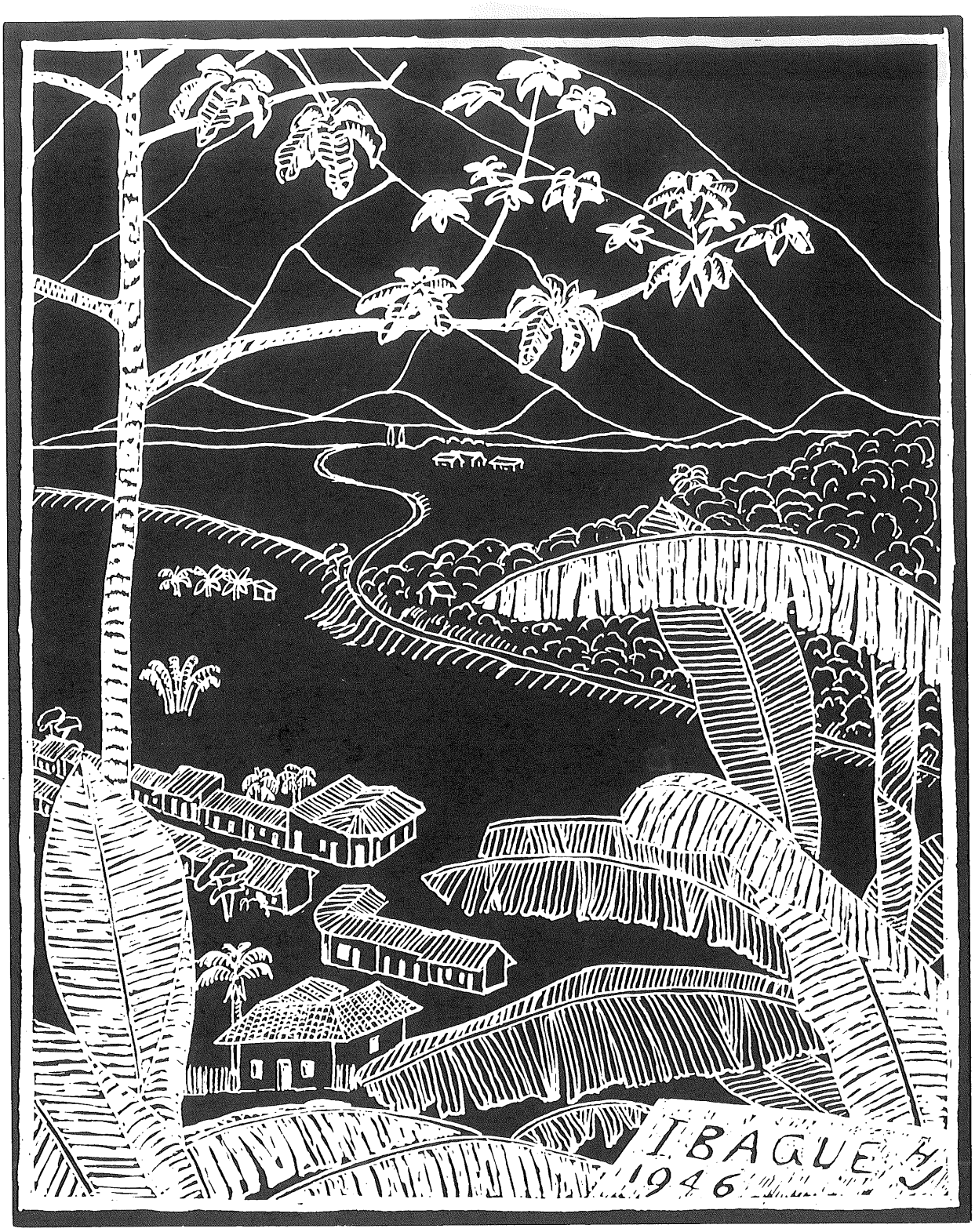

THE LAND REPORT

Spring 1992

Number 43

Contents

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Photographs for this issue by Bruce Colman, Laura Sayre, Jake Vail, and Sara Wilson.
Photo on p. 20 by Jon Blumb.
Illustrations by Jake Vail, except on pp. 17 & 19, by William Whitney.
Photos and illustrations pp. 10-15 courtesy of Mrs. Jean Jenny.

On the Cover

Hans Jenny was the world's leading soil scientist, as well as an ecologist, conservationist, philosopher, and artist. Here, a South American landscape by Dr. Jenny, courtesy Jean Jenny.

In This Issue

In the past few months, cancer took two good friends of the land to the soil that they loved so much. In January, soil scientist Hans Jenny died at 92. In March, Kansas lost one of its finest farmers, John Vogelsberg. Both were great supporters of The Land Institute, and in this issue of *The Land Report* we pay our continuing respects.

The Land Institute's research in agriculture that uses the prairie as a model has been outlined by ecologists Judy Soule and Jon Piper in their new book, *Farming in Nature's Image*. Exploring the many social aspects of farming in nature's image is part of the mission of *The Land Report*. Doug Romig's article on farmers and environmentalists in the previous issue, for example, attracted a lot of attention. Cows, and ranchers, it seems, are big news. The discussion of livestock, sustainable agriculture, communities, and the environment expands herein with several articles.

Thanks to the many voices from many places who contributed to this issue. *--JV*

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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

1992 Session is Under Way

Each February the wintertime workpace at The Land Institute quickens as a new crop of interns arrives. The interns are rapidly immersed in researching agriculture that looks to the native prairie ecosystem as a model and discussing issues that might ease the transition to a more sustainable society. The tenor of the whole place changes.

Spring arrived in Salina before the eight interns this year. By mid-February lazy V's of geese flew overhead and bluebirds investigated the boxes we set out as potential homes. Last fall, historian Donald Worster lectured at Salina's Smoky Hill Museum on the lessons of the Dust Bowl, lessons especially poignant in Kansas in these times of global warming. The arrival of spring a month early, while nice in many respects, thus came on a wind that we couldn't ignore.

The prairie parsley was flowering, the bees were active, and the interns were in shorts and T-shirts at the start of March, eating lunch outdoors and playing volleyball. Spring mornings are spent inside, however, in "warm-up" discussions and classes. After a week or two of orientation, we dove into Judy Soule and Jon Piper's new book, *Farming in Nature's Image: An Ecological Approach to Agriculture*. Published last December by Island Press, *Farming in Nature's Image* outlines the problems in agriculture and proposes the solution that we have been researching at The Land for a decade: using nature as measure. Judy and Jon are former and current ecologists at The Land Institute, and their book provides a good summary of our work to date, as well as a look at other examples of agricultural researchers using nature's wisdom.

Marvin Pritts visited from Cornell and shared some of his thoughts on perennial polycultures and farming in nature's image. Marvin is a berry crops specialist who is researching low-input fruit production in four New England states, and is asking some of the same questions about perennial polycultures that we are.

The interns also met George Pyle, editor of *The Salina Journal*. George spent a morning talking about the changing faces and roles of newspapers and his journalistic experiences in several small-to-medium-sized towns in Kansas.

The next weekend several of the interns journeyed north to a meeting of the Nebraska Sustainable Agriculture Society, and followed that with a trip to Concordia to attend a conference that explored the local ramifications of the General Agreement on Tariffs and Trade (GATT).

People at The Land are outstanding... Ted Schuur, Laura Sayre, Tom Mulhern, Stan Amick, and John Jilka after a prairie burn.

The 1992 Interns

—**Tonya Haigh**: B.A., Human and Physical Ecology, with subfields in anthropology and biology, Hamline University (MN).

—**Chad Hellwinckel**: B.A., Economics and Urban Studies, St. Olaf College (MN).

—**Emily Pullins**: B.A., Biology, University of California at Santa Cruz.

—**Corey Samuels**: B.A., Political Science, minors in chemistry and ecology & evolutionary biology, University of Arizona.

—**Ted Schuur**: B.S., Cellular and Molecular Biology, University of Michigan.

—**Suprabha Seshan**: B.A., Life Sciences, Open University (England).

—**Darryl Short**: B.A., Religion, minor in environmental studies, Oberlin College (OH).

—**Sara Wilson**: B.A., Political Science and Russian, University of Utah.

Michelle Mack & Laura Sayre, both 1991 interns, are our research fellows this year.

As we pruned the fruit trees and began to get the garden ready for the real arrival of spring, 1990 intern Paul Muto and development assistant Beth Gibans prepared and succesfully presented our seventh Green Thumb Gathering. Attendance was double the usual number, which can only be seen as a good sign. Corey Samuels writes more on the gathering on page 5.

The following week we made our annual spring journey to Kansas State University to meet with Orville Bidwell, emeritus professor in soil science and a long-time Friend of The Land. Orville has kindly contributed to our intern program for years, presenting a primer on Kansas soils to each new group of interns and making the people and facilities of K-State more accessible. This year he was joined by several K-State faculty. Orville, who led a successful drive to name Harney silt loam our state soil two years ago, has contributed a remembrance of Hans Jenny as part of this *Land Report*.

Classes moved from *Farming in Nature's Image* to Willa Cather's *My Antonia* and on to O.J. Reichman's *Konza Prairie*. To acquaint the interns with our research and the prairie, the research staff led several weeks' worth of discussions and readings in crop evolution, plant breeding, prairie ecology, and plant pathology. Interspersed were trips to the Konza Prairie Research Natural Area and Nebraska's Platte River, and a burn of The Land Institute's native and restored prairies.

In early April the interns chose their experiments (see p. 7), and classes changed to focus on agricultural policy. Land board member Donald Worster presented a slide show contrasting the myths and realities of agriculture in Kansas history, and Jerry Jost, on the staff of the Kansas Rural Center, spent a morning relating Kansas farming to world agribusiness. We read Donald Worster's *Dust Bowl*, Marty Strange's *Family Farming*, and studied the General Agreement on Tariffs and Trade (GATT), then Mark Ritchie paid a visit on May 6. Mark is the executive director of the Institute for Agriculture and Trade Policy, and has a gift for making the complicated issues of world trade understandable. After lunch and an afternoon with the interns, Mark presented a public lecture at Kansas Wesleyan University on GATT's potential effects on agriculture. Co-sponsored by The Land, The Salina League of Women Voters, the Kansas Farmers Union, and the Interfaith Rural Life Committee of the Kansas Ecumenical Ministries, Mark's lecture brought farmers, environmentalists, and blue-collar workers together with citizens of many other walks of life to better understand the global developments that could affect us all.

This spring brought many other visitors to The Land Institute, hailing from as far as Canada, Mexico, and the Rodale Research Center in Pennsylvania. Gary Wiegenbach came for a visit from Carleton College. From Saskatchewan, Lynn Oliphant and his friend Rhonda discussed species versus ecosystem preservation and restoration,

Tonya Haigh, Supi Seshan, Chad Hellwinckel, Sara Wilson, Darryl Short, and Ted Schuur

environmental education, and straw-bale houses. That same day, Earth Day, Paul McKay of Bethel College brought his friend Rogelio Cova to The Land from Mexico. Sr. Cova was awarded the Global 500 award by the United Nations Environment Program for his work in community mobilization for the protection of the environment, and has recently established The Center for Environmental Education and Ecological Action in Mexico.

Rutgers University professor Mike Hamm, who spent a six-month sabbatical at The Land in the spring of 1991, recently stopped in and discussed his current activities at Rodale. Eric Jorgensen came from California, where he works with the University of California-Santa Clara Cooperative Extension Service on high school-level agricultural education. From the University of Nebraska's extension service came Chuck Francis for a too-short talk on agricultural research and education at the land grant universities. As spring came on full force and the burned prairies took on a brilliant green, Salina geologist Nick Fent told us about what was underneath, and photographer Terry Evans came out and shared some of her latest work.

At the same time, we continued The Land's research in agriculture that uses the prairie as a model, planted the vegetable garden, renovated the classroom and catalogued the library, constructed a lab for on-site plant pathology work, took a trip to Chase County, Kansas (site of William Least Heat-Moon's *PrairyErth*), planned the Prairie Festival, and hosted representatives from the Nathan Cummings Foundation, the Jessie Smith Noyes Foundation, and the Austin Foundation.

The Green Thumb Gathering

Corey Samuels

The Green Thumb Gathering is a gardening workshop held at The Land Institute every other year. It offers a chance for area gardeners to share visions and innovations on how to make the most of a garden space. This March, when eighty people packed into The Land's classroom for the event, staff and interns got a lesson in making the most of *our* space. This year's Gathering was planned and coordinated by Paul Muto and Beth Gibans.

The day started with Ted Zerger's talk on his approach to gardening. Ted, a long-time Salina resident and avid gardener, seems as rooted to the place as his plants. He speaks of gardening as a highly personal activity, which must be learned from experience. His stories of his own creative gardening

Soup, seeds, and smiles at the gathering

methods, including never-tilled beds and artistic seeding, brought out the creative gardener in us all.

Following Ted's pitch for personal expression, Paul Muto, a 1990 Land intern, introduced us to the somewhat more technical subject of permaculture. Paul described permaculture as modeling a garden after an ecosystem, adding to personal expression the expression of one's land and home. To illustrate this, Paul treated us to a permaculture tour around The Land Institute's classroom building, looking at its water conservation potential.

Thom Leonard's talk had an eyebrow-raising title, "How to Turn a Turnip into a Broccoli," which proved to be a simple trick. In his talk, Thom gave away some secrets of what he calls "amateur biotechnology." He discussed using observation to find secondary uses for plants we normally use only one way. (The secret for turnips is that they are biennial, flowering the second year. Before flowering, they develop florets that can be harvested and used like broccoli.)

Dr. Lawton Owen, professor of entomology at Kansas Wesleyan University, gave us a visual tour of garden insects. His slide show of colorful bugs was prefaced by a warning that it was not for defenders of insect lives. Indeed, it focused on identification and eradication-by-squishing of harmful garden pests, while recognizing and preserving beneficial insects.

As is the tradition, Green Thumb Gathering gardeners treated themselves to a soup lunch, orchestrated by intern Darryl Short and made from vegetables brought by each participant. This year's record turn-out—twice as large as usual—resulted in a huge amount of soup, supplemented by bread, fruit, and cookies. A sunny spring-like day gave gardeners a chance to mingle and exchange seeds and secrets over lunch outdoors.

Land Institute Purchases Woodlot

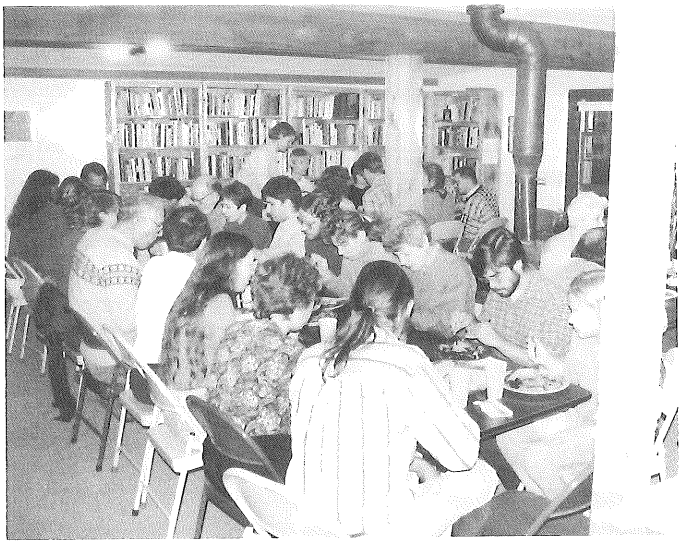
The Land Institute recently purchased 22 acres of land north of Solomon, Kansas, from long-time Friend of The Land Edith Koeman of Salina. Three acres are planted to perennial grasses as part of the USDA's Conservation Reserve Program. The balance of the property is wooded, complete with a small cabin, outbuildings, and a pond. Mrs. Koeman and her husband, the late Lester Koeman, preserved and improved this site as an obvious labor of love over the past thirty years.

We plan to selectively harvest the wood as a source of fuel for "Igor," the wood-burning furnace in our greenhouse. We've planted woodlots here at The Land Institute during the past three years, but it will be awhile before we're able to harvest any wood. When we built the greenhouse four years ago, a Friend of The Land made a generous gift to be used to purchase a woodlot when the right spot became available. The Koeman property is such that we will be able to harvest the wood we need to feed Igor without destroying the wooded character of the place. It also has potential uses in our education and research programs.

A Theology for Coming Home

The American Baptist Churches, USA Board of National Ministries, American Baptist Churches of the Central Region, and The Land Institute will sponsor a week-long conference titled "A Theology for Coming Home" at The Land Institute from June 22 to 26. Each day will feature field- or garden work, presentations, discussions, time for reading and reflection, and an evening seminar. Land Institute president Wes Jackson and Rev. Kim Mammedaty will be featured speakers.

For registration information, contact Dr. A. David Stewart, 1801 Anderson, Manhattan, KS 66502 (913) 539-3538.



At last December's board meeting, staff, interns, and the board of directors enjoy a meal that was planned by Alice Waters and prepared by all.

Changes in The Land

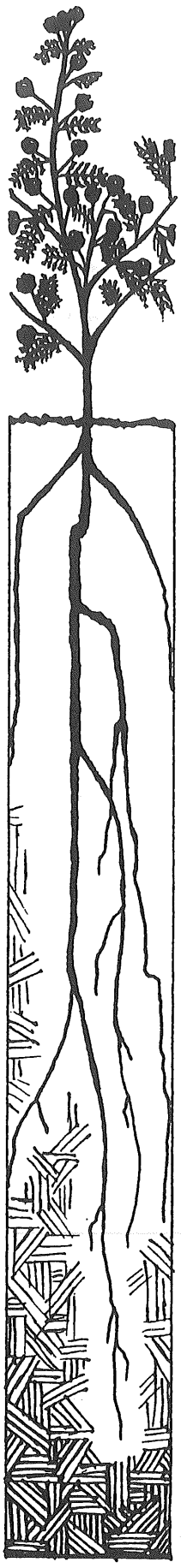
Laura Sayre, a 1991 intern, has stayed on this year as education assistant/intern coordinator. In addition to helping with curriculum planning and leading class discussions, Laura has kept the work schedule running smoothly (a full-time job in itself), and has lent her editor's eye and darkroom skills to *The Land Report*.

Berni Jilka left The Land this February. An intern in 1989, intern coordinator in 1990, and horticulturalist, groundskeeper, and steward of The Land's Harvest last year, Berni's constant smile and gracious attitude is already greatly missed. Happy trails, Berni.

Development assistant Beth Gibans has moved on, too, and is now studying at the University of California-Santa Cruz's intensive horticulture program. Beth was a 1988 intern, intern coordinator in 1989, and for the past two years has worked in outreach and fundraising. Beth's contributions to The Land Institute are considerable, not the least of which was coordinating the 1989 symposium on The Marriage of Ecology and Agriculture.

Are you a Working Assets credit card holder or long distance subscriber? If so, you can nominate The Land Institute to receive a donation from the Working Assets Funding Service. Just call or write Tom Mulhern at The Land Institute, 2440 E. Water Well Rd., Salina, KS 67401 (913) 823-5376, and Tom will tell you how to nominate The Land Institute for funding consideration. Or contact the Working Assets Funding Service directly during the month of June 1992, at 230 California Street, San Francisco, CA 94111 (415) 788-0777.

We've been nominated in the past, but the more nominations we get, the better our chances of winning a donation. Thank you for your help.



New Roots for Agriculture

Researching the Particulars of a Dream

Michelle Mack

"I cannot stress enough the importance of dreaming. Every single thing about The Land Institute was dreamed in a California bedroom. I lost consciousness of the dream: it became a part of me, and the particulars—such as perennial polyculture, the intern program, the land around us—began to come into place." —*Wes Jackson*

Recollections of Wes Jackson's words will often stop me in my tracks as I go about the detailed duties of a Research Fellow. I will look up from the particulars of a plant, a conversation with an intern, a pile of dirt and see the subtle constancy of the prairie beyond the research plots—the sublimated dream that motivates our research.

But I always return to the plant, to the conversation, return my shovel to the soil... Thus seems the pattern of research at The Land: a constant equilibration between the details of agricultural and ecological research and a vision of nature as the standard for a new sustainable agriculture. This is a difficult equilibrium to grapple with. From my vantage point I have seen research staff struggle to refine the details of our work while at the same time questioning its adherence to our vision.

There is an enterprise of creativity, renewal, generative science as Land staff emerge from a winter of data crunching and paper writing. Field work begins as research plants extend new growth and the prairie greens up. To take a step beyond the eternal pictures of interns and staff smiling over hoes and unintelligible plants, I will briefly introduce some of the questions staff have been asking and a few of their recent accomplishments.

Peter Kulakow, Land Institute Plant Breeder, has spent the spring "distilling hundreds of hours of intern and staff work into a few short pages." He is preparing a paper, "Genetic Variation in Illinois Bundleflower: A Potential Perennial Grain Legume," for publication. Peter describes the writing process as "frustrating: I'm not able to tell the whole story, but it's wonderful to have the time to think the whole mass of data through." Results show that Illinois bundleflower has all the trademarks of a good agricultural crop: enough genetic variability available for breeding and high seed yield. But these questions have led Peter to think about the limitations of new crops: acceptance of a new plant is contingent upon a place in an agroecosystem and in a culture—somewhere to grow it and someone to eat it. "I've been wondering about whether these concerns are fundamental or are merely details that can be worked out...What compels people to eat something?" Plant breeding is only part of a story that is narrated by culture and use.

The most exciting part of Plant Pathologist Mary Handley's field season has already occurred. During the first two weeks of April, Mary and interns visually rated the severity of disease symptoms caused by Maize Dwarf Mosaic Virus (MDMV) on the eastern gamagrass in our research plots. "I'm looking forward to analyzing this data. It is a confusing year that has generated many new questions." New lab space will allow Mary to incorporate serology—tests for presence of the virus—into her analysis, allowing her to cross-check visual ratings with actual presence or absence of the virus. It will also allow her to determine the strain of the virus, another question-generating mystery. There are two strains of MDMV: B, which is very uncommon, and A, which infects annual crops such as corn and is thought to overwinter in Johnsongrass. In controlled experiments, eastern gamagrass is infected by both strains. Mary is intrigued by the fact that "most of the plants in our field are infected with MDMV strain B, the uncommon strain. Why don't we find the common strain in our field?"

Mary is collaborating with Dr. Dallas Siefers, a researcher at Kansas State's Fort Hays Research Station, to explore the dynamics of MDMV in eastern gamagrass. She is also working with Dr. Jeanne Mihail of the University of Missouri, Columbia, on a bacterial disease of Illinois bundleflower. Mary's collaborators provide specialized knowledge and lab work. Mary provides "fieldwork and a different perspective. Our research opens up ecology as a point of synthesis for different kinds of disease work."

Jon Piper, Ecologist, is hoping that this will be a wet summer and the prairies will flourish. This is the last year of a six-year study of prairie vegetation dynamics, and Jon is looking forward to summarizing the results and devising new directions for prairie studies. "The prairie component isn't directly represented anywhere else in our research, so it is important for our educational program as well as our research program to develop new studies." Jon is interested in pursuing experiments that address different levels of organization on the prairie, such as community-level studies of the spatial assemblages of plants or ecosystem-level studies that compare nutrient cycles on the prairie and in the perennial polyculture.

A wet summer would also benefit the perennial polyculture experiment, now in its second year. "If this is a wet year, we'll probably see more of an effect of cropping system: the effect of a plant on its surrounding neighbors." According to Jon, plants will be bigger and hence more interactive as they enter their second year of growth. Cropping system effects will provide information on the compatibility of the plants and their potential to be combined in an agricultural system. Jon will present a poster on the polyculture experiment at the annual meeting of the Ecological Society in August, where he will chair a contributed paper session on plant competition.

1992 Research Projects and Attendant Interns:

- **Vegetation Structure of Native Prairie on Different Soils**—Darryl Short. This project is an examination of some typical vegetation patterns of the prairie, our standard for a sustainable agriculture, for insights into designing successful perennial polycultures.
- **Genetic Variability in Natural Populations of Eastern Gamagrass**—Corey Samuels. This is a continuation of our effort to describe genetic variation and identify useful material for domestication in over 200 collections of a native, warm-season grass.
- **Illinois Bundleflower Breeding Program and the Inventory Phase**—Chad Hellwinkel. The inventory phase extends our search for herbaceous perennials with promise as seed crop components of perennial polycultures. The Illinois bundleflower breeding program continues our survey of genetic diversity and traits useful for domestication of this native legume.
- **Perennial Sorghum Breeding Program**—Sara Wilson. This project addresses whether it is feasible to introduce winter-hardy perennial growth to an annual seed crop.
- **Nitrogen Contribution of Illinois Bundleflower and Other Legumes to Annual and Perennial Grains**—Emily Pullins. The purpose of this experiment is to estimate the contribution of nitrogen by five legumes, including Illinois bundleflower, to two annual grain crops, wheat and sorghum, and two perennial grain crops, leymus and eastern gamagrass. Results will help us address whether perennial polycultures can sponsor their own nitrogen fertility.
- **Perennial Polycultures**—Tonya Haigh and Ted Schuur. This study looks at interactions of perennial seed crops grown in mixtures. It addresses ecological questions about plant competition and facilitation, succession, plant-insect interactions, and plant-pathogen interactions that will inform our vision of a perennial polyculture.
- **Plant Disease Studies**—Suprabha Seshan. Incorporating the areas of plant breeding and ecology, this study focuses on the dynamics of disease spread and the variation for disease susceptibility in eastern gamagrass and Illinois bundleflower. Through greater understanding of the disease systems, we hope to be able to select plants that resist or tolerate disease and develop polyculture systems that minimize disease spread.

On March 12, 1992, at the Teller Wildlife Refuge in Corvallis, Montana, a conversation took place among Wes Jackson, Dr. Jurgen Schaeffer, a perennial grains breeder at Montana State University, and Richard Thieltges, a member of the Alternative Energy Resources Organization (AERO).

Out of this conversation was born the idea of a new newsletter that would focus on the field of perennial grains research. While The Land Institute and the Rodale Research Center disseminate their findings in annual research reports, there is at present no one place where discussion of new findings in perennial grains research is the central focus. The importance of this research for sustainable agriculture warrants such a forum.

Thus, we decided to put forth this call for a show of interest in such a publication. We are anticipating a mailing of perhaps twice a year. The newsletter would carry both technical and general articles in the area of perennial grains research. The focus would be both on the genetics of individual plants, and on the interactions and relationships of a plant community grown in a perennial polyculture. We would welcome articles from individuals working in the field of perennial crop development, and hope to translate some Russian works in the future.

If you are interested in being on the mailing list to receive such a publication, or if you have articles to submit, please reply to:

Richard Thieltges
1850 Dry Gulch
Helena, MT 59601

Hans Jenny: Forever a Friend of the Land

In Memory of Hans Jenny

Arnold Schultz

A memorial service was held for Hans Jenny on the University of California campus. Everyone who attended that March day in Berkeley perceived that Hans had not really died. Had he not turned soil science and ecosystem study into dynamic fields that are going to live on and on? His two books, *Factors of Soil Formation* and *The Soil Resource*, are already classics and will never go out of date. The wealth of new ideas he contributed to soil and colloid chemistry will be incorporated in experimental research on plant nutrition and pedology for a long time to come. And the many fine natural reserves that he helped to establish are living laboratories for never-ending long-term study and demonstration. Because Hans Jenny continues to live, I shall hereforth use the past tense sparingly.

Not many scientists will express the association they have with their field as one of friendship. That is precisely how Hans thinks about soil and how, later, he expresses it in his paper, "My Friend, the Soil." He sees in the soil the beauty that artists see and talk about with their paints. He sees in soil great complexity and diversity which yet is completely describable with the simple organizing equation: Soil=f(Cl, o,r,p,t...). He also sees ions dancing about as rocks and other parent materials break up and reform into solid horizons and hardpans. He sees in soil a resource that sustains the life of myriads of organisms, including humans, when used with scientific care and human compassion. All these insights comprise the friendship pact that Hans has signed with soil.

I first met Hans in person in 1949 when I was hired by the Forestry Department of the University of California, Berkeley. But I knew him well even before then; I had purchased *Factors of Soil Formation* while a graduate student at the University of Nebraska, studying ecology with Professor J.E. Weaver. I read the book several times in Lincoln, and thought of it as my ecology text. Later, in Berkeley, after I had the opportunity to work with him, I once said, "Hans, I've always thought of you purely as a soil scientist, but now I realize you really are an ecologist." "No, no," he answered, "I don't know much about ecology at all, but of ecosystems I know a lot." That statement emphasized to me that the study of ecosystems was much more than the study of ecology. Thereafter I coined the term *Ecosystemology* and started to teach both a graduate and undergraduate course by that name. Although we were colleagues in ecosystem research and thinking for over forty years, I remain forever his student.

The first project I collaborated on with Professor Jenny, as I called him then, involved digging up the root system of a plant—not the roots of big bluestem as I had with Professor Weaver, but the roots of a big Ponderosa pine. This was hard work; hard work and lots of sweat breaks down awe-barriers, and during this project Professor Jenny became Hans, and for me he has been Hans ever since. The pine tree ecosystem was the first—and smallest—ecosystem we were to study together; they

In describing the making of a fertile soil in *Meeting the Expectations of the Land*, soil scientist Hans Jenny wrote, "It all adds up to a soil mystique that transcends the notion of soil as a mere economic commodity or impersonal object of science." As the essays in this remembrance of Hans Jenny show, Professor Jenny's relationship to soil was intimate; he considered the soil his friend and at once used chemical, biological, physical, artistic, and mystical terms to describe it.

The loss of soil, the problem of agriculture, is, of course, what drives The Land Institute's research in perennial grain crops grown in polycultures, and the friendship between Dr. Jenny, The Land, and soil goes back many years. In 1986, we invited Hans to speak at our Prairie Festival, the theme of which was "Soil and Seeds: The Sources of Culture." He was unable to attend, but recommended that his friend Francis Hole come in his stead. Dr. Hole gave one of the most memorable presentations in the Festival's history, based largely on Hans's *Factors of Soil Formation.*

Soil ecologists are today discovering vast underground webs of mycorrhizal hyphae, on which nutrients travel from plant to plant through the living soil. It was my pleasure to discover, in putting together this *Land Report*, a similar web, vibrant and extensive, where ideas are being exchanged among friends.

It, too, is surely part of the soil mystique.

I would like to thank the contributors to this special remembrance. I am especially grateful to Mrs. Jean Jenny for her kind assistance, and for lending us Hans's drawings and granting permission to publish them.

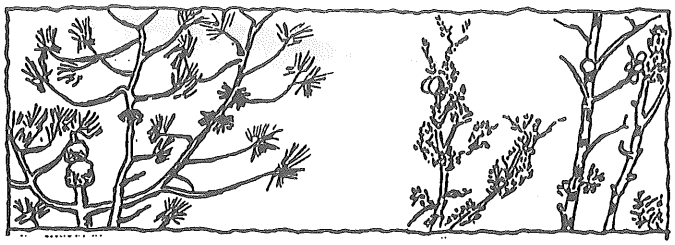
--JV

got bigger later on. Although the Ponderosa ecosystem didn't merit a paper of its own, it served as a connecting link between soil and ecosystem and appeared in the front pages of *The Soil Resource*.

This book, *The Soil Resource*, published by Springer-Verlag in 1980, took many years to write. It is one example of how thorough Hans is in everything he does. During one period he spent many months in intensive study of multivariate analysis before deciding not to use it in his book. When he plans to visit an area where he has never been before, he makes a thorough study of the history, geography, geology, and climate (and, of course, soils information) before going there. Between 1958 and 1965 I worked on an Arctic tundra ecosystem project at Point Barrow, Alaska, funded by the NSF. Up to 1960 Hans had been to every corner of the earth where soils existed, except the tundra, so I invited him to come up to Point Barrow and see it. In his preparation for the visit, he was surprised to learn that the annual precipitation on the coastal tundra was less than four inches—a veritable desert. We flew up to Barrow together in late June; snow had already melted but the Arctic lakes were still frozen, making a distinctive landscape of elliptical white patches on the ground. As we flew across the Brooks Range and suddenly saw the level Arctic plain lying obliquely ahead, Hans said, as if he expected the sight to be coming, "Aha! Alkali flats!" Hans was a big hit at the Arctic Research Laboratory with all the scientists and their graduate students.

Hans and I had long discussions in his old farmhouse at Comptche, only ten miles from his beloved Pygmy Forest. Our discussions often centered on holism versus reductionism. His arguments seemed to take the latter side, but in his actions he favored the other. Had I been a psychologist I might have read some deep-seated frustration into this ambivalence. If there was such, it was handled neatly in *The Soil Resource*. The book is organized like Hans Jenny's professional life: Part A and the first seven chapters are reductionist; Part B, with the last seven chapters, holistic. His doctoral degree in physical chemistry from Switzerland, his famous lectures in colloid chemistry in the Soils Department, and his highly respected research in plant nutrition and ion exchange in the Agricultural Experiment Station at Berkeley were highly reductionist, occupying much of the first 35 years of his professional life. The next 35 years, especially after his retirement from the University, were largely devoted to ecosystem study and to the preservation of natural landscapes. Yet, in each of these periods he kept his fingers and his creative mind in both doctrines.

Of all of Hans's many achievements—papers, books, lectures, and research—the crown is the



Pygmy Forest. His efforts, with the help of his wife, Jean, have preserved large chunks of this pygmy forest for education and for long-term research. With his graduate student, Bob Gardner, he documented the evolution of a landscape sculpted through a series of marine terraces which were formed during the million-year period of the Pleistocene on the Mendocino coast of California. The study of this chronosequence is actually a reification of the state factor approach which Hans had developed in his earlier book, *Factors of Soil Formation* (McGraw Hill, 1941), written before the pygmy forest phenomena had been observed or heard of. Perhaps the most earth-shaking of all is what this has done to our textbook soil and ecological theory. The soils and plant communities of the Middle West developed to maturity after the recent Wisconsin glaciation, a period of 50,000 years, and to soil scientists and ecologists they appear to be in steady state. The million-year period of the Mendocino chronosequence, however, has witnessed drastic changes in soils—from mollisol to altisol to podsol—and drastic changes in vegetation—from prairie to rich redwood forest to poor pygmy forest—with no changes in climate, species pool, topography, or parent material, only time. Hans Jenny has written only one line about this fallacy in Midwest theorizing. It appears in The Soil Resource as: "Some of the imagined Clementsian and Marbutian sequences last millions of years...."

What I intended to show in this sketch is that Hans Jenny is very much alive and still with us, overturning old theories and creating new ones. Now he sits in the old Pullman chair in front of the fireplace in the Comptche farmhouse. Seated around him are Wes Jackson, Stan Rowe, and myself. His secretary Joan is taking notes. We are talking about ecosystems. We are saying that the qualities that emerge at the ecosystem level of organization need to be itemized and better defined. Hans is skeptical. He doesn't know what an emergent quality is. He is forcing us to be explicit. That's the way he teaches. He is at a higher level.

Arnold Schultz is Professor Emeritus of Forestry and Conservation at the University of California-Berkeley.

"We may want to look into that..."

Wes Jackson

For many a scientist, there is *the* memorable field trip, *the* one that sticks out from all the rest. Mine lasted three days in September of 1985 near Comptche in Mendocino County, California. Hans Jenny and his friend Arnold Schultz, a forestry professor at the University of California, Berkeley, led Saskatchewan ecologist J. Stan Rowe and me up and down the ecological staircase of Mendocino. It was a trip in which any penchant toward eco-fundamentalism was sure to suffer. At least mine did.

Before I started up the staircase with its five, 100,000-year-old treads, I was a firm believer that any natural ecosystem was sure to improve, and by that I mean add top soil, increase in stability, maybe diversity, or if not improve, at least stay good indefinitely. By the time we headed back toward Berkeley in the car, the pillars of my ecological understanding had been shaken.

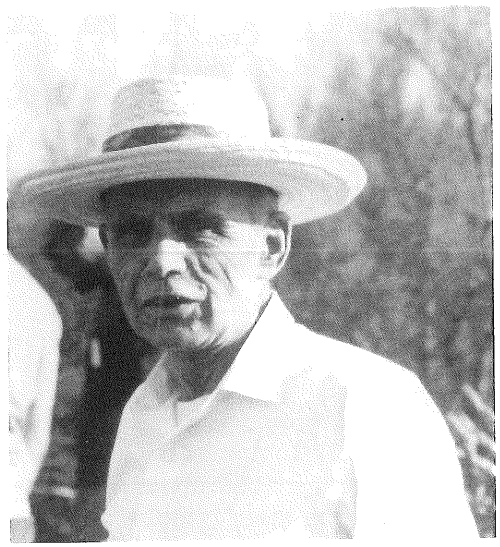
My concerns grew over the next several weeks, and finally about four months after the field trip there came a letter from Hans saying that he was not aware that there was a concept of steadily improving ecosystems. He said that such a "sunshiney belief rests on a neglect to appreciate the soil as a dynamic — either improving or degrading — vital component of land ecosystems." There was little comfort in the fact that I had been half right.

In that same letter he expressed his concern as to whether he and Arnold had presented Stan and me "sufficient physical evidence that the decline in soil and vegetation from the redwood-Douglas fir forest on the second terrace to the pygmy forest is a natural sequence." (The third terrace is a transition step to the full-blown pygmy forest on steps five and six.) Plant ecologists had, after all, designated the redwood-fir forest a climatic climax and the pygmy forest an edaphic (soil) climax. In Hans's view, ecologists had designated two different worlds, "not realizing that the two ecosystems might be on the same time arrow, merely separated by a long time interval."

Fundamentalism of any variety tends to die hard. Staring into a soil pit dug into the fourth terrace, I could sympathize with the churchmen who refused to look through Galileo's telescope. Even there, with the evidence before me, I protested, saying that good farming can improve the soil. "Yes," Hans said, but "the extent depends on what kind of soil, virgin or depleted, the farmer begins with." He thought it would be difficult to improve a good virgin Iowa prairie soil by soil management techniques, except perhaps by applying nitrogen, phosphorus, and potassium.

It was the beginning of an important lesson to me, and from then on I have burdened myself and my students with the question: Why should a look to nature, as we work out our relationship to the Earth, provide us with easy absolutes? There is nature, which may or may not have human interests. It is we who choose to make nature our standard or measure for agriculture instead of trying to understand agriculture on its own terms. It is also ourselves, not nature, who are loaded with our notions of good and bad. Few humans, in comparing the luxuriant redwood-fir forest to the pygmy forest, would not think that the latter represents a deterioration or decline. But Hans insisted that "nature might call it a biological improvement, an adaptation of vegetation to a changing substrate." This, by the way, raises another question: Why are there not then pygmy forests or pygmy prairies, pygmy whatever, all over the world? The answer is because we have disturbances—glaciers, volcanoes, mountain formation due to uplift—that are sources for eventual soil formation. Looked at this way, soil is as much of a nonrenewable resource as oil.

We're talking about more than soil here, though it is fitting that a discussion on soil formation is the means for doing so. It is not just a question of how the soil is made. Are there any firm laws about its formation that are not trivial? Nature seems to be saying "No." Hans said it well in the final paragraph of the same letter. "The picture of natural decline of native ecosystems, more dramatically displayed by bare laterite crusts, has broad philosophical implications. (Many) popular writers contend that if our society were to adhere to

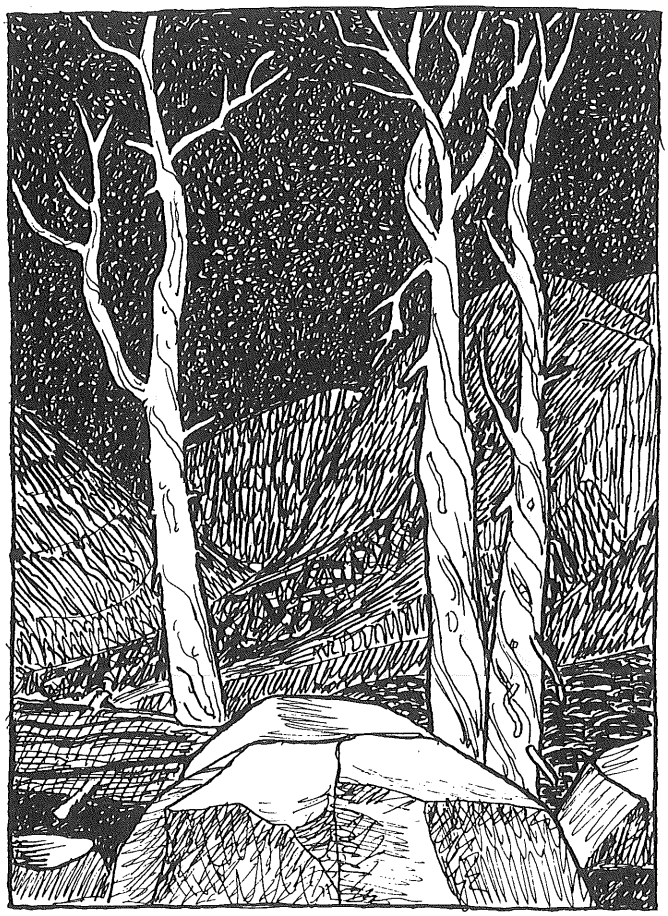


Hans Jenny

ecological laws we would have paradise on earth, a simplistic view. The laws they cite, for example, that diversity creates stability, may not be broad laws, and maybe there aren't any, unless they are trivial. We may want to look into that."

John Cobb, the Whiteheadian philosopher, has written me that "We cannot learn from (nature) except as we ask questions and we have to be ready to have the questions revised by the answers." He agrees with Wendell Berry, who says we need a conversation with nature. This view favors a highly interactive approach in which, as John Cobb says, "we neither try to impose our categories nor merely adapt to what is."

Perhaps it is the spirit in which we ask the questions that ultimately will determine our fate. Rather than ask what nature will require of us here, we mostly ask what we can get away with. The latter is a childish question. The former does not necessarily assume that nature has any moral authority. But it does not rule it out either. We will probably never know enough to know whether there is such. It is this source of humility, along with the lessons from the 500,000-year-old steps, which, in the long run, might make it possible to live harmoniously on this increasingly brown planet. Much of what we need to know and act on came from this man of the soil to which he has now returned.



Near Palisade Lakes, 51

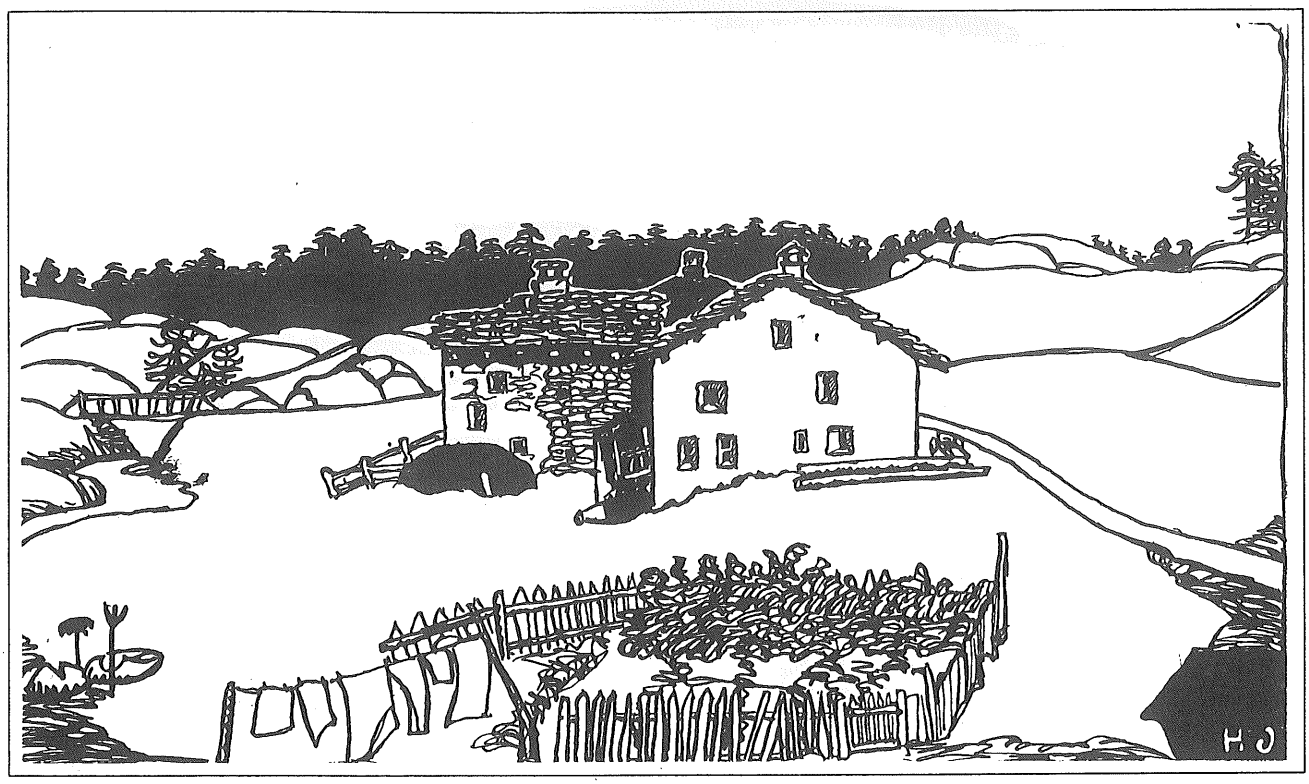
The above essay appeared as the editorial in the spring 1992 *Orion*. The issue was devoted to the living soil.

A Friend of the Soil

Francis D. Hole

Dr. Hans Jenny was a professor of soil science at the University of California-Berkeley from 1936 to 1967, and a pedologist (soil scientist and ecologist) of international stature. He was enthusiastic about the work that Wes and Dana Jackson and associates are doing at The Land Institute. Whereas most people go through life careless of the soil that supports them, Professor Jenny, in common with the members of The Land Institute community, was mindful of the earth beneath our feet. He asked questions about the "soil-plant contract" and the soil-plant-people contract. Hans and Jean Jenny, with the help of many friends of the land, have arranged the preservation, for purposes of research and education, of key natural landscapes in California, including Apricum Hill laterite crust near Ione, Mt. Shasta Mudflow Research Area, and the Pygmy Forest ecological staircase (Jug Handle Reserve).

I was fortunate in 1985 to be a guest of the Jennys, along with Professor A.M. Schultz and doctoral candidate Craig Allen, at the Jenny farm near the Pacific coast of Mendocino County, California, north of San Francisco. I remember the eagerness with which Hans observed the landscapes through which we tramped, and the thoughtfulness with which he meditated on the pages of a soil-data book that he carried with him in the field. He showed us the one-million-year-old infertile Blacklock podzol sand (Typic Sideraquod) and the depauperate pygmy forest that struggles to grow in it. A hardpan of 45 to 75 cm (18-30 inches) perches a water table and causes some steady runoff each winter. He asked questions and listened to our comments. We wondered if the Blacklock soil illustrates the fate of very old soils: to become infertile and leached by runoff caused by the hardpan that is inhospitable to roots. Does such an infertile soil force evolutionary development of stunted, endemic species of trees? One quarter of the area of the soil surface is bare or lichen-covered. Perhaps the hardpan will ultimately be exposed by slow erosion, and the site will be barren.



Hans Jenny's farmhouse in the Alps

Very young soils also came under Jenny's scrutiny. Among them were the pre-Aswan Dam alluvial soils of Egypt. For thousands of years annual flood waters brought fertile dark humic silt down from tropical highlands, and spread it about 1 mm thick on the plain of the Nile valley. The yearly deposit made the surface soil the youngest horizon. Older subsoil layers, once dark themselves, became progressively paler with time, by bacterial decomposition of buried humus. The resulting soil profile looked like prairie soil profiles of uplands in Iowa, however different in origin. The dark surface (A horizon) of the prairie soil is the oldest part of that soil, because it has been exposed to the most weathering. The subsoil (B horizon) has always been paler because root density diminishes progressively in depth, as does production of humus. On footslopes of hills in parts of Iowa, and in troughs between Alpine "mima mounds" in Switzerland, "Nile-soil"-like profiles have developed where local runoff waters provide new dark surface soil annually, and where subsoil colors fade with time.

Glaciation, wind-deposition of silt (loess), and volcanism are three other complex processes beside alluviation that add significant amounts of fresh parent materials to land surfaces. Loess deposits account for the fertility of the Kansas state soil, the Harney silt loam[1], and other loess-enriched prairie soils. They are unlikely ever to end up infertile like the Blacklock soil of the pygmy forest. This view was supported by Brimhall and others in a paper on evolution of soil that was possibly the last paper that Dr. Jenny reviewed and commented on for the authors.[2] The soil at the Morrow plots at Champaign, Illinois, is a case in point. Continuous corn yields for a century have remained at 32 bushels per acre without any additions of fertilizers, except for about 560 kg/ha/yr (500 lbs/acre/yr) of wind-blown dust including phytoliths and insect parts,[3] and 27 kg/ha/yr (24 lbs/acre/yr) of nitrogen from rainfall.[4] If 1 mm of soil erodes and leaches away each year from such soils, the surface of the ground will be a meter lower in a thousand years. New supplies of plant nutrients will be encountered in the soil profile as it develops downward, without formation of a hardpan, into fresh parent material. Such perpetual rejuvenation of a soil precludes soil senility.[5]

Jenny and his coworkers also investigated soil processes and distribution of soils. With respect to processes, soils were considered in terms of the forces, potentials, and interactions between atoms, molecules, colloids, enzymes, and organisms. Attention was given to activity of ions (plant nutrients) at the surfaces of roots and of soil particles. Using one-month-old romaine lettuce as the testing plants, workers determined the relative capacities of different soils to support plant growth.[6] Plant roots took up insoluble nutrients, such as iron, by direct contact to particles of iron oxide in calcareous soils.[7] Roots of rye took up non-exchangeable potassium.[8]

Dr. Jenny's study of the distribution of soils was in relation to spectra or sequences of the state factors: climate, organisms, relief (topography), parent (initial) material, time, and some special factors. Dr. Jenny found that yields in the pot tests could be related not only to properties of different soils, but also to the soil state factors at the sampling sites on the source landscapes. Data from the state factor soil sequences yielded answers to the question: "How do soils vary in space and time?"[9] Jenny had found "adequate scientific basis (for) field investigations" of soils.[10] He traveled to Colombia, Kenya, and India to get evidence of unique soil states in tropical regions.

Dr. Jenny thought of soil erosion as a form of destruction of the soil resource that is cumulative, just as radiation, however slight at a given moment, is cumulative in its damage to living cells. To him, no human-accelerated loss of soil by erosion was tolerable. He was alarmed that soil losses by wind and water are belittled. The work at The Land Institute in developing herbaceous perennial polycultures addresses the need to stop accelerated soil erosion that is rampant on cropped and grazed landscapes.

Jenny noted that in the upper Mississippi River valley region prairie invaded forest about 5,000 years ago, converting forest soils (Alfisols) to prairie soils (Mollisols). This involved some equalization of clay contents in surface and subsurface (A and B) horizons. One process to that end may have been upward translocation of B horizon materials, including clay skins, called cutans, into the A horizon by western mound-building ants.[11] We may need to consider whether a certain amount of B and C horizon materials should be brought to the surface each year in polycultured fields to mimic the soil rejuvenation work of ants and rodents in natural prairies.

Jenny's lively mind saw the value of conventional terms (such as for soil colors) and equations in the practice of soil research by the international community of pedologists. He also appreciated the importance of unconventional ways of looking at soils, ecosystems, and landscapes. He found attractive the concept of soil as material that is subject to seasonal changes in temperature. That approach would include solid rock at the surface in the realm of soil. Jenny defined "vert space" (green space) as all above-ground parts of the land ecosystem, including organisms and voids. "Soil space" is the below-ground living system that is not just an abiotic environment of organisms, but is the total system of animate and inanimate ingredients, including voids. He was one of the few who "are inclined to designate the roots of a tree as a property of the soil." Hans Jenny's lucid prose reveals his uncensored perception of beauty along with useful information. We read such phrases as "the eternal night of the soil," and "the soil speaks to us through the colors and sculptures of its profile, thereby revealing its personality."[12] He also saw that modern civilization promotes "soil malpractice" and keeps people unaware that each species of soil has a right to exist and to support life.

From a reading of Jenny's two major books, a short chapter on the making and unmaking of a fertile soil, a retirement profile, and a delightful

interview, we can see Hans Jenny as an inspired person who was happily at home on this planet.[13] He became interested in soil in his youth in Switzerland and he turned to soil science in order "to comprehend it." He came to love the beauty of soil as known through the senses of sight, touch, and smell.[14] His rigorous research methods, including mathematical treatment of data, are impressive. He published in an astonishing variety of scientific journals, enjoyed the friendship of many people in different disciplines, and integrated much that he learned from them into the planet Earth-soil view that he developed over a lifetime. He recently wrote, "As this century is ending people are becoming aware of resource limitations, and they will want to know more about soils and their response to environmental change."[15] He showed not only how to do soil science, but also how to live as a vital truth-seeker and -practitioner. Because success in proper management and protection of ecosystems in the future depends on people similarly oriented, disciplined and in love with the earth beneath our feet, we do well to enjoy, share, and promote the generous legacy left to us by this delightful friend of the soil.

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Hans Jenny

A Contagious Influence

Orville W. Bidwell

One of my most valued mementos is a *San Francisco Chronicle* editorial that describes the Kansas state soil drive, entitled "Digging the Dirt the Kansas Way," to which is attached a handwritten note: "Best regards, Hans. P.S. I didn't write it."

Those aware of Professor Hans Jenny's unexcelled affection for the soil readily understand his declination. Had he been in my shoes, the internationally acclaimed pedologist and "soil art" promulgator would have responded rhetorically to the print media's overuse of colloquial "dirt" for the more precise "soil" in countless headlines: "Senate moves dirty issue," "Soil lobbyist tackles dirty job," and "Lawmakers face dirty issue," to name a few. Professor Jenny would have seized the opportunity to use soil color and profile sculpture to impress us with

the soil's personality, history, and age.

Soil as art came to him naturally on his parents' Swiss farm, Kevin Stuart tells us, and was nurtured by his woodcarver grandfather and periodic visits to art exhibits while in high school. Hans, Stuart says, emphasized that soil profile art, unlike classical paintings with themes, is abstract, and those who customarily think of soil only as dirt rarely find beauty in it.

I trust that Professor Jenny would have been pleased to know that the Deputy Secretary General of the International Soil Science Society was granted a request in January to reprint in its *Bulletin* an article that appeared as "Soil as Art" in the Fall 1991 *Land Report*. Had it not been for Hans's contagious influence, I undoubtedly would have overlooked the *Wall Street Journal* front page commentary that inspired the article.

Enjoying the artistry of soils was not enough. Hans needed to know the science of their formation and use. He credits teachers like G. Wiegner for revealing the physical-chemical nature of soil colloids; Selman Waksman, Nobel laureate in Medicine who extracted streptomycin from the soil, for revealing its prodigious life; and contemporary colleague Richard Bradfield, for extending soil knowledge abroad as a member of the Rockefeller Foundation.

The conditions that brought about my first meeting with Professor Jenny are probably best left unsaid. While I had known this intellectual giant from afar as a distinguished scientist, author of my textbook, *Factors of Soil Formation*, and as the 1949 president of the Soil Science Society of America, I did not meet him personally until the 1961 St. Louis meetings, where his stimulating "Model of a Rising Nitrogen Profile in Nile Valley Alluvium and its Agronomic and Pedogenic Implications" preceded my uninspiring paper about Saline County, Kansas, community meetings.

It was not until the 1982 meeting of the Soil Science Society of America, when he accosted me and we visited for 15 minutes in the doorway of a hotel, that I learned he recognized me as a Kansan, though not, I hoped, for my lackluster paper on Saline County. To my great surprise he asked my knowledge of The Land Institute and the work of Wes and Dana Jackson. Later I learned that Wes had requested him to write "The Making and Unmaking of a Fertile Soil" in *Meeting the Expectations of the Land: Essays in Sustainable Agriculture and Stewardship.*

Having experienced Professor Jenny's field agility in eastern San Joaquin valley in November, 1977, I was struck by Boyd Gibbons's description of him in *National Geographic*: "Believing that soils highest in organic matter would exist at high altitude near the Equator, he recently climbed up Mount Kilimanjaro and filled his plastic bags with black soil. The Tanzanians were astonished to see this wisp of a man at 14,000 feet. Hans Jenny was 82."

My last moments with Professor Jenny were at the national soils contest on the morning of April 12, 1984, at San Luis Obispo, California. Hans had presented a version of his "Soil as Art" the previous night and his morning was free until a noon boarding of the Berkeley bus.

To give him an opportunity to observe soil contestants practicing for the next day's contest, Chairman Brent Hallock asked if we had room in our van and would mind having him as a passenger. Pleased at such an opportunity, we naturally responded in the affirmative. After a full morning pondering some San Luis Obispo County soils and landscapes we took Hans to the bus station, where he insisted on purchasing lunch for the six Kansans.

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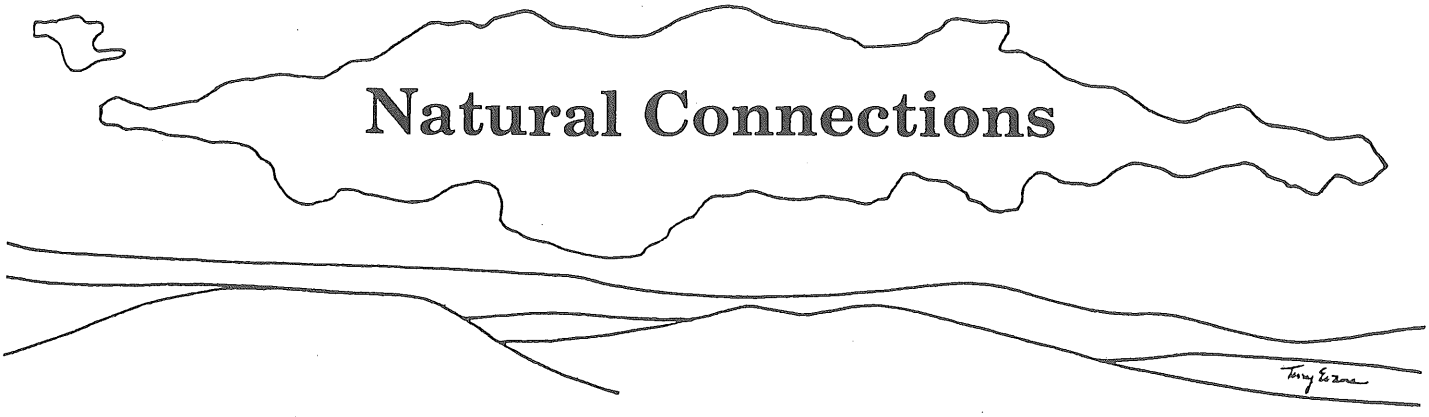
Orville Bidwell digs in at the 1986 Prairie Festival.



Medicinal Plants Used by Indians of the Prairie Bioregion

Kelly Kindscher

When we know the land around us, including the plants and their uses, then we can begin to know our place on it. For those of us who delight in the spring wildflower bloom of the Land Institute's Wauhob prairie or in other floriferous native prairies, protection of prairie and conservation of plant species is easily justified. For others, who have not seen the prairie or who do not have a fond appreciation of wildflowers, the past and potential uses of prairie plants may be a persuasive argument for their protection. This important reason is why I have been studying the history of native prairie plants used for medicinal purposes by Indians of the Prairie Bioregion.

The North American prairie, referred to here as the Prairie Bioregion, is a geographical area whose "soft" boundaries are determined by nature, in contrast to the "hard" boundaries of politically-defined areas, such as states. The Prairie Bioregion is distinguished from the neighboring Rocky Mountain and Ozark Bioregions by characteristic plants, animals, water relations, climate, and geology.[1]

The Prairie Bioregion is immense, covering over 1 million square miles. It stretches from Texas north to Saskatchewan and from the Rocky Mountains (from New Mexico to Montana) in the west to the deciduous forests of Missouri, Indiana, and Wisconsin in the east. It has a rich variety of grasses and wildflowers that are drought tolerant and require full sunlight.[2] This region includes both the areas occupied by the Plains Indians and the adjacent area to the east, usually classified as having Woodland affinities. Through my research, I have documented that tribes such as the Meskwaki, or Fox, located in present-day Iowa, primarily used prairie plants for their medicines. This indicates that prairie, rather than woodland, was the original predominant vegetation type of their native homelands, and that these peoples should be considered to have affinities with the prairies.

In preparation for writing *Medicinal Wild Plants of the Prairie*, I studied ethnobotanical and anthropological works on the Indian tribes of the region, along with works published on the pharmacology of native species found in the region and the historical accounts of explorers, travelers, and traders. I uncovered 203 native prairie plant species that were used by Indians of the region for medicinal purposes.

Echinacea angustifolia

The following twenty-five Indian tribes were found to have used these plants: Arapaho, Arikara, Assiniboin, Blackfeet, Cheyenne, Comanche, Crow, Dakota, Gros Ventre, Hidatsa, Kansas, Kiowa, Kiowa-Apache, Lakota, Mandan, Meskwaki (also called the Fox), Omaha, Osage, Otoe, Pawnee, Ponca, Sioux (Lakota and Dakota), Plains Cree, Wichita, and Winnebago. There is more ethnobotanical information available for the Sioux than any other Indian tribe of the region. Although medicinal plant uses were not always the same between tribes, they were often similar, and I believe that all tribes used a large number of medicinal plants.

In addition to literature searches, I have visited the Rosebud Sioux Reservation in South Dakota during each of the last four summers to learn about the use of medicinal plants by the Lakota. During my visits I have seen that some medicine men and traditional Lakota still use a variety of plants in their healing practices. However, they have made it clear that they use specific plants as agents for spiritual healing, rather than because these plants contain medicinal substances. In respect for this holistic health perspective and for their orally transmitted "truths" (of which I have only glimpsed), the information I present on Lakota use of medicinal plants in *Medicinal Wild Plants of the Prairie* is from already published sources.

Most Indian tribes had different hierarchies of medicinal plant usage, with certain plants commonly used for a wide variety of purposes. Ales Hrdlicka, a medical doctor and physical anthropologist at the Smithsonian Institution, emphasized this when he stated in 1932:

> In every tribe the older women and men knew scores of herbs and various mechanical or other means, which they employed exactly as did many of our country grandmothers and grandfathers, simply, rationally, and often with marked success. They knew poisons, emetics, cathartics, antifebriles, tonics, narcotics, and hemostatics, cleansing solutions, healing gums, and powders. They had antidotes. They employed massage, pressure, scarification, cauterization, bandaging, splints, sucking, enemas, cutting, scraping, and suturing. But whenever the cause of a complaint was obscure, or when the complaint was proving dangerous and all ordinary aid had failed, particularly if this was in a hitherto healthy adult—then their minds turned to the supernatural.[3]

The Indians of the region had both medicine men and medicine women.[4] They have been described by Frederick Hodge in his *Handbook of American Indians North of Mexico*: "These shaman healers as a rule were shrewd...; some were sincere, noble characters, worthy of respect; others were charlatans to a greater or lesser degree."[5] As part of their healing ceremonies, they used ritual, songs, drumming, prayer, and medicinal plants.

The Indians did not separate the use of these various methodologies in their healing practices. In my research, however, I examined just one component in isolation—the use of medicinal plants. Medicinal plants have played a major role in the health and healing systems of the Indians. This use of plant medicines has not been static, but has changed to meet new needs. Diseases that were apparently brought to North America from Europe, such as smallpox, have in some cases been treated with native prairie plants.[6]

The Indians of the region used moxa, or counter-irritants, as a treatment. For this purpose, they would burn a piece of a plant, such as the stem of lead plant (*Amorpha canescens*), on top of an injury. This burn was believed to counteract the injury underneath it. Moxa is used in the Orient today to stimulate an acupuncture point or serve as a counter-irritant. Plants used as moxa by the Plains Indians include: lead plant, asters (*Aster* spp.), round head lespedeza (*Lespedeza capitata*), white sage (*Artemisia ludoviciana*), nine-anther prairie clover (*Dalea enneandra*), prickly pear (*Opuntia* spp.), prairie ground cherry (*Physalis pumila*), and wild alfalfa (*Psoralea tenuiflora*).

There are also examples in Indian medicine of the Doctrine of Signatures, or belief in signs. According to this doctrine, the distinctive characteristic of a plant revealed its medical use. Green milkweed (*Asclepias viridiflora*) and snow-on-the-mountain (*Euphorbia marginata*) both have milky sap, which was a sign or signature that these plants were good to take as medicine by mothers who needed to produce more breast milk for their nursing babies.

Almost all native plants had Indian names. In some cases the Indians recognized a greater number of species or varieties than we do. Beebalm (*Monarda fistulosa*) is recognized today to have two distinct varieties.[7] The Pawnee had four names to distinguish the four varieties that they recognized and used.[8]

At least two plants, yarrow (*Achillea millefolium*) and sage (*Artemisia* spp.), were used almost identically by Indians in North America and folk practitioners in Europe before the two culture groups had contact.[9] In addition, there were some highly specialized uses of plants which today are considered to be dangerous. For example, soapweed (*Yucca glauca*) and puccoon (*Lithospermum* spp.) were known to be birth control substances and locoweed (*Oxytropis* species) was used for sore throat, asthma, sores, ear troubles, and to increase the flow

Liatris punctata

of mothers' milk.[10]

Many of the Indians' medicinal remedies can be explained by the presence of biologically-active substances in the plants. Twenty-eight of the 203 plants included in my study have been listed at some time in the *U.S. Pharmacopoeia*. However, the majority have ranges that extend into the more wooded eastern United States where the interest in finding and studying medicinal plants was historically more important. In fact, there was only one species listed in the *U.S. Pharmacopoeia*, purple coneflower (*Echinacea angustifolia*), that has a range confined to the Prairie Bioregion. This lack of use of native prairie plants by White doctors does not indicate that the prairie has fewer plants with biologically active substances, but rather that prairie plants have not been sufficiently studied.

There is a growing recognition of the value of plants for medicine. The World Health Organization concluded "that to meet the minimum health needs of developing countries by the year 2000, traditional medicine must be utilized."[11]

There is also a growing interest in plant medicines in the more developed countries. In Germany, which has liberal regulations on herbal preparations based on a strong tradition of natural drug usage, a survey found that 76% of women interviewed drank herbal teas for their beneficial effects, and about 52% turned to herbal remedies for the initial treatment of minor illnesses.[12] Remarkably, the greatest interest in the purple coneflower (*E. angustifolia*) today comes from Germany, where most of the research on its immunostimulatory properties is being conducted.[13] This plant, native to the prairies of North America, was also the medicinal plant most widely used by the Indians of the Prairie Bioregion.

The medicinal constituents and ethnobotanical uses of the plants of the Prairie Bioregion have not been adequately studied. To the Indians of the Prairie Bioregion medicinal plant uses were probably as important, if not more important, than food uses. In writing my previous book, *Edible Wild Plants of the Prairie*,[14] I found that 123 species of prairie plants were used for food, while in my current research I found 203 species to be used for medicine. Many plants were used for both food and medicine, usually with different preparation techniques or the more potent parts used for medicinal use.

The most comprehensive primary study of the ethnobotany of the Indians of the Prairie Bioregion is Melvin Gilmore's *Uses of Plants by the Indians of the Missouri River Region*, first published in 1919.[15] In this work, Gilmore made detailed observations on the use of plants by the Omaha, Ponca, Dakota and Lakota, Pawnee, and Winnebago. Paul Vestal and Richard Schultes of the Harvard Botanical Museum said in 1939 that "the economic botany of no group of Indians in North America is probably so inadequately known as is that of the Plains tribes."[16] Since then, there have only been a few studies of their ethnobotany.

Part of my current work is to revitalize interest in the ethnobotany and economic botany of the Prairie Bioregion. Conservationists, botanists, ecologists, environmentalists, and others can make

use of ethnobotanical information when studying prairie plant species for other purposes, and when presenting information on them, or on the values of native prairie, to the public. It is important for us to speak for the past, present, and future values of prairie because we need to help people see the rich and wondrous diversity of prairie plant species within the subtle landscape of the region.

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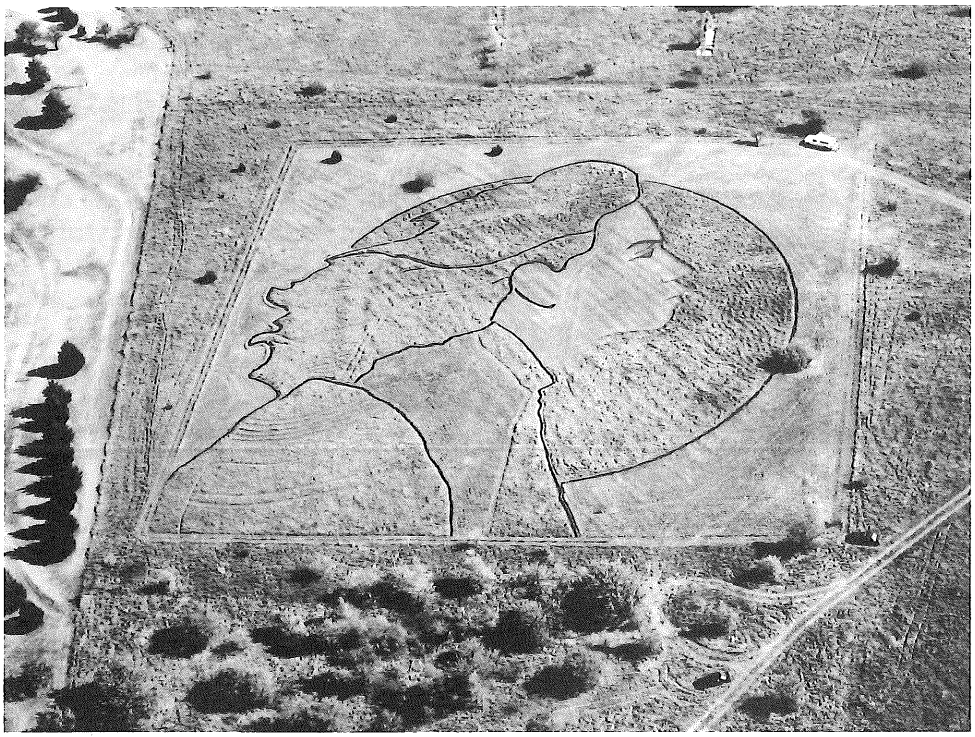
Kelly Kindscher's new book, *Medicinal Wild Plants of the Prairie*, is published by the University Press of Kansas and will be available in mid-June.



"Little Girl in the Wind," a prairie portrait of Kickapoo Indian Carole Cadue by Lawrence artist Stan Herd, located east of Salina.

Considerations for a Sustainable Society

The Role of Livestock in Sustainable Agriculture

Raymond Coppinger, Elisabeth Clemence, and Timothy Coppinger

We live in an age called the neolithic. It started 10,000 years ago and is characterized by permanent settlement and a developing symbiotic relationship with a few plants and animals. We think that we domesticated the grains and livestock—but that is a little egocentric, since we as a species are absolutely dependent on them. Our relationship with them is truly symbiotic, for their success is ours and vice-versa. We are involved in a domestic alliance so successful that many—perhaps most—of the wildlife on the planet may soon join the dinosaurs as part of the fossil record.

We are at the point in the neolithic age where the transition from hunting and gathering societies to a culture dependent on agriculture is virtually complete. The end of commercial fishing is in sight, the last of the "naturally" gathered foods. There remain a few rituals to remind us of the past, such as pick-your-own strawberries and turkey shoots, but these are based on species that are already part of the symbiosis.

Animals and plants that can't get in on this "domestic alliance" will be extinct in just a few more generations.[1] Arthur Westing has estimated that by 2030, people and livestock could amount to forty percent of the terrestrial animal biomass.[2] For those of us who are wildlife biologists that is terrifying. Westing is looking only at the next forty years, and we are thinking "forever." It doesn't look good for the wild world.

As we accept the reality of nature's demise, we must realize that all the ecological rules that currently frame life will stay the same for the ensuing nurture of agriculture. The concepts of diversity are theoretically as important for agricultural production as for natural production. Darwin said in his principle of divergence, "The same spot will support more life if occupied by very diverse forms... It has been experimentally shown that a plot of land will yield a greater weight if sown with several species and genera of grasses than if sown with only two or three species."[3] Sheep, goats, and cows prefer different species of plants and, like wild ruminants, specialize on different portions of the same plant. This leads to greater utilization of primary productivity with a minimum use of water and little soil disturbance.

In order to preserve the "balance of nature" we should strive to preserve and enlarge the diversity within the domestic alliance. In the agricultural ecosystem we should have as many trophic levels represented as we did in the ecosystem that it replaced. Only then will we have an agriculture that mimics nature in what might be referred to as a sustainable and perennial polyculture.

A diversity of trophic levels means incorporating animals into our agriculture. Throughout the popular and "politically correct" sustainable agriculture movement, animal production has often had a bad name. A philosophical rejection of livestock often stems from a reaction to management abuses in overproduction. The organic pollution in the case of feedlots, or desertification and land degradation due to overgrazing, should not be blamed on the animals, any more than silting, salting, and erosion from irrigated monocropping should be blamed on plants. Often as we argue the virtues of vegetarianism or some other dietary reform we forget that we are putting our own health above the health of a diversified ecosystem.

Some would argue that to cease animal agriculture would eliminate a trophic level. The resulting reduction of land devoted to raising animals and animal feed would allow us to support a greater number of people (a dubious virtue). We would like to argue that this is an over-simplification and probably false. Ruminants can eat more of the photosynthate produced in any habitat than can simple-stomached forms like ourselves. They can also turn that photosynthate into better quality food for us and avoid many of the environmental costs of grain and vegetable production. Most importantly, they integrate with the natural world better than most other forms of agriculture.

The Spanish have an old proverb: Wherever sheep feet touch the ground, the land turns to gold. There are many reasons for this. Ruminants and grasslands are symbiotic. The relationship between grazers and grass is on the same order as flowering plants and pollinating insects. If it weren't for the ruminants, natural grasslands would probably succeed to brush and forests. The very act of trampling a grassland allows stored organic material to be redeposited in the soil. Keeping grasslands cropped short through grazing reduces transpiration without increasing evaporation, thus maintaining soil moisture and higher water tables even in dry seasons. Grasslands and their incumbent animals

are more efficient at turning sunlight into biomass that are forests, and certainly more productive than row cropping, simply because not so much of the photosynthate is stored and water is conserved.

Probably the greatest asset of animal over grain-and-vegetable agriculture is that there is no need to plow. One never needs to have a naked soil, exposed to sun, leaching rains, dehydrating temperatures, and eroding winds. For this reason livestock can be raised on sloping land or on land that is vulnerable to wind or water erosion. Livestock successfully inhabit marginal and fragile lands and may even improve it over time, allowing organic material and soil moisture to build up.

Many farmers around the world still have wild creatures in their pastures. Many do not seem to mind these competitors because of the value of recreational and commercial hunting. Hunting rights can be sold by ranchers and on many farms around the world this can be a sizable portion of income. Western ranchers in the U.S. often make as much money on hunting permits as they do on their livestock. In Argentina, introduced European hares are now commercially harvested and both the pelt and the carcass are a substantial portion of the total agricultural export. There should be more conversations about wildlife being part of the ranch product, for in theory, endemic wildlife are better adapted to the land.

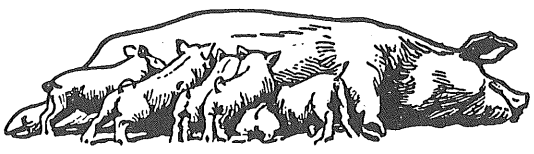
Regardless of one's ethical feelings about harvesting wildlife, the animals can be included as part of the total productivity of livestock operations, whereas they are rarely considered an asset on grain, vegetable, of fruit farms. Regulations for the use and export of furs and carcasses should be written with hunters and fishermen in mind, since they are often the major supporters of conservation efforts simply because they have a vested interest. When environmentalists closed down the world's fur markets and killed the price, Argentinian ranchers went back to spreading strychnine on the range to get rid of "worthless" vermin. If we want to keep that part of the natural environment, then it has to have a value, and part of that value must remain with the rancher.

Inherent in livestock management are two attractively flexible assets that lead to environmental stability. One is that animals are edible from the moment of their birth. There is not a ripe stage, which means that there is no set time for harvest. Also, livestock can move to food and water, take evasive action to pests, predators, or hostile climatic conditions, and in a sense they can care for themselves. Domestic animals don't generally have estrous cycles that are locked tightly into environmental signals such as light cycles or rainy seasons. This means that breeding can be arranged to coincide with photosynthetic production. Reproduction also can be scheduled so that lamb births occur after eagles, a major predator, migrate away. Lambing, calving, or shearing and foot-trimming can be planned for times when labor is available or when other crops don't need attention.

Many peoples of the world have centuries-old traditions for animal management in good times and bad in order to maximize not production but survival. During a poor growing season animal populations can be adjusted by migration or slaughter to suit the needs of the environment. During lush times, the Turkana tribes expand their herds of cattle, camels, and goats. When the lush grasses fade in periodic Sahelian droughts, they reduce the numbers of cattle and goats, keeping the camels, which eat leaves of the deep-rooted trees.

All life on our planet is dependent on photosynthesis. Photosynthesis is dependent on the number of photons of light that are available to plants, plus water and carbon dioxide, all of which are seasonally limiting. Plants are seasonally reactive, often having limited seasonal periodicities, resulting in small windows for germination and harvest. We have to eat every day of the year, which means that the edible photosynthate has to be stored for as long as a year after harvest. Stored plant products progressively decrease in palatability, nutritional quality, and edibility. It is also expensive and risky to keep pests out, which is why many cultures store the plant crop in their animals. Animals are able to eat plant material even when humans can't. Rotted and contaminated vegetable matter is much less of a problem for ruminants, and often green matter is purposely rotted (silage) to increase the value for ruminants and at the same time prevent other organisms from eating it.

Livestock can be used to harvest and salvage crop failures, or products that don't come to some standard of human need. Crops that are infested with pests or fail to fully mature in a poor season can be fed to ruminants. Similarly, animals are used to harvest residues of crops or to utilize portions of crops that are inedible. We, for example, live near apple orchards, and feed the leftover apple pulp from cider production to our sheep. In a diversified agricultural system, several crops might mature simultaneously and available labor might not be adequate to harvest it all. Animals can harvest these surpluses and store them for future consumption in their converted form.



Similarly, animals are used to harvest portions of a farm's unusable lands, and to gather seeds, insect pests, and other incidental products. Chickens sorting through ruminant droppings send the undigested photosynthate through the digester again. Chicken droppings can be run back through the cow as a source of nitrogen.

In recent years the healthfulness of animal flesh has come under scrutiny. The simple truth is that animal tissue is more digestible, has better ratios of essential amino acids, and as most people forget, has better ratios of essential fatty acids than do plants. Two major nutritional health problems of pre-World War II Japanese workers were beriberi and hemorrhoids. They ate so much rice to fulfill their caloric requirements that they constantly damaged their intestinal tracts. To meet metabolic and nutrient requirements, animal products are softer and less bulky, and for hard-working people with high intestinal peristaltic action there is less damage to the intestinal tract.

Animal tissue is also digestible uncooked. When we talk about calorie content of a specific food we forget to include the cost and the environmental expense of making the food digestible. Grains have to be cooked in order to provide nourishment to people. This is true of many plant products, some of which, like potatoes, are poisonous if not cooked. The only reason to cook meat is to kill parasites, and this can be done in calorie-conserving ways such as seviches, where natural acids are used to do the processing. Meat can be salted or sugared, smoked or dried. As part of a perennial polyculture, the basic reproductive unit need not be killed for years, providing offspring, blood, milk, and by-products such as fiber and draft labor right up to the time it is eaten.

The problem with an animal diet is that is very easy to eat too much. Too much of anything, that is, consuming beyond bodily needs or capabilities, will be harmful. There is no universally perfect diet, but a meat diet takes much less knowledge to meet essential caloric and physiological requirements, especially if activity levels are high.

Birds and mammals are homoiothermic. A major contributor to this process is the insulating quality of fur and feathers. These two animal products, combined with their skin and sinew, provide humans with a marvelous resource for clothing, helping us with our own thermo-regulatory mechanism, and allowing us to live comfortable with less need of heating fuel.

We in over-developed societies often forget the value of manure as fuel. Food for the most part must be cooked, and our dwellings heated. Methane digesters may be more ecologically sound than fossil fuel burners, but it requires a level of technology that far exceeds putting a match to a buffalo chip. In rural Turkey houses are built with stones that are chinked with an excrement paste. Wheat straw and hay are stored on the roof, acting as insulation, and then moved to an animal room adjacent to, and insulating of, the living room, for feed and bedding. The resulting mixture of straw and excrement is cut into blocks, stacked, dried, and used as fuel for cooking and heating. The ash fertilizes the garden.

In addition to ash, all the by-products of animal production are excellent fertilizers. These days, all our "organic" friends are looking for animal wastes to help their gardens grow. Most often the problem with intensive animal production is that nutrients are being moved away from their source. In many cultures this is used to advantage by allowing the animal to forage during the day on distant pastures and then excreting the residue next to the garden at night—another labor saving device.

We could continue to extol the virtues of our symbiotic life-preservers, and we haven't even mentioned many of them by name. We don't want the reader to think that we haven't considered the goldfish or the rice rats or even the dog in our "balance of agriculture" ecosystem. In many cultures the simple-stomached animals such as the chicken, dog, and pig provide another trophic level, digesting animal and human garbage and excrement products, turning them into edible and wearable products.

Last summer when part of this article was presented as a lecture at The Land Institute, one of the interns asked, "What's the point?" Perhaps the student thought the subject was being presented as some kind of contest between animal and vegetable. Not so. The question being asked is, how could a perennial polyculture be restricted to some plants? Why would one think that a prairie or prairie mimic could exist without animals? Prairies are symbiotic relationships between plants and animals. Agriculture is a symbiotic relationship between humans and varieties of those same grasses and animals. One cannot isolate any of the organisms from a symbiosis.

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Vegetarian Pastures

Michael Melius

These are thoughts you avoid when you're a vegetarian and have a passion for prairie.

I've come late in my life to both conditions. I wasn't raised as a vegetarian, and was only confirmed in my 25th spring, driving once-too-often through the stench from a cattle feedlot. Confirmation is not practice; in the ten years since I've become neither purist or preacher about this. I rarely eat meat, but it's hard to avoid it in this culture, hard to waste once it lands on my plate. My reasons for disdaining meat are many, having accumulated through the years until now I'm sometimes repulsed just by the thought of eating flesh. Meanwhile, I've largely lost my taste for meat, certainly pig meat. That was never a goal, but there it is. You can't argue with taste.

At about the same time, this passion for prairie has nearly become a need. It, too, is late, especially since I grew up knowing and roaming plenty of grassland, tame and native, in northeast South Dakota. It's late in that it's taken this long to collect the experience and understanding that inspire passion. And it's late in that so little true prairie is left in the Great Plains, not even in patches.

These convictions have grown separately in me, keeping their distance, but lately they shadow each other, competing. And in that dark place hide the thoughts I'd rather ignore, centered on the question, "How can you keep the country in grass without eating meat?" I drive past some prairie remnant and think, "I'm not much help here." Because I'm not in the market for the one product, grass-fed beef, that makes this land sustainably productive. "This land" being the Great Plains, where grass and grazers are ascendant.

This tears me in two. And I crown my duplicity with a fool's cap, for not adapting to the ecosystem I would champion, this supposed herbivore in a land I love but can't eat.

The complications have barely begun. Back home the Hutterite colony's new megaconfinement hog operation just reached the peak of production. Because now the cool north breezes of summer aren't so welcome, laden as they are with the stink peculiar to swine and corn and the stew of their sewage. Thoughts you may avoid, but smells? This is true property devaluation, when the home place seems less livable.

The stench reminds me: these are livestock that don't need pasture. Not that they have much choice in the matter, living from womb to slaughter in confinement. These animals live off native

Stirring the ancestral memories of our neighbor's bison with a prairie fire.

ecosystems, grass and wood and wetlands, that have been converted to farmland to grow feed grains. They're better fed than many of the world's people.

You carnivores may be doing my dirty work, but not if you're careless. All meat is not created equal. There's grass-fed, coyote-raised beef, and then there are hogs and poultry grown in confinement, fed by an expensive and inefficient farming system. Choose your cuts with these thoughts in mind. You want your meat butter-soft? Here I am trying to learn to live without killing and you're trying to live without chewing. You've gotten a bit lusty for the taste of meat, wouldn't you say? Can you imagine a supper without meat? What are the thoughts you avoid?

This is not to say that everything's fine on the range, or that we should subject every locale to management by Herefords. Nor can we forget the many ecosystems around the world being converted to grazing, as a meat-hungry world seeks to join us high on the food chain. And I'm always reminded, come summer, the way cattle raising involves stealing so much from the land, pure prairie sometimes, as hay: sheared, swept up, packed and piled and taken away. Then it's often the last to be used. Next time you travel in cattle country look for the piles of grass hay, abandoned and dark with rot.

Grass and other native plants have the advantage over annual grains in being perennial, hardy and adapted, enduring through too much rain or not enough, late or early frosts, hail, wind, heat, fire—in a word, sustainability. With all that, the greater biodiversity in the pasture versus the grain field is almost a bonus. To me it's primary.

What alternatives would I suggest for living off this grass? Toss in some buffalo and charge admission? (Ecotourism. With grazers, you can have your scenery and eat it, too.) Write about it? (Another kind of tourism.) Grow wools? Sell transplants? Dried arrangements? Eat the seeds? (The Land Institute gives vegetarians a lot of hope.)

Ultimately I don't care what it takes to keep this country in grass, just that it be so. Too much is lost when the prairie is lost. If it's not kept by private profit then it will involve some sacrifice, giving back and leaving alone. I daydream of turning the home place, farmed since before I was born, back to grass—all the way, to gophers and burrowing owls and ferruginous hawks. Orchids? Not to wish the stench of the hog farm on them. Not to turn back the clock. Who needs to turn back time when it keeps repeating itself? Time is a measured period. I choose mine, and act as an agent of periodicity, restoring that grassy prairie to this one square mile.

Michael Melius is a farmer by summer and writer by winter, from Hermosa, South Dakota.

Saving Land Means Saving Communities

Jim Scharplaz

The Z-Bar Ranch is an historic Flint Hills cattle ranch located in Chase County, Kansas. For the past several years there has been a great deal of controversy over various plans that have been proposed to make the Z-Bar into a public preserve or park. Recently, a compromise was hammered out in the long-running dispute. Both the ranchers who opposed the park and the environmental groups that supported it have agreed to the establishment of a private foundation that would buy and operate the ranch as a preserve. Many people have hailed the agreement as a victory for both sides. To me it appears that both sides have lost.

The Z-Bar as anything but a working, productive ranch is one more loss to the shrinking farming/ranching community. In decline for years all over the United States, farm and ranch communities everywhere are losing their ability to function. Chase County farmers and ranchers know, if the losses continue, that the day will come when their community won't work. When their kids will have to ride the bus to Emporia to go to school, and then will go away to college and won't come home anymore. When it's so far to a doctor that old folks can't safely retire in their life-long homes. When the local grocery store, repair shop, post office, pool hall, and horse-shoer won't have enough customers to stay in business.

Some claim that the preserve will provide economic stimulus to Chase County, which will help reverse the effects of the shrinking farm/ranch population. The preserve may prove lucrative to

On Jane Koger's Chase County ranch

some, but the kind of economic activity it sponsors will not reverse the deterioration of the traditional community. Chase County farmers and ranchers don't need tourists or tourist dollars, they need neighbors. People who will help burn pasture in the spring and ship cattle in the fall. People who will put your cows in when they get out, feed your livestock for you when you're sick, and stop their pickup or rein up their horse and talk when you feel like you're the last person left on earth. People who will serve on the school board, the Extension Council, the SCS board and the ASCS committee. People to join the churches, the local farm and business organizations, and the social clubs. People who will raise families on the next place down the road so that your kids will have someone to go to school with when they're young and someone to marry and raise your grandkids with when they grow up.

The preserve will, of course, bring in some people. Good people, too. Committed, highly motivated, intelligent people dedicated to doing the very best they can for the tallgrass prairie. People determined to contribute everything they can to the community they live in. People who, for all their good qualities, can never quite replace the farmers and ranchers that have gone, for, when it comes right down to it, they eat not because the sun shines and the rain falls but because Uncle Sam sends a check once a month.

Well, you may say, it's sure too bad about those ranchers, but the Flint Hills must be preserved, even if ranchers have to be sacrificed to do it. The Z-Bar is not the Flint Hills. The Flint Hills are six counties high and three counties wide, from Barnes and Parallel to Silverdale and Maple City, from New Cambria to Eskridge. When we put a fence around a little piece of it and declare it preserved, in effect we are consigning the rest of it to destruction. That little piece justifies a lot in the public mind: the Flint Hills are "preserved," let's do as we please with what lies outside the boundaries of the preserve. The Flint Hills, like the Amazon jungle and the Alaskan wilderness, are now a resource to be exploited by commercial interests. Even the "empty" space can be considered an extractable resource, to be turned into a training ground for Army tanks or a dumping ground for trash, with a profit turned in the process. When everything around it lies destroyed, the creation of a Z-Bar preserve will be a hollow victory indeed. Including every square foot of the Flint Hills in a preserve would not solve the problem either. Neither the federal government nor private foundations have much of a record against large monied interests. Only a population that understands that its life depends on the Flint Hills will take care of them as they should be taken care of. That's why the Flint Hills were in such good shape when they were stolen from the Native Americans. That's why, to a lesser extent, ranchers have taken good care of them since then.

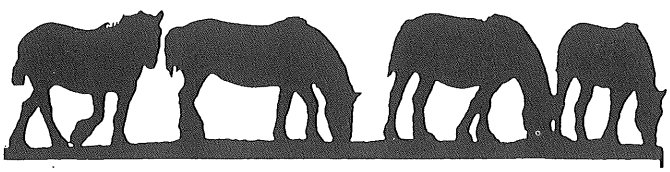
Environmentalists, if you're serious about the Flint Hills, or the Chautauqua Hills, or the Red Hills, or the Gyp Hills, or the Smoky Hills, or the Big Bend of the Arkansas, or the High Plains or any other geographical region that suits your fancy, move there. Live there. Be a neighbor. Make a hand. Become a part of the process of converting sunlight into human food by way of the prairie and grazing animals. Give up the conceit that you can stay in your urban ivory towers and send out park rangers to salve your consciences by remote control. Use your intelligence and resources to find a way to opt out of our consumption-crazy society.

Ranchers, we are vastly outnumbered, and our numbers are shrinking fast, yet we foolishly support policies that tend to destroy our communities and way of life. The economic powers that want to develop the Flint Hills will roll over us as surely as they roll over the population of any Third World country. We may have done well by the Flint Hills in the past, but the day will come when our best efforts will be completely inadequate. We need new people and new ideas. Reach out to welcome those who have the same goals we do, even though we're too dense to realize it and too stubborn to admit it. Our bigotry and biases have brought us very close to extinction. We must not just accept, but actively seek, the cooperation that can save the land—and us.

The image farmers and ranchers have of an environmentalist is of an arrogant yuppie in a three-piece suit dictating impractical policy from his plush Washington office to the ignorant country bumpkins. I think many environmentalists see us ranchers as greedy robber barons, taking as much as we can from our land and putting as little as possible back, while actively trying to poison the public in the process. Both images are false and both serve to divide us. Perhaps they are subtly encouraged by those who gain by our mutual animosity.

Ranchers and environmentalists are fellow travelers—and don't realize it. We should be—and must become—good friends, or our journey will be a failure. Maybe we can both start by making an effort to see and be seen as we really are.

Jim Scharplaz is a rancher from Minneapolis, KS.



Kansas Farm Women: Growing out of the Tilth

Tonya Haigh

We who study change in agriculture often find it interesting to explore the social issues that support farming, issues such as community life, family dynamics, and child rearing. At The Land Institute this spring we have often questioned how such societal aspects of agriculture might affect systems of production. Another question arises: How might the practice of sustainable agriculture affect a value system that simultaneously changes societal structure? From here we must begin to wonder what women's and men's roles are in all of this. The public will have a forum for discussing these same kinds of issues when "Kansas Farm Women: Growing out of the Tilth" premiers at The Land Institute's 14th Prairie Festival. The fifteen minute mixed-media show documents farm families at home, working on the land, and in connection with their wider communities, using photographs as text and as a foundation for storytelling.

Cynthia Vagnetti, the coordinator of "Kansas Farm Women," is a free-lance photographer based in Lawrence. She has been studying sociological aspects of the modern farm family through interviews and photography. The presentation focuses on the value systems of farm families that are developing alternative farming practices, focusing on the women to reflect their important role in our value systems and farming systems. To Cynthia, the reasons for focusing on women in agriculture are clear: "It seems that one consistent feature of sustainable agriculture is the family as a unit. They are not only a unit politically or in value terms, but they are the first step in understanding what community is. I think these women exemplify a paradigm that supports farming sustainably. They are not only related to the land, but they are also related to their families and are the interconnections towards the community."

The idea for the presentation came from Cynthia's graduate thesis in 1988, and the work that followed was mostly self-initiated. She began interviewing women and photographing the project in 1990, and received funding for her work in December of 1991.

Three Kansas women, Lisa French, Nancy Vogelsberg-Busch, and Marilyn Jones, and their families are the focus of the presentation. The women Cynthia interviewed are all strong role models and accomplished farm women. Nancy Vogelsberg-Busch farms a diversified organic operation, along with her two children and her husband Rick. Marilyn Jones and her husband Gary also have a diversified farm and raise over 200 sheep in southern Kansas. Lisa French and her husband Jim work a regenerative farm and raise their two children in a close traditional community. All three women are also actively involved in community organizations. Their stories, presented together, highlight some of the opportunities and challenges of the changing family roles in modern sustainable agriculture.

To study further the question of why women should be the focus of a discussion of farm values, it helps to look back at women's agricultural role throughout the settlement of the U.S. and the mechanization of farming. Although the sphere of women's work on the farm has typically been marginalized under the title of "Home Economics," and thus devalued as non-labor, the mothers, daughters, and wives of the American farm family have provided critical economic and emotional support for the farm family. During the drought of the 1930s, the ingenuity of the farm woman was the key to survival and maintaining quality of family life. She was not only able to add to the income of the farm through small, diverse activities such as selling eggs or cream and renting out sleeping rooms, but

Kansas garden women: Corey, Tonya, Emily, and Beth.

also held the job of maintaining emotional stability within the family and generating a quality of life that could not be bought at any price. Women provided subsistence production for household consumption, which meant caring for a large garden, raising poultry and dairy animals, sewing and weaving, and generally making ends meet. The women on the farm also contributed substantially to the hard labor of cultivating and harvesting, without wages.

Women's roles in contemporary agriculture are quite different from the days of midwestern settlement. While mechanization has in some sense lessened some of the hardships of both men and women, it also isolated them in their work and placed more financial burden on the family unit. While more women are working off the farm to bring income to the family, their on-farm responsibilities continue to be undervalued. Men and women involved in sustainable agriculture are seeking to redefine labor roles and family systems past the historical standards that may no longer be functional. Labor needs in organic farming require that those who wish to farm this way re-examine family needs, the concept of family chores, and the role of every family member. Community is also being redefined as an important factor in the emotional and economic support of the small farmer. These concepts are part of a changing ideal of quality of life, the communication of which to the greater community and future generations I think will require the leadership of women.

The woman has had a traditional role in linking the family to the outside world. She has been the educator, the caretaker, and the center of family activity. All of these things, traditionally undervalued, are extremely valuable resources. Farm women can be looked to for leadership in these areas and at the same time demand equality of responsibility in these roles. The family-community link is a huge factor in the development of a sustainable future, and is ultimately dependent upon the creation of equal partnerships within families which will share responsibilities of passing on values and linking family to community. "Kansas Farm Women" gives examples of the greater involvement and responsibility of the woman on the farm today, and leaves open to discussion the challenges, rewards, and potential burdens of this role.

"Kansas Farm Women: Growing out of the Tilth" will premier at The Land Institute's Prairie Festival on Sunday, May 31, at 2:30 in the afternoon. A panel discussion moderated by Rita Napier of the University of Kansas Department of History will follow the presentation.

General Aggrievement on Tariffs and Trade

Kathy Collmer

All our efforts toward sustainable agriculture may be killed in one fell swoop if the current General Agreement on Tariffs and Trade (GATT) proposal is accepted. The trade agreement, which has been under negotiation for six years and includes 108 countries, is expected to be concluded this year. By promoting global consolidation in agriculture, GATT will increase both the scope and the speed of the market forces eliminate small- and mid-scale farmers.

Propelled by the Cargills and Monsantos of the world, GATT has achieved an incredible momentum, and stopping it will require concerted action by American citizens over the next few months. The challenge is made more difficult by the fact that there has been virtually no American media coverage of the most dangerous sections of the current GATT proposal.

The scant news about GATT that has appeared has focused almost entirely on export subsidies, while GATT's unprecedented threat to food safety and environmental protection goes unnoticed. That threat lies in the proposed creation of an unelected international body called the Multinational Trade Organization, or MTO. As the judiciary and enforcement arm of GATT, the MTO would have the power to force any GATT country to repeal all national, state, and local laws that the MTO declares to be out of compliance with GATT rules.

Under the current GATT proposal, any law that restricts or regulates agriculture, manufacturing, or commerce-related activites is open to challenge. For example, DDT has been banned in the United States for many years, and we currently have the authority to reject at the borders any imports that contain more than a certain level of DDT residues. Under GATT, this regulation could be challenged by any other GATT-member country as an unfair barrier to trade.

The case would be brought to an MTO dispute resolution panel in Geneva. In their deliberations, which are closed to the public, panel members would be prohibited by GATT rules from considering any factors other than strictly commercial ones. Arguments about consumers' health, environmental damage, farmworker safety, or social impacts on farming communities are not allowed.

In this example the United States, as defendant, has the burden of proving that the ban on DDT-tainted imports does not in any way restrict commerce. The obvious unlikelihood of winning such

a case is compounded by the fact that cases are argued in the GATT "court" not by citizen representatives, but by appointees of our President. The panel's ruling would automatically goes into effect within 60 days, unless all 108 GATT countries unanimously vote to reject the decision.

Upon losing the case, the U.S. would then be required to rescind the offending DDT ban. Because GATT's "market access" provisions require every country to import at least five percent of its supply of every agricultural commodity, we could thus be forced to import DDT-contaminated food. Furthermore, we would not be allowed to label it as such, or even to put point-of-origin labels on it before putting it on the grocery shelves, since such labeling would be "discriminatory," and therefore constitute an "unfair barrier to trade."

Leaving aside the blatant violation of national sovereignty that this process represents, what is the long-term picture for agriculture and food safety? If the above example comes to pass—and something similat is almost certain to if GATT is accepted—our markets would be flooded with cheaper imports, causing prices on certain foods to plummet. U.S. farmers would be underpriced by growers in the Third World, where pesticide regulations are generally lax to non-existent. Many U.S. growers could be forced out of business. Economic hardship would undoubtedly generate intense pressure on U.S. policymakers to relax or abolish many regulations that American consumers and environmentalists have worked long and hard to obtain.

Looking just at the single area of food safety, here are some likely consequences of GATT:

- We would be forced to import meat and dairy products with high levels of hormone residues and disease contamination.
- Restrictions on the sale of milk containing genetically engineered bovine growth hormone (BGH) would be eliminated.
- Labeling rules for irradiated foods would be abolished.
- The Food and Nutrition Act of 1990 would be repealed.
- The Delaney Clause of the Food, Drug, and Cosmetic Act, which prohibits food additives that cause cancer, would be repealed.
- Organic foods certification requirements would be thrown out.
- Proposed "Circle of Poison" legislation, which would prohibit U.S. chemical companies from selling overseas the pesticides that have been banned in the U.S., would be impossible.
- Government support for sustainable agriculture programs would be reduced or eliminated.

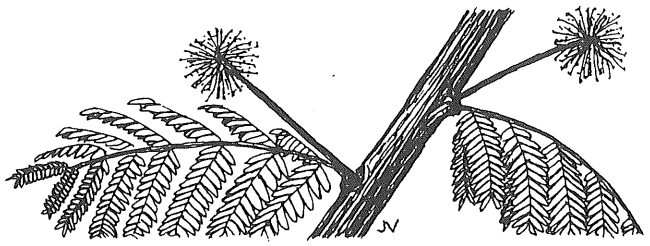
Unfortunately, both the U.S. House and Senate are currently under "fast track" rules for GATT approval. Since GATT is technically an agreement, not a treaty, only a majority vote is required for passage. From the time President Bush submits the package of GATT-enabling legislation—which he could do as early as this month—Congress will have no more than 60 working days in which to vote on the agreement. Debate is limited to 20 hours and no amendments are allowed; Congress must vote yes or no on the entire package. Because the few segments of American society that might benefit from GATT, such as the multinational corporations, have powerful lobbies on Capitol Hill, a yes vote at this point is quite possible.

However, anti-GATT sentiment is rising as Americans realize that the environmental, labor, health, and safety standards to which we have become accustomed are endangered. While many of us wish these standards were higher, they are nevertheless among the highest in the world.

The Citizens Trade Watch Campaign, the national coalition that is leading the fight against GATT, is pressing for passage of House Resolution 246, also known as the Waxman-Gephardt Resolution, and Senate Resolution 109, the Riegle Resolution. These resolutions call for Congress to reject any trade agreement that endangers U.S. health, safety, labor, and environmental standards. Both resolutions call for Congress to get off the fast track and open the debate to the American public.

As the facts about GATT become known, it is increasingly obvious that the "free" in "free trade" means nothing more than a free ride for multinational corporations. GATT will simply make it easier than ever for these conglomerates to transcend national borders and move to wherever labor and raw materials are cheapest and health and environmental standards are lowest. Since this will apply to agriculture as much as to any other industry, American citizens will effectively lose all remaining vestiges of control over the way their food is produced.

It's up to us to prevent this GATTastrophe! Write your Congressperson and Senators immediately. For more information on GATT, write Lori Wallach at Public Citizen, 215 Pennsylvania Ave. SE, Washington, DC, 20003 or call 202/546-4996.



The Social and Political Challenges of Biotechnology

Brooks Anderson

In two recently published works of importance to the sustainable agriculture movement, scientists admit that they do not know what role modern biotechnologies will play in America's effort to achieve a sustainable agriculture. In *Sustainable Agriculture in the Temperate Zones*, a group of entomologists writes, "It is not clear at this juncture whether or not biotechnology will be used to facilitate a transition to sustainable agriculture." Similarly, in the National Research Council's report, *Alternative Agriculture*, the board on agriculture remarks, "It is too early to tell how biotechnology will influence agriculture."[1]

In contrast to these resignations to wait-and-see, another position has been persuasively argued, most notably by Jack Kloppenburg. Kloppenburg maintains that social scientists should be able to develop reliable projections of the social, economic, political, and environmental impacts new technologies may have in the future. To develop such projections, scientists draw upon both past and present phenomena, identifying comparable aspects which can be expected to recur in similar fashion. By this logic, we need not remain idle during the development and diffusion of new technologies, assessing them after the fact. Instead, we can estimate the probable impact of new biotechnologies. Kloppenburg argues that in the past,

> social scientists could have, and perhaps should have, been in a position to observe the effects associated with the introduction of hybrid corn and subsequently anticipate, and possibly alleviate, certain negative consequences stemming from the introduction of Green Revolution plant varieties.[2]

But rather than studying and learning from these unprecedented applications of innovations in plant breeding, the social, economic, and ecological impacts of hybrid corn and the Green revolution remained for the most part unexamined until after 1970. Such impacts of the Green Revolution

> ...include the exacerbation of regional inequalities, generation of income inequalities at the farm level, increased scales of operation, specialization of production, displacement of labor, accelerating mechanization, depressed product prices, changing tenure patterns, rising land prices, expanding markets for commercial inputs, genetic erosion, pest vulnerable monocultures, and environmental deterioration.[3]

Given these past experiences and the direction that biotechnology research is taking now, Kloppenburg projects that for farmers "biotechnology should set the stage for a particularly rapid series of cycles on the technological treadmill. Biotechnology can be expected to increase the reliance of farmers on purchased inputs even as it accelerates the process of differentiation among farms and facilitates further concentration of operations."[4]

To understand why biotechnology will cause such results, one must examine the forces that influence the way new technologies in our society are developed and harnessed. To attain a sustainable agriculture we must direct at least as much attention and energy to analyzing and altering our political economy and institutional structure as to our search for sustainable practices. If sustainable agriculture is to become a national goal, the focus of our efforts must extend beyond agriculture, for a sustainable agriculture cannot exist in an unsustainable society.

In 1972, Jim Hightower and the Agribusiness Accountability Project's Task Force on the Land Grant College Complex conducted this type of inquiry, and reported the findings in *Hard Tomatoes, Hard Times*. Hightower and others examined the agricultural research at U.S. land grant colleges in the areas of mechanization, chemicals, food processing, rural sociology, and plant and animal breeding. They found that much of this research was being done to facilitate and encourage the adoption of input-intensive farming practices. This trajectory for agriculture, accelerated by publicly funded land grant scientists, has generated huge profits for food processors and manufacturers and dealers of agri-inputs, and increased competition among farmers. The study concluded that "Land grant college research is directed toward those private interests that least need assistance (business), while it ignores or works against the interests of those who desperately need help (small farmers and rural families)."[5]

Twenty years later we still face the challenge of reforming the land grant system. It is in the land grant college complex that much biotechnology research is being done. The combination of insufficient rules to ensure that research is being done in the public interest rather than for private interests, and the prevalence of the intradisciplinary approach to agricultural investigations rather than interdisciplinary work, virtually assures that new technology will not facilitate equitable or just farming systems. So long as agro-industry's influence and

disciplinolatry are allowed to continue unrestrained we can expect impacts from commercial application of biotechnology to be similar to the effects of hybrid corn and the Green Revolution.

America's scientific research agenda setting process is certainly one of our most severely malfunctioning institutional structures. Jo Handelsman and Robert M. Goodman, biotechnologists at the University of Wisconsin's College of Agriculture and Life Sciences, have argued that to encourage biotechnology research that will have applications for a sustainable agriculture, the research agenda setting process at all levels will have to be substantially reformed. Handelsman and Goodman believe that "the agenda for biotechnology research has been set largely by industry during the last decade," and that the "process has been distorted because of the lack of substantive contributions by the public."[6]

Like Hightower, Handelsman and Goodman conclude that only by more thoroughly involving the public will we be able to develop "the appropriate research context," which focuses "research by a cooperative and mutual process based on constant constructive dialogue and substantive involvement and cooperation of farmers and researchers." Public participation in setting the research agenda would provide land grant scientists with a clearer range of publicly endorsed research objectives, more tangible than the pursuit of a vague concept like "efficiency," without stringently regulating or dictating particular investigations.

Wendell Berry has identified six agricultural fallacies which, he claims, influence scientists' research at land grant universities and the public's attitudes about agriculture. These fallacies have shaped the agriculture we have today, as well as the research for the agriculture of the future. The six fallacies are:

- That agriculture may be understood and dealt with as an industry.
- That a sound agricultural economy can be based on an export model.
- That the "free market" can preserve agriculture.
- That productivity is a sufficient standard of production.
- That there are too many farmers.
- That hand labor is bad.[7]

It is safe to say that at least some of these fallacies are held by too many scientists working in agriculture today. This would partially explain the biotechnology research priorities of the past and present.

If sustainable agriculture is to be achieved, this mindset will have to be radically altered. To correct some of these mistaken assumptions, we should begin by replacing "productivity" with "regeneration of our human and material resource base." To preserve our fragile social and biological agricultural resources, we must replace faith in the free market with recognition of nature's limits. In addition, it is imperative that we recognize that a sound agricultural economy can be based on bioregional self-sufficiency rather than on an export model.

In *New Roots for Agriculture*, Wes Jackson suggested that emerging biotechnologies may provide the scientific tools required to model our agriculture on the patterns and processes found in nature.[8] Before we can explore such possibilities, the sustainable agriculture movement will have to redirect research priorities at land grant universities from narrowly defined work for corporations to a broader range of investigations. Judging from the past and present, sustainable applications of biotechnology are unlikely if we do not establish a process by which the public participates in agenda setting for publicly funded agricultural research, and correct the fallacious assumptions about agriculture that are the product of our political economy and institutional structure.

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The author gratefully acknowledges the comments and contributions of Jack Kloppenburg to this article.

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Enriching the Earth

Wes Jackson

An unconventional Catholic service was held in Beattie, Kansas, for John Vogelsberg at winter's end. Such a service was fitting for this unconventional farmer. John's physical body was dead. We could all see that as we entered the church. Nothing unconventional there. The service was unconventional in that somewhere in the middle his ten grandchildren walked toward the altar and the casket carrying forward much of the unmistakable spirit that all of us loved.

What was most moving began with a small commotion at the back of the church and then, single file, the ten fine-looking grandchildren came down center aisle, each carrying a piece of what Grandpa was all about. The first carried a hoe; the second, a bamboo fishing pole; the third, some ears of yellow corn and soil; the fourth, a corncob with goose feathers stuck in one end, a device that when thrown would twirl. One carried a baseball glove. (John had pitched for and later coached the team his sons were on.) A grandson carried a bow John had helped him fashion out of red elm. There was a coon hide in the procession, for John was a coon hunter, but mostly as an excuse, I suspect, to enjoy the mysteries of the countryside at night with dogs and men and boys. One had a toy John Deere tractor. Last and foremost perhaps came the child carrying "the hook" on the end of a long handle, the implement John and family members used to "walk the beans." He liked to say that was his answer to those who recommended the use of herbicides.

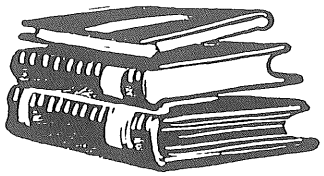
John was the third generation to organically farm the land his grandfather homesteaded in the 1870s. He was a founding member of the Kansas Organic Producers. I served with him on the technical review committee of the USDA Low Input Sustainable Agriculture program. His analyses of the various proposals were always intelligent and pragmatic.

As I sat there with his family and friends, I thought of a TV program that included John a few years back. Smithsonian World had sponsored a national broadcast entitled "The Promise of the Land," and John was the star. He talked about many aspects of farming, including how important it was to plant a tree, even though the planter might never sit in its shade. "I guess you could have a nice tombstone out in the cemetery someplace," he told that nation-wide audience. "I don't know if they ever pay attention to that or not. But you know that tree out there, they might get underneath the shade of that and say, 'That's the one that Grandpa left.'" In the same program he explained, "What we're doing here is working with nature instead of against her. You always work with her; never try to conquer nature."

I last saw him in a Topeka hospital a couple of weeks before he died. "Where you headed now?" he asked. I told him that I would end up at Tanya and Wendell Berry's place in Kentucky. He was quiet and then said, "Well, tell old Wendell my farmin' days is over. This prostate cancer has gone straight up my back." His index finger shot upward. "It's my own fault. The last time I was to the doctor was in 1941 when I took my Army physical." We talked a little longer, said goodbye and shook hands. His hand was as wide as I had remembered and his grip as strong.

Three Land Institute interns and I planted six apple trees at The Land a few weeks ago. Paul Rasch, a former student and staff member now running a large orchard in Michigan, had donated them to us. They have pest resistance bred in and never have to be sprayed. We planted them near the Carpathian walnut trees planted 14 years ago in memory of E.F. Schumacher. (Like John, Fritz Schumacher was at once German, Catholic, and a great lover of trees, especially those which bore fruit.)

Family and friends will gather sometime during the 1992 Prairie Festival as we dedicate those apple trees to the memory of John Vogelsberg. E.F. Schumacher wrote *Small is Beautiful*. John Vogelsberg loved that book and quoted it often, for it validated what he had practiced long before it was preached.



Books

Ecological Literacy: Education and the Transition to a Postmodern World

By **David W. Orr,**
State University of New York Press, 1992. 210 pp., $14.95 paper, $29.50 cloth.

Reviewed by *Laura Sayre*

Demand for educational experiences pertaining to ecological issues is high and rising. Every time I thumb through a listing of "environmental" jobs and internships (in *Earth Work* or *The Job Seeker*, *Environmental Opportunities* or "Connections" in the back of *Buzzworm*—the genre itself is currently mushrooming), the sections on "Environmental Education" seem to have grown even faster than the other parts. Environmental studies programs at colleges and universities across the country are being forced to place ceilings on the numbers of undergraduates admitted to their majors. This is good news for environmentalists, but it should also be thought-provoking news. If growing numbers of young people desire to learn and to teach about the natural world, we must have more inquiry like that provided by David Orr in *Ecological Literacy*. In this collection of essays, Orr examines the connection between "the crisis of sustainability"—a conceptual sum total of contemporary environmental problems—and education. What, Orr asks, is and what should be the relationship between this new fad, environmental education, and education more generally? Where is the common ground, if any, between the nature center and the university?

Orr, co-founder of the Meadowcreek Project and a professor of environmental studies at Oberlin College, has experience with both educational realms. This diversity of background is evident in his arguments: while the essays in *Ecological Literacy* center on questions for colleges and universities, much of Orr's critique of higher education in the U.S. is profound enough to make extra-university efforts appear essential to educational change. It is evident that Orr's sphere of concern extends beyond the classroom. Two of the three parts into which the book is divided discuss governmental and non-profit contributions to the sustainability debate. Our first step toward improving education, Orr implies, is to achieve broad cultural recognition of the environmental limits to human enterprise. Orr then goes on to explain how he feels such a shift in cultural attitudes could be impelled at the college level. He maintains 1) that environmental education must be not just inter- but supra-disciplinary, 2) that physical, practical work must diversify the undergraduate experience, and 3) that campuses must pay tribute to sense of place.

Orr is not the only individual, of course, for whom a recognition of environmental limits is attended by a criticism of traditional academic institutions; Herman Daly and John Cobb make a similar connection in their recent book *For the Common Good*, and The Land Institute's intern program reflects the same idea. Proponents of ecological thinking not only accuse departmental procedures of encouraging short-term, reductionistic science, but see the very partitioning of knowledge into academic disciplines as emblematic of the environmentally destructive proclivities of modern culture. As Orr rightly observes, "The symptoms of environmental deterioration are in the domain of the natural sciences, but the causes lie in the realm of the social sciences and humanities" (145-6). Because environmental problems transgress disciplinary boundaries, academic structures which segregate these areas seem to be in part responsible for the problems themselves.

Orr's third point, that colleges should foster a sense of place among students, is his most original and could be the most immediately fruitful. By sponsoring courses to study campus inputs and outputs, by recognizing student participation in area organizations, or by requiring students to contribute to maintenance of buildings and grounds, colleges could develop students' powers of observation, promote cross-class contact, and combat the aspect of careless mobility in American life. While this vision of education seems strongly compatible with the incorporation of labor components into undergraduate curricula, Orr's discussion of the latter is more theoretical than practical—he quotes A.N. Whitehead and drops the names of a few colleges which offer study/labor programs, but he does not examine such schools closely or offer ideas on how the head-and-hands approach could function at a conventional university.

"The case for confining environmental studies within separate departments," Orr admits, "is best made on grounds of political feasibility, intellectual coherence, and practical manageability" (144). Orr appears to find these arguments relatively trivial;

yet, they are not. Will students benefit from colleges that are incoherent and impractical? Will society? Orr's central thesis, that concepts of ecology must form the basis of the entire undergraduate experience, rather than being relegated to a mere corner of the core curriculum, may represent too great a challenge for the average university.

Where one stands on such questions is finally a matter of drawing lines of cause and effect in social life, which in turn depends on one's political point of view. It is precisely Orr's politics, however, which are difficult to determine. Advocates of sustainability tend to show a streak of fundamentalism, and Orr is no exception; but in the end he falls short of calling for the radical transformation he implies is necessary.

This ambiguity constitutes one of the principle difficulties facing promoters of the ecological cause at this time. Take, for instance, the two chapters which form Orr's response to Allan Bloom's *The Closing of the American Mind*. One of these chapters is a direct, just, and lucid critique of Bloom's approach to education. The other is what Orr calls a "prerequisite" to Bloom's list, an explicit "Syllabus for Ecological Literacy," including full citations and relevant page numbers. The list is not annotated but is arranged in the form of an outline, with subheadings such as "Thermodynamics," "Deep Ecology," "As Viewed from Literature," and "Human Cussedness."

Orr's effort to create a syllabus for ecological literacy is undeniably interesting and provocative. It provides a starting point for educators assembling curricula on environmental subjects, and it raises the important question of how radical a recognition of environmental limits will be for our culture. Orr contends that, "search as one may through Plato, Aristotle, and the rest of the authors of the Great Books, there is not much said about" the role of humanity in the natural world, and, it seems, proposes on these grounds that they not be read (99). Both the contention and the proposition could fuel quantities of good argument.

The fact that Orr offers his own book list in exchange for Bloom's, however, ultimately demonstrates that he has missed the point. Orr's list, like any other, is woefully inadequate in certain areas; like any other it emerges from the idiosyncratic prejudices and affiliations of an individual; and like any other it obscures the fact that educators cannot control how people behave by telling them what to read. Orr's proposal, in the end, is merely to substitute a notion of ecological literacy, grounded in the natural sciences, for an older but not necessarily more conservative notion of cultural literacy, grounded in the humanities.

By identifying two events which (partially) characterize the postmodern moment—the need to recognize environmental limits and the canon controversy—and then attempting to solve them together, Orr introduces the curious possibility of a postmodern, environmental point of view. The term postmodern is even more subject to competing definitions than the term sustainable, but the argument is mainly legitimate. Cultural recognition of human-induced, irreversible environmental degradation is a postmodern issue because it has to do with the certainty of knowledge: recognition of environmental crisis requires an admission of the reality of the material world, of our real ability to have an impact on it, and of its real ability to have an impact on us. Hence one can see the threat posed to environmentalists by postmodernists who assert the radical uncertainty of knowledge, as well as the interest Orr has in laying claim to an alternative definition of postmodernity.

Orr's political ambiguity, evident in his critique of Bloom, is also reflected in his neglect of the highly gendered nature of many of the issues of community and society under his consideration (although there is a subheading "Patriarchy" on his syllabus). Although Orr's discussions of sustainability in many ways amount to a reassertion of traditionally female values and qualitites—he goes so far as to say that natural resources "management is... more akin to child-proofing a day-care center than it is piloting 'spaceship earth'"—he never acknowledges that this is so, leaving the reader uncertain what sort of sustainable community of the future or the past he has in mind (162).

Orr's apparent disregard for the feminist perspective is the more unfortunate because environmentalists and environmental educators could learn something from feminists regarding all these issues. Feminism has always confronted a similar challenge of reconciling theoretical and practical needs, is also inherently interdisciplinary, and has had the perspicacity to keep postmodernism at arm's length.

Searching for the Sacred

Jake Vail

Two years ago, the end of nature was declared. In a book by that title, Bill McKibben argued that nature's separateness from us is its very meaning, and that the effects of human profligacy have brought about nature's end. It is an odd concept, that of nature's separateness being its meaning, yet it is a popular concept, one so embedded in our culture that many don't even see it. It wasn't always so, of course,

and in the minds of many contemporary writers the contrary view of being a part of rather than apart from nature is a cause for celebration and a hope for the future.

Several new books explore this human-in-nature/human-and-nature division. Some have received a lot of press, some have been paid little attention and deserve much more. In the former category I would include a thick book with a promising title but wanting in substance: *In the Absence of the Sacred*, by Jerry Mander. Its subtitle hints at some of its difficulty: "The Failure of Technology and the Survival of the Indian Nations." Mr. Mander tackles not one but two weighty issues (three, if one includes the relationship between the two), and all elude his grasp. The dilemma posed by technology has fascinated us since before the days of Ned Ludd, and this book brings little that is new to the discussion (especially if you have read Mr. Mander's *Four Arguments for the Elimination of Television*). Despite the heft of the subjects of *In the Absence of the Sacred*, Mr. Mander's tone is sensationalist and light. He makes some interesting points, such as "Other societies have the concept of taboo to deal with de-structive tendencies, but in our society the idea of taboo is itself taboo," but I was often bored. Read *Four Arguments*, Herbert Marcuse's *One-Dimensional Man*, and Richard Nelson's *Make Prayers to the Raven* instead.

Or read Gregory Bateson. Bateson, an anthropologist (to stick on a label that covers but a small portion of the man), is best known for his books *Steps to an Ecology of Mind* and *Mind and Nature.* Gregory Bateson died in 1980, but Rodney Donaldson, his long-time friend and associate, has assembled 32 "new" essays and published them under the title *A Sacred Unity: Further Steps to an Ecology of Mind*. Like *Steps*, this is a thick and satisfying minestrone, a blend of anthropology, epistemology, ecology, health, aesthetics, ethics, and the sacred, and it will stay with you for a long time. It is surprising that the writings of Gregory Bateson aren't more popular, for his ideas are applicable to many areas of contemporary cultural concern. Perhaps it is because Bateson stew is so thick, and takes a long time to digest. Try it, though.

When ecology, health, ethics, aesthetics, and the sacred are mentioned together, the name of another writer may come to mind. I will assume that readers of *The Land Report* are familiar with farmer-poet Wendell Berry and his works, but I think it's safe to suppose that many haven't seen the new book edited by Paul Merchant, titled simply *Wendell Berry*. A shame, if true, for included are 18 essays, letters, interviews, poems, and appreciations, plus two new works by Mr. Berry. Any of them will deepen your appreciation of the man whose stories and poems are, in Wallace Stegner's words, "good like bread."

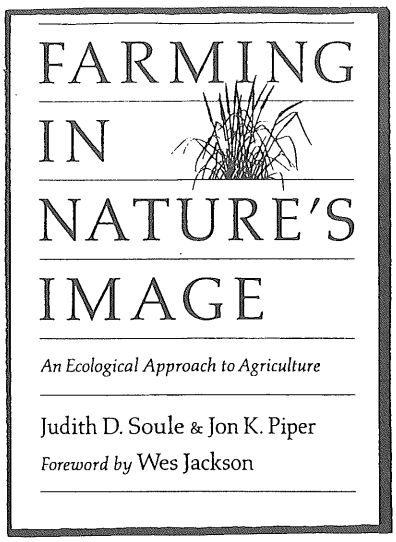
1,500 years ago Lu Ji said, "In making the handle of an axe by cutting wood with an axe, the model is indeed near at hand." Likewise, the writing in *Wendell Berry* about the writing of Wendell Berry is clear and complex, and spins many connections, connections between the parts of a life and between members of a vibrant community of which the life is a part. One of the many fine lines in the book reads:

One thing I learned about Wendell Berry in our brief desert travels is that the pen he carries in the front pocket of his work shirt is not a pen at all—it is a kaleidoscope, turned carefully by the calloused hand of a man who sees through the facets of American life his vision of health and strength between person and place.

- Jerry Mander, 1991. *In the Absence of the Sacred: The Failure of Technology and the Survival of the Indian Nations.* Sierra Club Books, San Francisco. $25.00, cloth.
- Gregory Bateson, 1991. *A Sacred Unity: Further Steps to an Ecology of Mind.* Edited by Rodney Donaldson. HarperCollins Publishers. $24.95, cloth.
- Paul Merchant, ed., 1991. *Wendell Berry.* Confluence Press, Inc., Lewiston, Idaho. $14.95, paper.
- Terry Tempest Williams, 1991. *Refuge: An Unnatural History of Family and Place.* Pantheon Publishers, New York. $21.00, cloth.

Terry Tempest Williams wrote that. She has also written the most powerful book I've read in a very long time. We who consider ourselves environmentalists too often get lost in hand-wringing and abstract thinking, and forget about simple compassion. Terry Tempest Williams remembers. I can't say enough to recommend *Refuge: An Unnatural History of Family and Place.* Terry Tempest Williams knows the joy of life and the pain of death, in her family and in the avian families of the Bear River Migratory Bird Refuge near Utah's Great Salt Lake. She also knows of the joy of death and the pain of life, and writes about each with love and amazing grace.

Last year 60% of American households didn't buy a single book. This year, make up for that and give *Refuge* to all your friends. And don't forget to keep a copy for yourself.



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