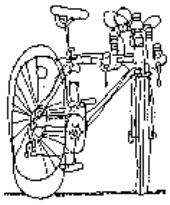
THE LAND REPORT

Number 22 Fall 1984

Contents



Fall 1984

On the Front Cover

This aerial photo by Terry Evans shows most of the original 28 acre site of The Land Institute. The three large roofs (l. to r.) are the Jackson house, classroom building, and barn. The four circles are granary roofs. On the inside curve of the terrace between the building and the barn, garden rows show up, as do trees with shadows in the orchard across the terrace road. In the bottom center, the first 4' X 20' research plots of prairie forbs and grasses stand out. The herbary can be seen in the upper right; the wind generator towers, in the upper left.

At The Land

Morning Discussions Important to Ag Interns

Ann Zimmerman

The threads of thoughts brought up in group discussion, and woven through the days of work, held together our summer and early fall at The Land.

By summertime, the group had developed an exceptional rapport too good to lose. So as the summer session began, without the all-morning classtime of the spring session, staff and interns agreed to meet for a 45-minute "warm-up" discussion three mornings a week. Just before nine o'clock on Monday, Wednesday, and Friday, Land people could be found hurrying in from the plots, and biking or driving in from homes in town, or reading the Salina Journal in the classroom, waiting patiently to see what would come out of the group that morning--news items, thought-provoking comments, recurring dilemmas of responsible living, work to be done.

The interns do not live at The Land, but have been spending their days there since February. They have focused much of their attention during the February-to-December term on the research plots, studying the potential of perennial polycultures as a part of the solution to soil erosion and toxic chemicals in agriculture. But the energy to work in the fields has often begun in the classroom.

The Land Report

is published three times a year by

THE LAND INSTITUTE
RT. 3
SALINA, KANSAS 67401

Editor.....Dana Jackson
Arts Associate.....Terry Evans
Circulation Manager..Linda Okeson
Printed by Arrow Printing Company

Contributing to No. 22: Paul Adelman, Mike Berghoef, Janine Calsbeek, Martin Guraky, Dana Jackson, Tony Martin, Weeden Nichols, Walter Pickett, Dana Price, Kirk Riley, Heidi Schmidt, Russ Wysong, Ann Zimmerman.

SUBSCRIPTION RATE: $5.00

THE LAND INSTITUTE IS A NON-PROFIT EDUCATIONAL-RESEARCH ORGANIZATION DEVOTED TO A SEARCH FOR SUSTAINABLE ALTERNATIVES: AGRICULTURE, ENERGY, SHELTER, WASTE MANAGEMENT.

WES: Brushing your teeth is a political act.
ANN: With acid rain, we don't even have to go to the wilderness to destroy it anymore.
KIRK: Here's a study directing factory workers, in case of nuclear attack, to jump in a lake. It says the odds of survival increase the longer the person remains submerged.

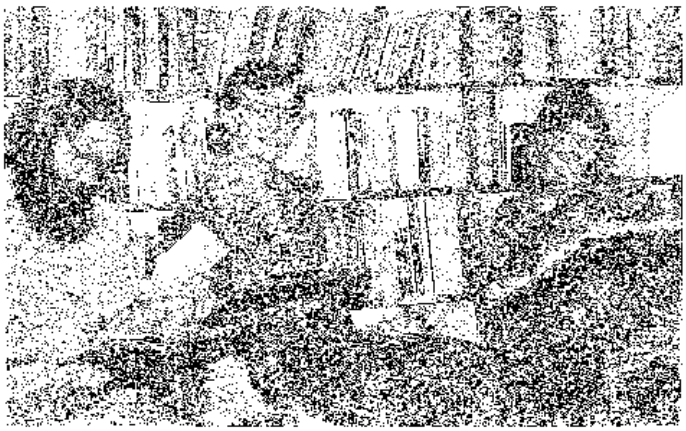
The free ranging warm-up discussions varied any day from the serious to the absurd. Hot debates on the U.S. political system and upcoming elections could be followed by discussions on the health hazards of aluminum, the state of organic farms, the problems of hazardous waste disposal, and the latest discoveries in cockroach aphrodisiacs. Often there were requests from plant breeder Walter Pickett for volunteers to cross-pollinate sunflowers, and pleas from Dana J. that we take home the abundant garden produce for supper.

JUDY: We should get down and look at the prairie from the plants' eye view.
WEEDEN: That reminds me of a story...

New staff members Judy Soule and Weeden Nichols enlarged the discussion circle beginning this summer. Judy, with a Ph.D. from Michigan State, began as our new ecologist on September 3. Her insights into the connectedness of the total environment in our research and her enthusiasm and clarity in teaching have been much appreciated. Weeden, a quiet thinker whose past has been with the military and the civil service, became on August 1 The Land's operations manager. He is expected, with equal ease, to climb the 90-foot wind tower, build a new barn (with intern help), and fix every conceivable mechanical device.

TONY: In science, it seems, you can't say <u>anything</u>...without qualifying it a hundred times.

Russ Wysong, Judy Soule, Tony Martin



Mike Berghoef, Kirk Riley, Ann Zimmerman

In September, regular class schedule began again with the daily warm-up (9-9:45) followed by discussion of assigned readings (10-12 noon). Much of the reading covered the myriad biological intricacies to be considered in our search for high seed-yielding perennials and our attempts to grow several species together. The considerations can be mind boggling, not only for those interns with little background in biology, but for the others as well--like juggling ten oranges at once, with a couple of bananas thrown in, too.

Under the curriculum heading of "Considerations for a Sustainable Society," Dana J. led discussions on all or key parts of several books. These included Wendell Berry's <u>The Unsettling of America</u>, Amory Lovins' <u>Soft Energy Paths</u>, John McPhee's <u>Encounters with the Archdruid</u>, Roderick Nash's <u>Wilderness and the American Mind</u>, Christopher Stone's <u>Should Trees Have Standing</u>, and David Ehrenfeld's <u>The Arrogance of Humanism</u>. One very nice change of pace was a cloudy morning spent reading aloud to each other selected passages from Aldo Leopold's elegant <u>Sand County Almanac</u>.

RUSS: There <u>is</u> a perception of crisis at the grass roots level.
KIRK: There is <u>no</u> perception of crisis at the grass roots level.
PAUL: I've brought in Emily Post's <u>Book of Etiquette</u> to tell us the proper way to introduce ourselves to visitors.

Visitors to The Land are frequent and often fascinating. During the summer, Tom Christy, a local hydrologist, gave a class on groundwater; Chuck Washburn, a California engineer, discussed the potentials of alternative energy sources; Frank Jenkins, a draft horseman from Kentucky, showed slides of his work farming and logging with horses; Gerd Reichardt, an engineering student in Germany and a member of the Green Party, gave his perspective on Green Politics in his homeland; and several former Land students passed through, proving to current interns there <u>is</u> life after The Land.

1984 Ag Interns

Paul Adelman--Arlington, Virginia--Oberlin College (OH)
Mike Berghoef--Grand Rapids, Michigan--Calvin College (MI)
Janine Calsbeek--Packwood, Iowa--Northwestern College (IA)
Martin Gursky--Nova Scotia, Canada--Pennsylvania State University
Tony Martin--Charlotte, North Carolina--Davidson College (NC)
Dana Price--Denver, Colorado--Stanford University (CA)
Kirk Riley--Livonia, Michigan--Michigan State University
Heidi Schmidt--Wayland, Massachusetts--Montana State University
Russ Wysong--Wolf Lake, Indiana--Antioch College (OH)
Ann Zimmerman--Salina, Kansas--Kansas State University

Wind generator specialist and former Land student, John Craft, gave a three-day short course on wind power and had pairs of students designing their own hypothetical wind-powered water pumps and electric generators. Finally, a visit by author Wendell Berry was a special pleasure. He gave a short story reading for the public in Salina, and then The Land people got to share more closely his gentle good nature, when he spent a morning in class discussing his hopes and convictions about culture and agriculture in this country and especially in his native Kentucky.

MARTIN: Despite all the damage and exploitation caused by our use of scientific knowledge, it is that same knowledge, and more of it, that is necessary for us to correct our mistakes.
JANINE: These lovely sunflowers in my plot grow for six months, reaching up to twelve feet high, and then in a day we cut them down and discard them because they are not useful data. Science is wasteful.
WALTER: I need a couple of people to help transplant sorghum hybrids down by the stream.

A morning's discussion could keep minds occupied all day, but outdoor work was allocated the largest block of time spent at The Land. Summer was hot and dry as Kansas summers are apt to be, but interns were thankful not to have a repeat of the prolonged searing heat and drought of summer, 1983. Experimental plots of perennial sunflowers, wild senna, Illinois bundleflower, and other species, planted in the spring, showed mixed progress through the summer. Several cases of poor germination disappointed interns, but in each failure was a lesson to be learned, and we hope to pass much of the knowledge gained on to next year's interns. Special care given to the plots included weeding (with hands, hoes, and rototillers), watering (with newly-installed irrigation pipe), and hand harvesting (sometimes followed by tedious counting and measuring of the individual seeds). The rapport of the group benefited from many a conversation held at the end of a hoe or over a pile of Eastern gama grass kernels. Developing ideas, asking new questions, wrestling with conflicts and ambiguities, and breaking into a song now and then--all this was done in the context of physical labor.

DANA J.: If we all go out right after class, it will only take us about five minutes to pick off all those potato bugs.
WEEDEN: As soon as the muddy ground dries, I'll need two people to help me on the barn today.

A long-term building project began in September when tall poles for a new barn were erected just south of the existing barn. By October, the interns and Weeden had carefully nailed several crossbeams into place, giving it more the look of a building than of a "pole farm" which had just sprouted some giant sticks.

WALTER: What did millions of acres of flat bottom-land prairie look like before it was ever plowed? What was the distribution of plants? We just don't know.
MIKE: I found some <u>good</u> looking mushrooms out on the quarter section. I sure can't identify them, but they do look nice.

The seven or eight hours of work time at The Land often extended later in the day and onto weekends for homework and special events. Several interns attended the annual meeting of the Center for Rural Affairs in Nebraska on July 28. Another weekend the interns helped at the Salina Education Fair where The Land Institute had a display. A visit to the Konza Prairie Research Area in the Flint Hills near Manhattan, Kansas, September 22 gave students great vistas of native prairie decked out in fall colors. And the following weekend, at the cool end of September, Land staff and students attended the annual conference of the Kansas Natural Resource Council held at Camp Wood--also in the Flint Hills.

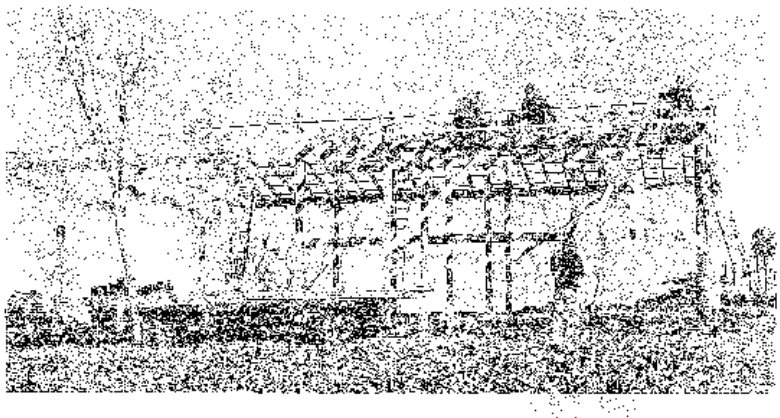
DANA P: Before the year is over, we should spend a whole day out on the 160 acres, just looking at the prairie.
TONY: All the time my sunflowers were in bloom, I kept forgetting to bring my camera. Now they are past their peak.
MARTIN: How are we going to get all this data collected and processed before the end of the year?

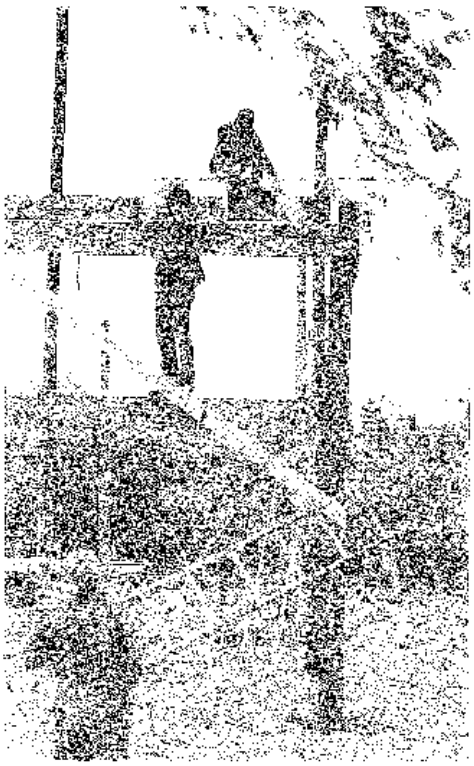
In mid-August, Donna and Marcus Gursky (Martin's wife and son) returned to their home in Nova Scotia, Canada, so that Marcus could begin school there this fall. The event

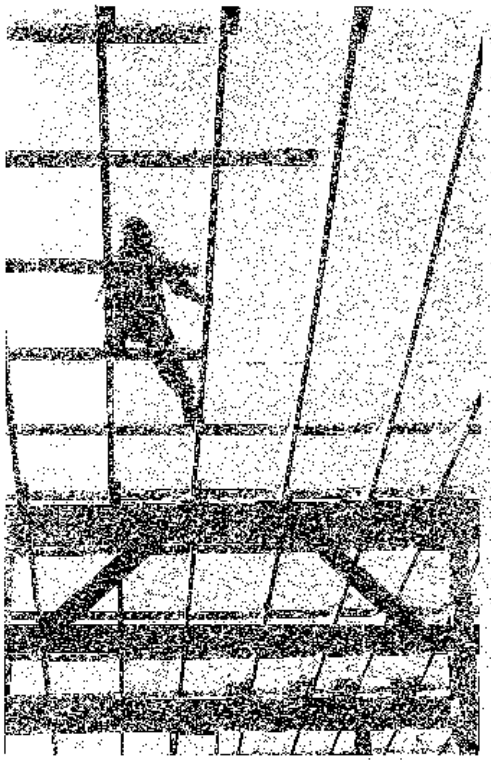
reminded us of the temporary nature of the close community we have established. We find we must get the fullness from each day, as the time between now and December 15 (the end of our term) is short. A few weeks ago when the plots of sunflowers bloomed, we discovered with delight that thousands of monarch butterflies had taken up residence in them for awhile. We looked at the butterflies as often as possible, knowing they would be flying on soon. The fields around The Land, gray when we came last winter and green through the growing season, have just burst into the flaming golds, oranges, and wine reds of fall; soon they will be brown and gray again.

Conversations among interns turn more and more often to plans beyond December, "after The Land." Through November, harvesting and threshing share worktime with research and write-ups. Papers on the results of this year's experiments must be completed by December 3 when each intern will present his or her findings to a reearch advisory group made up of university professors from this region.

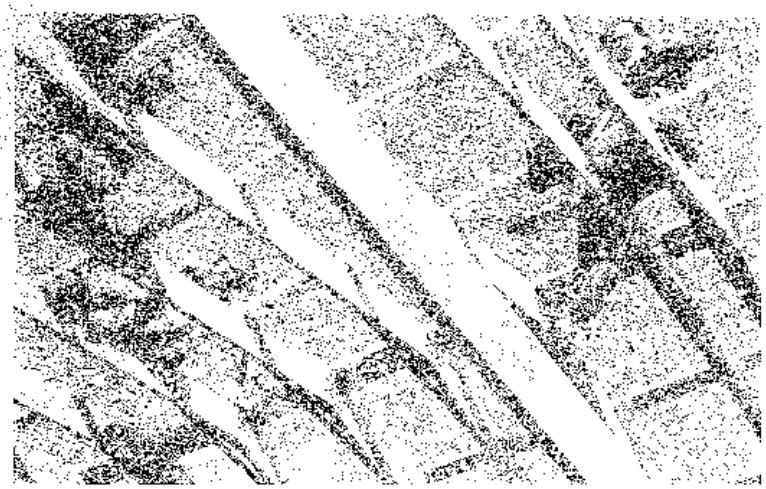
As we assess our ten-month stay at The Land, we can see much we will take with us, much we have gained from each other. And yet we will leave something of ourselves behind. We and The Land Institute have changed each other, and this year's interns leave it to the staff and future interns to carry on this part of the long haul to a more sustainable society.







Barn Building



Diverse Group Attends Visitors' Day

Dana Price

Each fall, The Land Institute invites anyone who is interested to come to our Visitors' Day program. This year's event, held October 7, brought about 170 people to The Land on a bright fall afternoon. Many of our visitors came from Salina and nearby communities, but others came from as far as Kansas City and the University of Nebraska. They included farmers and cityfolk, families and college students, people who had only recently heard of The Land and older friends returning to look at current projects. The number and diversity of participants reflect a growing concern over the problems of conventional agriculture and the need to explore alternatives.

The afternoon's program combined discussing ideas and showing the work going on at The Land. After Wes's introduction of The Land Institute staff and ag interns, people divided into four groups for a tour of the buildings, wind and solar energy projects, garden, and research plots. Based on experience, we had expected no more than 100 people to come. The four groups we had planned were not enough to keep the quality of interaction between visitors and Land people as high as we like. For future Visitors' Days, we will have to organize for a bigger crowd, dividing into more groups to ensure that everyone is able to ask questions and talk with staff and interns.

Following the tour and a break for refreshments, Dana and Wes discussed the new book, Meeting the Expectations of the Land. The afternoon concluded with a question and answer session.

1985 Prairie Festival

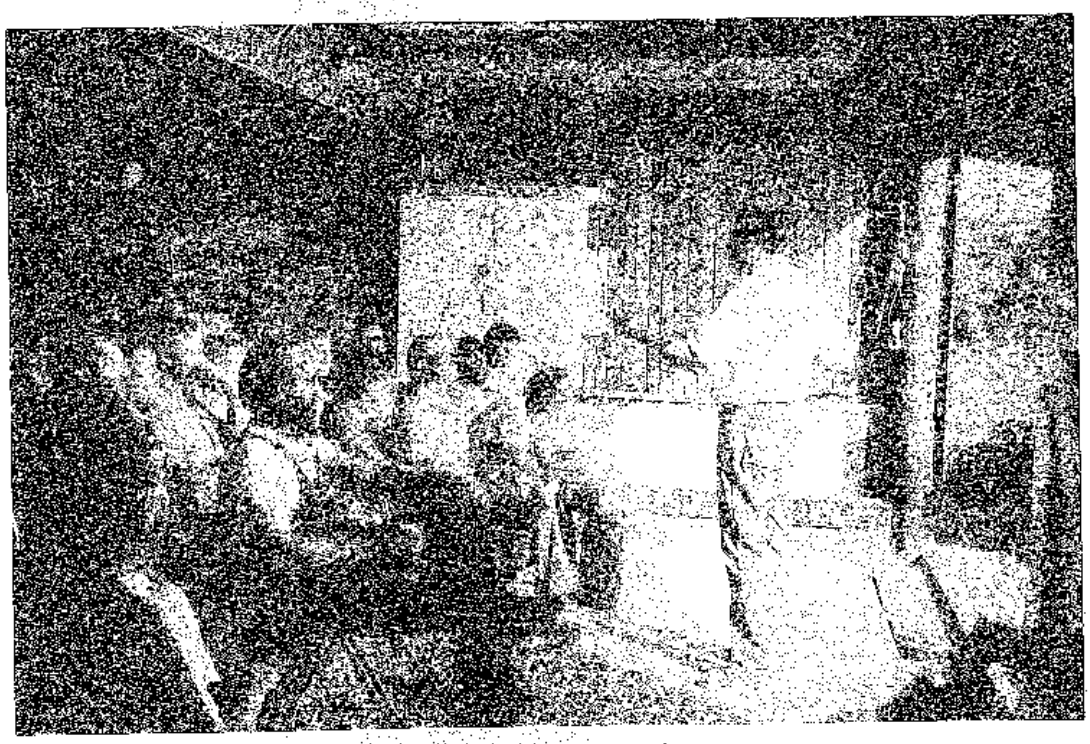
"Pattern and Tradition" is the theme for the 1985 Prairie Festival, June 1 and 2, at The Land Institute. This will be our seventh annual celebration of the prairie ecosystem and prairie folk. The featured speakers will be Gary Snyder and Gene Logsdon.

Gary Snyder is a writer whose book Turtle Island won the Pulitzer Prize for Poetry in 1975. He is the author of six other collections of poetry, the latest of which is Axehandles (1983)(see page) and four books of essays. He has been a student of anthropology and Zen Buddhism. He lives in the foothills of the Sierra Nevada near Nevada City, California, with his wife Masa and sons Kai and Gen.

Gene Logsdon is a farmer and writer whose articles in Organic Gardening are familiar to many. He is a frequent contributor to Country Journal and Ohio magazines. Gene is the author of Two Acre Eden (1978) and A Grove of Trees to Live In (1981). He and his family live near Upper Sandusky, Ohio.

During the two-day event, there will be many other speakers, plus panels, workshops and discussions. There will be art features, music, and prairie-related activities.

Invitations to the Festival with the full program and registration form will be mailed in April.



Wes Jackson speaks to Visitors' Day audience.

Seed Stock is Wendell Berry's Subject in Land Visit

Janine Calsbeek

"How does essential knowledge get handed down? How does one learn stewardship and care?"

Wendell Berry opened his reading at the Marymount College Little Theatre September 27 with these questions. Beginning with the evening reading and continuing into the classroom conversation, a theme ran through his visit: *seed stock*. Overtly and subtly, he continually talked of keeping seed stock vigorous, generation after generation.

"The vessel that contains it is community," he said.

Mr. Berry, Kentucky poet, farmer and friend of The Land, sat in an armchair on stage and read to a room packed with attentive listeners. His story, "It Wasn't Me," is about putting good people and a good farm together; it is about a farm auction, the scrawled note of a dead man, an heir who says, "my father's loves are not mine," a doctor and big farmer who want investments. The story centers around Wheeler, a lawyer who respects the dead and the land and knows what is expected by both, and his friendship with the young couple who had been caring for this farm and long to continue, but do not want to be indebted to do so.

"Don't you think I ought to lose it if I can't make it on my own?" young Elton asks. He wants to possess the farm by himself, be its first and only lover. But he comes to understand indebtedness and responsibility, and to accept with gratitude what he could never earn.

"The place is not its price," wrote Berry. "Everything about a place, a man or woman that's different from its price is a gift."

The audience that night was alert and full of questions. "How do we begin to develop a community, to develop continuity, in a mobile society?" someone asked.

How can the seed stock, weakened, be restored?

Berry's answer: "Stay put and pay attention."

"Pay attention to news that's underfoot, not from elsewhere," he said. He spoke of an alertness to place. He impressed upon us the importance of listening to the grasses and birds and people around us. He made it clear that if we begin to pay attention, our attitudes, our feelings, our words will begin to reflect our place.

Regrettably, language today is being shaped by contact with the media rather than by community. Berry said that those in his home area whose language was formed apart from television are almost gone. Our language is not rooted in the past; we have no sense of how it developed from other languages.

Wendell Berry

"Where continuity is not broken, you try to keep it from breaking," said Berry. "Where it's broken, start all over."

He gave another example of alertness to place: attitudes towards the weather. So many of us are removed from the effects of weather, of contact with it, so we see it only as a nuisance. Disc jockeys' reports are negative whenever weekend weather is anything but sunny and glorious.

"There's a certain attitude that makes you able to live with the weather," said Berry, "and not be surprised and outraged when it rains on your hay."

"You can't teach somebody to feel right about the weather."

To keep good seed stock, stay put and pay attention. See the life that has gone on many years before you in this place. Understand your history. Remember your ancestors.

"It's dangerous to leave the dead too far behind," said Berry. "It's dangerous to have no history but a written one."

At The Land the next morning, Berry, students and staff gathered in our traditional circle in the classroom to continue the discussion. He told of a $50 million hog farm in Nebraska, featured in Farm Journal. This operation produces 350,000 pigs a year, a pig every ninety seconds. The labor force includes Nebraska farm kids, whom the managers appreciate because they're farm raised and know how to

work, they say. "But where are they going to get the next generation?" asked Berry; "there will be no farm raised kids, only those pig-house raised."

Again, losing seed stock.

Consistently, Berry says that the size of a farm should be determined by what one can pay attention to. "I listen to innovative farmers and cranky old farmers," he told us Thursday night, and it was one of the latter who told him that twenty cows is the limit. "You can see them all," the old farmer said. "With more you may touch them but not see them."

On Thursday afternoon, Berry walked through the research plots and was patient with Wes's enthusiasm. One experiment excited their imagination: sunflowers planted three feet apart in every direction. When allowed lots of room to spread, the plants branch prolifically. But there are no neighbors for support on windy days, resulting in rampant lodging.

On Friday morning, we continued discussing independence and dependence. "You have an obligation to be as independent as you can, without damaging someone else," he said.

"Your bodily energy can make you independent if you use it," he continued. "But in this technological age, the body is obsolete. You have nothing to do with it so you jog. Next we'll have to jog our minds."

Berry continued, explaining that in the story he read, Wheeler likes Elton's struggle. But Elton realized that "making it on his own" was an illusion, that no one is ever fully independent. Today interdependence is even more necessary, according to Berry: "The age of the individual on the farm is over," he said.

Along with interdependent rural communities comes appropriate technology. Berry gave examples of the latest inappropriate technology. He told of Holstein cows bred to be the size of elephants ("a boon to the building industry," he laughed) and futurists hoping to splice microchips into brains so one person knows everything. He called it "obsolete science" based on cheap fossil fuel. "We need to resurrect the issues of scale," he said, "and quit technological thrill seeking."

Discriminating use of technology. Quality seed stock.

The Amish, according to Berry, practice consensus when approving something new. If one person is opposed, they assume the devil's for it. "That'd slow you down," said Berry.

He told of an Amish man who would not change to pneumatic balloon tires even though they'd be easier on horses' necks. Those tires lead to power machinery. "I want my children to farm with horses," the man said. "Are you saying that you want your children to farm?" he was asked; "is that the same thing?" His reply: "Yes."

According to Berry, the Amish don't educate kids to leave home. Some become sophisticated mechanical engineers if necessary, but basically, exceptional minds are at work on the same things everyone else is working on. He read part of an eloquent letter from a young Amish dairy farmer, a man who's also a biologist, naturalist, theologian and father--a brilliant man. "The best minds aren't running off to where they'll get credit for it," said Berry.

"Those who grow up on the farm need encouragement to stay," he said. "They're the seed stock, after all." He believes that newcomers, in order to make it, must be exceptional individuals, willing to learn from others, often those perceived to be not exceptional. He added that we need communities where non-accredited teachers are teaching.

Good seed stock is stable. It doesn't change quickly. Selection takes time.

Change takes time, too, according to Berry. He explained that Kentucky's notable products are tobacco, whiskey, coal and race horses; "we're badly needed in case of emergencies," he smiled.

"Most people who are thoughtful wish we weren't dependent on tobacco," he said, but he doesn't believe tobacco farming should be halted abruptly. "What you have to start is a tendency. I wouldn't want to stop anything all of a sudden. You pull a switch and see collisions."

"What you have to hope for are catastrophes that will be instructive but not devastating," he said.

He also sees perennial polycultures entering agriculture gradually. He thinks that these grasses should be used as forage, that there's a need for hot weather pasture, and many farms would benefit from native grasses. The next step would be to harvest those fields, which people already do for their own seed. "Management is going to be the key issue," he said.

Stay put and pay attention. Be a part of your community. Hand down essential knowledge, good seed stock.

In the days following Wendell Berry's visit, we mulled over his words and recalled these themes. We came to realize that we were given something beyond words. We were given a bit of essential knowledge by this man, Wendell Berry, who truly knows what is essential and can show others where the essential is to be found.

The 1984 Research Season

Walter Pickett

The summer of '84, though hotter and drier than most of our students liked, was much milder than the summer of '83. Plants did better. People did better. Research went better.

Not all of our summer's successes were due to milder weather. This year, we avoided many mistakes we made last year. For example, we put our experiments in more homogeneous soil which will reduce statistical error. In some ongoing experiments, we corrected last year's problems, such as uneven plant spacing.

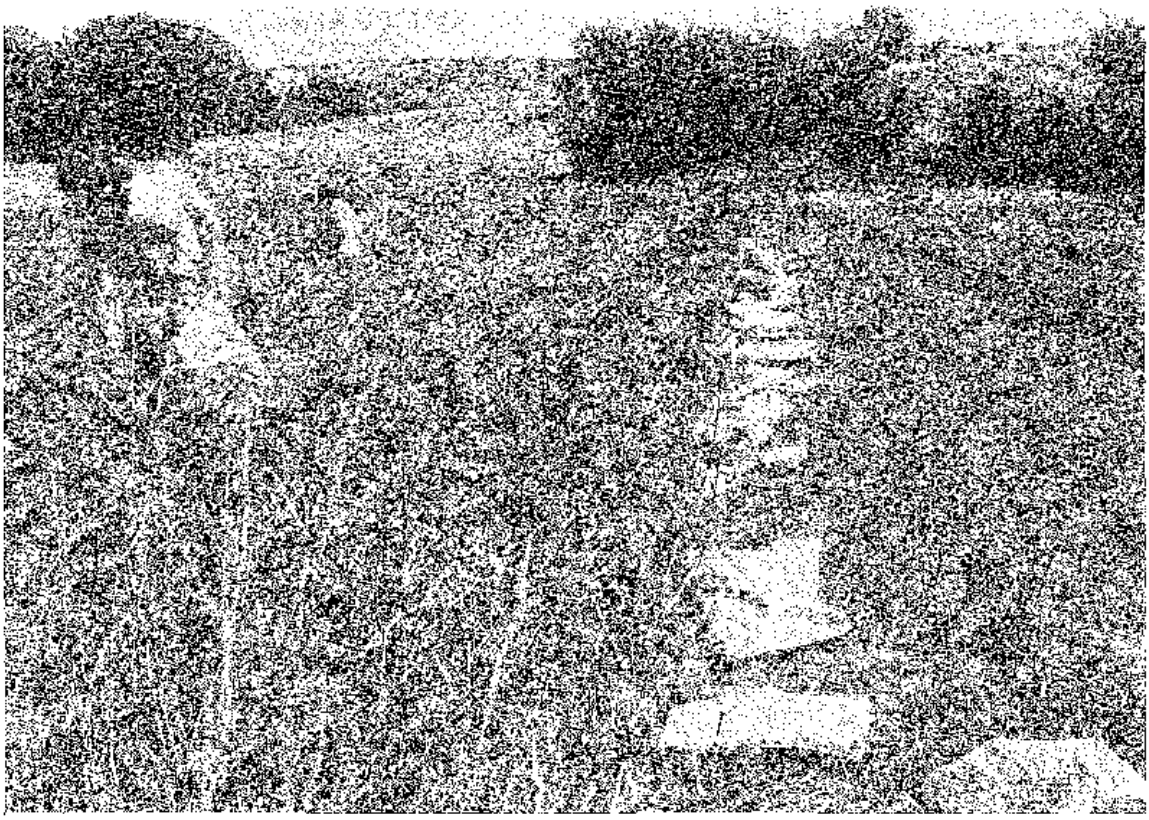
Breeding and Genetics

Some experiments have had no serious problems in the last two years and are on schedule. In 1983, we crossed grain sorghum (milo) with Johnsongrass, in order to eventually obtain a winter-hardy grain sorghum. We started the F_1 hybrid seedlings in the fall of 1983, and they survived through the winter in our greenhouse. They were transplanted outside last spring and have now produced about two quarts of seed.

Like Johnsongrass seeds, the F_2 hybrid seeds (seeds from F_1 hybrid plants) were quite dormant and slow to germinate. I decided to risk losing 300 seeds and try various seed treatments to break dormancy. I discovered that soaking the seeds in equal parts of Clorox and water breaks dormancy and gives good germination. This experiment not only told us how to germinate F_2 seeds in the future, it also gave us over 200 F_2 seedlings which will produce 200 F_2 families next year.

Another experiment that is roughly on schedule is the sunflower breeding. We now have three F_2 populations of seed from the following F_1 interspecific hybrids: Helianthus grosseseratus X H. maximiliani, H. salicifolius X H. grosseseratus, and H. mollis X H. grosseseratus. The traits we want to combine are as follows: from H. maximiliani--quick germination and high seed yield; from H. salicifolius--larger seeds and high percent oil; from H. mollis--shorter stalks, larger flowers, larger seeds, earlier bloom, and high percent oil. Many additional sunflower species crosses were also made this year.

Tripsacum (Eastern gama grass) breeding is proceeding, although not as fast as our original schedule projected. All of our 1983 seedlings that carried the gene for high seed yield died last winter. This spring, Chet Dewald, who originally gave us one of the plants carrying the gene for high seed yield, gave us five seedlings from that plant to replace those we lost. This was important because the original plant produces little pollen. Therefore, it sets little seed unless it receives pollen from another plant. The seedlings produced abundant pollen which enabled us to harvest a few hundred



Harvesting Wild Senna

Mike Berghoef
Dana Price

seeds. About half of the seedlings will be high yielders, and the others will be pollen makers.

Peggy Haas, of the Rodale Research Center, sent us two seed samples of Luna pubescent wheat grass. One sample had hulls on the seeds; the other had no hulls. The one without hulls is superior to the hulled type as a grain. We now have evidence that the hull-less trait is due to a single dominant gene, and we expect to develop a true breeding strain of hull-less pubescent wheat grass in two years.

Bicultures and Competition Experiments

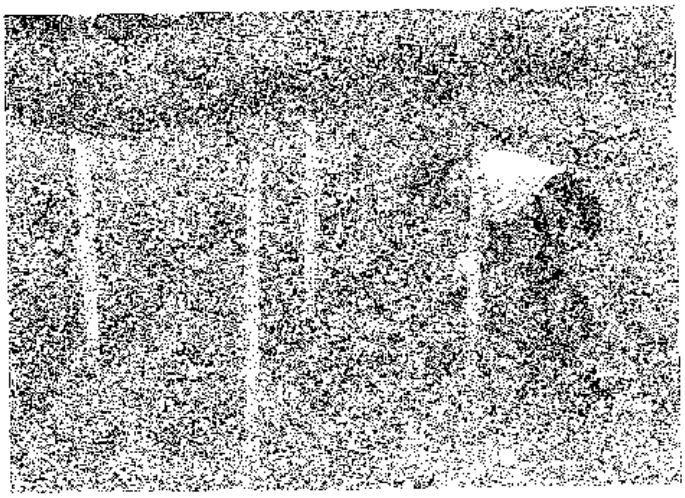
We think we reduced the experimental error in the 1983 biculture experiment. The experiment compares the yields of wild senna and Illinois bundleflower growing separately and together. In 1983, some of the seeds did not germinate, and a few plants died during the winter. We filled in all those blank spots with seedlings and we expect much more trustworthy results this year.

Martin Gursky and Dana Price innoculated the year-old Illinois bundleflower with nitrogen-fixing bacteria. They mixed water, corn syrup, and the bacteria and poured the mixture in a furrow they dug near the Illinois bundleflower rows.

A new biculture uses Eastern gama grass and Maximilian's sunflower. Both are two potential crop species that were part of the tallgrass prairie. We have observed that both are strong competitors against annual weeds.

One reason we put Eastern gama grass and Maximilian's sunflower together is to find out if the two species will reach a stable equilibrium and co-exist, or if one will crowd out the other. On half of each replication, we also interplanted a nitrogen-fixing legume, which we will never harvest, to see if the increased fertility will have an effect. We did not weed the plots. With two powerful competitors like Eastern gama grass and Maximilian's sunflower, we expect annual weeds and perhaps perennial weeds to be crowded out.

Janine Calsbeek and Russ Wysong



Dana Price checks her experiment.

Another experiment, new this year, compares the effects of nine different species, including five legumes, on Maximilian's sunflower. Maximilian's sunflowers appear to give off a natural herbicide. Various research papers suggest this to be true, but an unintentional experiment convinced us at The Land Institute. In 1983, we worked a large area of ground to do experiments. The plow, disc, and springtooth went directly across the whole area like one field, treating all the ground alike. Then we planted Maximilian's sunflower in a fifty-four foot square with a grain drill. We quickly cleaned the grain drill and planted wild senna next to the sunflowers. Nothing more was done until harvest. Neither plot was ever weeded.

In early spring of 1984, wild mustards grew thickly everywhere there had been no sunflowers in 1983. Around the fifty-four foot square plot of sunflowers was a distinct line, with mustards thick on one side but very few mustards on the other side. A few seeds of Maximilian's sunflower had been missed when the drill was cleaned, so a few Maximilian's sunflowers grew among the wild senna. The mustards were not growing close to those sunflowers either. This reaction was all the more striking because the sunflowers were dormant throughout most of the life of the mustard.

Other plants not known to be allelopathic (capable of producing a natural herbicide) have been able to compete well with weeds. Wild senna, planted last year and never weeded, is producing seed and growing well in spite of much weed competition. A three-year old plot of Illinois bundleflower needed weeding only once this summer. The plants quickly grew up and shaded the ground, and kept weeds from getting established.

Research Advisory Group

Various professors gave us technical help when we needed it. Dr. Craig Martin, a professor in the Botany Department at the University of Kansas, brought out a machine that measures

photosynthetic rate, that is, how much sugar a square inch of leaf produces per second. He and Heidi Schmidt, a Land intern, used this machine to determine whether there is a difference in photosynthetic efficiency between one, two, and four-year old Maximilian's sunflowers. No difference was found.

Dr. Jim Mayo, a biology professor at Emporia State University, helped Land intern Martin Gursky set up an experiment to detect different responses of plants to nitrate and ammonia, two forms of soil nitrogen. Dr. Mayo also loaned Martin a machine that detects atmospheric nitrogen fixation by plants. With it, he found that wild senna does fix some nitrogen. Previously we had thought it did not.

Dr. Lawton Owen, a professor from Kansas Wesleyan, identified several insects for us. These included beetles that eat our Illinois bundleflower seeds in storage and a midge that causes galls (tumor--like growths) on Maximilian's sunflowers.

Improved Techniques

New equipment and new procedures improved our research program this year. We bought a one-row planter which saves time planting and thinning. It does require a very fine soil, though, for even spacing. We also purchased a seed cleaner which quickly cleans small quantities of seed. For years, we have had a cleaner that effectively cleans large quantities of seed, but for breeding we needed one which would separate out a handful of seed without losing any. A cheaper, and perhaps more important, innovation was our biweekly tour. Every second Thursday we would all spend half a day walking through the research plots together. This kept everyone aware of changes in the plots and up to date on needed work. Our data records got bulky enough that our former filing system became inadequate. Now each experiment has a separate notebook which will be used for the duration of that experiment, sometimes several years.

Walter discusses experiment on Thursday tour.

Disappointments

1984 was not without disappointments. Insect damage, poor germination and plant disease all caused problems.

Bruchid beetles got into Illinois bundleflower seed storage and ate most of some accessions. This made it impossible to select for better germination this year. It also meant fewer plants to compare for other traits. We think that freezing the seeds for the winter is necessary.

Maximilian's sunflower seed did not germinate well in some plots this year. We found that of five bags of seed, only one bag had good germination. The other four had 11% germination and signs of mold. Apparently it had not dried fast enough. We will try to not let that happen again.

Our wild senna has a leaf disease. In nature, we find wild senna growing in small patches, each patch widely separated from the next. Each patch is in quarantine to some extent. When we planted out an acre of pure wild senna, we set up conditions for an epidemic.

We have the potential for a similar problem with insects that eat sunflowers. One species of caterpillar that eats sunflower leaves can defoliate a plant. Another species of caterpillar burrows into the flowers. As long as there was one sunflower here and another way over there, the moths had to spend most of their lives looking for sunflowers. When we plant a field to sunflowers, the moths can spend less time looking for sunflowers and more time eating and reproducing.

Neither the wild senna disease nor the sunflower insects are a serious problem yet, but we recognize them as potential problems. It is important to us that the grasses we are working with (Eastern gama grass, sorghum, mammoth wild rye, tall and intermediate wheat grass) are all climax species in their native habitat. They can be found in nearly pure stands covering several acres. This tells us that they deal in other ways with insects and diseases and do not count on quarantine.

Conclusion

Although there remains weeks of harvesting, threshing, weighing, calculating, and writing, we look back with satisfaction on our summer's work. We improved over 1983, and we learned things which will make 1985 a still better year. In 1983, some of the results for our experiments were not statistically analyzable due to some flaw in design or execution of an experiment. In 1984, we had fewer such problems. Those we had were mainly due to poor germination of sunflower, Illinois bundleflower, and wild senna seeds. We can lessen the sunflower and Illinois bundleflower germination problems from now on.

We built well on last year's results, and laid a solid foundation for next year's work. The day when people farm with perennials is one year closer.

Why Sooner and not Now?

Walter Pickett

As early as 1950, researchers reported the development of perennial grains,[1] but thirty years later, no one is using perennial grains. The biggest single reason is that yield declines in the second and later years after planting. First-year yields may be acceptable, but second-year yields are as much as 25% less. Given the ratio of fuel prices to grain prices, it has been cost effective to spend the money to prepare the seedbed each year and replant. Why does The Land Institute think that this will ever change, and how will the change come about?

If the fuel/grain price ratio changed drastically, it could become more profitable to accept the tiny profit of a small second-year crop rather than pay to prepare the ground for replanting. However, we are not counting on a changed fuel/grain price ratio to make our system compelling. We have taken on the problem of low yield in the second, third and later years.

We may not have to get second-year yields up to the level of first-year yield. If it costs $18 per acre to prepare a field to plant wheat (what one farmer charged in 1983) and wheat sells for $3.43 a bushel (the local price on June 11, 1984), then a drop of 5.2 bushels per acre will still be competitive. Since the price of fuel and grain are both subject to change, we cannot predict how big a yield sacrifice can be acceptable in the future. We expect the acceptable yield drop to get bigger, but I already said we are not counting on this to make our alternative acceptable. This just gives us an idea how close later yields will have to be to first-year yields.

If we are to get second-year yields up to first-year yields, we must know just why the second-year yields are now lower than first-year yields. Reasons that have been suggested include the following: drop in fertility of untilled ground, buildup of diseases and insects, change in plant density and treating perennials like annuals.

Soil Fertility, Weeds, Insects and Diseases

Low fertility, weeds, insects and diseases are not the causes for the second-year drop in yield. The increasing popularity of no-till farming shows that these problems can be overcome.

At The Land Institute, we are working toward ways of maintaining soil fertility and controlling weeds, insects and diseases without synthetic fertilizers and pesticides. But we assume that if these were the only problems, conventional agriculture would have easily found chemical solutions, as has been done for no-till farming.

Density

The density problem is a real one. If one plants at the optimum density to start with, yield will be reduced in the next year if the density goes either up or down. If many plants die, their yield is lost. If instead, plants spread, they become too crowded, compete for water and nutrients, and do not have enough strength left to produce a good yield.

We are now doing an experiment in which we thin a field of perennial sunflowers each year to its original density. We expect density to have a large effect. But it cannot be the reason for past failures because it has such a simple solution.

One could determine the optimum density for second-year yields, then plant that amount of seed of the perennial grain, plus enough seed of a similar annual grain to give optimum density for first-year yield. The mixed annual and perennial grain would be harvested in the first year. Then the annuals would die, but the perennials would spread to the optimum density for second-year yield. Yields would not drop until the third year, when the perennial began to crowd itself.

Problems of "Perennial Genes" in Plants That Were Annuals

If a plant has many thousands of years' history of evolution as an annual, some might expect that adding a few genes for perennialism would not work out well. Many breeders have transferred a few chromosomes (usually fourteen) from tall wheat grass, a perennial, to wheat, an annual with forty-two chromosomes. Some of the resulting varieties are perennial wheat-like plants. The high first-year yield but low second-year yield might be attributed to all the genes for annual habit being only partly overcome by the few genes for perennial habit. However, like researchers before us, we found that yields of pure perennial grass species start out high but they also drop to a lower level. Such a yield drop is not attributable to annuals in the pedigree.

Treating Perennials Like Annuals

We at The Land Institute believe it is a serious mistake to treat perennial grains the same way annual grains have been treated traditionally. Methods of maintaining high seed yield for grass seed production depend on the particular species being grown, but burning the fields once a year boosts seed yields of most perennial grasses. This is just one example of how perennials are treated differently from annuals.

We would presume that people who worked on perennial grains were aware of the farming methods used by forage grass seed producers. However, we have found little in the literature to suggest this.

We think of mulch as being good in gardens, but garden mulches generally are put around plants only after the soil has warmed up.

Mulching too early prevents the soil from warming up in the spring, with a resulting drop in production. Removing the mulch, either by burning the field or by close grazing or haying, allows soil to warm up earlier.

Warming the soil earlier starts the grass growing sooner so it can grow during cooler weather. The warm soil starts bacterial action sooner, which makes nutrients available sooner. These and other actions, still unknown, generally increase seed yield when the dead grass is removed. Yet literature on perennial grains seldom mentions mulch or mulch removal.

Choice of Crops

Perhaps an important consideration is the choice of perennial crops to study. In the past century, various people have tried to make wheat, rye, triticale, corn, and sorghum into winter-hardy perennials by adding a few genes from their perennial relatives. The results were only moderately successful, economically unsuccessful. The reasons for using these crops were (1) there was already a market for the grains, and (2) perennial relatives were available as a source of perennial genes.

A better way to choose a crop to work on might be to find wild plants that already have high yield. That was a criterion our ancestors used in choosing which plants to domesticate. We are pursuing this method, also. We found Illinois bundleflower, wild senna, and curly dock already to have high yield under some conditions, and they are already perennials. At The Land Institute, second-year yields of wild senna in 1983 did not drop in all cases from 1982 first-year yields. This showed us that second-year yields do not have to drop. A group at the University of Arizona has reported some success with a high-yielding wild perennial, buffalo gourd. Dr. W. P. Bemis heads the group, and he has published encouraging results.

Why Sooner and Not Now?

What encourages us most are reports of perennial grains used in the past. The Vikings ate Lyme grass seed as a cereal. Lyme grass, Leymus (formerly named Elymus) arenarius, appears to have been planted in areas where it did not occur naturally.[2]

Dr. A. I. Derzhavin, a Russian rye breeder, says that Armenians in Turkey recall that before the first World War, they had a strain of a perennial rye, which was grown on sandy soil where annual rye could not be cultivated. Dr. Derzhavin noted that Cossacks also once had perennial rye.[3]

These are two examples of perennial grains that were used in the past. We have made no search for such examples; rather, reports of these examples were sent to us by friends who knew of our attempts to develop perennial crops. Perhaps many other examples exist. But we do have an answer to the question: "If any agriculture based on perennials is possible, why have people always farmed with annuals?" The answer is, they haven't; some have cultivated perennials, so we know it is possible.

1. Many references are available. Notable is Wide Hybridization in Plants, N. V. Tsitsin, editor. Published for the National Science Foundation, Washington, D.C. and the Department of Agriculture by the Israel Program for Scientific Translations, Jerusalem 1962.

2. Lisa Carlson Griffin, "A 'Lost' Viking Cereal Grain" in Journal of Ethnobiology 1(2):200-207.

3. A. I. Derzhavin, "The Theory and Practice of Producing Perennial Rye Varieties" in Wide Hybridization in Plants, p. 143.

Ann Zimmerman, Kirk Riley, Martin Gursky, Tony Martin and Illinois Bundleflower

Our Community Organic Garden

Dana Jackson

The first killing frost (September 29 this year) marks the end of a garden cycle at The Land. We can forget about watering and weeding the tomatoes, eggplant and peppers, although our lettuce/spinach bed and the Swiss Chard will need attention until the short dark days in December. But the summer garden is history.

From 1974 through 1982, the organic garden belonged to the Jackson family. We had a semester program then, and there were no students around in the summer. When The Land Institute began the 43-week agricultural intern program, we turned the garden into a community project, and now all of us share in the work and the produce. I generally make decisions about the garden, although the ideas and experience of all the gardeners are taken into consideration.

Before a new group of interns arrives in mid-February, I have already ordered the seeds. The garden work begins on March 1 when we start planting broccoli and cabbage in flats. About the middle of March we plant tomatoes, peppers, eggplant, herbs and flowers, and the flats are placed in the living room windows of our house. We start planting spring vegetables out in the garden as soon as the weather permits.

As director of the garden, I draw out the garden plans for the year, deciding where particular crops will be planted based on where they were the year before. We do not plant vegetables or their relatives in the same area two years in a row; in fact, we try to let two years pass before repeating a similar crop in the same area. I also decide when it is time to begin planting and recruit workers during our morning warm-up.

On March 14, 1984, the weather was good, so we got out the digging tools and rakes and began to build raised beds. With most of the interns helping, we shaped nine beds by the end of the afternoon and had planted onions, radishes, carrots, beets, several kinds of lettuce and spinach. While the beds were being built and planted, other students put in peas in a second garden plot near the Herbary. On the 16th, Martin Gursky organized the planting of nearly 50 pounds of seed potatoes. This work was all done just in time, because on March 18 and 19 we had snow and ice. It stayed cold, and we stayed out of the garden until April 6, when Janine Calsbeek and Ann Zimmerman planted leeks, kohlrabi, and more lettuce. We continued planting during April: sugar snap peas, snow peas, chard, parsnips, garlic, more carrots, three kinds of cabbage from the plants begun in the house. In May we set out the warm weather plants started in the house, (tomatoes, peppers, etc.) and planted corn, okra, beans, cucumbers, squash, melons and flowers.

The advantage of having a large garden and planting a variety of different vegetables and fruits is that we can always count on getting something to harvest. One year we may have a bumper crop of cucumbers, but the corn yields little. Another year the aphids may get all the turnips, but the beets do very well. So far I have found the weather to cooperate during at least one of three seasons, so spreading the garden out through the spring, summer and fall also insures us of success with some crops.

Beginning gardeners are sometimes misled into thinking that a garden which has insect problems is not successful. The first garden in a new area usually does have few insects, but repeated plantings for several years generally will attract any critter the geography produces. A garden has been planted in one of our plots at The Land every summer since 1971. Other areas have been in use since 1974, or 1980. All the insects have found us by this time. Predators of those insects have found the garden, too, so the presence of a population of pests does not always mean disaster. The plants often do need our help though to withstand attack by pests.

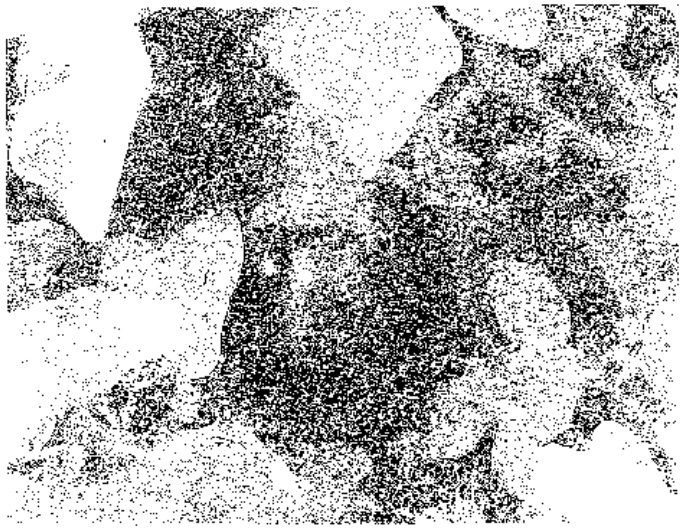
The eggplant won the medal for surviving assault by the most insects this year. First, brown worms began to eat the leaves in the night, and the only control was to go out with a flashlight and pick off the worms. Next came the flea beetles, which ate tiny holes in the leaves. When the leaves began to look lacy, we dusted the eggplants with rotenone. This is considered an acceptable insecticide by organic gardeners, but we use it sparingly, because it can also kill beneficial insects. Before long, gray blister beetles and striped blister beetles began feasting on the eggplant leaves. Colorado potato beetles joined the banquet. Students diligently picked off the beetles by hand each day and kept them under control. Then we noticed that the bottom leaves of the plants were drying up and falling off, as were the tomato leaves. Since millions of cucumber beetles thrived in the garden by that time, I suspected that they spread a wilt to the eggplants and tomatoes, just as they did to the cucumbers. We again used the rotenone to reduce the population of cucumber beetles. Bottom leaves kept falling off, but new, vigorous green leaves continued to appear at the top. The plants looked somewhat bedraggled, but they flowered and set fruit.

There are many people who would think we wasted a lot of time and energy fussing over such a distasteful vegetable and, in fact, not

everyone at The Land likes eggplant. I am finding that a major challenge of a community garden is to select the right vegetables and plant the right amount of them. We did not have enough onions; we had too many zucchini and yellow summer squash. We could have eaten more kohlrabi and planted less lettuce. Since three student households had small gardens of their own, we had an excess of the same vegetables planted in The Land's garden. This will never come out exactly right, but next year I plan to find out ahead of time who will have gardens and what they will plant. I imagine we will begin planting larger plots of potatoes and corn, which take too much land for small home gardens.

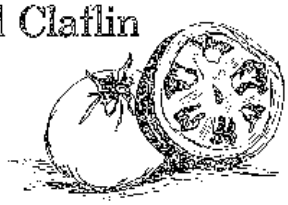
The garden notebook for 1984 has many lists of "what to do" or "what not to do" in 1985, based on the mistakes and lessons of this past summer. For example, the corn was very spotty because the brand new seed planter we used did not drop two seeds every eight inches as instructions said it would. After testing it a short distance, we determined that it worked well, so we quickly planted the whole patch. We were very disappointed when the corn did not come up where we thought it should. The students had trouble with the planter in the experimental plots also and learned that the ground must be worked until it is fairly smooth and the planter should be pushed more slowly. Some of my other notes are resolutions like "Plant the tomatoes farther apart next year!" or "Don't plant so many rows of yellow beans."

The garden notebook is a useful record of the 1984 garden. It is also the history of a successful community project. Although some people worked in the garden more than others because they preferred to do so, everyone helped at one time or another. Names of interns and vegetables on each page tell the story: Janine and yellow beans, Paul and peas, Mike and okra, Tony and tomatoes, etc. A dozen people shared the planting, mulching, weeding, and hoeing required by this large garden, just as they shared the salads, ears of corn, watermelon and baked potatoes at noon. In the 1984 garden, we learned more about growing vegetables and we learned more about growing community.



Gardening at 9th and Claflin

Tony Martin



One of the great joys of gardening for me has always been the solitude; being alone with the dirt, the plants, the bugs and my thoughts. But gardening on the corner of Ninth Street and Claflin Avenue has been very much a public affair; it's one of the busiest intersections in Salina. We don't have to tell people which corner we live one, the other three being occupied by a convenience store, a furniture warehouse, and a gas station. Behind our house, on the bank of this asphalt sea, is a tiny patch of Burmuda grass, to which I took a spade one warm March day.

Since then, my efforts have been on constant display before a steady stream of passers-by, both motorists and pedestrians. At times I have found this public contact unsettling. I haven't enjoyed pulling paper cups from the convenience store out of my garden along with the weeds; or dumping buckets full of ripe garbage into the compost pile under the watchful eye--and nose--of the neighbor hanging out clothes; or feeling the gaze on my sweating back of comfortable motorists, idling at the stoplight in their air conditioned cars, so near I could reach out, tap on the window and hand them a lead exhaust covered cabbage. "The poor fool," I imagine them thinking, "doesn't he know there's a Safeway down the street?" Then at other times, I've fancied myself a kind of Johnny squash seed, and my garden as a powerful consciousness raiser, greening the minds of Salinans who would be so impressed with the beauty and bounty of my little Eden they would all run home, tear up their yards and turn them into cornucopias.

Conversations with my landlord did not encourage this fantasy.

"My! You're really going to have a big garden!" (I'd just finished digging <u>one</u> 4 X 12 foot bed.) How much more of this lawn you plan on digging up?

"Well...ah...all of it."

"Oh!"

Tony Martin and daughter Angie work in their garden..

Or at the compost bin:

"You making a fence with those pallets?"

"No, it's a compost bin."

"Oh! What are you going to put in it?"

"Well, leaves, grass clippings...garbage... ah...manure..."

"Oh!"

"But it won't smell bad after I turn it a few times."

"Oh!"

On the whole though, reactions to the garden (including those of the landlord) have been overwhelmingly positive. People told me I'd have vandalism problems. I've experienced none. The eight year old boy next door presented himself as a prime candidate for such acts when he threw a brick through our basement window shortly after we moved in. Mario was watching me put out tomato plants one day when I asked him how he would like to have a plant of his very own. He liked the idea, and planted one (with a little help). Since then he has caused no problems. I'd read about trap crops serving as hosts for potential pests, but this was the first time I'd ever seen it work.

The teenager who mows the neighbor's lawn has been more than happy to dump the clippings into my compost pile rather than bag them up. His question about what in the world I wanted with "all this stuff" gave me an excellent opportunity to launch into a mini-lecture on solar energy and nutrient cycling, to which he responded with, "Hmmm...I never thought of that before."

I've come to accept, even welcome the many people who walk by. They punctuate my work with polite comments like "Nice garden," or "You sure do work hard out here," or "What's that plant?" I say "Thank you,"--"It's recreation"--"That's okra."

By far the high point of my ongoing encounters with strangers passing by was with the woman who pulled into the driveway one Saturday afternoon in July and got out of her truck to shake my hand and say, "I pass by here every day on my way to work and I've been watching your garden grow. I just wanted to tell you, I think you've done a beautiful job." I never heard comments like that when my garden was five miles from town and one hundred yards from the road!

In addition to attracting such beneficial visitors, my tiny yard on a busy corner environment offers several other unexpected advantages.

Twenty-four hour gardening. The street lamp on the corner means that, like the Kwik Shop across the street, my garden is open for business around the clock!

Very few insect problems. While squash bugs descended almost immediately on the zucchini plants at The Land Institute, it took them nearly two months to find my four hills. By which time we were so glutted with squash, their presence seemed a blessing!

Very low maintenance. One lazy Sunday afternoon, I was taken by a desire to go out to the garden and putter and, unbelievable as it may sound, there was nothing for me to do! Because the garden is so small, every available inch of space was planted in something. All the plants were heavily mulched with newspaper and grass clippings--there was not a single weed in sight. It was something I'd never experienced

in all my previous years of gardening plots bigger than I had time to handle, though I'd often dreamed of it. Much to my surprise, I didn't like it. It seemed unnatural. I mean, what's the point of having a garden if you can't garden?

I was much relieved a couple of weeks later when Burmuda grass finally started finding its way through the mulch and the plants started drooping for lack of water. Once again I could go out to weed and water by street light while listening to the radios of passing cars. And once again I could be alone with the soil, the plants, the bugs, the traffic, the people, and my thoughts.

The Cornucopia Project

Mike Berghoef

The Land Institute receives many publications from organizations that are working toward various phases of a sustainable society. One of the initial transition steps is to link local, organic producers. This route would eventually lead to the construction of a secure, stable, non-exploitative food system. This is the goal of the Cornucopia Project.

In 1980, Rodale Press initiated the Cornucopia Project as a part of the Regenerative Agriculture Association. The goals were to begin an organization which would analyze the vulnerabilities in the U.S. food system, seek out more sustainable options and develop programs to encourage local, organic, family farms that work toward benign agricultural practices. A Cornucopia Project membership allows a person access to their publications, which include the book Empty Breadbasket??, many state-specific food system studies, a quarterly newsletter, various editorials and food system news summaries.

Empty Breadbasket? "The Coming Challenge to America's Food Supply and What We can Do About It" is the Cornucopia Project's major publication. It is an analysis of the present U.S. food system, and it covers many facets of the production and distribution of food. The book considers the structure of the economic system, and the availability and use of resources. It covers transportation, soil loss, environmental impact of herbicides, pesticides and fertilizers and issues relating to crop exports and aid for the poor.

The quarterly newsletter describes the activities of the Cornucopia Project. The most recent summer issue covered the political considerations in food system policy and planning. This featured a breakdown of the major presidential parties' positions on food issues. Also included was the Congressional voting records on sustainable agriculture issues.

Approximately one-half of the fifty states have individualized food system reports (former Land student Kelly Kindscher wrote the Kansas report). These include listings of basic agricultural, land use, and consumer trend facts (i.e., amount of soil loss, dependence on imports, energy use and waste), recommendations for change and summary charts of food import statistics. Although these reports are rather general, they do tie together useful United States Department of Agriculture and state university information under the alternative agriculture paradigm. Subsequent studies will probably enable these reports to be more specific in the future.

The consulting service of the Cornucopia Project, together with the Rodale Research Center, has met with the leaders of the East African nation of Tanzania. Rodale staff worked with the farmers of Tanzania to increase their agricultural self-sufficiency. The methods of crop rotation, composting, manuring and intercropping have helped them maintain higher soil fertility and reduce certain crop health problems. This service was requested initially by the Tanzanian government and then requested and supported by the U.S. Agency for International Development. This situation is unique in that a developing country chose to import an organic, "soft" agriculture rather than a high technology agriculture requiring capital-intensive equipment and fertilizers.

The Agmarket Search is a recently-developed service that provides local market information to the Cornucopia Project's producer clientele. Computerized bulk purchaser surveys estimate potential local markets for specific foods. The listings also include the number of purchasers willing to buy local crops in season, their willingness to buy organic foods, and other services required by the purchasers.

Cornucopia Project symposiums have been organized on both national and regional levels. These are designed to help create more local groups. Several alliances have already been formed, such as the New Jersey Cornucopia Network and the East Central Cornucopia Alliance consisting of Michigan, Ohio, Illinois, Indiana and Kentucky. For further information on these and other Cornucopia Project activities, contact: Cornucopia Project, 33 East Minor St., Emmaus, PA 18049; (215) 967-5171.

Research Supplement

Ag interns write reports on the experiments they have conducted for publication in THE LAND REPORT RESEARCH SUPPLEMENT. To receive a copy, send $1.00 with your request to RESEARCH SUPPLEMENT, The Land Institute, Rt. 3, Salina, KS 67401.

Persons who already ordered the 1983 issue will receive it in combination with the 1984 reports. We apologize for the delay.

The Art and Science of Balance

Heidi Schmidt

"Any attempt to isolate a segment of reality is always misleading, but not for that reason less necessary." Herman Daly

"Koyaanisqatsi" lingers in the back of my mind as I plot out my perennial sunflower experiment. This Hopi word is roughly translated to a few related English phrases: crazy life, life in turmoil, life disintegrating, and, life out of balance. "Koyanniscuatsi" is the title to a movie which has no dialogue, only images of the destruction to the earth the human race has caused. In one of our morning sessions, Terry Evans, the Arts Associate at The Land, discussed with us the extraordinary symbols in this movie, which warn the viewer that the consumptive trait in humans has caused life to become out of balance. Terry then passed her prairie photographs around our discussion circle and explained how through looking closely at the prairie she has learned the flip side of "Koyanniscuatsi," life in balance. I, too, have learned the flip side of this word through studying the ecology of the prairie.

Ecologist Paul Sears wrote in 1935:

"The old problem of population pressure and tribal warfare appear in newer and more horrible guise, with whole nations trained for slaughter. And back of it all lies the fact that man has upset the balance under which wind and water were beneficial agents of construction, to release them as twin demons which carve the soil from beneath his feet, to hasten the decay and burial of his handiwork."

Artists and scientists both must work to restore the balance which makes life possible on the planet. They can help humans learn about life in balance if they can be freed from false notions that purely subjective or objective approaches are possible. Terry's art and my experiments will both have greater integrity if the subjective part of our research is revealed and brought in with the objective.

As I laid out my experiment for resource allocation in Maximillian's sunflowers, I had to make sure the rows were perfectly straight and that the plot was a perfect rectangle. I began to think: Here I am treating a piece of the prairie as if it were in a box. Nature doesn't plot her ecosystems with the Pythagorean theorem. Why do we treat our work this way if we are studying the prairie ecosystem? Then I remembered that when Terry began to photograph the prairie, she focused on particular quadrants that had been marked off. She used a certain film speed and held the camera a certain distance from the ground so she could capture a true reflection of nature's order. The reason we both began by squaring out the prairie was to have observations that were accurate and credible, to obtain publishable data.

The specific answers to biological questions are very important to the validity of our work, but when studying ecosystems, we are dealing with a complexity of variables, and we must expect nature to not always respond the way she did in our observations. It is an art to keep our minds from setting limitations on what the possible results may be. Arnold Schultz, who was our visiting professor from the University of California, Berkeley, in early June, told us not to look at our experiments as only answering particular questions, but to look at them as generating new pathways. Again I thought of how the artist works, how Terry worked in photographing the prairie. First she restricted herself to taking just ground shots in black and white, because she felt this was the only way to get a true representation of the natural forms and lines she was observing; color and horizon shots were too distracting and sensuous. The patterns she observed led her to eventually lift her camera 45 degrees and study other patterns over the landscape. Connections began to be revealed. Her pathways were increased. Then she began to photograph animals, which led to other discoveries. A wonderful example is the similarity in pattern between the hide of a buffalo, as seen in a close-up shot, and the grass on the Konza Prairie as seen from an airplane.

Today scientists have the tendency to separate the plant into parts and then singly study each part. Then they add up the information received from the study of each part and say, "This is a plant." The problem with this way of observation is that it ignores the truth of inter-relatedness. As children, we should have listened more closely to the song about our bodies: "The knee bone's connected to the thigh bone. The thigh bone's connected to the hip bone," etc. In our work at The Land, we must be constantly aware of the connections and interrelatedness of the parts in the ecosystem we separate out to study, or else we will miss some vital information. I read an article by Robert Albrecht in the April issue of The Utne Review called, "A Look Inside the World of Art." In the article, he is responding to a lecture he heard called, "What is Art?"

"The question as asked presupposes that art can be defined solely in terms of the art object itself and usually leads to a microscopic analysis of art technique, rather than shedding any light on the Gestalt we call art."

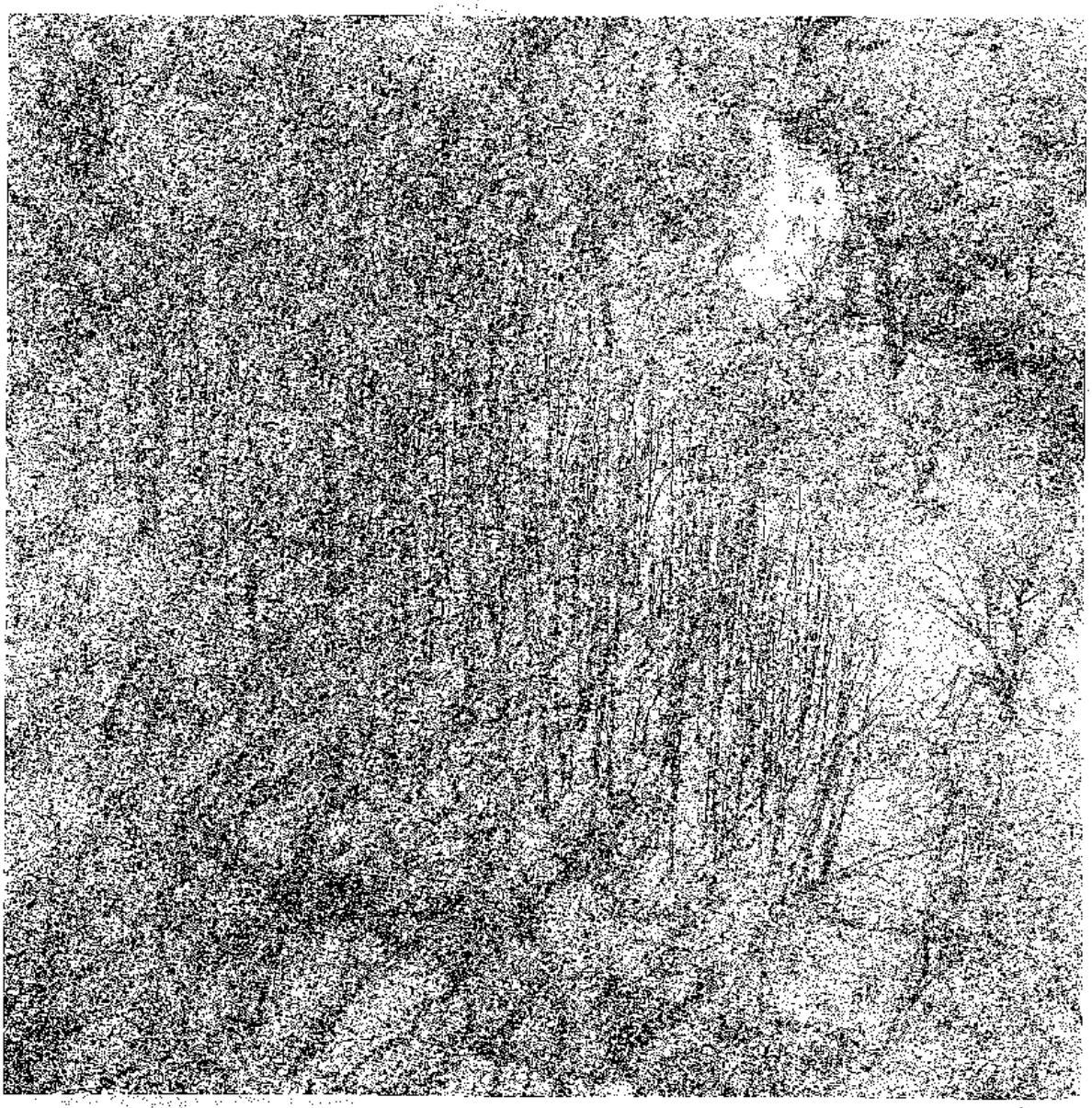
The word "science" could replace "art" in this paragraph, and the meaning would be the same. This is especially true when studying an ecosystem.

When I began thinking through these ideas, Terry pointed out to me that I was trying to separate everything out. I was putting labels on which was science at The Land and what was art. In class discussion one morning, one of us responded to an idea as being a "right brain thought." Wes was frustrated by labeling thoughts that way, because the right brain and the left brain are always working together, although one may be working more than the other. He also pointed out, "What about the top of the brain, and the bottom of the brain? Don't they work, too?" It was an oversimplification of a complex system. These categorical labels may be important to awaken us to different ways of thinking so we can understand how things work, but when they become overused, the terms and concepts lose their meaning. The same goes for analysis and art; it is all interwoven.

It is important to understand how different categories work, but to stop there would only limit pathways, limit our results. The following Tao prayer will be important for both Terry and me to remember:

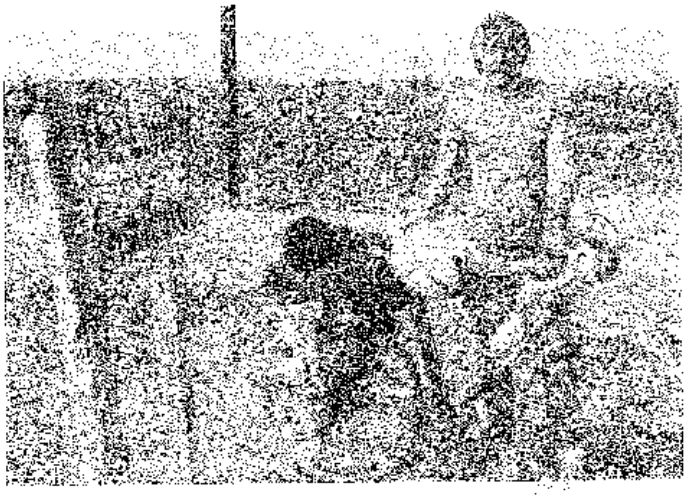
Thirty spokes share the wheel's hub;
It is the center hole that makes it useful.
Shape clay into a vessel;
It is the space within that makes it useful.
Cut doors and windows for a room;
It is the holes which make it useful.
Therefore, profit comes from what is there;
Usefulness from what is not there.

From our data and analysis, we profit by obtaining more factual knowledge to lead us to new pathways of discovery, but it is an art to make this data actually useful in pursuing our goal of a sustainable world, with life in balance.



Maxwell Game Preserve, March 1984

Terry Evans



Rediscovering the Bicycle

Martin Gursky

As a child, I remember how my boundaries were extended by pedalling my bike up and down the front sidewalk, timidly inching my way past another crack. Then as a teenager, before the driver's license and car, I recall how familiar I was with place, and how boundaries and time were so related to the state of repair of my bike, "Black Diamond." I named it after the big, black diesel locomotive that came by night to pick up ore cars in the rail yard behind our house. My bike was a single speed, ballooned-tired clunker which I believe I came by second or third hand. I painted the fenders coal black, and to make my mark, ran iridescent yellow stripes along the edges with large yellow diamonds in between. I know I believed it possessed magical powers, for I was able to go places and see things I would not ordinarily have seen.

From ages nineteen to thirty-nine, I rarely rode a bicycle or owned one. Then two years ago, I did some carpentry work for a brother-in-law who was building a house near us on the south shore of Nova Scotia. I had not wanted any payment, but Steve insisted that I take a Raleigh ten speed he had used for several years in New York City. I remember the day I decided to ride home on my new bike. It was a glorious day, very sunny with a slight cool breeze coming off the water. I pedalled out of his driveway and onto the coastal route heading for Lunenburg Town. While going along, I recall how calming and easy the pedalling was, and how I was becoming aware of the fine details of my surroundings. I knew this stretch of road, had travelled it often; but as I approached the government wharf in the small fishing village of Green Bay, the smells of fish and seaweed, the sounds of gulls and bell buoys and the sight of ocean against barnacle-clad wharf timbers all entered my senses at once, putting me in a sort of temporary trance. I started to realize how appropriate it was to be moving at this pace, so exposed to the outside world. My rediscovery of the bicycle had begun.

Even with the rediscovery, I found it difficult to substitute the bike for the car. It seemed that there was always a shortage of time or the roads were too large for the bike. Often the weather in Nova Scotia does not make biking easy. Eventually, my wife Donna and son Marcus joined me on short, recreational bike trips. We did no touring or overnight trips; most of our short jaunts never were over thirty miles round trip.

In November of 1982, I went to hear Wes Jackson speak at the Bentville Agricultural Research Station. I found his ideas about growing perennial plants as our food crops very interesting and necessary, and so I asked him afterward what the possibility was for an old man like myself to study at The Land Institute. He did not foresee any problem, so when I got home that night, I told Donna, "Start packing; we are on our way to the Land of Oz."

Six months later, the venture was beginning to materialize. After a couple of phone conversations with the staff at The Land, I assumed that if we got there, we could probably stay. Around the middle of May at the supper table, Donna, who normally presents the more logical proposals and is the more conservative, announced that she wanted to go by bicycle to Kansas. Our son Marcus told her, "No way." I thought, "My God, woman, have you gone mad? That is more than 3,000 miles and we are forty years old!" Then, on August 5th, with virtually no training and with last minute purchases of bike racks, panniers, and other necessary and unnecessary gear, we set off to find the yellow brick road, on bicycles.

The first day out and over our first major hill, we declared that to be the point of no return. The second day, with two flat tires, we questioned whether the decision of the first day could be revocable. However, following a brief discussion and meeting a fine old gentleman who helped fix our second flat, we were again bound for Kansas.

We travelled about fifty to seventy miles a day, at a rate of about ten to fifteen miles an hour. At this speed, one has time to absorb a great deal of information about the places one passes. There was time to read most of the historic signposts along the way even while pedal-

ing. We had time to exchange greetings with local residents and often stopped to indulge in longer conversations. There was time to inquire why forty or so large hotels and campgrounds were abandoned along Route 55 between Liberty and White Lake, New York. This place intrigued us. The hotels appeared as though the day of reckoning had come, and everyone had gone at once, leaving almost everything intact. We felt as though the owners and guests were just out for a short while and would soon be back. But it had been like this for about thirty years.

Most of the time we were travelling back roads which took us through rural towns and countryside. We took extra time to appreciate the natural beauty of the mountains in New Hampshire and climbed Mt. Washington. In Vermont we stayed with old friends at their lovely hillside farm, so typical for that area. But our ride was not all through esthetically pleasing countryside.

America has its share of ugliness, and there was time to see some of it. Some states were worse than others for almost continuous roadside litter of beer cans and broken glass. We found it took too much time to pass areas polluted by the fumes of either the pulp or oil industry. In the coal regions of Pennsylvania and West Virginia, we saw gallant efforts to heal the violated landscape, but it was apparent that nature had been pushed near her limit, and many of those scars were going to be there for a long time.

However, it was in these desecrated hills of West Virginia that we met some of the most energetic people, who have dedicated their lives to restoring the social and natural integrity this place must have had.

Had we been travelling by car, we would never have stopped in the coal mining town of Centralia, Pennsylvania, but on bikes there was time. Here we learned how a local politician and developer started a rumor about a major underground coal fire. He claimed that it threatened the lives of residents. He even brought in government mine inspectors to verify his position as he continued to buy up properties of frightened and packing residents. Several townspeople told us about the discovery of a major coal seam nearly two miles wide, running under the town. They said most of the residents were now quite sure the smoke that had been coming out the cracks in the streets and occasionally in their basements was probably due to two old smoldering dump sites that feed smoke into the labyrinth of coal tunnels already under the town.

Also in the coal regions of Pennsylvania, in the town of Carmel, we had an interesting overnight camp at the private hilltop campground of State Senator William Hilfrecks. It was late in the day and there appeared to be no public camping nearby. A clerk at the IGA store told us about the senator's place and said that he was known to be accommodating to travelers. So, off to the senator's place. When we arrived, we were told we could stay as long as we would like and that we should join in the local firemen's picnic going on that evening. We did, had great conversation and all the food and drink we could consume.

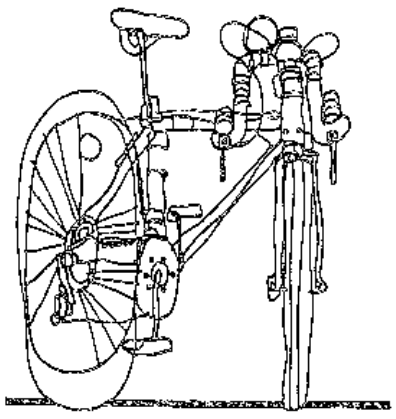
The bicycle, in addition to giving us much time to visit and explore, was a convenient vehicle to maneuver as compared to the car. We could often ride right up to anything we were curious about, and we could park just about anywhere. We did lock the bikes, sometimes with triple locks, and tried to use good judgment as to where it was safe to leave them. We had nothing stolen or abused the entire trip.

The bicycles were very easy to leave at hostels, campsites or in a friend's garage or basement. In New Hampshire in the white mountains, we left our fully-packed bikes at the Appalachian Mountain Club for the day for only twenty-five cents. In Washington, D.C., we were able to visit the Capitol and museums while staying with friends and then at a very interesting hostel. In Gettysburg, we took a room at a boarding house recommended by our bikers' handbook and found that it was run by a man who had been a battlefield guide for over forty years. He told us how best to use our two-day stay.

Because of the time it took to cross the mountains in West Virginia and our visiting along the way, it was now late October, and we could see early signs of winter weather. We democratically decided to end biking in Charleston and go by Amtrak the rest of the way to Kansas. By this time, we had covered over 2,300 miles and had passed through two Canadian provinces and eight states. There was no problem loading the bikes aboard the train for our two-day trip to Newton, Kansas. From there we biked to Salina.

We arrived at The Land on November 2nd; and on November 6th, when Wes returned, I was accepted as an intern. We found a place in Salina, about seven miles from The Land, and continued to use our bikes to get around. Donna worked at an evening job twenty minutes away by bike, and Marcus used his bike to get to school and explore every alley in town.

There is much support for cycling at The Land, as over half the students travel this way. Some of the people here have extensive biking



experiences, such as Dana Price, who has raced and done marathons, and Paul Adelman, who conducted European bike tours for kids. It has been really satisfying sharing our experiences.

Somewhere along the trip, I learned from a well-informed cyclist that among all moving animals and machines, a person on a bicycle has the highest efficiency rating. I since have discovered that a cyclist needs only a fifth of the energy of a person walking to move a given weight a given distance, as well as being three to five times faster. In terms of petroleum units, a cyclist in good condition is capable of 1,500 miles per gallon (1 gallon equals 34,000 calories).

The bicycle fits in with the teachings of Ghandi, Schumacher, Illich, and The Land Institute. It provides transportation that is personal power under personal control. It provides the exercise many of us pay for. It is non-polluting and is very economical. It also, especially on a trip like ours, gives one a terribly honest perception of oneself. A book I highly recommend, especially for all autophobes, is Daniel Behrman's The Man Who Loved Bicycles. He is adamant in his disdain for the automobile and longs for the day when the bicycle will overcome its tyranny. The bicycle for him is a vehicle for revolution. I agree. The bike has its place, and it is only time before more people rediscover its usefulness.

There is little doubt that the bicycle has made a big impression in our lives. I do not imagine us to be "century riders" (one hundred miles a day) or even less a triple century, but I am convinced we have learned how to substitute the bike for the car. With panniers and bike racks, we can easily haul as much as forty extra pounds. There are now all-terrain bikes on the market with gearing that will allow travel almost anywhere. The weather gear has come a long way and allows one to bike in rain and cold. Because of recent demand, bike parts and gear are coming down in price and quality has increased. The limitations of the bicycle as I see it are not technical, but attitudinal. I think we have made a partial transition. So, thumbs up.

Repairing the Solar Growing Frame

Ann Zimmerman

It began as a simple fix-up job for which I volunteered. But sandwiched between harvesting, preparation for the Salina Education Fair, Visitors' Day clean-up, and other generally more pressing things, the repair of the solar growing frame became a major construction project occupying many weeks of my time. In our always unpredictable morning warm-up session, the question, "What's the state of the solar growing frame, Ann?" became almost comically predictable, and I squirmed daily to explain why it was still incomplete.

The growing frame, built three years ago by students Maka Grogard and Fred Vogler with plans from Rodale Research Center, had been used each winter by Jacksons and interns, supplying fresh salad greens when the rest of the garden was a snowy memory. But the need for repair had become obvious.

The frame is made up of an insulated outer structure with south-sloping, double-glazed doors opening onto inner insulating shutters. We push the shutters back during the day so the sun shines through the glazing to the growing plants. In the late afternoon, we lower the shutters for the night to hold in the warm air around the plants.

By this summer, several parts of the growing frame were falling apart. Most obviously, the inner shutters--two panels of 3/4" Thermax insulation hinged with duct tape--were disintegrating. The duct tape's silver coating, under the force of the continuous sunlight, was flaking off and falling into the soil. Also being added to the soil within the growing frame were bits and pieces of transparent vinyl plastic torn away from the inner glazing of the doors. To Land people trying to grow food free of added chemicals, this contamination was worrisome. Besides these problems, a glazing support beam was missing and much of the structure needed a new coat of paint. The repairs would apparently be fairly straightforward, since I had the fully illustrated book of original plans.

Then the job began to grow. I found, in with the original plans, a letter from Rodale detailing a new, sturdier design for the shutters. Looking at the sorry state of the existing shutters, Mike Berghoeff, who was working with me on the project, and I agreed that something stronger was needed.

So began a process of scavenging for the right materials, and of purchasing the wood, insulation, and hardware that couldn't be found in The Land's scrap piles. The new shutters consist of wooden backings and frames around sheets of one inch Celotex insulation. There are two separate shutters, each one half the length of the frame and each double-hinged to

Ann Z. rakes soil in growing frame.

fold up against the back of the growing frame during the day. All boards were waterproofed with the least toxic waterproof coating we could find, and held together with nails and glue; the Celotex was held in place by reflective aluminum tape.

The rest was easier. We replaced the inner glazing of the doors with new plastic and bolted together the weakened boards that had split when we moved the glazed front panel. The only problem came in trying to remove silicone caulking where the old plastic had been attached. There may be a simpler way to remove the rubber-like substance, but we can confirm it is not by hand scraping, hand sanding, or attacking it with an electric wire brush. We finally just painted over the film of residue that remained, although the paint didn't stick to it very well.

When we had repositioned the front panel and installed handles to facilitate opening and closing the shutters, the growing frame was nearly complete. Caulking the cracks between the main parts of the structure was the final task.

This repair job took considerable time, and I appreciate all the help from Mike, and from several others: Martin, Russ, Amy Pallant, Tony, Dana P., and Wes. It points out to me what I am sure has long been apparent to people trying to live in a sustainable, self-reliant manner. Once the initial thrill of a new solar design, building, and use has settled down, there stubbornly remains that very mundane job of maintenance. Things aren't new for very long; if a self-reliant lifestyle is to be more than a fad, we must try to keep our enthusiasm and dedication as we maintain the structures we have built.

On Responsibility, Independence and Renewable Energy

Weeden Nichols

The use of renewable energy sources, versus non-renewable, is obviously an appropriate response to reality--the reality of the finiteness of the supply of fossil fuels, the reality of the damaging nature of both extraction and use of fossil fuels, and the hazards of the extraction, use and disposal of wastes for nuclear energy. Responsibility is the key. We do not wish to use very much of something which cannot be replaced, leaving all life after us with a much-reduced operating base. Not only do we not wish to deplete that base, but we also do not wish to poison or otherwise seriously damage it. And, aside from the persons and other living things to come after us, the earth itself is important. In addition to these considerations, however, how we approach decision-making regarding the use of renewable energy involves philosophical considerations, other than purely ethical, as well as economic and social considerations. (Practically speaking, we don't separate ourselves very far from economic considerations.) To put it another way, how much mileage can we get out of such a decision?

Here at The Land Institute, we use a vintage Jacobs direct-current wind generator to supply power for lights in the classroom building. This is a stand-alone system, meaning that it has no connection to the commercial power grid. (Without getting sidetracked into technology, which is not the purpose of this paper, it is also quite possible to have an alternating-current stand-alone system.)

We also have a Windcraft alternating current inductive generator which is an interactive system, meaning that it is tied in with the power grid. When we generate less AC power than we need, we automatically buy the difference from the power company. When we generate more, the power grid buys the difference from us. We don't need batteries for storage with the interactive system. In effect, the power grid is our storage. (Of course, what we are paid per unit of over-production is only about twenty percent of what we pay per unit of underproduction.)

Solar energy works for us at The Land. We make use of active solar heat in the classroom building and passive solar heat in the green-

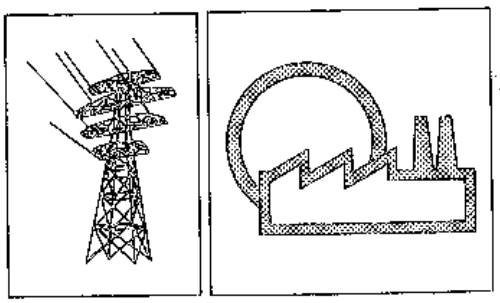
house and a small detached office. We have made experimental use of solar hot water heating and photovoltaic solar generation of direct current electricity. The Land Institute is contemplating large-scale use of photovoltaics in conjunction with the construction of a separate greenhouse.

We should note here that the possibilities for photovoltaics are essentially the same as for wind power. We could have an AC interactive system, or either a DC or AC stand-alone system. It would also be quite feasible to have a combination DC and AC stand-alone system. Initial cost is much higher for stand-alone systems, mostly because batteries are needed for storage. With energy tax credits, long-term payback is theoretically demonstrable for wind systems. With photovoltaics, although costs are rapidly declining for components, it would be hard to project payback at the present state of the art. With active or passive, direct or indirect gain, solar heat economic advantage could probably be demonstrated almost immediately in most cases.

The philosophy of The Land Institute favors use of contemporary energy versus stored fossil or nuclear energy, a sustainable society over non-sustainable, decentralization over centralization, and interdependence over dependence or independence. We favor simplicity and restraint in consumption.

There are those who foster illusions of independence or illusions of possible dependence. The Hank Williams, Jr., song "Country Folks Can Survive" is purely laughable, its portrait of independence including references to rifles and four-wheel drives. True independence in human society being clearly impossible, the option of being interdependent (depending on your own friends and neighbors, your community in other words, who also depend on you) should be preferable to being helplessly dependent (depending on governments and corporations, entities so large relative to the individual citizen that they need not consider the citizen's wishes or welfare).

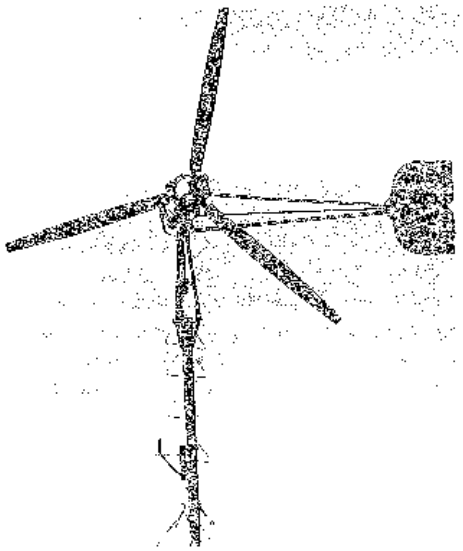
It would seem that in the process of making a decision regarding the use of renewable energy we have an opportunity to strike a "good lick" for decentralization and dignity as well as interdependence versus dependence. Simplicity is a positive value of itself; but the simplicity of passive solar heating, for example, is a value in aid of other values. The building is the system (often with cooling also being part of the design). There are no moving parts, and there need be few factory parts. These factors transfer dependence upon usually distant corporations to local businesspersons, tradespersons, neighbors--to interdependence.



Stand-alone wind or solar electric (photovoltaic) systems are not simple, and they are not cheap; however, there are benefits in terms of interdependence versus dependence. With interactive systems, the system goes down when the power grid goes down. The owner of the interactive system is as vulnerable to the whims of the power company as if no power system were owned and operative. (More vulnerable, really, because the power company can say at any time that the quality of power supplied by the private system is inadequate and must be disconnected. An interactive system cannot operate as a stand-alone system.) Further, the owner of the interactive system is totally vulnerable to the power company and the state government regarding "buy-back" rates. The "buy-back" rate may be so low (as ours seems to be) that during periods when we are not drawing power and all or most goes to the power grid, it may be costing us more to operate the system than we are receiving for the power we are producing. We are not in a bargaining position, nor is any other residential or small-business owner of interactive systems.

Let us consider the value of conversion to renewable power as a public statement. A passive solar house which is visibly a passive solar house, or a wind generator high on a hill, or a large photovoltaic array elevated above structures and trees and casting shadows upon the neighborhood, all are concrete, visible public statements. What kind of statements? We intend our statement to be (and we hope it is perceived as) a statement that we are aware of what most commercial power generation does to the environment, and that we are willing to commit some effort and expense to reversing that trend. Some public displays of exotic and costly alternative power devices may be statements of quite another type, however. They may be much in the vein of Thorstein Veblen's concept of conspicuous consumption, saying, "Everybody knows this gear is very, very expensive. Very few can afford it. But you can see I can afford it." Whether conspicuous consumption as a motive is ever a factor in renewable energy equipping is arguable but worth considering. Even if done for the wrong reasons, though, there is probably a net positive effect.

The problems caused by centralization include, but are not limited to, social (the vulnerability and helplessness of the individual, to which we have already referred), economic, and environmental. Energy is needed



for centralized distribution, and most of the energy so expended is non-renewable. Various mechanisms are needed for centralized distribution, and resources are needed to implement these mechanisms. If centralized distribution is not necessary in a given case, then the resources so devoted are either unnecessarily tied up or unnecessarily wasted, or a combination thereof. In the case of locally generating the power needed in a household or community, versus subscribing to the power grid, not much is accomplished other than a very good gesture, because the power grid is not going to disappear. In fact, those locally supplying some or most of their own power probably will prudently maintain their hook-ups. Trends, gestures, and statements are important, however. Actions which conform to the decentralization mode are gestures or statements which are not lost and, in the aggregate, become trends.

Of all the points touched or treated above, except for those pertaining to the saving of non-renewable energy or resources or to the prevention of harm and damage, the most important may be those which pertain to placing the individual on an equal footing in transactions. In terms of philosophy and economics, Adam Smith's "unseen hand" idea assumes transactions between approximate peers and envisions the greatest good to all obtaining through each party's acting out of enlightened self interest. Free choice no longer exists when one party to a transaction has so much power that the other party has truly only to acquiesce. With the loss of the assumption of a transaction between equals also comes the loss of faith that what is going on is the "free market" or "free enterprise system." Accompanying these losses, then, is the loss of faith that the greatest good for all necessarily results from such transactions. It may be that one necessity for a sustainable society is that the individual citizen may not be helpless in transactions, but be empowered to transact as an equal. This is a desirable trend which locally-converted renewable power from stand-alone systems might aid.

The Kansas Water Plan

Dana Jackson

The development of concern about water policy parallels the development of concern about energy policy. At first the fear of "running out" catches our attention. Next we start looking for new supplies. And last, we think about conservation, how to use what we have more efficiently.

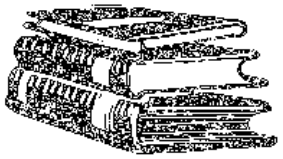
In Kansas, we are working on a fifty year State Water Plan, which is supposed to contain sections on management, conservation and development of the water resources of the state. The first draft presented for public comment by the Kansas Water Office proposed inter-basin water transfer schemes. These were dropped in the second draft, but the current Plan still focuses on the management and development of water supplies. In a November 9 hearing, Marsha Marshall of the Kansas Natural Resource Council pointed out to the Water Authority that the conservation section of the Plan does not outline any plan of action.

Both the supply and quality of our water could be enhanced by an effective conservation program. The Kansas Department of Health and Environment has found that a high percentage of suspended solids, phosphorous and nitrogen from agricultural run-off pollute Kansas water. Also, traces of agricultural pesticides and herbicides have been detected in 36% of the federal reservoirs in the state, 29% of the city and county lakes, and 42% of the public drinking water lakes.

The U.S. Department of Agriculture (USDA) statistics state that pesticide and herbicide use has increased 2.5 times between 1966 and 1982. The USDA also forecasts continued growth in the use of farm chemicals, due to the expected surge in conservation tillage practices, which are heralded as the savior of our topsoil, but use at least 30% more chemicals than conventional tillage.

The State Water Plan's solution to the contamination of water by agricultural chemicals is to implement more land treatment practices to reduce run-off. In testimony prepared for the Water Research Needs Conference on November 14, Mary Fund of the Kansas Rural Center acknowledged that this is important and necessary. But she also recommended tackling the problem at the source, the application of chemicals by farmers. Mary suggested that the Kansas Water Authority recognize the need for research into agricultural practices based on limited or no chemical use, from the perspective of its protection of the state's water quality.

If the Kansas Water Authority would pay more attention to conservation and water quality in the State Water Plan, they would find the problems relating to the management and development of water sources to be reduced.



Books

Axe Handles

by Gary Snyder
North Point Press, San Francisco, 1983

Reviewed by *Tony Martin*

When the name Gary Snyder kept coming up in conversations and readings here at The Land, I got out my old Norton Anthology of Modern Poetry and looked him up. In the introductory notes to the five pages of his poems there, I found the following quote: "I try to hold both history and wilderness in mind, that my poems may approach the true measure of things and stand against the unbalance and ignorance of our times."

The poems in Gary Snyder's latest work, Axe Handles, do just that. They speak with uncommon clarity and simplicity about the natural world, about the world of human culture, and ways in which the two come--and don't come--together.

In one poem about driving "across salt marshes/north of San Francisco Bay" he writes:

ah, this slow-paced
system of systems, whirling and turning

a five-thousand-year span
about all that a human can figure

grasshopper man in his car driving through.

Just what is and what should be our place in nature's "slow paced system of systems" is a constant subject of our discussions at The Land Institute. Snyder puts the discussion and what we humans like to think of as our "awesome powers" in proper perspective. In "Strategic Air Command," he responds to the flash of a jet across the night sky and his son's questions about satellites:

These cliffs and the stars
Belong to the same universe.
This little air in between
Belongs to the twentieth century
and its wars.

The time and space in which we exercise our "awesome powers" is indeed small. And we are completely surrounded, in both time and space, by powers infinitely more awesome than those of our invention. But Snyder does not offer this long view of things in order to dismiss our current destructive habits as insignificant. He offers it, I think so that we may look at ourselves and our place in creation more humbly and thereby "approach the true measure of things."

But the strength of these poems--and the accuracy with which they "approach the true measure of things" in general--derives from the fact that they are rooted in things in particular. "That is the poet's business, said William Carlos Williams, "not to talk in vague categories but to write particularly, as a physician works upon a patient, upon the thing before him, in the particular to discover the universal." And so, though Snyder writes about "system of systems" and the "universe," he takes as his starting point the things before him, "the smell of sun on gravel," "the taste of wild fig on the tongue," "amber beads of ancient sap in a rotting log." This is the language of poetry, of someone who is engaged and awake "like a dandelion head gone to seed about to be blown away." To speak of vague categories and generalized abstraction, to ignore "the patient," this is the language of alienation. It is possible to speak of being alienated from nature; it is not possible to speak of being alienated from "amber beads of ancient sap."

Alienation from nature, from work, and from each other is another subject that we frequently wrestle with here. Snyder succinctly describes the three alienations and the connections between them in a poem called, "Dillingham, Alaska, the Willow Tree Bar," where workers go after they "done drive cat...workers always on the edge of a brawl..."

Drinking it down,

the pain
of the work
of wrecking the world.

This connection between wrecking the world and wrecking ourselves appear more explicitly in another poem called "Breasts."

That which makes milk can't
help but concentrate
Out of the food of the world,
Right up to the point
where we suck it,
Poison, too

"But the breast is a filter," and nature (which, of course, includes our very flesh) has formidable redemptive powers.

So we celebrate breasts
We all love to kiss them
--they're like philosophers!
who hold back the bitter in mind
To let the most tasty
Wisdom slip through
for the little ones.
who can't take the poison so young.

These poems too are like breasts, full of tasty wisdom. And though Snyder is writing specifically about parenting in this poem, it is not just the task of parents, but of all of us to be like breasts and philosophers--to make tasty wisdom out of the poisoned food of the world. It is a hard task, for "the poison stays there in the flesh." And harder still is "the work that comes later...to then burn the poison away."

But concentrating poison and then burning it away, though it takes its toll in "flat breasts (and) tired bodies that will snap like old leather," can be a joyful process.

> And the glittering eyes,
> Old mother,
> Old father
> are gay.

There is joy in these poems--something rarely found in modern poetry--a joy expressed in the final poem "For All."

> I pledge allegiance to the soil
> of Turtle Island,
> one ecosystem
> in diversity
> under the sun
> with joyful interpenetration for all.

Imagine school children placing their hands on their hearts and reciting that!

One of the joys Snyder celebrates often in these poems is that of work, the kind of poison-burning work that is the very opposite of the alienating "work of wrecking the world." Axe Handles contains poems about gardening, splitting wood, putting up fence posts, turning compost, fixing trucks, plastering walls and painting houses. These poems come to my mind often as I work here at The Land Institute. After breaking a rake trying to use it to pound in a stake, I read the poem that begins:

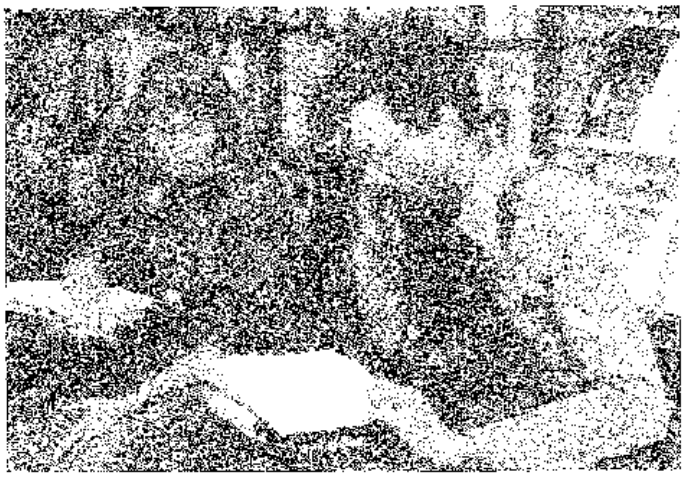
> What have I learned but
> the proper use for several tools?

And I wonder how many broken rakes it takes to learn that lesson!

Banging my hands while adjusting the tires on the Allis Chalmers tractor, I remember his poem, "Working on the '58 Willys Pickup," in which he contrasts his learning about trucks to his earlier, more scholarly spiritual pursuits as a student of Classical Chinese and Buddhism.

> The garden gets better, I
> Laugh in the evening
> To pick up Chinese
> And read about farming,
> I fix truck and lock eyebrows
> With tough-handed men of the past.

These are tough handed poems. And Gary Snyder is a tough handed poet--well worth locking eyebrows with.



Ann Zimmerman listens; Tony Martin reads a poem during warm-up.

Marked While Reading

Russ Wysong

I have two important educational interests. The first is in the continual process of learning and practicing the art of farming. The second is in being a teacher of the knowledge, skills, and attitudes necessary to ecological, more sustainable, types of agriculture than we have now in our country. My desire is to someday combine these interests by having like-minded learners with me on the farm.

With this vocational pursuit in mind, I am incorporating my ag internship at The Land as part of an Individualized Master of Arts degree through Antioch International, in Yellow Springs, Ohio. This relatively new interdisciplinary degree program is unique in giving the student the responsibility to articulate his or her educational goals and then to organize a curriculum to achieve them.

I have designed my Antioch degree program to provide the means to think and work my way back into farming and teaching farming in my home community of Wolf Lake, Indiana (northwest of Fort Wayne).

In developing the curriculum for my Antioch program, I did a great deal of reading. Certain paragraphs that I marked while reading have guided me in the design of my program. The four selections which follow illustrate the problems we face in developing a sustainable agriculture and the values which, I think, are important to integrate into farming and teaching.

.....

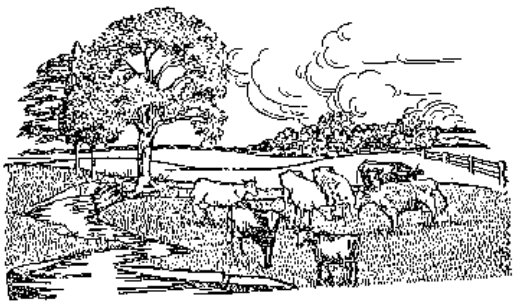
"A horrid little article graced the pages of the influential Farm Journal a few years back... describing 'Hiram Dracke, a keen analyst of farm trends who is also a farmer, feeder, professor and historian.' Professor Dracke, who operates

on a large chunk of Corn Belt land in Minnesota, is quoted as saying, 'Keep the people back in the cities and leave us free to farm. We'll send 'em food!'

Dracke speaks with the kind of innocent forcefulness that is the gift of those who will gain from generally discomforting change. 'A virtual revolution in farm consolidation is taking place, the extent of which is evidently beyond the grasp of most farmers,' the article quotes him as saying. 'Larger commercial farmers are rapidly expanding by using high-priced labor, paid managers, heavy borrowing and huge equipment. Meanwhile, small neighboring farmers, blissfully unaware, insist these very tools of growth spell the doom of large-scale farming.'

Dracke has studied trends in farm size (farms [conventional] that make money are getting larger), interviewed farmers who manage large farms, projected technological developments that will permit increasingly productive use of human labor, and he envisions a future for farming that seems both unpleasant and quite possible. Dracke likes it. I cringe to think about it."

Three Farms: Making Milk, Meat and Money from the American Soil, Mark Kramer



"Therefore, a realistic high school counselor teaches kids to get ready for disappointment. He or she may seem a villain in steering young people to the 600,000 clerk-typist openings when they want forestry, or in not making a whole lot out of the Phillips (Andover, Mass.) Academy's imaginative Short Term Institute's six-week programs for high school kids around the country, designed to give them the idea of knowledge-for-the-joy-of-it before they get washed into the Vo-Tech stream of cost/benefit thinking. It seems tough to advise them someone must staff the top offices everywhere, and raise their expectations to that?

The counselors are being realistic, and their advice isn't cruel. What is cruel is that we do not teach a decent philosophical way to look at life; so that those in our countryside who work with hands or heads are mislead, and waste years finding their inner life. People are taught to be drones."

"To Unteach Greed"
Letters from the Country
Carol Bly, pp. 59-60.

"Having acknowledged the invisible order that harmonizes creation and allows humanity its proper and becoming place, Pope saw:

> Not man alone, but all that roam the wood,
> Or wing the sky, or roll along the flood,
> Each loves itself, but not itself alone...

It is an order of love, but love is not enough; love must act, find its work, do it well."

Wendell Berry
Standing by Words
Poetry and Place, p. 144

"The reason anybody lives in Minnesota is that this is a place which produces food. It's a state whose existence is built on the productivity of its land. I know that this place is unrewarding to a great many people, and I know that it's unrewarding to many people who live here. But for me I think it just happens to be the right place. The thing we have here is the feeling of connectedness with natural things, with the land itself, and the almost fatalistic sense of our fortunes being tied to how well the land does. One of the things I have tried to say in my own writing over and over again is that you have to be attached to a place, you have to be settled down into something, rooted into something, if you're ever going to do anything worthwhile as a human being. But the prairie writers, as a group of writers, including, I would hope, myself, have insisted that if we've got a problem with our national culture, it's the problem that we have divorced ourselves from our bodies, and that begins when we divorce ourselves from the land.

We turn into people who are all head and very little heart. You can't be disconnected from a place and passionate about the world. You can't just float around in the atmosphere. You've got to be tied down somewhere. I feel tied down to this prairie. I wouldn't say that the way to become connected with the world again is to go to a prairie. The way to become connected with the world again is to find a place like my prairie--it may be very different--and then to become attached to it. That's the thing that counts."

Paul Grukor, editor,
Worthington Daily Globe,
from transcript of the
McNeil/Lehrer News Hour,
Nov. 25, 1983.

Meeting the Expectations of the Land

In 1982 The Land Institute received a grant to do an educational project about sustainable agriculture. We brought together some of the critics of conventional agriculture, thinkers and writers we know who agree that sustainability, not high productivity, should be the major goal of agriculture. After two days of discussion, we agreed to put together a book of readings which would describe and explain sustainable agriculture, with each person contributing an essay from his or her own particular perspective. The book, Meeting the Expectations of the Land: Essays in Sustainable Agriculture and Stewardship, was edited by Wes Jackson, Wendell Berry and Bruce Colman, and is copyrighted by The Land Institute. It is being published by North Point Press of San Francisco.

During our two days of discussions, we did not come up with a clear definition of sustainable agriculture, but we all more or less accepted Wendell Berry's statement: "Sustainable agriculture does not deplete soil or people." Now that the book is completed, the seventeen essays add up to this definition: Sustainable agriculture protects soil and water and promotes the health of people and rural culture.

The authors are from diverse academic and professional fields. But as Wes Jackson points out in the introduction, "We boast no claim that we have thought of every category which needs to be considered. What we hope to have done, if only through illustration, is to have presented some fresh examples of the kind of thinking and work necessary for a new definition of agriculture, a new synthesis."

Wes states in the introduction that the authors do not necessarily agree on the proposed solutions, and he gives examples. "Marty Strange at the Center for Rural Affairs and Jennie Gerard and Sharon Johnson at the Trust for Public Lands have different perspectives on the role of estate taxes in an idealized future. Hans Jenny, the dean of American soil scientists, believes all organic matter and nutrients should be returned to the soil and that none should be used for fuel, while Amory and Hunter Lovins and Marty Bender advocate deriving some energy from our agricultural lands to fuel the industrial economy."

The remainder of the introduction by Wes Jackson, quoted below, describes the other essays in the book.

"Two of America's leading essayists and poets, Gary Snyder and Wendell Berry, offer two equally important considerations for resolving the problem of agriculture. Gary Snyder is a student of the paleolithic and early neolithic. He sees humans as the product of a long evolutionary history in a gathering-hunting context, before the few seconds ago, in geological time, that we started agriculture. These patterns of the land are ancient; they are within our bones and nerve fibers and they won't be denied outright. Some of these patterns, in the modern context, are destined to work to our disadvantage, some of them to our advantage. But they are there and should not be ignored, as they have been by countless generations of agricultural policymakers. Wendell Berry, on the other hand, is a defender of culture, particularly the culture which is the product of agriculture, which is in and of agriculture. This cultural tradition was hard-won, just as the patterns of the wild were hard-won for nature. Both are vulnerable in the high-energy industrial world.

Two historians have contributed essays. Angus Wright, a Latin American historian, describes the impact of American attitudes and agricultural science and technology on both agriculture and culture of a Third World country. Donald Worster, an American historian well-known for his important books, Nature's Economy and Dust Bowl, has written two essays. In one essay, he calls for a 'water ethic' as an extension of Aldo Leopold's 'land ethic.' In another, he describes the terrible predicament of the modern farmer as a problem for all of society, not just the farmer. An agricultural journalist, essayist and small farmer, Gene Logsdon, argues in favor of the importance of traditional farming practices for a sustainable agriculture.

Steve Gliessman defines agroecology and describes how such an approach can contribute to sustainable agriculture. Gary Nabhan, an ethnobotanist who has done important field work, especially among the Papago Indians of the Southwest, explains the possibilities of desert agriculture. Wes Jackson and Marty Bender discuss their investigations into the polyculture of perennials at The Land Institute. Dana Jackson talks about the modest scale at which essentially all individuals can work--the garden, noting that in the aggregate, gardens are a significant source of food. John Todd, co-director and founder of the New Alchemy Institute and Ocean Arks International, describes sustainable agricultural practices in non-European cultures, concluding that truly sustainable agricultural science will be open to influences and data from all sorts of unlikely sources, and will look to local resources for making solutions. My final essay, "A Search for the Unifying Concept for Sustainable Agriculture," attempts to provide an overall perspective and an initial taxonomic framework for understanding varieties of sustainable agriculture."

On February 26-27, North Point Press and The Land Institute will sponsor a series of seminars and conferences in Washington, D.C., to further promote the issues raised in the book. Meeting the Expectations of the Land will be available from the publisher after these events.

State of the World 1984

by Lester R. Brown
and W. Chandler, C. Flavin, S. Postel,
L. Starke, E. Wolf
W. W. Norton & Co., New York, 1984

Reviewed by *Paul Adelman*

It used to be that a culture or society could exist in isolation, oblivious to and unconnected to the rest of the world. This age of independence is over. Even the most isolated society will have DDT in its food, pollutants in its air and water, and tritium (a radio isotope spread by nuclear weapons testing) in the bones of its people. As with all changes that develop over many years, the meaning and impact of this change from independence to interdependence is coming to us slowly. One result of this realization is that we must expand the scope of our analyses to the whole world, and that we must broaden them to consider areas other than just economics or science. The most important consideration, I think, is sustainability.

Sustainability is the standard by which Worldwatch Institute's new book State of the World 1984 judges, as the title says, the state of the world. Sustainability simply means asking the question: Are we living in a manner that can be continued indefinitely into the future? It is not an unreasonable question to ask, because, if it is not a factor in our decision-making process, then we are free to go on assuming that people alive today are somehow more important than those yet to be born. Considering sustainability forces us to consider the quality of life for generations far into the future. In this way, sustainability seems absolutely necessary as a yardstick by which to judge the world's progress.

The book is the first of an annually appearing series by Worldwatch. The topics covered in each one will differ. Worldwatch will be able to draw trends out as the analysis continues over the years, to let us know how we are doing. The fact that this book will come out every year sets it apart from the multitude of one-time studies (Global 2000, etc.). It is also important that it is done by a private organization, and not by the U.S. government, which could never be consistent longer than the terms of any one president.

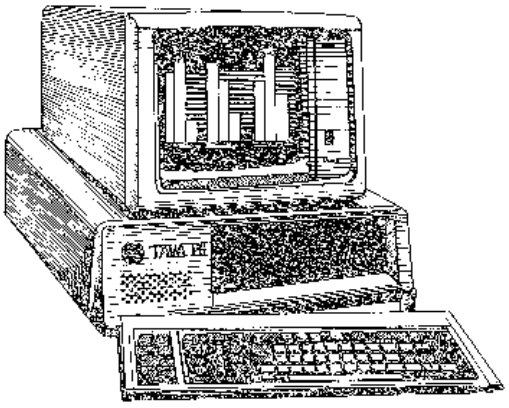
The book's basic finding is that we are failing badly at living in a sustainable way. The topics covered include population, energy (nuclear power, some renewable energy sources, and fossil fuels dependence), forest and soil protection, recycling, the future of the automobile, secure food supplies, and alternative economic policies. The "Overview" chapter covers each of these topics, as well as other sustainable society considerations, concluding that there is more bad going on than good.

The book does point out, however, that there is at least one example of a demonstrated solution for each problem listed. It is also necessary to point out that ten single solutions to ten problems considered in isolation does not necessarily mean that the total impact of those problems is overcome. Also, the existence of a possible solution in one particular instance or location does not mean that a problem is even close to being solved. For instance, even though China has been lauded (deservedly so) for reducing its population growth to just over one percent per year, it used techniques that would be considered totalitarian in any free world country, putting severe social and economic pressure on families having more than one child. On one hand, the reduction of China's population growth rate is absolutely necessary; on the other hand, it seems very discouraging that this initiative had to come from the government. It almost proves the theories of some writers (such as William Ophuls in Ecology and the Politics of Scarcity) that an environmentally sound and sustainable world must be forced on people by authoritarian governments, because people will never voluntarily lower their standard of living. It indicates that there is not a cultural willingness to change lifestyles to accommodate the limitations of the earth. On the other hand, there are twelve countries in the world, all of them in Europe, where there is zero population growth. These countries have the highest standards of living in the world, though, and we cannot simply wait until every country has an equivalent standard of living in the hopes that this will cause each country's birth rate to drop to meet its death rate. This would entail a level of development and resource consumption that could never be achieved, let alone sustained. Also, even a population growth rate of one percent cannot be sustained for more than a few decades. If China, with a population of one billion, were to keep growing at its present rate of just over one percent per year, it would have 2.7 billion people in a century. So, although there is some encouraging news concerning population, progress toward zero population growth is very slow. Progress toward stopping population growth is probably the most important single factor in determining how close we are to a sustainable society.

There is much more in this book than just population data. It contains a startling amount of information on just about all the topics that get threshed over and over in the environmentalist press. It is hard to say what the book's effect will be. People have been saying things like "We must stop population growth," and "We are heading for ecological disaster" for at least twenty-five years. I don't think the world of 1984 is as stable ecologically or politically as the world of 1960, when environmental awareness first started to trickle into mainstream society. But there may be no more effective way to bring about some progress toward a sustainable society other than by the efforts of people such as Lester Brown and the staff at Worldwatch Institute.

The Bias of Technology and the Limitations of the Computer

Paul Adelman



Technology is not the neutral force that it is widely considered to be. While it may be viewed as a tool that can be used both toward positive and negative ends, in fact, technology in and of itself has a bias that "determines its interaction with the world, the way it will be used, the kinds of people who use it, and to what ends," as Jerry Mander puts it, in his book Four Arguments for the Elimination of Television.

Mander's book is about the biases of television. Although many people think that only the programs on TV are bad, Mander argues that the technology of television acts as a selective filter through which some things fit and other things don't. For instance, it is easy to portray hatred and violence. It is difficult to show peace, or cooperation, because these things cannot be put into simple and understandable pictures. Television shows "things" such as cars or toasters very well. But a feeling or belief can't be portrayed because those things are really states of mind that must be felt, not merely seen.

The bulldozer is another piece of technology that has a bias. Sure, it can be used both for destructive or constructive ends. But a bulldozer runs on oil, which makes it part of the whole problem of global insecurity because of oil dependence. The bulldozer carries a bias for largescale change in the landscape, for giving humans more power to reorder nature than they can wisely use. The bulldozer gave us suburbia, leading to a dependence upon the automobile, and non-renewable energy sources, to traffic problems and air pollution.

The best examples of a technology which cannot be neutral is the handgun. The National Rifle Association says, "Guns Don't Kill People, People Kill People." But killing is a factor inherent in the existence of guns.

Military weapons cannot be neutral either. The size and power of a nation's armaments determine its foreign policy. A nation threatens or negotiates, depending upon whether the armaments of its adversary are greater or lesser than its own. Military technologies which we ostensibly control actually end up dictating our actions to us.

In our culture, there is a high priority on profit. As Mander points out, profit motivates technology. Although we would like to believe that technology serves some higher human need, in fact technology comes into existence primarily to make a profit for its producers. It is unfortunate that this is true, and it is argued that weapons producers are really "patriots." But only so long as they earn a profit.

One thing that technology does is homogenize us. The limitations of technology become the choices of society. For instance, a person may choose the model or color of a car, but can't choose to live without a car, at least not without being alienated from society. The same is true of electricity, fossil fuels, telephones, and increasingly, the computer.

The computer is the latest technology to grab hold of society. It is very interesting because it differs fundamentally from other technologies. Other technologies expand our muscles, but the computer expands, and modifies, our minds. Whereas airplanes expanded our legs to enable us to go anywhere quickly, the computer enlarges our memories and enables us to manipulate previously impossible amounts of information. For this reason, it is perhaps most crucial that we fully explore and understand the effects that the computer may have upon us. For once we come to accept that each technology has some bias to it, we have to ask ourselves: What is the bias, how will it be manifested?

It seems to me that the most important bias of the computer is that it cannot deal with anything that cannot be quantified. Already this raises the question of whether everything is quantifiable. It is argued both ways. But the computer can deal only with the concept of "better" if it can be expressed numerically. And, since something must be quantified for a computer to understand it, we already are letting the computer's bias determine how we will phrase our questions, which in turn puts limitations on the answers we can get. If it were agreed that everything could be quantified, there would be no problem. But, since there is good evidence that some things are beyond quantification, we need to decide what things computers might be good for and what things they might not be good for.

For starters, human-created systems might respond better to quantification than natural systems. For example, economics should be easier to analyze numerically than ecosystems. Of course, even human economics is a mess, and economic techniques such as cost/benefit analysis still lead to the conclusion that the final outcome depends on who is doing the analyzing. In general, though, it makes sense that human systems are more easily quantified than natural systems. But there has been a strong interest in using computers to create models of natural systems, and these models have already become the basis for some environmental decisions. I think this technique is worth exploring, because it makes some analyses possible that couldn't be done otherwise. But there is great danger here in that the scientists who are creating these computer models of ecosystems may not be aware of the bias that the computer brings to their scientific work, and of the effect it may have upon their findings.

Also, the layperson who is opposed to a decision arrived at using a computer model is less able to question that decision, because the computer makes it seem as if the finding is unquestionable. One can't argue with all those numbers. The computer lends an air of scientific legitimacy and seeming objectivity to the decision-making process, almost as if there were no human input involved at all. When a person with the aura of knowledge lent by the computer starts to whip out the rolls of printout with equations as long as his arm, there can be no argument except from someone who is equally expert, and this excludes almost everyone.

The computer has magnified this trend of making science appear objective. The use of computers in science is a self-legitimizing process. The ability to take that giant step backwards to survey one's work with a relatively unbiased eye varies inversely with the amount of time one has spent in a given field. This, of course, is one of the main arguments against over-specialization. The level of analysis that requires the use of a computer in predicting the behavior of an ecosystem is so technical and specialized that the vast majority of all people are precluded.

Paul Adelman

Science, as it advances, goes through three stages: descriptive (this is what we see), comparative (this is like this), and predictive (what happens when we do thus and so?). The predictive is the most complex level, and this is the level where computer models of ecosystems operate. It is when this technique is applied to the real world (i.e., not just as an academic exercise) that problems arise.

In 1976, the Army Corps of Engineers was planning to construct a dam on the Delaware River, at Tocks Island, in the Delaware Water Gap. The Corps used a model called LAKECO that represented the state-of-the-art in computer modelling. Its purpose was to predict whether or not the newly-created lake behind the dam would become unfit for recreational use, due to eutrophication (an increase in available oxygen due to excessive phosphorus, leading to algal blooms, unpleasant odors, and fish kills).

There were two main problems with LAKECO. First, as a model it was in itself insufficient. Second, the data fed into it was insufficient. The latter is a fault not of the computer, but of the human. But, the computer magnifies the error by legitimizing the human error.

According to Robert Cleary, author of the article "Mathematical Models" in the book Boundaries of Analysis, LAKECO was useless in predicting whether or not the lake would eutrophy. Mainly, this was because the model assumed that any substance added to the lake (such as phosphorus, the key ingredient in causing eutrophication) would instantly mix itself throughout the entire lake. But, in reality, phosphorus attaches itself to soil particles and tends to concentrate at the upstream ends of lakes, where the soil sinks as the water flow into the lake slows down. And this is true for many substances. Considering that the lake was thirty-seven miles long, different concentrations of various substances in different parts of the lake could be expected. But the computer model could not take this into account.

The shortcomings in the model were made worse by the shortcomings in data fed into the model. As Cleary put it, "the data base used is so pathetically small (and the numerical values in some cases so questionable) that accurate model predictions are almost certainly precluded." He recommended that the model be completely excluded from the Tocks Island decision-making process. And he added that no model existed that could give an accurate result.

Daniel Goodman, author of the essay "Ecological Expertise," also in Boundaries of Analysis, takes Cleary's analysis a step further when he argues that the ecological knowledge needed to make a model such as LAKECO work is beyond human understanding. In an evolutionary sense, as he puts it, "the living world evolved expressly to defy analysis." He gives six

reasons for this:

1) There are a vast number of species, and it is probably impossible to count them in a given ecosystem, let alone know everything about them. In the Environmental Impact Statement for Tocks Island, exactly 1,500 species were listed. It seems very doubtful that this is the right number--it's too perfect. And, in fact, many species, mostly small organisms, were omitted, as if small species were unimportant.

2) Every species is different from every other species, so it is not enough to simply count them all. The ecological niche of each must be known, as well as its relationship with other species, etc.

3) Although organisms behave in accordance with the laws of chemistry and physics, they do not behave as simple chemical reactions in a lab. The relationship among all the factors that determine the maintenance of a constant internal chemistry (homeostasis) in an organism is generally unpredictable.

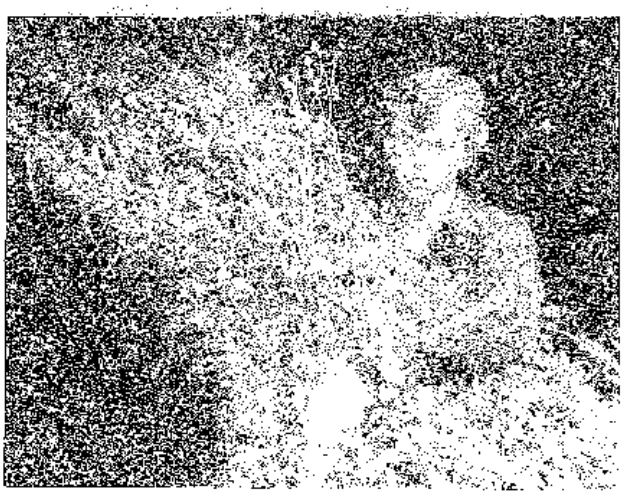
4) The odder an organism's behavior, the more likely it is to escape being preyed upon. For this reason, species will tend to accumulate outlandish and unpredictable competitive tactics. The deliberate subtlety with which organisms seek survival hints at the extent of knowledge that would be required to predict their actions.

5) Human intervention in an ecosystem is often unprecedented, and will therefore tend to cause an unprecedented response. It will certainly be easier to predict the results of natural interference in an ecosystem than of human interference.

6) Finally, there is the ecological axiom that "everything is connected to everything else." The complexity of the interrelationships in an ecosystem, apart from knowing everything about the individual organic and inorganic components, would seem to make it next to impossible to predict the behavior of organisms after massive human interference.

If human knowledge is inadequate, as these six points indicate might be the case, then computer models must surely fail. Given the familiar computer adage of "Garbage In, garbage out," it would seem that ecological modelling fails even before the computer stage is reached. When this inadequacy is combined with the knowledge that computers, like all technologies, are biased and self determining, it seems to me that a strong argument is made against relying upon computer modelling when the goal is to accurately predict the behavior of an ecosystem. Somewhere along the line, the technical bias will start to offer an answer that doesn't really respond to the question being asked.

In the final analysis, the computer can't be completely dismissed. It is here to stay. It will play an increasingly large role in the sciences and in making decisions concerning the environment. But, the scientists and policy makers who rely on the computer must understand that this technology is not an unbiased tool.



Kirk with bundles of Maximilian's sunflowers

Salina: A Rural City

Kirk Riley

"Kansas? Why would anyone want to go to Kansas? Well, anyway, say Hi to Dorothy and Toto for me." So ran the comments of some Michiganders as I left Detroit and Michigan for the Great Plains State of Kansas to begin a ten-month stay in Salina as an agricultural intern at The Land Institute. And like any person who moves to a new place, I had some preconceptions and misconceptions about the place to which I was moving. I knew only two things about Salina when I arrived in February: The Land Institute is there, and it has 40,000 people. I naively expected a city similar to that from which I came, only half the size. I expected that Kansans were much like Michiganders only not so numerous. For the benefit of future ag interns and anyone who wonders about Salina, here's what I found.

Salina has a colorful history, first as a cowtown on the Santa Fe Trail, then later a wheat-growing region, as told in glowing terms by Ruby Phillips Bramwell in City on the Move. The explorer Zebulon Pike first visited the region in 1806, where he found and named the Saline River, calling it "the saltiest stream in the world." Years later, the name Salina was given to the settlement to the west of the river, but with a long "i" sound to allay fears that the region's water was unfit for livestock.

Salina first struck me as a much bigger city than a population of 40,000 would indicate. The downtown has a distinct old-town urban feel, with store-front shops, a few tall buildings, and for America's breadbasket, the requisite grain elevators and flour mill. The main road, called Santa Fe, a branch of the original trail, retains some of its old-town charm, although most of the store fronts have been modernized.

The residential areas of Salina include fine older houses, many in various states of decay, and several old churches; suburban sec-

tions with well-groomed lawns and two-car garages; and a high-rent district, "The Hill," where the moneyed of Salina live--all located within the city limits. In addition, there is still prime agricultural land within the city, something one doesn't often find in large urban areas.

Housing at reasonable prices is easy to find in Salina. I found a house with three other Land students in the older part of town, and with it I found a sense of security, the unlocked bike and unlocked front door kind of security. The feeling was a small-town illusion, and all but lost after a friend had his bike stolen and I read the newspaper accounts of muggings, rapes, and shootings in Salina! Still the contrast with Detroit remains striking (especially after hearing accounts of the World Series' riots). With this feeling of safety came a renewed trust of people, including strangers, which sadly is one of the first things lost growing up in the city. On the other hand, I wonder if the people I have met are representative of Salina. The Land taps into a group of people unusual in their compassion and friendliness.

When I left Michigan for Kansas, I had had very little contact with rural folk, making it difficult to tell if what I saw were Midwest-to-Great Plains regional differences or urban-to-rural differences. Salina has its base in rural culture and, even today, most Salinans either grew up on farm or are the children of those who grew up there.

Perhaps the most surprising thing to me about Salinans was how much they enjoy working. Those who lament the loss of the "work ethic" that built this country would be glad to find it alive and well here. Not that it doesn't exist in Michigan; it's just less intense. I found a pronounced willingness, even desire, to sweat, get dirty and greasy, if the job called for it. I suspect that this enthusiasm for work springs from Salina's rural beginnings. Work is satisfying and fulfilling on the farm because of a diversity of tasks, the goals of which are readily apparent, unlike the industrial model workplace where the goals often remain obscure to and beyond the financial grasp of the worker.

Along with a strong work ethic, Kansas has fewer and less powerful trade unions than most states. Kansas is still a right-to-work state. The combination makes Salina particularly attractive to industry: people here know how to work, tolerate long, hard hours, and don't demand high wages. But questions arise: will the children of such people, those who did not grow up on farms, maintain the same work ethic? Are there special virtues, as Jefferson believed and as embodied in the myth of the Yeoman farmer, in those born and reared on the farm? What is clear is that farm population continues to decline. Where will industry go when the children of the person behind the cash register or in the machine shop want a job?

For the past several years, the city commission and the people of Salina have debated whether to encourage the building of a downtown mall, or a "Central" mall at the extreme south end of town. (A clever choice, that word "Central;" the developers obviously hope that the south mall will become the center of town.) One can suppose that another option was no mall, although that never seemed to make the debate, at least while I've been here. Little mention also has been made of the fact that directly across the street from the site for the Central Mall is the Mid-State Mall, which lost its anchor store years ago. It lacks the flair of the newer malls (three stories, tall ceilings, and waterfalls). But if Salina cannot support one mall, why build another? Wishful thinking rules the roost, it would seem, as the Central Mall plan eventually won out. A piece of prime agricultural land will be "developed" into an unneeded mall.

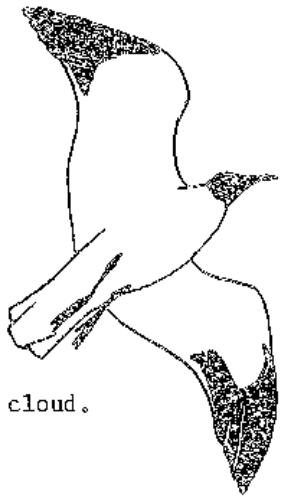
Another symbol of the decline of rural culture, the loss of local control, is seen along one of Salina's ugliest roads, Broadway. With a strip of fast-food restaurants, cheap bars, chain motels, and discount department stores, Broadway is the same street found in every town of any size. It has no local color or flavor. No one takes any particular pride in it; instead, it is seen as a necessary concession to a society geared to a high level of consumption and quick gratification, as if someone had said, "If you can't make it good, at least make it quick." The large chain stores on Broadway remove money from Salina as fast as it is spent, and with it goes an element of freedom: the ability to choose what the money does. The community does not know where the capital generated there is reinvested, whether it clear cuts the Amazon, constructs a skyscraper in Chicago, or builds an Mx missile.

Salina's ultimate economic base, however, lies directly in the soil, in agriculture, which provides a buffer through good and bad. The wheat farmers' market has become the world, a fairly constant market one suspects, and at least for the near future, wheat farming in central Kansas will continue. But the current agricultural economy protects and promotes the concentration of land ownership. Ultimately it causes communities to collapse into larger ones, severing the individual's ties with the land.

Salina is urban, but not urbane. Its cultural base lies in rural values, just as the myths and traditions of American democracy are rooted in rural values. To preserve these values, it will be necessary to protect and revitalize the rural life which fosters them.

Saturday Morning at the Dump

Weeden Nichols



Yesterday I visited the Salina Landfill.
(That is a euphemism for "local dump.")
I go there every two months,
My two-wheeled, pickup-bed, utility-trailer and I.

My load is cans and kitty-litter, used oil and oily rags,
Oil filters and air filters, chicken bones and tree prunings,
Wood ashes and worn shoes, broken bottles and bent metal,
Vinyl and glass and aluminum.

I pay my six dollars at the gate
And take the muddy road back
To where the bellowing, spike-wheeled garbage-smasher
Smokes and roars.

Seagulls are airborne in unison, one seething black-and-white cloud.
A three-dimensional latticework of seagull cries fill the air
As I rattle past.
Then the seagulls land abruptly, and all stare at me.

I wheel my trusty old Chevy pickup to the left,
Then back the trailer between two other pickups with trailers.
"You must have a boat, to back that way!" says the driver of one.
"No, I just haul a lot of garbage."

I throw out bottles and cans and Russian-olive branches.
I visualize a seagull carrying a Russian-olive branch,
Signalling the end of the garbage flood,
I smell the clean sea-smell of the winter Atlantic coast and hear seagull cries
of forty years ago.

I finish with shovel and broom.
The spike-wheeled monster spews black smoke and roars.
The half-digested human inside it looks impatient,
And I leave with my ark-load of shame.

Ah, seagulls of my youth!

The Friends of The Land have been extremely important. Many helped collect materials to build the first classroom/office/shop; many donated their time and labor to begin reconstruction after the building burned in October 1976. Friends donated books and money to help develop another library and began contributing to the general support of The Land through yearly gifts. The Land needs these friends, and new friends, too.

The Land Institute is a private, educational research organization. In recent years, several private foundations have awarded grants for special programs. These would not have been made if The Land had not shown a record of broad-based support from individuals who make annual contributions. Continued financial support from Friends of The Land is vital.

Contributors receive THE LAND REPORT and other occasional publications, plus notices of events sponsored by The Land Institute. The Land Institute is a non-profit organization, and all gifts are tax deductible.

Friends of The Land

NAME_____

ADDRESS_____

_____

PHONE_____ DATE_____

(CHECK CATEGORY OF CONTRIBUTION)

_____$15 _____$25 _____$50

_____$100 _____$500 _____Other

_____$5 U.S. subscription to THE LAND REPORT

_____$10 Foreign subscription - THE LAND REPORT

Agricultural Intern Program

The Agricultural Intern Program runs from mid-Feb. to mid-Dec. During spring and fall, mornings are spent in the classroom, and afternoons are used for physical work related to research, construction or maintenance. Research work dominates the summer session, but occasional field trips and seminars are scheduled.

Each term ten interns receive tuition scholarships and stipends of $90 a week. They find their own housing in Salina and bike or carpool to The Land for the 9:00 to 5:00 day.

The Land admits students of any race, color, national or ethnic origin. For more information about the ag intern program, write The Land or phone 913-823-5376.

1985 Calendar

Feb. 18	-	Spring Session Begins
June 1-2	-	PRAIRIE FESTIVAL
June 3-Sept. 6	-	Summer Session
Sept. 9	-	Fall Session Begins
Oct. 6	-	1985 Visitors' Day
Dec. 20	-	Fall Session Ends

Changing Your Address?

The Post Office does not forward 3rd class bulk mail. Please inform us if you change addresses. If 22 appears on your label, your subscription expires with this issue. PLEASE RENEW NOW.

The Land Institute
ROUTE 3 • SALINA, KANSAS 67401

Non-Profit Organization
U.S. Postage Paid
Permit No. 81
Salina, Kansas 67401