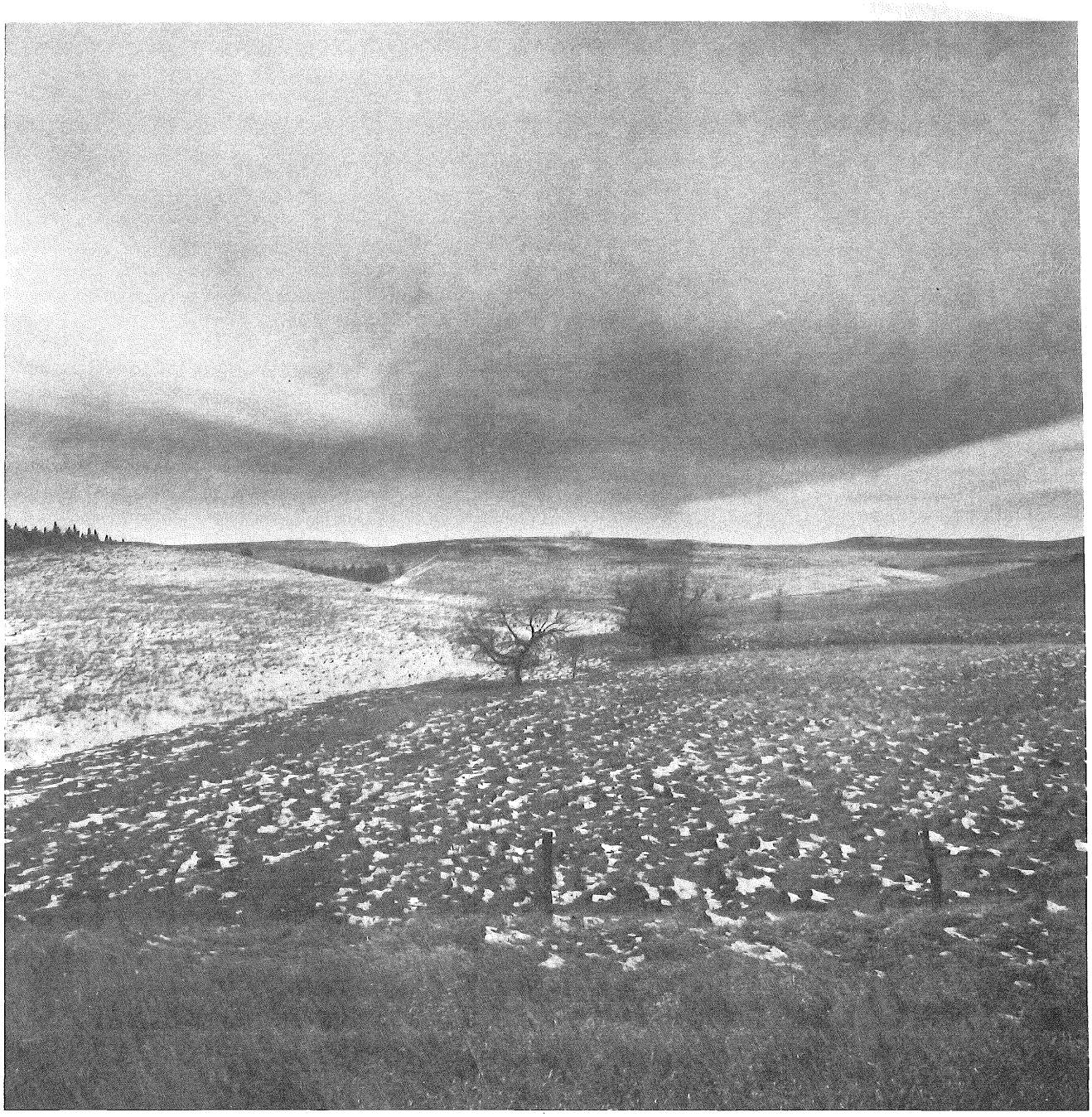

THE LAND REPORT

Number 9 Winter 1980

The Land Institute

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Cover by Terry Evans

At The Land . . .

Gift of Batteries Received

One of the first group projects for the students in the fall semester was to unload 69 two volt batteries (each one weighing about 300 pounds) from the back of a truck. The batteries were a gift from a Friend of The Land, Mrs. Harry Johnson in Oakley, Kansas. Wes Jackson and Joy Hasker drove two borrowed trucks out to Oakley, and Wes hired a man with a front-end loader to help move the batteries out of a garage and onto the big truck. They had to scoot the batteries to the door of the garage, and then to the back of the truck after the loader lifted them on. To get them off the truck back at The Land and lined up on the west side of the classroom building next to the fence, four students worked almost all of one day. Only two batteries were damaged, although that was enough to spark the classic jokes about "dropping acid."

The 110 DC Wincharger is hooked up to 55 of these batteries which are wired into the building to light it. Protecting the batteries from the weather has been a problem. Last spring the students built a shed to store the 16 batteries for the 32 volt Jacobs wind generator, but a new shed wasn't feasible for the larger group of batteries. When Kelly Kindscher, Karl Parker, Mark Lieblich and Jay Ellinghausen unloaded the batteries, they placed them off the ground a few inches up on

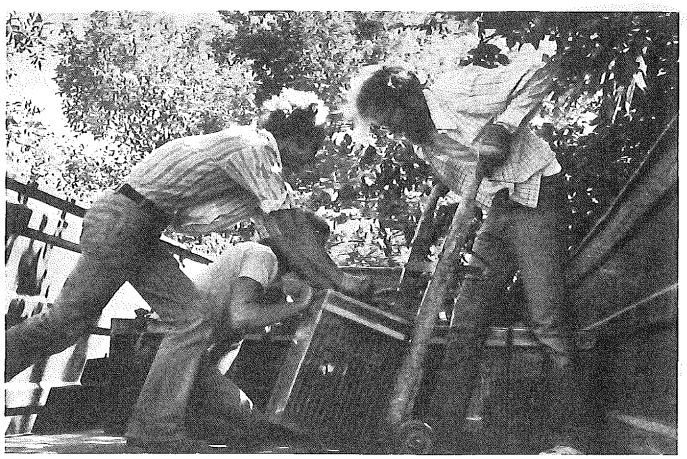
The Land Report
is published three times a year by
The Land Institute
Rt. 3
Salina, Kansas 67401

Editor.....Dana Jackson
Arts Associate.....Terry Evans
Graphics Asst.....Pam Ellinghausen
Printed by Arrow Printing Co., Inc.

Contributing to this issue: Marty Bender, Penny Geis, Joy Hasker, Ali Henderson, Dana Jackson, Wes Jackson, Kelly Kindscher, Mark Lieblich, Mari Peterson, Wally Roger, Charles Washburn, Pam Ellinghausen and Thelma Wright.

SUBSCRIPTION RATE: $3.00

The Land Institute is a non-profit educational-research organization devoted to a search for sustainable alternatives in agriculture, energy, shelter and waste.



Jay Ellinghausen, Kelly Kindscher, Karl Parker

wooden pallets. In December they covered them on the east side and on top with glass patio doors, our most versatile resource at the Land. This winter the batteries won't have snow drifted over them and won't get wet, although they will be subjected to more severe temperature variations than might be desirable.

K.C.C. Consumer Information Board

The Kansas Corporation Commission, which regulates major utility companies in the state, has chosen The Land Institute to be one of the eighteen groups with representatives on a Consumer Information Board designed to increase public participation in the regulatory process and to communicate consumer concerns to the KCC. The Land Institute has nominated Ivy Marsh of Salina, a Friend of The Land, to be its representative on the Board.

The Consumer Information Board will be part of a comprehensive electric utility load management study which has been underway for several months by the KCC. The study involves projects which include load management, energy forecasts, conservation and innovative rate designs. The overall goal of the study is to find ways to encourage the use of electricity in off-peak hours and hopefully curb or limit the need for construction of new power plants--one of the biggest reasons for higher utility bills.

KCC officials said the study will produce a large amount of information which will be of great interest to consumers. It will be the function of the Consumer Information Board to relay accurate information back to Kansas consumers as well as communicating the consumer concerns to the Commissioners about the direction they think the KCC should be going in these areas. The Board will also be working directly with consultants on three special areas of study; energy conservation, alternative energy, and energy storage techniques.

Affiliation with Emporia State Made Official

The Co-directors of The Land Institute and John Peterson, Dean of the School of Liberal Arts and Sciences at Emporia State University, signed an "Agreement of Affiliation" between the two schools in November. The affiliation is on a yearly basis, renewable each year at the pleasure of both institutions.

The staff of The Land and its Board of Directors will be privileged to use the library and Student Union, and have access to lectures, concerts, etc. at Emporia State. ESU faculty members will be permitted to share facilities and participate in events held at The Land.

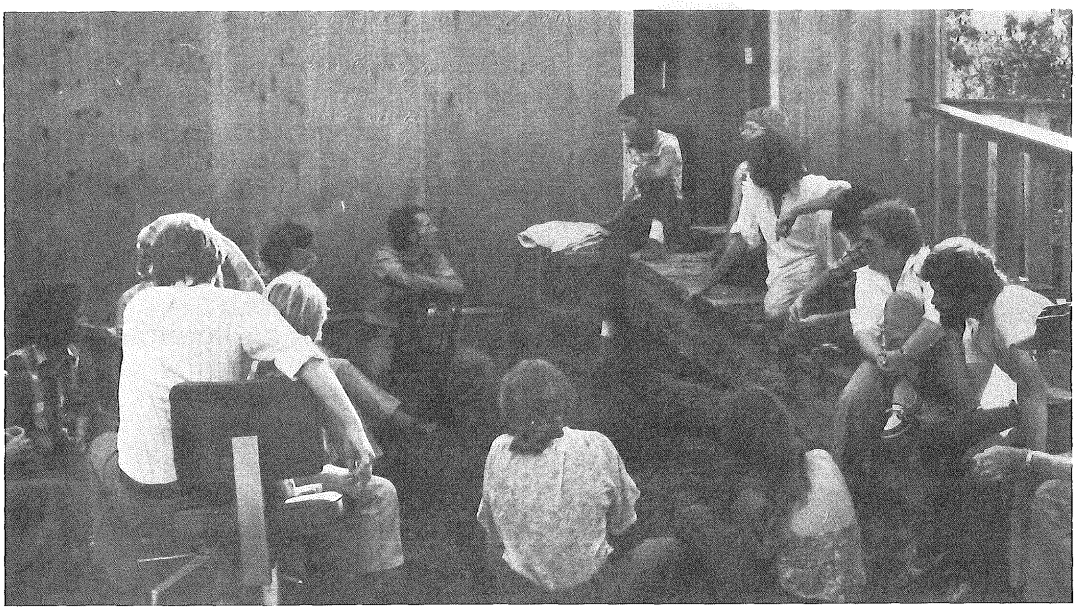
As part of the affiliation, Wes Jackson has been appointed an adjunct professor at Emporia State University.

Visitors' Day Held

An informal policy has evolved of having two days a year when visitors are welcomed at The Land with a special program. In the spring and fall, when the weather is pleasant, we have frequent requests from groups and individuals for tours and visits. We have found it convenient for us and enjoyable for our visitors to present a program of substance, rather than have an open house with people wandering around all afternoon.

On October 21 over eighty people attended Visitors' Day, although not all stayed for the entire program. We started with refreshments and short talks about the history, philosophy and goals of The Land Institute inside the classroom, then divided into groups for outside tours. At 3:00 P.M. the guests were invited to participate in one of four discussion groups led by students. The topics and leaders were "Solar Greenhouse Construction" with Mark Lieblich and Karl Parker, "Soft Agricultural Paths" led by Marty Bender, "Impacts Upon the Land from Waste Disposal and Transportation" with Mari Peterson and Jay and Pam Ellinghausen, and "Soil Health as Related to Human Health" led by Kelly Kindscher and Ali Henderson.

Following the group discussions, held on the north porch, east porch, greenhouse area, and classroom, everyone came together again for a wrap-up talk by Carter Henderson of the Center for Alternative Futures. Carter gave an informal presentation, and then there was time for questions and answers. His understanding of ecological and resource limits upon investments and growth of the economy gives him a point of view which is rare among financial experts. Carter Henderson's perspective of the future and how one should prepare for it was extremely interesting to the visitors, and a



Visitors' Day Discussion Group

lively discussion followed his talk.

The weather is always a critical factor in the success of activities at The Land. Just as the wrap-up session was getting underway, a soft rain began, which turned into a hard downpour as people were leaving for their cars. Nevertheless, we felt our weather committee had done an excellent job for the day.

Distinguished Men Are Guests

College students often become blase about having famous persons or distinguished scholars on their campuses. Frequently such personages appear in general convocations as speakers on platforms but have little personal contact with students. When such individuals visit The Land Institute, however, their presence is deemed extremely important. Often the guest will spend several hours in class discussions with our 8-10 students, and attend informal receptions or dinners with students and members of the board of directors of The Land Institute. During the fall term, students had opportunities to learn from three distinguished men who visited The Land Institute.

For the second time in its short history, The Land Institute was privileged to host Dr. Paul Sears, botanist-ecologist and professor emeritus of Yale, who is very well known for his book Deserts on the March. Dr. Sears spent the morning of Friday, September 21 in class with students at The Land and then gave a lecture that afternoon at Emporia State University. Friday evening and Saturday he joined the Tallgrass Prairie Conference at the Rock Springs 4-H camp near Junction City. As he shared his knowledge of the prairie ecosystem and the wisdom gained through years of experience as a conservationist, and a little of his fiddle playing, he was an inspiration to everyone at the conference.

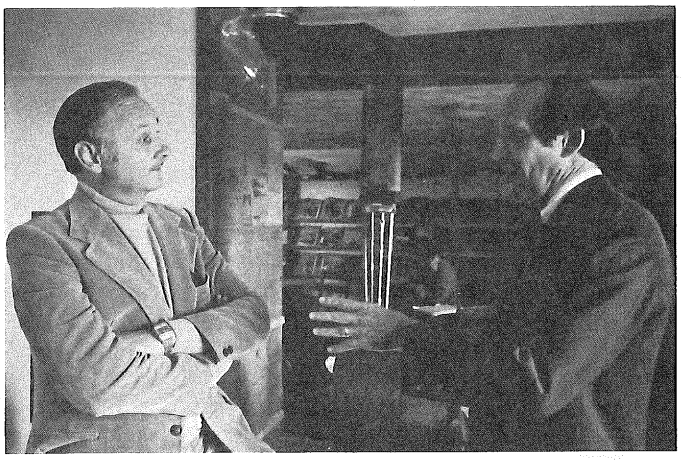
Our second distinguished guest was Carter Henderson of the Center for Alternative Futures in Gainesville, Florida, (formerly the Princeton Center for Alternative Futures), who visited Salina October 19 through October 22. Formerly the London Bureau Chief and Editor for the Wall Street Journal, the head of investor information for IBM, and a speech writer working with the chief executive officers of major U.S. financial firms and multinational corporations, Carter is now an author and lecturer on economic issues. His articles have appeared in the Bulletin of the Atomic Scientists, Current History, Nation's Business, The Journal of Economics and Business and Environmental Action. His most recent writing includes a monograph called "The Inevitability of Petroleum Rationing in the U.S." published in 1978 by the Princeton Center for Alternative Futures.

Carter gave a "wrap-up" talk following group discussions on Visitors' Day at The Land, Sunday, October 21. He spent Monday morning in the classroom with Land students, spoke to the local Rotary Club at noon, and gave a public lecture at Kansas Wesleyan that evening. His noon lecture, "Do Hard Times and a Monetary Crisis Really Lie Ahead?" so intrigued many of Salina's businessmen, that they also attended the Kansas Wesleyan lecture that evening to hear him describe "Jobs, Work and Changing Lifestyle in the 80's." Carter told his audience that the best invest-

ments for our inflation-ridden future lie outside the regular investor's market. He suggested that people should invest in themselves, and buy hearing aids, dental care, eyeglasses or other health improvement aids or programs which they need. Money is well-invested in education, or in training to learn practical skills. Carter stressed the importance of making one's home less energy dependent and more self-reliant for the future by spending money now on insulation, and solar energy. He also discussed the benefits of developing a lifestyle less dependent upon consumer items and credit cards.

Maurice Strong, best known to environmentalists for organizing the 1972 United Nations Conference on the Human Environment in Stockholm, Sweden, was the third distinguished guest at The Land. Although a Canadian by birth, Mr. Strong has business interests in the United States, Europe, Latin America and Australia, as well as Canada. His career has included involvement in business and industry, international development assistance, various United Nations programs, and university teaching (he has 23 honorary degrees); service as a trustee of the Rockefeller Foundation, as President of the National Council of the YMCA of Canada and a member of several international YMCA committees; and work with many environmental groups around the world.

Maurice Strong attended the exploration conference relating to the Great Plains Project on November 1. During an informal reception the evening before, and the soup lunch November 1, he was available for conversation with students. Mr. Strong made a presentation in the morning and then participated in the afternoon discussions about the need for and feasibility of a Great Plains in Transition Conference. From his world-wide perspective, Maurice believed the food-producing Great Plains region to be an area critical to human survival, and he encouraged conference participants to pursue the project and help create a consciousness in the region which would lead to a sustainable future.



Maurice Strong and John Simpson

County Energy Planning: Toward Community Self-Sufficiency

The essential missing element in the energy planning conducted in the United States over the last six or seven years is the involvement of local communities. Plan after plan has come down from government agencies, educational and research institutions and national organizations only to find little acceptance and a great deal of mistrust by the people who must make the plans work. Much attention has been paid to increasing energy supplied via large corporations and utilities which, by virtue of their bigness and technological complexity, exclude civic initiative and involvement in the process. This has led to a feeling of alienation by the people and the ever-present search for energy problem scapegoats.

The Mid America Coalition for Energy Alternatives and The Land Institute want to develop a project which will bring energy planning in Kansas down to the county level and involve local citizens in gathering data on primary and end use energy, conservation potential, and available energy resources for their own county. This data would be the basis for an energy plan in the county. Most important will be the goal of developing the community into an effective problem-solving citizenry, without which any energy plan would die after the initial efforts have been made. For example, in Saline County, an Energy Commission, composed of citizens from diverse backgrounds, did an energy study in the county and made recommendations to the city and county commissions and the school board. Marty Bender and Wes Jackson collected considerable data on end use energy needs and Marty wrote two reports: "Residential Energy Economics of Saline County," and "The Role of Local Government in Energy Conservation," which were presented to the three governmental units. The school board responded positively to the recommendation that an energy office be formed to coordinate energy conservation planning, but the other two commissions were unable to deal with the data or the suggestions. What was missing was the community involvement which could have helped the commissioners realize that something should and could be done.

Initially the project will involve a study with a single county in Kansas, one with a reachable population preferably containing no major urban areas or industrial complexes. During this phase, the coordinators will gain experience in citizen motivation for planning, develop a process for an actual energy plan using the County Energy Plan Guidebook by Alan Okagaki and Jim Benson of the Institute for Ecological Policies as a basic tool, and obtain usable data and a county energy plan. A second

phase of the project will be working with seven or eight other counties, each statistically representative of a "type" of Kansas county (population, industry, economics, etc.), counties from which some statewide trends can be observed. Phase Three would involve presenting data from Phase II to other counties of a similar type and assisting them in doing their plan. It is hoped that the end result would be essentially a complete statewide plan with working groups coordinating strategies for implementation.

The preliminary outline for this project has been written by Diane Tegtmeier of MACEA, with assistance from Wes Jackson of The Land. Dr. E. Dutton, Professor of Social Work in the School of Social Welfare at the University of Kansas, and Dr. P. Bowman, Director of the Institute for Community Studies at the University of Missouri in Kansas City, have been consultants.

Under a grant of $2500 from The Youth Project, Ms. Tegtmeier will continue to develop plans for the County Energy Planning Project, and will be the eastern coordinator when it gets underway. A representative of The Land Institute will be the western coordinator.

MACEA and The Land Institute have been interested in coordinating county energy planning since Amory Lovins, architect of the soft energy path concept, suggested to us that Kansas, with its good combination of involved citizens' groups, the interest and support of the Kansas Energy Office, the governor, and several legislators, was an ideal state to demonstrate this type of citizen energy planning. As more Kansans join the search for alternatives in energy within their communities, the missing element in energy planning will be found, and our opportunities for lessening the dilemma increased.

Woodburning Workshop Warm

September 29 was the day set for the wood-burning workshop, mainly because we wanted to have it on a Saturday before hunting season started and just before the first frost when people would begin to think about home heating. However, that date proved to be a bit early. When the temperature rose into the upper 90 degree range that afternoon, participants found it difficult to think about the relative heat values of different woods or how many cords of wood it would take to heat a house in January and February.

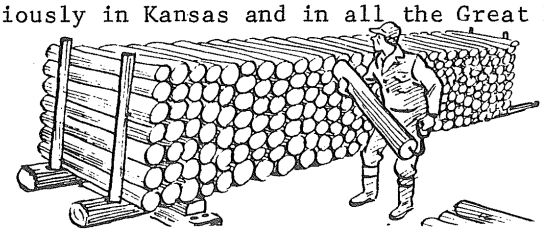
In spite of the heat, however, the excellent workshop leaders kept the participants very interested. Steve Burr, a member of the Board of Directors of The Land Institute, and Jim Wesch, a Friend of The Land, presented practical information based upon their own experiences.

Steve Burr demonstrates safe tool use.

In the morning session, Jim, who manufactures wood-burning furnaces and retails the furnaces and several types of stoves at Alternative Energy Sources, Inc. in Salina, talked about the economics of wood heating, types of stoves, wood heating efficiencies, and safety in the home. Steve, a wildlife biologist who has planted a large woodlot on his property, spoke about woodlot management and seasoning wood. In the afternoon, Steve talked about tree identification and woodcutting tool safety. They were going to demonstrate the best way to build a fire in the office Fisher stove, but changed their minds as the day became hotter.

The number of homes that are heated by wood-burning stoves has multiplied dramatically in the past five years. Many different brands and types of stoves are on the market, and informative articles about wood-burning appear in all kinds of magazines. But the increased use of wood stoves is not just a revival of an almost-lost art, but the application of an appropriate technology. The modern, airtight stove is an improved technology with an efficiency of 50-55% compared to the old fashioned 20-25% efficient stoves. Jim Wesch pointed out that in the 1700's, 17-22 cords of wood were used to heat a one room cabin each winter. With today's efficient stoves and insulated houses, four cords of wood will heat 1750 square feet of space.

The challenge of wood-burning stove technology is being met. But will a sustained supply of wood, without denuding river banks, destroying shelter belts and landscapes, and depleting soil be available? The Land Institute sees this as a challenge which must be taken seriously in Kansas and in all the Great Plains.



An Herbarium Project

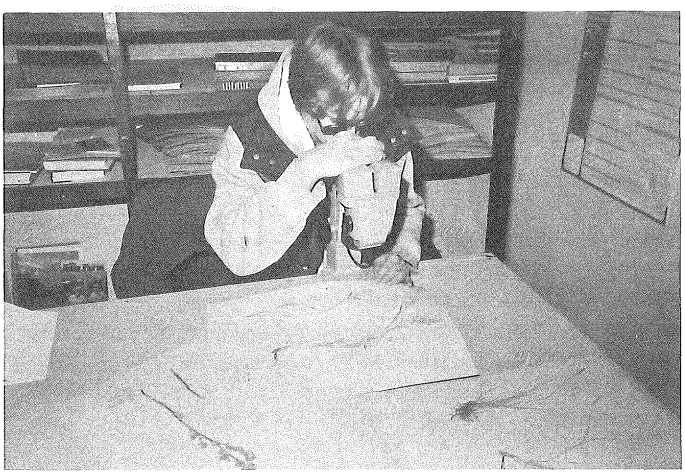
by Joy Hasker

During the fall semester, I started an herbarium at The Land. I began by simply finding out what flora was present by hiking in the woods along the Smoky Hill River, through the pastures, in the prairie grass area west of the classroom building, and along the north and east perimeters of the property. In the pasture east of the school I found an abundance of Indian Grass and Smooth Brome; west of the school I found Big Bluestem and Switchgrass. Three other plants found in abundance were Tall Eupatorium, Witchgrass (mostly south of the school), and Lambs' Quarters. There were also examples of nature's quirks, like Stinkgrass found with an abnormally large numberof florets on the spikes, making it look almost like a different species. There were also abnormalities in some of the Barnyard Grass and Straw-Colored Cyperus.

I ended up collecting and identifying 167 plants representing 117 species. For some species I collected several plants to show abnormalities or how the morphology changes as the season progresses. The list of species was too long to include in The Land Report, but is available upon request from The Land Institute. Since I wasn't able to begin the collection of flora until the fall semester, I would estimate that only about sixty percent of the actual flora of The Land was collected.

The information gathered through the collections for the herbarium is going to be used as a baseline for the flora of The Land before the introduction of other prairie species. The Land would like to establish a prairie herbary with as many different prairie plant species in it as possible. The landscape would take on a new character as plants escape from the herbary. The herbarium collection will be a record of species on the Land before the herbary. It will help us determine the speed of succession as the new plants become established in the native or non-native environments.

One of the greatest enjoyments I had in my experience collecting for the herbarium was when there were surprises, such as finding species where I didn't expect them, or in a different form than expected. A good example of this was the Eastern Wahoo in the woods along the river. Wahoo is in the Bittersweet family and is found most commonly as a shrub along its western boundaries, which are not this far west. The Land has a population which appears more like a tree than a shrub. H. A. Stephens describes it as a shrub in his book, Trees, Shrubs, and Woody Vines in Kansas, but in Trees by Howard A. Miller it is described as a "shrub-like tree," which is more like what we have found.



In keying out the specimens, I became familiar with a great number of references, but the references of greatest help to me were as follows: Janet Bare's Wildflowers and Weeds of Kansas, How to Know Grasses by R. W. Pohl, H. A. Stephens' Trees, Shrubs and Woody Vines in Kansas, A.S. Hitchcock's Manual of the Grasses of the United States(volumes I and II) and N. C. Britton and H. A. Brown's An Illustrated Flora of the Northern United States and Canada (volumes I, II, III).

A Building Project

Besides the herbarium, Joy worked on a project with Ali Henderson to build a machinery shed / storage building attached to the barn. Its design was limited by material resources such as steel roofing on hand, the availability of used 2 X 4's, and cheap siding, and only one particular space the building could occupy (we did not want to cover the concrete under the basketball goal). Joy and Ali labored faithfully through the semester down to the last splash of red paint and produced a functional shelter protecting the combine, hay baler, tractor, blade, mower and disc, as well as barrels of feed, from the winter rains and snow.

Carpenter Ali Henderson

Alternatives in Agriculture

Agricultural Ecosystems

by Kelly Kindscher

Last August I received a grant through the Department of Energy's Appropriate Technology Small Grants Program to research and develop a model Agricultural Ecosystem. I have been doing my research here at the Land Institute and have taken part in daily discussions and other activities during the Fall semester. A synopsis of my research follows.

A model farm of the future was designed by some United States Department of Agriculture specialists and described in the February, 1970 National Geographic. It was characterized as a highly specialized super-farm with radio-controlled and totally automated machines that work fields several miles long without a wheel touching them. Their vision of a future farm assumed unlimited energy resources, a continued decrease in the number of farms, and that people would not directly be involved in the production of our food.

As we enter the 1980's, our vision of the future has changed. This research project, titled Agricultural Ecosystems, assumes a future of limited energy resources and the necessity of an ecologically-sound agriculture. A model agricultural ecosystem that could be established on a small bottomland plot of land in northeast Kansas will be developed. For the purposes of this research, an agricultural ecosystem is defined as follows: a community of agricultural crops and its environment treated together as a functional system of complementary relationships based upon transfer and circulation of energy and matter.

Kelly Kindscher finds healthy Swiss Chard under the skylight cold frame in December.

Components of Agricultural Ecosystems

Accompanying the model of a possible agricultural ecosystem will be a documented paper giving detailed explanation of its components. The components of an agricultural ecosystem can be divided into two main groups--environmental components and plant components. The environmental components include: a) soil types; b) moisture requirements; c) nutrient requirements; d) shade tolerance; and e) effects of slope. The plant components include: a) the selection of food-producing plants; b) their spatial arrangement; c) inter-plant relationships such as synergistic, competitive, and allelopathic interactions; and d) plant protection --habitat for birds and beneficial insects.

Selection of food-producing plants

Careful selection of food-producing plants will be made in order to maximize productivity and diversity. This particular agricultural ecosystem will be designed to minimize fossil fuel requirements and to produce a sustainable yield over a long period of time. Tree crops and other perennial crops will provide the main structure of this food-producing system. Legumes will be employed to help maintain soil fertility. Mulch and cover crops will be used, and annual grain crops will be grown during the sequence of crop rotations.

A possible model

An agricultural ecosystem might look as follows: There will be widely spaced nut trees (walnuts and pecans) and fruit trees (apples, apricots, cherries, peaches, pears, and plums). Scattered underneath and between them will be bushes (currants and raspberries). Growing up into the bushes will be vines (grapes). In the remaining open spaces will be grain crops (wheat and corn), legumes (alfalfa, clovers, and beans), and both annual and perennial vegetables.

It is my hope that an ecologically balanced food-producing crop system can be developed. The problems associated with developing an agricultural ecosystem are great and it may be beyond the scope of this study to completely investigate all aspects of this food-producing system. Perhaps the ultimate value of this study will be to promote ecological food production and encourage other concerned agricultural scientists to further investigate sustainable agricultural practices.

"Modern agricultural technology is not time-tested, even in areas where it has led to greatly improved yields with few apparent ill effects... Our objective must be to achieve an ecologically sound approach with the potential for meeting the long-range needs of a stabilized human population."

(from the Introduction to Agricultural Ecology by George Cox and Michael Atkins, Freeman, 1979.)

The Kansas Apple

by Kelly Kindscher

The Kansas State Horticultural Society published The Apple in 1898. It was written explicitly for Kansas apple growers and contained the latest horticultural techniques and short testimonials from apple growers across the state. Since the turn of the century, the apple has lost much of its former importance. Kansas produced 3,713,919 bushels of apples in 1890. By 1977, this had decreased to 400,000 bushels. In 1897, Kansas had 11,187,332 apple trees covering 2,035,000 acres. For 1977, Kansas had 1,800 acres of commercially grown apples. Saline County had 99,048 apple trees in 1897, while Douglas County, in northeast Kansas, had 280,088.

The Apple provides a historical perspective of apple production in Kansas. But this book is more than an out-dated treatise on how apples were grown at the end of the last century. It is about people and their experiences with the production of their most popular fruit. For The Apple, the Kansas Apple, is the story of people like Major Frank Holsinger who had lived 30 years at Rosedale, Kansas and who had been growing apples there for 29 years.

Maj. Frank Holsinger, Rosedale, Wyandotte county: Has resided in Kansas since March 7, 1867 - thirty years; has 1500 apple trees from one to twenty-nine years planted, "big as a barn." Prefers Gano, Ben Davis, Missouri Pippin and York Imperial for commercial purposes, and Early Harvest, Cooper's Early White, Maiden's Blush and Jonathan added for family use. Says life is too short to tell how many varieties he has tried and discarded. Prefers a loose soil and used to think hilltop best, but says there is no choice between bottom and hilltop, and that any particular slope is a delusion, as all are equal. Plants medium two-year-old trees, "usually roots downward - tops up." Cultivates with double-shovel plow and hoe up to seven years, planting with corn or potatoes. Then grows clover and weeds, "weeds mostly," ceasing to cultivate when it becomes inconvenient. Says windbreaks are unnecessary, and should only be made of the sun - "let her shine" - and does not understand how a rabbit can do a mechanical job of gnawing. Does not prune; he "trains"; leaves the pruning tools in the tool-house, and says it pays. Would thin apples on trees if labor did not come so high. His experience as to difference in fruitfulness between planting of one or of several kinds (together) is unsatisfactory. Believes fertilizers are good for trees if spread out, never if piled around the tree; would surely advise its use on all orchards. Would never allow an orchard pastured by any kind of livestock.

Has a large list of insects to contend against, but is not bothered with leaf eaters, hence does not spray, and does not believe any one has lessened the codling-moth by spraying. Uses common sense on borers, and digs them out. He first mounds the tree, and thereby gets what larvae there may be deposited high up in the collar, few remain; these I dig out, which is all "simple enough." He describes gathering apples thus: "Pick 'em by hand; surround the apple with your fingers, break back gently, which loosens the stem, then lay gently in the basket. It is very simple, the process." Makes two classes, one the best, the other of seconds. In the first we put all that seem perfect; in the second, all others that are not culls. Packs in barrels, well shaken down and pressed; marks with name of variety, and always rolls (?) them to market. Sells the best any way possible, peddles seconds, and lets the culls rot. His best market is Kansas City - three miles. Never dries any. Stores for winter in various ways. Has had varying success, and believes loss in cold store was owing to varying temperature and lack of proper care. Does not irrigate, but trusts in the Lord. Prices range from six dollars to ten dollars per barrel. For help he uses "men and mules," and pays as "little as possible, believing that is often too much."

H.L. Jones, Salina, Saline county: Have lived in Kansas forty-four years; have an apple orchard of 6000 trees, planted from five to twenty-five years. For market I prefer Missouri Pippin, Winesap, Jonathan, Lowell, Cooper's Early White, Grimes's Golden Pippin, and Wealthy. For family orchard would plant Early Harvest, Maiden's Blush, Jonathan, Winesap, Missouri Pippin. Have tried and discarded Alexander as a shy bearer which rots on the tree. Prefer bottom land here, sandy soil, free from clay or hard-pan. Preferable with northeast slope. Plant well-branched two-year-old trees: turn deep cross-furrows the distance the trees are wanted apart; cultivate in corn until the trees are five or six years old; after that use the

plow and disc harrow and plant nothing. I emphatically believe that windbreaks are essential. They may be made of anything hardy and suitable, as Osage orange, box-elder, walnut, etc. To protect from rabbits, wrap with grass or cornstalks. I only prune with shears and saw, to clear the limbs off the ground a little. I believe stable litter is good for an orchard. I pasture very little, and do not think it good for an orchard. I spray as soon as the leaves start, with Paris green or London purple, mostly for canker-worm, and doubt its effect upon codling-moth. Thrifty trees are not usually bothered with borers, and unthrifty trees should be made into firewood. Our pickers use sacks with strap over the shoulder. We sort into four classes: First, large, sound fruit; second, small sound fruit; third, slightly damaged fruit; fourth, culls. Very little packing is done here; apples are usually sold to shippers in bulk. I sell my culls to hundreds of farmers in this and adjoining counties for canning, apple-butter, etc. My best market is here in Salina. I have tried distant markets, but it did not pay very well. Have never dried any; stored but few for winter in baskets and barrels. I find the Missouri Pippin, Winesap, Rawle's Janet and Romanite are the best keepers. Our loss in keeping varies with the season and the condition of the apples at picking time. Have never irrigated any. Prices during the past six years have varied from twenty-five to fifty cents per bushel. I use men and boys to help pick and at spraying time in the spring, usually paying one dollar per day.

Finding *Zea diploperennis* in Mexico

by Marty Bender

Zea diploperennis, the recently-discovered perennial related to our annual corn, is becoming an important plant in our perennial grain crop research. A short article in the last Land Report described our initial planting of this grass at The Land and our plans to do research with it. In late October we transferred eight plants to the Kansas Wesleyan greenhouse. Recently the plants flowered, and Wes made crosses to ensure that fertilization occurred so that we would have seeds. We heavily mulched the remaining 28 plants in the field to see if their rhizomes could survive the Kansas winter. The article also mentioned our interest in traveling to Mexico to become familiar with Zea diploperennis and the locations where it has been found. Then in the future we could search for it in more northern locations where the plant would have more resistance to cold weather.

In November, John Schwartz of Albuquerque, New Mexico, a member of the Board of Directors of The Land Institute, and I decided that we would drive south in January to the University of Guadalajara and find out from the botanists there the locations of Zea diploperennis. A phone call to Dr. Hugh Iltis at the University of Wisconsin, who had collaborated with the University of Guadalajara botanists in the discovery of this plant, changed our plans. In early January, he planned to take an expedition of eleven biologists to the Sierra de Manantlan, the only range where Zea diploperennis has been found, to collect and identify the flora and fauna there. With this base of information, Dr. Iltis hopes to convince officials of the Mexican government to make parts of the Sierra de Manantlan into a national park in order to protect

Corn in right hand, Zea diploperennis in left.

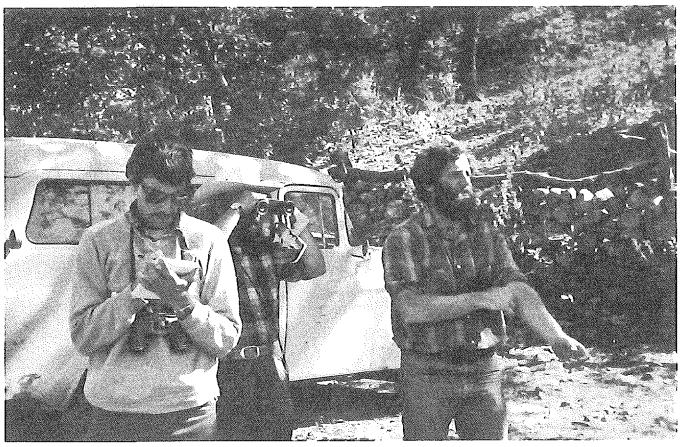
the four known locations of this plant. Since Dr. Iltis told us that it would be almost impossible to find the plant on our own, it was very fortunate that he agreed to let John and me to accompany the expedition. In our final days of preparation, we were pleased to see the excellent article on Zea diploperennis in the December 1979 issue of Smithsonian.

On December 28th, I flew down to Guadalajara, where John was to arrive a week later, and met the members of the expedition. Accompanying Dr. Iltis from the University of Wisconsin were seven botanists: Dr. Bob Kowal, Dr. John Blum, Dr. Don Waller, George Schatz, Steve Sollheim and Brad Schnee, and two ornithologists: Dr. Ed Beals and Dr. Kurt Rusterholz. Others in the group were Dr. Paul Sorenson and Penny Matekaitis from Northern Illinois University, and Dr. Caldwell Hahn, a biologist who works for the World Wildlife Fund, which is interested in preserving the Sierra de Manantlan. She collected insects and after the expedition was to accompany Dr. Iltis to talk to the Mexican Secretary of the Interior.

The next day we met the five botanists from the University of Guadalajara: Dr. Maria Puga and four of her students, Rafael Guzman, Servanda Hernandez, Jose Vasquez, and Eugenio Nieto. Dr. Iltis gave many botany texts to Dr. Puga for her botany department library. Smiles appeared as Dr. Iltis presented a 1980 high school biology textbook, which devoted an entire page to Zea diploperennis and Rafael Guzman who discovered it.

It took several days to prepare for the trip to the mountains due to unexpected events. The luggage of the Wisconsin members arrived two days late because Texas International Airlines did not have a flight until then. Although the employees at Avis had reconfirmed Dr. Iltis' reservations for the two VW busses the week before, they did not reserve them. Meanwhile, many of us went to the marketplace in downtown Guadalajara, where we saw free enterprise at its best. If there was anything that made us want to live in Mexico, it was the taste of the fruits in the market.

On December 31st, as we drove to the Sierra de Manantlan which is five kilometers by thirty kilometers, the scenery changed from dry, deciduous scrub forest to oak-pine cloud forest at an elevation of 2,000 meters, from which we could see the Pacific Ocean about thirty miles away. Below the cloud forest was Rincon de Manantlan, a logging town of several hundred people, where we often obtained gasoline, some food, and eventually established a base camp in a large, vacant, half-completed house which was known as "La Casa Grande." The numerous logging roads enabled us to drive throughout the Sierra de Manantlan and set up two-day camps, so no long hikes with supplies were necessary. While the logging trucks rolled by with firs and pines



John Schwartz (on right) helps ornithologists.

of one meter diameter, we collected plants and insects and identified birds. Dr. Iltis even collected lichens from the fir slashes at the sawmill.

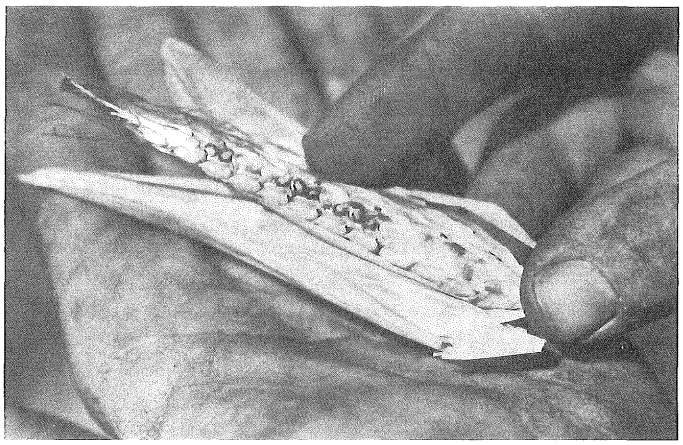
Although most of the Sierra de Manantlan has been lumbered and has suffered fire damage, the flora and fauna have remained somewhat intact. Among the trees of four feet diameter, there was one oak with a diameter of eight feet, worthy of a photograph. In the understory, many of the woody plants were in genera that we usually associate with herbaceous plants in the temperate climate of the United States. For example, some of the woody plants were spurges (Euphorbia species), mints (Salvia species), and composites (Senecio species). The birds were so numerous that it was like the peak of warbler migration in an eastern U. S. forest. Two of the birds we identified there, the Black Chachalaca and the Eye-ringed Flatbill, were far from their presently-known ranges in Mexico. And fortunately, Zea diploperennis is still intact in four small patches.

We encountered a number of difficulties in attempts to collect the seeds of Zea diploperennis. The five Mexican botanists had to return to Guadalajara to prepare for the winter term of school. Without our Mexican friends, we could not collect Zea diploperennis seeds from the La Ventana site at 2400 meters, which is the highest site known, because Dr. Iltis was not familiar with the area or the local people. The road to Los Joyas site at 2,000 meters was damaged by a landslide, so three of the botanists and I had to remain behind and watch the VW busses, while the rest of the group walked two kilometers to the site and collected several pounds of seeds. I began to think that I was not going to get a chance to see Zea diploperennis, but when John Schwartz arrived with his Dodge panel truck, Dr. Iltis told me where a third site was north of Rincon de Manantlan at 1450 meters.

At the third site, which was a recently-harvested corn field irrigated by ditches, it

took me about a minute to identify the Zea diploperennis. About fifty stalks were growing on the edge of the field near the irrigation ditch. The farmer's son told John that they did not plant the "milpilla," which means "little corn." On each slender, six-foot stalk were about seven small ears, with one stalk having eighteen ears. The ear was a three inch spike, consisting of one row of about eight unattached kernals enveloped by a simple sheath. The ears did not resemble the ears of the farmer's cultivated corn, which were the same size as U.S. corn but with five percent of the kernals purple. The kernals of Zea diploperennis were grayish brown and speckled with dark brown.

As I examined various stalks, I noticed that the ears on one stalk were broader than usual and had several layers of sheaths. I knew that I had found a natural hybrid between corn and Zea diploperennis. Altogether, I found three hybrid plants, each with about seven ears and each ear containing about twenty kernals. While the hybrid appeared to be an annual plant, the Zea diploperennis was definitely a perennial, since small shoots were already emerging from the rhizomes of old



Hybrid between corn and Zea diploperennis.

stalks. John and I collected seeds from Zea diploperennis and the hybrids and gave them to Dr. Iltis, who let us keep some seeds to take back to The Land for our research.

At the end of the expedition, John and I quickly said good by to the botanists who were very busy packing the hundreds of plant specimens at the University of Guadalajara. If our hurried thanks were missed, we wish to express them once again to each member of the expedition.

Kansas Rural Center Formed

The Kansas Rural Center, located in Whiting, Kansas, is a newly-formed organization with the goal of improving rural life in Kansas. Soon to be incorporated as a non-profit corporation, the Center will help Kansans examine rural issues that are affecting their lives and their communities. The primary function of the Center will be to sponsor educational and research projects in rural areas of Kansas by obtaining and administering grants and contracts from both public and private funding sources. The Kansas Rural Center is modeled after the Center for Rural Affairs in Walthill, Nebraska, and it hopes to develop a Small Farm Energy Project similar to that sponsored by the Nebraska Center.

The Kansas Rural Center is being organized without a general membership, like the Nebraska Center. A Board of Directors, composed of rural advocates from across the state will determine the policies and programs of the organization. The staff of the Center, both paid and volunteer, will implement the decisions of the Board. Fred Bentley (Box 81, Whiting, Kansas) is Acting Chairman for the Board until officers are elected. Dana Jackson of The Land Institute will serve on the first Board of Directors.

There were 65 pages in the December issue of Farm Journal. 30 of those pages were devoted to pesticide advertisements.

Telling the USDA

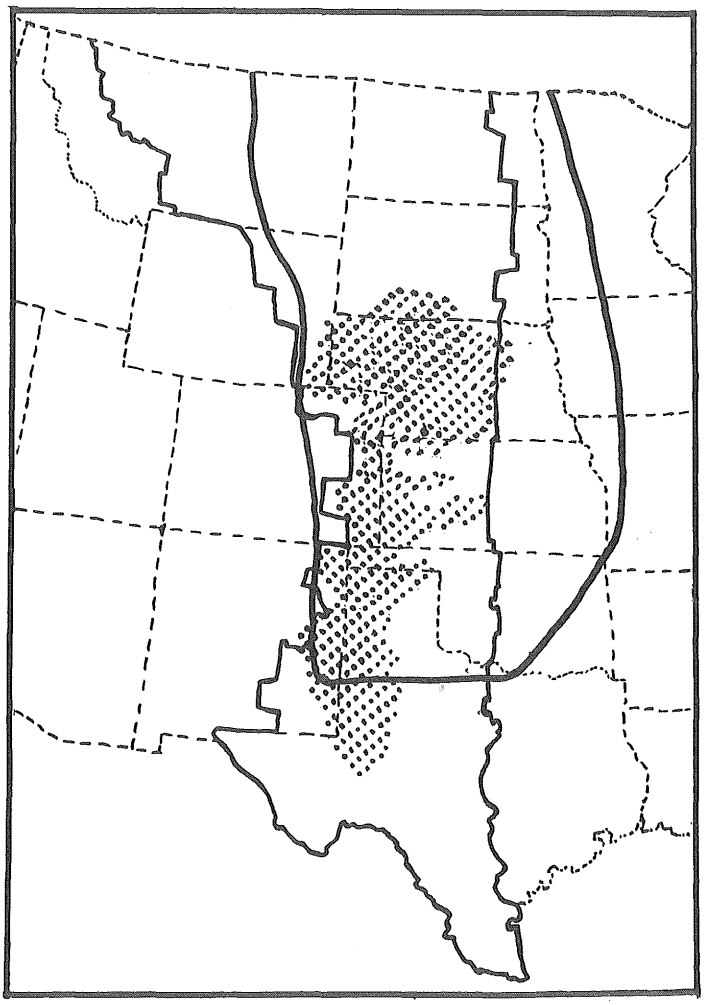
In hearings conducted by Secretary of Agriculture Robert Bergland in Spokane, Washington, agriculturalists from the National Center for Appropriate Technology asked for a re-examination of current highly centralized agricultural systems, and consideration of available alternatives. Keith Kemble, manager of the National Center's agriculture research program, noted that just 3.6 percent of the U.S. Dept. of Agriculture's 1979 budget was allocated to projects benefitting small-scale farmers, yet there is steadily increasing demand for small farm equipment and organic production techniques. He pointed out that only 18 percent of the energy used in the U.S. food system is used directly for agricultural production, while the remaining 82 percent is consumed in processing, preparation, distribution and transportation. A large part of that energy could be saved by decentralizing food production and marketing, through community gardens and alternative distribution systems such as producer/consumer cooperatives, Kemble testified.

In written testimony, the Soil Association of South Dakota told Bergland that the biggest help the USDA could give farmers like them would be to exercise all possible leverage on the land grant universities to do research in the areas of integrated pest management, fertility maintenance and soil improvement with locally available resources, and to quit distributing false and misleading information about organic farming.

The Great Plains in Transition: Toward a Sustainable Agriculture and Culture

by Wes and Dana Jackson

On much of the Great Plains, where a major supply of the world's food is produced, evaporation is equal to or greater than rainfall. Water for irrigation is pumped from aquifers with very slow recharge rates, and the lowering water tables cannot sustain a high production agriculture on the Great Plains. Past development has forced the land to meet the expectations of the people through the mining of water and soil. The future of the Great Plains is in jeopardy if we do not change the course of development and promote a vision of a sustainable future based on humans meeting the expectations of the land rather than visa versa.



The area known as the Great Plains has not been defined precisely. We have shown the boundaries according to Carl Frederick Kraenzel in the book Great Plains in Transition by the solid black line extending to the southern edge of Texas and northern edge of North Dakota and Montana. The wider, curved solid line shows the boundaries according to the Atlas of the Flora of the Great Plains edited by T. M. Barkley. Neither shows the extension of the Great Plains into Canada, though we know they do not stop at the border. The dotted area is roughly the Ogallala Aquifer region as shown by U.S. Geological Survey Maps of ground water.

History of the Great Plains

John Fischer, the former editor of Harpers, has written an excellent book about the Great Plains. Fischer grew up on the High Plains of Texas, and in his somewhat autobiographical treatment, entitled From the High Plains (Harper & Row), he captures much of the essence of Great Plains' economies and ordinary life by looking at the region as an area with a long history of mining ventures.

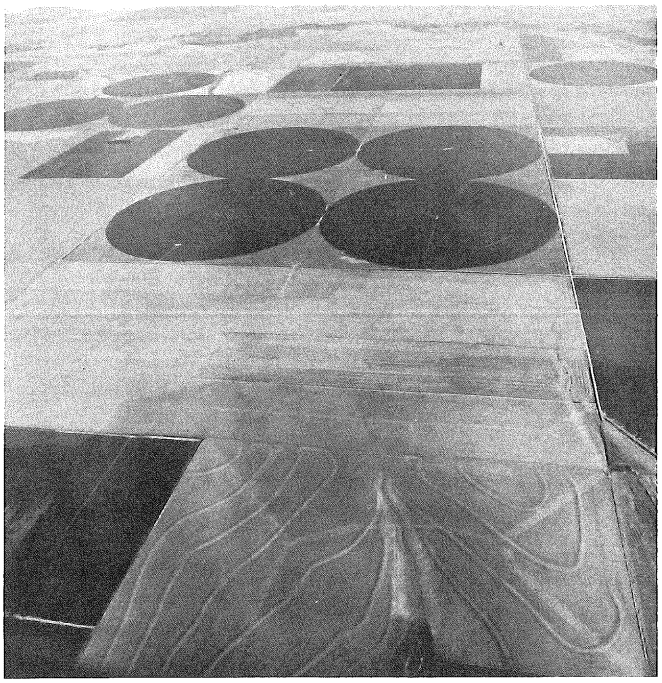
There were three phases of mining before the twentieth century. The first miners were Indians, who for centuries mined flint for arrows and scrapers, but who had stopped before the Spanish intrusion, and for some unknown reason, before the flint was gone. For about 300 years after the Spanish left the horse, a Comanche-economy rapidly developed around the American Bison, the buffalo. This was not really a mining economy so much as a harvesting one, but that all changed around 1873 when white hunters of hides killed a million buffalo a year for the next seven or eight years and left the bones to be bleached by the prairie sun. Early settlers sold these bones for fertilizer in the East. But within a decade the mining was over. Next came the miners of grass, cattlemen, who used what should have been the ecological analog of the bison to overgraze land which the migrating bison barely affected. Drought, followed by an unprecedented blizzard, led to a dramatic collapse of this cattle industry in the 1880's.

Next came the soil mining around World War I. The market reflected the fact that over fifty million acres of agricultural land in Europe was out of production. The Americans responded by plowing forty million Great Plains acres. Wheat was planted as a cash crop, and crop rotation was abandoned. Farmers became more active participants in a money economy as they bought the newly-invented technologies in agriculture, such as threshing machines, for grain production. With their new-found efficiency, they quickly produced a glut on the market. Prices dropped and the response was to plow more land, grow more wheat to pay the debts, and, of course, this further depressed the price. After a few quick

rounds of this spiral, which subjected more and more acres to the plow, came the dust bowl of the '30's. It was then, and remains today, the worst environmental disaster the United States has ever known, and in the opinion of George Borgstrom, the world-renowned nutritionist, one of the three great ecological catastrophies since the beginning of agriculture.

But back to our mining heritage. By the time of the dust bowl, the ephemeral oil and gas boom was already well underway. Almost every pipe driven seemed certain to deliver an abundance of 30¢ per barrel oil. The history and future of mining this portable liquid fuel is now painfully clear to us all. The most recent, and what may be the last, mining operation of the region is fossil water, much of it from the Ogallala Aquifer. This lens-shaped gravel bed of ancient origin, formerly up to 300 feet thick in places, stretches from western Nebraska to northern Texas, where it supports a twenty-five year old center-pivot economy. Any aerial view shows a non-sustainable agriculture, historically fit only for humid regions, dominating an area in which evaporation is greatly in excess of rainfall.

So far we have described only the mining ventures which (though we often forget) were based on the collective beliefs and values of us all. What a short time ago it was that most of us believed that resources were inexhaustible, that humans can conquer nature, and that the good of the individual works automatically for the good of society. Even now, millions believe that personal property rights are absolute and that markets can expand indefinitely.



Center-pivot irrigation in western Kansas.

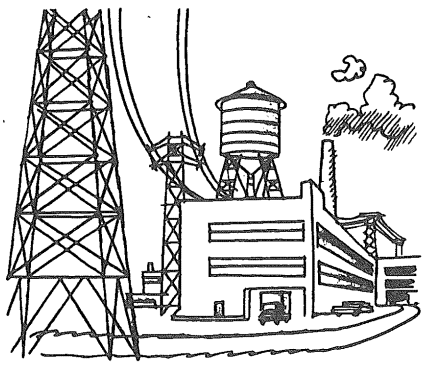
Donald Worster, in his splendid book entitled Dust Bowl, has summarized the events and concluded that what happened, most dreadfully in the southern Great Plains in the 1930's was less the consequence of drought and more the consequence of our economic system leaning on these beliefs and values, and finally coming into conflict with a fragile shortgrass prairie ecosystem.

Future of the Great Plains

The most believable scenarios for the future are projections of history. Unfortunately, when mining has been the dominant activity over the landscape, most scenarios which "naturally follow" aren't particularly appealing. Nevertheless, we cannot ignore our history. The following two scenarios, the first negative and the second positive, both begin with the assumption that an "economic hole" will develop in the Great Plains as agricultural income drops. A decline in irrigation due to increased costs of pumping from a lowering water table will greatly affect the economic base of the region.

Scenario One. This scenario arises out of the historical momentum of the past. It is a continuation of a tradition of exploitation of finite and non-renewable resources. About 200 miles east of the Rocky Mountain coal and oil shale lies the Ogallala Aquifer previously mentioned. North of this fossil water is the Platte River, already impounded by forty dams, with plans for more. South is the Arkansas River, another important regional water resource. All this water supports a rich, humid-agricultural economy. Some feedlots of the region can accommodate one million cattle at once, or about three million a year. Water affords this, for local stockmen no longer have to ship cattle to the real corn belt for finishing. Consequently, the area now supports numerous packing houses and a way of life very different from before World War II.

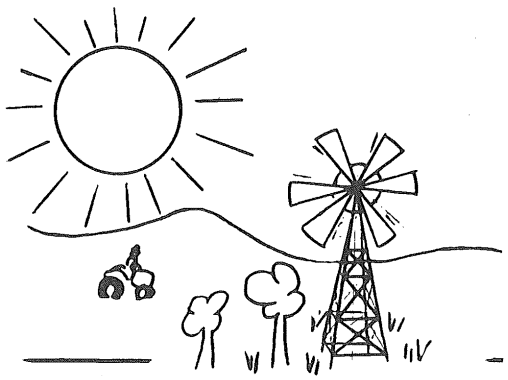
Water in the region is progressively becoming too deep to economically lift, even though scarcely half of it is now gone. Few, if any, center pivots are being added, and numerous towns seem certain to experience economic stress. Since industry can afford to pay more for a gallon of



water than can a farmer, industry moves in. (The most water-intensive industrial use in California is centralized power plant cooling, and a utility can afford to pay from ten to one hundred times more per gallon than a farmer can.) The Chamber of Commerce leaders in threatened towns naturally try to attract industry to the region from the East and from Los Angeles and anywhere else they pick up a scent. Lures are water, fifteen miles per hour winds to blow away pollutants, a strong work ethic, dislike of union labor, and close proximity to the newly-emerging energy center of the country.

It might seem that once pressure is removed from agriculture to keep the economy alive, area residents can return the plowed land to grass. But what usually happens in a "boom area" is that a "fever" gets generated and land prices accelerate. No one knows exactly why, for relatively little of that land would be needed for housing or for factory location. But once high land prices have been paid, there is a strong incentive or pressure, even if the land was purchased as a tax write-off, to make the land pay for itself. Therefore, it becomes wheat ground, not grassland. Unfortunately, the family that has purchased land as a "living hearth" will have to work it intensely. Suddenly the stage is set for the kind of spiral generated during and after World War I which brought on the dust bowl of the 1930's.

Scenario Two. People of the region realize that a truly sustainable agriculture and rural culture must be based on renewable energy and recyclable materials. Rocky Mountain energy, therefore, is not simply energy to be burned to maintain the status quo, but rather it is seen as "transition energy." Instead of seeing the wind as an asset for blowing smoke away, it is seen as a potential source of electricity, and thus hydrogen can be produced for vehicular transportation. The area has an abundance of sunlight for heat collectors and photovoltaic cells which make electricity. The water is used no faster than the recharge rate, but is of an ample quantity to turn out renewable technologies. The population of the region experiences modest growth, and the pressure on the land is sufficiently low that much acreage is returned to perennial grassland.



The first scenario leads to "strength through exhaustion" and may happen "naturally." The second scenario leads to a sustainable agriculture and culture, but it will require a deliberate effort to make it happen.

Regional Consciousness: How Soon is Too Soon or Too Late?

Several years ago, while a professor at California State University in Sacramento, Wes Jackson directed the Lake Tahoe Environmental Consortium, which involved seven colleges and universities from California and Nevada. It was a $250,000 a year project, if one counts the institutional matching funds and resources for the federal funding. Almost everyone involved was interested in preserving what was left of the environmental quality of the Tahoe Basin. The only problem was, we got there too late, maybe even twenty-five years too late. Lake Tahoe sits right where the common boundaries of California and Nevada bend. On the California side, second home development and the usual "fast services" were a blight. On the Nevada side were the big bucks of the casino owners and operators behind their not-so-hidden values. The formerly-pure, clear waters of this mountain gem were now supporting algal growth around much of the edge. What were we to do? We could recommend that excavation be done in such a manner that the soil nutrients were less likely to run into the lake. We could educate children in the schools about the importance of a quality environment. But it was too late to really have much influence because of the momentum already underway.

Is it too late to develop a vision of the Great Plains before the momentum for destructive development picks up? We think not.

Toward Sustainability on the Great Plains

On November 1, 1979, twenty-five people met at The Land Institute for a one-day conference to discuss how options promoting sustainability on the Great Plains might become a part of a regional consciousness. They were asked to suggest other scenarios, besides the two described, which could be imagined given the resources of the region. They discussed the patterns which are likely to develop on the Great Plains if present policies are continued, and what parameters are associated with these collective patterns. Are there alternative policies which could re-direct these seeming inevitabilities, and how could they be made known to the people of the region and be implemented by private and governmental agencies?

Maurice Strong, the organizer of the first United Nations Conference on the Human Environment held in Stockholm in 1972, attended this meeting and encouraged The Land Institute to continue exploring these questions. Though such a large-scale task as guiding the development of the Great Plains toward a sustainable agriculture

and culture seems formidable, he believed it should be attempted. Attitudes and visions of the Great Plains will affect the many local decisions and policies which determine the future.

What Should Be Done?

It was the consensus of those attending the conference at The Land that a significant effort should be made to influence Great Plains people to consider options for a sustainable future. As a beginning, a widely-publicized conference should be held in the fall of 1981 which would involve a broad spectrum of Great Plains scholars, government officials and community leaders. The proceedings of the conference would be published in a volume which, with its policy recommendations and images would become a working document guiding the implementation of sustainable alternatives rather than another book gathering dust. This document should be somewhat of a hybrid between the scholarly Man's Role in Changing the Face of the Earth, the proceedings of an international symposium held in 1955, and the California Tomorrow Plan, a brief, graphic description of an alternative future for California developed by the California Tomorrow organization.

Planning Grant Received

The Land Institute has received a grant of $2000 from The Youth Project to begin planning the conference. Individuals from various parts of the Great Plains will be brought together in the spring of 1980 to serve as an advisory commitee. The committee and The Land Institute will then write a proposal for a grant from a major funding agency to hire a project director to organize and administer the conference.

The goal of the conference will be to discuss how options promoting sustainability on the Great Plains might become a part of a regional consciousness, and how these options could be integrated into policy decisions within the region. Follow-up activities will be suggested at the conference and implemented later by an expanded advisory committee.

Following the conference, the proceedings will be edited at The Land Institute and published within a year.

Conclusion

Those who attended the preliminary conference at The Land Institute on November 1, 1979, struggled with concern over the feasibility of this ambitious project. The Great Plains has been settled and developed with little deference to its particular geographical and climatic conditions. However, the future is no longer viewed assuming plentiful supplies of energy, water and mineral resources, and we must act differently if man is to continue to live on the Great Plains and farm its soil for the benefit of the world. This project presents a tremendous challenge, and we must pursue it.

Dust Bowl: The Southern Plains in the 1930's

by Donald Worster
Oxford Univ. Press, N.Y., 1979
243 pages, Bibliography, $14.95

Reviewed by
THELMA WRIGHT

Donald Worster grew up on the southern plains and has a deep love and respect for the land and the people who inhabit it. The Dust Bowl is a recounting of the awful Black Blizzards which devastated millions of acres of land, caused the exodus of the "Okies" and the Exodusters and brought bankruptcy and misery to thousands of people. The author concentrates his history in Cimarron County, Oklahoma and Haskell County, Kansas. His interviews with survivors and the many photographs tell a dramatic story of the terrible disaster which struck this country.

In the great movement west, Americans thought of the grasslands as the place where infinite wealth could be farmed from the land. Intensive working of the land could enrich them and bring about a secure future for themselves and their families. They had no understanding of the fragility of the soil and no thought for the results of the breaking of the sod.

The book gives precise evidence of why the dust storms resulted and excellent documentation for the process, including the technological revolution which made them possible.

> "Explaining the plow that broke the plains requires one to explain the powerful expansionary and autonomous thrust of American society. The historian traces the origins of this extraordinarily determined push into the grassland to Jefferson's outward-moving democracy and to the shaping of American agriculture by an evolving capitalism. There was no sharp break between the two; both were expressions of the same self-minded, individualistic dynamism that ignored complex ecological realities." (p. 96)

Worster strongly suggests that our economic system is at fault for the American push for more and ever more production, more possessions for each person and the ultimate cost in disaster for this blind attitude. He links the stock market crash and the Great Depression to the same system in a unique investigation of cause and effect. The New Deal and the Roosevelt times are explored for attempts to bring about a more humane era. Failures and successes are discussed in detail.

The Epilogue: On A Thin Edge (p. 231) sug-

gests some solutions for the future, but says the problems of putting them into effect are almost insurmountable.

To a reader who lived through the Dust Bowl period, memories are invoked of the many smaller dust storms when the winds blew the collected dust again and again. One remembers not only the terrible heat, the human suffering and despair, but the pitiful crying of the starving, thirsty cattle and the waves of grasshoppers that ate everything in their path.

The younger reader will absorb a sense of dread and an understanding of the results of bad land management and the unbridled push for more production. The book is interesting not only for its stark history but for its dire predictions of the future.

This perceptive book, well constructed and well documented is made easy to read, partly because of the stunning photographs and by several maps used in the illustrations. More carefully dated photographs would have been helpful however.

Worster is now an associate professor of American Studies at the University of Hawaii and the author of Nature's Economy and American Environmentalism. We look forward to his future works.

The reviewer and her family did live through the dust bowl years, although not on the Southern Great Plains. This picture, taken in 1937, shows them at "Poverty Knob," a place they farmed near Steele City, Nebraska, very close to the Kansas border. As tenant farmers for seven years in that area, they grew wheat for their landlords, and corn and alfalfa to feed their own cows and chickens, which provided an income from eggs and cream.

EARTH DAY '80

April 22

Almost ten years ago an exciting and powerful event took place which marked widespread public commitment to environmental protection. The event was EARTH DAY. The legacy of legislative and community achievement that followed is not only impressive and important, but a statement to what can be accomplished through strong public action.

People across the nation currently are making plans to celebrate the tenth anniversary of EARTH DAY, to demonstrate that environmental values are widely supported and constructively pursued. Conferences, seminars, open houses, street fairs, walking tours, and many other efforts will take place on April 22 to celebrate EARTH DAY '80. The focus will be on positive, resourceful initiatives taking place in local communities everywhere to improve environmental quality and protect our natural resources.

The Land Institute and the Kansas Wesleyan Environmental Studies Program are sponsoring an EARTH DAY Planning Meeting for the Salina community on March 4 at 7:30 P.M. in Room 111, Peters Science Hall. Anyone who is interested is welcome to attend.

At the national level, a temporary, nonprofit organization, the Citizens Committee for the Second Environmental Decade, has been formed to act as a clearinghouse, catalyst and coordinator for EARTH DAY '80 activities. They can be contacted by writing to EARTH DAY '80, Room 510, 1001 Connecticut Ave., NW, Washington, DC 20036, or by calling (202) 293-2550.

All Friends of The Land are encouraged to participate in EARTH DAY activities in their local communities. The environmental movement is rooted in the multitudes of local organizations which work to improve the quality of life in their neighborhoods, cities and counties. The decisions of the 80's will be difficult and complex, and environmental concerns will not be a part of them unless people show that they care about a healthy environment.

CELEBRATE EARTH DAY '80 on APRIL 22!

Alternatives in Energy

In June, 1979, Dr. Charles Washburn, professor of Mechanical Engineering at California State University, Sacramento, taught a special energy course at The Land. During the time he was in Salina, he and Wes Jackson began to study the potential of alcohol fuels to help meet the nation's demand for transportation fuel. Some of the results of Washburn's calculations were discussed in the fall Land Report in an article, "Energy from the Land," by Dr. Washburn. He concluded: "If the urban, agricultural and forestry wastes which are readily collectable are used, together with the agricultural products from "surplus" land to produce transportation fuels, the net energy available will be from 1/20 to 1/10 that now consumed by our transportation system." A good conservation program could achieve this much.

The potential of alcohol fuels to help solve our transportation fuel problem has been vastly over-estimated. Yet there is a tremendous enthusiasm for production of alcohol fuels from farm crops such as corn. Farmers talk about producing alcohol for on-farm use in order to be more self-reliant. Farmers' organizations talk about expanded markets, greater demand for grains, and higher prices.

In the midst of all this enthusiasm, it has been difficult to be a voice of caution. The Land Institute recognizes that the land is the source of all our wealth and well-being and is committed to helping those who grow our food on the land, especially the small family farmers. But The Land Institute would be doing a disservice to the land and the farmers if it did not share its information and the results of its investigation. The agricultural community should seriously consider the soil loss problem which would be associated with increased corn production for alcohol fuel.

On November 10, Wes Jackson testified at the hearings of the National Alcohol Fuels Commission in Salina, Kansas. Again, on January 3, 1980, he gave similar testimony at hearings in Chicago on President Carter's plan for rationing gasoline. In Chicago he stressed the need for an equitable conservation plan to stem the current high interest in a massive alcohol fuels program from our grain fields to meet transportation fuel needs, saying that such a program would cause a steep increase in soil erosion, threatening us with food shortages later on. Copies of the article which follows were given to the commissioners and hearing personnel at both hearings.

Impacts on the Land in the New Age of Limits

by Wes Jackson, Mari Peterson and Charles Washburn

A future society based on sustainable energy requires that we look to a sunshine future and that we regard all fossil fuels as transition fuels. Such an energy future will likely be a "fine-grained" approach, perhaps even a decentralized approach which means we will have to look to numerous sources of energy at the regional level to meet our needs: direct solar photovoltaic, wind, microhydro including low head run of the stream, and biomass conversion of plant materials and wastes. Extensive use of any one of these partial solutions will not accomplish what a moderate conservation program is capable of accomplishing. We have omitted nuclear power as an option, for our country's experience has left us with an awareness of the unresolvable uncertainties associated with that energy source. Furthermore, we deplore the crash synfuel program which seems bent on taking a 200-year supply of coal and converting it to an ephemeral 40-year supply.

THE LAND'S POTENTIAL FOR LIQUID FUELS

What kind of potential for fuel production does the American land hold? Plants are 3-dimensional solar collectors which at very low efficiencies capture dispersed energy and store it in a chemical form. We can easily calculate the land's potential for production of portable liquid fuels based on our country's available land area. If every acre of the coterminous 48 states was suddenly to become as productive as our average corn field was in 1977, a little over 90 bushels per acre, the alcohol yield would be about equal to our current transportation fuel use. We'd have to grow these corn plants on every acre of deserts, mountain tops and cities.[1] Since this is not possible, what is?

Corn is our country's top carbohydrate producer. There are other feedstocks we could consider for alcohol production, such as garbage and stover and straw, and even other grain crops or potatoes, but if we are to be serious about a meaningful alcohol fuels program, one that really puts even a modest dent in foreign imports, we have to employ our champion energy producer. We have to rule out sugar cane since it is a tropical crop. Even if we could grow sugar cane here, it would out-yield corn only by a factor of two or three, and then under the most favorable conditions. Sugar beets likely require more energy input and the energy balance

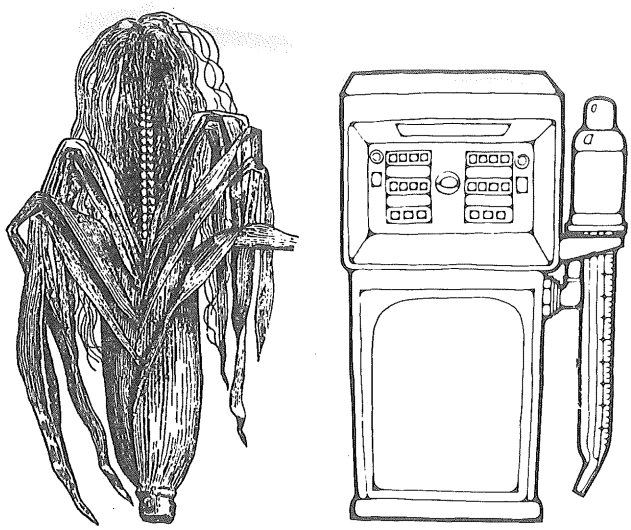
might eventually rest somewhere between corn and sugar cane, but we don't know that now. Even if it does out-yield corn by a factor of two, it remains insignificant.

When we do an energy balance analysis in order to see how much energy goes into alcohol production from corn and how much comes out, the results are disappointing even when we are overly generous. For our purposes we have assumed no energy input into the alcohol plant; it is to be built from local materials and operate with a previously unused energy source such as direct solar, wood or wind electric. Let us further assume that the spent mash which is a protein by-product can be substituted for other protein sources. The mash therefore is given an energy credit equivalent to the quantity of energy that would be required to grow the same amount of protein elsewhere. Using the 1978 U.S. average yield of 100 bushels per acre for corn, we might expect to harvest 72 gallons of ethanol per acre after we subtract the energy cost for the fertilizer, pesticides, machinery manufacture, traction for seed bed preparation, maintenance and harvest, and add the spent mash energy credit.[2] More than half (53%) of this total equivalent energy yield comes from the credit we give the spent mash by-product. This is a disappointing result, for this 72 gallons per acre yield has an energy value equivalent to only 1.05 barrels of crude oil.

It requires less energy to grow wheat than corn and the higher protein content yields a larger credit. Nevertheless, assuming the 1977 wheat yield of 30.6 bushels per acre, there would be an optimistic alcohol harvest of 51 gallons per acre -- the energy content of which is equivalent to 3/4 barrel of crude per acre.[1]

These are sobering results, for if enough agricultural alcohol is to be produced to make a dent in U.S. oil consumption, thousands upon thousands of acres of currently unfarmed land must be brought into production. Farmers are already cultivating their most productive lands[3] and any new lands will be less fertile and of a steeper slope. These are lands in which the erosion will be greater than the national average, lands in which fertilizer inputs will be necessarily greater than the current national average and yet, the yield will often be less than the current average. Consequently, the average energy balance will be even less on a per acre basis.

Our purpose is not to provide one more calculation of the energy balance. We are deeply concerned about our national soil loss problem. Most estimates of this problem vary, but not radically. The General Accounting Office's study of 1976 found the average soil loss in the Corn Belt, Great Plains, and Northwest to be around 16 tons per acre per year. An Iowa State study in 1972 set the figure at 12 tons per acre per year for the nationwide



average.[4] Let us be conservative for purposes of illustration and assume 9 tons of soil loss from a typical field used to grow 100 bushel-per-acre corn to make alcohol.

Let us pose a very simple question. At 9 tons of lost soil per acre, how many pounds of soil does each gallon of alcohol represent that we send from our corn field to the transportation sector? It can be determined as follows:

$$\frac{\text{lbs of soil loss}}{\text{gallon of alcohol}} =$$

$$\frac{9 \text{ tons}}{\text{acre}} \times \frac{2000 \text{ lbs}}{\text{ton}} \times \frac{1 \text{ acre}}{100 \text{ bu}} \times \frac{1 \text{ bu}}{0.72 \text{ gal}} =$$

$$\frac{250 \text{ lbs}}{\text{gal ethanol}}$$

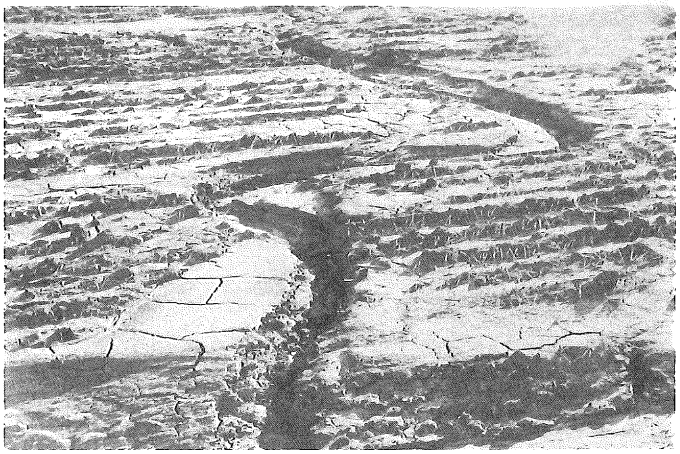
With the addition of marginal cropland[5] to the productive sector, we can estimate that the average loss is increased to 9.26 tons per acre.[6] This may not seem like much, only 7 more pounds of soil per gallon for a total of 257 pounds per gallon. It is important in the analysis of alcohol production to look beyond the individual consumer and producer to the impacts on the nation as a whole.

We currently farm 400 million acres in this country, and since we have an average loss of at least 9 tons per acre, the total amounts to 3.6 billion tons of soil loss per year in the U.S. (This is certainly conservative since the Iowa State University study concluded there are 4 billion tons of soil lost each year. This would be enough to fill a train 633,000 miles long, one that could be wrapped 24 times around the earth.) Let us look at a comparison:

Current lands: 400 million acres x 9 tons/acre
= 3.6 billion tons

Current land + marginal lands:
511 million acres x 9.26 tons/acre
= 4.7 billion tons

This amounts to a 30.6% increase in erosion nationwide! Here we are assuming the current



Wheat field near Salina, Kansas.

crop mix. With a massive alcohol program, there will be little incentive for crop rotation, even though in Missouri continuous corn land will lose as much as 20 tons per acre, while similar land in rotation with wheat and clover will lose only 2.7 tons per acre.

Keep in mind that the energy in the alcohol required to meet the demands of an average U.S. car for one year could alternately be used as food to feed 23½ people for an entire year.[8] From our point of view, the issue is not whether the alcohol is there, but that massive alcohol production from our farms is an immoral use of our soils since it rapidly promotes their wasting away. We must save these soils for an oil-less future. We believe it will be easier to deal with the political realities associated with scarce energy for a wasteful transportation system than the political realities associated with a scarce food supply and extremely high prices for that food which is available.

We are not deeply concerned that the nation had to spend $158 million in 1975 to dredge and remove sedimentation from the nation's rivers, lakes, reservoirs and ditches. Nor are we bothered by the fact that the same job today, with the marginal land brought into production (30.6% more erosion), would cost $270 million. This sediment has lost its value as productive topsoil, so the dredging merely represents another external cost to society from erosion.

However, we are concerned with a more fundamental problem. In 1975, $1.2 billion was spent on fertilizers to replace nutrients lost through erosion in that year alone. If we bring marginal land into production, replacement fertilizer will cost over $2.1 billion. The dollar cost is not of particular importance. The fact of most importance is that fertilizers are fossil-fuel-based and that we have literally moved our agricultural base from soil to oil.

We can see some alcohol production for farm use as part of our fine-grained approach to a sustainable energy future. Nonetheless, our fields will be pressed if we try to meet all our direct farm energy needs. Gasoline and diesel fuel for farm production accounts for approximately 6% of the fuel consumed by all motor vehicles. To meet this need alone, we would need approximately 140 million barrels of oil equivalent.[7] This could be provided by 133 million acres of corn for alcohol. In 1976, 71 million acres of corn were harvested!

We recommend that more attention be given to our most underrated source of energy -- conservation. The average U.S. automobile carries 2.2 passengers. To provide the fuel farmers need for production (gasoline and diesel only), we can bring all the marginal land into production plus use all our current corn production for alcohol and consequently increase erosion 30.6%. Or, we can increase the number of people per vehicle from 2.2 to 2.4, thereby releasing 140 million barrels of oil from automobile consumption for use elsewhere.

There is no simple solution to our nation's future energy needs. We must devote our efforts to looking for the most appropriate mix of energy sources, including conservation. It is of extreme importance that we reserve as many options as possible for future generations in the areas of energy and food production. Most importantly we must preserve our soils for continued use as a food-giving resource, realizing that the soil is the basis for the health of the civilization.

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1. From "Energy From the Land", by Charles A. Washburn. The Land Report. Fall 1979.
2. One bushel of corn will yield 2.04 gallons of alcohol. An acre producing 100 bushels will thus yield 204 gallons. However, using calculation based on work by Pimentel and Terhune ("Energy and Food," Annual Review of Energy, Vol 2, 1977) we must subtract 170 gallons per acre in crude oil equivalent as the energy cost for producing the crop. Thus, 204 gallons - 170 gallons leaves a net of 38 gallons of oil equivalent. But when we credit the protein mash with the direct and indirect energy it would require to grow a substitute protein equivalent in the high-protein soybean crop, we have a total of 72 gallons per acre of net alcohol production.
3. "Corn Yields...Where Do We Go From Here?" by John Marten. Farm Journal, May 1979.
4. "To Protect Tomorrow's Food Supply, Soil Conservation Needs Priority Attention," General Accounting Office, March 1, 1977.
5. Marginal land's potential for conversion to cropland is categorized as high, medium, low, or zero by the Soil Conservation Service (Potential Cropland Study, October 1977). For our paper we define marginal land as that in the high and medium categories, since only this land can reasonably be brought into production. This amounts to 111 million acres in the United States. The SCS categories are based on the economic feasibility of bringing the land into crop production considering development costs, production costs, and commodity prices in 1974.

6. This analysis is based on data in the Potential Cropland Study by the Soil Conservation Service. Of the marginal cropland, 32% of the acres have severe erosion and 27% have above average erosion problems. We conservatively assume that 12 tons of soil loss per acre represents severe erosion and 10 tons per acre represents above average erosion. Using a weighted average formula, we arrive at 10.2 tons per acre of soil loss on marginal land.

   With all high and medium potential cropland brought into production, we would be using a total of 511 million acres. Averaging current cropland (400 million acres) at a soil loss of 9 tons per acre and marginal cropland (111 million acres) at 10.2 tons per acre, we arrive at an average of 9.26 tons per acre of soil loss with all current and potential cropland in production.

7. Gasoline and diesel fuel demands for farms amount to 170 million barrels per year. Since 18% of the current farm land is in corn production and we accounted for the energy inputs to grow that corn in our alcohol energy balance, we need to come up with 18% less gasoline and diesel -- 140 million barrels per year.

8. The following calculations were made by Charles Washburn based on data from the 1976 Statistical Abstract and from the Monthly Energy Review:

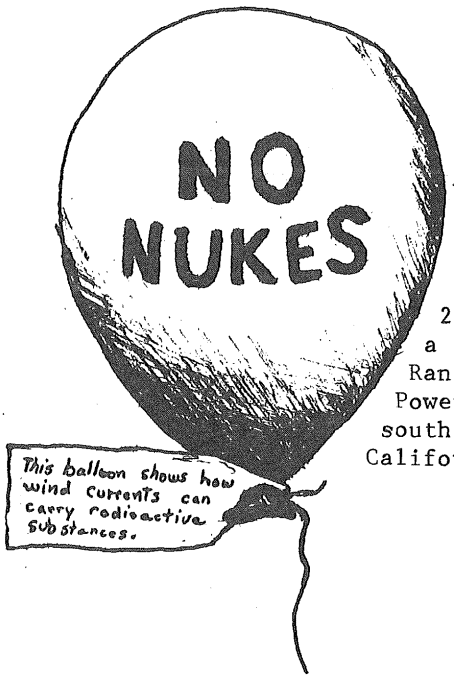
$$\frac{\text{Calories}}{\text{Person-year}} = \frac{2500\ \text{Cal}}{\text{day}} \times \frac{365\ \text{days}}{\text{year}} = 912{,}500$$

$$\frac{\text{Calories}}{\text{Car-year}} = \frac{680\ \text{gallons gasoline}}{\text{car-year}} \times \frac{125{,}000\ \text{Btu}}{\text{gal gasoline}} \times \frac{0.252\ \text{Cal (kcal)}}{\text{Btu}}$$

$$= 21{,}420{,}000$$

   So you can feed 23.47 people with the number of calories required to feed one car. (These are actually kilocalories, the usual "Calorie" talked about with food.)

9. This is based on information in the National Transportation Statistics, the U.S. Department of Transportation, 1976.



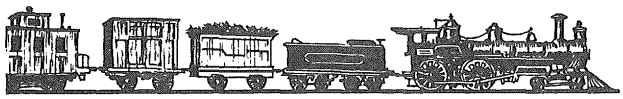
Edgar Lanzl found a balloon on his farm near Hollywood, Kansas, on Nov. 5 at 9:00 A.M. The attached tag said the balloon had been released about 20 hours earlier by a group near the Rancho Seco Nuclear Power Plant, 40 miles south of Sacramento, California.

Our Transportation Dilemma

by Mari Peterson

On an otherwise calm December morning, one New York motorist after another tried to jump the gun on an anticipated rush hour traffic jam, but only succeeded in bringing on the inevitable as early as 4:30 A.M. Commenting on the absence of service by the Long Island Railroad on that particular morning, a National Public Radio spokesperson declared that the strike had "upset the fragile balance of nature that the cities have created." Elsewhere across the nation, at least 60 million workers found their way to 48 million cars for another trip to work (3/4ths of all workers[1], 4/5ths of these driving individually).

Off on the distant horizon of the Atlantic, some large super tankers made their way to American ports. These few Herculean ships bring the 9 million barrels of oil needed daily by the U. S. transportation network. Each day Americans consume 19 million barrels of petroleum[2] for industrial, home and transportation uses, the latter comprising over half the total.[3] An abrupt halt to the importation of oil would assuredly bring collapse to the transportation system, and thus to industry and households. Yes, it is a fragile "balance of nature" man has created.



Tracking Early Transformations

Between farm and city, a few horse-pulled wagons kicked up dust, and off on the waterways a few barges and boats moved along at five miles an hour while most people stayed near home tending to their crops, store or shop. Peter Cooper was one of these folks tending to business in 1830-- the business of building the steam locomotive, Tom Thumb.

Ten years later, 3,000 miles of railroad had been laid in the United States, almost twice that constructed in Europe.[4] The limiting factor in Europe was the driving impetus in the United States: the price of land. George Taylor in the book The Transportation Revolution (Holt, Rinehart and Winston, 1951) noted that up to 1868 English railroads paid out more for land than the total sum spent on all American railroads to that date.

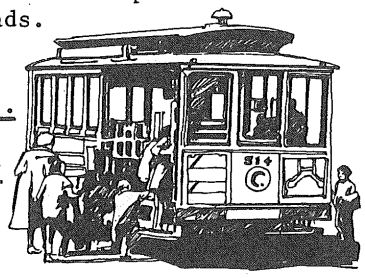
By 1850, with the Doctrine of Manifest Destiny well in hand, the national government found an interest in aiding the railroads through land grants. Within the next 21 years, it gave 129 million acres of land to the railroads[5] with Texas providing another 5 million.[6] Condensed, this would equal the land area covered by Iowa, Nebraska, and Kansas. (As a matter of fact, most of Iowa was owned by the railroads in 1878.)[7] This western thrust in

railroad development radically altered the western land. Great cities were built at railroad intersections, settlers moved West in droves, and farmers turned over the prairie sod. In fact, the future of the Great Plains was determined in part by the East-West railroads which linked the Plains to the great industrial centers, but provided no efficient means of commerce or communication between the northern and southern parts of the Plains.[8]

Other changes were precipitated by the railroad development. Prices on land adjacent to the railroads began to skyrocket. Robert Fogel studied the land forty miles on either side of the Union Pacific in his book, The Union Pacific Railroad, A Case in Premature Enterprise (John Hopkins Press, 1960). In 1860 this land was worth $4.4 million, and with normal appreciation through 1880, it would have been worth $5.8 million. In actuality it was valued at $158.5 million -- a 36-fold increase. Even more important is the change that took place in the formerly self-reliant communities. A real specialization took hold in cities and rural areas as the other commodities for subsistence were provided inexpensively by the railroads.

With a Wave of the Wand..

Trolley Meets with Folly



In 1901, the course of history took another turn as the first big oil "gusher" was struck in Texas.[9] Within the next two years, Henry Ford organized for mass production of the Model-T and the Wright Brothers successfully flew at Kitty Hawk. By 1910, the railroad construction period was virtually over.

The fascination with the automobile, coupled with the availability of oil, led to the federal adoption of a national highway construction program in 1916. What has happened since 1916 is rather well known. At that time there were less than two million cars;[10] today there are over 100 million.[11]

There's one other mode of transportation that's been overlooked -- the trolley car. By the way, whatever did happen to the trolley cars? As was reported before the Senate Subcommittee on Antitrust and Monopoly, General Motors Corporation organized a company called United Cities Motor Transit to buy the trolley lines in a couple of locations in Michigan and Ohio. Once acquired, the lines were dismantled, GM buses were moved in and the new transit system was turned over to local management. After being censored for such activities by the American Transit Association, GM formed a different alliance with Standard Oil of California and the Firestone Tire Company. By 1949, over 100 electric transit systems had been replaced by GM buses in forty-five cities. Of course justice prevailed. The Federal District Court in Chicago fined General Motors $5000 and its treasurer, $1.[12] (Did you know there was a day when you could get on a trolley car in New York City and find your way through various transfers to Boston, Massachusetts?. . .)

Efficient Travel Means More than Saving Time

The tragic event of recent transportation history is that as a nation we have systematically chosen those modes of transportation which have the poorest energy efficiencies relative to the work accomplished, and also the highest capital requirements. Using the British Thermal Unit (BTU) of measure for the energy content of the fuel, at one end of the spectrum are the railroads with 630 passenger-miles produced per million BTUs of fuel; at the other end, the auto -- 110 passenger-miles per million BTUs. Likewise, waterways and railroads are more efficient in carrying freight than trucks or airlines.[13]

However, we have pumped the greatest amount of capital into auto travel ($236 billion with $72 billion of this total invested in highways). The intercity trucks represent $30 billion of investment toward freight transport. In total, nearly $270 billion has been channeled into highway transportation for passengers and freight, whereas all forms of nonhighway transportation have received only $70 billion.[14]

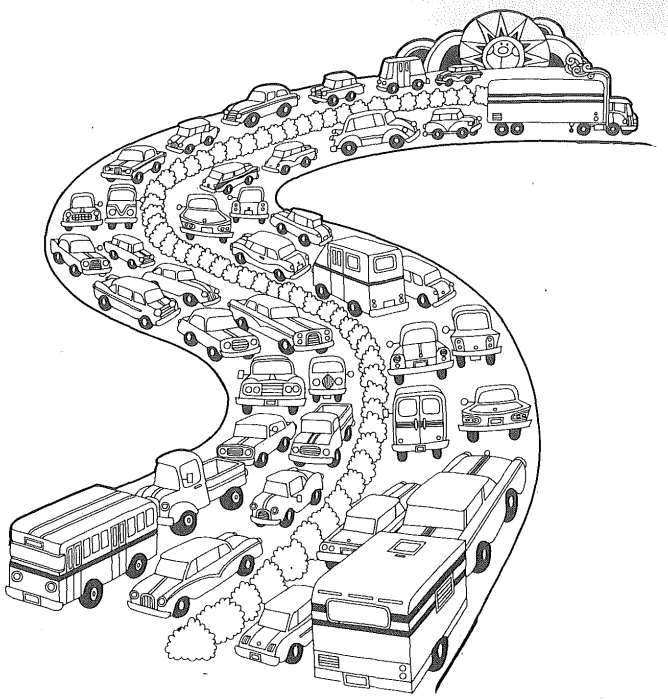
To augment these inefficiencies, as most aspects of production and consumption have become more centralized, the goods we consume travel greater and greater distances to provide us with the same amount of end-use product. Likewise, the distance between work and home has increased steadily over the years.

And last, not only have we chosen those modes of transportation that perform the least amount of work per energy input and have increased the distance that goods and people travel, but we have allowed engine efficiencies to drop in our most commonly used transportation modes. We replaced piston engines with jet engines in aircrafts and dropped the engine efficiency by almost half. Until recently, the trend towards bigger cars dropped auto efficiency. On the other hand, railroads increased in efficiency five times over since 1950 as diesel locomotives replaced steam locomotives.[15]

Both Feet on the Ground

What has caused this shift toward inefficient modes of transportation? One consideration is the general wealth of the nation and the relative cheapness of energy and capital as we have been developing. Most Americans can afford to own a car so they do, thus gaining the benefits of accessibility and ease of transport, plus the security of private ownership.

The government hand has not helped matters any. In this past year alone, the Department of



Transportation provided $7.2 billion for highways, $2.9 billion for air transport and only $1.7 billion for railroads. During the year, Amtrak received a 26% reduction in funds from DOT while the others received a 6% increase.[16] Not only Amtrak struggled this year, but the other problem company, Chrysler, is in the process of being hooked up to a life-support system. Historically, there have been problems with the way the Interstate Commerce Commission has regulated freight rates in ways that have tended to favor truck transport over railroads.[17] What has created such biases?

One issue at hand is that of making a choice between public good and private profit. The railroads are in need of at least a $10 billion investment to perform needed repairs and to update equipment.[18] Furthermore, passenger travel with Amtrak is not profitable, partly due to the increased labor needed to directly and indirectly service the passengers.[19] In Europe and Japan the choice has been made to provide for the public good, and they operate extensive passenger rail services with government subsidization in lieu of private profits.[20]

The extent of the existing infrastructure is a vital consideration in government and private decision-making. Unless an intercity passenger rail system or innercity bus system is fully in place, operates on a regular schedule, and can get an individual to or almost to the desired destination, it is not appealing to most people. Conversely, an enormous investment has been made in the interstate highway system, and in innercity clover exchanges and bypasses. The railroad investment (infrastructure) is older and has been neglected too long. It is not surprising that the government favors its newer investment in highways.

The question of infrastructure should not be passed over lightly. We are approaching a transition point when fossil energy will no longer fuel our transportation system. Biofuels (alcohol fuels) cannot provide 9 million barrels of oil equivalent energy per day because of limited land space for field and forest energy crops.[21] Synfuels cannot provide 9 million barrels of oil equivalent energy per day and are based on the nonrenewable resource of coal. If we begin to look to any other fuels -- electricity or hydrogen -- we are referring to the need for a change in the infrastructure.

The best way to approach the transportation future is to extend the lifetime of our limited dowry of petroleum as long as possible. This will allow more time for making wise decisions. The railroads could be an important transportation form in the future. Because of the ability of the train to perform more work per unit of energy, the railroad infrastructure must be saved and hopefully improved. In the meanwhile, increased use of rail for passenger and freight transport will decrease energy consumption, but it is unlikely that enough people will use the railroads to cause a significant drop in energy consumption. This means we must work on the number one problem -- the automobile.

Since World War II, the number of automobiles has more than doubled, and the number of miles traveled per capita has doubled. Why is the automobile so much more indispensable today than it was in 1946? Have we overlooked the possibilities for walking, bicycling, and car pooling? Perhaps the greatest culprit is urban expansion which has moved the worker further from the workplace. Isn't there an area closer to work that would be a suitable living place? Or a job closer to home? However, if we do have to coexist with the ubiquitous auto, then it has to be made with better engine efficiencies.

Only 25% of the transportation energy is used to move freight, so there is plenty of cream to skim off the top of our nation's excessive mobility.[22] The "footlooseness" of society is a recent phenomenon -- since the Tom Thumb. The future need not resemble the past; for example, improvements in telecommunications may allow the same amount of communication with far less transportation, especially for business. The future, though, will not be pleasant if we continue this footloose race at the present speed. Let's get both our feet on the ground and move with calculation and contemplation into the unknown transportation future.

Our Energy Dilemma

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13. Railroads and Waterways carry 1,300 and 1,470 ton-miles per million BTUs, respectively, compared with 360 for intercity trucks and 20 for airlines. See Barry Commoner, "A Reporter at Large (Energy-III)", The New Yorker. (February 16, 1976), 68.
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Building a Solar Greenhouse

by Mark Lieblich

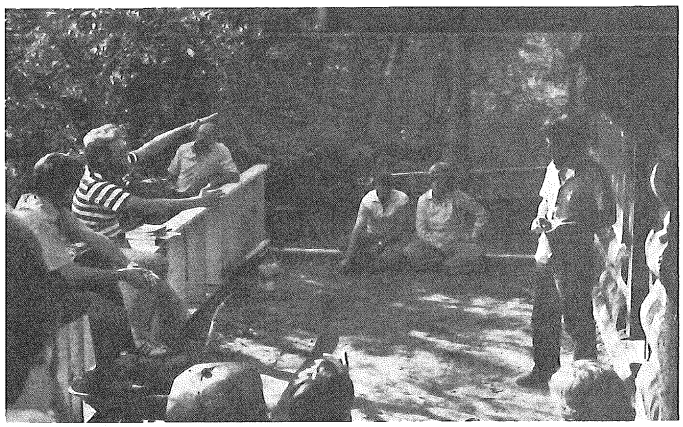
As the Land Institute's search for new crops has grown in importance, the need for a greenhouse has arisen. This will provide the climate controls necessary for plant breeding and an environment in which cold-susceptible plants can survive through the winter.

In keeping with The Land's philosophy of self-reliance, it was decided the greenhouse should be solar-heated. The sun will be utilized for heating purposes as well as lighting, where a conventional greenhouse only takes advantage of the sun for lighting purposes.

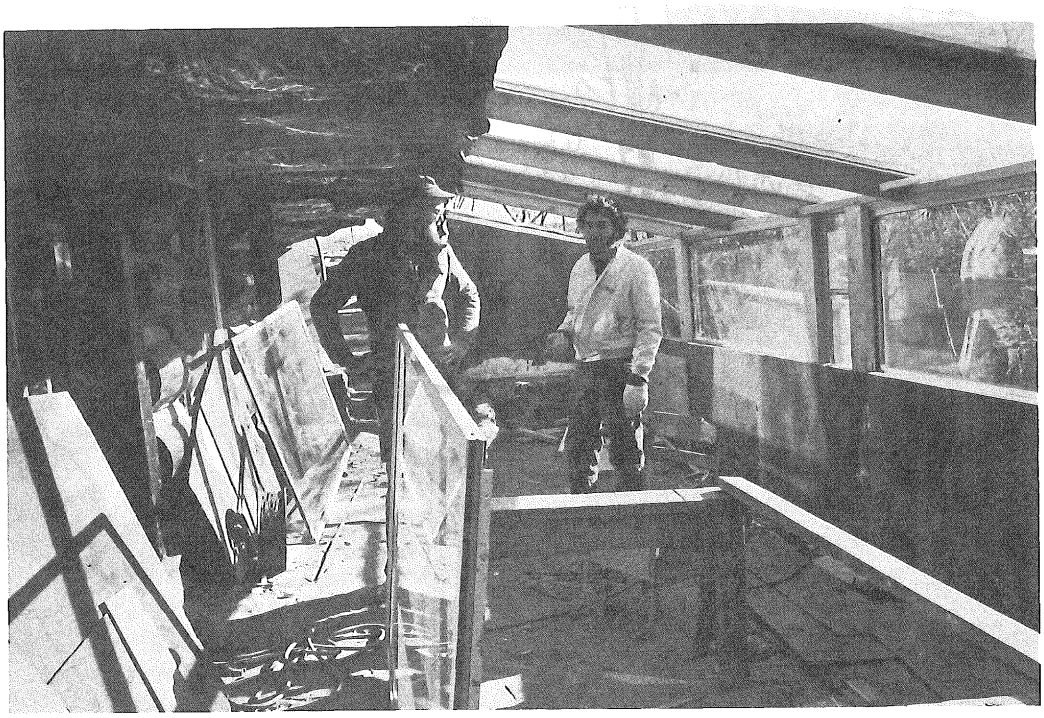
The foundation for the greenhouse was laid during the Spring 1979 semester by The Land's students. Part of this is a six inch irrigation pipe and the rest is a short concrete wall. The greenhouse will be attached to the library/shop building's south-facing wall. This will function as the greenhouse's north wall. The site allows for a greenhouse which is approximately 30 feet by 12 feet, with one of the long walls shared with the building.

When a greenhouse is attached to a building or home a type of symbiotic relationship is created. The greenhouse benefits through the building's support, the subtraction of a wall to lose heat through, and the breaking of winds. For the building, the excess daytime heat which accumulates in the greenhouse can be vented to the inside for space heating purposes. The connection of the two structures also eliminates heat loss when a person needs to move from one to the other. While the north wall of the greenhouse is no longer permeable to light, there is actually very little reduction of light entering the greenhouse. In the Northern Hemisphere only a small fraction of the light enters through a greenhouse's north wall.

In our situation, the library/shop building heat gain from the greenhouse will be used to supplement the active collectors and wood-burning



Visitors' Day, October 21, 1979.



stoves. The building's south-facing wall has a door and windows which will be used to vent excess heat into the building while drawing the building's cooler air into the greenhouse. Since the greenhouse's priority will be to maintain a favorable environment for the plants, heat will only be vented to the building when the temperature in the greenhouse is sufficiently higher than necessary

Karl Parker and I, both fall term students at The Land Institute, began working on this project in September. First, we studied basic technical information on greenhouse construction and passive solar energy principles. The information was applied as we came across problems in the design and construction. During the construction process, we learned some basic skills in welding, carpentry, masonry, and insulating.

Most of the construction materials used for the greenhouse are considered local to The Land Institute. This usually means materials which are donated to The Land by friends or purchased by Wes at "bargain basement" prices. We did need to buy tin roofing, insulation, and alot of lumber. For glazing, we used large glass patio doors, part of the stock which Wes purchased for $4.50 each several years ago.

We decided to use two layers of glass, which will help minimize heat loss. An insulating curtain to be pulled in front of the glass at night also will be needed. The roof and walls are being insulated with at least six inches of fiberglass insulation. The foundation has been foam-insulated thirty-six inches deep, which is below the frost line. Insulation has also been placed inside the irrigation pipes which are part of the foundation.

As the only heat source will be the sun, a heat storage system for cloudy days and long, cold winter nights is needed. The greenhouse has been designed along passive solar energy principles, so we have opted for a storage system which will require no energy input to operate. Fifty gallon oil drums, painted black and filled with water will be stacked along the greenhouse's north wall. These drums will gain heat whenever there is daylight and then radiate the heat to the greenhouse during cool periods. This system is well-suited to our situation since Kansas is blessed with remarkably few overcast days.

The small solar greenhouse concept has been growing in popularity due to many successful examples across the country and some well-written, informative books on the construction of solar greenhouses. (see bibliog.) That commercial greenhouses have traditionally used the sun only for lighting and have largely ignored storing its heat seems irrational. As passive design principles and conservation techniques become well-proven we should be seeing more of these greenhouses where people can grow food year-round, add heat to their homes, have a greenhouse which is energy self-sufficient, and have a moist, warm environment to enjoy during the coldest weeks of the year.

Information Sources:

1. Fourth National Passive Solar Energy Conference Proceedings. Oct. 3,4, & 5, 1979. Kansas City, Missouri.
2. Food and Heat Producing Solar Greenhouse R. Fisher and B. Yanda
3. The Passive Solar Energy Book E. Mazria
4. Low-cost Energy Efficient Shelter E. Eccli,ed.

Alternatives in Health and Nutrition

Introduction

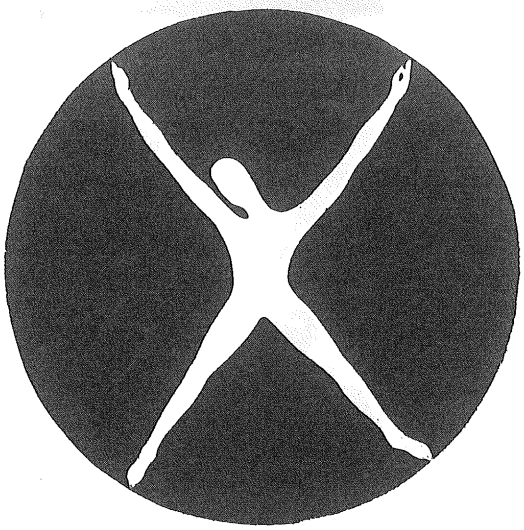
by Dana Jackson

Medicine has become a high technology business, far removed from its origins as a folk art. The sterile, stainless steel equipment of hospitals and the highly-specialized medical doctors combine to treat and cure illnesses which would have been fatal twenty-five years ago. But the synergistic effects of toxic by-products created by our industrial society, including stress, have created complicated maladies which probably didn't occur twenty-five years ago, and which doctors can't cure. And there are still many simple ills and discomforts which modern medicine can't remedy.

As wonderful as high tech medicine can be for the person needing a kidney transplant, it doesn't usually help the average person maintain general good health or prevent colds, lower back aches, minor infections, etc. Of course, there are non-medical people who promise relief from these problems if one only takes alfalfa pills, or comfrey tea, or vitamins, or doses of red cider vinegar daily. But for most people, these simplistic solutions are no more helpful than the classic advice of doctors, "Take two aspirins and call me in the morning." Norman Cousins has convincingly argued that placebos have great power to heal, but their success is directly proportional to the quality of the patient's relationship with the doctor, his or her faith in the treatment, and general mental condition.[1] There is a need for an approach to medicine somewhere between high technology and placebos. What is needed in medicine is appropriate technology.

"Preventive Medicine", "Holistic Medicine", "Holistic Health Care"-- these are some of the terms which describe a new way of thinking about medical care and an attempt to develop appropriate technology in medicine. The role of nutrition and exercise and a good mental state are all recognized as important factors. Some health counselors emphasize diet, prescribing whole natural foods without additives and preservatives; others emphasize techniques for relaxation such as yoga and massage.

Like appropriate technology in other areas, appropriate tech medicine would take into consideration the individual's desire to take greater control over his or her own life, or body. This requires a better understanding of the human body so that one can discuss procedures with doctors and make decisions concerning treatment, or know when one does not need a doctor's advice.[2] When the Boston Women's Health Book Collective published Our Bodies, Ourselves in 1971, they felt that the male-dominated medical profession had kept them ignorant and had been insensitive to women's needs.



Changes emerging out of the women's movement since then have altered health care practices in many ways to better serve women. And women know more about their bodies.

One phase of women's health care has been increasingly challenged in recent years--the procedures in child birth. Some women have chosen to give birth at home with a midwife attending, rather than in a hospital with all its high tech facilities. It is standard procedure in some hospitals to screw a monitoring device into the skull of every baby being born. However, a few hospitals are trying to modify their procedures and provide a warmer, more human atmosphere for the mother, father, and child during the birth process.

The two articles which follow deal with alternatives to childbirth in hospitals. Dr. Wally Rogers of the Univ. of Missouri School of Medicine, writes about the responsibilities of parents who choose home births. Penny Geis describes the reasons some women choose midwives as attendants during home births and the effort to legalize midwifery in Kansas.

The final article in this section is a consideration by Ali Henderson of the relationship between human nutrition and health and the health of soil.

1. Norman Cousins, "The Mysterious Placebo: How Mind Helps Medicine Work", Saturday Review, October 1, 1977.
2. This better understanding is sought by reading popular medical books, and the following are often given as references:

Taking Care of Yourself: A Consumer's Guide to Medical Care by Donald M. Vickery, M.D. and James F. Fries, M.D., 269 pages. Can be ordered from Addison-Wesley Publishing Company, Reading, MA 01867 for $5.95.

Wellness by Chris Popenoe, 443 pages. Can be ordered from Random House, 201 E. 50th St., New York, NY (A comprehensive source book).

Parental Obligations in Home Births

by Wally Rogers, M.D.

Some people wish to consider alternatives to giving birth to their child in the typical hospital. A couple needs to consider the advantages and disadvantages of various locations and conditions under which they wish to have the birth of their child. Hospitals and physicians are increasingly recognizing the importance of family-centered birthing, and many facilities are being modified to provide natural childbirth within the hospital. Improved transportation, communication and health care make home birth an attractive alternative to some couples. Any couple deciding to have a child must consider carefully the obligations they assume and their ability to fulfill them.

The most important obligation of prospective parents is to become educated regarding the pre-natal, birth and post-natal experiences they will encounter. It isn't necessary to memorize data-filled medical texts, but rather to understand, as much as possible, the normal process of pregnancy, delivery and infant care. Parental concerns and decisions depend on this understanding. Couples should find and attend one or more classes when provided by various institutions and organizations. Many books are available. Different points of view should be sampled. Biological and psychological aspects should be understood. The father and other family members may be involved and provide important support.

A pregnant woman is obliged to supplement her learning with good prenatal care and nutrition. A normal healthy young woman will have no problems, but regular visits to reinforce learning and provide simple checks on progress are essential. The physiological changes of pregnancy are important changes. Good health and nutrition are necessary to support the development of the fetus. Preparation for breast feeding and infant care is also needed.

The couple is obliged to obtain competent assistance for their birthing. They should receive advice from a competent medical person in regard to possible complications. The incidence of some complications is similar for each birth. The complications related to adequacy of the pelvic outlet are most important to the first-born child who tests the birth canal. A thorough examination and certain tests will be necessary to allow informed counseling of the couple regarding potential risks for the coming birth. Assistance for this pre-natal screening and the actual birthing may be given by different types of professional people. Training, experience, philosophy and personality all combine in a professional to hold the confidence of the couple.

When a couple has begun their education regarding birthing, started pre-natal care and has had some counseling regarding possible complications, they should find themselves ready to decide on their preferred place for birthing. The choices often seem extreme: natural home birth or technical hospital birth. Other alternatives may become available as proponents of each extreme begin to understand the other's position. The location may be less important than the timely availability of competent, compassionate assistance.

Another obligation is for the couple to plan an alternate location for birthing and to have an understanding of the situations which indicate that the alternate has become more advantageous. If the primary location is chosen to be the hospital, failures in communication or transportation may lead to a home birth. Some planning should be done for this possibility. If the primary intent is a home birth, complications with birthing or care of the mother and infant may lead to the desire for hospitalization. Again, appropriate planning should prepare additional medical personnel and facilities for this possibility.

The great majority of childbirths are uncomplicated if appropriate attention is given to these parental obligations. Technical advances available with physician and hospital involvement may be essential to the well-being of some mothers and some infants, but result in iatrogenic complications for others. It is not possible to exactly predict the outcome of any given pregnancy, but for selected, motivated, healthy couples, the risks of home births are not greater than hospital births. Many countries with low infant mortality have more home births than the United States of America. Birthing alternatives should be available in the United States and their safety supported by appropriate laws.

Sources for information about home birth:

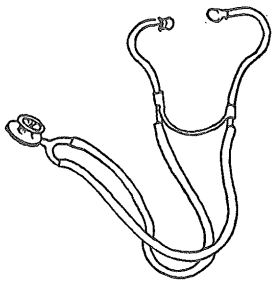
NAPSAC - The National Association of Parents, and Professionals for Safe Alternatives in Childbirth
A federation of most other organizations and individuals active in the field. Publishes Directory of Alternative Birth Services and Consumer Guide. $4.00, 97 pp.
P.O. Box 267, Marble Hill, MO 63764

ACHI - Association for Childbirth at Home
Offers a course on home birth for prospective parents. Publishes Giving Birth at Home. $5.00, 108 pp.
Operates bookstore; Free catalogue
P.O. Box 2232, Buena Park, CA 90621

Informed Home Birth
National organization which publishes The Informed Homebirth Newsletter. $10/yr.
Also provides tape series, film showings, conferences, and a mail order book store.
Recently published Special Delivery.$10.70
Box 788, Boulder, CO 80306

Home Births with Midwives—An Option Desired

by Penny Geis



"A STETHOSCOPE IS AN APPROPRIATE TECHNOLOGY"

The reaction to social structures and institutions which have grown beyond the human scale has spawned a wide variety of efforts to regain control over our own lives..including our health. We run, meditate, change our eating habits, form holistic health and self-care groups, use biofeedback techniques--or even have our babies at home with midwives attending.

Birth practices in the United States today are exemplary models of structures and institutions difficult for the individual to affect. A couple entering the hospital thinking they have prepared for "natural childbirth" can be overwhelmed by enough high technology and dehumanizing routines to make them think they're caught in a depressing science fiction movie! The woman is divested of all personal clothing--(maybe even her pubic hair!), given an enema, attached to IV's, and hooked up to an electronic fetal heart monitor -- sometimes a tiny electrode is screwed into the baby's scalp! (A stethoscope is an "appropriate technology.") She is given drugs to speed up or slow down labor - maybe both - and her membranes may be artificially ruptured. She lies on a narrow, hard surface in a position chosen for someone else's convenience and receives more drugs to prevent her from feeling the birth. She is cut from vagina to rectum, the baby is removed and she is stitched back together. Within an hour or two she is separated from the baby - so the child can learn about institutionalized technology in the nursery. Throughout all of this the couple is denied both supportive contact with family and friends, and privacy. Before the man leaves his wife alone in the unfamiliar room, the couple is warmly congratulated for their "natural birth." They were among the lucky ones, as no unusual interventions were required.

High technology birth is accumulating its own share of evidence damning our efforts to control nature instead of trying to work in harmony with it. Statistics of the World Health Organization always show at least ten countries with better mortality and morbidity figures than the United States. Midwifery and homebirth are common in countries such as Holland and Sweden where birth health is best. Each technological intervention calls for another, with a snowballing effect that may net infant brain damage, maternal depression, sexual difficulties, low self-esteem and child-abuse.

Some doctors, nurses, nurse-midwives and consumers are working to make the hospital a safer and more humane place for all childbearing women. Others, for both practical and philosophical reasons, prefer to reserve the hospital for the four to ten percent of high-risk births and work for safe home births.

Assuming responsibility for a home birth requires a great deal of information. Most couples also want an experienced and competent birth attendant with them. This is usually a midwife -- a non-nurse midwife. In other parts of the world, nursing and midwifery are considered two different disciplines. In the United States the American College of Nurse-Midwives has discouraged both independent practice and home-births.

According to the internationally accepted definition, a midwife "must be able to give the necessary supervision, care and advice to women during pregnancy, labor and the post-partum period, to conduct deliveries on her own responsibility and to care for the newborn and the infant ...This care includes preventive measures, the detection of abnormal conditions in mother and child, the procurement of medical assistance if needed and the execution of emergency measures in the absence of medical help." (excerpted from TEXTBOOK FOR MIDWIVES, Myles, 8th ed.)

Midwives have assisted at births in Kansas homes since pioneer days and are still fondly recalled by many older Kansans. A retired Manhattan midwife tells of being trained in Topeka and working "hand-in-hand" with a local physician at home births. As births were moved into hospitals, demand for midwifery services nearly vanished. Recently, however, interest has grown as Kansas has joined a national trend toward more planned home births.

Although Kansas statutes make no mention of midwifery, there is a 1978 opinion from the then-Attorney General Curt Schneider. Following an infant death at a home birth, he said that any non-licensed person assisting in a birth would be acting as a midwife and indirectly violating the Kansas Healing Arts Act by practicing medicine without a license.

Implementation of a 1978 Kansas law authorizing the Advanced Registered Nurse Practitioner will probably allow Certified Nurse-Midwives to practice in a hospital under the direction of a physician. Midwives who want to practice independently, attend home births, or who have not also been trained in nursing would not benefit.

Two bills affecting midwifery are now under consideration by the Kansas Legislature. One is a bill proposing the licensure and regulation of midwives, HB 2503. The other is a Health Care Personnel Credentialing Bill proposed by the Interim Committee on Health and Welfare. It would provide a mechanism for two types of government credentialling:

registration - administrative listing of qualified persons, preventing others only from using the title, and

licensure - statutory granting of the right to perform functions of an occupation by those licensed and by no others.

FOR MORE INFORMATION:

The Partal Post - a Kansas newsletter about homebirth and midwifery issues. One trial copy free; subscription $5.00/yr.
Julie Butler, Editor
RR 2, Lewis, KS 67552

KALM - Kansas Association for the Legalization of Midwifery
An ad hoc coalition of groups and individuals to explore and pursue ways to make midwifery clearly legal in Kansas.
Brochure - SASE; individual membership.$3.00
1831 E. Iron, Salina, KS 67401

The Role of Food Co-ops in Human Health and Soil Health

by Ali Henderson

During this semester at The Land, much time has been devoted to discussing soil health. This discussion has covered a wide range, dealing with everything from erosion to the pesticide and fertilizer "chemotherapy" that hides the fact that our soil is being washed away.

The search for solutions to these problems is difficult and frustrating, but extremely important. Among possible answers are perennial grain crops, increased use of known conservation practices, and organic farming methods that are more compatible with the environment.

Though I am not an agriculturalist or a plant geneticist, I see these problems and solutions as an integral part of my own special interest in health and nutrition. In short, we can't produce healthy food without healthy soil, and when the American people become more aware of their own nutritional needs, such necessary changes in agriculture will occur more easily. For example, most of the corn grown in the U. S. is used as cattle feed. It requires a lot of pesticides and fertilizers and is an annual that needs yearly plowing. All this spells trouble for our already stressed soils.

If the American public were to follow the recommendations of the Senate Select Committee on Nutrition and Human Needs, much stress on the land could be eliminated. The Committee's report, "Dietary Goals (1977-78)," outlined the following suggestions for improving the health of the American people:

--Increase the consumption of complex carbohydrates and naturally occurring sugars from 28% of energy intake to 48% of energy intake.

--Reduce the consumption of refined and other processed sugars by about 45%.

--Reduce overall fat consumption from about 40% to about 30% of energy intake.

--Reduce saturated fat consumption to about 10% of total energy intake, and balance that with polyunsaturated and mono-unsaturated fats, accounting for 10% of energy intake each.

--Reduce the amount of sodium intake to about 5 grams a day.

If Americans could reduce their intake of fats from 40% to 30% and cut the saturated fat allotment of that new total to only 10%, think of how much beef and pork consumption and, consequently, soil-taxing corn production, would decrease.

This need not spell disaster for the feedlot owner or the farmer either. Given that these changes would occur gradually, it would be possible for corn growers and feedlot owners to take advantage of rising demands for other crops, specifically those suggested in the 1979 Surgeon General's report, "Healthy People," for balancing a diet significantly lower in animal protein. Some of these "cash crops" include whole grains for direct human consumption, fruits, vegetables, and nitrogen-fixing legumes such as beans,

Ali Henderson and Joy Hasker have lunch.

peanuts and peas. "Healthy People" also urges the consumption of "relatively more fish and poultry," which might make fish farming or similar enterprises more attractive.

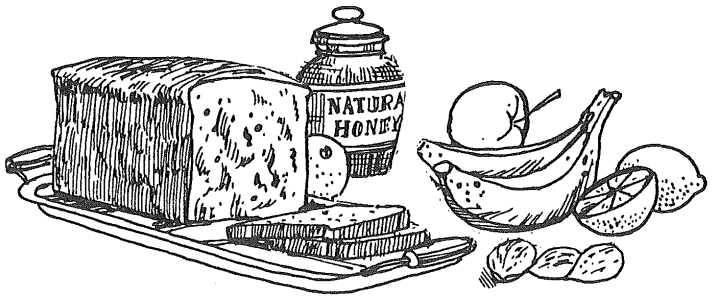
With this advice in mind, some subtle changes can begin to occur. A more nutrition-minded public will be more interested in wholesome organic foods grown in healthy soil. The currently developing "health craze" is no secret to anyone, as more people are taking obvious steps to improve their health. Jogging, aerobic dancing, weight watching, and avoidance of heavily-processed foods are among prime examples. Interest in "natural foods" and organic produce is already on the rise, making it possible for small organic farmers to make a living by selling to health food stores and food cooperatives. Larger food companies are also cashing in as they find a market for "natural" cereals and high-fiber breads, though not necessarily with the public interest in mind. More often than not the commercial "natural" cereals are loaded with sugar and overpriced to boot. The emphasis should be on simple, nutritious food, over which we have control. It need not be brought to us through television promotion by the "good folks" at General Mills. And it need not be purchased in expensive health food stores or from distant mail-order companies with questionable advertising.

The Role of the Food Cooperatives

The goal in this transition is to make people aware of their own dietary needs and to make good food accessible and relatively inexpensive. One way this goal can be achieved is through increased membership and participation in community food cooperatives.

The most significant advantage of a food co-op is that it is usually organized for people, not profit. Those involved with it are more sensitive to the needs of the community, and they have an involvement and ideology that supermarkets do not.

Co-ops can sell quality food at relatively low prices while working in harmony with the neighborhood and the farmer. When possible, many co-ops try to purchase food locally, and when local farmers know there is a market for organic produce, they feel more secure growing it. Co-ops generally stock a variety of staple grains, flours, beans, nuts, herbs, cheeses and vegetables and fruits, very few of which have been processed. People who buy and use such foods are probably meeting the dietary goals outlined by the Senate Select Committee on Nutrition and Human Needs. All this good food can be sold at lower-than-supermarket prices because food is purchased in bulk, packaging costs are low, work is shared, store facilities are usually simple and cheap, and only modest amounts are spent on advertising. Often food cooperatives are incorporated as non-profit organizations.



Spreading the word about the value of whole foods can be a function of the co-op too. It can offer nutrition education and counseling, distribute literature, have a recipe pool, and even sponsor speakers on the subjects of health, nutrition, organic farming, and food preservation.

Among additional services a food co-op can give are automatic membership for senior citizens, co-op car pools or a van to reach those without transportation, special bulk orders for those who cannot shop very often, and the opportunity for individuals to sell homemade products such as yogurt, bread, or granola in the store. All of these things can help bring people in need of an improved diet at low cost together to benefit from a food cooperative.

There are many factors involved in changing our attitudes about food, nutrition and the value of good soil, but we have to start somewhere. Although better nutrition awareness is by no means the only answer, we must begin to "heal ourselves" before we can do the same for our soil.

Prairieland Food Cooperative Thriving

by Pam Ellinghausen

The Prairieland Food Cooperative is one of Salina's answers to the community's need for good food and a place to talk to friends, exchange recipes, browse through cookbooks, and become a part of the packaging and selling of foods. The food co-op began as a buying club and after two-and-a-half years has evolved into a store front with an active membership of around 70. The store carries the usual staples of flours, dried beans, nuts, herbs, cheeses, and dried fruits, but there is much more. Natural fruit juices, peanut butter, honey, banana chips, snacks, and a delicious variety of spices and teas are some of the member's favorites. The co-op has recently added home-made yogurt, carob powder, potatoes, coffee beans, raw peanuts, black beans, cinnamon sticks and whole cloves to its growing list of products

During November, I became the store manager, and I have really enjoyed the time spent in the store as I become acquainted with the wide variety of people in the co-op. Here's just a

taste of what you might hear while working and shopping:

-an account of a 1930's eating co-op for college students, costing $12 per month
-how to make Indian bread over a fire
-the solution to Iran
-a former baker's method of sweetening breads without sugar or honey

The Prairieland Food Cooperative can be an exciting place to share ideas, or a relaxing place to shop without crowds and lines of people. Membership is lifetime and costs $10.00/household, $5.00/individual, and $3.00 for senior citizens. To keep the store in operation, each member works two hours per month, and this entitles them to a 25% discount on all store prices. The Prairieland Food Cooperative is located at 707 Bishop, and is now open on Tuesday, 2-6 pm; Thursday, 6-8 pm; and Saturday, 10 am - 2 pm.

Ron Force fills out ticket before paying Pam Ellinghausen for his co-op order.

"New Age" Board Games

When one opens the plain gray box containing the game called "Save the Whales," she or he knows it didn't come from Parker Brothers or Kenner. The game board is as colorful and intriguing as the box is plain and practical. But what is unique about this game is that it is based upon cooperation among players. They compete not against each other, but against The System to save the whales. Besides the board, the game equipment includes eight whale markers cast in white metal and plated with nickel, exact replicas of the Gray, Blue, Fin, Humpback, Bowhead, Right, Sperm and Orca whales. Other game pieces are a metal catcher ship, the Magic Barnacle and two stacks of game cards and dice. The rules are given in an information-packed booklet, and players cannot help but learn about whales and the factors endangering them as they play the game. It is a wonderful feeling to accumulate enough survival points and be able to save a whale and place it in its natural habitat on the board, and a sad moment when the catcher ship overtakes an endangered whale, sending it into extinction.

This game takes some adjustment in thinking. Children playing it were overheard using the old Monopoly terms, such as "passing go," and talking about how much it cost to save a whale, rather than thinking in terms of survival points. But these same kids were also overheard repeating a lot of facts about whales which they learned.

The Animal Town Game Company sells several other games: Nectar Collector (the bee game), Back to the Farm (a small organic farm of course!), The Peter Principle Game, and Dam Builders (beavers try to outwit the Army Corps of Engineers). These games are fairly expensive, $13 for all except the Whale Game which is $18. They are manufactured in rather small quantities by a family business. For a free catalogue, write Animal Town Game Co., P.O. Box 2002, Santa Barbara, CA 93120.

Recreation

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_____

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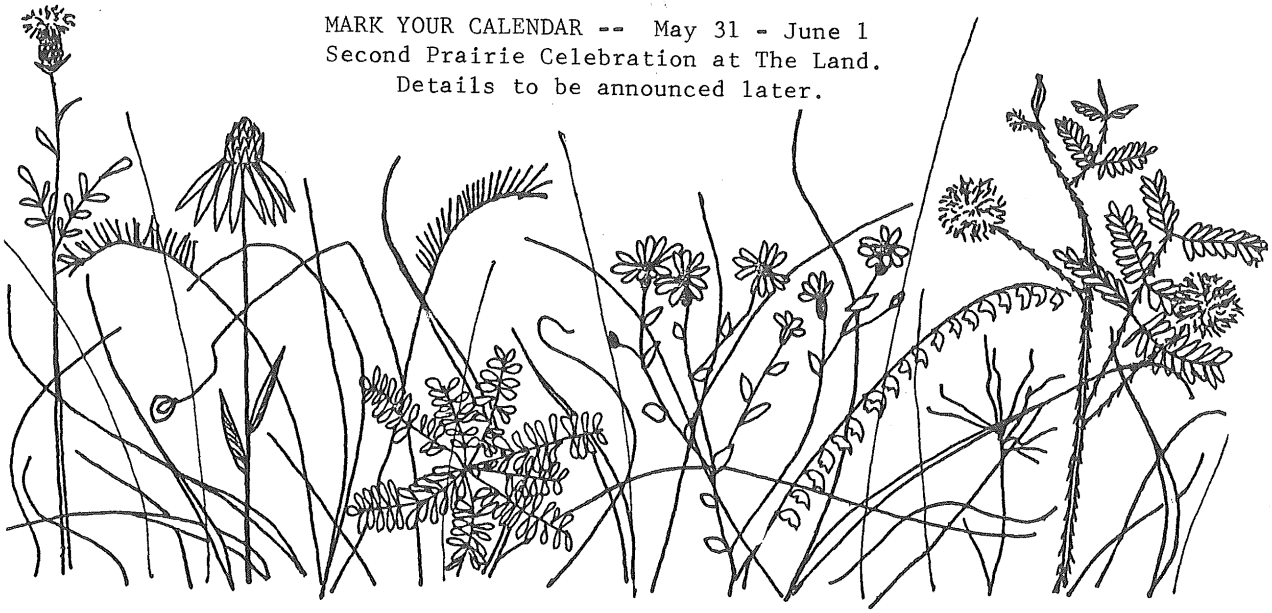
Friends of The Land

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

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

Spring Festival Planned

MARK YOUR CALENDAR -- May 31 - June 1
Second Prairie Celebration at The Land.
Details to be announced later.



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