



THE LAND REPORT

Number 33

Summer 1988



Contents

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AT THE LAND

The In's and Out's of Summer.....	3
Perspective and Wisdom.....	4
The Man of MANAS.....	5
Fall Visitors' Day September 24.....	6
William Irwin Thompson to Conduct Seminar.....	6
Mari Detrixhe Elected Board President.....	7
"Planting in the Dust" Performances to Continue.....	7
Long-Range Planning Begins.....	7

THE 10th ANNUAL PRAIRIE FESTIVAL

Health, Beauty and Permanence.....	8
Land and People: An Ecological Perspective...	10
Wendy Johnson Inspires Gardeners.....	16
Seeking Permanence.....	16

NATURAL CONNECTIONS

A Flint Hills Visit.....	19
Listening to Silence.....	20
Music to Evoke the Prairie.....	22

NEW ROOTS FOR AGRICULTURE

Prairie Patterns and their Relevance to Sustainable Agriculture.....	23
In the Greenhouse.....	24
Post Doctorate Position Open.....	26
The Land Institute Research Report.....	26

TRADITIONAL ROOTS FOR AGRICULTURE

The Land's Harvest.....	27
Grain Patches in the Garden.....	28
An Introduction to Bio-Dynamic Agriculture...	29

BOOKS

<i>The Women's West</i>	35
<i>Women and Farming: Changing Roles, Changing Structures</i>	36
<i>Garden Seed Inventory</i>	37

PERSPECTIVES.....Public Policy	
Energy Choices.....	38

Photographs for this issue were taken by several staff members and interns.

ON THE COVER

Karen Finley took this photograph of Jon Piper and his son Joshua cooling off in Sharp's Creek during the Flint Hills trip with interns on June 20. There are trees along the cut which the creek made, but above on the high bank one can see the dominant vegetation of the area, prairie grasses. Terry Evans made the print.



At The Land

The Land Institute was established as a non-profit educational organization in 1976, and a student program has been our central educational focus. Since 1983, when we began the agricultural intern program and the 47 week "growing season" term, college age students have worked at The Land throughout the summer. The spirit of the eight interns permeated the Institute this year, seasoning the daily routine of our fourteen permanent employees with physical energy, intellectual challenge, and humor.

Summer officially begins right after the Prairie Festival when we suspend regular class sessions and the interns spend most of their time time outside taking care of the experiments and tending the garden. During the hot days of this July, however, the staff and interns were happy when visitors came and we could go into the classroom for a discussion. In addition to the three invited scholars (described on page 4), we also enjoyed special sessions and potluck lunches with Peggy Waggoner of Rodale Research Institute and Elizabeth Raisbeck, a senior vice president with National Audubon Society. Don, Bev, Will and Katie Worster, dropped by in August on their way from Utah to Massachusetts. Don, whose last book was *Rivers of Empire*, talked about the need for new cultural images (other than conquest and domination) for the

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

-- BOARD OF DIRECTORS: Orville Bidwell, Karen Black, Bruce Colman, Mari Sorenson Detrixhe, Terry Evans, Wes & Dana Jackson, Ivy Marsh, Jim Mayo, Conn Nugent, Dwight Platt, John Simpson
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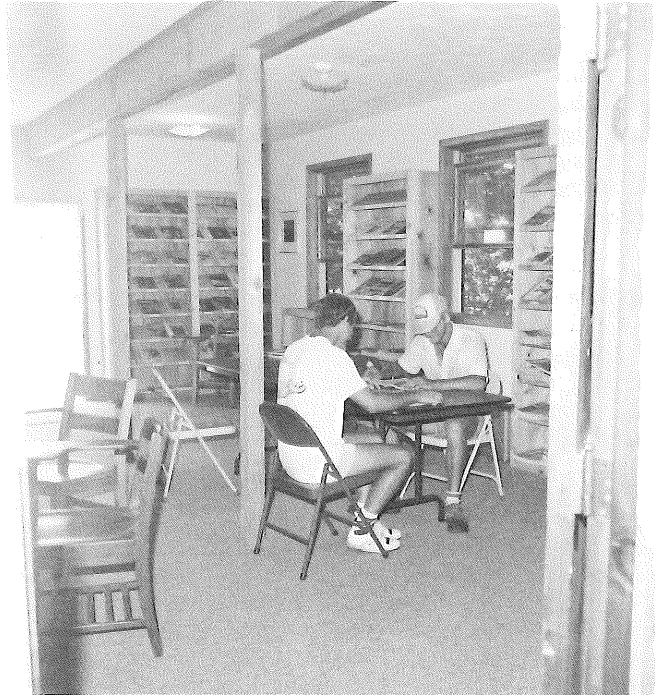
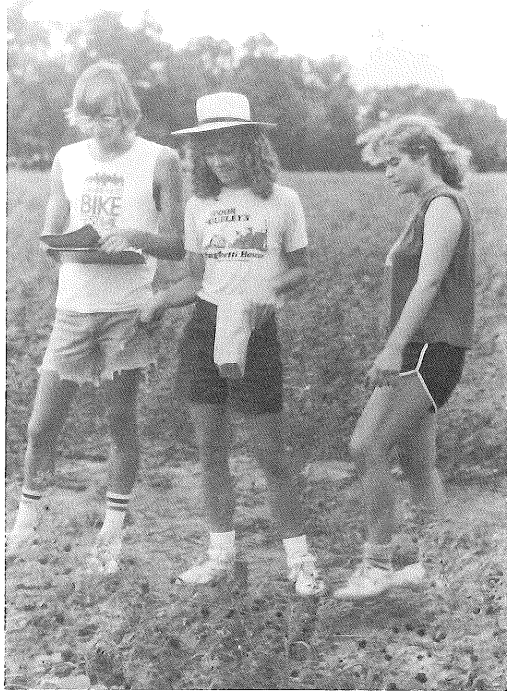
Western United States, and the group speculated on what those might be.

Putting a new roof on the classroom building was a major summer project. A storm in July 1987 peeled back part of the roof over the classroom/library. Interns and staff repaired the damaged area the next day, but the building really needed a whole new roof. This July, 1988, Rob Fischer, operations manager, and

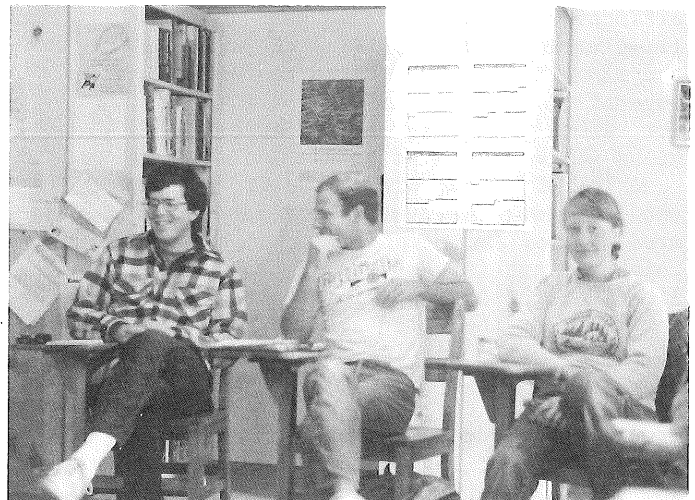
several interns installed a new "hot tin roof" (brown metal) in the sweltering heat.

On the roof, in the garden, out in the experimental plots, in the classroom, in the kitchen, out on the prairie — that's where interns spent the summer at The Land Institute. As their articles in this issue show, they also reflected on the Prairie Festival, read books, researched topics of personal interest, and wrote.

The In's and Out's of Summer



Clockwise: Jake Vail, Jennifer Delisle & Beth Gibans out in the Illinois bundleflower plot; Doug Towne & Tom Clemetson in the library; Adam Rome, Doug and Laura Benson in the classroom; Doug and Rob Fischer on the roof.



Perspective and Wisdom

The Land Institute provided the 1988 interns a summer scholar program with the perspective and wisdom of 244 years of collective experience.

Wes Jackson accomplished this by inviting three octogenarians to The Land Institute as visiting scholars: Henry Geiger, Harry Mason, and Jack Sharp. Each man spent two class periods with interns and staff.

Henry Geiger is described in the following article.

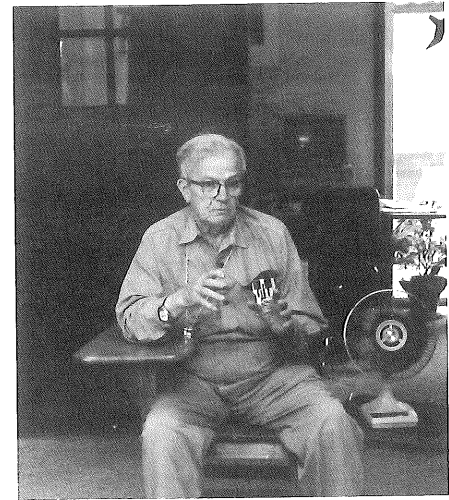
Harry Mason, professor emeritus of psychology at Kansas Wesleyan, now living in Port Orford, Washington, was also a visiting scholar last summer (see L. R. # 30). For the 1988 sessions, Harry assigned a *NEW YORKER* story, "Mar Nueva" by Mark Helprin, which led to a wide-ranging discussion about surviving under authority and power one cannot change. Harry's unusual way of looking at the world never fails to surprise listeners and stimulate new ideas.

Aaron J. (Jack) Sharp, professor emeritus of botany at the University of Tennessee, had a teaching assignment awaiting him upon his return to Tennessee, a special course in the Smoky National Park. One of the authors of *Great Smoky Mountain Wildflowers*, as well as 250 professional papers, Jack is still an active botanist and teacher. He helped start an annual Smoky Mountains wildflower walk program in 1929 which is popular yet today. Three years ago he found a plant "new to science" in the Great Smokies.

Wes asked Jack many questions about his career as a "plant explorer." Jack described adventures in Guatemala and Mexico and travels all over the world. His association with many well known figures in American botany, such as Paul Sears, Liberty Hyde Bailey, Julian A. Steyermark, A. S. Hitchcock, William Vogt, and Lamont Cole also led to interesting stories. Jack Sharp believes there are still places in the world left where one can be a plant explorer.

"Why catalogue something about to become extinct?" Wes asked. "Because of its historical importance," Jack replied. He pointed out that the plant could give a clue to the history of vegetation and tell us about the environment. For example, he once found a moss in the Aleutians which indicated to him a forest had once been there. Other scientists did not agree until someone discovered petrified wood in the area. Also, Jack explained that though one may think a plant is almost extinct, another one like it might be found in another part of the continent or the world in a similar niche.

Jack Sharp worries about the state of American botany. The great emphasis on biotechnology has led to professionals who "want to ignore the outdoors and produce everything in labs. The ones I know are more concerned with the dollar than the technology," he declared.



Aaron J. Sharp

The Man of Manas

Dana Jackson

For forty years Henry Geiger has written and published *MANAS*, a "journal of independent inquiry, concerned with study of the principles which move world society on its present course, and with (a) search for contrasting principles that may be capable of supporting intelligent idealism under the conditions of life in the twentieth century."

Henry Geiger was our guest at The Land for three days. We gathered in the classroom two afternoons to ask him questions about his beliefs, his life's work, and the many scholars and thinkers he has known, such as Robert M. Hutchins, President of the University of Chicago, Scott and Helen Nearing, and Abraham Maslow, the famous psychologist.

I asked Henry if he wrote every day. (*MANAS* is published weekly, except for a "summer interlude" in July and August.) "Yes," he replied, "but I only write things once. It comes out right the first time now." Henry begins the June 15 issue:

'We are continually counselled and warned, these days, that the modern world is undergoing a process of unavoidable change, that our thinking must be altered to accommodate the processes of this change, and that moral or ethical foundations in thought and action are required to avert disasters which are well on the way to taking place.

Even considering that Henry has been writing every day for forty years, I am still amazed that anyone can organize complex ideas into clear sentences and do it right the first time!

Theodore Rozak said of MANAS in the introduction to *Small is Beautiful* by E.F. Schumacher (1973):

"With few exceptions, the principal forums for his writing have been those little, intensely alive, path-finding journals (like MANAS in America and RESURGENCE in England) which more than make up for their limited audience by being ten years ahead of the field in the quality of their thought."

Henry knew E.F. Schumacher. He stayed in Henry's house and Henry drove him around to his various speaking engagements. *Small is Beautiful* is a book Henry turns to often, as he states in the lead article of the May 11, 1988, issue of MANAS "It is as though there is really far too much in this book to be absorbed by a single reading, with the kind of attention we give to even the best of books."

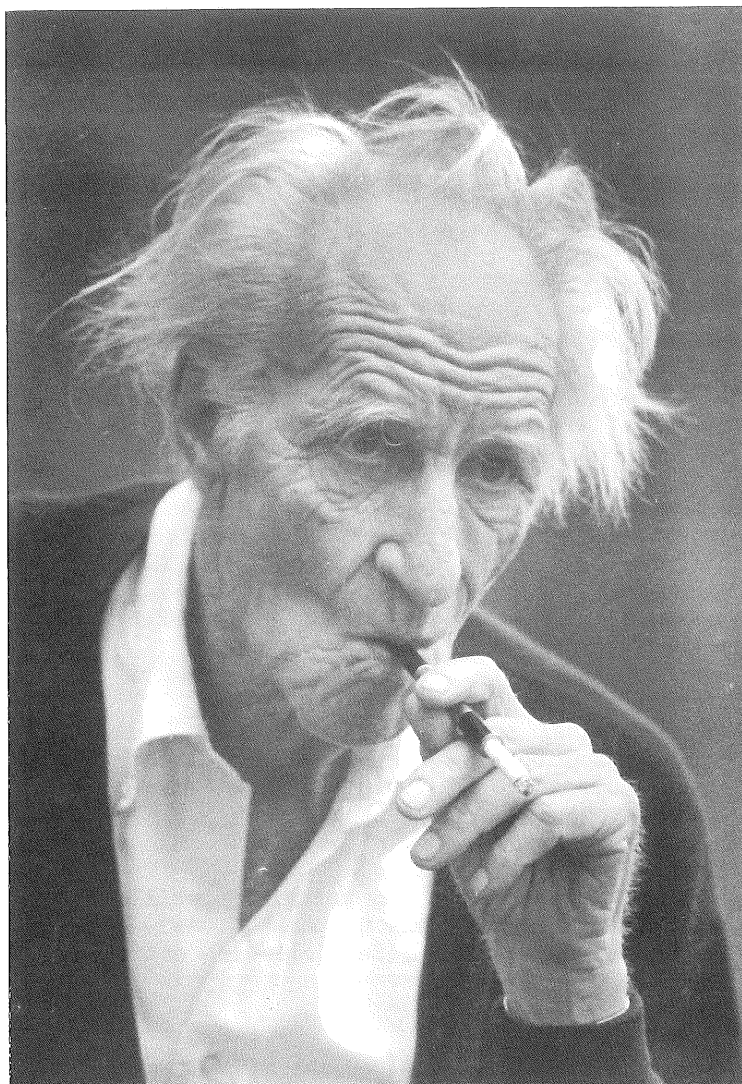
Henry has given attention to books by Wendell Berry and Wes Jackson and has quoted from articles in *THE LAND REPORT*. Some of his loyal readers have become Friends of The Land.

Henry Geiger grew up in New York City, the son of a musician father and an artist mother. He attended the Cathedral Choir School of Saint John the Divine as a child and was an actor in the Theatre Guild as a young man. In 1936, at the age of 28, Henry went west to California where he has remained. During World War II he spent "four years, three months and 24 days" in a conscientious objector camp, planting trees and fighting forest fires. It was there he began planning the publication of MANAS, which he began in 1948.

One does not find the name of Henry Geiger in the pages of MANAS. Writing always in the editorial "we," Henry explains that editorial articles are "unsigned, since MANAS wishes to present ideas and viewpoints, not personalities." Each issue has a lead article, an editorial, a "Review" section, a department called "Children and Ourselves" and one named "Frontiers -- Religion, Science, Education."

"You don't fix institutions; you grow better ones because you've got to have them even though they're a menace. I'm a philosophical anarchist." Henry told Land Institute people.

When asked what he reads, Henry replied: "Only what I have to. Ninety-eight percent of the books that come in now aren't worth reading; the other two percent I read two or three times." Henry receives several books in the mail each week to review, most of which get donated to his local library. Though he can quote long passages of lyric poetry by Shelley, Henry does not print or review poetry in *Manas*. He said he would be "embarrassed" to criticize poetry.



Henry Geiger

Photo by John Thelander

The common root for MANAS suggests "man" or "the thinker," and in the content of the magazine, which Henry describes as "philosophy and practical psychology," he presents the ideas of those he judges to be significant "thinkers." Henry is more oriented towards men as thinkers, and only occasionally singles out women, but given his history and the extensive, valuable contributions he has made to the critique of human culture, this blind spot is forgivable.

Information appears below for anyone who wish to become better acquainted with MANAS.

SUBSCRIPTION RATES

1 year \$10 2 years \$18 3 years \$25

Students and others with low income who find it difficult to keep up with rising costs may subscribe at the rate of \$7.50 for one year and \$14 for two years.

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Fall Visitors' Day September 24

The schedule for this year's Visitors' Day on September 24 will be different from that of former years. Rather than staff and interns leading tours of the premises as in the past, visitors will pick up maps with descriptive texts and take self-guided tours. The tours can be at their leisure and at any time from 9:30 A.M. until 4:00 P.M.

There also will be programs to attend on Visitors' Day. At 10:30 A.M. participants can get an update on this year's research by attending an introduction to ecosystem agriculture and a tour of experiments (visitors should be prepared to do some walking). Alternatively, they can take part in a workshop on "The Garden in the Fall" led by Thom Leonard in the community garden. Participants should be prepared to do some garden work.

At 12:30 there will be a potluck lunch (bring food to share and table service).

The final program (2:30 - 4:00 P.M.) will be a dialogue between Wes Jackson and William Irwin Thompson on the topic "Ecosystem Agriculture and the New Biology." Following the dialogue, the audience will be invited to comment and ask questions.

Prior to Visitors' Day activities, William Irwin Thompson will conduct a special seminar on his latest book. (See following article.)

Visitors' Day is free and open to the public.

William Irwin Thompson to Conduct Seminar

William Irwin Thompson will be at The Land on September 23-24 to direct a seminar based on his recent book, *Pacific Shift*.

Pacific Shift defines the shape and content of a new global culture which Thompson sees rising out of the Pacific basin bounded by Los Angeles, Sydney and Tokyo. This emerging culture incorporates such diverse influences as the creative West Coast-Japan tension, Silicon Valley computer technology, Buddhism, and feminism. It signifies a major shift from the formerly dominant New York-Paris-London industrial culture.

Thompson's position is that this new culture embodies stewardship rather than exploitation of the earth and an economy based on appropriate technology, information and cooperation rather than production, consumerism and competition. He explains how this value system could lead us away from a machine-oriented world view

that makes science its religion, seeks to dominate and exploit nature, and glorifies predatory individualism.

Thompson explores the whole range of our cultural heritage to assemble the outline of the coming Pacific electronic era. In a discussion ranging from the novels of Doris Lessing, the films of Peter Weir, and MTV rock videos to the insights of economist E. F. Schumacher, structural anthropologist Claude Levi-Strauss, cultural historian Michel Foucault and Gregory Bateson. *Pacific Shift* points out the signposts charting the course for this cultural transformation.

William Irwin Thompson received his Ph.D. from Cornell University and has taught at Cornell, M.I.T. and the Universities of Toronto and Hawaii. While in New York in 1972, he established the Lindisfarne Association, a "contemplative community of scholars devoted to the study and realization of a new planetary culture." Thompson's first book, *At the Edge of History* was nominated for a National Book Award in 1972. He is also the author of *Passages About Earth, Evil and World Order, Darkness and Scattered Light, The Time Falling Bodies Take to Light, and Gaia Politique*. He is a resident of Bern, Switzerland.

The schedule for the seminar is as follows:

Friday Evening, September 23, 1988

- 7:30 P.M. - Lecture by William Irwin Thompson followed by a discussion in Land classroom
- 9:30 P.M. - Reception

Saturday Morning, September 24, 1988

- 7:30 A.M. - Continental Breakfast (Pacific style)
- 8:00 A.M. - Lecture/discussion with William Irwin Thompson
- 2:30 P.M. (optional) Attend the Visitors' Day program featuring a dialogue between Wes Jackson and William Irwin Thompson

To register for the seminar, send \$35 to The Land Institute by September 14. This fee includes \$15 for *Pacific Shift* which will be mailed to each participant (postage paid) as soon as The Land Institute receives the registration fee.



William Irwin Thompson, 1979 Prairie Festival

Mari Detrixhe Elected Board President

At their annual meeting on May 30, 1988, the Board of Directors of The Land Institute elected Mari (Peterson) Detrixhe to be president of the board. Wes Jackson served as president in the preceding year.

Mari was the director of the Kansas Natural Resource Council for three years. For two years prior to that she worked as a research associate in energy at The Land Institute and before that was a student at The Land. She now lives on a farm near Ames, Kansas with her husband Ed.

With her administrative skills and dedication to the vision of The Land Institute, Mari provides the kind of strong leadership needed at this point in The Land's development. She organized a process for long-range planning and facilitated discussions about the future of The Land with representatives of the staff and board of directors on July 29 and August 27.

Planting in the Dust Performances to Continue

Dona Freeman, Wichita, has performed the role of Annie in "Planting in the Dust" 25 times since her selection for the part in the summer of 1987. Dona has agreed to continue to play Annie in a second year of performances for The Land Institute.

Dona Freeman is well known for her numerous roles in the Wichita Community Theatre, including a part in *Philadelphia, Here I Come*, which won third place in the 1987 National Community Theatre competition. In a review of her appearance in Manhattan, Kansas, *The Manhattan Mercury* wrote: "In the role of Annie, Dona Freeman gave a beautifully sustained performance. Her quietly impassioned portrayal of a woman with an intense commitment to the land was very impressive."

"Planting in the Dust" by Nancy Paddock is a one-act, one-woman drama in which Annie, a young farm woman, reveals her connection to the land and the satisfaction of farming it right. She reflects on generations past and on what the soil and its caretakers have weathered. And she wrestles with the present, with the emotionally charged issues of today.

The author of the play, Nancy Paddock, is a Minnesota poet associated with The Land Stewardship Project of Stillwater, Minnesota. She is a co-author with Joe Paddock and Carol Bly of *Soil and Survival* (Sierra Club Books, 1986).

"Planting in the Dust" is a thirty minute presentation, usually followed by a 15 to 30 discussion with the audience, led either by Dana Jackson or a person from the community where it is performed. It is appropriate for a variety of audiences and has been sponsored by soil and

Long-Range Planning Begins

Board of directors members serving on the long-range planning committee for The Land Institute are Mari Detrixhe, Ivy Marsh, John Simpson, and Conn Nugent. Gabriel Hegyes, Paul Rasch and Peter Kulakow are staff representatives. Dana and Wes Jackson, co-directors of The Land Institute are also on the committee.

At the July 29 meeting, the group considered The Land's strengths and distinctive abilities which influence its vitality. Members commented individually on what they value in The Land and hope for in its future. The result of this brainstorming session was distributed to other staff and board members for perusal and comment. At the second meeting on August 27 they began discussing primary strategic goals of The Land Institute over the next five to ten years, given its sustainable agriculture and stewardship mission, external needs, and the strengths enumerated at the July meeting. Committee members discussed answers to the question: What will The Land look like if we are making progress on these goals?

Additional meetings of the committee will be held. Their deliberations are to result in a report and recommendations to the staff and board that will guide the development of The Land Institute in the coming years.



Dona Freeman

water conservation districts, churches, regional women's groups, conferences, colleges and universities, and historical societies.

The fee for a performance is \$250 plus travel expenses. For more information or to schedule the play, contact Dana Jackson at The Land Institute.



The 10th Annual Prairie Festival

Health, Beauty and Permanence

Tom Clemetson

People arrived for the Prairie Festival on Friday evening, May 27. A pair of bicyclists were the first to show up; they came all the way from southern Arizona. We were impressed. Later we found out that they had flown into Salina and biked from the airport a few miles away. This seemed more plausible as they looked much too refreshed for a bike trip of that length. Other campers pulled in and participants began to gather around the bonfire. Former interns and students surfaced and introduced themselves. The stories about their terms here and experiences since they left added to my understanding of The Land Institute. Everyone seemed ready for a good time.

On Saturday morning the campers and new arrivals found a green world. The rains a week or so earlier had eased the harsh look of the spring drought.

Most of the morning activities were held outdoors. One was the Volksmarch, an hour long trek for "health and beauty" on our 160 acres. Another walk led by Kelly Kindscher concentrated on the medicinal plants found in our prairie. A couple of gardening workshops took place in the morning, one given by Wendy Johnson on vegetable and flower gardens, and the other by John Sjo who discussed native plants in home landscapes. Land Institute tours also ran all morning. The festival was alive with the energy of these outdoor activities.

Lunch provided the transition from the physical experiences of the morning to the provocative programs of the afternoon session. J. Stan Rowe gave the first speech, "Land and People: An Ecological Perspective" (printed in its entirety in this Land Report). The second by Conn Nugent, "E.F. Schumacher: Idealism and Realism," explored Schumacher's ideas and what they implied for our relationship with the land.

Conn discussed the confusions and misperceptions in modern society of which Schumacher wrote. Modern society seems not to acknowledge the difference between renewable and nonrenewable resources. We also confuse industry and agriculture. Schumacher defined industry as the production of lifeless matter and agriculture as the production and continuation of life. Schumacher wrote about the confusion of quantity with quality, especially the misconception that things of value can always be enumerated. He

felt this crisis of value to be an indication of emotional and spiritual laziness.

Conn outlined Schumacher's solution which emphasized good work, work respectful of ecological principles and based on a new system of social organization. To have this new social system would require metaphysical reconstruction, a new religion to replace the religion which has become so influential, the religion of economics. Economics controls our actions more than traditional religions. When someone describes an activity as sinful or immoral, it probably does not stop that phenomenon from occurring. On the other hand, when one describes a project as uneconomic, that kills it.

This religion frees people from responsibility. They can rely on the monetary system and market forces to make decisions. The system is allowed to function with the goals of limitless accumulation of resources and perpetual growth. No distinction is made between desirable and undesirable growth. The lack of a limiting principle in a world of finite resources is dangerous both for the stability of the economic system and modern society.

Many people recognize the ills of modern society and the validity of Schumacher's solutions, yet the problems are still with us. Conn gave a reason: "One of the most difficult issues with which Schumacher fails to grapple is the degree of sensual delight which this era can offer to us. Damn it can be fun!"

Schumacher held a deep admiration for China and its rejection of materialism, but now China and several other eastern societies have begun to embrace the cash economy and its rewards.

Conn accepted many of Schumacher's solutions to our social ills. He agreed with the need for a kinship to the land as explained in the talk by J. Stan Rowe. But he also stated the need for human kinship. In our actions and plans we need to pay attention to the old and the children, especially the future generations of children. An empathy with the past and future of our species could provide the impetus for the social change that Schumacher promoted.

For the rest of the afternoon the participants broke into smaller groups. Discussions about human health were led by Frank and Lora Gilbert and by Liese Ricketts. Rural community health and the influence of public policy on the

priorities of environmentalists were the topics Fred Bentley of the Kansas Rural Center and Ron Henricks and Charlene Stinard of the Kansas Natural Resource Council presented. Dave Granatstein explained on-farm research and other activities of farmers interested in sustainable agriculture in Minnesota. Finally, J. Stan Rowe and Wes Jackson discussed the integration of ecology and agriculture.

A concert by the Alfred Packer Memorial String Band followed a potluck picnic. Then Dona Freeman's emotional performance of "Planting in the Dust," a one act play about land stewardship by Nancy Paddock, provided a change of pace. The seriousness of the discussion faded away when the music resumed, and dust flew in the barn until midnight as the feet of festival square dancers responded to the calls of Mike Rundle. <



The Alferd B. Packer Memorial String Band



Ole Olson and David Orr help move chairs.



A panel of 1985 interns describe their current work in sustainable agriculture: (l. to r.) Steve Ela, Michel Cavigelli, Danielle Carre', Dana Price, Holly Winger.



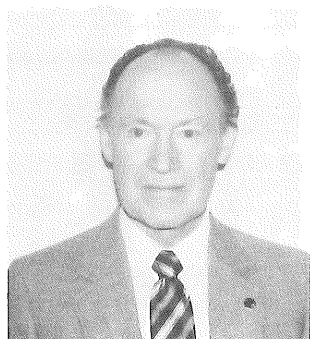
Potluck Picnic



Conn Nugent and Wes Jackson

Land and People

An Ecological Perspective



J. Stan Rowe

J. Stan Rowe, Professor emeritus, Plant Ecology and Crop Science, University of Saskatchewan, Saskatoon, Canada, presented the opening talk of the 1988 Prairie Festival, printed here in its entirety.

The theme for this year's Festival, "Health, Beauty and Permanence," is an apt focus both for Land and for the communities it nurtures. In its broadest sense, Land is the total environment of communities, the larger whole from which they are born and to which they return. Their welfare and comeliness are linked to the health and beauty of the Land.

The ecological perspective is that of outlook; it seeks comprehension by examining, exploring, finding out about things. In contrast, the physiological viewpoint is that of insight, of reduction and anatomy, aiming to inspect things, to look into them. Physiology reveals the parts and functions within, while ecology points to encompassing realities without.

Applying the ecological perspective to ourselves, looking outward to what surrounds, sustains and recreates us, the earthly milieu is discovered, the Land-as-source not resource. Hence an appropriate title for this talk is "Land First," or, transposing the words in one of Schumacher's lines: People are precious next to the Land.¹

A familiar poetic theme portrays man asserting brief possession of the Land that soon repossesses him. Thus, in the poem "Hamatreya" by Emerson, the Earth sings:

They called me theirs
Who so controlled me
Yet every one
Wished to stay, and is gone.
How am I theirs
if they cannot hold me
But I hold them? ²

In this and similar poems, the motif of human self-importance, of homocentrism, is asserted. The man-managers take charge with bravado, staking their claims to the planet's surface. The Land endures and waits, at length reclaiming the claim-stakers as its own, quietly

affirming its encircling importance, asserting its grave truth.

If mortality, the down-side of the Wheel of Life, teaches an ecological lesson, so does vitality, its up-side, though in a less obvious way. Neither the sphere wherein humankind lives nor humanity's integral relationships with it is self-evident. Marshall McLuhan commented that environment is invisible to those immersed in it. "We don't know who discovered water," he said, "but we're pretty sure it wasn't a fish." One up on the fish, some of us with plenty of money and the urge to get away from it all have planned man's disengagement from the gravitational arms of earth, seeking to escape the inescapable. But once out in space, the natural milieu surmounted, an astonished backward look discovers the unique and only world, the Home of all homes. Photographic confirmation of humanity's ecological status is ours.

The perspective from the moon affirms that we are earthlings, denizens of a wonderful cloud-swathed blue sphere, sharing with several million other life forms the sun-warmed interface between atmosphere and water-soil. But even without such sight-evidence, events of our own making have recently conspired to remind us that we are deep-air animals. Cues are acid rain, a warming climate, asthma and a tight chest, watering eyes, strange industrial smells, and geiger counters clicking in basements.

Few dispute today's perilous, human-induced changes in the atmosphere's composition: the increase of methane, oxides of nitrogen and sulfur, carbon dioxide. This is no infrared herring, no ecofreak scam. Immersed in the air layer, swimming around in the murk at the bottom of it, watching the canaries die, humanity is nudged into awareness of total dependence on the atmosphere for well-being, health, and survival, matched by an equal dependence on the other strata: water and soil. In the words of a perceptive politician from Newfoundland: "Ten years ago we didn't know about environment, but now it's all around us!"

Much more than this, as living creatures we participate in a whole ecological system whose integrated parts have evolved in such a close evolutionary way, over four and one half billion years, that what we call "life" is as much a property of the planet as it is of protoplasm. In no realistic sense can organisms -- people, other animals, plants -- be separated from the planet's enveloping matrix which is as spirited, as animated, as they. To designate water, and soil, and air, and received solar radiation as inorganic, abiotic, and dead, is to perpetuate a dangerous falsehood, for without these marvelous constituents, no thing would merit the labels organic, biotic, and alive.

"The World is Your Body" said Alan Watts, and he was right.³ Organisms -- the quintessence of the stardust that is the land's



foundation and of water and air that are intermingled with it -- cannot survive without continually internalizing and externalizing the energy and materials beneficently provided at the earth's surface.

Worth noting here is health's dependency on avoiding heavy metals, radionuclides, sulfurous compounds, petroleum hydro-carbons, and all those unnatural resources that we persist in digging out from underground where they lay safely sequestered during much of our evolution. Non-renewable resources, the very foundation of industrial civilization, are not constituents (except in trace amounts) of the natural milieu nor of our bodies. Injected in ever-larger quantities into the life-space, they are increasing ionizing radiation, toxifying the earth, threatening to kill us. In effect we are turning the geological clock back, recreating the early Precambrian era when acid rain, laced with the sub-surface products of massive vulcanism, etched the bare rocks of the planet.

The Report of the World Commission on Environment and Development (the Brundtland Report) recommends avoidance by foresight of pollution and other environmental problems.⁴ An anticipate-and-prevent approach instead of the usual react-and-try-to-cure one, would switch all industry away from unnatural resources, substituting for the latter those that are time-tested and certified to be ecosystem-friendly and biologically benign, the renewable and replenishable resources that the Land so generously offers.

Notice my use of "Land" in the geographer's all-inclusive sense. Land should be understood as the total volumetric matrix (transparent above, opaque underfoot) that encapsulates organisms. Land is much more than soil, important though that fertile, recycling, detritus-reducing stratum is. Lacking words appropriate to the reality, substantiality and importance of the earth's creative surface, ancient ones such as "land" and "landscape" have to be stretched, expanded, redefined, while new ones such as "ecosphere" and "ecosystem" have to be brought into wider use. Vague self-effacing "environment" must be set aside, for as a descriptor of the miraculous surroundings that create and sustain, it fails pathetically.

"Environment" is its own put-down, its own pejorative. At face value it means what surrounds something else that is the center of interest. Environment proclaims itself to be peripheral and therefore asks not to be taken seriously. It excuses itself from confrontation with far less substantial things that declare themselves to be real and important, such as economic systems and political systems. What the world needs now (in addition to love, sweet love) are better words than weak "environment," words expressing the tangible, authentic reality of the larger systems in which most organisms play their appropriate roles.

The primary recognizable unit is the planetary ecosystem, the Ecosphere, that comprises by containment all the lesser sectoral land/water ecosystems: seas and continents, regions and locales. Notice the name, the Ecosphere (literally the Home-Sphere) is preferred to the word "biosphere," because the latter encourages the human bias toward biological phenomena. One of the prejudices we need to escape is the conviction that organisms, protoplasmic bits and pieces like us, are the only things that matter.

We are fixated on organisms, so much so that Paul Ehrlich can declare ecology a sub-discipline of population biology and no one bats an eye.⁵ When organisms are moved to center-stage the World recedes to a mere background. The insight of Aldo Leopold was better: he said that an ecological comprehension of land and an understanding of ecology go together, and the latter does not necessarily originate in courses bearing ecological labels; it is quite as likely to be geography, botany, agronomy, history, or economics.⁶

A literal translation of ecology, home study, implies a focus on the home of organisms rather than on the organisms themselves. Unfortunately the theme has not been popular in academe. Indeed some ecologists dispute the reality of ecosystems, claiming that they are not cybernetic enough, suspecting an element of unscientific mysticism in entities described as more inclusive than populations and communities, especially when the adjective "holistic" is attached to them. They ask, "Who has seen an ecosystem?" Well, who has seen the wind? And after all, there are those NASA photographs.

Doubts about realities of a higher order than organisms persist. Small wonder that most of the talk about conservation, scarce heard amid the roaring of tractor and bulldozer, is still focused on preserving species. The western plains are the center of numerous species-in-jeopardy programs, of salvation strategies for black-footed ferrets, whooping cranes, kit foxes, trumpeter swans, burrowing owls, prairie chicken, ferruginous hawks; and the reasons are not far to seek. The massive plough-down of the grasslands that continues, even with the world glut of wheat, has made this interior region one of the most intensively utilized agricultural areas in the world and one of the poorest in native landscape ecosystems. Little value is placed on the latter, for native prairie is "unimproved" land, waste land, land that is not paying its way. That of course is why the grasslands had to be taken away from the aboriginal foragers, the Amerindians. Their agriculture, such as it was, had made few inroads on the Land.

Some have proposed that the Earth, Gaia, is a super-organism.⁷ Is this perhaps an unintended but subtle devaluation that downsizes it to our kind? More reasonably the Earth, the Ecosphere, is supra-organismic, a higher level



***Renunciation of man's
domination-of-nature attitude is
the prerequisite for a just society.***

of organization than mere organisms that constitute one of many kinds of components.

As organisms, people are parts of the supra-organismic Ecosphere. All manner of problems are created by denying this ecological reality, by asserting our wholeness, nominating ourselves as the standard against which relative importance is to be judged in the universe. To reverse this misconception, to conceive and perceive people, ourselves, as parts, elevates the ecospheric whole and confers greater-than-human value on it. To paraphrase Aldo Leopold, the commodity that we thought belonged to us is transfigured into the community to which we belong. The world, the Land, is accorded primary importance, which need not downgrade its constituents. Such recognition provides an elevated purpose for humankind: to be the conscience of the world.

This is radical stuff and Western tradition lends little support to it. Read the renowned philosophers, the wise men, study the sacred scriptures, the works of the great artists, and an indisputable conclusion emerges. Only two relationships are important: that between Man and God, and that between Man and Man. The People-Planet relationship is just not there; its significance is zip. When in our tradition the World is recognized, it is only as the stage where Man, proud Man, plays out his conceits.

Lest the gender-conscious among you worry that I have slighted the other sex by referring only to Man, the masculine term is purposely used because, as you know, the other blind spot of the West's heavy thinkers is precisely the feminine. They have paid as little attention to Woman as to the Ecosphere. So, of course, by extension from their homes, they projected either a capricious Mother Nature to be cajoled and tricked or an inert Nature, a passive Mother Earth, simply there to be "husbanded." In the last half-century, we've come a long way. No longer do we use sexist terms; vis-a-vis the world, neither husbandry nor wifery nor cohabitation is appropriate. We "manage the resource base optimally."

Some scholars suggest that man learned to enslave the land by first practicing enslavement on women, children, animals, and other men.⁸ Whether historically accurate or not, this argues the primacy of inter-personal relationships; only a just society will deal justly with the land. From the ecological perspective, the priority is reversed. Just treatment of the land comes first. How can we hope to be personally whole in a dismembered society, a land scalped, scraped, eroded and poisoned, asked Wendell Berry.⁹

Renunciation of man's domination-of-nature attitude is the prerequisite for a just society.

Thus ecosophy, ecological wisdom, encourages a better attitude to nature, to the Land, as the prescription for a better society.

The task is to develop a sense of belonging to the world, to cultivate an empathy with the Land wherein we live, to experience the in-ness of our earthly existences. The inscapes of our thoughts and feelings must be congruent with the landscapes where we live.¹⁰ We cannot mind the world until the world is important in our minds as the surrounding inventive and sustaining sphere, a thing of intrinsic value, an end in itself. It preceded us; we came from it; we are incapable of remaking it once destroyed; and it supports us. Maintaining its health and beauty in perpetuity is perhaps the only creative, risk-free goal that humanity can set for itself, a goal moreover guaranteed to restore health and beauty to humanity.

Schumacher the economist despaired of economic thinking unguided by non-economic values.¹¹ Just as physics is dangerous unless guided by metaphysics, so economics needs meta-economics that acknowledges the realm of the sacred. Surely the world, the Land is sacrosanct and not merely a plaything of econometricians.

Recognition that the Ecosphere is supremely important, possessing intrinsic value, calls for reexamination of two profound questions, until recently believed to have been correctly answered for all time. Like the answers to the questions posed by the Sphinx, these also will determine whether we are devoured or allowed to continue on our way:

—Who in the world do you think you are?

—What in the world are you doing?

The first is the key question, for what people do in the world depends on who in the world they think they are. The popular answers are homocentric and unecologic: We are the elect, lords of creation. In the words of the Bard:

"noble in reason, infinite in faculty,
in action how like an angel,
in apprehension how like a god,
the beauty of the world,
the paragon of animals..."

Shakespeare had the good sense to end Hamlet's recitation with a cautionary, "And yet..."¹²

Because any way you slice it, the message is species selflove, homocentric narcissism. In Greek fables retold, Narcissus took a shine to one of Zeus's women; Venus shook an admonitory finger at him, saying, "Just watch yourself!" Homo sapiens has apparently taken its cue from Narcissus. Is there any avenue of escape from the solitary confinement of a narcissistic existence, from the cramped introspective cage that the human species has willed for itself?

On the authority of a number of seers, simple exposure to the Land (the earlier the better, and the wilder the better) can work wonders.



Next to the Land people become precious.

Love of place is natural to everyone. In his book on topophilia, Yi-Fu Tuan² defines it as local or regional patriotism (as opposed to imperialistic patriotism), resting on the intimate experience of place (that is, of Land) and, he says, on a sense of its fragility that needs our compassion.¹³ So it is with the Prairie and those who inhabit the Plains.

I was born in the grassland region and have spent most of my life here. Imprinted on me at an early age were the wide-open landscape, the big sky, the singing grass, the meadow lark's song, the wind-waves that roll through the grain fields, the indigo water of prairie ponds at spring breakup.

It seemed right that at the end of the Second World War I should enroll at the University of Nebraska in Lincoln to study grassland ecology with Dr. J. E. Weaver. He took me to a half square mile of native prairie near the city of Lincoln and in effect said, "Go to it; find out what you can about it," a marvelous introduction to the Tall Grass Prairie and the ideal way to earn a graduate degree.

J. E. was a serious, life-is-earnest kind of person, some would say the model of a hard-headed scientist. Nevertheless, in his book *North American Prairie*, he allowed a momentary exposure of his affections, writing of the grassland: "One glories in the beauty, its diversity, and the ever changing patterns of its floral arrangements...One comes not only to know and understand the grasslands but also to delight in them and to love them."¹⁴ And on a nostalgic note, perceiving the imminent invasion by improvers of the grassland, he wrote: "The writer has been fortunate in living in that portion of the prairie that has resisted civilization longest." Are the citizens of Lincoln still resisting civilization?

Certain it is that resistance is more and more a duty. The immigrant civilization brought to the Plains from eastern North America and Europe imposed on the grasslands a foreign technology, developed in quite different ecosystems. Over most of its 10,000-year history agriculture was practiced on naturally irrigated deltas and floodplains, and later on deforested lands of ample rainfall as in Europe and eastern North America. Only in the last 125 years or so have the semi-arid grasslands of the world been tested. Dryland cropping in northeast China, for example, is only 80 years old, the same as in my part of Canada. No precedents exist anywhere in the world to indicate whether semi-arid agriculture can be sustained for much more than a century. Here on the Interior Plains from Saskatchewan to Texas a gigantic experiment of uncertain outcome is underway, cheered on by agribiz, agricultural research stations, university departments of agriculture. Loss of organic matter, loss of soil structure, wind and water erosion, all are indicators that the

No precedents exist anywhere in the world to indicate whether semi-arid agriculture can be sustained for much more than a century.

stability of grasslands depends on a permanent cover. The longterm prescription for sustainable use, for kindly use, may well have its pastoral side, shepherding flocks, propitiating the spirit of the primeval bison.

Even when the grasslands have been recognized as different from the forested lands where traditional agriculture developed, the hopes brought to it have been the same. Periodic drought is the underlying cause of grasslands, yet many were the theories that discounted this reason for the absence of trees. And still today inhabitants of the interior plains have not come to terms with their semi-arid millieu, nor with the corollary that drought is a norm to be accommodated in whatever agricultural system is devised. The expectations of forest-dwellers continue to persist on the plains, a recurrent source of disappointment, frustration, and despair.

Edward Ahenakew, an Amerindian of the northern grasslands, expressed his sense of himself as part of the Land in these words: "I am a Plains Cree," he said, "and on the prairies I can believe I am the center of the world, my world. The land of the forest is a good land but when I am in the midst of it I feel small and of no account."¹⁵ How much harm has been done and is being done to the Plains by those with unreasonable expectations of it, by those with no empathy for it because they came from the land of the forest, feeling themselves small and of no account in the strange surroundings of the grasslands?

In his poem, "Editing the Prairie," Don Kerr pokes fun at the outsider's view:

Well, it's too long for one thing
and very repetitive.
Remove half the fields.
Then there are far too many fences
interrupting the narrative flow.
Get some cattlemen to cut down those fences.
There's not enough incident either,
This story is very flat.
Can't you write in a mountain
or at least a decent sized hill?
And why set it in winter
as if the prairie can grow nothing
but snow. I like the pubic bush
but there's too much even of that,
and the empty sky filling all the silences
between paragraphs is really boring.
I think on due consideration
we'll have to return your prairie.
Try us again in a year
with a mountain, or a sea, or a city.¹⁶



Meeting the expectations of the Prairie is especially difficult, first because of our forest-dwelling background and latterly because of our city-dwelling background.

Yesterday I flew east from the region of the Mixed Prairie to Minneapolis, then south, skirting the edge of the Deciduous Forest, passing mostly over grasslands or rather what Professor Kuchler has mapped as Potential Prairie, for in the lexicon of the agronomist it has been "improved" by conversion to cropland. Only fragments remain of the rich and varied True Prairie that once covered almost seven percent of the coterminous United States, and that should pain us all. At the north end of the Tall Grass Prairie formation in Manitoba, an inventory is underway to locate the last few remaining patches, and the suspicion grows that the largest is a 60-acre block surrounded by houses within the city limits of Winnipeg. In Iowa the last major native grassland is reported to occupy no more than 200 acres.

May Watts lamented in her book *Reading the Landscape* that the Prairie survives only along fencelines: half a mile long and eight feet deep, cornfields on one side of the fence and small grains on the other.¹⁷ She looked and saw Illinois as a one-foot-wide strip sandwiched between the alien vegetations of Central America and Europe. Kansas deserves the palm for preserving the single largest True Prairie tract, the Konza Prairie Research Natural Area, saved from the plough by affectionate foresight (or by the obdurate soils of the Flint Hills). And of course other lovers of the Prairie have preserved precious patches of the primordial native landscapes, such as the Wauhob Prairie here at The Land.

But why bother? Why worry as the last of the natural grasslands disappear, miniature Amazonian forests underfoot, cut off, destroyed, vanished with hardly a trace. Stephen Pyne tells us that these grasslands from time immemorial were "conflagrated prairies," cultural artifacts resulting from the use of fire as a technological tool by the aboriginal inhabitants of the interior Plains.¹⁸ Is not present land use, till agriculture, just another technological innovation displacing the aboriginal one, ploughed lands in place of burned lands?

We must, I think, defend or condemn technologies not only according to what they do constructively or destructively to the world and to people, but also according to the attitudes that beget them and which, reflexively, they reinforce. Without romanticizing the life of the Amerindians, they, like foraging people everywhere, lived lightly on the land. The evidence is strong that they shared a Land-community ethic. Hence when they "conflagrated" the prairies, adopting a tool from the natural regime of prairie fires, it was not to overpower the Land but to help in its re-creation as a partner. The Land Institute is attempting to



Mark Gernes listens to Stan Rowe during his 1986 visit to The Land Institute.

reform agriculture toward the same re-creative goal. The attitude is everything.

To try to preserve native landscape ecosystems is important, above all else for its symbolism. Such preservation — renouncing the economic for the metaeconomic, the physical for the metaphysical, the utilitarian and pragmatic for cooperation and compliant coexistence — signals a sympathetic attitude toward the ecosphere. It affirms as self-evident this truth: that the world was not created for people only, but for purposes that far transcend the human race with its limited foresight and imagination; and therefore, it behooves all conscious inhabitants of this beautiful planet to nurture it as a garden, maintaining it in beauty, health, and diversity for whatever glorious future its denizens may together share.

Faced with today's mammoth environmental difficulties, people turn to science and scientists for solution to problems of hunger and food supply, problems of over-population and soil destruction, of industrial pollution and threats of nuclear war, of global change and land use. Reliance for advice on those whose mission is problem solving, discovery of new knowledge, comes naturally in a society where the secular religion of science rides high. Apt to be overlooked is the fact that the ozone holes over the poles discovered by scientists and graciously monitored by them on our behalf were created by an earlier generation of scientist/technologists playing around with unknown-to-nature chlorofluorocarbons. Can such trouble-shooters double as guides? Might it be that their very mode of knowing — objective, analytic, manipulative — fragments or at least obscures the reality of wholeness? Better perhaps to look to others for leadership, to the scholars who don't call themselves scientists. Or are they part of the problem too?

Philosophers, artists and historians bear no ecological guilt surely, for the pursuit of



goodness, beauty and truth is environmentally benign? Dead wrong. These comrades also have cooperated in bringing us to where we are, and if we extricate ourselves it will surely be with their help. They express the beliefs and values of the culture. Thus the movers and shakers (the scientists, engineers and sodbusters of this world) have a reasonable excuse for their mistakes; they only perform what humanist experts sanction as valuable and desirable.

The ecological perspective, Land First, is a vision that all must share and propagate in the interests of health, beauty, and permanence. The Prairie where we are today, the land of the

grasses, needs its sympathetic philosophers, artists, historians, to stir the imagination about what once was and what can be, with images that are ecologically realistic, based in the bioregion, true to the True Prairie, transcending traditional myths of heroic humanity fighting dust and drought, grasshoppers, blizzards and bad markets.

In our minds we must find our way back to the lost place where we have always been -- the globe, the ecosphere, the Land -- seeking a common vision and then a common covenant to understand, to respect, to love it.¹⁹ That is the ecological perspective of Land and people. <

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SEEKING PERMANENCE - CONTINUED FROM PAGE 18.

Lastly, David proposed that "under whatever name we put on it, we must recover some very thorough, deep sense of the sacred." We are in a unique position in the history of all living forms to be able to choose life or death for ourselves and the rest of the biological universe. We must constantly work to choose life. And only out of some deep respect for all life can we make the right decision that will lead us to sustainability. We must see ourselves as "custodians of a long chain of evolution." David repeated the words of Stewart Brand in the introduction to the *Whole Earth Catalogues*, "we've become as gods; we better get good at it."

David Orr concluded his speech by reminding Prairie Festival participants that in order for us all to work towards permanence, we must retain our own staying power. Through courage, dedication and sheer toughness, we will do good work.

And by the good work and wise words of David Orr and Conn Nugent, the 1988 Prairie Festival was brought to its conclusion. Both these men inspired each participant to continue the search for health, beauty and permanence in his or her own life. And through this essential quest, we move forward to an uncertain, but hopeful future. <

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Wendy Johnson Inspires Gardeners

Dana Jackson

Prairie Festival participants who attended the Saturday morning garden session led by Wendy Johnson found themselves by-passing later programs they had planned to attend in order to be part of Wendy's other two sessions. They became more and more excited about gardening as Wendy explained her firm belief in the benefits of double digging beds and composting and enthusiastically described the encouragement of certain weeds, "dynamic accumulators," to build or cleanse soil. Participants explained their own methods of insect control and shared recipes for potions to repel insects and marauding deer.

Wendy, the head gardener at Green Gulch Farm near Sausalito, California, takes care of one and a half acres of perennial plants in beds. The farm also grows annuals on about fifteen acres, much of which is lettuce to be marketed to San Francisco restaurants.

Wendy describes herself as an "heretical student" of Alan Chadwick. Although she definitely learned much from the famous gardener, she formed her own opinions and applies his methods flexibly. For example, Wendy emphasized the importance of a gardener designing beds to her own scale, that is, not too wide for one's arms to easily reach the middle from each side. The width of paths between beds should also fit individual patterns. At Green Gulch, they determine the width between beds by measuring the space needed for an adult and a child to walk together comfortably between them.

Wendy admits to "double-dig fanaticism," although she readily agrees that the method is not appropriate for every gardener in every climate and soil. She won many converts on Sunday morning when participants in her workshop helped double-dig a bed. Part of the area was once a driveway and has been gardened only for a few years. The diggers found the top four inches of soil to be loose and soft because of the straw mulch composted into it over the last four summers, but dense red clay lay below, hard as concrete. Digging forks alone would not loosen this layer; the gardeners first had to use a pick axe. They could easily see the advantage of loosening that subsoil to allow the absorption of water and the penetration of roots.

In her Sunday morning session on garden fertility, Wendy stressed that the key to a sustainable garden is the development of fertility by cover crops and the composting of weeds and vegetable wastes. A lengthy and animated discussion took place by the compost pile, which we finally interrupted in order for Wendy to eat lunch and still catch her plane in Wichita. But the gardening enthusiasm sparked by Wendy lingered over the remainder of the Prairie Festival.



Wendy Johnson

Seeking Permanence

Beth Gibans

"Man's management of the land must be primarily orientated towards three goals -- health, beauty and permanence."¹ These words by E.F. Schumacher inspired the theme for the 1988 Prairie Festival. Schumacher believed that a society geared toward these three goals would function productively and sustainably, while still maintaining the dignity that makes us human.

Relative to each other, the first two of these goals are easy-- we have some sense of what is beautiful and healthful. The third, permanence, is one we have yet to understand fully. We do not yet know how to live as a society with permanence as our primary goal. But we must begin to learn.

In the closing program of the Prairie Festival, Conn Nugent and David Orr helped us to explore what it means to seek permanence and how we should go about it.

Schumacher spoke of "permanence" almost synonymously with "wisdom." Related to this, he insisted that "no one is really working for peace unless he is working primarily for the restoration of wisdom."²

Conn Nugent is working for peace, and he certainly is working for the restoration of wisdom. As former executive director of International Physicians for the Prevention of Nuclear War (IPPNW) during the time it received the Nobel Prize for Peace, Conn contributed significantly to nuclear disarmament efforts.

Conn addressed the Prairie Festival audience on the topic, "Preventing Nuclear War." Befitting his roles as organizer and educator, Conn, without notes, interpreted complex international issues knowledgeably and eloquently.

Conn told the audience that current nuclear weapons are dramatically more accurate and powerful than their predecessors. Hence, the danger of first strike capability has escalated. The resulting heightened fear impels each side to construct more accurate, quicker weapons and thus continues a vicious cycle that accelerates the arms race. As these weapons have become quicker and more sophisticated technologically, the time to react in the case of attack has gone from three hours to one hour to now less than ten minutes. And as Conn put it so well, "Most of us make better decisions if given three hours to think about them than we do if given three minutes."

Conn also pointed to the decentralization and "conventionalization" of nuclear weapons as significantly increasing the possibility of a mini-war. In the old days nuclear weapons were larger and more easily distinguishable from conventional weapons. Today, they are portable and easily concealed, existing in virtually all military units. There is no longer a distinction between nuclear and conventional forces.

In assessing the likelihood of a nuclear war, Conn outlined three possible scenarios. The first would be a pure accident caused by human error, mechanical complications, or miscommunication. The authorities claim that there is a zero percent chance of this happening, but Conn reminds us that they also said that the chance of Chernobyl happening was one in ten million years.

Another possible scenario is a direct war with the Soviet Union. This Conn described as highly unlikely, since in reality the rivalry between the U.S.S.R. and the U.S. is insubstantial: there is no border conflict, we are both imperialist nations with distinctive understood spheres of interest, we've never fought each other before and lack material reasons to fight. Conn compared our rivalry to that of the religious wars of our ancestors who skirmished over ideological differences.

The third scenario, which is widely believed to be possible, is that a nuclear war would be initiated by third parties involved in regional conflicts, such as the Arabs and Israelis, or India and Pakistan. It is not too difficult to imagine the escalation in one of these areas from a regional conflict to an all out reactive war. Conn concluded: "We cannot dreamily accept on sheer mathematics alone that since there has not yet been a nuclear war that there will not be one. Deterrence, I submit to you, is mathematically evil. These weapons must go off...The very existence of nuclear weapons, I am persuaded, will one day impel their use."

So what can we do?

First and foremost Conn insisted that we must establish, "as a matter of American self-

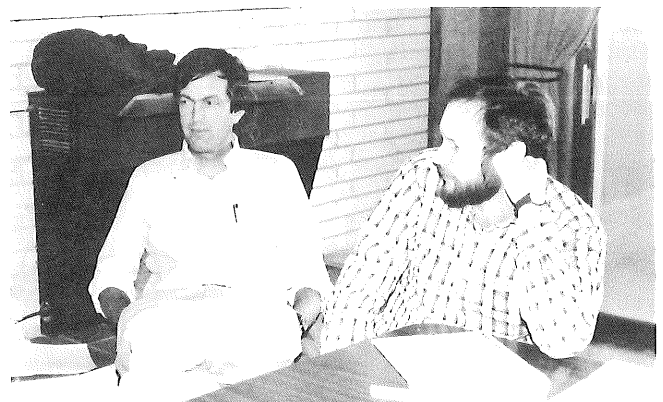
interest, the denuclearization of the world. Not because we love the Soviets, but because we love ourselves." And out of this love we must act, because it is important to our personal, national and planetary concerns. We must challenge the idea that nuclear weapons are a necessary part of international policy and accept their existence only as part of a course leading to their annihilation.

Secondly, Conn pleaded for time. "At this junction in history, for the cause of sustainability, we need to buy time. As a species, we need to buy thirty, fifty, one hundred, two hundred years to figure out how we are going to devise systems of agriculture and manufacture that will not rob our descendants of their rightful inheritance." He acknowledged that some of us will have to do the research into these issues, as the Land is doing, while others must work through the political system to slowly change attitudes and structures that currently encourage our present unsustainable policies.

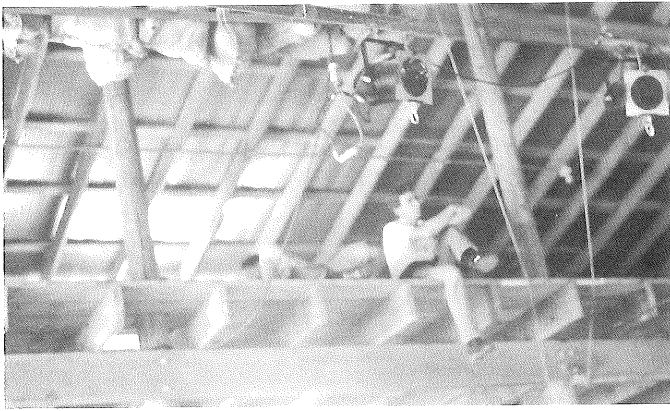
Lastly, he urged members of the audience as individuals to demand peace as part of a universal peace movement. He passionately urged people into politics, since the problem is inherently political. Only by electing those who better represent our values and beliefs can we change the nature of the discussion on nuclear weapons and fundamental global issues and move to actively eliminate their threats to our survival.

No one could agree with Conn more about the importance of entering the political arena than David Orr. David is the co-founder and director of the Meadowcreek Project in Fox, Arkansas, an environmental education center. He has a Ph.D. in political science from the University of Pennsylvania and is very deeply committed to finding creative political solutions to societal problems.

David concluded the Festival with his talk: "Towards Permanence: The Continuation of Life on Earth." He recognized the difficulty of seeking permanence when nothing is permanent -- life and evolution are in constant flux. But he



Bruce Colman and Conn Nugent at a Land Institute Board of Directors' meeting.



Watching the program from the barn loft.

also recognized that the quest is essential. To David, working towards permanence requires a reexamination of our political structure and democratic process. "If environmental issues are inherently political, as I think they are, building a sustainable and durable society will require civic renewal leading to what political theorist Benjamin Barber calls 'Strong Democracy.'"³

David outlined four fundamental areas for reform in order for civic renewal and sustainability to occur. First, he discussed economics. We need an economic system based on ecology, one that recognizes the real costs and benefits of our actions and transactions to our environment, culture and long term survival. This economy would, of course, be powered by the sun and be resource efficient. David stressed that people operating within this economy would be driven by and rewarded for good work and not greed, since, in the long run, greed is unsustainable. Schumacher appropriately called upon Gandhi's words to explain this idea: "Earth provides enough to satisfy every man's need, but not for every man's greed."⁴

Similarly, a sustainable society would be a fair society. "You cannot build a permanent civilization based on inequity." Central to this concept is the distribution of wealth. In 1987, one percent of the population in the United States controlled thirty-six percent of the wealth. This "centralization of power has removed many resource decisions from the public arena,"⁵ in essence making decisions about our global resources a private matter for those who have greater accumulated access to them. We must democratize these decisions by first redistributing wealth and establishing a fair society. David admitted that this issue is unpopular with many prominent people, but "we will need the courage to force it onto the public agenda."

Second, we need a "politics as if survival really did matter." This begins with a strong participatory democracy and calls for new political leadership "whose loyalties go beyond party or nation to humanity and the planet."⁶ He proposed that after 1988 we have "no President

of the United States who is ecologically illiterate"!

Civic renewal would stress civic virtue, citizenship and community participation, elements weak in our present experience. Without these at the base of our democratic structure, that structure is threatened and sustainability is virtually impossible. He argued that "democracy is going to be essential for sustainable resource management; it isn't a frill." We will have to learn how to be good citizens. Because "as long as we allow [these] to be eroded, our legacy will be exactly what we deserve."

The third area for reform is education. In order for us to invigorate our democracy and teach ecological literacy, we must make education a top priority in our new society. We must educate differently, however. David suggested that "all education is environmental education — by what we include, by what we exclude, by what we emphasize, by what we deemphasize. We convey to students that they are part of or apart from the natural world."

To begin to prepare students to be thinking individuals who are part of the natural world, David sees three fundamental aspects of a comprehensive education. First, it should be interdisciplinary and connective. It should teach students to think across disciplines and beyond specializations. We need to be able to combine the need for expertise with the perspective and breadth of generalists to build a sustainable society.

Second, there needs to be an active dialogue between thinking and doing. Doing allows for connections with the natural world that result in quality thinking. Our expertise rests on this good thinking.

Third, education must involve a connection to place, both ecological and cultural. We must educate people to inhabit a place, not simply reside there; to contribute to and draw from their communities for support and significance. We live in a transient society where few people still retain their sense of belonging to a place, cultural and natural. David suggested that "the sum total of violence done by people who don't know who they are because they don't know where they are adds up to the global ecological crisis." As hard as it may be, we must resist the mobile addiction and regain our places.

David insisted that these connections should exist in our places of learning as well. Campus policies should be consistent with our role in the world and demonstrate our connectedness with the biosphere. So, for example, the cafeterias should prepare locally grown foods, and buildings should be heated by renewable resources. These types of connections are essential in order for education to promote to each student what it ought to, a life long search for wholeness and excellence in all aspects of life.

(CONTINUED ON PAGE 15)



Natural Connections

A Flint Hills Visit

Karen Finley

A traveler passing through the Kansas Flint Hills a century ago, by mule-powered wagon loaded with supplies, (including extra hardwood timber not available further west in case of a broken axle or other wagon problems), might at this point in the trail have been surrounded on every side by a hundred miles of prairie. His intention, and that of his family, would be to cross this country, or to create a place less wild within it. Land interns, the Piper family, Randy Kempa, and Jerry Rasch visited the Flint Hills June 20 and 21 by truck and automobile, carrying not flour and bacon but spaghetti sauce, apricots, and a pie from The Land's cherry trees. Our purpose was not to cross the prairie but to find ourselves within it, surrounded by a country that no longer typifies the Kansas landscape.

The Flint Hills region is North America's greatest remaining expanse of tall-grass prairie, a fraction of an ecosystem which once covered most of the present states of Iowa, Illinois, southern Minnesota, northern Missouri, and the eastern edges of Nebraska, Kansas, and Oklahoma. A century and a half ago, prior to the westward expansion of the American pioneers, the region was inhabited by indian tribes, and by elk, wolves, mountain lions, and the American Bison, or buffalo. These large mammals were eliminated by newcomers in search of food, sport, and security, as were the indian tribes that hunted them. The elimination of the buffalo, several hundred thousand head of which roamed in the Flint Hills until the 1880's (when the beast vanished from the state), is particularly significant in the transformation of the landscape, as it played a major role in the evolution and preservation of the grass dominated ecosystem.¹

These early inhabitants are gone, as well as a natural cycle of fires, which removed the dense thatch of dried grasses from the soil surface and prevented woody species from successfully colonizing the area. The landscape has changed due to these and other losses in ways we can only estimate. The tall-grass prairie has

been largely obliterated by cultivation, remaining only as patchy pieces of what it once was. In Illinois, four square miles of prairie remain out of 40,000.²

The prairie grassland of the Flint Hills survived the plow, remaining intact because the rocky, shallow soils there are unfit for cultivation. For the last century it has supported an economy based upon cattle ranching and is managed by burning and other practices to maximize the production of forage. Though the cow is a poor substitute for the prairie's once dominant grazer, the lack of disturbance below the surface of the soil allows the continuance of the diverse tall-grass prairie community.

Departing from state highway 56, where the wheat harvest was being carried out in full force, we headed south on the road from Council Grove and through Cottonwood Falls. These historic towns, scattered limestone homesteads, and the unplowed grasslands of the Flint Hills seemed to carry us back to an earlier time. We followed the Morris-Chase county line to a place where the vista is wide and the prairie seems particularly vast, appearing to stretch as far beyond the horizon as it once did. After a spring burning, the hills were wonderfully green. Blue wild indigo, wooly verbena, butterfly milkweed, leadplant, evening primrose, prickly poppy, coneflowers and wild alfalfa were in bloom. We chased a pair of scissor-tailed flycatchers, watched plovers alight on fenceposts, and startled bobwhites and killdeer in the grass.

Dawdling, as perhaps only a dozen half-lost amateur botanists, bird-watchers, and photographers can dawdle on a hundred degree day in the hot Kansas wind, we eventually made our way along Chase county roads to the ranch headquarters of Ms. Jane Kroger, near the town of Matfield Green. From there we trucked to a high place in her hilly pastures to set up camp. Jane not only kindly allowed us to spend the night on her land, but also sent up a half gallon of just-churned ice cream with her ranch hand Sue, who stayed to share our pie and conversation.

Waking up to the first summer sunrise, I watched the heavy flight of a great blue heron overhead and heard a kingfisher rattle above a

nearby cottonwood-lined creek. I listened to the prairie's small, subtle voice and felt sad at the sacrifice of the once-vast prairie to the prosperity of midwestern agriculture. How soon will it be until the prairie is forgotten entirely in the minds of most Americans? Will the people of Kansas one day forget that another, richer, landscape preceded their highways, towns, and cultivated fields? Remembering the original landscape and the history of its transformation is important to our future decisions, especially (but not limited to) those regarding land and resource use and agriculture.

Across the country and the world, other landscapes such as these are gradually being overcome and forgotten. Our narrow understanding and regard for history makes this an easy process. The distance that we live from the landscape, both in terms of time and space, prevents us from knowing a place both in ecological and in historical context. If it is true, as Aldo Leopold said, "we grieve only for what we know," then only by becoming personally acquainted with a place will we value its continued survival.³ Our visit to the Flint Hills was a big step towards knowing and valuing this tall-grass prairie area. ◀

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Laura Benson eats dinner on the prairie.

Listening to Silence

Jake Vail

On the morning of the summer solstice I awoke as the stars were fading out. A cool breeze whispered as I pushed back my sleeping bag. From the surrounding Flint Hills prairie I heard birds waking up.

And nothing else.

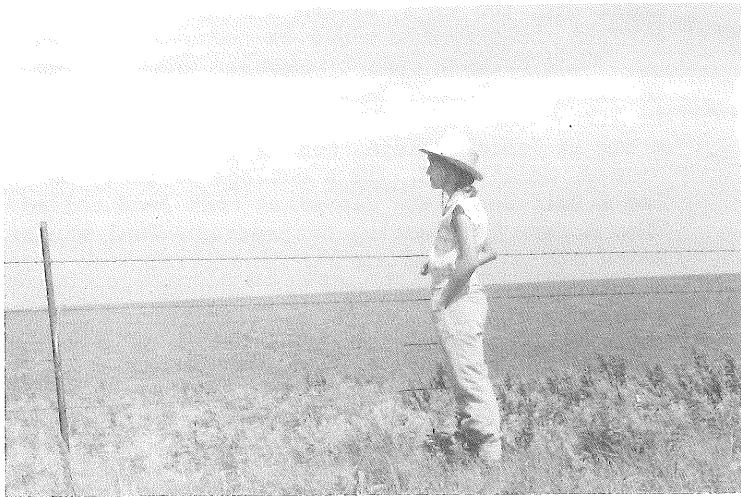
No ticking clocks, passing cars, air conditioners, radios — not even other people. A dickcissel announced its plans for the day, a bobwhite quail called out inquisitively, a great blue heron flew lazily by with a thundering silence, looking as though he might still be asleep.

A few weeks before at Maxwell Game Preserve I stood awestruck as a sudden queer sound that interrupted the nearly complete quiet proved itself to be the heavy breathing of a dozen bison, gathered in a wallow fifty yards away.

On a cold morning in April, huddled in a blind (blind indeed in the pre-dawn pitch), a strange tongue issued forth as the spring prairie chicken booming commenced.

Annie Dillard reminds us that "beauty and grace are performed whether or not we will or sense them. The least we can do is try to be there."¹ But it's difficult to hear sermons in stones when picnickers' radios blare, rubber meets pavement, and planes roar by everywhere you go. The wonder of the snorting bison at the Maxwell Preserve was abruptly shattered by a sextet of fighter planes screaming directly overhead at well over 100 decibels. The relative isolation of the Flint Hills prairie isn't exempt either: after the nighthawks settle in and all is silent, the unnatural noise attached to that arcing pair of blinking lights way above reaches your ears.

Some time ago *Coevolution Quarterly* published a piece by Ivan Illich entitled "Silence is a Commons," in which he drew parallels between the traditional village commons and the commons of our aural environment.² The commons of which Illich writes is "that part of the environment which lay beyond (our) own thresholds and outside of our own possessions, to which, however, we have recognized claims of usage, not to produce commodities but to provide for the subsistence of our households." This view of the environment runs directly counter to the view of the environment as a resource. When seen as a resource, the commons is swiftly appropriated and enclosed. Enclosure, Illich points out, redefines a community by undermining its local autonomy, changing its inhabitants to consumers, and limiting the kind of environment on which the moral economy of its survival is based. People become economic individuals that depend for their survival on commodities that are produced for them, an environmentally induced redefinition of people.



Experiencing the wide horizon.

Silence is a commons, but has fallen prey to the "tragedy of the commons" as elucidated by Garrett Hardin, where in a limited world every new enclosure involves the infringement of someone's personal liberty.³ (Perhaps when speaking of silence Hardin's phrase ought to be inverted to read that every new infringement involves the enclosure of someone's personal liberty). The earth now houses over five billion people, and when our media, the "extensions of man," are taken into consideration, being aurally free becomes impossible. The advent of loudspeakers transformed silence from a commons to a resource for which we compete. This in turn set up a Batesonian double-bind, where one is damned if he fights back, for this wins no silence, and damned if he submissively listens.

Hardin thus concluded that the tragedy of the commons has no technical solution, but that it requires a fundamental extension in morality. That this is not so obvious and that technical attempts at freedom from the double-bind seem to win some victories can be seen in the popularity of personal stereos and headphones, which allow one's choice of aural environment at no cost to others.

Yet this is not freedom, but only substitution of one kind of environment for another -- one designed by someone else. "We are locked into a system of 'fouling our own nest,' so long as we behave only as independent, rational, free-enterprisers," says Hardin. The noise we discharge has fouled our nest to such an extent that our original nest is no longer apparent.

"...So long as we behave only as independent, rational, free-enterprisers." Therein lies hope. People are increasingly heeding the words of William Blake:

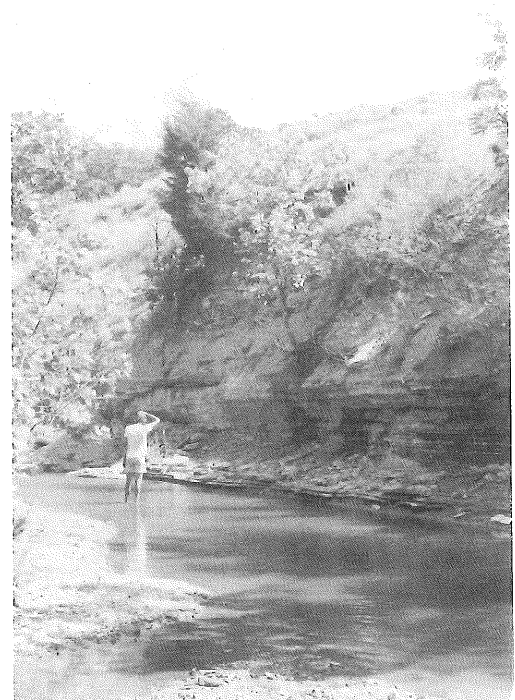
I must Create a System,
or be enslav'd by another Man's.
I will not Reason and Compare:
my business is to Create.⁴

Underlying this creative movement is a sense that we may instead be interdependent and intuitive, and that there's no such thing as a free enterpriser. There seems to exist a realization that a recovery of a sense of place, a re-inhabitation of earth, is of great importance. Hardin points out that morality is system-sensitive. As new systems and moral economies then coevolve, the domain we release will surprise us with sublime sounds we have long extinguished or forgotten.

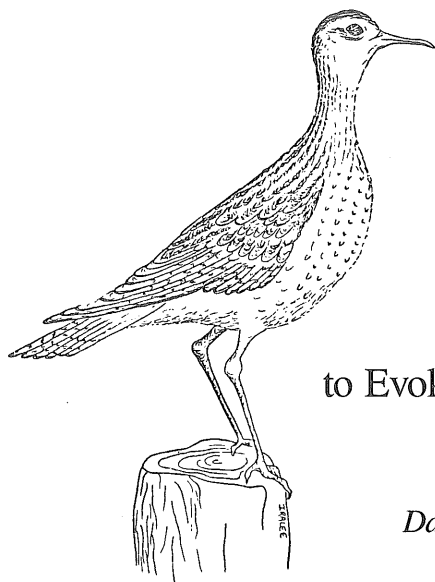
Yi-Fu Tuan writes, "In the face of the sublime we undergo a sort of death. The striving, manipulative, and self-righteous part of the self is extinguished, and if religious teachers are correct, the self that remains, seared of delusions, is ready to experience a resurgent yearning for the ineffable good."⁵ The least we can do is try to be there. ◁

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Cooling off in a prairie stream.



Music to Evoke the Prairie

Dana Jackson

For several years, Paul Winter has expressed interest in creating music which would celebrate the prairie. When The Land Institute sponsored the Paul Winter Consort performance in October, 1986, we hoped to take the musicians to see some tallgrass prairie and explore the possibilities, but they simply were not in Salina long enough. The spring 1988 concert at Bethany College placed them only fifteen miles from us, but again they had to hurry on to the next performance. Paul told me then that cellist Gene Friesen would take the lead in this project to create prairie music and would try to spend some time in Kansas in early June.

To our delight this did happen. Gene Friesen squeezed in a quick trip to Kansas between a performance and an important radio interview in New York City to promote an album.

Wes picked him up in Wichita on the morning of June 14 and drove into the Flint Hills. I met them in front of the historic courthouse in Cottonwood Falls; then we explored several Chase county roads and out-of-the way places. Wes drove us through explosions of butterfly milkweed, and purple-lavender clouds of lead plant and false alfalfa. The plovers drew our eyes to the sky and fence posts; the grasshopper sparrow, to the tips of tall forbs.

Kelly Kindscher, former land student and author of *Edible Plants of the Prairie* (University of Kansas Press, 1987), joined Gene and me at the Jane Koger Ranch near Matfield Green in the late afternoon after Wes returned to Salina to keep an appointment. Jane drove us out onto her 6000 acre ranch and pointed out potential camping spots. We chose to camp on a hill with a broad vista, though we cooked our spaghetti supper on an open fire near a creek.

Gene experienced the prairie that evening and early next morning in a rainy blue-gray mist. The nighthawks were scarce, evidently not liking to fly in the rain. The cattle scattered when we walked through the pasture, then bellered and mooed themselves back together again all evening. Sound carried well in the

moist air, too well, as the distant, faint hum of cars on the turnpike could be heard all night.

Gene Friesen cannot remember when he began thinking of himself as a musician. He was born in Hillsboro, Kansas, where his father taught music at Tabor College, but he grew up in Fresno, California. As a college student, he led a thirteen piece classical rock band called "The Modern Fur-Bearing Orchestra." Paul Winter heard the group perform and remembered Gene when he needed a cellist. Gene has been an integral member of the Paul Winter Consort since 1978.

Watching Gene play the cello is as exciting as hearing him. He plays the entire instrument, bringing forth music and rhythm out of every quarter inch of wood and string. Sometimes the listener worries about the ability of the instrument to survive the energetic playing. But Gene also coaxes moving, lyrical sounds out of the cello, like the title piece of the album with Paul Halley called "New Friends," which is almost excruciatingly beautiful.

Gene and I drove back to Salina the morning of June 15, arriving in time for a potluck lunch at The Land. The cello had been locked in the car since he arrived in Wichita, and it was obvious that he was eager to get his hands on it again. He began by playing a special version of "Happy Birthday" in honor of Wes, then he improvised his first piece after being on the prairie. Gene told me that his music just came out of the instrument, just made itself. I asked him later if he visualized anything as he played for us, and he said no. But as the music filled our classroom, I saw plovers hovering overhead with their rapid wingbeats, I saw bursts of orange butterfly milkweed, I felt the soft rise and fall of lavender green hills and was in Chase County on the prairie again.

Gene will come back in the fall for more prairie experiences. Then we hope to get the entire Paul Winter Consort here. Someday there will be an album by the Paul Winter Consort that celebrates the prairie. ◀



Eugene Friesen in the Flint Hills.

New Roots for Agriculture

Prairie Patterns and their Relevance to Sustainable Agriculture

Jon Piper

By now, the environmental and social problems associated with large-scale industrialized monocultures should be familiar to most readers of *The Land Report*. These problems include high levels of soil loss, pesticide and fertilizer contamination of soil and groundwater, utter dependence upon finite fossil fuel resources, loss of cultural knowledge, and the depopulation of rural communities. Reliance upon extensive monoculture grain farms arose this century in large part from the availability of inexpensive fossil fuels that favored mechanization and labor efficiency. Within agricultural universities, research to maximize production (yield/area) through specialization and massive inputs took precedence over guaranteeing sustainability of harvest into the indefinite future.

On the Great Plains, the native prairies, which had developed and endured for millenia, were turned quickly beneath the onslaught of American settlement. The settlers replaced the array of native grasses and forbs with such alien species as wheat, soybean, and sorghum introduced from other continents. Agroecosystems in North America were then modified to accommodate the biological requirements of these new crops.

Referring to agriculture on the American continent, Wendell Berry has stated, "We have never known what we were doing because we have never known what we were undoing."¹ Indeed, the prairie ecosystem existed as a complex web of interdependent relationships among plant, animal, and microbial species. Critical nutrients were garnered, retained, and recycled efficiently by the prairie's biota. Generations of prairie grasses, thriving during the moist springs and hot summers, then drying in autumn and winter, accumulated thick mulches of leaves and stems that gave rise to deep dark soils. These rich prairie soils have made the highly-productive Great Plains granary possible. But the prairie's value to agriculture exists not only in its death. In fact, the future of North American agriculture may depend even more upon our recognizing and appreciating the dynamic patterns that characterize the prairie's life.

The grasslands of the central United States are composed predominantly of warm-season grasses, which display their maximum growth from May through August. Within these plant communities there are also sizeable components of ephemeral early spring wildflowers, and perennial legumes and composites that flower throughout the growing season. Prairie plants have been growing together for thousands of years, adjusting their growth patterns, partitioning

environmental resources, and coexisting successfully. Most prairie plants form associations with soil fungi, called mycorrhizae, that contribute to nutrient accumulation and efficacy of nutrient transfer from decomposing matter to living roots. These mycorrhizal associations are probably vital in providing soil phosphorus to the grassland community. Many plants have ecological roles we have yet to define.

The plant species remaining in contemporary prairies are those that have adapted to the sometimes harsh and unpredictable climate of the Great Plains. In Kansas, annual temperature can range 140 ° F and change 70 ° F within a 24 hour period.² Summer deluges, though sporadic, can be devastating. Dominance of the native vegetation by grasses has resulted from a history of periodic fire, drought, high winds, and large grazing mammals. Where these factors are eliminated, prairie degrades to scrubland or woods.

Obviously, understanding the plant community that has been tailored to the Great Plains environment is crucial to our efforts to devise an agriculture that exists in harmony with nature. The agriculture we envision, modelled on the prairie, would be composed of herbaceous perennial seed crops grown in mixtures. These mixtures will take advantage of differences among species in growth period, nutrient use, and water requirements. We will incorporate into the design of perennial polycultures various principles of ecosystem function discovered in studies of the prairie ecosystem. Thus we will address nutrient cycling, ecological succession, long-term stability of yield, and biological management of insects, diseases, and weeds within agroecosystems. The herbaceous perennials we are developing for polyculture, eastern gama grass, wild rye, and Illinois bundleflower, have either been derived from native prairie or are analogous to species occurring in native prairie.

Among our most important, and most difficult, tasks is perceiving what the prairie can teach us about ecosystem-level agriculture.

Three years ago, we embarked on a series of explorations by asking such questions as:

1. What level of plant growth is sustained by the prairie year after year?
2. When are different types of plants actively growing and what are their roles in the grassland community?
3. What are the proportions of composites, nitrogen-fixing legumes, and cool- and warm-season grasses?
4. How does prairie vegetation change from year to year?

In 1986, we began measuring plant biomass on three prairie sites at The Land Institute. These sites represent a gradient from steep and shallow to level and deep soils. On dates in spring, mid-, and late summer we have sampled aboveground vegetation within twelve randomly placed 1/2- by 1/2-meter wooden sample frames. The spring date coincides with a flush of ephemeral forbs that flower and set seed while most grasses are just emerging. The late summer sampling corresponds to the flowering period of the dominant tallgrasses, and represents peak biomass on the prairie. During each one- to two-week sampling event, a small army of staff and interns clips all aboveground plant growth within sample frames, and sorts the material by species into paper bags. Following *this tour de force* the plants are dried to constant weight in a laboratory oven, then weighed to the nearest hundredth of a gram. We then examine the data thus produced to help address the questions outlined above.

Some consistent patterns have already begun to emerge. For example, there is an inverse relationship between productivity of a site and plant species diversity. This means that the richest soils tend to be dominated by one or a few species whereas poor sites appear to provide more available niches and can support a wider variety of plant species. Secondly, we have noted that the highest proportion of legumes occurs on the least fertile site. Legumes appear to be favored where soil is poor and tallgrasses cannot dominate. Thirdly, we have found that annual plant growth on our prairie is similar to, and sometimes exceeds, that of rain-fed grain crops on the Great Plains.³

Beyond the important data gathered in this study, these sampling periods offer excellent opportunities to hunker down and look closely at the prairie. One can begin to appreciate the sometimes subtle differences that distinguish plant species. An observer may see for the first time the characteristics of prairie soil surfaces, numerous nearly invisible seedlings, or the myriad insects constantly milling about. In that quiet and distraction-free environment one is surrounded by the music of the prairie: the stiff grasses rustling in the constant breezes, the buzzing of insects, the songs of the dickcissel, western meadowlark, savannah sparrow, and bob-white quail.

Aesthetic arguments aside, perhaps one of the most pragmatic reasons for preserving prairie is that it must serve as our only standard by which to judge agricultural practices in the future. Thus, the ongoing work here and on The Konza Prairie near Manhattan, Kansas, may turn out to be as important to agricultural science as it is to ecology. Biological patterns inherent in prairie ecosystems will appear ever more valuable as we discover the principles of sustainable agriculture for this region. <

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2. O.J. Reichman, 1987. *Konza Prairie: a Tallgrass Natural History*. University Press of Kansas, Lawrence, Ks.
3. Details of the studies and complete species lists can be found in Land Institute Research Reports 3 and 4 (1986 and 1987).

In the Greenhouse

Mary Handley

Through this spring and summer we've had plants growing in our new greenhouse. Construction is not quite complete, but Paul Rasch has been a good sport about working around the pots and flats, and has finished critical jobs "in the nick of time".

We started seedlings of Illinois bundle-flower (IBF) and Eastern gamagrass (EGG) for transplanting to new experimental plots at the start of the season. Also the market gardeners used the greenhouse for starting their melons, squash, peppers, tomatoes, and flowers.

Growth in that early phase was slow, and we had problems with reddening and stunting of some plants (especially sweet potatoes) because of low temperatures at night. The plants mostly recovered as it warmed up, and shortly the problem was too much heat. Our evaporative cooling system, pads and fans, has been effective at keeping temperatures 10 - 20 degrees cooler in the large center room than in the passively cooled east room.

We have no automatic controls or thermostats yet, so for all of the adjustments to the vents and the evaporative system, we have relied on dedicated students and staff. The interns have been on a rotation to open and close vents and water plants seven days a week. This meant early morning, mid-afternoon, and late evening trips to the greenhouse all spring. Things settled down once Danelle Okeson started helping out for the summer. The Okesons live just two miles from the Land, and in addition to her daytime work as The Land's groundskeeper, Danelle faithfully came back every evening to open or close vents and turn off fans. She checked the weather forecast to help decide how to leave the greenhouse: vents open if the minimum temperature were to be above 65 and no thunderstorms; top vents closed if thunderstorms were likely; vents all closed if below 65 were forecast.

The sorghum breeding project is in the greenhouse this season, which makes pollinations much easier than in previous years, and reduces the chance of wind blowing bags off seed heads. Very soon after the plants emerged, we noticed an outbreak of aphids which turned out to be the

dreaded greenbug. As greenbugs feed on sorghum they inject a toxin into the plant which causes leaves to redden and which can kill young plants. Controlling the bugs on our hybrid plants was critical. The first application of Safer's insecticidal soap (an application approved for organic growers) did a good job on the aphids, but also damaged the young plants. A lower soap concentration, less generous volumes of spray, and spraying in the cooler morning hours solved that problem. A combination of Safer's spot spraying, hand squashing, and periodically spraying the whole crop (four times so far) has kept the bugs controlled. The other major pest on the sorghum has been grasshoppers, at least three kinds, which can hop into the as-yet-unscreened vents. Jennifer

Delisle, the intern in charge of the sorghum project, has become an expert at catching grasshoppers, and her manual control has kept their depredations down.

IBF plants in large pots have been growing so fast one can practically watch them grow! They are flowering and setting seed indoors, and we hope the seed will be able to mature normally. EGG plants are still small, but are growing well. We plan to keep these plants through the fall and winter to see how they grow as days get shorter.

We've had an assortment of four-legged visitors. A mouse with gourmet tastes devastated the melon seedlings until captured. Lizards, toads, and a box turtle have also been spotted, eating some insects for us, we hope.



Caton Gauthier & Wes Jackson in the greenhouse.

Photo by Terry Evans

Now the research projects are sharing space with 2300 broccoli and cauliflower plants started as fall crops for the community garden and market garden. I noticed that the gardeners have set a half dozen mouse traps, not wanting to repeat their spring experience.

Paul is starting to work on the heating system so we don't get caught by the first cool night. The sorghum will be in the greenhouse through the fall, and pollen is not produced reliably below 70 degrees, so we'll need the boiler by late September.

As we move into fall and winter we'll be doing more small projects such as germination tests, nitrogen fixation estimates, plant division and rooting, and fertilization to better understand our plants and how they grow. By winter, I expect the greenhouse will be one of the most pleasant places to be, and we will all want to do more and more work there. ◀



Stonework by Ken Baker enhances north side of new greenhouse.

POST DOCTORATE POSITION OPEN

The Land Institute has an opening for a post doctorate in soil science. This two-year appointment could lead to a permanent position. We are looking for someone with expertise in soil fertility and plant nutrition and soil microbiology to work with our perennial polyculture research. For more information, talk to Jon Piper, Peter Kulakow or Wes Jackson at (913) 823-5376. Send applications to Wes Jackson, Director of Research, The Land Institute.

THE LAND INSTITUTE RESEARCH REPORT

The results of experiments carried out in 1987 are now available in *The Land Institute Research Report*, Number 4. Papers in this publication were written by the research staff and 1987 interns and edited by Jon Piper. The 1986 report (number 3) is also still available. Copies can be purchased by mail for \$2.75 each postpaid. Address orders to Research Report, The Land Institute, 2440 E. Water Well Road, Salina, Kansas 67401.

Beth Gibans harvests *Leymus* (*Leymus racemosus*) a perennial, grain producing grass that we are studying at The Land. It is not a prairie plant, but is a native of southeastern Europe, including parts of Bulgaria, Romania, Turkey and Russia. (See Burritt article, L.R. # 28)



Traditional Roots for Agriculture

The Land's Harvest

Danielle Carre'

"Hell, a guy could grow anything in this dirt!"

So we were challenged by an old vegetable farmer concerning our new organic truck farm on The Land's 72 acres along South Ohio Street. The soil, a Hall silt loam, is productive and easy to work. If it were the only variable in our operation, we would have a relatively easy time turning a profit.

The "we" on this project are Brad Burritt, Danielle Carre, Paul and Jerry Rasch and Sara Goering. Brad and I started work on the market garden on the first of April, while Paul and Jerry began working full time shortly after the Prairie Festival. Sara has helped out with marketing by making phone calls and personal contacts and clerking at our retail stand.

We planted a variety of vegetables this spring, sweet corn and melons being our major crops. Initially we spent much time getting equipment ready, a water well drilled, and an irrigation system set up. Then we planted the early crops and started seedlings in the greenhouse. As the weather became warmer, the annual reality of insects and disease came upon us. In addition, June turned out to be very dry and hot, with many days of temperatures over 100 degrees.

By late June we had most of our crops in and we were irrigating full-time; even so we had a hard time keeping up. The heat also kept the peppers and tomatoes from setting fruit and killed much of the corn pollen. While we were busy watering, cucumber beetles settled in on the melons. Although cucumber beetles can damage plants by chewing on the leaves and flowers, the diseases they carry prove to be the real menace. Cucumber mosaic virus and bacterial wilt are both vectored by cucumber beetles, and the latter hit us hard. We sprayed Rotenone to control the beetles (Rotenone is a botanically derived insecticide approved for organic farming), but many melon plants were infected. We continuously pulled out the infected plants, watching much of our melon crop wilt away.

This was also a bad year for corn earworms. We did get some control by spraying Dipel (a bacterium, *Bacillus thuringiensis*) every three days. Some varieties we planted were more susceptible to earworm because of their thin husks; these were essentially unmarketable.

The farmers' market, new in Salina this year, provided our best outlet early in the summer. Unfortunately, there were too few producers to supply the many eager customers who showed up in the beginning, and many buyers stopped going downtown to buy produce on Saturday morning. Folks did come back to the market



when the corn and tomatoes came on and the produce supply increased. We also set up a stand at Vita Villa, a health food store in Salina, and sales were good in the late afternoon hours we were open each day.

We do not advertise ourselves as organic growers out of respect for the Kansas Organic Producers' organic certification guidelines, which stipulate that land must be free of prohibited pesticides or fertilizers for three years before being eligible for certification. Although there has been a good response to fresh produce in Salina, many people are unconcerned about whether or not their produce is sprayed with chemical pesticides. Since we are the only farmers selling unsprayed produce in Salina, the option is new, and people have not considered the advantages. We provide information regarding our production methods, and we hope the public will start requesting organic produce.

A related problem is the consumer's unwillingness to pay a decent price for fresh local produce. They come to the market expecting extremely low prices, as if we were selling extra zucchini from a backyard hobby garden. We need to educate the public that vegetable farming is serious, hard work. We also need to educate consumers that when they buy from local farmers, they benefit both the farmers and the local businesses (hence the community), since most of the money stays within the region.

In spite of the difficulties in marketing this first year, we have enjoyed the contact

we've made with folks, which direct marketing allows. We realize that it will take some time for us to become established and for the quality produce of The Land's Harvest to be widely known in the community.

Next year we hope to plant perennials such as strawberries and asparagus and start a rotation plan on a portion of the 72 acres. Although our future farming plans are unclear, we are considering what the qualities of a complete farm are. Should we integrate animals? What kind of rotations would be best? Can we avoid using off-farm fertilizers? Our farming will be a process of research as we investigate the best varieties to use, when and how to plant and cultivate, methods of pathogen and insect control, and efficient production methods. We hope our efforts will provide information to other farmers who are interested in sustainable vegetable production, ◀

Grain Patches in the Garden

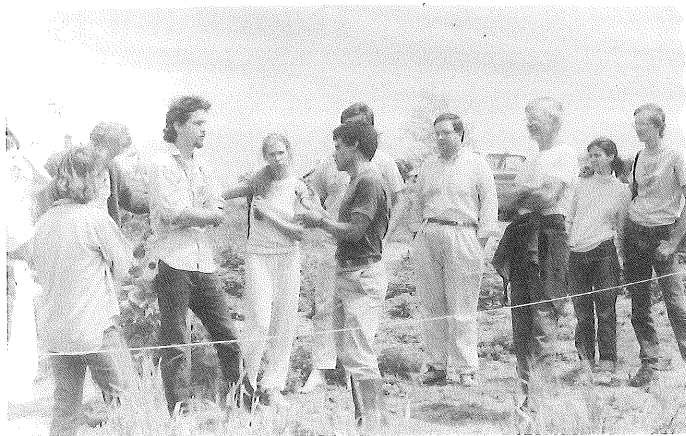
Thom Leonard

Forty acres is small for a Kansas wheat-field. Quarter sections, sections, and landscapes are more common, America's beautiful amber waves of grain on a sun washed, wind tossed sea. In contrast to this, a few ponds and puddles of golden grain graced the Land's gardens this summer. At the north end of the "middle garden" between the classroom and the office building, grew five-foot tall rye, an old variety collected in California. Two cereal patches were in the main vegetable garden, one in the northwest corner, the other near the middle of the garden, along the drive to the Red Barn. These two areas grew some thirty varieties of wheat, barley, and oats from the Grain Exchange collection. These three patches probably didn't exceed a combined total of 1500 square feet, a far cry from the usual Kansas panoramic wheat field.

Included in these plantings were "old timers," varieties that were once grown commercially in Kansas but have since fallen from favor; three accessions of the venerable "Turkey"; and several Asian landraces of wheat and barley.

We also grew small grains in a large garden site that the Grain Exchange maintains in Salina. All of these cereal crops were Grain Exchange seed increase plots.

At the west end of the research plots in the bottom on the 160 acres, we left for grain a patch of wheat that we had planted in the fall as a cover crop. One hot June afternoon after work Jake, Tom, Laura, Beth, Jennifer, Doug Dittman ('87 intern visiting), and I reaped the patch with sickles and scythe and bound the grain into sheaves. A week later, Karen and I towed the Allis Chalmers All-Crop combine to the patch and threshed the sheaves, using the combine as a "mobile stationary" thresher. We



Thom shows bread patches to Prairie Festival participants.

will clean this wheat with the "Clipper" seed cleaner and grind it in our Diamant flour mill.

All of these varieties were cut with sickles and a scythe with a bow cradle attachment. Except for the bread wheat in the bottom and one variety of rye from the middle garden, the grain was threshed using a Vogel-type plot thresher at Kansas State University.

The growing of garden patches of cereal crops is part of the strategy of the Grain Exchange to establish a network of growers to help maintain diverse cereal germplasm and to more equitably distribute the art of growing the staffs of life. We are just beginning to learn how grains might fit into the garden pattern. While what we have done is not a formula for others, and probably not even our best option, it's what we've done and where we have begun our attempt to add staple seed crops to the garden fertility and rotation scheme.

With the exception of two varieties, all these grains were fall sown. The rye and wheat in the town garden followed corn and melon crops, and the ground will be planted now to a legume cover crop. Here at the Land, the rye in the "middle garden" followed late sweet corn; a late planting of short-season bush-type winter squash (compost was dug into the rows at planting) has followed the rye. The south wheat plots in the main garden followed a main-crop sweet corn planting last fall. Green beans now grow where the wheat was. The wheat and barley varieties in the north part of the garden gave us a pea-cucumber succession last year. After the grain harvest we added compost to the soil and planted late sweet corn for fall eating. This fall's garden bread patches will follow early broccoli, potatoes, and green beans.

There are likely more patterns of vegetable-grain rotation than dreamed of in your horticultural extension agent's programs. Timing, fertility, work load, and your own culinary and aesthetic pleasures all will influence your garden choices. Including grain in your garden plantings adds one more element to an already diverse system. Cereal crops have different fertility requirements than most

garden crops, have different insect and disease pests, and they provide straw for compost and mulch. Little work is required to maintain cereals between sowing and harvest. The growing cycle of winter (fall-sown) cereals allows late crops to follow them, and for them to follow late summer vegetable harvests, as long as fertility is maintained through adding compost and including nitrogen-fixing crops in the rotation. (We inoculate all legumes sown in the garden to insure maximum fixation.)

While we utilized mechanized threshing equipment, garden bread patches are readily harvested and threshed by hand. Two people can quickly flail the grain from the sheaves from a moderately-sized patch. Winnowing, simply pouring the grain from one container to another in a steady breeze, is often the only further cleaning homegrown cereal requires before milling or other use. The most that the bread patch gardener might expect to do is to further clean the grain with appropriate screens to remove larger, heavy "trash" and small weed seeds.

While we may choose not to grow all our own bread grains, even a small bed or patch will yield enough wheat to bake a loaf or two of bread. Good garden soil provided with adequate moisture should yield a pound of wheat for every

ten square feet of area. With excellent fertility, the right variety, and irrigation this could be doubled.

As gardeners, most of us have chosen to let farmers with their sections of land and capital intensive technology provide the staff of life. While the garden bread patch may not supply the city millers and bakers with wheat, it can provide the gardeners with bread for their table and a fuller experience of subsistence. The bread patch baker may discover that her or his garden grown grain, freshly milled, far surpasses in flavor and baking qualities anything from supermarket shelves. If the varieties we plant are "old timers" or rare varieties, we will be preserving an important part of our genetic heritage as well. A patch of green-turning-gold grain, waving in the summer breezes, adds a beauty to a garden that strikes an almost primordial chord. There is a magic in standing in the waving grain of your own planting, ripening in the sun, soon to be ripening again in the warmth of your oven. Perhaps this connection with this most basic human activity of the last ten thousand years is reason enough to sow a few seeds of cereal in what you have previously thought of as your vegetable garden. ◀

An Introduction to Bio-Dynamic Agriculture

Doug Towne

"So is your internship at this Land Institute place concerning Bio-Dynamics mate? You know, the farming method where the cockies (farmers) bury cow horns filled with cattle manure in the soil. After winter, they dig up the horns, scrape out the manure, thin it down a lot, and spray it onto their fields. Quite a bewdie (fantastic) system for creating soil fertility, aye?"

It was a torridly hot January afternoon at the Moore Park Golf Course as I prepared to tee off from the first hole, half listening to this spiel. Fortunately my first few days in Sydney had adequately attuned me to the Australian sense of humor—I knew when my leg was being pulled. Rounding out the foursome on the links were three Aussies with whom I had earlier struck up a conversation in the clubhouse over a shout (round) of tubes (beer cans).

Lining up my club face on the teed orange dimpled ball, I made a comment like, "Yeah, that's a good story."

"Mate, you don't believe me?" said my golfing companion earnestly, even going as far as to set down his Victoria Bitter so as to appear more authoritative. "It's fair dinkum," he exclaimed resolutely, "saw it all on the 'Big Country' show on the telly last month."

Within the week, his testimony was confirmed. In produce stores, farmers' markets and roadside tables, prominent signs proclaimed,

"Grown Bio-Dynamically." The Bio-Dynamic trademark, "Demeter," marked many of the fruits and vegetables for sale—and this cow horn business was an integral part of the system.

This method has been steadily growing Down Under, with currently over a million acres farmed according to Bio-Dynamic (BD) standards. Wheat, barley, oats and rice farmed via this method are in big demand in Europe, while meat, dairy products, fruits and vegetables are marketed locally.¹ But while the method is familiar to many Australians and also popular in Europe, few Americans, even those involved directly in the agricultural sector, have a vague idea, let alone a clear understanding, of what constitutes Bio-Dynamic agriculture. Being one of these unenlightened Americans, I decided to find out all I could about the system. What I learned from BD publications and from talking to farmers appears in this article as an introduction to Bio-Dynamic Farming.

GOALS AND HISTORY

It is clear why the Bio-Dynamic Farming Method is a relevant topic when we examine its aims:

... to make a farm an individually unique, self-sufficient ecosystem concerned primarily with the health of the land and maintaining and building soil structure and fertility. By

fostering a reduction in energy and economic input from outside sources, through harnessing the sun with biological means and through a greater reliance on life-dependent energy sources, this method also provides healthy food and feed and could help preserve the family farm as a way of life.²

In its most dedicated application, BD is a way of life in which a farmer makes a life-long personal commitment to his land. Some BD farmers see themselves as participants in a mystical process of building fertility back into a soil that has deteriorated due to years of neglect.³ In addition, the Bio-Dynamic Association of America, founded in 1938 is the oldest group to advocate an ecological, sustainable approach on the continent.⁴

The method's genesis occurred when Austrian philosopher Rudolf Steiner was asked by farmers in his Anthroposophical Society to provide recommendations for solving problems they were encountering. As an editor of Goethe's scientific writings, Steiner was influenced by Goethe's observation that form is an expression of the rhythmic alternation between expansion and contraction, between light and dark. Goethe believed that "a study of the forms and their metamorphoses leads gradually to a spiritual participation in the creative, formative principle."⁵ Steiner took Goethe a step farther when devising anthroposophy or the path of knowledge that strives to lead the spiritual in man to the spiritual in the universe. Feeling, "how intimately the interests of agriculture are bound up, in all directions, with the widest spheres of human life," Steiner laid out the basis of Bio-Dynamics, detailing its philosophy and goals as well as recommending specific practices and preparations in a series of eight lectures given in 1924 in Poland.⁶

Research along the lines suggested in these lectures has continued worldwide. While most has occurred in continental Europe, two notable individuals have worked in English speaking countries. Alex Podolinsky, a BD farmer of forty years, has had a direct influence on Australia's widespread utilization of the system. Dr. Ehrenfried Pfeiffer, brought to America from Switzerland in the late 1930's by, ironically, the Sun Oil Company, was for many years an important researcher and spokesman in this country for the BD Association. Robert Steffen, a student of Pfeiffer's in the early 1940's, is an important resource for this article. He is a farmer near Omaha, Nebraska and very active in the BD Association of America.

Bio-Dynamic agriculture could be considered a form of organic agriculture. But some aspects of generic organic farming are simply a substitution of one fertilizer or insect control substance for another, rather than a rethinking of the approach to the problem. Instead of defining BD by the products and practices

avoided, proponents present BD as a systematic, sustainable alternative to chemical agriculture covering all aspects of farming and gardening. Purveyors of this method believe that agriculture is not just something to do with nutrients and plants; instead, they recognize the total environment of the plant. Soil fertility is not dependent on substances added to the soil but rather on harnessing available growth and metabolic forces to provide and maintain the proper medium for growing crops.⁷ By cooperating with and integrating the life-giving forces that actively regulate the growing process in plants, animals and soil, an organic whole or a self sufficient ecosystem is created.

OVERVIEW OF METHODS

As Dr. Pfeiffer once wrote, "There is very little to buy in the BD method, but lots to do."⁸ There are eight main components of BD agriculture that are used to harness the natural dynamic forces:

- 1) a system of composting organic waste to produce humus to add nutrients to the soil;
- 2) the use of certain plant, animal and mineral extracts termed the Bio-Dynamic Preparations to enhance humus production, increase photosynthetic activity in the crops and induce proper composting of organic wastes;
- 3) a system of crop rotation;
- 4) except in remarkable circumstances, the nonuse of inorganic fertilizers and pesticides on crops and medication in animal feedstuffs;
- 5) using companion planting principles to enhance crop growth and help ward off disadvantageous insects;
- 6) good plowing, using the proper equipment at the correct time;
- 7) sowing and harvesting according to the cosmic rhythms;
- 8) using both crops and animals to strive towards self-sufficiency.

How many of these components actually will be practiced depends to a large extent on the scale of the operation. Obviously, composting, companion planting, and perhaps following cosmic rhythms are impractical on very large spreads, but are by no means necessarily limited to garden-scale ventures. While several of these practices should be familiar to those interested in sustainable agriculture, a few are more obscure and will be explained in greater detail.

PREPARATIONS

A cornerstone of Bio-Dynamics is the application of BD preparations to aid in the production and maintenance of humus in the soil. Humus, a substance which has profound effects on soil fertility, tilth and water retention, is a colloid, containing varying amounts of nitrogen and is produced by microbial action.⁹ Through its exchange capacity, humus can hold a variety of plant nutrients including potassium, phosphate, calcium, manganese, zinc and iron. By binding these fertilizer ions, their leaching is retarded and they are held in a form available

to the plant. These nutrients are also utilized by the soil's microlife, including the beneficial bacteria that fix nitrogen from the air. Humus can also hold (without evaporation) around 75% of its own volume in water, a very beneficial trait especially in times of plant water stress.¹⁰

Conventionally grown crops are not fed with insoluble nutrients however. "Plants fed indiscriminately through the water with soluble nutrients have become bits of machinery," warns influential Australian BD farmer Alex Podolinsky.¹¹ Even organic manures, those still mostly in the raw state, fertilize mainly through the water of the soil because there are so many solubles. He maintains that plants overfed with minerals are "like people who have been fed on cream puffs. The plants are weak and they are attacked by diseases."¹²

The BD preparations are made from fermented organic materials. Farmers apply the preparations only in small quantities. This use is analogous to that of homeopathic medicines in which patients use extreme dilutions to stimulate the body's natural defenses. Besides enabling the wide, inexpensive use of the preparations, the extreme dilution demonstrates the dynamics of the method. Farmers do not apply a quantity of manure or salts to fertilize, but a small amount to increase a life force that is present in nature.

There are eight preparations numbered consecutively from 500-507 that work dynamically or affect metabolic and growth processes. Generally numbers 502-507 are used to aid the development of compost, while 500 and 501 are used to improve the earthly and cosmic growth conditions respectively. The BD Association recently began underwriting the distribution and production costs of the preparations, although many farmers still make their own. A community of BD farmers send the needed raw materials to Hugh Courtney, an officer of the Association, who supervises their transformation into preparations.

Biodynamic practitioners use the herbal preparations 502-507 to stimulate the decomposition process in manures and compost and produce a rich humus material. Experiments have shown many beneficial effects of BD treated compost, namely the increased ability of humus to store nutrients and the development of stronger root systems.¹³ The preparations are made from plants: 502, yarrow blossoms; 503, camomile blossoms; 504, stinging nettle; 505, oak bark; 506, dandelion flowers; and 507, valerian flowers. Suitable substitutes can be used if these are not easily accessible. Producers put the preparations through a fermentation process before their application. BD farmers use small quantities, about a teaspoon of most substances for every three cubic meters of compost. They more commonly use Pfeiffer's BD Compost Starter, which employs bacteria isolated from the BD preparations.¹⁴ The final nitrogen content of the finished compost is in the range of only



Doug learns about Robert Steffen's machine for stirring BD preparations.

1-2%; nevertheless, BD practitioners claim it is effective because the compost doesn't reduce natural nitrogen fixation in the soil. It is utilized efficiently, and there is little leaching or denitrification of the nitrogen.¹⁵

Preparation 500 is the substance described to me in Australia. It works underground on three interlinked factors: microbial activity, humus formation and root growth.¹⁶ They make it by packing cattle manure into a cow horn and burying it for the duration of one winter. Vessels constructed out of other types of materials such as glass and ceramics have been substituted, but Robert Steffen claims these containers have been unable to produce the high quality characteristic of that manufactured within a cow's horn.¹⁷

While application rates of 500 vary by country and/or reference consulted, it is always used in minute quantities, between one and four ounces per acre. One could measure the manural value in 500 on a NPK basis, but that is not what is important. It would not work as a stimulant to life activity if it were used in larger amounts. The dilution rate is a hornful of 500 (about one ounce) to two gallons of water.

BD Preparation 500 must be activated before becoming homeopathically effective. Manufacturers accomplish this with special machines that stir 500 in untainted water for one hour, alternating the direction as soon as a deep vortex appears. This produces thorough mixing and increases the water's oxygen content by 70%.¹⁸ Mechanical sprayers commonly apply 500 onto the fields; optimal timing is shortly before sowing or after harvesting of crops that continue to grow.

BD Preparation 501 is used to increase the light collection of the plant and is particularly important in wet, cloudy climates. It is a silica spray of ground quartz buried for the duration of the summer.¹⁹ The preparation and

application of 501 is similar to 500; again farmers spray small amounts onto the plants. A gram of 501 diluted with two gallons of water is the typical amount applied to an acre.

A pasture should be lush and/or the plant part to be harvested should be starting to form before 501 is applied. One application will last throughout a growing period but practitioners recommend several during blossom and fruit formation to aid the ripening process and flavor.

From a Bio-Dynamic standpoint, applying inorganic fertilizers works against the development of soil fertility, leading towards shallower root systems and inhibition of soil bacteria and rhizobia capable of fixing nitrogen. Nonetheless, Podolinsky occasionally recommends their application as a medicine. In poor soils deficient in a particular nutrient or group of nutrients, the lacking NPK and/or trace elements are added often, in the form of insoluble rock dust, to give Preparation 500 something to work with.²⁰

PLOWING

The formation of a crumbly, deep, well aerated soil structure can be advanced through the effects of good plowing, an important aspect of BD. A poor soil structure characterized by compaction, low biological activity and matted roots can be improved by cultivation that allows air, water and roots down into the soil. Specifically the type of plowing recommended by Podolinsky is deep ripping, and chiseling using a mole type drain blade.²¹ This cultivation implement fractures the soil along joints in the ground, while also, at an appropriate depth, cutting through the field, lifting the dirt. The blade presses steadily sideways against the heavy compaction, and causes fracturing of the raised soil. The ripper points downwards, tearing at the bottom to avoid the formation of

a plowpan. Plowing at the wrong time causes structural disintegration, creating hardpans when the soil is too wet. Soil should be dry, but not in a prestressed state.

SOWING AND HARVESTING

Practitioners of the Bio-Dynamic method attempt to work within a "cosmic ecology" involving not only the earth but the other heavenly bodies. The moon in particular has a large influence, especially in areas near the ocean and/or characterized by a moist climate. BD farmers would cut hay towards the new moon for better quality since there is a lower water content in the plants. A more exotic practice is sowing crops according to the zodiac constellation which the moon passes in front of in its sidereal revolution. BD farming teaches that for best germination results, a seed's vital unfolding period must take place within the time the correct zodiac sign is active. For instance, practitioners believe it would be best to sow lettuce or other leaf crops while the water signs of Pisces, Cancer and Scorpio are active. Other zodiac combinations are earth signs for root crops (Taurus, Virgo and Capricorn), light signs for flowers (Gemini, Libra and Aquarius), and warmth signs for fruit or seeds (Aries, Leo and Sagittarius).

Although this is one of the most striking characteristics of BD agriculture, it should be noted that often, "Planting by active zodiac signs is appreciated if not followed in large scale operations."²² Podolinsky and Steffen state that the local weather pattern is more important and should override an active zodiac sign for time of sowing. Studies conducted by Abelle, in which proper planting during an active zodiac sign produced significantly higher yields than the control plots, show an important correlation worthy of attention and further research.²³

MERCURY VENUS MARS JUPITER
 ♿ 1-3 ♀ 3-23 ☿ 23-30 ♀
 ♄ SATURN ♀ URANUS ♀ NEPTUNE ♄ PLUTO ♄

SEPTEMBER

♊

(A section from the 1988 Kimberton Hills Agricultural Calendar: A Beginners' Guide for Understanding the Influence of Cosmic Rhythms in Farming and Gardening.)

DATE	☉ IN ZODIAC	☾	☿ Ag	♀ Pg	♂ PHASE	CONJUNCTIONS, OPPOSITIONS, & EVENTS	AM												PM											
1 THUR	♈	♈ ¹⁶			☉		1 2 3 4 5 6 7 8 9 10 11 12																							
2 FRI	♈	♈			☉ ²⁴	♈ ¹⁴																								
3 SAT	♈	♈			☉	♈ ¹³	♀ ³³																							
4 SUN	♈	♈ ¹⁰	♈ ⁷		☉	♈ ⁵ ♈ ⁶																								
5 MON	♈	♈			☉	♈ ²	♈ ⁶																							
6 TUES	♈	♈ ¹⁶			☉	♈ ²¹																								
7 WED	♈	♈			☉	♈ ¹⁰																								
8 THUR	♈	♈ ¹⁰			☉																									
9 FRI	♈	♈			☉																									
10 SAT	♈	♈			☉																									

FOOD QUALITY

The quality of food and feed produced, measured via several different indices, has always been a BD focus. Studies compiled by Maria Linder, a biochemist at California State University, Fullerton, have shown that plants grown Bio-Dynamically typically have higher protein and vitamin levels, greater dry weight, longer shelf life and better flavor, are preferentially grazed, and the seeds have a higher germination rate.²⁴ Studies of this type date back to William Albrecht's publications in 1961.²⁵

An explanation for these differences is that the large variety of waste products used for BD fertilizer automatically return a wider range of elements to the soil than the commonly applied NPK, iron and manganese.

Podolinsky provides another point of view:

If we feed plants indiscriminate amounts of salts through the soil water, they have to take it in as they take in their water supply. We have plants overfull of water to match the overfullness of salt. As a result, because of a lack of sun activity because the light cells are not blown open, these plants have little in the way of vitamins, enzymes, hormones and other substances.²⁶

However, nutritional value of food is determined by the content of beneficial and negative components and also by the biological utilization of these constituents by the organism. Some animal feeding trials have revealed a more favorable effect on fertility with BD feed than conventionally grown feed.²⁷ Those Bio-Dynamically inclined have long believed that other indices of the food may be as important as actual nutrient content. In 1986, Dorothea Staiger at the University of Bonn, using BD and conventional feed analytically proven to be identical in terms of its ingredients, conducted a feeding trial to indirectly examine food value. The use of BD feed produced higher pregnancy rates, more embryos, larger litters and better overall health of the rabbits.²⁸ This study seems to indicate that feed analysis methods currently in practice do not encompass all the factors affecting the nutritional quality of food.

YIELDS

People are interested in the kind of yields produced by BD farming methods. In various studies covering a wide geographic range, different time scales and various crops, BD yields were sometimes superior, occasionally significantly lower, but mostly competitive with conventional yields.^{29,30} Perhaps more questionable and potentially troublesome than long term yields is the production levels during the transition from conventional to Bio-Dynamic farming, which have not been documented to any large extent.

Looking at the situation from an economic standpoint, although gross returns from BD and conventional farms in Australia are said to be roughly equal, net profit is much higher for BD farmers because they do not spend money on insecticides and chemical fertilizers.³¹ The preparations and their application are far less expensive.

CONCLUSIONS

Bio-Dynamic agriculture is an eclectic mixture of traditional farm conservation practices, general organic farming principles and alternative ("mystical" might even be an appropriate term) components, whose preparation and use is rife with rituals. This summation is itself probably an unfair breakdown as practitioners continually emphasize the holistic character of the method.

The actual applications of some components, and even to some extent their effects, are indistinguishable to the naked eye. The original secretive characteristics of the German BD Association led to little public dissemination of their method until recently (the Association was even banned in Germany in 1941). This, along with mainstream agriculture's view of the method as inconsequential and even dangerous has hurt publicity about the method. These factors make it very difficult for people to relate to and consider Bio-Dynamic Agriculture.

Although its goals and reported results are sustainable and healthy, it might be easy to dismiss BD as successful within certain limitations, namely the small sector of society religiously following the theology and social philosophy of Steiner. But the widespread utilization and apparent success in Australia, a western country whose dependence on chemical agriculture and current farm crisis is similar (if not more acute) than ours, make this assumption more difficult.

"But why are only a score of farms in the U.S. employing the method?" an observer might argue (even with the Australian experience).

An often heard sentiment of Wes Jackson is something to the effect that the worst farmers can survive on the best land. Robert Steffen, talking specifically about BD, echoes this perspective. "The American farmers have been spoiled by their naturally fertile land. They have been living off the economic productivity of the soil and currently off the chemical inputs. Bio-Dynamic agriculture is always more prevalent and popular on marginal lands where conventional agriculture is failing."

Australia provides an excellent case study of this trend. Their farmland is characterized by ancient, mostly saline and sodic soils with low available phosphorus, combined with a hot climate and little or unreliable precipitation. This environment, in combination with a farm crisis similar to that currently taking place in America, and a lack of alternative agriculture research occurring in its universities has made a grim future for many farmers. The situation was

ripe for the conversion of over a million acres to Bio-Dynamics. This has occurred without any help from government or industrial sources but largely through the work and dissemination of information by one person, Alex Podolinsky, over the last forty years.

One might think that increased awareness, discussion and practical experience with BD could occur under the current agricultural climate. Historically, some level of farming crisis has ensued before the method has been investigated and utilized to any degree.

For Bio-Dynamics to become more than an intriguing oddity and for the method to have an impact on future thought about sustainable agriculture, the BD Association will have to ameliorate several problems. These include publicity, marketing, research and farm conversion data.

A major problem is a lack of available public information about BD. There is little to be found in libraries, bookstores and universities. At the Kansas State University library, one can find only a single book and no periodicals on the topic. One has to contact the BD Association to obtain any significant information. Little discussion can occur with information so difficult to obtain.

There are few markets that recognize and actively seek the often superior quality BD products. If BD-grown products are really more nutritious, it shouldn't be too difficult to get the growing numbers of health food buffs to purchase them and create a larger demand for Demeter marked goods. While locales such as California have more outlets for direct consumption, in other places an odd coincidence is needed to preferentially market locally, such as Robert Steffen selling his vegetables to a nearby Omaha restaurant whose owner hails from the Waldorf School. But the majority of Steffen's grains and soybeans are shipped to Europe, where there is a large demand for American-produced BD foods.

Further research into the potential contributions of Bio-Dynamics to soil fertility, crop yield and quality, and both human and animal health is required to confirm and extend the currently available data. Much of the scientific studies have been conducted in Continental Europe by the BD Association, university and state research stations. However the languages the studies have been written in are a barrier to easy assimilation in the U.S.

Certainly topics such as "life forces", "biological assimilation of nutrients" and "cosmic rhythms" are atypical scientific fare. But studies currently available that seemingly correlate the above stated topics with otherwise unexplainable physical results indicate it would be narrow minded not to continue to explore if these results can be replicated and more clearly understood.

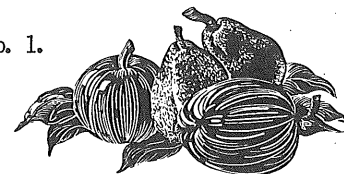
Steffen says that a slowly expanding minority of scientists such as Maria Linder are beginning to consider and research these topics.

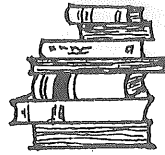
However, certain advantages of this farming method discourage expanded research. The BD inputs are inexpensive and their production is independent from agribusiness industries. Although beneficial for the farmer, this factor makes it unlikely that funds provided by industry for university research will be available to any great degree.

And on a more practical level, the cost effectiveness and actual plans for the conversion of conventional farms to BD must be clearly documented by institutions that farmers respect in order to demonstrate the potential of this alternative approach. ◀

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The Women's West

Edited and with introductions by Susan Armitage and Elizabeth Jameson
University of Oklahoma Press, Norman, OK, 1979

Reviewed by *Caton Gauthier*

Our image of the Old West consists of pioneers and cowboys breaking trails and taming wild lands. These rugged individuals ward off blood-thirsty Indians, build homesteads, and farm or ranch the expansive prairies. Susan Armitage and Elizabeth Jameson claim that this image of the West is a myth which not only romanticizes the lives of men but excludes the history of women of diverse cultures and social classes.

The editors have organized papers originally presented at the 1983 Women's West Conference held in Sun Valley, Idaho, into a collection of essays divided into five sections. They contain an abundance of unrecognized history obtained from art, census documents, newspapers, literature, personal letters, diaries, interviews and surveys.

Part one, "Myths," exposes the stereotypes of Western women and men as portrayed in Western paintings. In "The Way We Weren't: Images of Women and Men in Cowboy Art," Corlann Gee Bush examines the use of backgrounds, details, and color to analyze the images of men and women in paintings. She explains how background and the positions of subjects affect viewer interpretation. While men are typically placed in open landscapes, women are often closed in by a blurry background, or framed by something, like the opening of a covered wagon. Men are portrayed actively engaged in gun fighting, horse riding, or cattle driving. The large background and focused activity give the viewer the impression of male independence, strength, and bravery. However, women are portrayed as passive: in portraits they sit serenely with an unfocused stare, in scenes of danger they cringe while men protect them. Women are shown with children or pregnant and seem to lack individuality.

Ms. Gee Bush also explains how color affects the mood of paintings. Women are often shown in warm tones or rich colors which set them apart from their scenes, giving them a separate symbolic reality. In the presentations of men, however, "the palette is somber and monochromatic, using shades of brown, black, and gray to emphasize the barrenness of the landscape, their masculinity, and their seriousness of purpose."

Likewise, Patricia Albers and William James trace the stereotypes of Native American women as presented on postcards in their work "Illusions and Illumination: Visual Images of American Indian Women in the West." Squaw madonnas, Indian women weaving baskets, and women wearing the "tourist's image" of native costume are some of the common images analyzed and then compared to reality.

In part two, "Meetings," three essays discuss male-female relations in cross-cultural partnerships. Sylvia Van Kirk, in her article, "The Role of Native Women in the Creation of Fur Trade Society in Western Canada," demonstrates how mountainmen and traders were dependent upon Indian wives in developing trading markets and living off the land. Although native women served as excellent wives for fur traders, racism rapidly deemed Indian women as undesirable, and their daughters (having learned their mothers' skills as well as being "civilized"

with formal education and indoctrinated to white values and culture) became the desirable wives. Van Kirk shows that native women served as the connecting link between the two cultures, and that the growing bias against Indian wives made enemies of once interdependent peoples.

Similarly, Sherry L. Smith shows Euro-American attitudes toward Native American women in her essay, "Beyond Princess and Squaw: Army Officers' Perceptions of Indian Women." A viewpoint she emphasizes is that Indian women were considered wild and sexy, unlike "good" white women who were seen as virtuous and asexual.

In the last article of this section, Susan L. Johnson uncovers the cultural biases and stereotypes placed on Mexican women in "Sharing Bed and Board: Cohabitation and Cultural Difference in Central Arizona Mining Towns, 1863-1873." Ms. Johnson compares two very different cultural patterns which existed in the Arizona goldfields of the 1860's: the Mexican informal union where women cohabitate with men for economic reasons; and the Anglo double standard of morality which places women in one of two categories, "good girl" or "bad girl," while men lack these distinctions. Working with census records and local folklore she reconstructs the lives of Mexican women and Anglo attitudes toward race and sexuality.

The third part, "Emotional Continuities," draws from the feelings and life experiences of individual women via literature and personal



letters. In her striking essay, "Violence Against Women: Power Dynamics in Literature of the Western Family," Melody Graulich describes how traditionally women were seen as property, and their duties were to bear men's children, serve the family, and submit to male authority. Women were considered destined to the "life of drudgery" — cooking, cleaning, childcare, food production, and in many cases, maintaining the farmstead. They lacked a sense of individuality and social importance; therefore, their work was taken for granted and went unrecognized. Graulich shows how, under such circumstances, women fell victim to physical and emotional abuse from their husbands. Knowing no way to escape, they accepted it as women's reality.

Part Four, "Coming to Terms with the West," is a collection of essays describing the lives of working women. This section breaks the stereotype of the defenseless frail woman who needs to be provided for, by telling the history of women homesteaders, mothers in poverty from mining towns, prostitutes, immigrant servants, and waitresses. Each of these papers reveals the economic and social inequities confronting working women of the time.

Lastly, Part Five, "Expanding Our Focus," extends the time frame into the twentieth century, "as women entered public life in the West through politics and wage work." This section also emphasizes that Western women's history must be inclusive of all women, not just the white elite. Rosalinda Mendez Gonzalez, in the article "Distinctions in Western Women's



Mary Campbell and Frances Griffin
on a hunt, November 8, 1917.

Experience: Ethnicity, Class, and Social Change," offers a Marxist framework which encompasses sex, class, ethnicity, and capitalist and colonial development.

Other essays examine the women's suffrage movement and give detailed accounts of women who held public office and the way their accomplishments were viewed by society. In "The 'Girls' from Syracuse: Sex Role Negotiations of Kansas Women in Politics, 1887-1890," Rosalinda Urbach Moss shows how women running for office, even those elected, were rarely mentioned in the newspapers. When they were, their accomplishments were down-played or ignored. In addition, single women who held office and got married during their term were expected to resign in order to tend to their womanly duties as housewives and mothers.

The lives of contemporary working minority women are also looked at in this section. For example, in "The Impact of 'Sun Belt Industrialization' on Chicanas," Patricia Zavella shows that these women's attitudes about work and family are not only molded by traditional Mexican culture, but also economic reality.

The Women's West challenges readers to look at the Western frontier through women's eyes. It is written for a general reading audience, and its short essays allow time and space to think about and discuss the issues presented. This book is an excellent choice for those interested in expanding their knowledge and perspective of the history of the West.

Thanks to Lisa Calloway from the Smoky Hill
Museum in Salina, Kansas, for helping us find
the photographs accompanying this article.



Gertrude Schneider Schmidt and Mary
Schneider Hintz butchering hogs in 1910.

Women and Farming:

Changing Roles, Changing Structures

edited by Wava G. Haney and Jane B. Knowles
Westview Press, Boulder, 1988.

Reviewed by: Karen Finley

The 2nd National Conference on American Farm Women held in Madison, Wisconsin on October 16, 17 and 18, 1986 provided a unique forum for the gathering of scholars and farm women interested in the historical and contemporary roles of women in farming and in the implications of the changing structure of American agriculture on those roles. *Women and Farming*, a collection of essays published this year that evolved from presentations at that conference, offers those who did not attend an opportunity to join that forum.

The essays are of an academic nature, arising from an emerging interest in women's issues, rural sociology, and women in public policy within the nation's universities. The collection is arranged into six sections which address (1) the impact of social changes (in agriculture and in gender roles) on farm women, (2) these women's daily lives as portrayed by themselves and through historic and fictional writing, (3) farm women's roles in the farm economy, (4) their control of resources and technologies, (5) their lives in historical and comparative perspective, and (6) the historic and contemporary roles of women in the rural community and in the political arena.

Twenty essays authored by twenty-four women and one man contribute towards "making the invisible farmer visible" (the title of Haney and Knowles' introductory essay). Among these are Nancy Osterud's oral histories of New York dairy farm women, Mary Neth's look at women's participation in farm organizations in the first half of the twentieth century, and Virginia Fink's essay about the impact of changing agricultural technology on the roles of women on the farm.

Academics have traditionally looked at women's roles in agriculture via an "urban" model, one which separates the public and private spheres, or production (of commercial goods and services) and reproduction (of family and social institutions). This collection represents a conscious attempt to study farm women based upon a model which integrates household and family life with the economic or corporate sphere of farming. As Sarah Ebert puts it in the title essay (Pg. 22):

Family life and family farming are integrated, and women's productive and reproductive work cannot be neatly separated without losing the holistic reality of farm families, family farms, and their location in a world system. "Way of life" is not a senti-

mental term. The tendency of researchers and policy makers to analyze the impact of work on the family obscures the family itself as a changing structure that shapes and constrains production. The personal ties linking owner-operators to family workers on family farms have often enhanced production because "way of life" and "passing it on" remain primary goals of farm families. More specifically, passing on both their skills, values, and the farm itself remains a primary goal of women in farm families.

It is the acknowledged intention of the editors, Dr. Wava Haney, professor of Sociology at the University of Wisconsin Centers, and Dr. Jane Knowles, Assistant Director of International Agricultural Programs and Associate Director of the Land Tenure Center at the University of Wisconsin, Madison, that the collection influence future public policy decisions. They advocate: 1) agricultural policies which recognize and support women's roles in farming, 2) rural community development policies that take into account women's roles in community building, and 3) gender policies that give women more control over their lives. The book chronicles not only the realities and concerns of women in farming communities, but also reveals their record of involvement in agricultural and rural community policy making.

The voice of women, which is growing in its political sophistication, is and will be important in deciding the future of America's farms. The integration of the household and the farm, which is the experience of these women, motivates their demand that the concerns of family, health, and community be included in the same forum as are strictly economic aspects of agricultural policy. *Women and Farming* offers a fresh perspective on the power of women to make the farm a healthy place for people to live.

Garden Seed Inventory

This second edition compiled by Kent Whealy of Seed Savers' Exchange is an inventory of 215 mail-order seed catalogs from the U.S. and Canada. *Garden Seed Inventory* contains descriptions of 5,291 standard vegetable varieties and a coded list of the companies offering each one. The 424 page book is a landmark preservation tool. Hundreds of excellent vegetable varieties are in danger of being lost as agrichemical producers have been buying out family-owned seed companies and dropping their collections of regionally adapted standard varieties. It is imperative that gardeners and preservation projects buy up these endangered seeds while sources still exist.

Softcover copies, \$17.50 postpaid; hardcover, \$25 postpaid.
Seed Savers Exchange, RR 3 - Box 239, Decorah, Iowa 53201.

Energy Choices

Paul Rasch

The oldest and most visible landmarks of The Land Institute are the two wind generators which have provided us with electricity — and problems — over the past ten years. At present, neither wind generator is operating. The Windcraft was blown down in a 100 miles-per-hour wind in July 1987, and the Jacobs needs a new set of batteries. Rather than rebuilding the Windcraft and buying new batteries for the Jacobs, as we've done in the past, we're taking a hard look at their utility and the costs of repair and maintenance, trying to decide how to meet our energy needs responsibly and economically.

Likewise, how to meet our energy needs nationwide and around the world is a matter which warrants close attention. Three 1988 Worldwatch Papers have refocused some attention on the energy outlook: *Renewable Energy—Today's Contribution, Tomorrow's Promise* (#81); *Building on Success—The Age of Energy Efficiency* (# 82); and *Rethinking the Role of the Automobile* (# 84). Combined, these three publications succinctly chronicle the current status of our energy use and imagine a practical and increasingly proven route to a more secure future.

The "energy crisis" of the seventies seems to have given way to an "energy glut" in the eighties, but the fact remains that energy resources on the earth are limited and being depleted at a rapid rate. Consumption of oil in the U.S., which declined from 1973 to 1985, is now on the rise again.¹ At existing rates of consumption, known oil reserves in the U.S. would last less than eight years if we had no imports to rely on.² Small wonder that we are so eager to protect "our interests" in the Persian Gulf.

Even if we somehow disregard the inevitable end of oil, a new energy crisis is now looming large: environmental degradation due to fossil fuel consumption. With alarming consistency, report after report is linking fossil fuel use to air pollution caused by ozone production, global warming due to increased carbon dioxide in the atmosphere, and acid rain caused by high levels of sulfur dioxide and carbon dioxide in the air. Particularly implicated in these downstream effects is the automobile which is now suspected to be the leading cause of the greenhouse effect. Unlike the distant notion of energy scarcity, the environmental problems associated with our voracious appetite for oil are very immediate and show no signs of waning with shifts in political or economic policies.

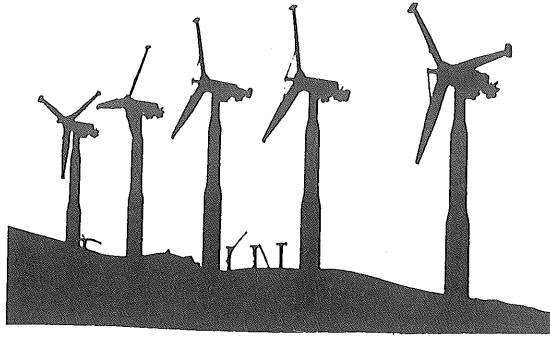
This is not to say that nothing has come of our decade-long concern over scarce energy.

Most industrialized countries accomplished significant reductions in energy use through a combination of technical advances and cutbacks at the personal and institutional levels. As just one example, efficiency programs at six of the largest electric utilities in the U.S. have eliminated the need for 7,240 megawatts of generating capacity, at less than a fifth the cost of new plant construction.³ In Europe and Japan, energy savings have been even more impressive. Yet for all that energy efficiency offers in reducing our reliance on fossil fuels, in itself it is no solution. However much we are able to cut back our energy demands, we will always need a supply of energy. In a livable future without fossil fuel, this means the use of alternative, renewable sources of energy.

In the aftermath of the 1973 oil embargo, a host of options were explored in the attempt to find renewable sources of energy, including technologies employing solar, wind, hydro and geothermal. Government subsidies, eager business people and a curious public aided the efforts to develop these resources. Numerous businesses sprang up, some less scrupulous than others, to meet the demand for solar collectors, wind generators and other energy devices covered by federal and state energy tax credits. At first, many of these energy systems were crude and rather unreliable, but as the years of experience mounted, the technologies became sound social and economic investments. Unfortunately, just as many of these energy technologies were getting established, the tax credits were pulled out from beneath them, and all but the most firmly established of the companies folded. A few years later and we find ourselves no less in need of renewable energy technologies, but with few businesses involved, little repair capability for the technologies that were installed, and negligible research and development in the area.

Probably no technology better typifies the boom and bust nature of alternative energy systems than wind generators. Once used extensively to power farmsteads across the rural U.S., these devices enjoyed a strong resurgence in the 1970's and early 1980's. In the decade following the oil embargo, over 10,000 wind machines were installed worldwide, but by 1985, wind turbine sales had dropped sharply as country after country reduced or eliminated subsidies.⁴ In California, however, where the Public Utility Regulatory Policies Act has been vigorously supported, some 16,000 wind machines now provide over 1,400 megawatts of capacity, (the equivalent of a large nuclear power plant) at costs equal to or less than that for conventional generators.⁵

At first many of these wind machines were unreliable, but they have become very dependable power production units, running 80-98% of the



time that the wind is blowing.⁶ They can be installed in a fraction of the time required to plan and build a larger coal or nuclear facility, thus allowing utilities greater flexibility in their planning. When repairs are needed, the machines are efficiently taken care of by trained mechanics available through the economies of scale, unlike our situation at The Land. And the power produced by these machines coincides very nicely with the peak demand created by summer air conditioning.

Above all, these machines produce electricity at a fraction of the environmental costs of their fossil fuel and nuclear-fueled counterparts. All of these factors weighed together point to a promising future for wind power, or at least they did until the end of the energy tax credits in 1985. While new machines are still being installed, the rate of such installations has fallen dramatically from 4,687 machines in 1984 to 1,500 machines in 1987.⁷

Ardent fans of the free market may herald the ending of the energy tax credits and even the subsequent "thinning out" of businesses and technologies inspired by the Carter-era incentives. Such an attitude ignores the brutal fact that our energy resources are indeed finite, and that alternative, renewable sources of energy are necessary components of any realistic planning for the not-so-distant future. As a nation

we can ill afford to wait until our resources dwindle further to explore advancements in both conservation and renewable energy technologies. Such an effort will necessitate government subsidies and extensive research and development programs. Paying for such an endeavor in a time of budget balancing will not be easy; we have already squandered a great opportunity by not imposing a stiff tax on oil when prices started to recede in the 1980's. The myopia which has so successfully lulled us into a return to bigger cars, faster speeds and fewer wind generators will come to an end one way or another. The choice we have is to wait for another "energy crisis" or to plan for a future of moderate needs and imaginative designs.

The future of the wind generators at The Land Institute, like the future of our country's energy policy, is clouded with uncertainties. With so many other demands on our financial resources, we have decided for now not to invest any more time or money in the wind machines. Like the federal government, we can put out of our minds the inevitable energy crunch and the return of climbing energy prices. Years down the road, we may well wish that we had allocated more of our scarce time and money to the search for sustainable energy systems. ◀

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During the fall and spring, interns spend most mornings discussing assigned readings in the classroom. In the afternoons they work outside on experiments related to perennial polyculture research and help with construction and maintenance. In the summer, research field work dominates the schedule, though there are visiting speakers and occasional seminars. Interns collect and analyze data, then write papers on the experiments which are published in The Land Institute Research Report. They also contribute articles on a wide range of subjects to The Land Report.

Student interns receive a stipend of \$125 a week and free produce from The Land's community garden. They are responsible for finding their own housing.



Beth Gibans weeding herbs and flowers in the garden. Photo by Terry Evans.

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