

THE LAND REPORT

Number 15

Winter 1982

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SKETCHES: Dana McCain (11 & 12), Terry Evans
(6), Sue Leikam (33)

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On the Cover

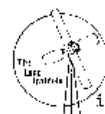
Terry Evans' photograph of a dried, stiff-leaved Golden Aster (*Heterotheca stenophylla*) is on the front; Lead Plant (*Amorpha canescens*) is on the back. Terry says of her work: "I find pleasure in the lines that the dried plants form, and in the curious way that the photographic images seem to float and have volume..."

At The Land

Amidst a snowstorm on February 8, ten students arrived at The Land to begin the spring semester. Three were returning for a second term: Jan Ryan, Grand Rapids, Michigan; Marie Rasch, Conklin, Michigan; and Lynn Hirschberg, Miami, Florida. The new students included Stu Slote, Tenafly, New Jersey; Barry Moir, Gloucester, Massachusetts; Marvin Pauls, Walton, Kansas; Den Berry, Port Royal, Kentucky; Nora Kelleher, Cape Cod, Massachusetts; and Dana McCain, Abilene, Kansas. Filling the appropriate technology intern position this semester is Margo Thompson, Hamilton, New York.

On the first morning, all staff and students met in the classroom, and the traditional circle of chairs had to be expanded into an "egg" to accommodate all seventeen persons. In addition to the ten students, three research associates work at The Land: Mari Peterson in energy planning, Marty Bender in agriculture, and as of January 15, Walter Pickett in agriculture. Terry Evans, arts associate, works on special projects and participates in some of the class sessions. Linda Okeson is the administrative assistant to co-directors Wes and Dana Jackson.

A day at The Land begins with the 9:00 A.M. "warm up" session, a time to make announcements, plan the work, talk about materials needed, and discuss environmental current events. The rest



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EDUCATIONAL-RESEARCH ORGANIZATION
DEVOTED TO A SEARCH FOR SUSTAINABLE ALTERNATIVES:
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BOARD OF DIRECTORS: Karen Black, Steve Burr, Richard Courter, Terry Evans, Bernd Foerster, James Forsythe, Dana Jackson, Wes Jackson, Ivy Marsh, Gordon Maxwell, Dwight Platt, John Simpson.

HONORARY BOARD: Wendell Berry, David Brower, Alan Gussow, Joan Gussow, Carter Henderson, Amory B. Lovins, Paul Sears, William Irwin Thompson, John Todd, E. F. Schumacher (1911-1977).



Stu, Marie and Jan.

New Term

Begins

of the morning is spent discussing assigned readings. In the afternoons, students work on individual or group projects, and do necessary maintenance.

Certain books are always assigned to new students, such as Small Is Beautiful, The Unsettling of America, New Roots for Agriculture, The Global 2000 Report and The Arrogance of Humanism. Returning students have alternate assignments, but meet with the large group to discuss books they have not previously covered. All ten students read and discussed Ecology and the Politics of Scarcity by William Ophuls as the first assignment of the spring semester.

The students live together in houses in Salina and carpool to The Land each day. They bring sack lunches or heat soup and make popcorn in the kitchen on the first floor of the classroom building. One day a week there is a potluck lunch in the Jackson house.

The Land has a special cooperative program with Kansas Wesleyan in Salina, where students can enroll to receive credit for The Land semester. Graduate students can enroll for credit at Emporia State University.



Marvin, Den, Lynn, Nora and Margo.

For Prospective Students

Applicants for admission to the fall 1982 student program should write a letter to Wes Jackson, describing past academic and work experiences, major interests, and goals for the future. We recommend that applicants have completed at least one year of college. The Land admits students of any race, color, national or ethnic origin. Prospective students may make appointments to visit The Land by phoning (913) 823-8967.

1982 Prairie Festival

"RESETTLING AMERICA" will be the theme of the fourth annual Prairie Festival at The Land on May 29-30. If it rains, the program will be moved to the Marymount College Ballroom.

Registration begins at 9:00 A.M. on Saturday and continues all during the festival. The fee will be \$3.00 a day per person, with everyone under sixteen admitted free. Participants may register for one day or for both. Primitive camping spots for tent campers can be reserved. We request that no one bring cats or dogs.

On Saturday there will be a workshop called "Resettling Prairie Plants." From 10:00 until 12:00 in the morning, Marty Bender will lead a plant identification walk through the herbary, the research plots, and nearby pastures. At 1:00 P.M., Dr. Joan Ehrenfeld, a plant ecologist at the Rutgers Center for Coastal and Environmental Studies, will speak about the "comings and goings of some of the important prairie plants." Landscaping with prairie plants, replanting pastures to native grasses, and techniques of prairie restoration will be other topics covered in the afternoon sessions.

The Saturday evening program will feature Wendell Berry, poet, novelist and essayist,



Appropriate Technology Interu, Margo Thompson.

Continued on pg. 6.

The Land Purchases 160 Acres

At a special meeting on January 10, the Board of Directors of The Land Institute approved a proposal to organize a fund drive to buy land owned by Mr. Edward Sudendorf II. Early in February, Mr. Sudendorf agreed to sell us 160 acres nearly adjacent to The Land, which includes 68.5 cultivated acres, approximately 80 acres in pasture, and the balance in trees and wildlife habitat. Were it not for the county road, the southwest corner of this property would touch our northeast corner. Mr. Sudendorf owns two other parcels of land which could also be very useful to The Land, but our priority now is to purchase this particular quarter section because of its proximity to our sheds, tools and equipment, and our irrigation system which draws water out of the river.

The transaction was scheduled to be closed around March 21. The purchasing price for the 160 acres is \$112,000, \$700 per acre. By March 1, Friends of The Land who were contacted personally or by phone had pledged a little over \$40,000 in gifts or interest-free loans to be applied towards the down payment. Our goal is to acquire \$56,000, half the total price, by the closing date. The Land will borrow the difference between \$112,000 and the total amount raised from the First National Bank in Salina at an interest rate of 16.5%.

As we discussed this purchase with the board, several considerations surfaced. The opportunity to buy this land came soon after our annual finance drive. Since the total contributions were already above the goal we had set for the year, we didn't feel like turning around and asking people to donate again after they had been so generous during the regular fund drive. Also, the task of raising such a large amount of money compared to our regular yearly budget was sobering, to say the least.

On the other hand, with only 28 acres where we are now (property owned by the Jacksons), The Land Institute is limited if we want to do agricultural research. We are soon to reach a point where we need to expand some experiments to the field level. This is probably our last best chance to obtain land nearby. The Sudendorf land has been held in trust for the past 25 years and only became available in January.

YOU CAN HELP THE LAND INSTITUTE PURCHASE
THE 160 ACRES. SEND YOUR CONTRIBUTION TO

LAND PURCHASE FUND
The Land Institute
Rt. 3
Salina, Kansas 67401

ALL CONTRIBUTIONS ARE TAX DEDUCTIBLE.

Besides using the land for agricultural research, we might be able to derive an agricultural income from it for The Land Institute. We want to work as hard as practical to become more self-reliant, less dependent upon grant money from private foundations in New York, Boston, Chicago, etc. (We have never taken government money, either for agricultural research or for our day to day operations.) We believe that tough times are coming, and that our permanence as an institution devoted to a search for sustainable alternatives will depend to a large measure on our own self-reliance. We want to be here to work with farmers and townspeople as sunshine replaces expensive, scarce fossil fuel.

Some economically feasible examples of the type of agriculture we are researching will be essential in the future. It is not good enough to simply talk about perennial polyculture; we want to try it, and we will need land to do so. Someday we would like to put together a "Sunshine Farm," one which relies on the sun's energy for almost all operations. This would mean not just solar and wind equipment and conservation building design, but solar-powered field operations, whether that be draft horses, or tractors running on methanol or a vegetable oil-based diesel fuel. The crop mixes on sloping soil would be less demanding of fuel, which makes this more feasible than it would be with conventional monocultures.

The board of directors agreed unanimously that we should seize the opportunity and purchase the acreage close to The Land. And so we are entering a new era. We hope that we can raise the money to pay off the balance fast, so that higher interest rates don't sap the resources of the Friends of The Land, and fund raising doesn't sap our time when we should be working with the students, publishing The Land Report, designing experiments, sowing seed, harvesting, weighing seed and reporting on our results.

We live in a time when it seems that all worthwhile organizations are screaming for money to help turn this country from its senseless, destructive path toward a safer, sustainable future. Until now we have avoided the dramatic appeal for money because we were getting by. After all, when everyone is standing on his or her toes, no one sees. But here we are, coming up on our toes, doing the same! We just hope it doesn't last long, and that you can help us chew what we have bitten off.

Wes Jackson Dan Jackson

Co-directors



This aerial photograph shows most of the 28 acres now used by The Land Institute, from the grid on the lower left where the mowing and burning experiments were done, to the herbary just above the large S-shaped terrace. The quarter section immediately diagonal from our northeast corner (left of the cedar trees) is the land we are purchasing. Most of the land can be seen in the upper fourth of the photo.

Prairie Festival

Continued from pg. 6.



especially known for his book The Unsettling of America. The evening will also include music and a reporting period for all environmental/alternative organizations represented, as we have had at the past two festivals.

On Sunday morning there will be a variety of discussions, workshops and demonstrations, as well as talks by David Ehrenfeld, Professor of biology at Rutgers University, and Donald Worster, Professor of American Studies at the University of Hawaii. Following the potluck lunch at 1:00 P.M., there will be an afternoon program beginning about 3:00 and ending at 5:00 P.M.

All the details have not been worked out yet, although the speakers have been confirmed. We will mail invitations with specific events and times listed to Friends of The Land, subscribers to The Land Report, and members of environmental groups who we know are interested. Anyone else desiring an invitation can receive it upon request of The Land Institute.

Books by Prairie Festival Speakers

In preparation for the Prairie Festival, we recommend that everyone read some of the important books written by our speakers. Down town News in Salina has stocked the three (in paperback & reasonably priced) which we use in the classroom at The Land: The Unsettling of America by Wendell Berry, The Arrogance of Humanism by David Ehrenfeld, and Nature's Economy by Donald Worster. Bookstores and public libraries should also have some of the seven books of verse, three novels, and several books of essays (The Gift of Good Land is the latest) by Wendell Berry. Another fascinating book by Donald Worster (reviewed in Land Report No. 9 by Thelma Wright) is called Dustbowl: The Southern Great Plains in the 30's.

The Land Institute is proud to be gathering together at the Prairie Festival such well-known thinkers and authors. An acquaintance with some of their writing will enrich everyone's participation at the Prairie Festival.

The Land to Co-sponsor Dance Performance

On the evening of March 23, Joan Stone of Lawrence, Kansas, will give a dance performance in the Salina Community Theatre, 303 E. Iron. Her appearance is co-sponsored by The Land Institute and the Saline Arts Commission.

One of the main works Joan will perform is called "Grass." In conjunction with this theme, Terry Evans, arts associate at The Land, will exhibit her prairie photography in the Salina Community Theatre.

Joan Stone trained in classical ballet with Jack Quinn of the Metropolitan Opera Ballet. She studied modern dance at Sarah Lawrence College and the American Dance Festival, Connecticut College.

Undecided about dance as a career, Joan taught elementary school, worked for the New Haven Redevelopment Agency, studied anthropology at Columbia University, and received a Master's Degree in Urban Studies from Yale University.

Joan Stone began to develop her own approach to choreography and performing in the mid 1960's. She now combines performing with teaching workshops, functioning as an artist-in-residence, lecturing, and writing on various aspects of dance. She describes her dancing:

To tell my stories, I've searched for essential gestures that communicate essential thoughts and feelings. I dance in-the-round without musical accompaniment or theatrical devices. I enter the performance space, introduce myself to the audience, and start dancing.

A few gestures and a story begins to unfold. It develops not by accumulation of words, sentences, and paragraphs, but by accumulation of gestural phrases and their manipulation in time and space.

My movement vocabulary draws upon the whole spectrum of human gesture from the walk and turn of a person on the street to the fall, tap and arabesque of a formally trained dancer. Gestures are joined into phrases, which are repeated, contrasted, reversed, scrambled, interrupted, augmented, diminished, tried in different contexts-- and thus, formed into episodes.

A performance ends with a discussion.

TICKETS FOR THE 7:30 P.M. PERFORMANCE ARE \$2.00 for adults and \$1.00 for students.



Joan Stone dancing stories in a new way

Alternatives in Agriculture

Agricultural Research at The Land: A New Threshold

Wes Jackson

Some generous and timely funding by Rodale Press (publishers of New Farm and Organic Gardening) has given our agricultural research a boost this past January. We hope our results will yield some answers to two important biological questions. We have stated many times over in The Land Report that we need to know whether herbaceous perennialism and high yield can exist together, and whether perennial mixtures or polycultures can outyield perennial monocultures. The Rodale money will be used primarily to answer the first question, though about a third of it will be spent to conduct research on the second question as well.

Before I describe how we intend to spend this \$36,000 grant over the next two years, I want to explain why the agriculture we are researching and promoting was not possible until recently, why so many simple, yet fundamental questions could not be meaningfully researched until now. The agriculture we are talking about at The Land had to wait on the consummation of a marriage between two fields of biology: ecology and population genetics. This only occurred about fifteen or twenty years ago.

Let's back up a bit. The roots of modern ecology have been around since early in this century; 1910 or so, but population genetics as a discipline was not born until much later--in the 1930's. However, this latter field did not mature until the 1960's, for it was not until this time that enough research had been done to give us a very good understanding of the dynamics of evolutionary processes. The marriage of the 1930's, as I have mentioned, wasn't fully consummated until the 1960's when these "dynamics" became better understood. This marriage reached textbook level in the last ten to fifteen years and has been widely publicized and somewhat more refined. It seems inevitable that practical minds would eventually ponder the implications of such knowledge for agriculture. Since this is where we find ourselves, a more detailed history of the maturity of plant population genetics seems in order.

In "Fifty Years of Plant Evolution," in Topics in Population Biology edited by Otto Solbrig et. al. (Columbia Univ. Press, N.Y., 1979), G. Ledyard Stebbins, one of America's outstanding plant geneticists and now emeritus professor of the University of California at Davis, has sketched that history of population genetics. As he sees the discipline, it has developed from three motivations. First, there is the motivation of systematists, the plant classifiers or taxonomists, the people who experience both

delight and frustration while trying to figure out how to make sense of the earth's botanical variety. Since Darwin, these biologists thought that if they could better understand how life forms appeared on earth through evolution, they could better understand where the "natural breaks" or discontinuities between plant groups might exist, be they at the species level, with genera, families or whatever. As Stebbins says, their primary motivation was that they wanted a "valid species concept." Such a concept still remains elusive, incidentally, but there was a time when these scholars shared the idea, which was almost dogma, that chromosome number within a species was constant. So beginning in the 1930's, they counted chromosomes and later compared chromosome shapes and sizes of different species. Later, at a more sophisticated level, they studied chromosome pairing in the hybrids and provided an even more refined method for determining degrees of relatedness among species.

While all this chromosome work was going on in the '30's, '40's and '50's, there was another group of scientists with a different motivation, people who possessed what one might call the "naturalist impulse." Stebbins describes them as the kind of people who are naturally fascinated by the rich diversity of form and structure, of ecological and geographic distribution, and adaptations among plants. They simply enjoyed analyzing this pattern of diversity for its own sake. Such botanists have always been the ones most at home with the ecologists. Many of them were ecologists, in fact, and published many ecological papers.

The third tradition, Stebbins recalls, was started by a small group of broadly-trained geneticists, particularly in the United States, England and the U.S.S.R. These people were primarily interested in evolution for its own sake and thought that a study of the higher plants would contribute generally to a better understanding of the evolutionary principles. It was this groundwork, completed by the 1960's, that made the consummation of the marriage between ecology and population genetics possible.

From the inventory of knowledge gathered during those years, I believe that we now know enough to move toward a partial solution of what I have called "the problem of agriculture." Much of this knowledge has been used to fine tune the traditional crops for increased yield, but has also contributed to "the problem." There has been more soil erosion, more chemical contamination of the countryside, more use of fossil fuel-based fertilizers, more reliance on huge capital investments for farm machinery and equip-



When Robert Rodale, John Haberern and Richard Harwood visited in December, Marty and Wes showed them the Herbarry and experimental plots.

ment, and on and on. On relatively flat land, we might get by with such a simple agriculture, but for sloping ground, the inherent virtues of plant mixtures or plant communities, such as reduced soil loss, resistance to insects and pathogens, appropriate water and nutrient management are too obvious to ignore.

Those fascinated by the giant strides humans have made miniaturizing our technology in the computer world will be impressed by the "biohardware" and "biosoftware" upon which we rely. To them I would say that we are trying to take advantage of the "combination of circuits" which nature has built in over the millions of years in "systems" which are self-reproducing (something the human has never done). H. T. Odum has noted that this has occurred "probably at thermodynamic limits." By relying on the natural integrities, we are relying on the information in life forms, the DNA language of various species which operates at an energy cost 10^{21} less than the energy cost for keypunching a comparable "bit" of information on hollerith cards.

This energy saving isn't our concern. It interests us no more than the language of the computer. What interests us is the opportunity to manipulate potentially high-yielding species and make them part of an integrated mix.

We wouldn't call ourselves "designers," but "imitators of designs," designs which are the culmination of millions of years of trial and error in nature. The distinctly human effort in

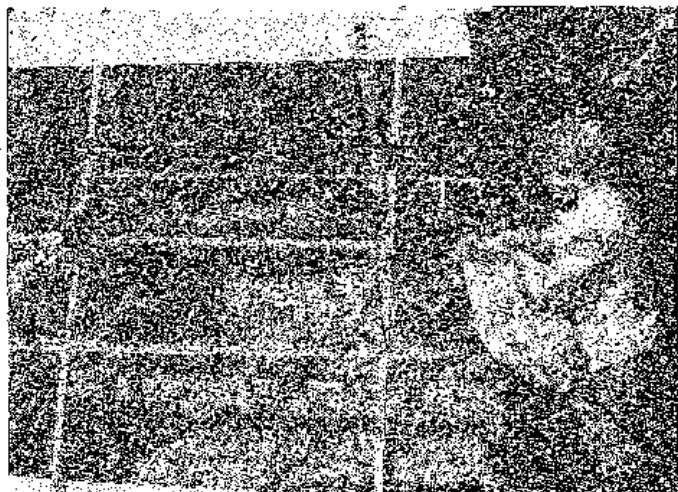
all this would be to direct these ecosystems toward the human purpose, to encourage a yield comparable to our traditional crops while avoiding the devastating consequences. This is where an understanding of ecology and the dynamics of evolutionary processes are essential. We will be relying on the same tools developed and used by the pioneers in these disciplines, the mathematical and statistical models, the microscopes and greenhouses.

This brings us back to our recent funding by the Rodale organization, which has, in effect, embraced the idea that now is the time to use that knowledge for a sustainable agriculture. From our \$36,000 grant, we will spend \$26,000 over the next two years breeding for high-yield among some twenty different wild species. Our newly-hired plant breeder, Walter Pickett, went to work January 15. Walter has done graduate work in plant breeding at Kansas State University and has spent the past three years working on vegetable crop improvement for the Peace Corps in the Republic of Niger in Africa. Walter will be working to generate high yield through ordinary selection, through wide crosses and even through grafting of annuals onto perennials. We have emphasized over and over that some of these plants may have no practical value as food crops, but they may help us settle some of the important questions. In a similar view, I doubt that grafting in herbaceous plants will have much utility for crop production.

In the fall of 1982, we will spend \$5,000 of the Rodale money to purchase a high-powered microscope, glassware, and some chemicals in order to look at the chromosomes of the plants we involve in crosses.

We have called this particular phase of our research the "fast track," for we are pushing for quick results in producing high yield. Some of the "slow track" research is also being supported by the Rodale grant, for part of Marty Bender's salary will come out of it for herbarium development and for some of the ecological research. This latter work involves the integration of various species into mixtures which are compatible and self-sustaining. Beginning modestly, the Rodale organization has increasingly supported our agriculture research for the past several years. Now that we have built a strong base, they agree that our program is ready for a larger push.

I am moved to end on a note of appreciation, not to the Rodale organization this time, but to two groups of contributors over the years -- our students and the Friends of The Land, who saw us through those years of marginal budgets. The work of several generations of students has helped produce a solar greenhouse, the herbarium, and our existing research plots. Two Friends of The Land have generously donated considerable equipment that is useful. No hands need be idle for long around here! We are especially grateful for the small donations which keep coming. We know that many of the contributors have been giving with some measure of sacrifice. Without this commitment, we could not have come to the point we are today in such a short period of time. What we are doing may not be a "people's science" in the strictest sense, but it is a science that would never have been supported either by the giant corporations or big government--the surest testimony to me that we are on the right track.



Marty Bender threshing seed in combine.

Appropriate Technology for Agricultural Research

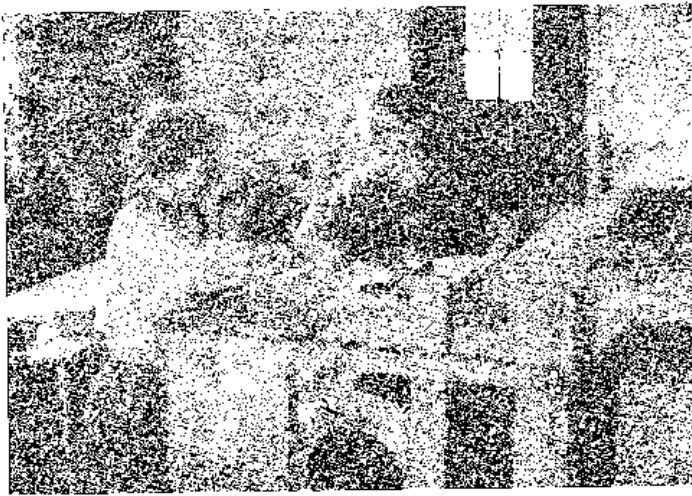
Marty Bender

We have been gearing up for research on the development of mixed perennial grain crops. In past issues of The Land Report, we explained our many experiments and what we learned about perennials from the scientific literature. In the fall 1980 issue is an article on our irrigation system, which is a good example of appropriate technology. After several attempts with a large pump, we found that a submersible well pump and three Rainbird sprinklers provided sufficient water for our experiments. This year, we have been rigging up equipment for harvesting, threshing and cleaning seeds from our experimental plots.

To harvest seeds, we have a hand-held harvester for small plots and a combine for large plots. The hand-held harvester is a gas-powered thirty-inch hedge trimmer made by Little Wonder, Inc. Since the trimmer has blades on one side only, we were able to modify it by attaching an aluminum tray (2 feet wide, 2 feet long, and 1 foot deep) to the unbladed side to catch the seeds. The combine, which is an Allis-Chalmers Model 66 "All-Crop" Harvester with a five-foot cutter bar, was purchased at a K.S.U. agronomy auction. Leland Lorenzon helped us make the combine operational.

To thresh the seeds gathered with the hand-held harvester, we use a W-W "Kiowa" model A-G grinder as a hammermill. To thresh large quantities, we have modified our Allis-Chalmers combine so that it can be used as a stationary thresher. An opening was cut underneath the grain auger to allow the threshed seeds to fall into a tray, thus avoiding losses that might occur if the seeds were to continue on up the clean grain elevator.

To clean the seeds by removing stems, leaves, and weed seeds, we have obtained two old seed cleaners which we have been renovating. One is a Clipper No. 2B model with eight screens, loaned to us by Rev. Richard Taylor in return for restoring it to its original condition. Students have been sanding and painting it and retracing the faded letters. The other seed cleaner is a Clipper No. 27 model which we purchased from a defunct seed company in Salina. When we first examined it, we were unsure that we could make it operational, even after looking at a large-scale Clipper model at the grain elevator in Assaria, Kansas. So we visited the Kansas Fish and Game office at the Kingman Wildlife Area to look at several of their seed cleaners in operation. Convinced that we could get the old Clipper to work, we laid a cement foundation for it in the barn and installed a motor and belts. We have built wood frames for five screens, but eventually we will need many more.



Lynn and Marie painting letters on seed cleaner.

Seeds for Plant Breeding

Walter Pickett

It's frustrating to work for years to develop a new crop variety, only to discover that what you wanted existed all along. This sometimes happens to plant breeders, especially those working with forage crops on which there's not much literature. It could easily happen at The Land, where we're working on little-known species.

But now the Western Regional Introduction Center is sending seed from its entire collection of Wheatgrass (1271 accessions), Wildrye

(201 accessions), Fescues (1246 accessions), Ryegrass (620 accessions) and Dropseed (90 accessions). The brome grass (about 1000 accessions) will come from a separate center. With all these seed, we should be able to study the variations within the species and avoid the pit-fall mentioned above.

Our plans are to plant each accession in a single row and evaluate it for seed yield components. For example, one might put up a lot of seed stalks, but have few flowers per stalk. Another might have fewer stalks, but more flowers per stalk. Another might have larger seeds, but fewer of them. Once we know this, we can start planning our crosses with greater confidence.

Dr. Gordon Kimber, at the University of Missouri, also sent us some very interesting seeds. He sent seven seeds from a hybrid between Timopheevi wheat and *Agropyron elongatum*. Timopheevi is an annual wheat of a primitive type having half of its chromosomes in common with durum wheat. *Agropyron elongatum* is tall wheatgrass, a perennial. The hybrid was made to breed true by manipulating its chromosomes with a chemical. This is the second time at The Land that we have had a plant which included all the chromosomes of both an annual and a perennial. We have had hybrids between perennial and annual corn before. Dr. Kimber also sent sixteen seeds of annuals closely related to bread wheat, which should give some variation when crossed with perennial types.

Various other people have also sent seed samples, including $\frac{1}{2}$ pound lots for this summer's experiments. We greatly appreciate their help.

Sustainable Agriculture

Sustainable agriculture is the subject of many conferences around the country this spring. People have become interested as a result of the widely-publicized National Agricultural Lands Study, the U.S.D.A. Report and Recommendations on Organic Farming, the Rodale Publishing Company Cornucopia Project, and acquaintance with such books as Bill Mollison's *Permaculture I* and *II*, Masanobu Fukuoka's *One Straw Revolution*, Wes Jackson's *New Roots for Agriculture*, and of course, *The Unsettling of America* by Wendell Berry.

Wes Jackson will be speaking at conferences in North Carolina, Arkansas, Florida, California, Iowa and Kansas. Saint Mary College, Leavenworth, Kansas, will be the site of a Midwest/Plains conference on "Creating a Sustainable Food System," on May 21-23. Wes will be one of two speakers on Friday night, May 21. For more information, contact the conference coordinator, Dee Berry, 5 East Bridlespur Drive, Kansas City, Missouri 64114. Phone (816) 942-3081.



Organic Producers Meet

Dr. Garth Youngberg told the Kansas Organic Producers at their annual meeting on February 21 that the USDA still does not have a distinct, recognizable program aimed at organic farming. Youngberg, the USDA coordinator for organic farming, was appointed following the completion of the *Report and Recommendations on Organic Farming* in 1980. He was one of ten persons on the study team, and now his responsibility is to handle the public's response to the study.

About 40,000 copies of the study have been distributed, and it has been translated into several languages. Besides researchers and organic farmers, urban people concerned about the quality of their food have been interested in the report. And most importantly, conventional farmers have been very interested.

Dr. Youngberg stated that conventional farmers are asking questions about organic farming because of all the anxieties developing in their lives, anxieties about the cost of chemi-

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Optimism on a Finite Earth

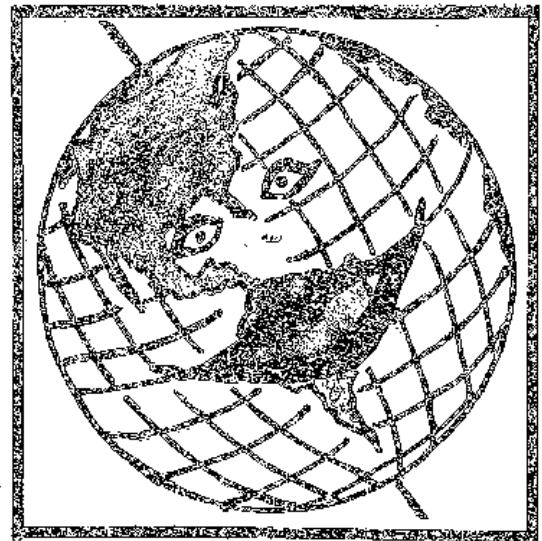
Dana Jackson

When Paul Ehrlich appeared on the Johnny Carson television show in the late 1960's to discuss his book, The Population Bomb, he introduced a startling idea to the American public: the earth could not support an infinite number of people, because the earth is finite. The prevailing faith was that our huge earth contained an unlimited amount of materials the growing human population needed to live and prosper. Although a few scholars in the 1950's-

Fairfield Osborn in The Limits of the Earth (1953) and Karl Sax in Standing Room Only (1955)- had received some attention for their challenge to this belief, the general public did not get the message until The Population Bomb (1968) became a bestseller.

Growth has been a sign of progress since the industrial revolution. In the United States we have taken for granted that towns need to be growing in population, business districts need to be expanding, industries need to be increasing sales and constructing more facilities. The idea that there could be a point of diminishing returns for society as a result of growth was seldom seriously considered. Garrett Hardin's classic paper, "The Tragedy of the Commons," which first appeared in Science, December 13, 1968, illustrated quite clearly the diminishing returns of a growing population on a limited resource base. By the early 70's, many people were writing and speaking about overpopulation, overconsumption of resources, and pollution. This increasing awareness became the "environmental movement."

People who wanted to hold on to their faith in an infinite world considered Ehrlich and Hardin to be "doomsayers," but many of them reconsidered when they read The Limits to Growth, a study done for The Club of Rome by M. I. T. researchers Donella and Dennis Meadows, Jørgen Randers and William Behrens III, published in 1972. By the use of computer modeling, the authors projected what the future would be if present growth continued. They explained the mathematics of exponential growth and showed how it starts out slowly and then increases more and more rapidly. The amount added each year to an interest-earning savings account (or a human population) is not constant. It continually increases as the total accumulated amount increases. Population growing in this manner (in 1798 Malthus called it "geometrical increase") requires exponential growth rates in the demands for food, capital, non-renewable resources and pollution absorption. But because the earth is finite, the demands cannot be met, the limits to



growth are reached, and the system collapses.

Most economists couldn't deal with the M. I. T. study because all their theories depended upon limitless resources. Many politicians simply couldn't understand it. Yet, The Limits to Growth was read and debated widely, and it influenced the course of events. Throughout the next decade, beginning with the National Environmental Protection Act requiring environmental impact statements, citizen concern prompted Congress to pass legislation based on the belief that the earth is finite. Several Presidents signed into law bills to regulate air and water pollution, surface mining and ocean dumping, toxic substances and hazardous wastes; to protect endangered species, coastal zones and Alaskan lands. Congress approved a new Department of Energy because of the national concern over dependable, long-term energy supplies.

In 1976, Americans elected a President who seemed to believe in a finite earth. Early in his term, President Carter directed the Department of State and the Council on Environmental Quality to study "the probable changes in the world's population, natural resources and environment through the end of the century," as a basis for long-range planning. The results of this study, The Global 2000 Report to the President, released to the public in July, 1980, concluded:

If present trends continue, the world in 2000 will be more crowded, more polluted, less stable ecologically, and more vulnerable to disruption than the world we live in now...Prompt and vigorous changes in public policy around the world are needed to avoid or minimize these problems before they become unmanageable.

Before the report was widely distributed, Americans elected a different President, one who apparently believes in an infinite earth. The Global 2000 Report, along with its sequel, Global Future: Time to Act, was doomed to obscurity. The second study took a look at present government programs related to long term global issues raised in Global 2000, assessed their effectiveness and recommended improvements. President Carter referred to it extensively in his farewell address in January, 1981, an address which turned out to be a farewell to this report as well as to the American people.

These reports were significant not just because they substantiated the conclusions of studies such as The Limits to Growth, but because for the first time an official government project brought together information from thirteen separate divisions of government and made projections over the range of population, resource and environmental concerns. Methods of gathering and analyzing data varied in the different agencies and resulted in some rough approximations when it was all put together. But the final results, compared with other global projections, probably understated the severity of potential world problems in the 21st century.

The Limits to Growth - False Bad News?

Although the Global 2000 and Global Future Reports have been ignored by the federal government in the last year, scientists have not forgotten them. At the recent meetings of the American Association for the Advancement of Science (AAAS) in Washington, D. C., organizers of the Environment section scheduled two full days for symposia related to the Global 2000 Report. One of the symposia, called "Life on Earth is Getting Better-- Or is It?" was arranged by S. Fred Singer and Julian Simon, outspoken debunkers of the limits-to-growth point of view.

For nearly a decade, the limits-to-growth concept prevailed among scientists. Although there were those who argued in letters to Science with certain base assumptions and some of the methods used in the M. I. T. study, few challenged its general conclusions about exponential growth. But Julian Simon sparked a revival of the "Malthusian vs. the Cornucopian" debate when Science printed his article, "Resources, Population, Environment: An Over-supply of False Bad News," in the June 27, 1980 issue. The summary of the article stated:

False bad news about population growth, natural resources, and the environment is published widely in the face of contradictory evidence. For example, the world supply of arable land has actually been increasing, the scarcity of natural resources, including food and energy, has been decreasing, and basic measures of U. S. environmental quality

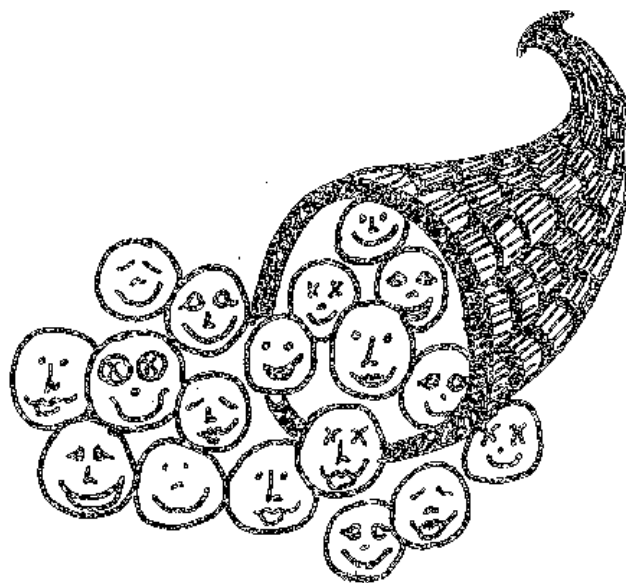
show positive trends. The aggregate data show no long-run negative effect of population growth upon the standard of living. Models that embody forces omitted in the past, especially the influence of population size upon productivity increase, suggest a long-run positive effect of additional people.

The M. I. T. researchers applied aggregate data in their computer models and showed how exponential growth of human populations puts demands on the earth that reaches limits. Simon also used aggregate data, but he applied it with general trends and, ignoring the power of the exponential, made linear conclusions from past experience, concluding that we have been misled about the limits to growth.

In a letter to Science printed in the December 1980 issue, George Cowgill commented on Simon's method.

Simon repeatedly commits the same fallacy he notes in others: past trends are simply extrapolated into the future. It is worth recalling the story of the person who leaped from a very tall building, and on being asked how things were going as he passed the 20th floor replied, "Fine, so far."

In this same issue, there were several other writers arguing with Julian Simon's conclusions on the basis that he ignored the realities of world politics and resource distribution. A letter from Steve Singer pointed out that an increase in arable land (Simon had quoted Food and Agriculture Organization data showing a rise from 1403 to 1507 million hectares in the world as a whole from 1961-65 to 1974) could mean that "semi-nomadic Tuaregs may be pushed back a mile by the encroaching sands (Sahel Desert), while a million Bengali farmers plant yet another row of rice each in an increasingly marginal swamp to



feed their ever-larger families. Arable land may thus be increased in the aggregate, but both Tuaregs and Bengalis are worse off." Allan F. Matthews pointed out in his letter that Simon's evidence that the world total of food production per capita is rising, "derived by averaging the overfed and the underfed, does not disprove the fact that millions of people are under-nourished." Matthews also pointed out the fallacy of concluding that mineral resources are less scarce just because prices have decreased. "Multinational corporations, mining companies, and plantation owners ordain that situation by paying exploitative wages of a few dollars a day in Africa, Latin America and Asia," he said. Another writer, Wayne Davis, was amazed that Simon could totally reject estimates of mineral resources by geologists. But Simon's belief in "the ultimate resource," people, negated geological evidence of scarcity:

...because we find new lodes, invent better production methods, and discover new substitutes, the ultimate constraint upon our capacity to enjoy unlimited raw materials at acceptable prices is knowledge. And the source of knowledge is the human mind. Ultimately, then, the key constraint is human imagination and the exercise of educated skills. Hence an increase of human beings constitutes an addition to the crucial stock of resources, along with causing additional consumption of resources.

Readers outside the sciences were given a sample of Simon's ideas in an Atlantic Monthly article, June, 1981, entitled, "The Scarcity of Raw Materials." Simon showed that based on patterns in the past, the cost of raw materials decreased, and that meant scarcity was decreasing. He concluded the article by denying that he is a "cornucopian," and restated his faith in human knowledge as he had in Science.

I believe that human ingenuity, rather than nature, is limitlessly bountiful. I believe that with knowledge, imagination, and enterprise, we and our descendants can muster from the earth all the mineral raw materials that we need and desire at prices that grow smaller to other prices and to our total income. In short, our cornucopia is the human mind and heart.

The Ultimate Resource

The beliefs stated in the quotations above were expanded upon in Julian Simon's book, The Ultimate Resource, published in 1981 by Princeton University Press. Although most scientists preferred to ignore it, the book received general public attention, and scholars were forced to

review it. Herman Daly, a "steady-state" economist at Louisiana State University, wrote about the book for the Bulletin of the Atomic Scientists. He attacked Simon's denial of resource finitude. In connection with oil, Simon wrote in The Ultimate Resource:

...our energy supply is non-finite, and oil is an important example....the number of oil wells that will eventually produce oil, and in what quantities, is not known or measurable at present and probably never will be, and hence is not meaningfully finite.

Daly commented on this in his review:

The fallacy of the last sentence is evident. If I have seven gallons of oil in seven one gallon cans, then it is countable and finite. If I dump one gallon of oil into each of the seven seas and let it mix for a year, those seven gallons would no longer be countable, and hence not "meaningfully finite," therefore infinite. This is straightforward nonsense.

Herman Daly also noted that the words "entropy" and "second law of thermodynamics" do not appear once in Simon's 400 page book.

The October 28, 1981 New Republic carried a review entitled "Dr. Pangloss Meets Cassandra" by Garrett Hardin. Hardin stated in the third paragraph:

Simon's conclusions are highly palatable to budget evaders, car salesman, realtors, advertisers, land speculators, and optimists in general; scientists find them appalling.

Like Daly, Hardin was most bothered by Simon's refusal to accept the finitude of resources, especially the idea that whatever is not "meaningfully finite" is assumed to be infinite. Simon discounts the importance of mineral exhaustion because "an economic equivalent of a scarce element (like copper) could be used. But Hardin points out that there can't be an infinite number of substitutes. It would just be a game of musical chairs, not a way to transcend a finite supply. In illustrating that Simon chose to refer only to optimistic predictions of the earth's supply of resources, Hardin stated that Simon used only the oil supply data of Vincent McKelvy, the longtime director of the U. S. Geological Survey. For over 25 years, McKelvy, who believed there was plenty of oil, and M. King Hubbert, who predicted a decline in oil production, carried on a debate. Hardin pointed out that Hubbert was the Cassandra until the 1973 oil crisis, when geologists concluded that Hubbert was right. "Leaving Hubbert and his work out of a book-long discussion of resources is like omitting the names and works of Adam Smith and John Maynard Keynes from a treatise on economics," Hardin said.

A Quarrel of Two Faiths

Garrett Hardin participated in the January AAAS symposium arranged by Julian Simon. Simon spoke on the topic, "Life on Earth is Getting Better," and Hardin entitled his talk, "Why Pollyannas Prosper." It was the classic confrontation of people of two different faiths. Daniel Luten, in a paper published in 1978 called "The Limits to Growth Controversy," could have been describing the AAAS symposium of 1982.

I suspect that we witness a quarrel of two faiths. The one is of biologists believing in the reality of constraining principles, seeing mankind at one extreme of a great continuum of life, partaking to some degree of all its attributes for better or worse, and subject to the environment of this world. The other faith is of social scientists, empiricists and skeptical of principle, seeing man as a thing apart and human society as perfectible, given enough study; and seeing man as superior to and capable of controlling the environment of this world.

As in any quarrel of two faiths, one side is not likely to convince the other. The evolutionist seldom converts the creationist, or vice versa, and the biologist believing in a finite earth will not change the mind of the social scientist who believes humans have the power to produce an infinite material resource base. But it is irresponsible to conclude, therefore, that we should ignore these intellectual debates, these duels with numbers and graphs. As Daniel Luten said in the paper referred to above, "On the limits-to-growth issue, there is no place for fence sitters. The world is infinite or it is finite. This time it is wrong to see 'merit on both sides.'"

Those who find themselves to be fence sitters, who distrust the numbers and logic of both sides, could look at the controversy from this standpoint: if humans take a course of action based on one point of view, and it turns out to be wrong, what are the consequences? If they act on the other point of view and it turns out to be wrong, what are the consequences? Daniel Luten considered the choices in his paper.

If we act as though we believe in infinite expansion, and this turns out to be impossible, we risk an ultimate disaster for humankind. We may well destroy most of the biosphere in our desperate attempts to survive. Indeed, as we well eliminate much of the planet as a suitable place for human habitation. Man-induced expansion of deserts, areas of exhausted and eroded soils, and denuded hill slopes testify to this possibility. Ultimately it may prove impossible to

"On the limits-to-growth issue, there is no place for fence sitters. The world is infinite or it is finite."

reverse such a trend, for the resources needed to accomplish such a reversal would be unavailable.

If we believe in nonexistent limits and voluntarily restrict our growth--possibly even reduce total population--what losses do we risk? Some geniuses (and some scoundrels) who might have been born will not be born so soon. Perhaps, to compensate, we can better afford to develop the talents of those now neglected. We will have slowed down exploitation of the planet for the benefit of man. We will be faced with serious problems of the equitable distribution of existing goods and services, but at least more could be available per capita, however unevenly distributed. If growth and expansion later prove to be both possible and desirable, it would appear absurdly easy to set the process in motion again. The resources would still be here.

The most rational, most prudent course of action seems obvious. As a nation, we began to recognize that course in the 70's, but now we are back to the old faith, and our "conservative" leadership is making policy as if the earth were infinite. We have "supply side" economics which means making the pump more efficient in extracting resources. Instead of working towards greater equity in the distribution of the world's mineral and energy resources necessary for economic development, our State Department tells the "have-nots" that they can become consumers like us if they apply initiative and free enterprise. The energy policy of the Reagan Administration is to promote the construction of nuclear power plants, in spite of their enormous and growing costs and the fact that the radioactive waste disposal problem has not been solved, while drastically cutting programs to encourage conservation and the development of renewable energy sources. The Reagan Administration assumes that our earth has an unlimited ability to absorb pollution without seriously damaging the life support system as they continue to decrease the staff of the Environmental Protection Agency and hamper its ability to monitor and regulate toxic substances in the air, water and land.

People who understand the Second Law of Thermodynamics, diminishing returns, diseconomies of scale, principles of ecology, and exponential growth are becoming very alarmed about our federal government's policies and programs. Yet, many of them have preferred to ignore the recent limits-to-growth debate involving Julian Simon

because it's a rehash of old issues, and Simon's omissions, faulty logic, and fallacies are obvious. But as Peters D. Wilson wrote in his review of Simon's book for Intercom (Nov./Dec. 1981), a publication of the Population Reference Bureau, "It is risky at best to ignore a book and a point of view whose time for public attention appears to have arrived." Wilson quotes a complimentary essay on The Ultimate Resource in the New York Times Book Review saying that the 1970's didn't demonstrate the limits to growth, but the "social limits to nongrowth," and that people are tired of "stagnation."

Wilson lists three reasons why the book is likely to be widely read and quoted. (1) During the 70's, the limits-to-growth concept became part of the status quo. Jimmy Carter's election "politically embodied the limits-to-growth outlook," but his defeat in reelection by Ronald Reagan "has thrown it into doubt." (2) People now serve in the nation's capital who were not around during substantive debates over population growth and resources that occurred before 1972. The ideology of new members in Congress, their inexperience, and the tone set by the new President, all makes Simon's thesis more acceptable to them. In fact, Simon's ideas and numbers can be used to support actions reversing policies on conservation and resource management established by former administrations. (3) Some of Simon's arguments will give ammunition to the "Pro-Life" lobby, those who attack abortion rights, family planning, sex education, and women's rights. For example, Simon explained why he decided not to work on a U. S. funded project to lower fertility in less-developed countries:

What business do I have trying to help arrange it that fewer human beings will be born, each one of who might be a Mozart or a Michelangelo or an Einstein or simply a joy to his or her family and community, and a person who will enjoy life?

Euphoria or Optimism?

Garrett Hardin emphasized in his AAAS talk and in the book review of The Ultimate Resource that optimism as epitomized by Dr. Pangloss and Pollyanna is more happily accepted by people than truth. But Julian Simon's message that life on earth is getting better is not optimism, but euphoria, Hardin said.

Humans like to believe that if we work hard we can keep improving our supply of material goods, and thus our lives will be better. Americans even seem to feel that they deserve to increase their buying power each year. What if humans could believe that we can improve our lives without continuing to increase our supply of material goods? Then we would have reason to be optimistic.

There are limits to growth when we are talking about population, energy, resources, capital and pollution absorption. There need be no limits when we are talking about the growth of human artistic, intellectual and spiritual qualities. Improved human relations, community cooperation, peacemaking among nations, the preservation and care of wilderness and wildlife areas, and the artistic design of low energy, minimal materials-consuming homes, workplaces, tools and transportation devices are all human activities that can keep growing. All the great qualities of human beings which fill Julian Simon with optimism can fill everyone with optimism, if humans accept a world of physical limits yet strive for growth in the quality of life. From this perspective, humans could be "the ultimate resource."

Jackrabbit

for Grandfather

a wizened old man
he sits haunches gaunt
still as a long silence
at the edge of a road
which is going nowhere

only his ears suggest sound
tuned to the very end
to every frequency
of the evening wind

histories of the prairie
stir into dust at his feet
the felt kinship with the Kansa
drawing his bones down into
the earth he has turned
and will turn into

all other creatures in the world
are waiting to move
propelling ahead in dreams
at a terrible speed

down night roads
shadow has lengthened into memory
his last days sashay crazily
in too bright a light.

Ruth Moritz Elliott

(Originally published in
TELLUS 5 Winter, 1981)

Prairie Images

Terry Evans

"Art is so urgent, so utterly linked with the pulse of feeling in people, that it becomes the singular sign of life when every other aspect of civilization fails...The people of the caves of Altamira built scaffolds in the dark interiors of their rock caverns, and with pigments made from ground roots and bark and minerals they painted an amazing world upon their ceilings by the meager light of oil lamps. They were spending their time drawing pictures when some would say that they should have been out finding food and facing the tremendous improbabilities of their survival."

Jamake Highwater

"The arts give shape to our deepest feelings. They give form to our experiences. They make vivid our connections to each other and to the places we inhabit."

Alan Gussow



With this issue, we begin a new series in The Land Report about prairie art, expressions that have the prairie as their source and that are made by plains artists.

Colette Bangert is an indoor painter from Lawrence, Kansas, who has been painting the lines and movement and forms of grasses and wind and earth for over twenty years. When I became obsessed with photographing the grasses, Colette's

images came into my mind, and I knew instantly what their source was. One day, shortly after harvest, Colette and I went up in a small airplane for an aerial view of the ground. She was amazed to see that the lines made by the combines were similar to the lines made in some computer art she had done. (not shown) That discovery seemed to be a reminder that machines are controlled by mind, which is a part of nature. Is there perhaps some universal pattern in the grass and in our heads? Gregory Bateson suggested that there is a "pattern of patterns," a metapattern which connects us all.

In looking at the images made by Bangert, Foth, Regier, and myself, I am struck most by their commonalities, which have partly to do with the influence of art history, but more specifically to do with our attempts to get at the essence of the prairie, to see and to express the pattern of patterns. We are not looking at the same places, and we do not make like images, but there is a quality of space and line and movement in all of our work that surely has been invoked by the prairie itself.

Joan Foth, who teaches art classes at Washburn University in Topeka, Kansas, and I have discussed the prairie sky, the way the sky sometimes makes its own horizon lines and the fantastic and unpredictable cloud formations that sometimes echo the ground forms.

Bob Regier, Chairman of the Art Department at Bethel College, Newton, Kansas, works with several mediums in response to the prairie, and many readers will remember his moving presentation of slides that closed the first Prairie Festival a few years ago.

Laura Jackson's poem shows the same rigor that is expressed in the visual works, the discipline that does not allow a simple cursory glance at the subject, nor a strictly emotional response. Her poem is the distilled expression of understanding the biology and the geology of the prairie, as well as a deep appreciation of its mystery.

The prairie is the metaphor for and the reality of the diversity and interrelatedness we work to express.

Hills of Flint

Laura Jackson

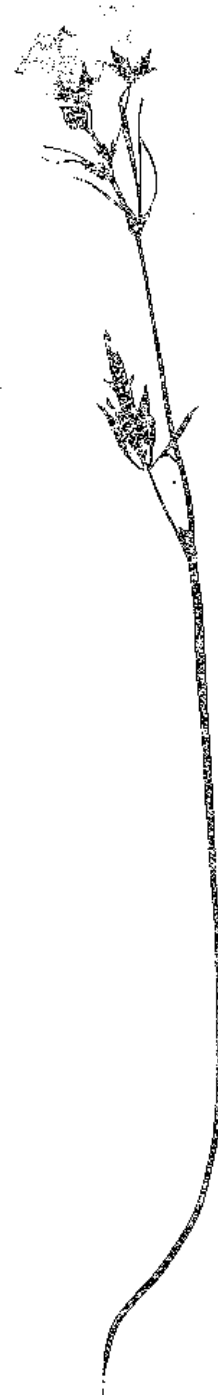
This is earth,
the place of unknowing,
where there is no analysis,
no question.

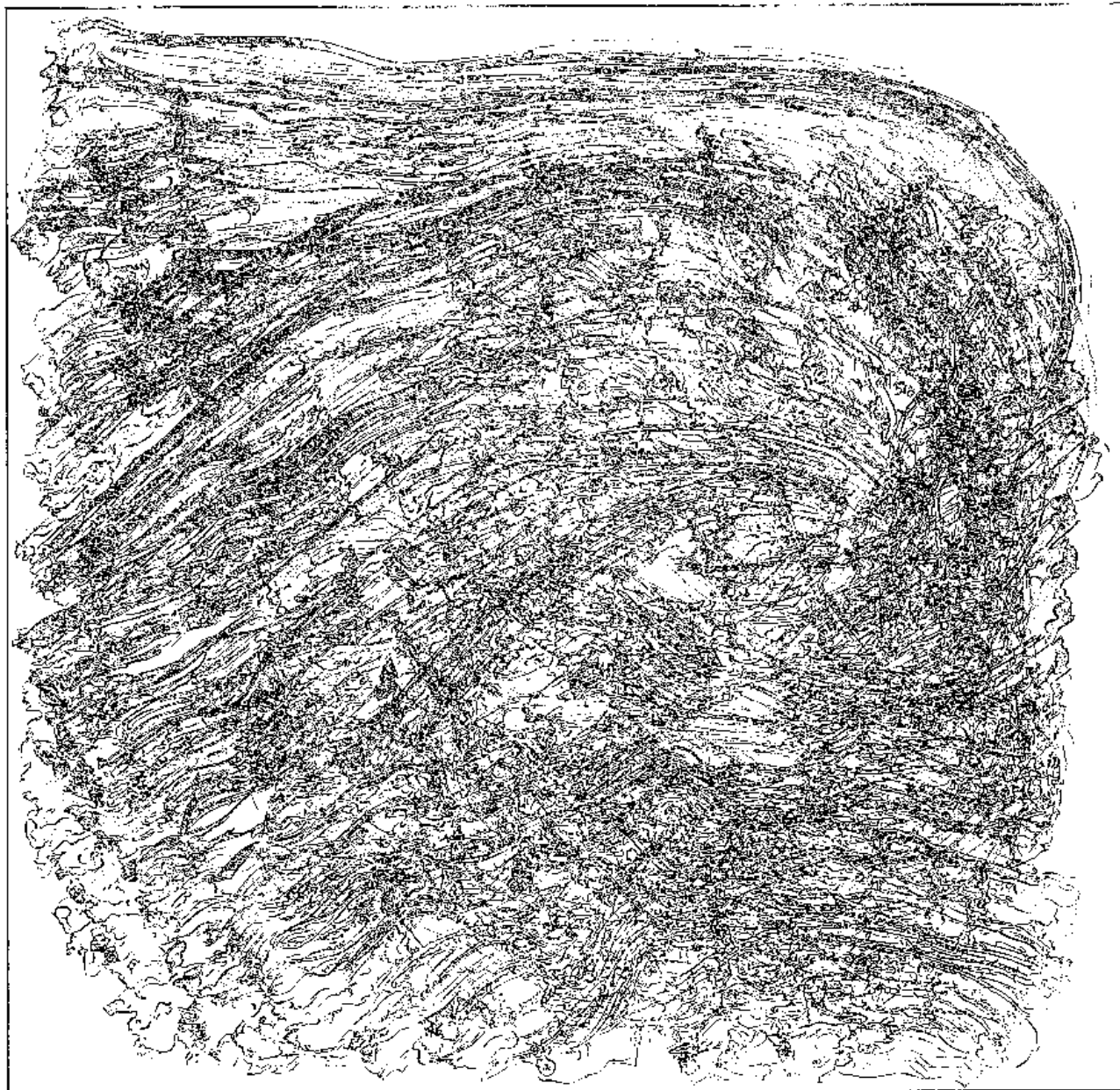
The dumb wisdom of blooming grass
weaves leaves into humus.
The dun coyote lives to hunt,
teach the whelps to sing,
teach them to push through the long grass
quick, quick as air.
Afterwards her bones learn paths
through the grassland of root and stone.

The tumbling, tunneling underhum
of winged things:
beetles of metallic jade
creep under surface rock.
Plants that are wed to one bug for life--
the gall, the larva, then the light,
winged pretty that flies away.

Ice and flint
shatter the brittle hills.
The river drifts across the valley floor
leaving more beds empty.
Rainwater carves flint without sparks,
dripping into limestone,
making flint in the dark
curved divisions of the rock.
Fossils dissolve and refix in silent crystal.

Here is a landscape in song,
a sky in flight;
this is where wind and grass and sun
nest one inside the other.
Sun-greened seed heads rub,
blown by the thin reed scratch,
the golden, cottonwood leaf-flecked rush
of air which is always wind.
Only a moment stretched flat on earth
will show you that language is useless
only senses serve a purpose
that this is earth,
in a place of unknowing.

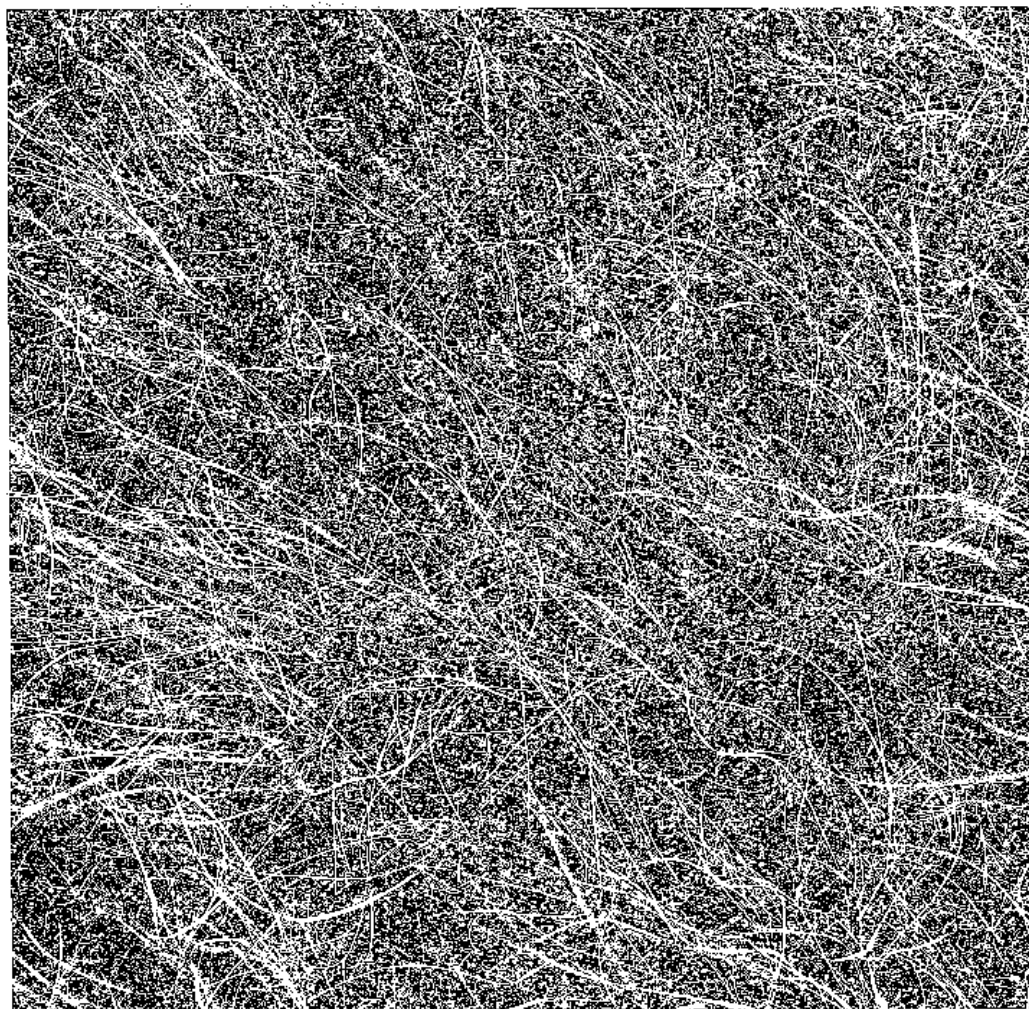




Of the Wind acrylic on gessoed massonite 48" X 48"

Colette S. Bangert

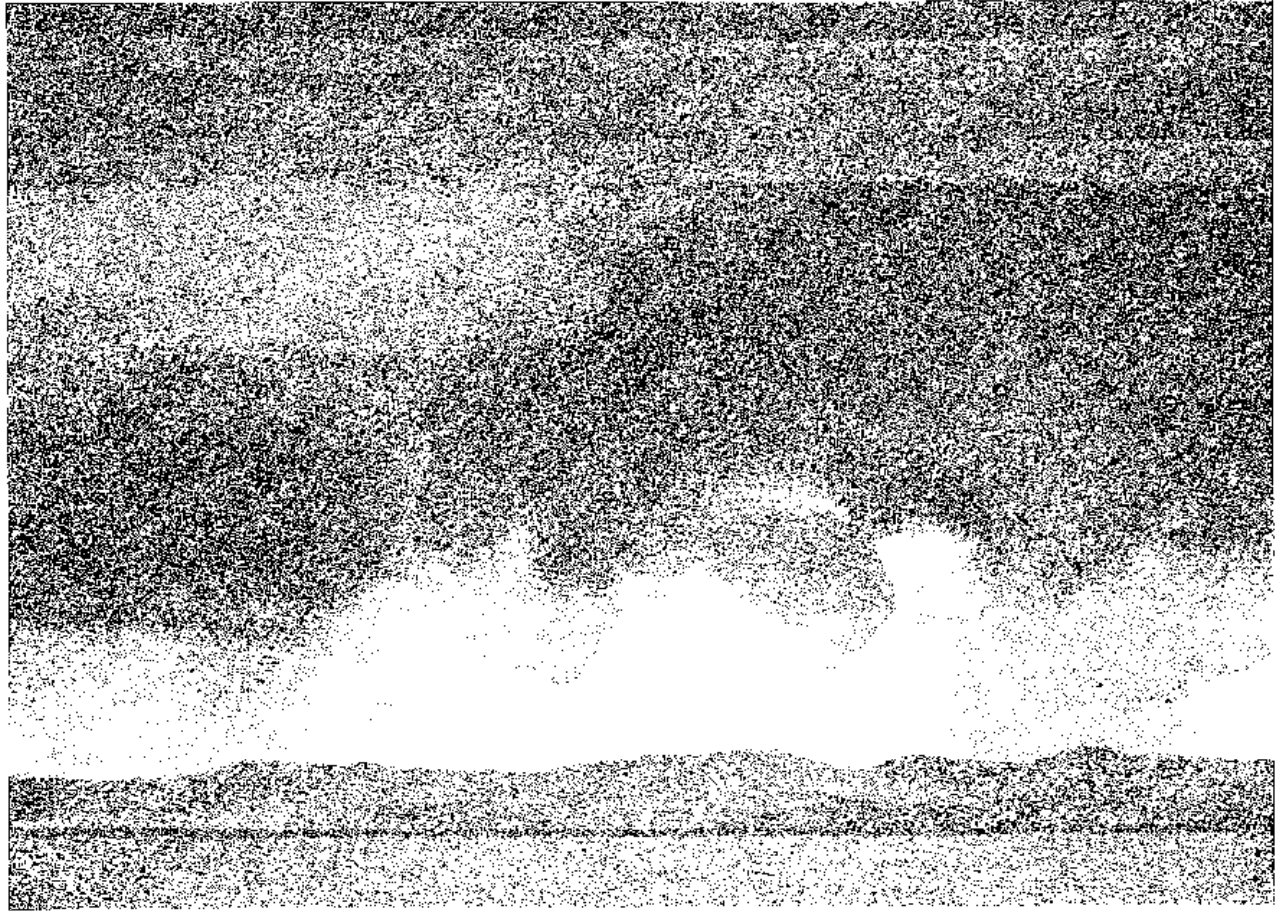
The form of grass as grass, and leaves as leaves. The landscape form, itself, is the subject. Line as form. Grass as form. Brown leaves as form. White as space. White as light.



Grass Series black and white photograph 19" X 19"

Terry Evans

As I have photographed the prairie, I have begun to see some other things as well. The wind is almost always present on the prairie, and I learned that in Greek and Hebrew, wind is the same word as spirit and breath. I saw the effects of the wind, but not the wind itself. The wind changed the colors of the grasses as it wove them together, and moved them in rhythms of line, and I saw a tangle of winter prairie grass making spare calligraphy in the wind.

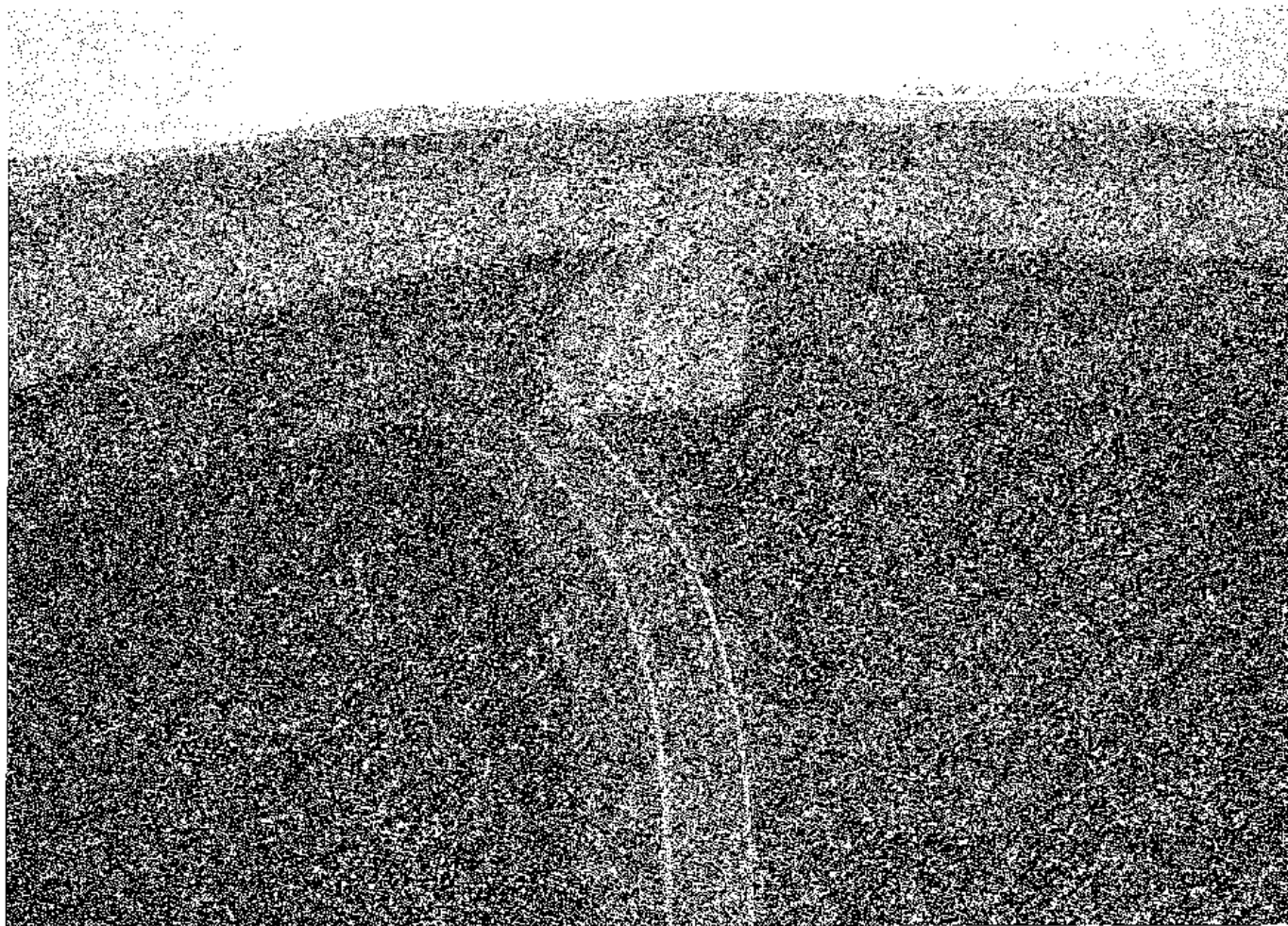


Cloud Light Series watercolor 25" X 36"

Joan Foth

The natural world affects all painters and colors and their perceptions. For the landscape painter it becomes a metaphor for every nuance of feeling and perception. Each day I monitor the variations in land, sky, weather and season as closely as the farmer trying to gauge the future progress of his crop. My materials--watercolor and paper--are by their very nature as sensitive to variations in weather and season as a plant, so that what I do technically is also related to the rhythms of the natural world.

I didn't grow up in Kansas, but living here a long time, the prairie space overtook me and invaded my work. The horizon is low and the sky is so vast it dominates everything. It acts as a stage for the drama of light and weather. Often there are several meteorological acts going on at the same time and my paintings become layered in the same way with colored bands separating one level from the next. The view is so wide in this landscape that the paintings are also about the sense of freedom one feels in such a large space, a sense of living in the sky without barriers of trees, mountains and walls.



Ribbon to Kanorado

silkscreen print #5 of 6

32" X 24"

Robert Regier

The prairie, in both its microcosms and its macrocosms, continues to provide an inexhaustible fund of visual information for my visual explorations. The choice of the prairie is not an arbitrary one. It has ministered to my spirit in countless ways for a good number of years. I cherish a certain intimacy that grows with each deliberate trek that is taken into its sometime inviting, sometime hostile terrain.

My most recent work has involved the exploration of a technical approach to the print that would allow it to express the aesthetics of color nuances and to function as possible metaphor for transitions in prairie light, color, and atmosphere. So I think of my work as both invention and description. Invention combines intention and accident, and is rarely related to our common visual reference points. It is "fooling around" in a positive sense. Description combines observation and memory, and often alludes to shared visual experience. I am most pleased when neither invention nor description seems compromised; when the image has integrity as both abstraction and metaphor for landscape we commonly share.

Alternatives in Shelter

Structures as Symbols

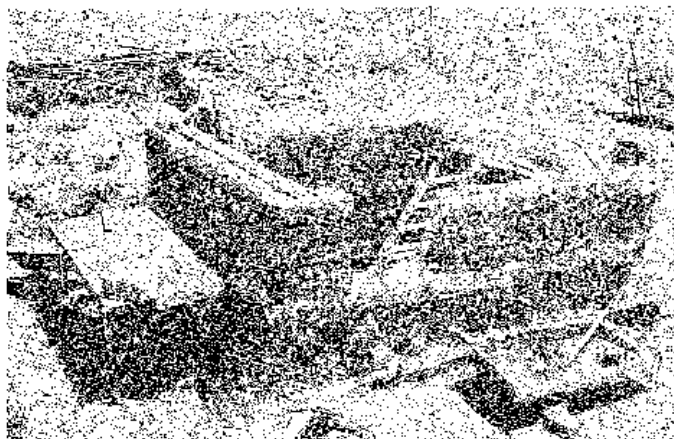
Dear Jacksons:

I was dismayed to read that the adobe structure has been plastered with concrete!! (Land Report No. 14) Why concrete? I am amazed that you would cover a non-energy-intensive (fossil fuel) building material like adobe with an energy-intensive material such as concrete. We have the invention of concrete to thank for the urban nightmares that have been constructed in the past years.

You could have saved some skin by mixing up a batch of stucco from the dirt under your feet! I confess that I should have plastered the adobe myself with mud stucco back in the summer of '77. (See Land Report No. 2) However, mud stucco has to be done yearly or twice yearly anyway, depending on the climate. I also confess that cement was used in the foundation of the structure and in some of the blocks.

The point I want to make is that the experimental and symbolic utility of the adobe structure has now been "spoiled." So what if the walls were a bit weathered? At least visitors could see that it was possible to build a structure out of the very dirt under our Nike tennis shoes, and it would stand up! By "symbolic," I mean that the adobe structure (in my opinion) was there (partly) to show others that one does not need wood, concrete and steel to build a shelter.

I feel something has been lost here. As someone who is greatly interested in the built environment, I feel our structures do symbolize where our heads and hearts are. Rozak (Where the Wasteland Ends) speaks pointedly about the artificiality and obsolescence of our "modern" building methods, materials and buildings. There are too few symbols around representing



John Jankowski, spring, 1977.

alternative shelters. Of course, alternative shelters will not convince the majority of Americans to live in something other than a tri-level Ranchburger--but there's always hope!

One reason for this criticism is that the forlorn adobe structure is an important symbol to me, because it represents the experience I had there at The Land, the things I learned about myself and our society.

Just one more thing--I think that perhaps the concrete plaster represents an overt (or covert) concern with our having buildings that are neat, clean and that have Nice, clean lines--the kind of baloney that many professors in the College of Architecture at K-State stressed.

Well, of course, this does not alter how I feel about The Land. I am disappointed, but the fault is partly mine. However, I am serious about buildings being symbols, and believe that positive building symbols (using alternative materials and methods) could make a difference in the future.

Sincerely,
John Jankowski
2720 N. Frederick Avenue
Milwaukee, Wisconsin 53211



Dear John,

Wes and I think you are right. To be consistent with our principles, we should have applied mud stucco each spring and fall to the adobe structure.

Since you were a student here, we have put up two wind generators and wired one into a bank of batteries. We continued working on the classroom building, which now has two offices, a library-classroom, a shop, a kitchen, and an attached greenhouse. Students built an extension to the barn, a composting toilet, and a shed, which was given a passive solar facelift last semester and will soon be a new office. We started an agricultural research program and planted an herbary and research plots. What I'm saying is----there is so much more to maintain than there was in the spring of 1977. The crumbling of the adobe bricks on a structure we use for food storage was only one of our problems, and our quick and easy fix turned out to be energy-intensive concrete.

Nevertheless, expediency should not be the motive for everything we do at The Land. And it isn't.

Wes says the concrete does not have to be permanent. We can clip in a few places and pull off the concrete-coated chickenwire. Maybe we'll get our act together someday and reinstate the adobe structure to its symbolic position.

As a member of the second group of students to work at The Land, you helped formulate some of our principles and traditions, as well as make an important physical contribution in the form of the adobe shelter. Thank you for keeping in touch and continuing to be a part of our search for sustainable alternatives.

Sincerely,
Dana Jackson

A Passive Solar Facelift

Jean Stramel

One job which needed to be done during the fall 1981 semester at The Land was to retrofit the "battery shed" into a passive solar building to be used as an office. Since I had no previous construction experience, this was indeed a chance to learn about building and remodeling, and to develop many useful skills. So I chose the passive solar retrofit as my project, and Hilary Henri decided to work with me.

The battery shed was built in 1979 to store the 39 two-volt batteries for the wind generators. At 300 pounds each, they proved too heavy, and the floor started to crack from the weight. So the batteries were moved out, leaving their "house" unoccupied. The building's south wall was made up of four sliding glass doors, which were to provide the passive heat to keep the batteries from freezing in winter. This southern exposure was ideal as a basis for a retrofit job. Cici Bigelow began remodeling the inside of the building during the spring 1981 semester (see L.R. #13). Our project began with considering how to improve the efficiency of the south wall windows through a more appropriate, air-tight design.

There are many factors to consider in the design and construction of a passive solar structure, all of which combine to determine whether or not the system will work. Mazria, in The Passive Solar Energy Book, divides these factors, or "patterns", into three major groups.

First are the design patterns, which determine the overall shape and orientation of the building in relation to the sun, wind and trees. This includes consideration of the north side, location of indoor spaces, protected entrances and the location of windows.

The next group of patterns considers the selection of the appropriate passive system and its details. Solar windows, clerestories and skylights, heat storage, greenhouses, and roof pond systems are commonly included in various combinations in passive solar structures.

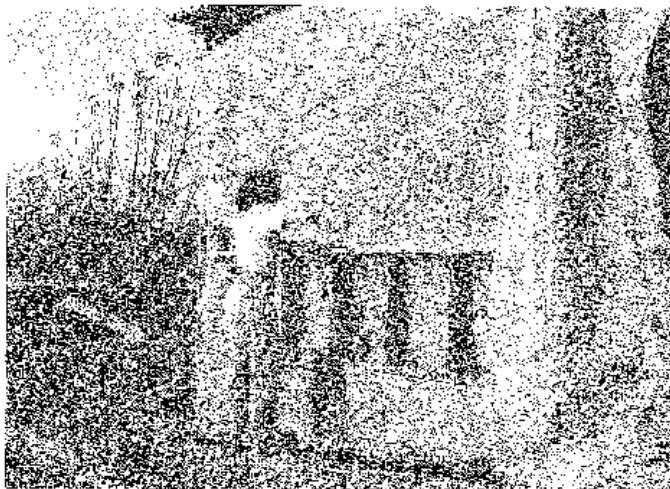
Third are the patterns which help increase the efficiency in the passive system, such as movable insulation, reflectors, shading devices, outside insulation and summer cooling.

The battery shed location, orientation and structure were already suited to a passive solar design. It was built with 12 inches of fiberglass insulation above the ceiling and 6 inches in the walls. The south side window space was 7' X 12' or 84 square feet. The floor area of the building is 12' X 13', or 156 square feet. In cold climates (average winter temperature 20° to 30°F), the standard is to provide between 0.19 and 0.38 square feet of south-facing glass for each one square foot of floor space area. The previous window/floor ratio was .50, so the window area needed to be reduced.

We calculated that a double-paned window the size of patio doors (4' X 6½') plus one smaller, (approximately 3' X 4') would provide enough direct gain heat for such a small floor area. These windows would be framed in with a conventional stud wall.

The battery shed's foundation was bulged out from the weight of the batteries, and not level on the surface where the wall was to be built. We constructed forms of boards and spent one afternoon pouring a cement casing over the existing foundation to level the top and make it vertical again to support a wall. We used rebar and chickenwire to make sure the new cement face didn't pull away from the old.

Here we ran into a major problem when we saw that our forms were too weak and the weight of the cement was causing the top to lean out. Wes rescued us by helping pull the forms back in with some fancy wiring and braces. Eventually we had a clean, vertical, level front wall and square foundation.



Next we cut one-inch styrofoam insulation to fit on top of the foundation, then cut and fit a 2 X 6 header board over that, securing it with the anchor bolts in the foundation. Then the front face of the building had to be extended one 2 X 4's width to be flush with the new foundation's outer wall.

We had to build the double-paned window before we could frame in the wall. To do this, we started with 2 patio door panes of tempered glass and 2 X 6 lumber to make the frame. We cut two grooves in each board with the circular saw, wide enough for the glass, leaving a one inch air space between the panes. Then we drilled eleven $\frac{1}{2}$ " holes in the air space allowance all along the bottom frame board to hold silica packets for moisture absorption. We did some sanding and filing to get the window panes to fit in the grooves, cleaned the inside surfaces of the glass well, and then put the window together. We fastened the corners with 6" lag screws and recessed the tops into the wood, put the silica packets into the holes, and caulked all the edges and seals to make an air tight, moisture proof window, we thought. However, after a few days, the window showed signs of condensation on the inside, so we took the packets out and put new silica in. The new silica seems to be doing an adequate job, although there are still signs of moisture on the inside when the window gets shaded. As long as no new moisture can enter, it shouldn't be a problem.

The window was ready to frame in with the stud wall. We also used a smaller factory-made window which was donated by a Friend of The Land, Dennis Johnson, Smolan, Kansas. We turned this window on its side to fit the opening instead of using it vertically, and it slides open to provide ventilation for hot days. The big window provided 38 square feet of window space, and the smaller one, about 10 square feet, which gave a window/floor ratio of .30, well within that suggested by Mazria. After the wall was built and the windows fastened in place, we cut styrofoam and thermax insulation scraps to fit tightly in

each wall section. We then covered the outside wall with $\frac{3}{4}$ " cedar siding and trim, which gave an attractive finish to the building.

On the inside, we placed fiberglass insulation wherever needed to make sure there were no air leaks, then finished the wall with sheetrock. The semester drew to a close and we had to leave things unfinished.

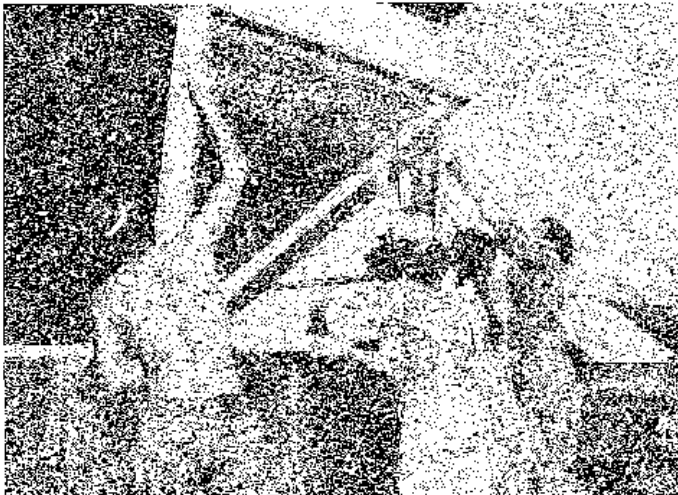
There are still some major parts of this retrofit job to finish. The woodstove, which provides backup heat for the building, is in place but there is no hole in the wall for the flue pipe. Probably the most challenging project will be to design insulating shutters or curtains for the windows to keep the heat that builds up during sunny winter days from escaping rapidly at night. There are many different approaches to window insulation systems, and this would make an interesting and valuable project for another student next semester.

For summer, the building needs a screen door to provide ventilation. Also, an overhang needs to be designed and built to block out the hot summer sun's rays, yet allow for maximum heat gain in winter.

We experienced first-hand some of the successes and failures involved in construction work, as well as gained valuable skills in using different tools. It is gratifying to stand back and gaze at our passive solar facelift. Both of us now feel confident about tackling other projects on our own.

The following books are good references for passive solar design and principles:

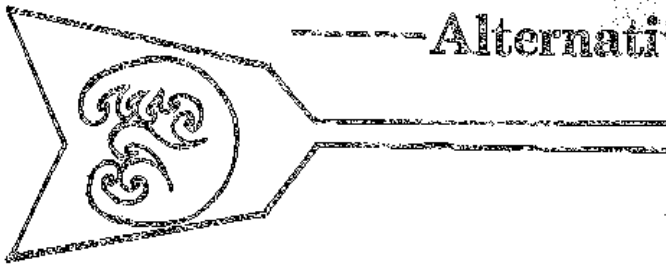
Solar Retrofit; Adding Solar to Your Home, Daniel K. Reif, Brick House Publ. Co., Andover, Mass., 1981. \$8.95.
The Passive Solar Energy Book, Edward Mazria, Rodale Press, Emmaus, PA, 1979. \$12.95.
Solar Greenhouse; Design, Construction, Operation, Rick Fisher and Bill Yanda, John Muir Publ., Santa Fe, NM, 1976. \$6.00.



Paul, Jeanne, Hilary and Wes.

Editor's note: Wes built some bookshelves, laid a carpet, installed a small wood stove and ran the pipe out the west wall, and wired the building in early February, and Mari Peterson moved her office into the ex-battery shed. The small room warms up so well from the sun that Mari has sometimes needed to open the window by her desk to cool it down a bit.

"The World Turns to Solar" is the title of the 7th National Passive Solar Conference to be held during the World's Fair in Knoxville, Tennessee, August 29 to September 1, 1982. The conference will emphasize integrated heating and cooling concepts, including climate-specific designs. Because of the two year housing slump, a major focus will be on innovative, integrative, energy-conscious, passive solar retrofits. Four days of commercial exhibits will feature the latest solar products and design aids.



Alternatives in Energy

Installing a 500 Watt Wincharger

Jan Ryan and Lynn Hirschberg

When we came to The Land and started thinking about projects, the idea of installing a wind generator was appealing. We were interested in electricity, wood carving and mechanics, but, as women, had limited actual experience in these areas. This project would give us our opportunity.

The installation of a 500 watt, 32 volt D.C. Wincharger began with its purchase from a local Salina resident. The purchase included a generator, control box, governor, and an irreparably-damaged set of propellers. A former student had already installed a 35 foot tower and set up a 48 volt bank of batteries. Our main goal was to provide the Indian house with lighting, and to get some hands-on experience with wind generators.

The tower ladder needed two rungs so we made them out of scrap angle iron. We were then able to check the tower for any safety hazards, and get acquainted with a new "level" of activity, namely, working 35 feet in the air. These initial ascents were especially exciting as we amused ourselves with jokes about falling off.

Since the generator was in working order, no work on the plant itself was necessary except to free up the brake mechanism by widening the shaft it rides in with a screwdriver. Our next step was to clean the collector rings. These are brass rings on the stub tower that transfer electricity from the generator to the collector brushes and then down the wires. For this we used steel wool, as any rougher abrasive would scar the rings. Then we adjusted the collector brushes, put them over the rings and tested for the proper resistance.

At this point we were ready to hoist the generator. We estimated its weight at 50 or 60 pounds and decided to lift it with a long nylon rope and a pulley. Lynn pulled on the rope while Jan climbed with the generator, lifting as she went, and after about fifteen minutes it was up to the platform. Our lack of a gin pole posed a problem in getting the generator from the platform to the top of the stub tower. After discussion, however, we decided that a strong man would be an appropriate technology and called Paul Rasch over to help lift it into place. This accomplished, we realized we had forgotten to bolt on the stub tower, so that was done in a hurry.

Next, we started on our biggest task of the project--carving a set of eight foot blades out of Douglas Fir. Douglas Fir was chosen because Wincharger blades are commonly made of that wood. We purchased a piece of stairwell lumber as it

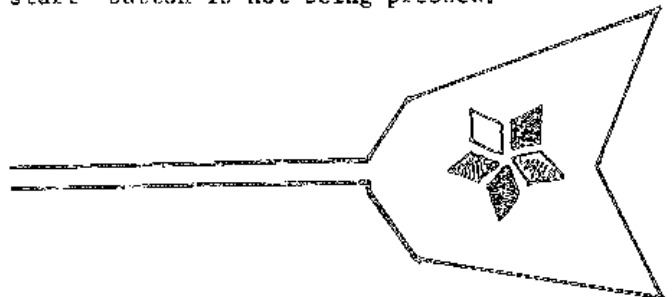
is supposed to be the strongest. We then took a trip down to Goessel, Kansas, to begin carving the blades with the help of John Craft, former research associate at The Land and the designer of Windcraft wind generators.

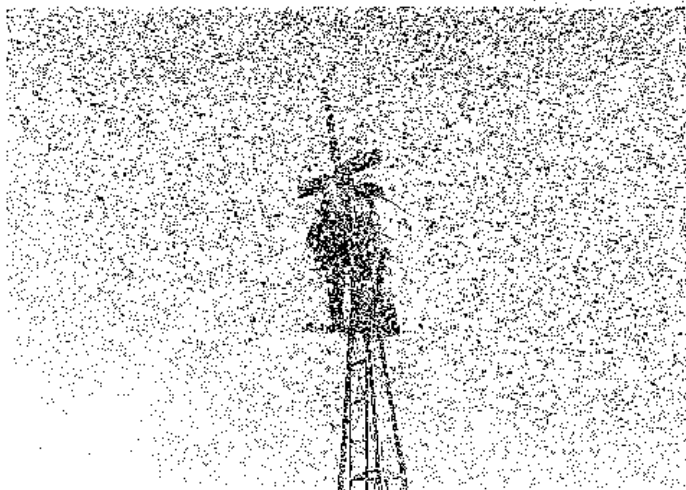
A draw knife was used for rough cutting; a spoke shave and a plane for the more delicate shaping. After we had completed most of the carving, we balanced the blades on a piece of angle iron. The carving and balancing process took about three weeks. Once balanced, the blades were attached to a flyball governor and re-balanced. Then we applied three successive coats of polyurethane coating for protection, and rubbed the wood with steel wool between each coat.

During this time, each of us painted a design on one side of the tail. The tail was put up with little difficulty.

The day we chose to install the blades was a rare, windless one. Two guidelines were tied to the tips of the blades, with a hoist rope going through the center hole. A pulley was used to help haul it up, and after tying it off at the platform, we both climbed up to lift it onto the generator. The blades and governor were then bolted onto the hub which we had previously attached to the generator with a wood-ruff key.

After hooking up wires to the tower, batteries, and the control box, we were ready to press the "start" button on the control box. This button allows for the stored volts in the batteries to send a current into the generator. "Motoring" the generator, as this process is called, is a way of determining if wiring is done correctly. It worked. The blades had begun to spin, but we noticed that their speed was escalating, even though the start button had been released. After a quick consultation with Paul, we figured out that the relay was stuck open, and the propellers were turning at the expense of the batteries. So the faulty relay was replaced with a diode, which prevents the current from flowing to the generator when the "start" button is not being pressed.





The next step was to track the blades, which means measuring the distance from the props to the tower, and making sure it is the same for both blades. Any difference greater than one-fourth inch needs correcting, and ours was a bit off. This was adjusted by placing a shim under the bolt on the side closest to the tower. After some trial and error, the blades were tracked. A final touch was to stick some aluminum tape on the leading edge of both blades, for wind protection.

What remains to be done is installing a volt meter to stop the flow of amps into the batteries to prevent over-charging. For now, we have the brake on, letting it fly occasionally to keep the batteries full so they don't freeze and crack.

We have figured that the generator will put out approximately 55 KWH per month, based on data provided in Other Homes and Garbage (p. 45) and the 11.5 mph average wind speeds in Kansas. This book also provides the average monthly KWH consumption of common household electrical appliances. To get an idea of the practical uses of the wind generator we installed, a part of their table is reproduced on this page.

It is interesting that at one time, this 500 watt generator provided many rural people (especially in the Great Plains) with all of their modest electrical needs. It was in the pre-R.E.A. (Rural Electrification Administration) period, about 1930-1950, that wind plants such as ours were manufactured. While many were sold off as scrap or even junked, some of them were stored on farms and may be salvageable today, although their value is becoming more widely known and their availability limited. An excellent book about finding, testing, buying and installing old wind plants is The Homebuilt Wind Generated Electricity Handbook by Michael Hackleman, Peace Press 1975. We used this book extensively for both information and inspiration. Other Homes and Garbage by Jim Leckie, Gil Masters, Harry Whitehouse and Lily Young, Sierra Club Books 1975, mentioned above, is also very helpful with basic concepts of electrical generation.

**Table 3.3 Example of Monthly Energy Demand Calculation

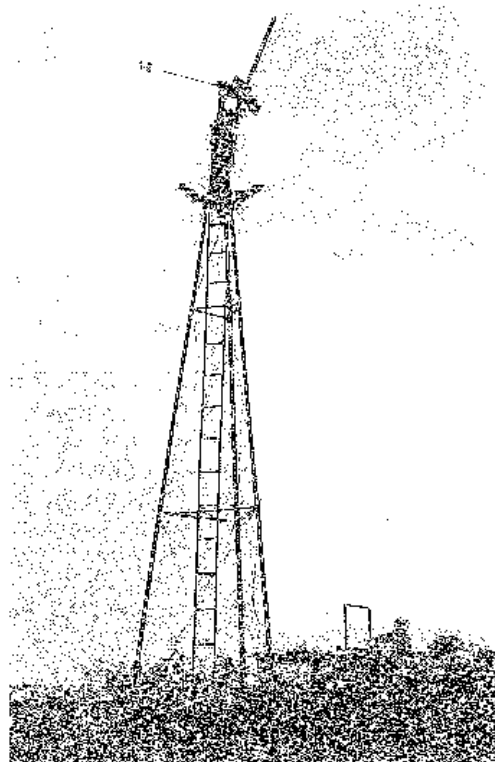
Appliance	Power (watts)	Usage hrs/mo.	Energy KWH/Mo.
Clock	2	720	1.5
Refrigerator-Freezer	330	--	70.5
Sewing machine	75	15	1.1
Radio-phonograph	105	60	6.3
Television	255	60	15.2
Toaster	1100	5	5.5
Washing machine	375	2	0.8
Table saw	950	5	4.8
Lights (5 @ 60-watt)	300	120	36.0

Total: 142 KWH/month

**Other Homes and Garbage, pg. 38.

Kansas Wind Energy Handbook

A special publication, The Kansas Wind Energy Handbook, prepared by the Solar and Wind Program of the Kansas Energy Office and Wichita State University Wind Lab will be available by the end of March. The approximately 100 page handbook covers such subjects as machine design, site selection, machine selection and incentives. Anyone who has considered installing a wind machine to produce electricity for home or business will find this book very helpful. To obtain the book, contact the Solar and Wind Program, Kansas Energy Office, 214 West 6th, Topeka, Kansas 66603.



Photovoltaics: Sunlight to Electricity in One Step

by Paul D. Maycock and Edward N. Stirewalt
Brick House Publishing Co., 1981
222 pages. Glossary, index, numerous photos
and illustrations.

\$9.95

REVIEWED BY *Paul Rasch*

Few things have transformed the lives of Americans as abruptly as the electrification of the nation. In a relatively short time we have come to depend heavily on this high quality form of energy to light our homes, run our motors and power much of our industry.

Our rapid increase in electrical consumption is due in a large part to the convenience it affords the consumer. From the vantage point of the end-user, electricity is quick, efficient and relatively cheap. Little wonder that electrical sales grew in leaps and bounds from World War II through the early 1970's. However, as Americans became more energy and environmentally aware, the total costs of electrical energy have become known despite the rhetoric of electric utility companies. People like Amory Lovins have shown the serious economic and environmental consequences associated with electricity generated from non-renewable resources, and the gross inefficiencies of electrical use in many of its current applications. Thus we find ourselves facing the electric dilemma: it is too convenient to abandon, yet in many ways its use is too costly to continue.

In their book Photovoltaics, Paul Maycock, Director of the Renewable Energy Institute and president of Photovoltaic Energy Systems, Inc., and Edward Stirewalt, senior associate of Planning Research Corp., have given us an excellent report on the technology most likely to alleviate the electric dilemma.

About the time that America was discovering the value of electricity, a young scientist named Albert Einstein was writing about the photovoltaic principle: sunlight striking certain materials causes electrons to jump out of their original orbit, thus creating a difference in potential or voltage. Photovoltaics takes the reader from this most elementary principle through an excellent section on the different construction and uses of photovoltaic cells, and then explains how and why they will become an important part of our lives in the very near future.

Probably the most important point conveyed by the book to a person unfamiliar with photovoltaics is that they are not a space age technology for the distant future but one that is technically ready for residential use immediately.

As the authors point out, "Photovoltaic technology is no longer exotic, casting a rosy glow over the 21st century. We must begin to treat it as a practical here-and-now reality to be integrated fully into our decisions about energy supplies."

The question thus posed is: how soon will this technology be "integrated fully" into our nation's energy policy? Herein lies the strength of the book. The authors have done a remarkable job in combining various reports and publications which address this question. Their conclusions are optimistic.

---Photovoltaics will be fully economic for massive private use before a major utility can design, purchase and install its next new nuclear reactor.

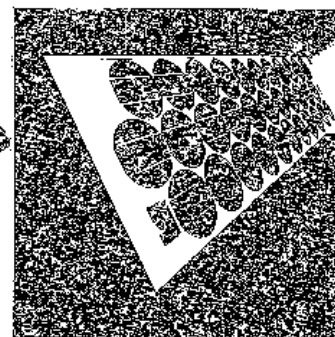
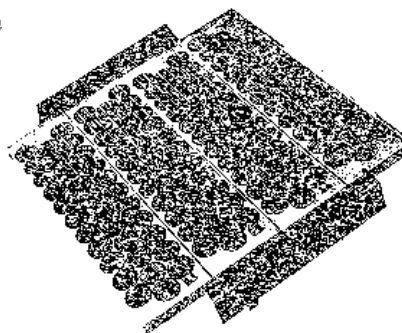
---Photovoltaic systems installed on the roofs of residences in the U.S. will be fully economic - delivering electricity that costs 5 to 10 cents per kilowatt hour - by 1986 without tax rebates, and by 1984 with a 40% tax rebate and Solar Bank financing.

---If we seriously begin to adopt photovoltaics now, as much as 30% of the nation's electric energy can come from this source by the year 2000.

As the authors point out, "Massive deployment of photovoltaics is inevitable." How soon they become commonplace depends very much on the amount of support given them by the government.

One area which deserves more attention than that given it in this book is the question of scale. Certainly the manufacture of photovoltaics seems to lend itself to a rather large centralized type of energy production. Yet quite possibly their best use could be in small rooftop arrays which feed excess electricity back into the electric grid. As unsettling as this may seem to utility executives, it could prove to be a much more effective way to meet our electrical needs.

In addition to covering the major questions concerning photovoltaics, this book also includes sections on their history, a list of suppliers and even a chapter on how to properly size an array for your household and determine its current cost. The book has much to offer everyone from the most informed energy researcher to the "average" consumer.



Completing the Solar Hot Water Heater

Marie Rasch

When I first came to The Land, I had never worked on any kind of solar system before, so I chose the solar hot water heating system as my project. I knew the sun would provide the heat; I wanted to see how we could utilize this heat in the hot water we use and enjoy so much.

The first step in reconstructing the solar hot water system was removing the $1\frac{1}{2}$ " black rubber hose which was strung in a serpentine fashion inside the collector frame under a glass covering. The hose was installed by Mark Bigelow last semester, but he found that it didn't conduct heat well enough to properly heat the water. The outside of the hose absorbed heat, but it couldn't transfer this heat to the water very well. It was a good idea but wasn't very efficient, so we decided to use metal for the collectors. The glass frames and hoses running downstairs were used again.

We had acquired some 2' X 2' truck radiators in good condition. I used four of these, connecting them in a vertical series spaced 10" apart. These radiator-collectors are joined together by some of the $1\frac{1}{2}$ " black hose, and the hose is held in place by clamps. (see figure 1) I connected the hose leading from the output of the pump to the inlet of the collectors, and the outlet of the collectors to the input of the pump, via the heat exchanger. Just below the output of the collectors I added on an air vent, which allows air in the system to escape. (see figure 2)

The heat exchanger is a 55 gallon barrel with the top cut out, containing two radiators, each 1' X 2' with a copper joint welded at the

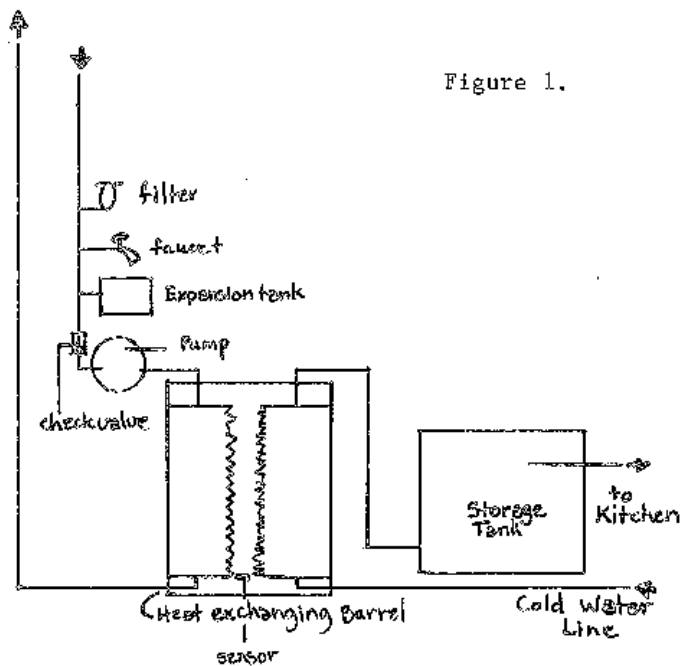


Figure 1.

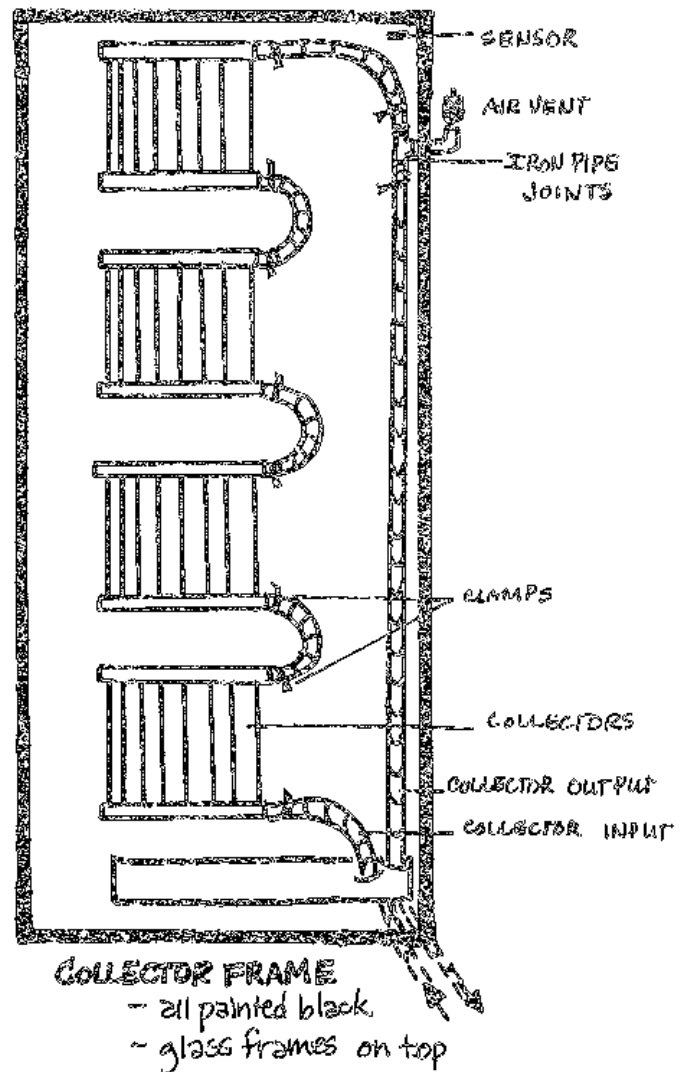


Figure 2.

center of each top. The barrel is also filled with water to aid in heat transfer between the two radiators. The closed loop from the collectors through one of the radiators in this heat-exchanging barrel is filled with a 50/50 solution of water and antifreeze to prevent the water from freezing. We used the closed loop containing antifreeze to avoid the worries of forgetting to drain the system during extremely cold weather. The fluid is run through the loop via the pump; a check valve deters reverse flow. Also attached to this loop is an expansion tank, a filter, and a faucet. The expansion tank allows the fluid to expand as it increases in temperature. The faucet is for draining the system if it ever needs to be done. We installed the filter to pour the water/antifreeze solution through, and left it there to clean out any dirt or foreign objects that might be in the system (though there shouldn't be any).



Marie Rasch and her cousin Paul Rasch.

The other radiator in the heat-exchanging barrel is for receiving the heat from the radiator in the closed loop and running it into a storage tank. The storage tank we have is a 25 gallon electric water heating tank. The inlet of this radiator is connected by P.V.C. pipe to the building's cold water line. The outlet from this radiator runs into the storage tank and from there, into the kitchen faucet.

It is very important to thoroughly insulate the heat-exchanging barrel. I wrapped 2" thick fiberglass insulation with a plastic covering around the barrel two times, securing it with tape. For the top, I cut a piece of plywood to cover half the barrel and put three layers of insulation on that and then packed more insulation on the other half where the hoses and P.V.C. run in and out. It now looks like a giant roll of toilet paper.

Next I put in two sensors and a sensor box. The two sensors are sensitive to heat and regulate when the pump turns itself on. One sensor is in the upper right-hand corner of the collector frame, and the other is on the heat-exchanging barrel about four inches from the bottom. The pump is plugged into the sensor box which is mounted on the wall between the heat-exchanging barrel and the pump. The sensor box is plugged into an electrical outlet.

The final step was to complete the solar collector on the roof and cover it with glass. To make a tighter, leakproof fitting, I painted the iron pipe joints used as connectors. Then I filled the closed loop with the water/antifreeze solution to be sure the connections were leakproof. Mark Bigelow had removed glass from aluminum-framed patio doors last semester and reframed it and in 2 X 4's. I painted the wood frames to protect them from weathering and installed them over the radiators, using a generous amount of latex caulk to seal the system. It was important to achieve an airtight fitting to avoid moisture build-up on the inside of the glass.

During the process of constructing this system, I ran into a few problems. Leaks were plaguing me for a while, but finally all are

fixed. Then I ran into problems with the pump. The first pump was very noisy and inefficient. When we got another quieter pump, it wasn't doing the job of pumping the water all the way around the closed loop. We couldn't figure out why. Finally, a man at Gage's Plumbing suggested that we pour some of the antifreeze/water solution through the opening where the air vent fixture is screwed in above the collectors. This worked. The water began to circulate.

I am glad I decided to work on this project, encountered the problems, and worked them through to produce a functioning solar hot water heater for The Land Institute building.

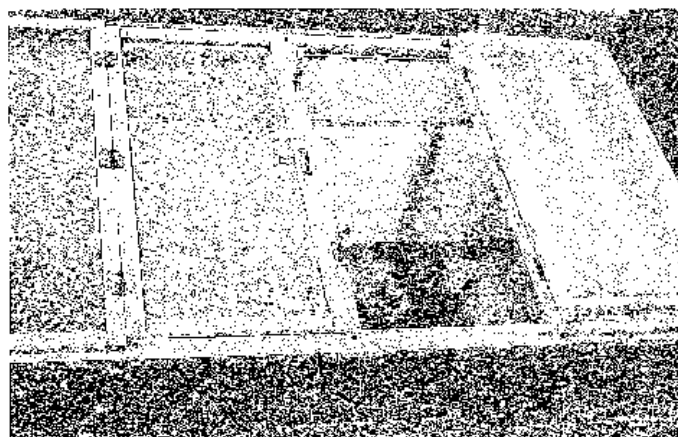
Performance of the Solar Growing Frame

The solar growing frame built by Maka Grogard and Fred Vogler in the 1981 spring semester has functioned beautifully during the winter. We do not have a thermometer inside the frame to know what the exact lows have been, but the healthy Swiss Chard and lettuce indicate that the temperature did not fall much below 32 degrees F.

The only part of the structure which needs improvement is the folded thermax insulation which opens out at night above the plants. It is hinged with silver duct tape which has pulled away from the the thermax. Also, adjusting the insulation has been awkward as it has no handle to grasp to move it forward or backward.

We regret that the solar growing frame was not tested to greater capacity this winter. This is just the result of not planning ahead carefully. We did not have the right seeds in stock last fall to plant in the frame. The students did plant some lettuce, and transplanted two Swiss Chard plants, but there is room in the frame for much more. The lettuce was planted too close to the front of the frame and is shaded too much of the time by the low winter sun.

When our spring seed order arrives, we plan



to plant spinach and more lettuce for early greens this growing season. Seeds for the Chinese vegetables, recommended by the people at Rodale who worked with the growing frame, have also been ordered. Now that we know how well the solar growing frame works, we are eager to make better use of it and have abundant greens at The Land every winter.

Performance of the Solar Greenhouse

The temperature was -12 degrees F. on the morning of January 10. Inside the greenhouse, it was 32 degrees F. None of the plants were hurt. Throughout the very cold temperatures of January, enough heat was collected on sunny days and released on cold nights and cloudy days to maintain moderate temperatures inside the greenhouse. During that time, there was no additional heat coming in from the building where the greenhouse is attached. We did install a woodburning stove about January 15 in the office used by Marty Bender and Walter Pickett, but we didn't burn it at night. Early in February we had several below zero nights in a row and no sunshine in the daytime. For three or four nights we turned on an electric heater in the greenhouse to protect the plants. Fortunately, the wind was fairly strong, which meant that the induction motor wind generator producing A.C. current produced enough electricity to run the heater.

As with almost all construction at The Land, the greenhouse is the result of students designing and learning with low cost materials. Since we had no intention of adding a greenhouse when we started the building, it was a genuine retrofit with no blueprint to follow. Students gained experience in problem-solving every step of the way. (See Land Reports 9, 12 and 13.)

The foundation for the 12 by 30 feet greenhouse was started by students during the spring semester of 1979. When Mark Liebllich and Karl Parker took on the project the following fall,

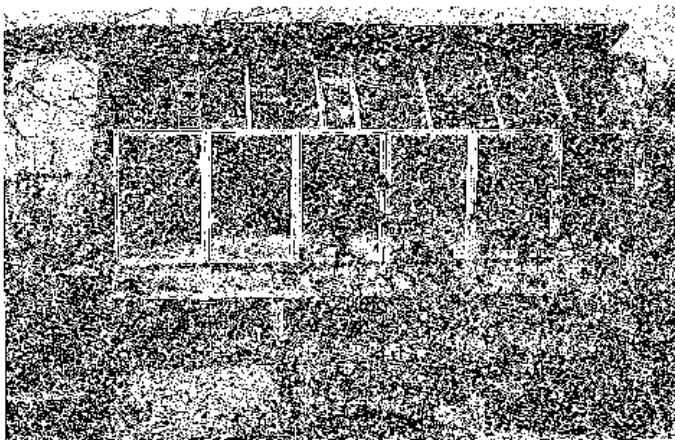
they foam-insulated the foundation 36 inches deep. They also framed in and insulated the walls below the windows and installed patio doors as glazing.

Paul Rasch and Tom Mulcrone began working on the greenhouse in the fall of 1980. They winterized it by refitting the east and west doors and weatherstripping them, and caulking windows with butyl rubber. They also installed three Solaron Company solar collectors, which had been donated to The Land, on the south side under the windows, and constructed a rock storage area inside to store the heat. When the temperature inside the collectors is higher than the temperature of the rocks, a fan automatically comes on and pulls warm air into the rocks. The fan runs off batteries storing DC electricity produced by the Jacobs wind machine.

Additional heat storage was added during January 1981, when Dennis Ronse attached bins of rocks to the north wall of the greenhouse to passively collect heat, and Tom Mulcrone laid a brick floor, which is another heat sink.

During the spring semester, Tom and Paul undertook the task of reducing night heat loss through the overhead glass. First they transferred the glass from the aluminum patio door frames into wooden frames. Then they constructed insulating shutters made of wooden-framed thermax, which fit over the outside of the glass. These are raised on sunny days by small, hand-cranked winches, and the silver side of the Thermax reflects additional light into the greenhouse. At night, the shutters fit snugly over the glass and prevent warm air from escaping. They are kept down all summer, and the white wooden frames reflect heat away from the building. The only problem with the shutters has been during a strong southwest wind. When the wind rattles the shutters noisily, we just lower them. Snow removal with brooms has been easy because no more than four or five inches has fallen at any one time this winter.

We are delighted with the greenhouse. It works. It is paid for! It is ready for intensive use as we expand the agricultural research program this spring.



The greenhouse with the shutters up.



Wes, Marty and Walter working in the greenhouse.

Community Alternatives

County Energy Planning: An Update

Mari Peterson

It has been a good year for community energy activities in Kansas. Much has happened in the state and also to Diane Tegtmeier and me since I last wrote in this column.

Harvey and Wabaunsee Counties each have had a group of citizens complete an end-use energy assessment. These studies, which were finished over a year ago, produced some good working information plus some startling facts. In the large Flint Hills county of Wabaunsee, which has only 6,000 people, citizens discovered that \$10 million was spent for energy by all sectors of their economy in 1977. Of that total, approximately \$9 million left the county. The total personal income from all sources was \$36 million. Looking at the total economy from this perspective, it is obvious why these rural communities have to struggle so hard to stay alive. In Harvey County north of Wichita, approximately \$34.6 million of the county's total personal income of \$200 million went for energy expenditures to outside sources.

Both of these counties were awarded grants from the Kansas Energy Office under the Community/County Energy Management Grants program to continue their work. In addition, five other communities received assistance for various energy projects. Each of the two counties used a portion of these funds to hire a local, part-time energy coordinator for the county's project. In Wabaunsee County, the coordinator is Kathy Hund of Paxico. Keith Wiens fills this position in Harvey County. I have been very impressed with their enthusiasm and skills.

Neither Diane nor I have a direct role in the activities of Harvey County anymore, though we appreciate the communication we have with Keith and others working on their project. Keith has located 90 volunteers to serve on committees to study the potential for conservation and alternative energy sources. These are the committees: residential, commercial-industrial-institutional, transportation, government, financial, agricultural, emergency energy preparedness, and public awareness.

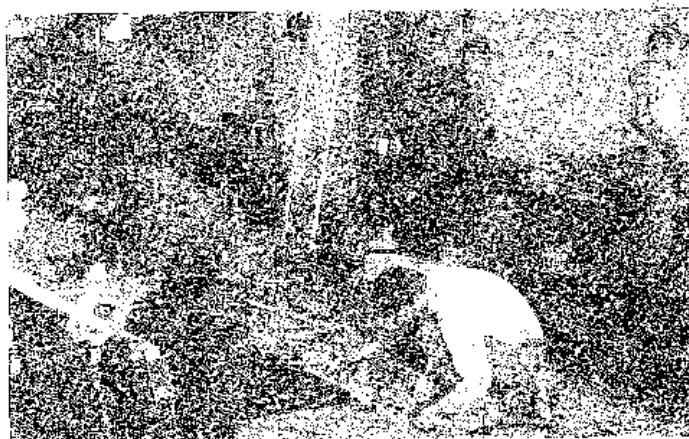
In Wabaunsee County, citizens have come together to work in town groups, with county-wide meetings in the areas of agriculture and financing. The sector approach was not a workable model because of the wide, geographical separation of the towns and the distance people would have to drive to attend county-wide meetings. The town groups have taken a particular interest in home weatherization information, offering a free Project Conserve audit to each home, hosting a conservation workshop, and hoping to weatherize some homes for low-income elderly. The agricultural task force has been seeking information on conservation and alternative

energy sources for the farms. Several seminars have been scheduled for this winter, including one on methane production, another on burning vegetable oils in diesel engines, and one on basics of solar design. In addition, they are planning two construction workshops, the first to make a simple solar food dryer. A larger construction project, yet to be determined, will follow, with financial assistance from the Small Farm Energy Project of Hartington, Nebraska. The financial group has been exploring ways of providing loans for weatherization and funds to keep various activities going beyond the length of the Kansas Energy Office grant.

Diane Tegtmeier and I have had a few side projects in addition to our consultation with Wabaunsee County. This past winter we formed an independent, non-profit corporation called Energy for Rural Self-Reliance to carry on the work of promoting broad-based citizen participation in local energy issues. We have been fortunate to have Jim Redfearn join our staff. Jim has a masters degree in community development from the University of Missouri. He has contributed his perspective to our general approach and has assisted in specific areas, such as local funding sources for community projects.

This spring, Energy for Rural Self-Reliance and the Kansas Natural Resource Council will be publishing a book called Kansas Energy: A Resource Guide to Community Action. In this manual there will be an overview of energy extraction, consumption and ownership in the state, and a report on the status of conservation and renewable energy resource development in Kansas. Another major section will include information on energy programs through state agencies, academic institutions, and various Kansas organizations. There will be a "yellow pages" of energy auditors, solar designers, wind machine distributors, and so on. A final section will include suggestions on how to organize for energy activities at the local level, how to gather data on local energy consumption and project future energy scenarios, and where to locate the technical resources that are available to a citizen energy group. The Center for Renewable Resources in Washington, D.C., funded our work on this document.

We are hoping that Energy for Rural Self-Reliance can gain some degree of self-sufficiency through contracting for specific services, hosting seminars and workshops, selling the Resource Guide, and miscellaneous other means. We are optimistic that in more communities, people are taking an interest in working together to solve local energy problems. We are presently in the process of negotiating a contract with another community, and we have received inquiries from



Wabaunsee County Solar Food Dryer Workshop

several others at a recent conference for community leaders sponsored by the Kansas Corporation Commission.

While we are excited on one hand about the growing number of local actions occurring throughout the state--from workshops to weatherization programs to comprehensive planning--we are very discouraged by the attitude of state and national leaders that the Kansas Energy Office programs and the national solar and conservation programs are unimportant and can be carried on by the private sector. That is simply shortsightedness on their part. The state and federal tax credits and community energy management grants have helped generate the growing energy activism. The

Kansas Energy Office also serves a vital role as an information clearinghouse for state residents. The payback from these programs is so much greater than the dollar outlay. It seems a shame to see legislators turning back the hands of time precisely when we need to be looking ahead. We must all work to preserve these programs which really only account for a pittance in the budgets, but do so much good.

The Conference on Alternative State and Local Policies of Washington, D.C., sponsored a workshop in Manhattan, Kansas, this past November for community energy activists. Workshop leaders provided good insight on how to work with broad-based citizen groups, achieve some financial independence, and make the most of state energy resources. The materials they have published in these areas are very helpful to persons organizing energy projects. If you are outside the Kansas area, you may wish to get in touch with them for the information that can get your citizens' group off the ground.

Many energy studies have been completed across the United States, and even more citizens' groups or units of local government are tackling specific issues. While our federal government puts all of its energy dollars into developing light-water breeder reactors and solar satellites, we will be working twice as hard with a fraction of the money to make those monstrous energy technologies unnecessary. At the same time, we can become more aware of our community and more involved in making it a good place to live.

Who Owns Kansas Farmland?

Mary Fund

Growing concern over the issue of "who owns the land," and thus controls this valuable resource, led to the current land ownership research being conducted by two staff members of the Kansas Rural Center. Elise Watkins and Mary Fund are researching land ownership in eight western Kansas counties and will issue a report on absentee ownership and outside investment, the relationship between irrigation and absentee ownership and the effects on local communities. The counties included are Clark, Edwards, Finney, Grant, Gray, Haskell, Scott, and Seward.

Although widespread ownership and control have traditionally been viewed as vital to the responsible care of the land and to our political and economic well-being, similar studies across the country reveal that widespread ownership is more rhetoric than reality. Increasing amounts of farmland are coming under the control of non-farm and absentee owners, whose main interest is the return on their investment or the tax advantages gained.

The decision to focus on western Kansas was based on the value of the area's agricultural production, and the high incidence of corporate farming and intensive irrigation, which point to



the predominance in the area of capital-intensive agriculture. Since this area is representative of the general direction that agriculture has been pushed by national policies, the examination of who owns and controls the land should tell us a great deal about the direction and future of the state's agriculture and its resources.

Funding for the project has been received through internships from the Center for Rural Affairs in Walthill, Nebraska. The study has also received support from the Catholic Rural Life Project of the Kansas City Archdiocese, Kansas Organic Producers, and individual contributions.

Anyone wishing more information on the study, or how to conduct their own local research, or anyone wishing to contribute toward the study expenses can write to the Kansas Rural Center, Land Study Project, Box 133, Whiting, Kansas 66552.

KAW Council Formed

Ken Lassman

On January 23, 1982, in Lawrence, forty people from Kansas and Missouri braved wintry weather to gather together for the purpose of forming a Kansas Area Watershed (KAW) Council. Representatives from Lawrence, Topeka, Kansas City, Manhattan, St. Joseph and Warrensburg, Missouri, discussed the bioregional concept as applied to the Kansas watershed and our prairie bioregion. A consensus was reached that developing an ecological consciousness and responsibility in order to live within our region's ecosystem is an overriding purpose of this group. Important to this end is developing the spirit of community and of self reliance in terms of economics, food, skills and health.

The Council planned an event for the May Day weekend (Apr. 30, May 1, 2) at Camp Hammond located Southeast of Topeka. Modeled after the Ozark Area Community Congress, this gathering will facilitate the ongoing process of developing an ecological framework for living in our bioregion. Work committees on finances, publicity, food and workshops were formed in preparation for the KAW Council in May. Another organizing meeting was scheduled in Manhattan to reach people unable to attend the January meeting in Lawrence.

For more information, contact Ken Lassman, 1225 Delaware, Lawrence, Ks. 66044, or Kelly Kindscher, 716 Lake St., Lawrence, Ks. 66044.

For a thorough examination of the concept of BIOREGIONALISM, see the Winter 1981, number 32, issue of CoEvolution Quarterly.

Gardens for All

The 1981-82 National Gardening Survey, conducted by the Gallup Organization and recently published by Gardens for All, a Burlington, Vt.-based national association for gardening, revealed that a surprising 13 million American households expressed the desire to garden but need space in which to have a garden. Of the 13 million households, 52% said they would be interested in becoming community gardeners. The potential new community gardener is found most frequently in central cities, between 18 and 29 years old, high school educated, earning less than 20,000 annually, and married with children. Among other findings:

- 4.2 million American households began new vegetable gardens in 1981
- 55% of new gardeners live in the South and West
- 1.7 million acres of U. S. land is committed to home vegetable production
- \$414 is the typical dollar yield of the home garden
- 19 billion pounds of food are yielded from the nation's home gardens.



Dana Jackson

The Land Institute is closely associated with the Prairieland Food Cooperative in Salina. A Friend of The Land made a special grant in 1977 to hire a research associate to (1) do a survey and determine if there were enough interest in Salina to support a food co-op and (2) to organize one if the results were positive. The Land hired Jan Peters, who determined by a questionnaire sent to likely participants that enough people would buy from a co-op in Salina. A steering committee met frequently that fall, and by December or January, the first food order was made.

The Prairieland Food Co-op started out as a buying club. The members prepaid for each order, and once a month they picked up their food at the Sunrise Presbyterian Church. The club soon found itself owning a scales, cheese knife, packaging materials, scoops and measuring cups. If only ten people ordered cornmeal in small amounts, what was left in the 25 pound bag had to be saved to sell the next distribution day. It soon became a hassle to move the supplies and excess food back and forth from the church to someone's house to keep for a month. Getting a storefront seemed to be the answer.

The Prairieland Food Cooperative has now been in the store at 707 Bishop for three years. Some problems were simplified, but others were magnified by starting the store. We acquired more equipment to maintain, such as five refrigerators and a freezer, and we had overhead to pay--rent, gas and electricity. Various store management systems were tried, worked for awhile, became unsatisfactory and were replaced: management committees, worker collectives, a paid, parttime manager-bookkeeper, and volunteer managers. Enthusiastic members did too much, burned out, and others took their place in the leadership. However, an active board of directors has been a steady, healthy factor, voting in changes in the store operation when members expressed dissatisfaction. The steady guidance of Tom Renich as treasurer has kept the store running as a business, not just a social experiment.

The food co-op has tried several ways of pricing the stock. In the current system, all items are marked with a non-working member price, but those who work two hours a month get a 15% discount, those who work four hours get 25%, and those who work eight or more get a 35% discount. Members who do not have regular jobs, such as clerking, food ordering, picking up the cheese, or producing the newsletter, can work by just showing up in the store to package or clean on Saturdays (9 to 5) or Tuesdays (2 to 6).

The Land Institute students have played a big part in the success of the store (and probably in some of its failures too!). Most of them become working members and regularly purchase



food there. A former student, Sue Leikam, worked as a bookkeeper-manager at one time. Pam Ellinghausen and Paul Rasch served as volunteer managers while attending The Land. The co-op became a recycling center while under Paul's leadership.

A major improvement was made at the store in November 1981 when the co-op acquired a second, upright Tyler cooler and sold its five drippy, frosted over refrigerators. Paul Rasch and Marty Bender supervised the building of a walk-in cooler in the back room during Thanksgiving

vacation. This will be important during the hot months when all food needs to be kept cold to prevent insect damage.

Too many Friends of The Land to mention have been instrumental in organizing the food co-op, in donating materials, labor and time to the store, and dependably buying food there for the past three years.

The supermarkets need not feel threatened by the food co-op in Salina. We have increased the number of items stocked, but we will never compete with Safeway. However, our members get satisfaction out of buying their whole foods, organic whenever possible, simply packaged, in a friendly, neighborly store. Although the supermarkets have begun selling small bottles of juice and dried fruit snack packs, there are still many co-op items they do not sell, or sell at higher prices: unsweetened coconut, whole wheat pastry flour, whole wheat pasta, raw cashews, tofu, triticale flakes, herb teas, etc.

The store does not have a manager now. Marty Bender is president of the board of directors and spends a lot of time on behalf of the food co-op, but the success of the Prairieland Food Cooperative depends upon the loyalty and personal responsibility of all its members.

Small Farm Schools

The Land Institute is not really a school for homesteaders. Neither are we a small farm school. Students do have the opportunity to learn some skills which might help them as small farmers, but we do not emphasize farming as much as we do agricultural research. Two real farm schools recently sent us information.

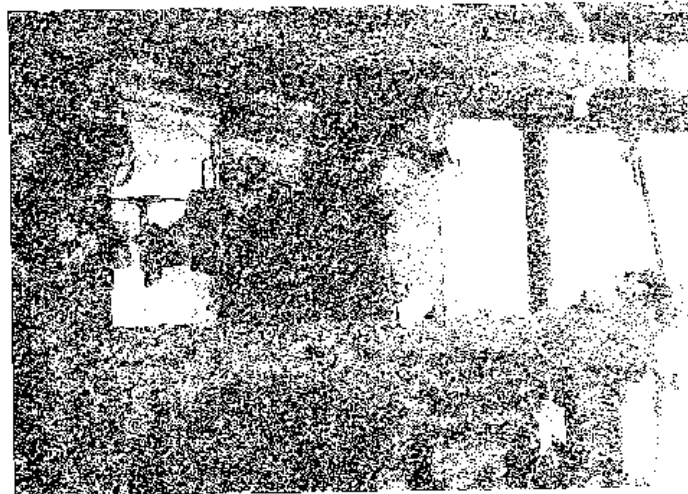
The Malachite Trust Farm-School is 35 miles northwest of Walsenburg, Colorado and 72 miles southwest of Pueblo on the eastern slope of the Sangre de Cristo Mountains. The 400 acre farm, at an elevation of 7200 feet, includes lush, sub-irrigated river bottom and many acres of grassland. Malachite is establishing a small farm school "to teach, to experience and to research the blending of old proven small farm methods with new appropriate alternatives." Write the Malachite Trust Farm-School, A.S.P.-Box 21, Gardner, Colorado, 81040 for information.

The Stepping Stone Institute near Miami, Florida, is also starting a new program on a 400 acre ranch. Their brochure states that the Stepping Stone Farm will be "a living, working community of permanent resident researchers, innovators, and craftsmen dedicated to the goal of disseminating information on appropriate technology, alternative farming techniques, building construction, and food preservation, as well as the intermediate technology of small scale cottage industry." Write to the Stepping Stone Institute, 1515 N. W. 7th St., Miami, Florida 33125 for information.

Community Work

Persons looking for work in public interest organizations or community service can find opportunities advertised in Community Jobs, a monthly newsprint-type magazine, published by The Youth Project. Community Jobs lists jobs and internships in non-profit, community-oriented organizations. In addition, it contains articles about community work as a profession and ways to develop more effective community projects.

SUBSCRIPTION RATES: (1 year) \$8.88/individual, \$12/nonprofit organizations, \$24/institutions, universities. Community Jobs, 1520 16th Street, N.W., Washington D.C. 20036.



Den Berry at the radial arm saw.

cals and their possible effects on human health and soil health. Farmers who know that they can't afford to switch to organic farming tomorrow still support research and information which may make it possible for them to switch sometime

The organic farming coordinator has no staff at the USDA, but he is hoping to receive some outside money to hire one person to systematically assess existing extension materials. Dr. Youngberg is being helped to write long range plans for research into organic farming by a ten member Organic Farming Coordinating Committee, composed of persons in the USDA. Because the members all have fulltime department jobs in addition to the committee, work on the plans is going slow.

Although there are obstacles to the wider adoption of organic farming, Garth Youngberg believes these can be overcome by research, information and planning. He thinks that organic farming is on the public policy agenda of the general public and within governmental agencies. As evidence he cited the number of articles in newspapers and magazines about soil erosion, and the results of a Harris survey in which 61% of the respondents felt that the nation should be moving towards policies that preserve the natural fertility of the soil. In government, the Fish and Wildlife Service, which manages 140,000 acres of farms on 100 wildlife refuges, farms organically on two of its farms, and heartily supports research on organic farming.

The members of the Kansas Organic Producers told Dr. Youngberg following his speech that they did feel there was a need for research. John Vogelsberg specifically asked for work to be done on legumes that fix more nitrogen.

Persons can express their support for research on organic farming through the USDA by encouraging their congress people and senators to support the Organic Farm Act of 1982, to be introduced by Jim Weaver of Oregon. This bill calls for organic farm projects at six universities around the country, and sets up an official system to use existing organic farmers as advisors to county extension agents.

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by WES JACKSON

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Friends of The Land

The Friends of The Land have been extremely important to The Land Institute. Many helped collect materials to build the first building; many donated time and labor after that building burned to help start reconstructing the classroom/library/shop. Friends donated books and money to help develop another library. The Land needs these friends, and new friends too.

The Land Institute is a private, educational-research organization, financed by student tuitions and private gifts. Contributors receive THE LAND REPORT, any special publications, and notices of interesting events at The Land. The Land Institute is a non-profit organization, and all gifts are tax deductible.

The Great Plains in Transition

"The Death of an Aquifer" is the title of a thirty minute television documentary produced by KNME of Albuquerque, New Mexico. The program tells how the depletion of the Ogallala Aquifer is affecting farmers in Texas, New Mexico, Oklahoma, Kansas and Nebraska who pump water from the aquifer to irrigate their crops. Some of the proposed solutions, such as water transfers from rivers in Missouri and Arkansas, are explored.

Stuart Udall narrates the documentary, and Wes Jackson comments on several aspects of the Ogallala Aquifer depletion. The interview with Wes was filmed at The Land Institute last summer.

"The Death of an Aquifer" was prepared for distribution throughout the public broadcast system and has been shown in the West and Southwest. Your local public television station can make arrangements to show it by contacting Hal Rhodes, Senior Producer, KNME TV5, 1130 University Blvd., N.E., Albuquerque, New Mexico 87102

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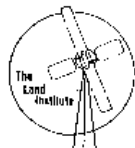
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