms. Fewer large-scale confinement operations, for example, will promote more efficient recycling of animal manure.

To determine how much cropland will be required in a post-fossil fuel era to feed our nation and to fuel on-farm traction, the current U.S. cropland base of 360 million acres must be multiplied by five factors. The first factor is the fraction of current cropland acreage required to feed the present U.S. population, not counting exports or half our meat consumption. The four remaining factors represent proportional increases in acreage for: 2) extra grains and vegetables to offset the fewer calories and protein from reduced meat consumption; 3) compensation for decreased agricultural productivity; 4) crops to fuel biological and/or mechanical traction on farms; and 5) ratio of future U.S. population to the current one. The

values for the first four factors are 0.5, 1.04, 1.5, and 1.18.[29-32]

Based on these calculations, 330 million acres of cropland would provide food and on-farm traction for the present U.S. population. Likewise, the current U.S. cropland base would support 270 million people. A population increase of 50% to 375 million would require 495 million acres, of which 135 million acres would be additional or marginal cropland.

The last estimate demonstrates the large demand that population growth will make on our nation's agricultural resources. It is in the best interest of our immediate generations to develop social and economic structures that allow: 1) local production of food in home gardens, 2) efficient systems for local recycling of human excreta and food processing wastes, 3) decentralization of populations to facilitate the first two efforts, and 4) community support for people who postpone having children until later in life, which would go a long way in reducing population growth. I hope that my analysis has convincingly demonstrated that with these efforts, as well as others, organic agriculture can feed our nation in the next century.

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29. Foreign agricultural exports and half our meat consumption account for one-third and three-sixteenths of U.S. cropland acreage, respectively.[1,33] Although U.S. grazing land is an important resource, only a small fraction of the 3/16 portion for meat is due to grazing, compared to the contribution by feed.[33] So, our national food supply would require slightly less than 1 - (1/3 + 3/16), or roughly half of current U.S. cropland acreage.
30. To determine the proportional increase in acreage for the extra grain and vegetables required to compensate for the reduced meat consumption, the feed acreage-equivalent of an acre of food grain must be estimated. The overall conversion efficiency of grain into retail meat is 11.3% in terms of both energy and protein (computed by weighting the conversion efficiencies for various farm animals in proportion to the

percent that each contributes to our meat consumption).[1,34] Thus, an acre of food grain could feed as many humans as could the meat from 8.8 acres of feed grain. But, since roughage is converted with less efficiency than grain, I have assumed conservatively that 1 acre of food grain is equivalent to 5 acres of feed. This results in a factor of 1 + (3/16)(1/5) = 1.04.

31. Working from the experiments discussed in this paper, I have assumed an average national grain yield of 38 bushels per acre to represent the decreased agricultural productivity without commercial fertilizers. With the current national average of 58 bushels per acre, cropland acreage must be increased by a factor of 3/2 to offset the assumed productivity that will be 38/58, or two-thirds of the current average.
32. On-farm traction will be provided by biological and mechanical means. For biological traction, note that the horse and mule population in the U.S. peaked in 1920 at 25 million on 360 million acres of cropland. This workstock required 90 million acres of cropland, or a fourth of cropland acreage, but the national average grain yield was 21 bushels per acre.[35,36] Thus, in the future only a fraction, 21/38, or 48 million acres will be required. From the current 360 million acres of cropland and the factors in footnotes 29, 30, and 31, this represents 48/(280 + 48), or 15% of cropland acreage, which is the proportion of cropland that a farm must devote to biological traction. A similar percent of cropland for mechanical traction would be required for vegetable oil fuel from sunflowers or ethanol from corn grain, if we assume that on-farm traction for crop rotation requires an average of six gallons of diesel-equivalent per acre. The current national average for traction to grow corn is ten gallons per acre.[37] With crop rotations that include cereal grains and hay, however, the average fuel requirement should be less than this figure. In addition, less energy will be needed to harvest lower crop yields, such as one cutting of hay instead of three or four. The figure of 15% is based on net energy balances for these fuels, in which there are energy charges for crop production, processing, and amortized capital and energy credits for by-products from processing.[38,39] The 15% proportion gives a factor of 1/(1 - .15), or 1.18.
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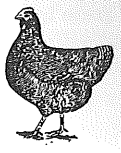


The Ekhaga Experimental Farm

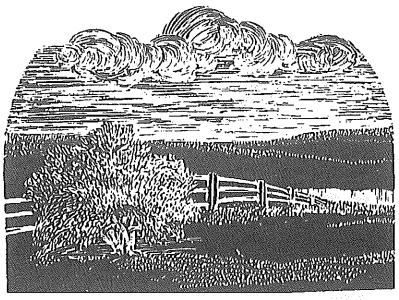
Ted Schuur

I had the unique experience this spring of travelling to Sweden for twelve weeks to work on a sustainable agriculture project operated through the Swedish Agricultural University (SLU) in Uppsala, Sweden. As described on page 4, this work opportunity was arranged as part of an exchange between former Land Institute interns and SLU students. The exchange is intended to promote international understanding and cooperation within the sustainable agriculture movement.

Describing the project I worked on requires a brief explanation of Sweden's current political and social climate. Modern industrial farming has led Swedish farmers to produce more food than is demanded by the populace, a situation common to many industrialized farming nations and, of course, one which drives down agricultural prices. Typically, the Swedish government has paid farmers a subsidy in order to keep farmers' incomes at least marginally higher than their costs of production. The budget crisis of the 1990's has caused the Swedish government to be interested in reducing or eliminating these subsidies. Outright elimination of subsidies, however, would probably have the effect of bankrupting farmers, many of whom depend on them in order to continue farming.

A second option would be to reduce the amount of food produced—and hence raise the prices of farm products—by adopting different farming techniques. In this particular situation, widespread adoption of low-input or organic techniques could make a world of difference for the overall viability of farming. While it is known that low-input agriculture would result in slightly lower yields, this fact becomes an advantage in the context of a glutted national market. Low-input agriculture could also reduce farmers' production costs, allow more farmers to remain on the land, and mitigate many of the environmental problems associated with high-input conventional agriculture. This combination of problems and potential solutions has piqued the Swedish government's interest in sustainable agriculture, and has led to the establishment of the Ekhaga Experimental Farm.

The Ekhaga Experimental Farm is designed to examine and address issues of sustainable agriculture at several levels. Ekhaga is a small farm of 25 hectares (around 62 acres) and operates according to organic farming guidelines. It is theoretically divided into two modes of production: a crop rotation including livestock such as beef cattle, pigs, and chickens; and a crop rotation without



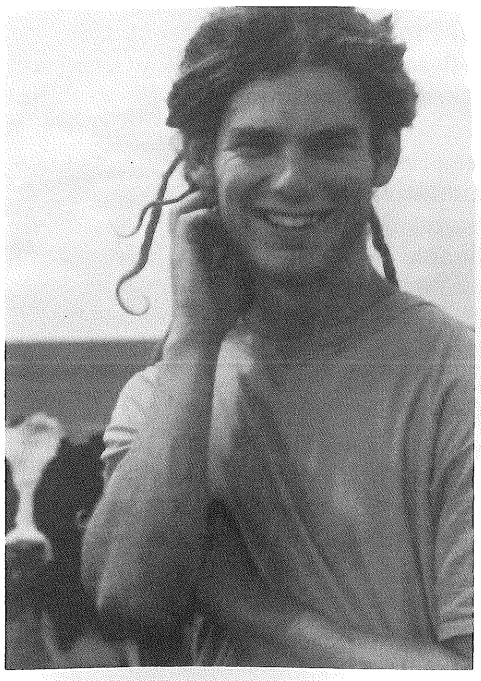
livestock in which fertility is maintained through leguminous green manures. Both are six-year rotations and include oats, barley, and winter wheat as grain crops; vegetable crops such as swedes (a rutabaga-like vegetable), potatoes, cabbage, or carrots; and leys, or pastures, made up of a mixture of grasses and legumes.

These rotations act as demonstrations for visiting farmers and as long-term experiments in biological sustainability. Data are being collected on the status of soil nutrients and organic matter content so that it will be possible to monitor the effects of these techniques over time. In addition, there is enough flexibility within the rotations to permit outside researchers to conduct shorter-term experiments into specific techniques for sustainable farming. In this way, Ekhaga operates as a research station as well as a demonstration farm. Finally, Ekhaga is intended to be accessible to the public—to provide a means through which people can become more involved in how their food is produced, as well as serve as a place where people can relax and enjoy themselves.

I was involved in this farm project in several different ways. On the one hand I helped the farm operations manager with the daily operation of the farm, including the spring planting and care of the animals. On the other hand, I assisted several of the outside researchers with the studies they were conducting at Ekhaga. I also used the nutrient data collected on the farm since its inception to create models projecting the future flows of nutrients to and from the farm. This was part of a project designed to unite villagers with their food source by providing low-cost quality organic food to people in exchange for organic wastes from their households in an attempt to reduce the net export of nutrients from the farm. The paper I put together from this study will be presented at the European Association for Farm Systems Research/Extension meetings this fall.

While there are many similarities between the contemporary agricultural situations in Sweden and the United States, throughout my stay I became aware of the subtle differences between Swedish and American farming. The most evident of these results from the different requirements that the landscapes of the two countries have placed upon farmers. The Swedish landscape is shaped from glacier-scrubbed granite that imposes a natural pattern on farming by constricting the fields with forested granite outcroppings. In the corn and wheat belts of the United States, by contrast, there are no such extensive rock outcroppings, and the wetlands that initially made land untillable have now largely been drained. The result of this difference is that the scale of Swedish farms tends to be much smaller than that of farms in the Midwest and Great Plains. Ekhaga, for example, is a small farm by U.S. standards, but is near the average size of a Swedish farm. As you can imagine, this one difference alone has reverberations affecting the form of agriculture on all levels.

Both Sweden and the United States have experienced the incredible benefits of modern farming. Now, both countries have the opportunity and the need to consider the long-term effects of conventional farming. The sustainable agriculture movements that have been born of this need are analogous and yet distinct. In Sweden, a history of Socialist politics and a greater acceptance of governmental regulation expands the government's ability to propose and implement solutions to the crises of industrial farming. It is telling, for example, that in Sweden the state agricultural university is engaged in some of the most progressive action of this kind, whereas in the United States cutting-edge research in sustainable agriculture is happening to a large extent outside of the state agricultural schools and federal research stations. Hopefully, through this small institutional exchange, the fruits of these two distinctive programs for sustainability can be shared.



Ted Schuur

Considerations For a Sustainable Society

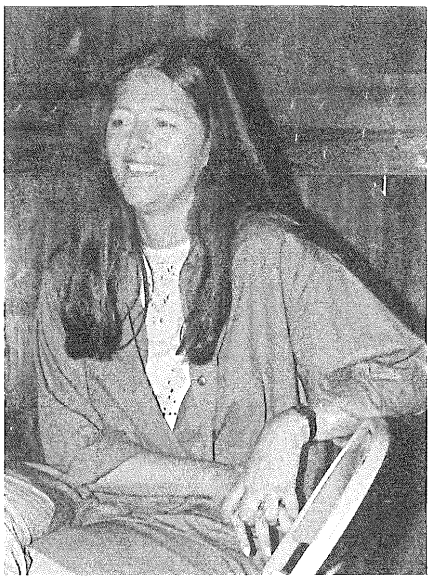
Ecologically-Based Traditional Cultures as Models

James MacNeil

Richard Lee, a renowned figure in the study of the Ju/'hoansi people (formerly known as the !Kung) of the Kalahari Desert, was among this year's Prairie Festival speakers who offered thought-provoking insight into the subject of "Becoming Native." Travelling from Namibia to make one of the keynote presentations, Lee acknowledged the "irony of jet-setting around in connection to the Ju/'hoansi." He pointed out that he had just moved from "one of the oldest, most successful and stable human adaptations—the Ju/'hoansi, to the newest and least stable one—ours," and expressed his hope that the "juxtaposition of these two would strike some intellectual sparks." Lee suggested that the Ju/'hoansi's lesson to the world is "the importance of living lightly on the land."

From the hunter-gatherers of the Kalahari, the Prairie Festival participants were led through our Paleolithic past to the transition to agriculture. The Ladakhi people of the Tibetan plateau provided this lesson, and Helena Norberg-Hodge, director of the Ladakh Project, made the presentation. Norberg-Hodge described another pre-industrial society that could serve as a "baseline for understanding our own complex culture." The Ju/'hoansi and the Ladakhi peoples provide models of what Prairie Festival coordinator John Ellefson called "sustainable ecosystems that include human beings living in sustainable relationships... that are the fabric of sustainable communities."

Born in Sweden and educated in several countries, Norberg-Hodge is a linguist by training and became the first westerner in recent times to master the Ladakhi language. For nearly twenty years she has lived, worked, and learned with the Ladakhi people of the high altitude desert in the northern Indian states of Jammu and Kashmir. In that time she has become deeply concerned about the detrimental impacts of modernization on key elements of traditional Ladakhi culture. In 1978, she founded the Ladakh Project, with the goal of providing the Ladakhi people (and since 1985, the people of Bhutan as well) with the means to make informed choices about their future. Norberg-Hodge admits that before she went to Ladakh she assumed that the direction of "progress" was inevitable. Her experience with the Ladakh Project, however, has convinced her that there is more than one path into the future. One of the principal roles of the project has been to present this path and perspective to other organizations and individuals by linking the pre-industrial cultures of Ladakh and Bhutan to the newly-emerging post-industrial movement in the more "developed" countries of the world.



Helena Norberg-Hodge at Prairie Festival

In what follows I will explore the lesson of the Ladakh Project while referring to my experiences with the Thai, Lao, and Karen peoples of Thailand. While working in rural development and forest conservation in South-East Asia between 1987 and 1992—first with the Peace Corps and then as a consultant—I often felt a reluctant acceptance of the inevitable direction of "progress." Listening to Norberg-Hodge's presentation, however, my cynicism was replaced by a sense of strength and hope. I would like to discuss my renewed confidence in the belief that any plan for appropriate rural development and the preservation of nature resides in the people and in the particularities of the places in which they live.

The recent experiences of traditional peoples exemplify the problems of the conventional development model. Inspired and propelled by western industrial forces, this model is dependent on economic growth, the enclosure of common resources, the specialization of labor, and the centralization of power. Despite its intermittent successes, conventional development has often occasioned a decline in local standards of living and has left as its legacy a series of well-documented cultural and ecological disasters. As an "anthropologist of modern industrial culture," Norberg-Hodge has observed that techno-industrial culture is spreading from the

west around the globe and is distancing people from their sense of place everywhere.

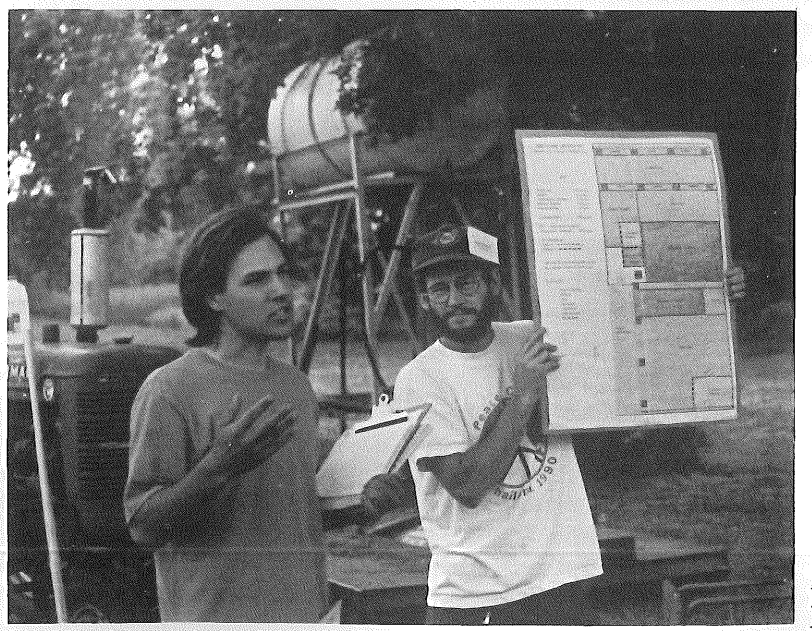
To find ways to reverse (or at least slow down) these unfortunate trends and pursue more sane and appropriate paths to development, it is imperative to look closely at what Norberg-Hodge calls "ecologically-based traditional cultures." In the preservation of these cultures may lie the key to the preservation of the environments in which they live. The preservation of cultural diversity can therefore ensure the conservation of biological diversity. The peoples of these traditional cultures offer examples of ancient ways that may hold information vital to the future of post-industrial human society. The economically and politically dominant countries, increasingly unable to grapple with their intractable environmental and social problems, should be concerned about the direction of development in places like Ladakh.

The Ladakhi's way of life has been shaped by their landscape. In Helena's words, "the land shapes the village, shapes the house and shapes the mind." Their Buddhist values of frugality, generosity, and communalism encourage efficient use of the thin soil and scarce water in the rainshadow north of the Himalayan watershed at 14,000 feet. Monasticism and polyandry have been the traditional mechanisms for keeping the population within the natural limits. Hardy crops—peas, turnips, potatoes, barley—and hardy domestic animals—sheep, goats, horses, and dzo (a yak and Asian cattle hybrid)—are the mainstays of the Ladakhi diet and livelihood.

Helena described the traditional Ladakhi way of life as something of an economic miracle in that they were able to provide for all their basic needs by working only the four summer months. Much of the rest of the year was colored by festivals, marriage ceremonies, and other cultural activities. She also described the Ladakhi's distinctive *joi de vivre*—a spirit she felt derived from their compassion and from their sense of the interdependence of all things. Untouched by Western influences and detached from the global economy, the Ladakhi experienced lives of connectedness and satisfaction, lived harmoniously integrated into their ecosystem, and had no concept of themselves as "poor" or "disadvantaged." In fact, they were not.

This all began to change when tourists discovered the region in the 1970's. Since then the central Indian government has sought to bring the Ladakhi into the national, and hence, the global economy. The purpose of this development has been to incorporate the Ladakhi into the national political and economic arena, ostensibly in order to improve their standard of living. As has been the case with other marginal populations, traditional subsistence growers, and indigenous forest dwellers, the Ladakhi have been enticed and pushed into the global economy. Goods that were once consumed and bartered locally are increasingly replaced by products that are subject to the vagaries of national and world markets.

In Ladakh and elsewhere, the negative impact of this prevailing mode of development is becoming increasingly apparent. The standard development scheme begins when a centralized agency lays out the infrastructure: roads, ports, telecommunications, etc. This infrastructure provides the medium upon which the fossil fuel-based economy may then realize itself. Genetically uniform monocultures dependent on fossil fuel inputs soon replace fields of diverse locally adapted crops; there is a sudden loss of autonomy in individual and village decision-making and resource-use; people tend to become more competitive and acquisitive.



James MacNeil holds a poster while Alan Page speaks during a farm research tour.

Working in Thailand as a community development volunteer with the U.S. Peace Corps, I witnessed the impact of such development. Many of the villages I worked in were growing rice for subsistence and cassava for export to Europe. Although cassava had been introduced by the Thai government purportedly to alleviate poverty, in many ways the situation had actually worsened. In one village, for example, while several supposedly positive indicators of development were in place—a decent gravel road, a health station, a primary school—social and economic health appeared

*Teak (*Tectona grandis*) poached from Mae Yom National Park in northern Thailand.*

alarmingly unstable. The fertility of the cassava fields was exhausted by leaching, erosion, and continuous mono-cropping, and many villagers were either working elsewhere to pay off debt incurred to purchase inputs for this export crop or were losing their land outright to creditors. The forest that had once provided the villagers with food, medicine, building materials, and environmental stability was being logged by a private company that had received a government concession. The company's trucks then hauled the raw teak logs south to the Bangkok ports for export. Meanwhile, Esso and Shell trucks were delivering imported oil to fuel the newly-created industries around the nearby city of Chiang Mai. Industry was offering the local people jobs and purchasing power, but could not provide them with the stability of a firm, locally-managed natural resource base. Deciding that the central government was in-effective in addressing the needs of this remote village, some villagers, my Thai coworkers, and I began to search for more appropriate paths to development.

During my final two years in Thailand, I helped coordinate and implement a field project of Wildlife Fund Thailand, an associate organization of the World Wildlife Fund. The project encouraged conservation of forests and wildlife in a World Heritage Site Wildlife Sanctuary called Huai Kha Khaeng, located in the western highlands of Thailand. Fifty Karen villages, situated in the buffer zone surrounding the sanctuary, were the focus of our conservation, agriculture, and reforestation projects. But education and extension work alone were inadequate to address the problems of deforestation and poaching. External forces were encouraging forest destruction and complicating conservation efforts. The intrusion of outsiders and the villages' increased contact with the market economy provided a demand for poached forest products while contributing to the erosion of traditional Karen values. Recent establishment of protected areas by the government made the traditional Karen practices of hunting and clearing trees for agriculture illegal. In fact, the Karen people had been practicing subsistence swidden farming in these forests for centuries and possessed a wealth of knowledge of the use of forest foods, medicines, and wildlife. They lived in tightly knit communities, held land in common, and respected the knowledge of their elders and the spirits of the forest. Although their language had no word for "conservation," their subsistence farming practices and modest lifestyles did not exceed the constraints of the fragile tropical forest environment.

With the Karen villagers we began to explore the notion that appropriate forest conservation required that the indigenous peoples be given a degree of autonomy in managing forest resources. In this way they could preserve their village institutions, their cultural identity, and their forest at the same time. Traditionally occupying the mountainous areas along the Thai-Burmese border, the Karen are referred to by the lowlanders as hilltribes. They have a profound relationship with the mountain forest. They are careful not to clear forests along rivers and above the village, which indicates a traditional understanding of the importance of keeping watershed forests in place. They gather at least one hundred fifty types of vegetables and medicinal herbs from the forest. They grow the well-adapted, genetically diverse strains of upland rice that everywhere in Thailand are being replaced by genetically uniform Green Revolution varieties. Surely, we thought, the preservation of the Karen's culture and knowledge would also ensure the conservation of biological diversity.

I am not advocating the absolute preservation in place of all pristine, traditional cultures wherever they may still persist. It is not essential for traditional peoples to totally shun the market or culture of the outside world. Human cultures have always experienced some change. The Karen have always traded (more recently sold) surplus fruits and bamboo shoots for goods such as salt, cooking oil, or some clothing materials. Traditional peoples should not have to deny all technology, for some sophisticated, yet appropriate, technology could fit their needs without causing social upheaval. For example, local renewable energy production for heating homes, warming water, and processing food could enhance quality of life. Introduction of technologies that recognize natural diversity and existing cultural patterns would not disrupt village life or degrade the environment. The Ladakh Project's *Ecological Steps Towards a Sustainable Future,* which includes a chapter on appropriate technology, submits that, "If the production of energy can remain as far as possible on a village level, the villages themselves will be strengthened, and the people's capacity to make a living from the land given much-needed support."[1] To bring this

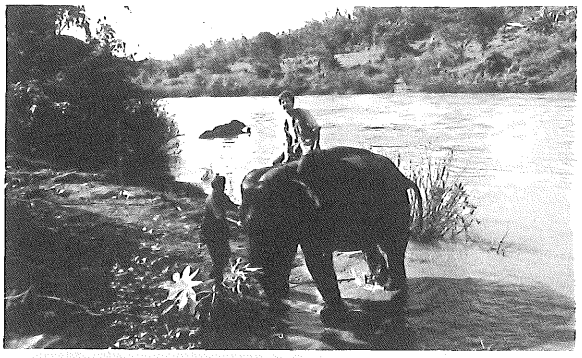
notion to fruition, there must be strategies for maintaining local self-reliance and some autonomy. This will reduce the extent to which people are dependent on the vagaries of the global economy. The most appropriate technologies, however, are contained in the knowledge the people already possess. And government school curricula and extension agents cannot ensure the transmission of this knowledge to new generations. As Bill Mollison points out in *Permaculture,* "The most inappropriate advisor is an agriculturalist trained in 'modern' techniques. What is needed is continuous, local education of experienced people and a lateral transfer of their evolved skills."[2]

Above all, it is essential that people remain psychologically and physically rooted in the land. If their institutions are strong and they receive guidance in interpreting the mystique of the dominant culture, they will be suspicious about any forces from the outside that threaten to displace them from their subsistence base. Helena Norberg-Hodge offered the following perspective at the Prairie Festival:

> These people were not necessarily noble or immensely sagacious, but what they had were incredibly wise traditions that were based on a coevolution with their natural environment. The wisdom they contained was a cultural wisdom that was based on living in place, deeply and closely connected with place. Knowledge was rooted in particularities of place.

The Karen's intricate knowledge of the forest ecosystem and the Ladakhi's ability to farm sustainably and control population growth in a relatively sparse environment—these cultural attributes will be irretrievably lost if they are displaced from the land.

The preservation of nature, of culture, and of "knowledge rooted in the particularities of place" cannot be entrusted to the agents of uni-dimensional, top-down models of development. In my experience, the preservation of a wildlife sanctuary depended on the encouragement and preservation of the endangered way of life of the traditional peoples surrounding it; this in turn required a productive subsistence agriculture and resilient village institutions. It is no wonder that our field staff and the village elders called for meetings with government officials to discuss the imminent arrival of electricity. The central government had plans to electrify every village, but the villagers had played no role in formulating this policy. Electricity brings debt to villagers for installment costs and for the purchase of appliances, including the infamous television. The television brings a consumer ethic and fosters feelings of cultural inferiority by presenting uni-dimensional images of the good life of middle-class consumers. The resulting acquisitiveness and cultural disintegration makes for increased stress on fields and damage to the forest. This demonstrates how complicated a forest conservation effort turned out to be!



James with a logging elephant and its trainer on the Mae Yom River in northern Thailand.

The preservation of the wild and the survival of human cultures is an immensely complicated affair. We can simplify our lives, but we cannot simplify our efforts to preserve life. Be it development of remote villages in the tropics, resettling the deserted countryside of North America, saving the rosy periwinkle in Madagascar, or preserving the panda in China, we must at once redouble our efforts and question our own consumptive lifestyles. We cannot save the rainforest if we abandon the people that live in and around it. Any new world order that strives to standardize world markets and political systems while effectively homogenizing the human cultural experience cannot hope to preserve biological diversity. We must keep things as complicated as they really are.

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1. 1988. The Ladakh Project, Berkeley, California, p. 47.
2. *Permaculture: A Designers' Manual.* 1988. Tagari Publications, Tyalgum, Australia, p. 250.

The Paradox of Becoming Native

Jen Tressler

Choosing necessity. Travelling thousands of miles to talk about being native. Becoming native. Enabling constraints. Such paradoxes flavored many discussions at the 1993 Prairie Festival, and William Vitek's presentation "Community and the Virtue of Necessity" was no exception. Though paradoxical concepts occasionally may weaken a position by highlighting its inconsistencies, they can also serve to provoke further thought on an issue and lead to the progressive re-evaluation of assumptions. I feel that the issue of community is key in moving towards sustainability and found this theme most directly addressed in Vitek's talk.

William Vitek, a professor of liberal studies at Clarkson University, centered his talk around the idea of necessity and how it is valuable because it holds communities together. According to Vitek, necessity is a condition that can tie one to a place and to a community. It is a constraint, he said, that may begin as a force against one's will but can eventually lead to greater freedom for the individual. To illustrate the idea, he offered the example of a child learning to play a musical instrument—the child is constrained at times to practice, limiting her freedom to do other things, but eventually experiences a freedom in musical expression that could not have been had without the initial constraint.

The constraint Vitek describes is important in a community. The degree and kind of constraint can vary and can lead to desirable outcomes such as identity and sustainability or to undesirable outcomes such as oppression and hierarchy. It must be recognized that the latter is a potential reality when an element of personal freedom is not maintained. A durable, healthy community obviously cannot occur with stifled and frustrated members.

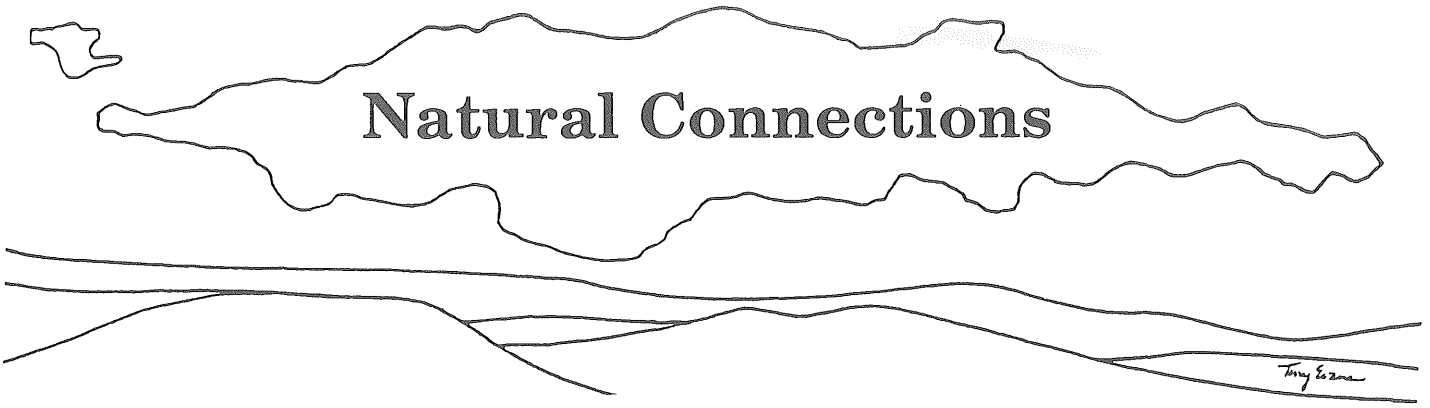
Identifying what constraints are appropriate for a community is an important matter. With the technologies that have arisen in the last century, certain physical constraints on the individual and on society have been removed. This has created the illusion that almost no limits exist, in growth and consumption in First World countries especially. Transportation, food production and preparation, shelter, clothing—it has become easy for consumers to obtain these things without dealing directly with the earthly components of which they are made. This distance has fostered an ignorance of the often destructive and wasteful processes involved in their manufacture. The growth demanded by dominating economic systems has exacerbated the situation. Making a community aware of the real limitations of the planet in relation to the consumption of that community is a starting point to realizing constraints.

Vitek proposed necessity as the restraint which allows for the flourishing of community. In the past, individuals experienced the necessity of staying in one place usually due to physical, social, or legal constraints. Communities arose from the interactions of these people in a place and the idea of being native became a reality. Many of these constraints no longer exist for most people in our present Western societies, and it is for this reason that the necessity now must be by choice. The choice is a desirable one when it is realized that natural factors favor it. The basic need of people for human interaction, the limits of the planet in providing for current levels of Western consumption, and the cultural and geographical identities with which individuals connect themselves are some of these natural factors. The conclusion is "the radical act," as Vitek quoted Terry Tempest Williams, "of staying at home."

Simplicity has become radical. It is this quiet, radical attitude, though, that I believe can counter the dominant destructive habits of Western society. Group effort in meeting the group's needs while striving for a balance with the surrounding ecosystem may be an answer to the dilemma of unsustainable living. It requires individuals to choose necessity, and it requires strong human relationships—among individuals and between individuals and the places where they live.

The ideal of this simplicity is one end of a spectrum of responses to an unsustainable culture. Grappling with the ideas of being native is also a part of the spectrum. As people consider changes in ideology, there may be a period of confusion and seeming inconsistencies. Hopefully, the paradoxes of the Prairie Festival are more than just interesting oxymorons, and will encourage community and its virtues.

Jen (with hoe) horsing around with (l to r) Jeff, Audrey, and Abigail.



A Pedologist's Ruminations on Soil: Observations on the Soils of Chase County, Kansas

Eric Karlstrom

> Then God Yahweh formed man out of the soil of the earth and blew into his nostrils the breath of life, and man became a living soul. God Yahweh took man and put him in the Garden of Eden to serve and preserve it.
>
> Genesis 2:7

> The ecological discourse about planet earth, global hunger, threats to life, urges us to look down at the soil, humbly, as philosophers. We stand on soil, not on earth. From soils we come, and to the soil we bequeath our excrements and remains. And yet soil—its cultivation and our bondage to it—is remarkably absent from those things clarified by philosophy in our western tradition.
>
> Ivan Illich, *Declaration on Soil* (1990)

The second chapter of Genesis clearly delimits humans' responsibilities as stewards of the earth. The early Hebrews understood that we come from the soil: the very name Adam derives from *adama*, a Hebrew noun of feminine gender meaning earth or soil. The fundamental connection between humans and soil is also manifest in the Latin word for man, *homo*, which derives from *humus*, the stuff of life in soil. Humus is also the root for our words *humble* and *humility*.

And yet, as philosopher Ivan Illich points out, we moderns tend to forget our physical and spiritual connections with soil. In fact, modern civilization can rightfully be accused of treating its soil like dirt. Alas, many people use the words *soil* and *dirt* interchangeably.

But there are vast differences between soil and dirt. Although both soil and dirt will support a building, a street, or a parking lot, only soil will support a prairie, a forest, an ecosystem. By providing anchorage and sustenance for plants, soil is the basis for all terrestrial life. Unlike dirt, soil is alive and teeming with life. A cubic meter of fertile pasture soil may contain trillions of bacteria and actinomycetes, billions of fungi, algae, and protozoa, millions of nematodes, and tens of thousands of mites and small worms. Soil acts as a living filter; its biochemical processes render pathogens and toxins harmless, turning them into nutrients. Soil is perhaps our most precious and vital resource.

If I can impress upon my students just one soils concept, it is that soils, in contrast to dirt, are unique products of five soil forming factors: climate, organisms, parent material, slope, and time. Differences in these five environmental factors from one region to another produce differences in soils. There are no soils on the moon because the moon does not have a climate or vegetation. There is no such thing as "cave soil" for the same reason. The stuff on the moon and in caves is just dirt. In fact, dirt, or unconsolidated sediment, is what we soil scientists, or pedologists, refer to as parent material for the soil. It is the stuff in which soil forms—over time, under the influences of climate, organisms, etc.

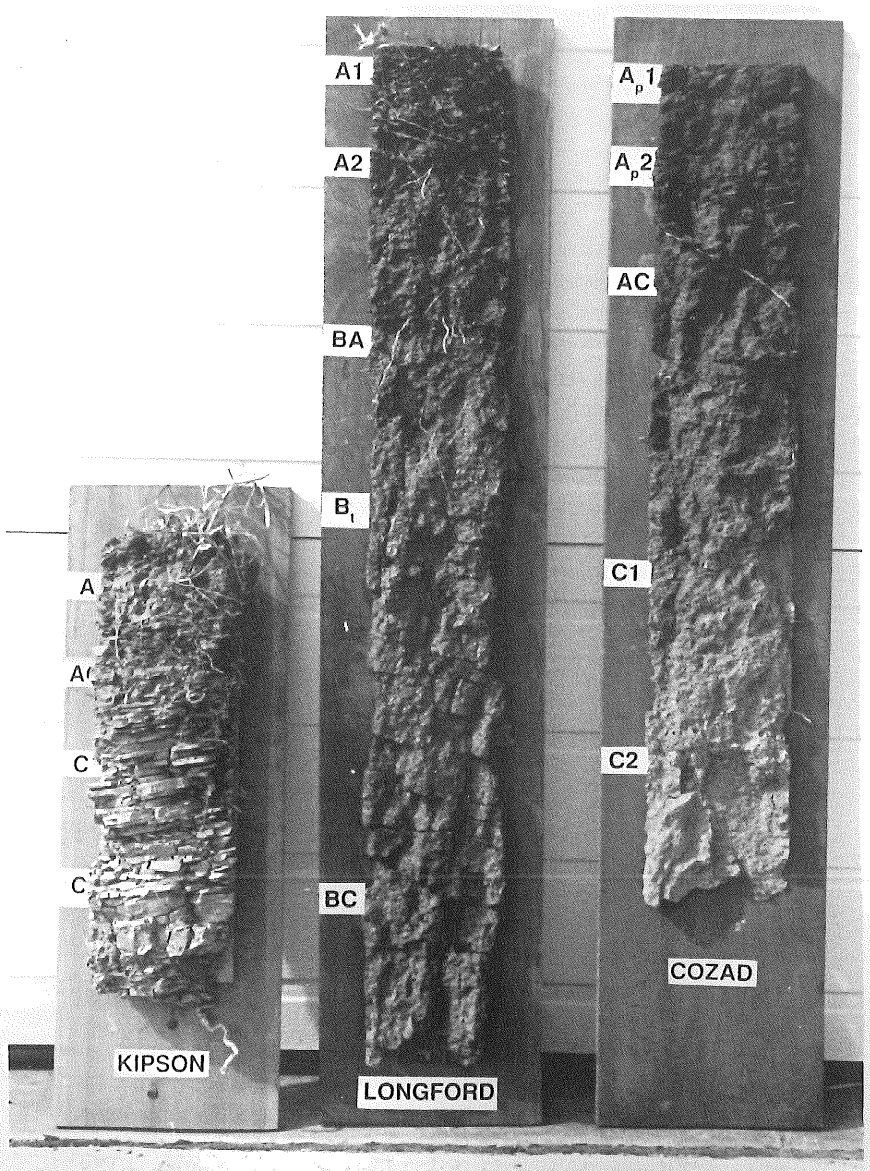
It is the time factor which makes soil for all practical purposes a non-renewable resource. Depending on local climate, a mature soil can take tens to hundreds of thousands of years to form. Natural rates of erosion, termed "geologic erosion," are generally slower than rates of new soil

Eric Karlstrom earned his Ph.D. in soils and geomorphology from the University of Calgary, Alberta, in 1981. This summer he began a one-year leave of absence from his teaching position at California State University, Stanislaus, in order to work at The Land Institute's Matfield Green Project.

formation, at least on gentle slopes. But a mature soil can be lost via human-abetted erosion in a matter of centuries or even decades. In the less than 150 years since farmers began plowing up the Midwest, for instance, Iowa has lost about nine inches, or roughly half, of its topsoil. The Worldwatch Institute estimates that about 26 billion tons of soil are being eroded worldwide each year in excess of new soil formation. At this rate, the earth stands to lose 7% of its soil in the next decade and 70% in the next century.

What is causing this rapid topsoil depletion? Poor farming practices, deforestation, and overgrazing are the main culprits. As Walter Clay Lowdermilk and Hugh H. Bennett stated in the 1938 USDA *Yearbook of Agriculture,* "Soil erosion is as old as farming. It began when the first heavy rain struck the first furrow turned by a crude implement of tillage in the hands of prehistoric man. It has been going on ever since, wherever man's culture of the earth has bared the soil to rain and wind." The Mediterranean region and Africa, in particular, show the scars of millenia of human abuse of the land. The pattern was noted in the Koran (Sura XX:9): "Do they not travel through the earth and see what was the end of those before them?... They tilled the soil and populated it in great numbers... there came to them their apostles with clear signs, which they rejected, to their own destruction. It was not Allah who wronged them, but they wronged their own selves."

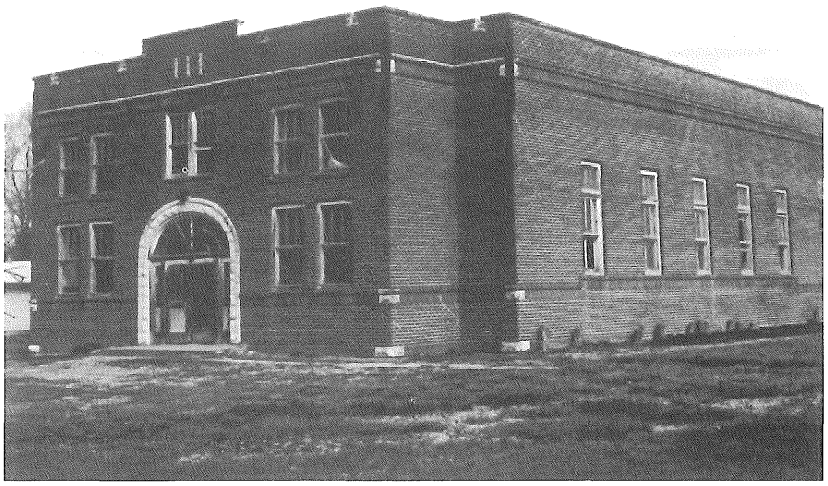
The fascinating story of soil and civilization is engagingly told in Daniel Hillel's *Out of the Earth: Civilization and the Life of the Soil.* Hillel notes, "Superficial observers of history who ignore the role of environmental factors may ascribe the defeat of an empire to moral decay, cultural enfeeblement, lead poisoning, or lack of military preparedness—when actually the main contest had already been decided by the abuse and degradation of vital resources," such as soil and water (p. 17).



These soil monoliths are representative of the soils around The Land Institute's headquarters in Saline County.

Having demonstrated, I hope, the importance of my subject, I'd like to make some preliminary observations on the soils of Chase County—which thus far, fortuitously, are still in pretty good shape. On my first visit to our small garden in Matfield Green, I noticed three telling characteristics of the soil. First, the topsoil, or A horizon, is a rich, dark grayish-brown color. This indicates an abundance of humus, or partially decomposed organic matter, and insures that the soil is fertile. Humus is colloidal. That is, it consists of sub-microscopically small, negatively-charged particles that, when saturated in a soil solution, attract and hold positively-charged cations such as calcium, potassium, sodium, and magnesium. These nutrients are essential for plant growth. Secondly, in backfill from a nearby trench I observed that the subsoil, or B horizon, is reddish-brown, quite clayey, and breaks into large subangular blocky clumps, called peds. Clay is the smallest soil particle, with a diameter of less than two microns, or two millionths of a

meter. Like humus, clay is colloidal, greatly enhances soil fertility, and is an aggregating material that produces soil structure. The reddish-brown pigment of the B horizon derives from oxidized iron and indicates that the soil has been well-aerated and formed mostly above the water table. However, on closer inspection, I noticed that the lower B horizon is made up of a mottled mixture of reddish-brown and dark gray colors. The gray colors result from the reduction of iron oxides in a water-saturated environment, indicating that the drainage of water through the soil here had been impeded, either by the clays themselves, by fluctuating water tables, or possibly by local spring activity.



The school gymnasium in Matfield Green, Kansas.

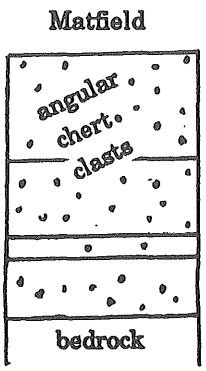
Thirdly, I noticed that the ground is riddled with small cracks (0.5 to 2 cm) which form a polygonal pattern at the surface. The cracks appear in dry weather and close after a soaking rain. This indicates the presence of expandable clays, most probably of the montmorillonite group, in the B horizon. Montmorillonite is the most expandable of the clays, due to its exceptional ability to become hydrated, or to hold water between its sub-microscopic-sized layered silicate sheets. The good news is that because of its extremely high capacity to exchange cations, montmorillonite greatly increases soil fertility. The bad news is that its shrink-and-swell properties often cause severe structural damage to foundations, buildings, and roads. A quick inspection of Matfield's sidewalks, mortar foundations, and rock walls indicates that yes, expandable clays have indeed taken their toll here. Nationwide, expandable clays cause more property damage (around two billion dollars' worth) in an average year than any other single natural hazard, including earthquakes, hurricanes, floods, or tornadoes.

Soils are "clay factories" in the sense that clay minerals are formed and altered by chemical and biochemical processes in the soil. Different soil chemical and leaching conditions produce different kinds of clay minerals. But all clays have a tremendous amount of internal surface area per unit of mass (a kilogram of clay can contain as much as two hundred acres of internal surface area). And this surface area is highly reactive chemically and biochemically. Some scientists even speculate that the earliest forms of life—bacteria—may have evolved in clays, using clay materials as forerunners of proteins, nucleic acids, or other biomaterials. This raises the interesting possibility that the second chapter of Genesis could be taken more or less literally.

But I digress. After my initial reconnoitering around Matfield Green, I obtained a free *Soil Survey of Chase County* from the local Soil Conservation Service office up the road in Cottonwood Falls. Soil surveys provide basic descriptions of soil types (called soil series), information about the formation and classification of soils, maps showing the distribution of soil series, and recommendations for use and management of soils. All of the nineteen series recognized in Chase County are classified in the Mollisol order. Mollisols have thick, organic-rich A horizons (mollic epipedons) and generally form under prairie vegetation—the annual decay of grass roots within the soil produces the high humus content. In Chase County, the SCS recognizes three suborders of Mollisols (Udolls, Ustolls, and Aquolls), depending on moisture regime, and seven great groups Argiudolls, Haplustolls, Natrustolls, Argiustolls, Paleustolls, Haplaquolls, and Hapludolls), depending on the presence or absence of other soil properties. These rather convoluted soil names, made up of admixtures of Latin, Greek, and English word fragments, are typical of the Comprehensive Classification System, which was adopted in the U.S. in 1960 and has been the standard system worldwide ever since.

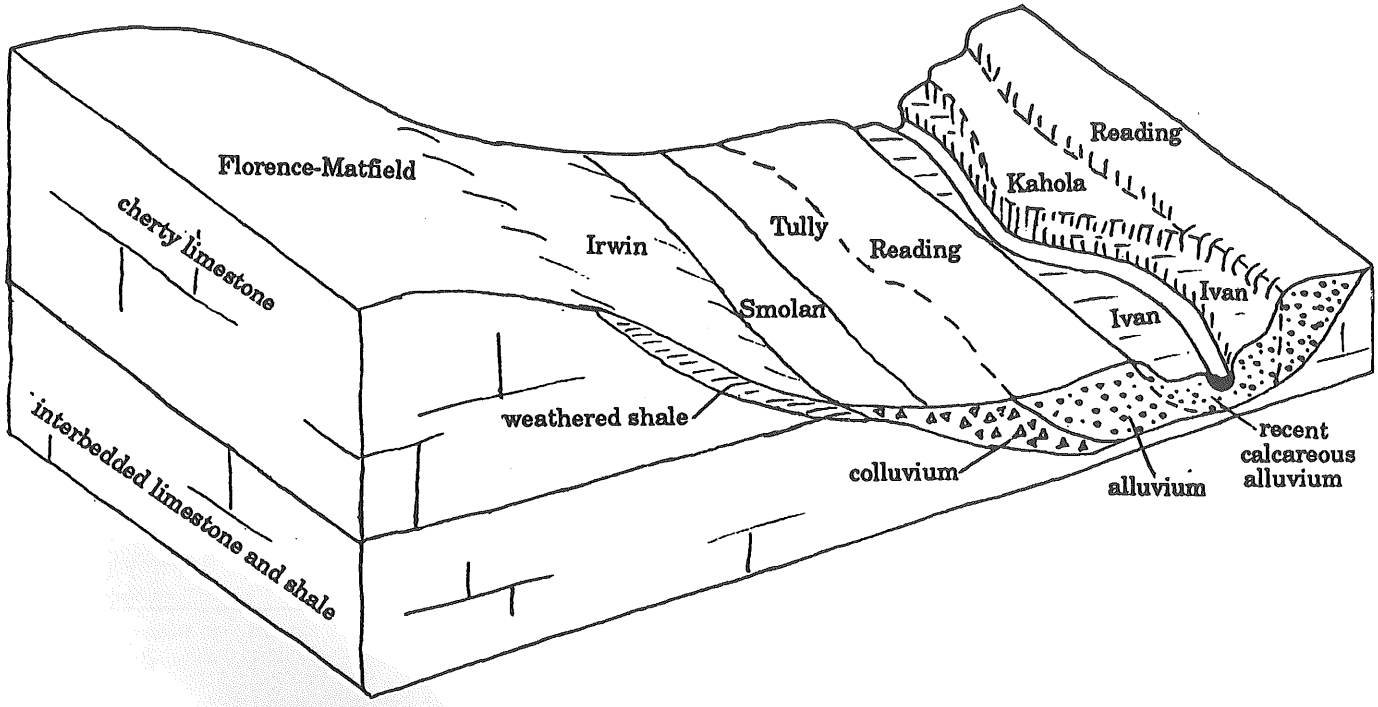
The different soil types in Chase County mostly reflect differences in soil age, position on the landscape, and parent materials (Figure 1). In general, soils developed in silty Holocene alluvium along watercourses are the youngest and least developed. For example, the Ivan and Kahola series (named for the type localities where field descriptions were taken), consist of A_p (plow layer, 7

to 9 inches thick), A (the next 8 to 10 inches), and AC (7 to 15 inches below that) horizons, over C horizons. These soils, classified as Cumulic Hapludolls, are frequently flooded and hence are subject to additions of new sediment (dirt!) at the soil surface. Soils on slightly higher and older terraces (early Holocene or possibly Pleistocene) are more strongly developed. For example, the Reading series, a Typic Arguidoll, includes a 24-inch, dark brown B_t (argillic, or clay-rich) horizon under a 17-inch, dark grayish-brown A horizon. Clay content in the B_t horizon is 30 to 35%, and shrink-swell potential here is moderate. The abandoned elementary school and gymnasium at Matfield Green are located on the Reading soil, according to the SCS map.



Based on my research in Arizona, Wyoming, and Montana, as well as on the SCS data for Chase County, I suspect that a detailed soils/geomorphological investigation here would reveal several distinct ages of Holocene and Pleistocene terraces which would correspond broadly with several distinct types of soil, based on their age differences.

A gently inclined slope immediately above the terraces connects the Flint Hills Uplands with the Holocene terraces in the bottomlands. The parent material on these fan-terrace or pediment surfaces is probably a mix of Pleistocene alluvium and similarly-aged colluvium, or material derived from mass wasting and sheet wash from adjacent higher



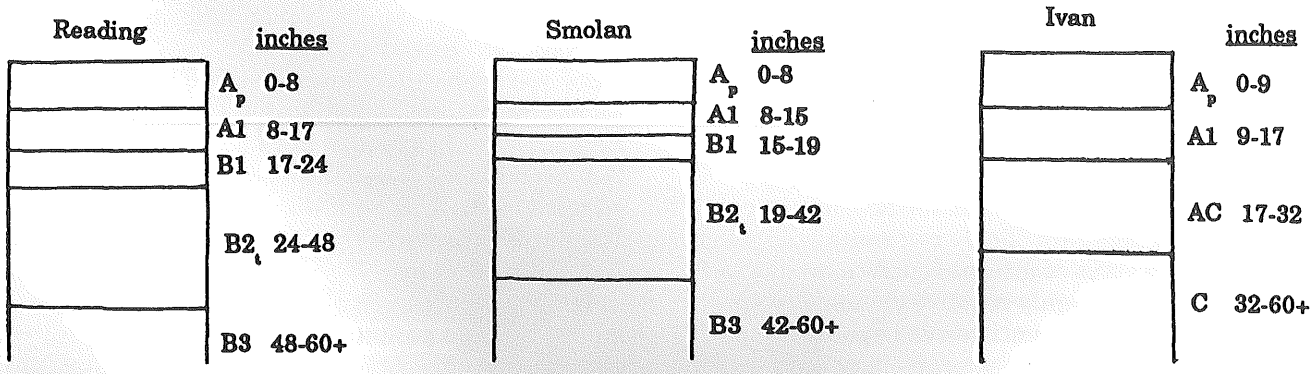


Figure 1: Association of characteristic soil series with landforms and representative soil horizon sequences (after* Soil Survey of Chase County, Kansas, *USDA Soil Conservation Service in cooperation with Kansas Agricultural Experiment Station, 1974)

slopes. The soils on these intermediate-level surfaces are much better developed than those in the Holocene alluvium. Our garden soil in Matfield Green is an example. Although the SCS has mapped soils in Matfield Green as belonging to the Tully and Reading series, neither of these series has the reddish-brown colored argillic (B_t) horizon I observed in our garden. This demonstrates why soil mapping units can only be considered broad approximations of what's actually on the land. The soil in Matfield looks more like the SCS's Labette or Smolan series, typically located on upland surfaces, which both have moderate to high shrink-swell potential.

The Flint Hills Uplands are a series of erosion surfaces cut across interbedded Permian limestone and shale. Cursory inspection suggests several surface levels, probably resulting from several episodes of erosion during the Pliocene and Pleistocene, or within the last five million years. The soils on the upland surfaces are paleosols, or old soils formed on landscapes of the past under climates different from today's. These soils are mainly residual soils comprised of the leftover products of the weathering of limestone in place. They are not arable because as much as 50 to 85% of the total volume consists of chert fragments, the rock portion of the limestone most resistant to chemical dissolution. Like the *terra rosa* soils of the Mediterranean, many of which were also developed in limestone residuum, they are marked by a reddish, clay-rich argillic (B_t horizon). Matfield, Labette, and Florence are some of the soil series in the Uplands.

The Matfield series, an Abruptic Pachic Paleustoll, is possibly the oldest soil in Chase County: it may have been forming for the past two million years. This soil includes a 46-inch, brown to dark grayish-brown, very cherty silt loam A horizon and a 20-inch thick B_t horizon of dark red, coarse cherty clay, with 73% clay in the fine fraction. The A and B horizons rest directly on bedrock, indicating that the soil is mostly the product of in situ weathering, although texture of the A horizons suggest that windblown silt, or loess, was also incorporated into the upper horizons over time.

To conclude, I'd like to emphasize two important concepts. Landscapes like the Flint Hills are products of many different successive environments. Over time, erosion has prevailed over deposition, removing much of the geologic record. Thus, geomorphologists refer to landscapes as *palimpsests,* a word applied to ancient parchments which have been written on, erased, and reused many times. Likewise, soils are produced by a host of complex, changing environmental factors. Pedologists sometimes refer to them as *synthographs* because they provide a record or synthesis of past environmental influences. It is the particular pleasure and challenge of paleopedologists to try to reconstruct the nature of previous environments by analyzing climate-, time-, or vegetation-dependent properties of paleosols. But even for non-pedologists, it is sufficient but essential to understand that soils are the matrix and sustainer of all terrestrial life and virtually all human enterprise.

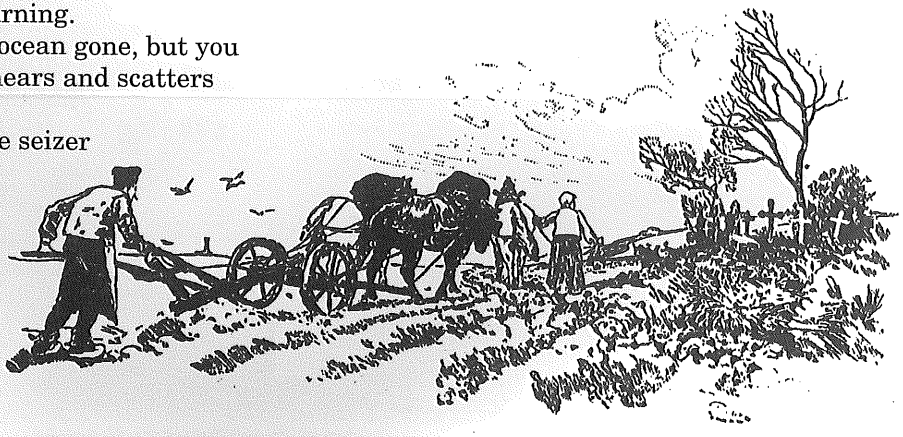
Carhenge, in northwestern Nebraska

Philip Kimball

breaking the plains

it's not the tractor in the fog,
the faint percussion in the middle ear, muted and dispersed,
popping Johnny's progeny, john deere's plowbeam, soil-polished plowshare,
twelve bottom moldboard suited to the plains.
soothing reassurance, stitching air and land, an earthy first fragrance
permeates, loess and loam, gasoline, oiled gunny, sweat and rain.
it's not the moiled light that intervenes, gleams and saturates
the steel, paint and plastic, the wet windshield glass of toyota, audi,
volvo, suburu, chevy and ford parked along the right of way,
the barbed wire fence row of the old oregon trail, where the heavy wagon box
clatters and twists, the loaded axletree and iron-wrapped wheel,
canvas canopies slap, strain and stutter, travel,
jangled chain over ruts, cattle, an ox, a spotted hog in tow.
it's not the gravel road that cuts north along the edge across the draw,
the dormant switch grass and wild rye that grow in the ditch, crinoidal
limestone shards, mollusk matrices, the sunflower stalks
that will ravel, rattle and blow, the indifferent bois d'arc hedge
spreading tangled offspring into the field.
it's not phlox, sand dropseed, prairie gourd, goldenrod,
mead's milkweed, the fringed orchid, purple clover, queen anne's lace,
squirreltail, needle-leaf sedge, pussy toe, redtop and daisy fleabane.
it's not the distant talkers, the nikon shutter, discussion,
testimony, witness and the awe. it's not john brown, jim lane, quantrill,
speculators, sod busters, border ruffians, jayhawkers,
molasses lappers, exodusters, clod hoppers, not
buffalo, fox, antelope, puma, prairie dog,
mastodon, teleoceras and sabertooth cat.
it's not the kaw.

it's the phantom self-consciously stripping bluestem spikelets to carry home,
the spectre in the mirror, the pucker and fold
around the wary green eyes, the well-fed flesh year round, kumquat,
cantaloupe, kohlrabi, artichoke, brown rice, tofu, lox,
pork chop, bacon, leeks, kale and beans.
the face, the curls, the nod, the wistful grin, the deprecatory frown,
protruding ears, the yellow teeth, dull skin growing taut
about the pale forehead, the cheeks and jaw, the chin, the closed skullbones
underneath. frail, transitory. exposed furrow ribs. orogeny,
alluvial deposits, eroded and washed,
uplift, thrust and fall, settle and fill.
it's you, caught up in this inexorable turning.
not the landscape will not survive, the ocean gone, but you
evolving to the dust that swirls from shears and scatters
in obscure morning mist.
you drifter in the prairie flux, desperate seizer
of an imaginal razor now.
let loose. you turn the sod.
it's you who drive the plow.



Philip Wedge

Van Gogh's "Crows Over a Cornfield"

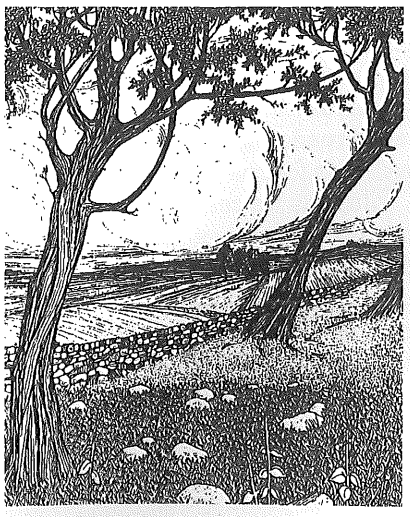
(Nelson Art Gallery, 1963)

Not the polished, medieval armor,
gape-mouthed, empty in the entrance foyer,
nor the moon rising in the chinese tapestry
over wooden bridge by high mountain,
but the skeleton crows held in mid-flap
above the cowering wheatfield;
the scraped-on yellow whistling from the canvas
just as at home it would in a world already
over-familiar to my eyes till seen suspended
thus, as if it awaited my stopped-breath
seven-year-old wonder to bring
it back to life... crows criss-crossing
still, wheat ready for harvest and barely
time enough to get it in to dry.

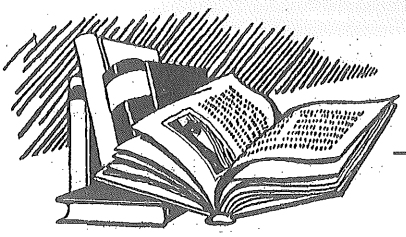
Judith Roitman

The death of the Elkins prairie

To perceive twelve thousand year old prairie, this community of roots like trees
existing and not existing, transmuting, intertwined with humus
until there is no distinction, like fingers, like hands grasping
and now pulled apart, not like bread, like bodies
tied to horses, the high cry beyond hearing,
the searing presence of air. I think of Armenians in black dresses,
their native villages, how the Turks drove them over the earth like rain.
Or Jews in Prague, the thousand year old synagogue, the thick walls,
its level eye slits, the women crowded behind them,
how they went up the chimneys like smoke,
like the coal ash that falls everywhere in eastern Europe's winter
giving asthma to the children. In my dreams redwoods
talk to each other forever, as I walk slowly with John's father
who can not look up from the arthritis.
I dream of the moon rising and my mother lost
among the great sand dunes of the Brooklyn shore.
Gulls wheel overhead screaming for garbage.
In the grass like tangled hair—the wildness!—
a man, it could be anyone, pores through bluestem,
(the movement of ants through childhood)
he moves forward on his knees, the car has long left him,
his face, his probing fingers, we must be careful
not to leave a mark, as if the planet
balances exactly on this point, the tip of yellow sorrel.



These three poems appeared recently in *Phoenix Papers: 26 Lawrence Poets* (Stephen Addiss and Stanley Lombardo, eds., Lawrence, Kansas: Penthe Publishing Company, 1993). Philip Wedge's poem was previously published in *Kansas Quarterly*. Reprinted by permission.

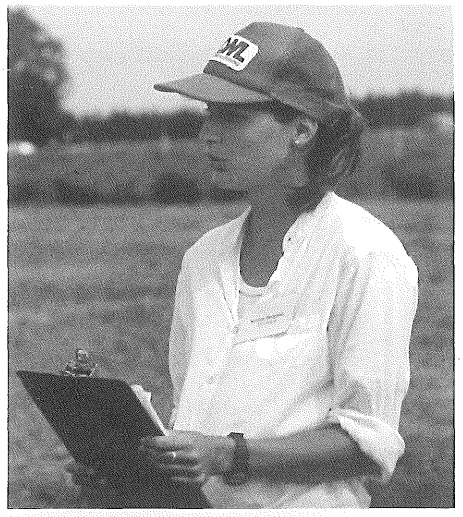


Books

Wild Seasons: Gathering and Cooking Wild Plants of the Great Plains

By **Kay Young**
Illustrated by Mark E. Marcuson. Lincoln: University of Nebraska Press, 1993. xxi + 318 pp. Appendixes, additional sources, list of contributors, indexes. Cloth $40.00, paper $15.00.

Reviewed by
Kirsten Bergman and Abigail Breuer



Kirsten Bergman

Wild Seasons calls back a tradition of collecting and preparing food from wild plants to a culture that has mostly forgotten this immediate connection between ourselves and the providing environment around us. Kay Young reminds us that dandelions, for example—today regarded as weeds, to be eradicated by herbicides or at best ignored—were once a common food source, rich in important vitamins and surprisingly versatile. We are treated to stories and recipes that demonstrate the clever resourcefulness of our relatives of only a few generations ago—people who desired more than just the staple foods of the farm or market, and found in wild plants flavors and aesthetic pleasures unavailable today in the finest of gourmet grocery stores. While *Wild Seasons* does not teach us how to subsist solely from wild plants, it should satisfy those with a beginning interest in the art and tradition of using wild plants in cooking and show all readers how to find some uncommon ingredients for common dishes.

"Just as we can never go back to subsisting wholly on wild things, neither can we wholly exclude wild things from our lives," writes Young (p. xii). Ask a child where food comes from—often she'll say "the grocery store." This is too often the perspective of kids and adults alike, as the food industry has become the main provider of nourishment in our lives, as vitamin tablets have become a replacement for a healthy, balanced diet, and as we have forgotten the real source of our food—the earth. Learning about and eating wild plants, those considered to be weeds or those you simply never thought edible, is an exciting and empowering experience. Not excluding wild things from our lives means realizing our dependence on wild things, as the wild is the ultimate provider of life for all creatures.

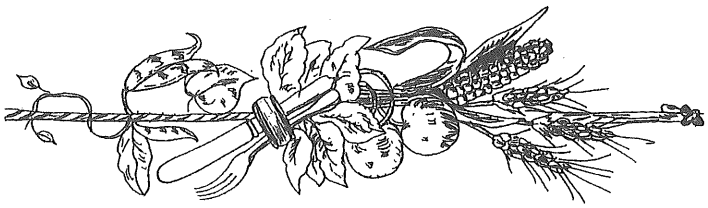
Young is trained in both botany and folklore, so that her stories or histories of the plants emerge naturally from her instructions on gathering and cooking. Her tales make the book thoughtful reading even for those not interested in preparing food. An experienced gatherer and cook of wild plants herself, Young fills the book with helpful, thorough tips on plant identification, collection, and preparation. A glossary of botanical and culinary terminology, moreover, makes the book completely accessible, so that even the novice can carry through one of her recipes with success. Many of the plants in the book, while common to the Great Plains area, can be found in other regions of the United States as well, and the book notes their geographical ranges as well as local habitats. Finally, as is appropriate in a book on the eating of wild plants, Young strongly cautions the reader to identify the plants properly, and make certain that their source is safe.

Young collected recipes all over the country, and they range from old-time regional staples to elegant hors d'oeuvres. Her recipe for poke sallet (pokeweed shoots boiled and then fried with bacon or pork) hails from Harlan County, Kentucky, home of the annual Poke Sallet Festival. Lambs-quarters, one of the most commonly-collected wild plants all across the country in areas both rural and urban, is usually cooked up as greens, and according to one of Young's sources was harvested and canned in huge quantities in Kansas City during the Depression.

On the other hand, cattail pollen pound cake, milkweed pod pickles, cream of rose hip soup, and wild violet jelly are among some of the more unusual creations that can be made from Great Plains wild plants with the help of *Wild Seasons*. These recipes tend to rely on a majority of store-bought supplies, but prove that integrating wild plants into otherwise-familiar dishes can be tasty, beautiful, and fulfilling.

Young speaks of the importance of experiencing the natural cycles around us in our lives. She believes that by paying attention to wild things—the seasons and uses of wild plants, for example—we can be "connected to something stable, a scheme or system that continues to work as it should" (p. xiii). If some element of our lives is otherwise unstable, our connection to the natural world can serve as a constant.

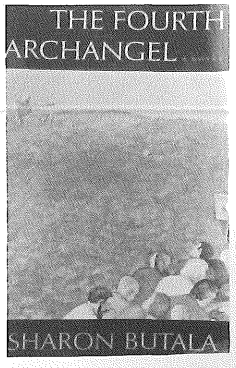
Wild Seasons, as Young spells out, "is not a survival book" (p. xiii). Neither is it a compendium of ethnobotanical information, including Native American usage, like Kelly Kindscher's *Edible Wild Plants of the Prairie*. It does, however, provide ways for us to incorporate wild plants into our daily lives through cooking and eating. With its suggestions, we can reduce our dependence on the domestication of nature and once again live in closer harmony with wild plants. In regaining knowledge of edible wild plants, we will be reminded of how important it is that our daily lives do not impose on the habitats of wild plants and animals, and that we relearn ways of living lightly and responsibly on the earth.



The Fourth Archangel

By **Sharon Butala**
Toronto, Ontario: HarperPerennial/HarperCollins, 1992. 295 pp. Paper $14.95.

Reviewed by *Audrey Barker*



Picture a small rural town in the midst of a dry grassland. The land gives life to the community, but the myth of limitless growth has pushed the land beyond its capacity, and it is waning. This is the setting for award-winning Canadian writer Sharon Butala's fifth novel, *The Fourth Archangel*. The story revolves around the lives of the residents of Ordeal, Saskatchewan—lives bound to one another and to the fading town. In a provocative book full of dreams, struggle, and apocalyptic visions, Butala explores the meaning of contemporary rural life.

As a featured presenter at Prairie Festival this spring, Sharon Butala spoke of how she came to call the shortgrass prairie home. She was born in rural Canada, but grew up and lived part of her adult life in the city. Her marriage to rancher Peter Butala brought her to live in the prairie again. She knew it would not be easy, coming from the city and the people she knew to live in a spare, harsh-seasoned land of drought, intense heat, and blizzards. With the nearest neighbor four miles away, it would be lonely. However, not only has she stayed for seventeen years, she has become an eloquent voice for rural life. Her talk piqued my interest about her writings, so I picked up this recent novel, set in the land she calls home.

Ordeal is dying as the farms surrounding it fail. The remaining residents realize this, as does the central government, which is preparing to shut down the town's post office and school. The community's responses to Ordeal's troubles range from political action to nightmares and religious fundamentalism, the many characters' stories intertwining in a confusing array of subplots. Amy Sparrow is a central character: a lifelong resident of Ordeal, a sculptor inspired by the place in which she lives, and an organizer of rallies meant to appeal to the government for help in saving the town. Val and Jessie Sheridan, a young farming couple, become involved with the rallies because they are in danger of losing their farm to creditors and hope the government can offer them some relief. Alma Sheridan, Val's aunt, is possessed by visions of the town's destruction and is convinced that God has spoken to her. Zena Lavender and Rita Zacharias, two of the town's many widows, form a sort of secret society that holds the town together. Finally, there is the Church of the Millennium, a small but highly visible religious group led by the fanatical preacher Uriel Raven (named for the fourth archangel of the Bible, who brought visions to seers). All the characters are deeply tied to the land and personally affected by the failing of the town.

Butala's support for rural communities is evident in *The Fourth Archangel*. In her Prairie Festival talk, she explained her purpose in her recent work: "It has become my mandate... to talk about the tragedy that's going on in rural North America where people are losing... a way of life, whether they did the right thing or didn't do the right thing..." The older residents of Ordeal remember when the prairie was beautiful and alive rather than overused; when the air was clear and vibrant instead of full of dust. Val Sheridan, born adjacent to the land he and Jessie farm, is now burdened by debts for land, new equipment, a new house. It seems unlikely that he and Jessie will be

able to continue farming or remain on the land. Butala writes of their situation with great sympathy—one of the most painful scenes of the book is when the bank comes to seize their equipment and cattle—but she also makes clear their folly in borrowing too much, as well as the general destructiveness of conventional farming. Val and Jessie know that how they work the land destroys its fertility and eventually their way of life, yet they also want to have modern equipment and other products of industrial culture.

The fundamental difference between urban and rural life, stressed by Butala both in the book and in her talk here, is that rural living is a life lived in nature. The beauty of the prairie and the small community of Ordeal permeates the book, giving ample reason for why rural life should be defended. The people of Ordeal have a complex view of the land. Every character, whatever his or her perspective on land use, receives sustenance and meaning in life from the land. One of Butala's characters wonders how people in cities could possibly have this: "What do they know of the tang of wildness in the air, the steady heartbeat beneath the warm earth, the fierce joy of winter? And if they did, how then would they survive from house to car to factory or office building and back again?" (p. 11). Without rural communities, Butala implies, responsible land use would be even more difficult, because it is rural people who remain in touch with the fundamental fact that in nature is the source of our lives.

Butala avoids idealizing rural life; she does not overlook the problems of small towns. Amy feels compelled to hide a romantic relationship from the town's eyes, though there is no reason for scandal. Jessie is hounded by Val's rural relatives because she is from the city. Fundamentally, however, these people feel bound together by the memories and unrecorded events and relationships carried through their lives. The community that exists in Ordeal fosters a sense of place so strong that Rita Zacharias and Zena Lavender handcuff themselves to the post office that is to be shut down. Amy explains, "Our lives are continuously impinging on each other's lives. We aren't a bunch of separate people... we're a community" (p. 132). The value and soul of rural life is the connections among people, and between people and the land.

Much of the action of the book revolves around the protest rallies held to convince the unsympathetic government to keep basic services in the town and to help farmers through the long drought. An early scene portrays a rally whose attendees unsuccessfully attempt to capture the attention of the Saskatchewan Premier. It is obvious from the start that they are shouting to deaf ears—the government will not, perhaps cannot, save them. At the end of the novel the Premier does attend a public protest, but the meeting is

Audrey Barker (far left) speaking to a group at Prairie Festival.

interrupted first by the outbursts of the town schoolteacher, who is haunted by visions of the town turned to a wasteland, and then by a tornado tearing through town. These events overwhelm the residents' anger, drown out their appeals to the central government, and render the protest futile.

In fact, *The Fourth Archangel* is full of visions, religious fanatics, and signs of the apocalypse. Alma Sheridan is terrorized nightly by visions of the town obliterated, of herself standing alone in a desert wasteland, surrounded by a deafening sandstorm. Old farmers like Sandy McDonnel are visited by phantom ranchers with herds of cattle larger than anyone has anymore. Members of the Church of the Millennium erect a gargantuan cross on a hill above the town and hold daily prayer meetings there. These mystical events form an integral part of the book, meshing with the ordinary aspects of the story. In her Prairie Festival talk, Butala discussed her interest in dreams and visions, describing how her own dreams became a reliable source of knowledge about future events as she became more closely bound to her landscape. Through living in nature, Butala has become personally aware of other ways of knowing and sensing that seem as truthful as "ordinary" knowing. Somewhere straddling these two modes lies what Amy Sparrow calls the true landscape of the town, the "spiritual landscape" of ties among people and their unspoken thoughts about mortality. Thus, the connection between apocalyptic visions and the dying of a rural town becomes clear: this is a monumental destruction, not just of a town, but of ties between people and their source, the land.

Butala presents the death of rural life as caused by a powerfully destructive force set in unstoppable motion. I found this treatment of the "farm crisis" somewhat unoriginal; however, Butala's representation of the sorrow of the people leaving the dying town to face rootless lives elsewhere is strongly compelling. Amy Sparrow, Ordeal's artist, put it this way: "People who have never lived anywhere else in their lives, or their parents before them, are going to have to leave here, go someplace else, be like immigrants in their own country for the rest of their lives" (p. 51).

The Fourth Archangel shares certain themes with its more familiar contemporary, *A Thousand Acres*, by Jane Smiley. Both books center on rural life and depict how the human urge to control nature destroys the land and those who live there. Smiley's work, however is more of an indictment of human nature, while *The Fourth Archangel* portrays the rural residents as hapless victims of a destruction that has gone beyond human power, though it originated in the fallacious idea of human control of nature. It is a bleak story. Convinced as I am that there are creative alternatives to industrial agriculture, I finished Butala's book somewhat critical of this portrayal. However, without fundamental changes in land use and a shifting away from industrial models, Butala's vision may be frighteningly close to the truth. In any event, Sharon Butala's is a strong rural voice: *The Fourth Archangel* is a dramatic portrayal of life and death on the prairie.

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_____	SA10 Aging and Caregiving: Comparing Ju/'hoansi and North American Patterns	Dr. Harriet Rosenberg
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_____	SU3 Standing at Ease in Nature	Sharon Butala
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Left: (in the tree, l to r) Jeff Shields, Jen Tressler, Audrey Barker, Christian Petrovich, (standing) Alan Page, Corey Samuels, Abigail Breuer, Jennifer Katcher, James MacNeil, and (kneeling) Kirsten Bergman pause for a group photo during a day trip to Kansas State University.

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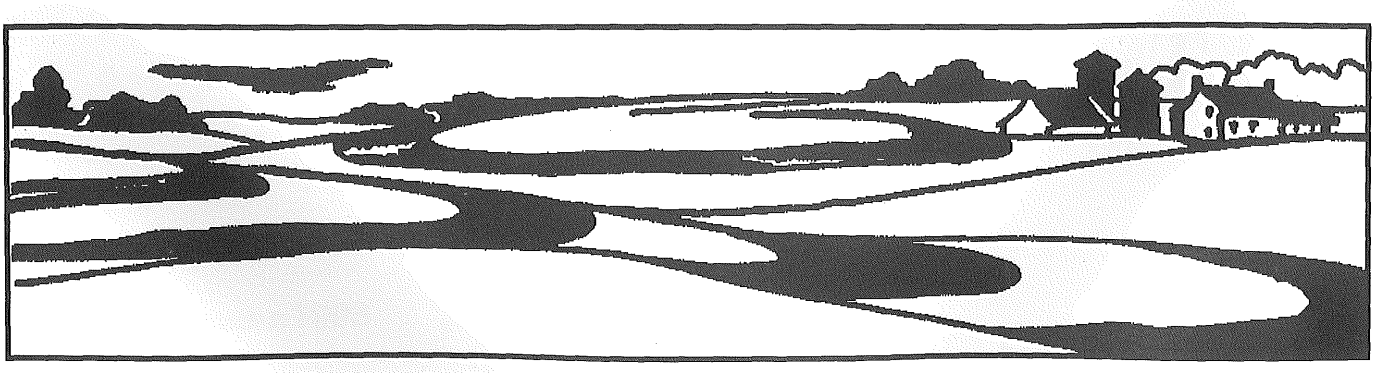

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