The Land Institute

THE LAND REPORT

Number 6 Fall 1978

Eastern Gama Grass: Grain Crop for the Future?

Saline County's Golden Opportunity

The three principal governments of Saline County, Kansas, have established a Tri-governmental Energy Commission, which in turn has proposed that an energy office with a budget of $60,000 be established. Because the wisdom of establishing such an office and budget has been challenged, the energy commission must defend its recommendation. We have been gathering data at The Land Institute, and it appears that a half million dollars in energy costs can be saved Saline County citizens by the end of the second year, and that a 3% per year reduction in energy consumption can be realized if there is an assiduous effort by the energy office.

Discussions and debate are underway, a healthy sign that some are recognizing that the current form of energy utilization cannot be maintained and are looking seriously to the prospects of a sustainable, sunshine future.

Wes Jackson

The Land Report

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

Contents

Prairie Images

The four center pages of this issue, pages 12-16, feature photographs and sketches by Terry Evans. Terry is a professional photographer in Salina and a Friend of The Land who frequently participates in Land activities. She became interested in prairie images while assisting Jim Peterson and Maureen Hosey on the companion planting study at the Fent Prairie last spring, and she has continued to study the prairie plants and photograph them. We are very pleased to share Terry's Prairie Images in The Land Report.

At The Land:

Conference is Main Fall Event

Two hundred and forty-six people attended the conference co-sponsored by The Land Institute and the League of Women Voters of Kansas at Salina South High School on October 21. The planning and organization were made possible by a grant from the Overseas Development Council and the Charles F. Kettering Foundation.

SOFT ENERGY PATHS: ENERGY POLICY FOR A SHRINKING PLANET brought together two subjects important to both the LWVK and The Land Institute: energy and development. The LWV has a consensus in both areas and actively lobbies for its positions. Students at The Land discuss the broad environmental issues of population and food, resource depletion and pollution throughout the world, and as they read the Club of Rome studies, Worldwatch Papers and articles in current publications, they become aware of the special problems of developing nations.

The objective of the conference was to examine the effects of current U. S. energy policies on the rest of the world and consider the mutual advantages of alternatives based on soft energy technologies. A soft energy path on this shrinking planet, according to the founder of the concept, Amory Lovins, can bring us "toward a durable peace."

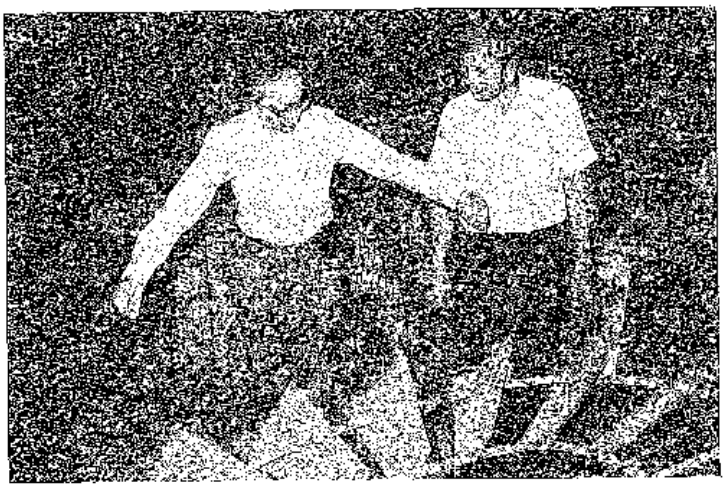
In addition to Amory Lovins, an internationally-known expert on energy policy, the other major speaker was Ruth Hinerfeld, President of the League of Women Voters of the United States. Ms. Hinerfeld has an extensive background in the field of international relations. She is on the executive committees of the United Nations Association and the Overseas Development Council, the trade committee for the Atlantic Council, and recently was reappointed by President Carter to the Advisory Committee on Trade Negotiations.

Following presentations by both Ruth Hinerfeld and Amory Lovins in the morning, the two speakers took part in a dialogue moderated by Wes Jackson which explored the international implications of a soft energy path.

The afternoon session, moderated by Maxine Hansen, was called "Kansans Relate to Global Energy Problems." Five Kansans presented short commentaries, reacting to the morning session from their particular perspectives. The speakers were Robert Riordan, Kansas Office of Energy; Paul Johnson, Kansas Legal Services; Vernon King, former volunteer in Haiti for the Mennonite Central Committee; Jim Converse, Department of Sociology and Anthropology at Kansas State University; and Diane Tegtmeier, Mid-America Coalition for Energy Alternatives. There was a dialogue with Amory Lovins or Ruth Hinerfeld following each presentation. The floor was then open for comments and questions from the audience.

After the conclusion of the afternoon session, approximately ninety of the conference participants visited The Land Institute. Students and former students showed them the projects, explained the solar heating system, and described the program at The Land.

MORE ABOUT THE CONFERENCE ON PAGE 18.



Amory Lovins is New Board Member

Amory Lovins has agreed to become an honorary member of the Board of Directors of The Land Institute. The only other honorary member has been Dr. E. F. Schumacher, British economist and author of Small is Beautiful, who died in September, 1977.

Amory Lovins is a physicist and the author of numerous technical papers, articles and six books. "Energy Strategy: The Road not Taken," an article which first appeared in Foreign Affairs, October, 1976, quickly became a classic document in energy planning and brought Amory Lovins to the attention of the public. He is now a consultant to several United Nations Agencies, the Science Council of Canada, the Office of Technology Assessment for the U.S. Congress, Resources for the Future, and the M.I.T. Workshop on Alternative Energy Strategies. During the 1977-78 academic year he served as a Regents' lecturer at the University of California in Berkeley. When not traveling, he resides in London where he is the British Representative for Friends of the Earth. Soft Energy Paths: Toward a Durable Peace is the title of his most recent book.

Early in June Amory Lovins plans to return to Salina to attend the annual meeting of the Board of Directors, to meet with the Tri-Governmental Energy Usage Commission, and to present an introductory lecture for the four week energy workshop being held at The Land in cooperation with Emporia State University.

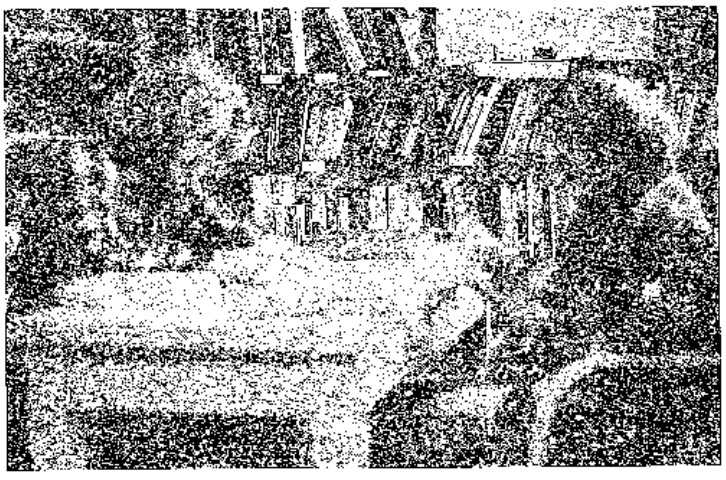
The Student Program, Fall 1978

The fifth group of students to attend The Land Institute began their program on September 12. Each semester has been different as work-study schedules and content evolve to fit each group of students. The general objectives remain the same however. The Land Institute is devoted to a search for alternatives in agriculture, energy, shelter and waste. Every student is required to work on an individual project in one of these areas and to read and discuss material which will help develop a philosophy suited to the alternative technology.

During the first two weeks of the fall, 1978 session, students spent about two hours a day in discussion and the rest of the time working together on general tasks which needed to be done. They organized the scrap piles, sawed and stacked scrap lumber for winter firewood, cleaned the batteries for the wind generators, installed the aluminum strips on the solar collectors to create air turbulence, and painted the building which is to be the new outhouse.

In the third week everyone began an individual project. Roofing the Indian House, building a wind-powered grain-grinder, planting an herb garden in the grow hole, and research on Eastern Gama Grass will be described in detail in the winter Land Report.

The reading list for the fall term has included Soft Energy Paths, Small is Beautiful, Zen and the Art of Motorcycle Maintenance, and the galley proofs of the third edition of Wes's book, Man and the Environment, which will be published in January, 1979, and a reserve file of articles and papers from various publications. In addition, Wes assigns individual readings and students develop their own reading lists relevant to particular projects. No one is ever finished with all the readings.



Brian Williams and Carol Maguire.

A day at The Land begins at 8:45 A.M. when Wes and the students meet to discuss what materials or extra muscles are needed for certain projects and when to work on projects and when to discuss the readings. Four days a week they eat sack lunches (a stove and refrigerator are available on the first floor if they want to cook) and one day a week they have a soup lunch which Dana prepares in the Jackson house. The day is officially over at 3:00 P.M., and most of the students leave to go to their jobs, although a few may stay to read or work outside. Students do not live at The Land, but have rooms or apartments in Salina.

The program is open to persons of college age or older. It is recommended that applicants have completed at least one year of college. Over a third of all students that have attended The Land had earned college degrees before they came. The Land Institute admits students of any race, color and national or ethnic origin. College credit is available through Marymount College in Salina.

Persons wishing to apply for admission are requested to write a letter describing their past academic work, job experiences, interests, concerns and goals. Address the letters to Wes Jackson, The Land Institute, Rt. 3, Salina, Kansas 67401.

THE SPRING TERM BEGINS FEBRUARY 5, 1979.

Off the Calendar

What goes on out at The Land? First and foremost, our students discuss readings and work on their projects. However, a look at the calendar for the months of September, October and November reveals an involvement that goes beyond a course of study for eight to ten students. There is a lot of "coming and going" at The Land as we interact with friends in the community and with various organizations and classes, and participate in programs sponsored by other groups.

September-

... 1- Kansas Organic Producers' VISTA Project Committee met at The Land.

... 9- Dana spoke about S. Asia at an AAUW Seminar on Development in Marshalltown, Iowa.

...12- The Land Institute Board of Directors met.

...18- Fremont Regier & class from Bethel College visited. In the evening, the Prairieland Food Cooperative executive committee met at The Land.

...23- Wes & students attended UFM Hunger Seminar.

...27- Jim Peterson spoke at Bethel College to students in the Life Enrichment Program. Smoky Hills Audubon Society Executive Board met at Land.

...28- Wes presented a convocation address at McPherson College. John Black reviewed three books and discussed technology assessment.

October-

... 7- Kansas Solar Energy Society met at The Land.
... 8- Dave Fancher's K. W. class visited.
...13- Wes, Jim, & Marty went to Woodward, Okla - homa to obtain Eastern Gama Grass.
...17- Wes spoke to Ecology Club at K. U.
...20- Afternoon speakers at The Land were Elaine Shea and Larry Wagner of Save the Tallgrass Prairie, Bill Ward and Diane Tegtmeier from Mid-America Coalition for Energy Alternatives. In the evening, Amory Lovins met with students, former students and board members.
...21- SOFT ENERGY PATHS CONFERENCE.
...22- Amory Lovins spent the day at The Land.
...23- Attended KSU convocation to hear Lovins.
...25- Terry Evans talked to students about photography and the prairie.
...26- Harry Mason talked about the history of psychology.

November-

... 1- Marilyn Chlebak's Central High School class came for special program.
... 2- Isabel Mason talked about the history of nutrition.
... 8- Lavanum of the Atheist Centre, Vijayawada, India visited.
...14- Slide-lecture given by Colette Bangert, painter, co-sponsored with the Salina Cultural Arts Commission at Community Theatre.
...16- Wes spoke at Farmers' Union Meeting.
...29- Wes spoke to Dave Fancher's class. Fremont Regier from Bethel College spoke to students about third world development.

Prairie Program Proposed

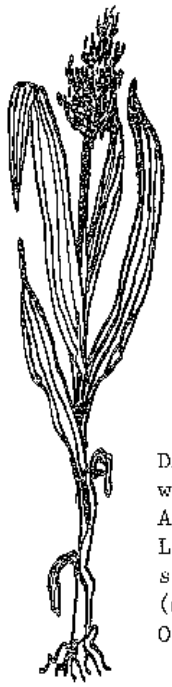
Last spring, during the course of an ecological study on an unplowed prairie relict north of Salina, Kansas, three different ways of viewing the prairie came together. Most of us involved in the work had never really looked at prairie before, and we brought to it preconceptions based upon our backgrounds in science, literature and art. The exchanges generated by the interaction of these different views of the prairie indicated the need for an attempt at integration.

Out of this came the idea for a program that would show how these different human perspectives interrelate. These relationships found substance in some of the concepts that we talk about at The Land Institute, one being that human beings are but one element in a diverse web which is resilient and holistic. Another concept is that the prairie, as a life-enhancing, energy-conserving organism, serves as a possible model for the governance of human behavior within society and nature. Also, we recognize that the Kansas prairie is the source of Kansas community and Kansas agriculture. Although European culture has provided us the warp and woof, it appears to be a prairie frame on which we have built our culture. The Land Institute received a $200 Planning Grant from the Kansas Committee for the Humanities to develop a program based on these concepts.

We have proposed an outdoor program which will communicate our ideas about the prairie to a larger audience on June 2, 1979. It will

(Continued on page 9.)

In Memory of Cocoa and Dave



CHARLES JACKSON (COCOA), 24, lived at The Land the summer of 1975 and helped build the barn. He was a competent carpenter. Cocoa was also gentle, contemplative and humorous. In many ways he inspired the formation of The Land Institute. He was a graduate student in physics at Colorado State University when he was killed by lightning in the mountains above Fort Collins in September, 1978.

DAVE HENDERSON, 22, lived at The Land the summer of 1976 and worked on the construction of the first classroom building. After it was destroyed by fire, he helped show us that The Land idea was more than a building, books and tools. His student project was a study of the potential of grain sorghum (milo) as a food for humans. He died in Springfield, Ohio in October, 1978.

Alternatives in Agriculture

Eastern Gama Grass: Grain Crop for the Future?

By Wes Jackson and Martin Bender

The Spring 1978 issue of The Land Report carried an article which suggested that the exorbitant soil loss problem, an average of nine tons per acre per year, might be due to the fact that high-yield agriculture employs a monoculture of annual herbaceous plants. Cultivation and planting processes bare the soil seasonally, exposing it to wind and water. On the other hand, the natural ecosystems tend to be polycultures of mostly perennials, with root structures and vegetation holding the soil at all times. Perhaps a solution to the soil loss problem could be the cultivation of perennials for some of our food crops. Further elaboration and refinement of this idea was presented in the November/December issue of Not Man Apart, a publication of Friends of the Earth, under the title, "Toward a Sustainable Agriculture."

In both articles, three candidates of wild perennial plants were suggested as being the most promising to study for their potential as seed crops. These were Eastern Gama Grass (Tripsicum dactyloides), the wild millets and wild soybeans. At The Land we have begun an investigation into the promises of Eastern Gama Grass.

Eastern Gama Grass is one of the most productive and palatable native grasses of the bottomlands in the southeastern United States. In fact, most natural stands of this species have been greatly reduced due to its palatability for domestic grazing animals. At present there is an ambitious program underway to develop strains which could be attractive to farmers and ranchers as a forage crop (Dewald and Louthan). During June, 1978, a symposium was held at the U.S.D.A. Southern Great Plains Field Station in Woodward, Oklahoma. The general consensus of the meeting was that the prospects for the development of one to many high-yielding varieties for domestic use were quite good.

No serious attention has been paid the species, however, as a potential grain producer, because hindrance of its spread for forage purposes has included its inadequate seed production and low germination (Dewald). We will speak to these problems in this paper in order to evaluate the possibilities for overcoming these hindrances.

The Apparent Virtues of This Species.

Eastern Gama Grass has at least eight distinct virtues which make it a good candidate as a perennial grain producer. 1) It has already been extensively studied, particularly by those interested in the evolution of corn. We have counted over eighty published works relating to the species, and there are doubtlessly more. 2) The species is already at home in our corn belt, for it nearly rivals corn in the extent of its distribution in North America. It ranges from Florida to Texas and Mexico north to Massachusetts, New York, Michigan, Illinois, Iowa and Nebraska. 3) Because this tall, stout perennial has a thick stembase structure called a proaxis from which numerous "tillers" emerge, any desirable races can be propagated vegetatively. 4) The female flowers which set seed are localized and separate from the male flowers which produce pollen. Therefore, no tedious effort is necessary for the breeder to emasculate the plant before making crosses. 5) The species contains two, and perhaps three, chromosomal races and numerous morphological varieties which will give us a wide range of options. 6) A type of reproduction in which the egg will develop into a seed without the aid of fertilization, called apomixis, has been discovered in the species. This characteristic is valuable in propagating desirable forms. 7) The species displays a natural immunity against grasshoppers, corn ear worm, and the European corn borer (Dewald, personal communication). 8) Finally, a preliminary chemical analysis of one of our samples has revealed a protein content of over 27% and a carbohydrate content of over 51%. There are reports in the literature of upwards to 35% protein for this species. Most wheat is around 12-14%, and corn is under 10% protein.

Some Negative Aspects of the Species and How They Might be Overcome.

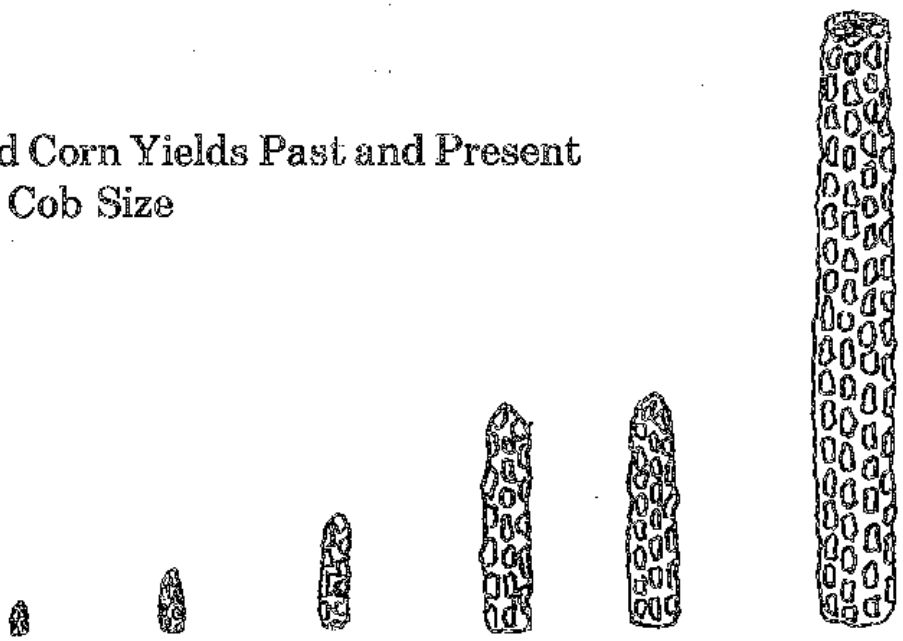
There are definitely some negative concerns which must be dealt with if the species is ever to be a contender as a grain producer. 1) The outer glume and palea forms a hard, boney, presumably highly cellulose covering around the grain, which must be eliminated before the grain is ready for eating. Pat Dreese, a current student at The Land who has a B.S. in milling science, spent a few minutes with the milling machinery at Kansas State University and successfully separated the seed from the covering. Based on the encouraging results of the minimum effort, it seems clear that a systematic effort to eliminate this boney outer covering without significant damage to the grain itself will be a minimum problem. 2) Since the species dwells mostly in the bottomlands, especially in the Southeastern U. S., it may be difficult to employ it for saving the soils in the uplands. However, the tremendous amount of genetic variation in the species, due

to its wide range of growth in the U. S., should enable us to structure, through crossing, a cultivar capable of abundant growth on upland soils. 3) Low seed germination in all but a few examples suggests that it may be difficult to propagate the species through seeds. However, plants which have demonstrated a higher percentage of seed germination can be genetically selected time after time as a source of favorable germplasm. After several generations of selection, we should have attained germination in the neighborhood of 90% or so.

4) Finally, seed production for this species is notoriously low. Before the boney hull is removed, the harvest yield has been around 300 pounds per acre at least. At 60 pounds per bushel, an acre would produce around five bushels. Worse yet, our investigations have revealed that the grain itself is only 21% of the total on the average. Therefore, we must multiply this 300 pounds by one-fifth, which results in a yield of about one bushel per acre. Lest we become discouraged, we need only remind ourselves of the low-yielding early corn of 5600 years ago. (See table)

We are indeed fortunate to be able to move so quickly toward increasing seed production. Nearly 400 collections have been obtained from the U. S. Department of Agriculture, Southern Great Plains Field Station in Woodward, Oklahoma and planted in the experimental garden at The Land. These accessions were from across much of the range of the species and are the result of the extensive efforts of Range Agronomist C. L. Dewald and Agricultural Research Technician V. H. Louthan. It is through their generous efforts

Estimated Corn Yields Past and Present Based on Cob Size



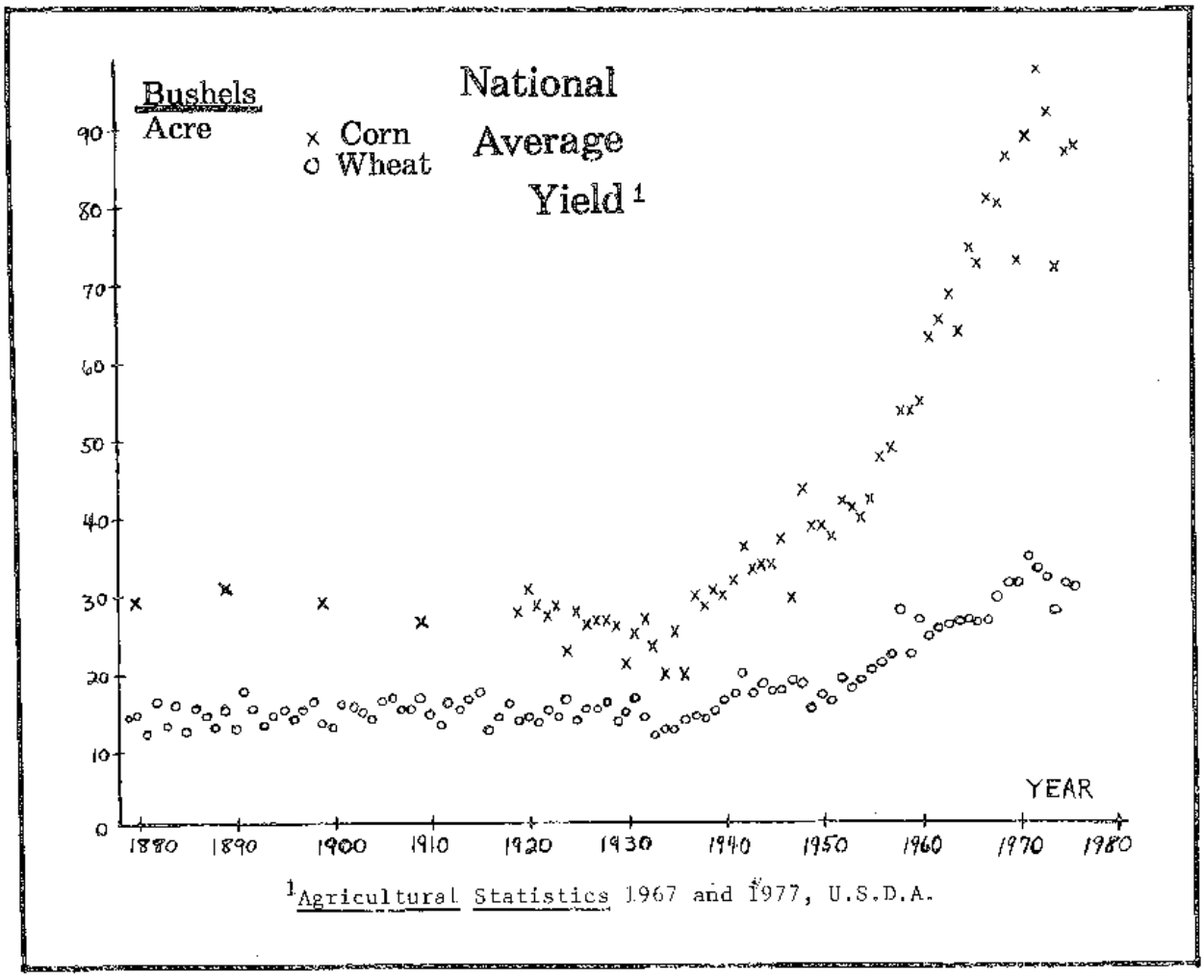
Location	San Marcos Cave Tehuacan Valley Mexico	Bat Cave New Mexico	San Marcos Cave Tehuacan Valley Mexico	Bat Cave New Mexico	San Marcos Cave Tehuacan Valley Mexico	United States
Date (B.P.- Before Present)	7200-5400 B.P.	5600B.P.	5400-4300 B.P.	1900 B.P.	1800-1300 B.P.	Present
Dimensions[1] (inches)						
Length	5/8	15/16	1 3/4	3 1/4	3 3/8	9
Diameter	1/4	5/16	5/16	5/8	5/8	1
Surface area[2] of corn cob (sq. inches)	0.49	0.92	1.72	6.38	6.63	28.3
Estimated[4] Yields (bushels/acre)	1.5	2.9	5.3	19.7	20.5	87.4[3]

1) P.C. Mangelsdorf, 1961. "Introgression in Maize." Euphytica 10:157-168. P.C. Mangelsdorf et. al., 1964. "Domestication of Corn." Science 143:538-545.
2) Calculated from this formula: surface area of a cylinder = π x diameter x length.
3) National yield for 1976. Source: Agricultural Statistics 1977, USDA.
4) The other yields were estimated by setting up proportions between the surface areas of the cobs and the yield listed for present-day corn, and also by making the falacious assumption that past corn plants were planted at the same density as present-day corn.

that we have been able to obtain a tremendous array of living material and gain a quick background of information. Several of these collections have been examined cytologically and their chromosome numbers determined. We now have the very great opportunity to begin to classify this variation and select for factors which might lead to an increase in yield.

We believe there are several approaches we can employ in order to increase yield. For example, the species currently produces reproductive stalks indeterminately, i.e., over the species range reproductive stalks are sent up from May to November. However, we do have in our collection one accession from Flush, Kansas, in which the seed pattern is determinate rather than indeterminate, i.e., it tends to flower at once. In this accession might be the genes which will allow us to squeeze flowering and seed set into a narrower time frame. An accession from Paris, Texas produces dense tillers, the first stage toward the development of a reproductive shoot, thus eventually assuring several reproductive shoots at once. Another aspect which makes seed harvest difficult is the tendency for seed heads to shatter when ripe. However, a population in Briscoe County, Texas, which is represented in our collection, displays a great deal of resistance to shattering (Lovell, 1976). Some plants have a more favorable reproductive to vegetative ratio in the number of shoots. Some have more seeds per head than others. By selecting all of these characteristics and eventually combining them into one plant, we should have the makings for a many-fold increase in grain production.

Improvement in wheat and corn production over the past 100 years is displayed on the graph to remind us of the dramatic changes in crop improvement which can occur as a result of a systematic and informed procedure pointed toward increased production. At the very least, in the short run, we would expect to increase seed production sufficiently to make the distribution of the plant as a forage crop more economically attractive. Our optimistic view at this point, however, is that this relative of corn could achieve yields equal to that of corn before the onset of hybridization and chemical fertilization in the 1940's, which was around thirty bushels an acre.



[1] Agricultural Statistics 1967 and 1977, U.S.D.A.

Marty Bender plants Eastern Gama Grass.

The Environmental Vision

The eroding American uplands ultimately need a polyculture of herbaceous perennials that are grain producers to substitute for annuals that are grain producers. We imagine that the lowlands can continue to grow the traditional crops, and we would encourage vegetative cover for forage on land not necessary for grain production. Ideally then, we need to bring several species along at once and evolve them in concert. Such an approach would entail a new era in plant breeding. For humans to direct the evolution of a diverse agricultural ecosystem with an eye to sustainability first, and overall yield second, will require more of an understanding and application of ecosystem principles than has been necessary previously. This will probably require a vast amount of team research on the polyculture of crops in order to determine which seeds would set together and which ones far enough apart so there is no problem of shattering during the harvest of each crop.

The transition from the hard energy path to the soft will likely require fifty years for completion, Amory Lovins estimates. But such a long venture seems worthwhile for the American culture since the hard path emphasizes strength through exhaustion and the soft emphasizes sustainability. Similarly, the transition from the hard agricultural path built around monoculture, high energy pesticides and fertilizers, to a soft agricultural path patterned after nature will likely take all those fifty years and more. But again, the soft path is sustainable. An holistic approach would suggest that it is just as important to save our soils and keep them healthy as it is to shift our energy economy toward a sunshine future.

PRAIRIE PROGRAM continued from page 5.

present poets Harley Elliott and Steven Hind reading their works. Terry Evans' prairie photographs will be on exhibit. A conversation about the value and significance of the prairie will take place. Wes Jackson will moderate, and the participants will be David Brower, President of the Friends of the Earth; Nick Fent, Saline County naturalist and geologist; Richard Keller, Professor of English at Emporia State University, and Keith Sebelius, First District U. S. Congressman.

In recent weeks, Terry Evans and I have brought to completion the long process of tree mutilation which is called "grant writing." We have requested funds from the Kansas Committee for the Humanities to underwrite most of the expenses for this project. By the time this issue of THE LAND REPORT is in the hands of the readers, we will have learned whether or not our proposal was funded.

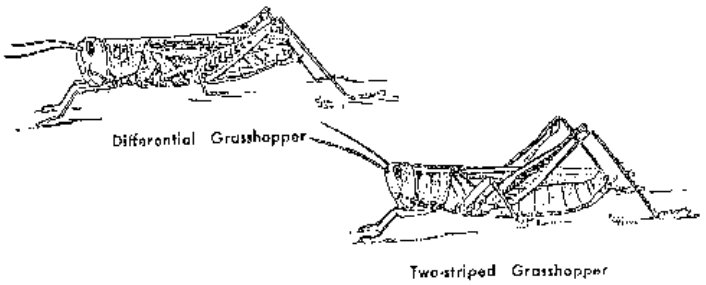
Jim Peterson

Land Institute Board Member Receives Award

Steve Burr was named "Wildlife Conservationist of the Year" by the Kansas Wildlife Federation on October 14. Steve has a wildlife degree from Colorado State and has worked for the U. S. Fish and Wildlife Service in Arizona and California. He helped organize the Smoky Hills Audubon Society and the Kansas Audubon Council and served as the first president of both organizations. Burr was instrumental in obtaining sixty-four acres of land which includes a lake, at the southwest corner of the junction of I-70 and I-35 in Saline County. The Smoky Hills Audubon Society leases the land from the Saline County Conservation District and works to improve wildlife habitat at the site.

Steve is conducting several conservation programs on his 300 acre farm northwest of Salina. A five year plan for the land includes the planting of some 20,000 trees. One portion has been planted with fast-growing trees for a source of firewood. About thirty acres have been seeded to native grass.

The Annual Christmas Bird Count of the Smoky Hills Audubon Society will be on December 17. Contact Ken Baker, 825-1957 for more information.



Garden Plagued by Grasshoppers

At the organic gardening workshop last spring we discussed common insect pests such as the squash bug, potato bug and cucumber beetle. Grasshoppers were probably mentioned, but they weren't a major concern. If we had only known!

The 1978 garden at The Land was plagued by grasshoppers. They didn't begin the real damage until July, so we had an excellent spring garden. In May and June we feasted on strawberries, peas, lettuce, spinach, radishes, rhubarb, and cabbage. By the end of June, when we were impatiently eyeing the corn and anticipating the yellow ears stacked on a platter, grasshoppers moved into the west edge of the garden. They stripped the potato foliage and moved on into the squash. The green leaves were picked clean on the rhubarb, leaving only ribs sticking up from the ground. Onion tops began to disappear, and then the salsify leaves. They consumed every single leaf on the green beans. The early corn wasn't harmed much, but the later corn, which we usually count on to stock the freezer, was really gnawed away. We harvested half ears, 4-5 inches long instead of 8-10.

Watching our garden being eaten before our very eyes was really depressing. It affected the way we took care of it. There was little rain, and even though everything was heavily mulched, the garden should have been watered more than it was. One had the feeling though that watering the plants was watering grasshoppers. At that point, Sara Jackson, 10, whose interest in natural things usually delights us, was studying the various grasshoppers, admiring their coloring and observing their behavior. It was impossible for us to reinforce her appreciation for this creature, however.

In August the grasshopper destruction decreased in the garden, and increased around the house. The herb garden disappeared: mint, sage, tarragon, chives, basil and marjoram no longer flavored our food. Leaves on lilac bushes, iris, and the flowering crab apple tree were consumed. But in the garden, the eggplant, having survived the flea beetle after all, began to produce purple fruits; and as tomato leaves are unpalatable to grasshoppers, tomatoes began really to set on. A very few yellow beans in another part of the garden provided a few meals, and some of the onions in another part of the garden matured to a good size. We were still enjoying peppers, tomatoes and eggplants as the autumn equinox occurred, even though the tomatoes needed to be picked before completely ripe because grasshoppers relished the ripe ones.

The newspapers reported the farmers' demands that the EPA remove bans against certain very toxic chemicals reportedly effective against grasshoppers. Very little information seemed to be available, at least in the media, about why there were so many grasshoppers this year, or if they would be as bad next year, or how the reproductive cycle worked. Politicians at every level criticized the EPA and sympathized with the poor farmers who were being denied the use of an effective "tool" against grasshoppers. To do any good at The Land, the whole 28 acres would have needed spraying, as well as the roadside, the river bank, the neighbor's land, etc.

Since there were so many grasshoppers this past summer, it seems likely that they will have laid many eggs which will produce a large population next spring. I have read that normal, hard spring rains destroy emerging larvae. Although we could be lucky, we aren't going to count on the weather cooperating to that extent. We have a strategy to produce a good harvest (of some things) before the grasshoppers really get destructive in the middle of the summer.

1. Plow and disk the garden this fall; then rototill it early next spring to disturb eggs in the garden soil.

2. Plant as early as possible so the crops can be harvested before grasshopper populations become large.

3. Keep weeds tilled out around the edge of the garden and between rows.

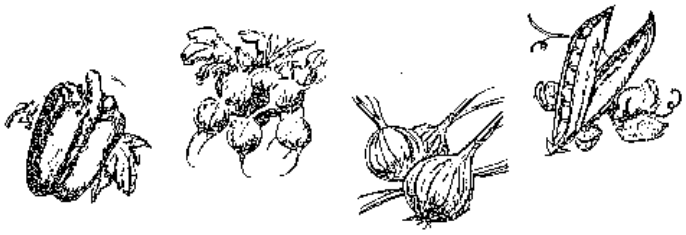
4. Plant the crops grasshoppers seemed to prefer this past summer in the middle or on the east side of the garden. We think the grasshoppers moved into the west side of the garden from the unmowed native grass. Perhaps if that side were tomatoes, grasshoppers wouldn't move in as fast as they did in the beans and corn.

5. Protect the potatoes with straw if frost is likely so the foliage will not be frozen back. This will prevent potato growth from being slowed down, and perhaps the potatoes will be well-formed before the grasshoppers move in to mow them down.

6. Plant favorite foods in different spots around the garden and maybe some will survive.

7. Be prepared for the possibility that grasshopper damage may be minimal, but some other major insect pest will sneak in the garden and chomp down.

Dana Jackson



The Alternatives Network

RAIN NEW CRITERIA THE MIDWEST JOURNAL OF APPROPRIATE TECHNOLOGY Intermediate Technology TRANET

Tilth WIND POWER DIGEST Acorn

If you thought that the ideas and influence of E. F. Schumacher were just "trendy," and that the concept of appropriate technology essentially disappeared after his death, you were wrong.

One section of magazine shelves in The Land library is devoted to the Alternatives Network, the publications of organizations around the country providing information about specific appropriate technologies, listing the names of other people and A.T. organizations with similar interests and objectives, and discussing and evaluating the impact of appropriate technology.

Several of the magazines and newsletters see their most important function to be "access." ACORN (News about Energy Alternatives, Appropriate Technology and People in the Midwest), RAIN (Journal of Appropriate Technology), published in Portland, Oregon, and THE WORKBOOK (Access to Information), published in Albuquerque, New Mexico, all have a similar goal: to help people "gain access to vital information that can help them assert control over their own lives." Access is provided in two ways: by reviewing books and magazine articles with information about appropriate technologies, and by "networking," telling people and organizations about each other.

To help tie the network together, the National Center for Appropriate Technology has designated nine publications as regional newsletters: AKWESASNE NOTES (Rooseveltown, N.Y.), ACORN (Park Forest South, Ill.), CASCADE/LITE ENERGY (Eugene, Oregon), HIGH COUNTRY NEWS (Lander, Wyoming), NEW CRITERIA (Ames, Iowa), NEW ROOTS (Amherst, Mass.), OZARKA (Eureka Springs, Ark.), PEOPLE & ENERGY (Washington, D.C.), and SOUTHWEST BULLETIN (Santa Fe, N.M.). As soon as others are funded, they will be announced.

Some of the organizations within the A.T. network aren't actually doing "networking," but are more involved in experimentation, in data gathering, or teaching within their own community. Such organizations include THE NEW ALCHEMISTS (Falmouth, Mass.), INSTITUTE FOR LOCAL SELF RELIANCE (Washington, D.C.), SMALL FARM ENERGY PROJECT (Hartington, Ne.), TILTH (Arlington, Wa.), FARALLONES INSTITUTE (Berkeley, Ca.) and THE LAND INSTITUTE.

The LAND REPORT does not intend to duplicate the work of the networking journals. However, we do want to support and encourage local or regional groups working to promote appropriate technology, such as the Kansas Organic Producers, Manhattan A.T. Group, and Prairieland Food Cooperative. Each issue will describe the activities of a few of these organizations or print articles submitted by them.

One look at TRANET, a "newsletter-directory of, by and for those individuals around the world who are actively developing Appropriate/Alternative Technologies," reveals that A.T. is alive and well not only in Salina, Kansas; Eureka Springs, Arkansas; and Santa Fe, New Mexico; but also in Belo Horizonte, Brazil; Papua, New Guinea; Einhoven, Netherlands; and Dakar, Senegal.

KANSAS SOLAR ENERGY SOCIETY

The second organizational meeting of the Kansas Solar Energy Society was held at the Land Institute on Saturday afternoon, October 7. This new organization is affiliated with the International Solar Energy Society and will have nine chapters in Kansas. The membership fee is $10 and any person may join. To serve on the Board of Directors, one has to be a member of the international organization also.

For more information, write to the chairman, Don Stewart, 1202 S. Washington, Wichita, Ks. 67211.

K.T.I. Solar Utilization Technology Program

In order for the solar energy industry to really get underway, capable technicians must be available to design, install, adapt, maintain, test and evaluate the equipment that is sold. The Kansas Technical Institute in Salina is able to make a significant contribution in this area through its Solar Energy Utilization Technology Program.

This program prepares the graduate for a position in the construction and/or manufacturing industries. It embraces the design, manufacture and installation of solar energy collection systems. It deals as well with the sales and maintenance of such systems. The two year program is designed to develop the student's ability to proceed in an independent manner to use both trade

and technical literature to solve technical problems.

For information about the opportunities at K.T.I. in solar energy utilization technology, contact Kansas Technical Institute, 2409 Scanlan Avenue, Salina, Kansas 67401 or call 913-825-0275.

Alternate Energy Sources, Inc.

Friends of The Land, Jim and Linda Wesch, have opened a new business (the first of its kind) in Salina at 752 Duvall called Alternate Energy Sources, Inc. They will be selling Fisher woodburning stoves and two models of the AES woodburning furnace with chimney pipe fittings and accessories. Beginning in February they will be selling solar components for people who wish to buy and install their own solar heating systems. Phone 913-825-8218.

Prairieland food cooperative

Now that the food co-op is incorporated and located at 707 Bishop Street, important changes are taking place in its organization. At the first annual meeting on October 28, there was a consensus that the co-op cannot continue to distribute food only one day a month and pay rent and other overhead expenses, but neither can it afford to open its doors daily to the public because of the increased expenses of insurance and building improvements necessary to meet health requirements. A schedule will be worked out to open several days a month to distribute food to an enlarged membership. The store will be open to members three Saturdays in December.

The entire venture of a food cooperative was made possible by a grant to The Land Institute from an individual interested in having a natural food store in Salina where products could be purchased in bulk. Jan Peters was hired in the summer of 1977 by The Land to investigate the feasibility of a food cooperative, and when the study and survey indicated there was enough interest in Salina, she began to work with a steering committee to get the co-op organized. Jan worked as the bookkeeper-manager until her resignation in May, when a former Land student, Sue Liekam, was hired to do the bookkeeping, and collectives were organized to assume some of the management responsibilities. The grant to The Land can continue to subsidize the co-op's bookkeeper working approximately twenty hours a month until April or May.

Officers for the Prairieland Food Cooperative are Fred Elliott, President; Mary Anne Powell, Vice President; Steve Renich, Secretary; Tom Renich, Treasurer. Diane Simpson, Marty Bender, and Mary Anne Powell represent the members at large, and each collective has a representative on the council.

The name PRAIRIELAND FOOD COOPERATIVE was chosen in October 1977 by a steering committee which met many times before deciding to start as an ordering club rather than borrow money and plunge into store management. Monthly orders were distributed at the Sunrise Presbyterian Church from February through September. When the Bishop Street building was first used to package and distribute food on October 7, members of that original steering committee felt great excitement as another step toward the "our store" goal was reached.

There are many challenges in this next phase of cooperative development, and there will be many problems. Reading through the Food Co-op Handbook, one can see that the growing pains are normal. Every cooperative has to worry about paying its bills, increasing member participation, stocking quality food that sells, satisfying the health department, etc. But the co-op offers an ALTERNATIVE to supermarket shopping, an opportunity to obtain whole food at cheaper prices with fewer packages, an opportunity to buy directly from producers, an opportunity to learn about nutrition and diet from those who will share recipes, another chance to have a little more control over one's own life.

Manhattan Appropriate Technology Group

"We feel that the best technologies are those which seek to accommodate themselves to the environment within which they are used. Technologies that allow communities to maintain a high level of self-reliance need to be compatible with the human, material and financial resources of a given community or society."

This is part of the draft statement of purpose drawn up by members of the newly-formed Manhattan Appropriate Technology Group. They meet regularly once a week, 7:30-9:00 P.M. on Monday night, at the University for Man center, 1221 Thurston, Manhattan, Kansas. They also meet informally between 3:30 and 6:00 Friday in the Fireplace Room, UFM.

Some of the projects being undertaken include the establishment of an information coordination center and library on A.T. at the UFM, development of community and University courses for instruction in the theory and practice of appropriate technologies, and presentation of panel discussions and illustrated talks to various University student groups and departments as well as local community groups. The group is interested in leasing or possibly buying some land for appropriate technology building projects and alternative agriculture teaching.

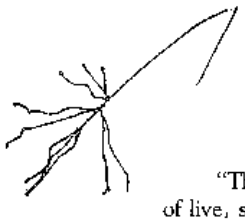
The newsletter editor will send copies for distribution at a suggested subscription price of $2.00 a year per person. For more information, contact MATG Jim Converse, Dept. of Sociology, Anthropology and Social Work, Waters Hall, K.S.U., Manhattan, Ks. 66506. (913-532-5984)

Prairie Images

Konza prairie Manhatten, Kansas 8·16·78 Terry Evans

Fent prairie Salina, Kansas 8·28·78 Terry Evans

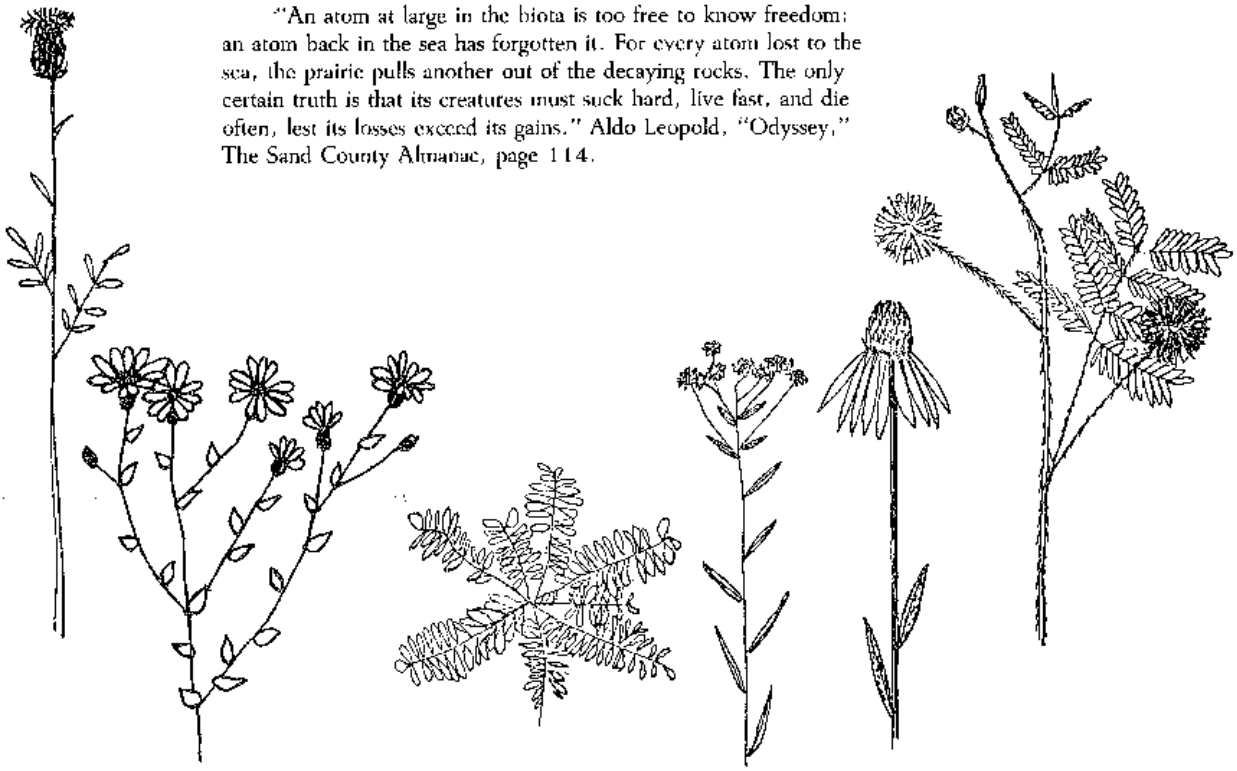
Tent prairie Salina, Kansas 6·24·78 Terry Evans



"The average aboveground biomass of the prairie, inclusive of live, standing dead and litter, was 275 grams per square meter, and the average belowground, 1625 grams per square meter. Percentagewise this means that roughly 15 percent of the total standing crop occurs above ground, and 85 percent, below ground." Sims and Singh, "Preliminary Analysis of Structure and Function in Grasslands," Prairie: A Multiple View, page 181.

"So many species—often a total of 200 or more per square mile—can exist together only by sharing the soil at different levels, by obtaining light at different heights, and by making maximum demands for water, nutrients, and light at different seasons of the year. Legumes add nitrogen to the soil; tall plants protect the lower ones from the heating and drying effects of full insolation; and the mat-formers and other prostrate species further reduce water loss by covering the soil's surface, living in an atmosphere that is much better supplied with moisture than are the windswept plants above them. Light is absorbed at many levels; the more-or-less-vertical leaves of the dominant grasses permit light to filter between them as the sun swings across the heaven." John E. Weaver, Prairie Plants and Their Environment, page 51.

"An atom at large in the biota is too free to know freedom: an atom back in the sea has forgotten it. For every atom lost to the sea, the prairie pulls another out of the decaying rocks. The only certain truth is that its creatures must suck hard, live fast, and die often, lest its losses exceed its gains." Aldo Leopold, "Odyssey," The Sand County Almanac, page 114.



Save the Tallgrass Prairie

In 1830 a great sea of tallgrass covered more than a quarter of a billion acres of this country. Its rich prairie soil soon yielded to the plow, or to cities, Federal impoundments and highways until today, only 1% of the prairie remains. Most of that lies in the Flint Hills of eastern Kansas, with a small amount in northern Oklahoma. This last significant area is being threatened by power-lines, dams, housing developments, plowing and changing agricultural practices, including seeding with foraging grasses, aerial fertilizing and herbicide spraying.

In September, 1977, Larry Winn, Jr. (R. Ks.) and nineteen co-sponsors entered HR 9120 which calls for a Tallgrass Prairie National Park and Preserve. The measure will be introduced again in 1979 with the strong possibility of hearings.

A Tallgrass Prairie National Park and Preserve would be for the preservation of an unimpaired population of native plants and animals, a place where future generations can see what the historic tallgrass prairie was like. Imagine its 350 kinds of wildflowers, 300 species of birds and 80 species of mammals, including bison, elk and prong-horned antelope, plus an opportunity to experience the sense of freedom afforded by the wide prairie landscape. Another purpose of the Park would be to communicate the prairie's cultural role- its significance to native Americans and early pioneers, to sodbusters and cowboys, to small homesteaders and great combines- its influence on human development in America from prehistoric to contemporary times.

HR 9120 identifies a site in Chase County, thirty miles southwest of Emporia as the best location for a park. The area would total 187,500 acres (3% of the 1% of remaining prairie), about 58% of which would be Park and 42% an adjoining Preserve. The Preserve designation is given to about 78,000 acres because oil and natural gas production occur there which the proponents feel should be permitted to continue until these resources are exhausted, but in a way that does not set a precedent for other present and future national parks. It also has the advantage of squaring up the eastern boundary which will aid in employment of preservation techniques.

A Prairie Coalition, patterned after the Alaska Coalition, is being formed to broaden the base of support for the Tallgrass Prairie National Park. The framework will be the major environmental organizations, but the Coalition wishes to include a wide spectrum of interests. Anyone wanting to know what to do to help should write or call Save the Tallgrass Prairie, 4101 West 54th Terrace, Shawnee Mission, Ks., 66205. (Phone 913-384-3917)

Elaine Shea

Citizen/Labor/Energy Coalition

H. O. and Thelma Wright represented The Land at a conference in Des Moines, Iowa on November 11, the "Midwest Organizing Conference for the Citizen/Labor Energy Coalition."

The conference brought together leaders of citizen organizations, labor unions, churches, senior citizens, minority and public interest groups from Iowa, Nebraska, Minnesota, Kansas and Missouri. Participants met to discuss and help design action programs to implement coalition policies on natural gas pricing, utility reforms, jobs through energy conservation and solar energy.

H. O. Wright is a retired Postal Union Official. He and Thelma are Friends of The Land who meet with students each semester to discuss labor and environment.

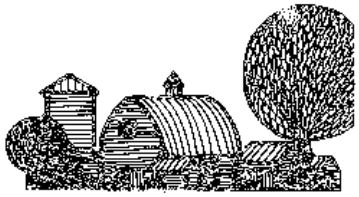
KANSAS ORGANIC PRODUCERS, INC.

The Kansas Organic Producers' VISTA PROJECT began November 1. This project has received a $5000 grant from ACTION to finance activities of the KOP via salaries to regional coordinators. There are three component parts to the project: food, energy and marketing.

The food component will deal with home gardening, food preservation and preparation, and nutrition. Major emphasis will be on reducing the family food budget while improving the level of nutrition by better utilization of home grown products, including field crops. Locally recruited volunteers for this part of the project are Nancy Vogelsberg (former Land student), Ken Lassman and Dan Bently.

The second component will address the problem of energy use on the farm, including that used in the home, the barn, and the field. The project will identify and publicize ways energy can be used more efficiently, as well as provide technical assistance for the development of renewable energy sources on individual farms. Locally recruited volunteers are Lyn Ellen Doxon and Vaughn Flora.

The third part will explore the marketing needs of organic farmers in the state as well as the buying needs of consumers on the retail and wholesale levels. The situation will be evaluated to determine the feasibility of forming a marketing cooperative in the state. Sue Gordon is the locally recruited volunteer. In addition, there will be two nationally recruited volunteers for this component.



Soft Energy Paths: Energy Policy for a Shrinking Planet

Saturday, October 21, 1978

Salina South High School, Salina, Kansas

Ruth Hinerfeld, President of the League of Women Voters of the United States.

"The U.S. Role in Meeting Basic Human Needs of All Peoples"

In the opening address of the conference, Ruth Hinerfeld established the international perspective. She focused on the developing world, outlining the problems of third and fourth world countries, describing international strategies for fostering their development, and examining the U. S. role in these strategies and the U. S. stake in development.

The problems of the developing world are the problems of poverty, Ms. Hinerfeld explained. Three billion people, three-fourths of the world's population, live in the developing countries, which are mainly in the southern hemisphere. One billion of them, one fourth of humanity, exist in a state of absolute poverty with per capita incomes of less than $75 a year. Another billion subsist in conditions of relative poverty that are little better, characterized by widespread hunger, malnutrition and disease, illiteracy, high birth-rate and infant mortality, low life-expectancy and despair.

Ms. Hinerfeld sketched the history of foreign assistance to developing nations, pointing out that policies of the 50's and 60's aimed at rapid increases in industrial growth did not create the hoped-for conditions in which benefits trickled down to the poor and the quality of life improved for all. During the last twenty-five years, most developing countries increased their rates of growth in GNP an average of 5% or more per year, but few experienced economic gains in per capita income because their GNP gains have been eaten up by population increase. In the 1970's, third world countries began making major demands to right the wrongs of the colonial era and produce a new international economic order. These demands included access to markets of the developed world and preferential import treatment for manufactured goods, commodities agreements to stabilize wildly fluctuating prices, debt relief, access to technology, restrictions on the conduct of multinational corporations, increased levels of aid and greater participation in the world's financial institutions. Though these policies would assist the economic growth of third world countries, they would not be enough to help the poorest of the poor in the third and fourth world.

The 70's gave birth to a new development strategy, with the ultimate goal of the elimination of absolute poverty by the end of the century. This basic human needs strategy assigns top priority to meeting minimum requirements for food, jobs, shelter, clothing and education. It is a direct investment in human capital. The U. S. Congress was the first to move in the direction of this new strategy when it passed the 1973 Development Aid Act, also called the New Directions Legislation, which stipulated that economic assistance must be used for the direct benefit of the poor. It stressed the humanitarian purpose of development and de-emphasized the purpose of winning friends and influencing governments which had turned off friends and supporters of foreign assistance.

Ms. Hinerfeld stressed the important advantages of the Basic Human Needs Development Strategy, pointing out how it would fit into a soft energy path. The focus on the local level, small-scale labor-intensive techniques would encourage the development of decentralized energy systems, thereby making a break with the system of petroleum dependence.

Although there is a growing realization that equitable growth in developing countries through

the Basic Human Needs Strategy would mutually benefit developed countries, still many Americans do not understand. They do not realize that we do have a stake in development because what happens in the U. S. economy is increasingly affected by what happens in the economies of developing countries, as well as visa versa. Americans are not aware that we are dependent upon imports from developing countries for all natural rubber, jute and tin, and a very large proportion of other key raw materials. They do not realize that non-oil-producing countries now purchase 40% of our exports of manufactured goods and 27% of our total exports, more than we sell to both Eastern and Western Europe and the Soviet Union combined. In addition, U. S. business and banks benefit from investments and loans. But these benefits cannot increase or even continue unless the overall economic health of the economies in developing nations is improved.

In addition to mutual economic interests, the U. S. public and the people in developing countries have a mutual stake, a crucial stake, in a world at peace. The perpetuation of poverty side-by-side with prosperity has been compared to a time bomb ticking away. Although there is no guarantee that the Basic Human Needs Strategy will totally eliminate tensions, in the long run as developing nations become more prosperous and confident, they will be more interested in international cooperative efforts to deal with the spread of nuclear weapons, achievement of reasonable rates of population growth, environmental protection, control of terrorism, the best uses of scientific and technological know-how, the uses of outer space and ocean depths, improved machinery for the international economic system, and more rational approaches to the use of non-renewable resources.

Although the average American remains generally unconcerned about our economic and political stakes in development, his understanding of the Basic Human Needs Strategy is firm on moral grounds, Ms. Hinerfeld stated. Americans are generous so long as they don't believe they are being taken advantage of unfairly, or that their resources are being wasted. They have an instinctive preference for the basic needs approach and are much more likely to support humanitarian assistance than to aid economic growth per se. Ms. Hinerfeld believes that after a decade of disappointment and disillusionment with U. S. foreign policy, Americans are looking for long term goals, a new sense of mission in their relations with the rest of the world. A major new development effort designed to meet the basic human needs of the poorest offers Americans a chance to respond to lessons of the last twenty-five years of foreign assistance by helping the poor countries to help themselves to a better and more just life for their people.

Amory Lovins, British Representative for Friends of the Earth.

"U.S. Energy Policy and World Energy Needs"

Energy, the second subject area of the conference, was addressed by Amory Lovins. He sketched two paths along which our energy system might evolve in the next fifty years, paths which he described as vehicles for ideas, not precise forecasts. Though based on U. S. figures, the same principles, with variations in technical details, apply anywhere, giving the scenarios broad international relevance.

Strength Through Exhaustion. The first path is based on the principle that the energy future should be like the past, only more so. The energy problem is simply how to find more and more energy to meet projected demands by treating the demands as homogenous aggregate numbers and not looking particularly at what kinds of energy are needed for what purpose. This approach requires that we use all the depletable fuels we can and produce electricity in ever-larger, more-centralized plants.

Amory Lovins declared that this policy of "strength through exhaustion" simply won't work, mainly because of economics. Off-shore, arctic and synthetic fuels take about ten times as much capital as the traditional direct fuel system on which our whole economic system has been built, and the central electric systems are about another ten times as capital intensive. They are too expensive to substitute on a large scale for oil and gas.

"Even in an engineering sense this isn't a very efficient policy, because more than half of the enormous energy growth never gets to final users. It goes to conversion and distribution losses as the whole fuel chain becomes steadily less efficient. We also would still be short of oil and gas in such a future.. Although we would

have electricity coming out of our ears, it substitutes only slowly and imperfectly for oil and gas, especially in transportation," Lovins said.

Lovins claimed that every big power station makes unemployment worse as it takes 4000 jobs out of the economy by sucking capital out of all the other sectors that need it. As the path of strength through exhaustion tends to contribute to inflation and make the economic problems worse, at the same time it creates political problems. The strong centralized systems would need complex bureaucracies to run the complex technology and these systems give the energy and side effects, or social costs, to different groups of people. The energy goes to New York or Los Angeles, and the side effects to Appalachia, Navajo country and the North Slope.

Another major disadvantage of the increasingly centralized systems is their vulnerability to disruption, by accident or malice, especially electrical grids which can be turned off by just a very few people. Over all the domestic problems looms the larger threat of nuclear violence and coercion. As Amory pointed out, "A couple of decades from now we are supposed to have some tens of thousands of bombs' worth of strategic materials like plutonium running around as an item of commerce within the same international community that's never been able to stop the heroin traffic."

This energy policy is aimed toward cheap abundant energy, but its side effects, interacting with other side effects in a complex world system, make it not cheap at all. "With tax subsidies making energy look cheap, we use it wastefully, causing us to import more oil, which is bad for the dollar and our independence, worse for Europe and Japan, and disastrous for the third world." To pay for our balance of trade deficit from importing oil, we sell agricultural commodities. By buying wheat from us, Russia can divert investment from agricultural projects to military activities. We then raise our own military budget, but partly to defend the sea lanes to bring in the oil and defend the Israelis from the arms we just sold to the Arabs. At this point Lovins concluded, "I guess the argument suggests that the best kind of Middle Eastern arms control might be American roof insulation."

The idea that energy is cheap has caused us to substitute it disproportionately for human skills. Though economists call this labor productivity, it means we have to fuel the economy to employ the workers displaced by the machines made possible by what appears to be cheap energy. And by making large capital investments in centralized energy systems we can't afford to pay for the social costs of unemployment.

If we follow the hard energy path, we won't address rational development goals such as the basic human needs strategy. Instead we will continue to compete with our trading partners to see who can export the most reactors and weapons to developing countries. As we burn more fossil fuel, more carbon dioxide goes into the air, which runs the risk of destabilizing the world climate. A change in the monsoon pattern of several third world countries with marginal agriculture would damage their efforts to feed themselves.

The Soft Energy Path. Although proponents of the hard path energy policy tell us there is no alternative, Lovins declared that there is another way of looking at the energy problem, a nicer direction called the soft energy path. It has three technical elements: 1) using the energy we've got much more efficiently, 2) getting energy increasingly from soft technology and 3) using the fossil fuels for the transition.

"The soft path is distinguished from the hard path not by how much energy you use, not just by choices of equipment, but primarily by very different political and structural implications...The hard path is a tacit assumption that the more energy we use the better off we are, and energy is elevated from a means to an end in itself. In the soft path, how much energy used is considered a measure not of our success, but of our failure."

The soft path does not address the problem of how to get more energy to meet homogenous demands, but asks: "What are the heterogenous end use needs? What is the job we are trying to do, and what is the best fuel for that job? How can we meet those needs with an elegant frugality of energy applied in a most effective way for each task?"

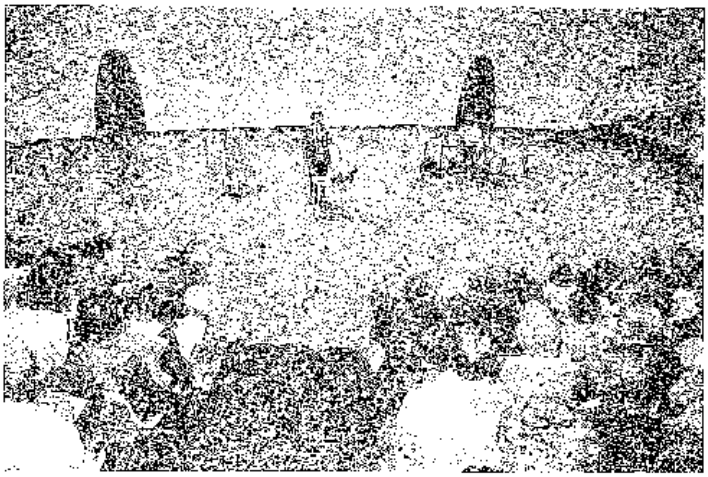
End use efficiency is extremely important in the soft path approach. Insulating houses, recovering waste heat in buildings and industry, co-generation of electricity in factories as a by-product of steam, etc., can allow us to roughly double end use efficiency by the end of the century.

The second technical element of the soft path is getting energy increasingly from soft technologies. There are five specific properties of soft energy technologies: 1) They are diverse. There are dozens of kinds, each used to do what it does best without trying to be a panacea. 2) They are renewable, running on wind, sun, water, farm and forest residue, not on a particular fuel. 3) They are relatively simple and understandable from the user's point of view. They can still be technically sophisticated, like a pocket calculator, a tool people can use, not a mysterious machine run by a technological priesthood. 4) and 5) Soft technology supplies energy in the right scale and the right quality for each task.

The soft technologies have the advantages of being cheaper and quicker to build than the large-scale energy technologies of the hard path. Fewer people are vulnerable because of malfunction or shut-down when diverse technologies are used.

The third technical element of the soft energy path requires that we use our fossil fuels to bridge the transition from the current path to the soft path. This means we must use them wisely and not make high capital investments in energy inefficient processes like coal gassification.

Amory Lovins illustrated points throughout his address with transparancies of graphs and charts not described in this account. The main ideas in the speech are developed fully in his latest book, Soft Energy Paths: Toward a Durable Peace. Other recent articles by Lovins are "How to Finance the Energy Transition" in Not Man Apart (Friends of the Earth magazine), (Sept.-Oct.) and "Soft Energy Technologies" in the Annual Review of Energy, 1978, 3: 477-517.



Dialogue Between Ruth Hinerfeld and Amory Lovins

The goal of this segment of the program was to have Ruth Hinerfeld and Amory Lovins discuss the linkages between a soft energy path and problems of development. To guide this discussion, questions were drafted ahead of time. Ruth and Amory responded to each question, and then the moderator, Wes Jackson, opened the floor to comments and questions from the audience. Selected excerpts from the dialogue follow below.

QUESTION: (Meeting Food Needs) In order to increase per capita food availability in the developing countries by at least 1% a year, increases in crop production per acre or hectare must average 2.5% per year. Those countries which have increased yield dramatically did so through Green Revolution technology involving irrigation, fertilizer and pesticides, made possible through hard energy path technologies. Could the soft energy path support the increases in food production which are needed?

AMORY: "26,000 Gobar biogas plants are a lot cheaper than one single Western-style fertilizer plant with the same fertilizer output...The gobar gas plants have over a hundred times more jobs in countries with a labor surplus and capital shortage. Instead of being a net energy consumer, they're a copious net producer of methane, with which they can meet virtually all the cooking, lighting, pumping needs of the village, and that is half of all the energy needs in India. Now what happens is that the dung is burned as cooking fuel in open fires. All the nitrogen goes up in smoke which blinds people. Whereas with a gobar methane plant, you get out a better fertilizer than you started with, plus a very clean, efficient fuel. This is an example of a very powerful development tool which is why China has installed about five million biogas plants in the past six years.

RUTH: "...the ability to use the soft energy technologies in the developing countries where there is not already a huge infrastructure based on hard path technology is much greater. However, I think we must not overlook what are perhaps some of the greatest obstacles to the introduction of any new technology in developing countries, as well as our own country, and that is the social infrastructure, the customs, the attitudes. For example, there have been places in Africa where they have pioneered in villages with soft energy technology, and they have met the same fate as the traditional technologies. Outsiders came in and introduced the technology into the village. Even though it was appropriate to the village, something relatively simple they could use, they had not participated in the development of the technology; they had not participated in the decision that the technology would be used. It was, in fact, imposed. And when the outsiders left, there was nobody to maintain, there was nobody to repair. ...It fell into disuse. No matter what the path of technology, the results are the same unless there is the kind of social or political preparation to accompany the use of the technology.

AMORY: "It's a very important point. In fact, a lot of the early work in India on biogas plants fell afoul of this problem, even though the technology was indigenous. It was introduced by urban-educated, technological elites in India who didn't understand how villages worked and how villages worked differently in different parts of India. So, in many areas the social benefits of the plants were not distributed. What happened was that the few families in the village who owned most of the cows and had most of the capital would put up a digester just big enough for their own needs, and then the people who used to collect dung free as a cooking fuel were worse off than

they were before, and they didn't get any of the methane or the fertilizer...There are several ways around this...one is something like a municipal utility for the village, but simpler...But if you don't bear that in mind from the beginning, any technology can make things worse, even the soft technology.

QUESTION: (Economic Growth) At the joint meeting of the International Monetary Fund and World Bank in September, World Bank President Robert McNamara stressed the importance of increasing economic growth of developing countries to alleviate "absolute poverty." He said that if economic targets fall short, the number of "absolute poverty" victims could be 1.3 billion by the year 2000. What U. S. policies could assist economic growth in developing nations? Would economic growth be possible without further reliance on oil?

RUTH: "It has been estimated that approximately half of the reserves in fossil fuels that have not been explored in present time are in the developing countries themselves. They lack the capital to explore and exploit. The World Bank is now embarking on an effort to provide them the capital assistance to enable them to develop their fossil fuel resources...They can't afford, nor are they going to wait to that point when we, as well as they, can completely switch to a different energy path. They are not willing to hold off on their development. They must develop at a faster rate than they are now, and this will, in the short run, entail traditional energy sources.

AMORY: "The broader question when we talk about economic growth is - what is it that's growing? What are developing countries developing into?... The conditions under which countries like ours developed, into whatever they are, no longer exist. ...Most of my Indian friends in the energy policy business now think they have made a great mistake in the past. They, and outfits like the World Bank and Export-Import Bank, have spent a lot of money trying to electrify India, saying that if you've got a lot of power stations, this makes you into a modern country, and somehow it'll trickle down to the villages. When you put a new power station in India, it turns out that 80% of the electricity goes to urban industry, a lot of which isn't even Indian; another 10% goes to a rather small number of urban households; another 10% goes rural. If you're lucky, 1% might end up trickling down to the people you are trying to help. They now feel they would have got a lot further, for example, by putting clay stoves in villages, which roughly trebles the efficiency of cooking with the scarce fuels they've got. When you're at that kind of subsistence level, that's the most sensible thing to do first.

RUTH: "True, 80% of people live in villages and they are getting an iota of the total amount of electrification, but what prestige there is in being an electrified village. How much they value this as a social goal...As long as this continues to be a commonly held value, it's going to be very hard to buck there, as it is here... Until we make progress in this country in attitudinal change, ...it's not fair for us to expect this kind of attitudinal change in developing countries."

AMORY: "The question about Indian electrification is more one of priority rather than whether you ever do it....Electricity is very useful stuff to have in villages, but incidentally, the cheapest way to get it is not to run in a power line from a central station. It would be from an indigenous source, whether it be wind, hydro, solar pond, heat engine or photovoltaics. There've been some interesting studies and trials lately using these technologies in a way that starts at the village level so the benefits trickle up instead of down."

QUESTION: (U. S. Energy Conservation) The United States' energy consumption is nearly 40% above that of Western European nations with similar standards of living. If the U. S. should seriously strive to lower consumption through conservation, would the energy saved actually benefit the life of the campesino, the beggar sleeping on the streets of Calcutta, or the peasant farmer in Senegal? (Did a single Armenian ever benefit from the peas forced down the American child forty years ago?

AMORY: "I've already mentioned the surprising opportunity for energy conservation in developing countries. It may seem as though people who have no energy in our sense have nothing to conserve, in particularly if you think of conservation wrongly as curtailing functions rather than using the energy more efficiently. Most of the energy used in the developing world is not commercial energy. It doesn't show in the statistics at all. It's things like firewood or dung, and it is a greater amount of energy than all the oil moving in world trade today. But it's used very inefficiently, like open fires in cooking, and very simple, zero-capital things like clay cooking stoves could stretch scarce fuels much further. But it's absolutely impossible for countries-- where we jump into a several ton automobile to drive half a mile to get a six pack of disposable aluminum cans- to say anything to people in that position about the wise use of energy. So our model is very important. The way we are guzzling too much of the world's oil and other resources is very important...And there are all the indirect ways in which our wasteful consumption falls out on everyone else because of the economic imperatives we are driven into to try to pay for the oil."

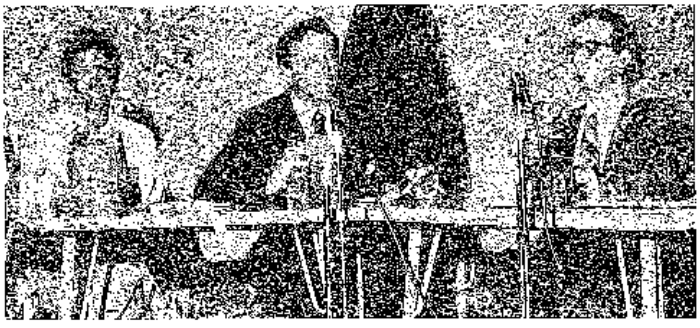
RUTH: "...to the extent that we conserve energy, we strengthen our own economy. And since our economy is still the linchpin economy of the world, we create a stronger economic setting and improve the prospects for economic growth and development elsewhere."

QUESTION: (Nuclear Safety) It has been argued that if the U.S. abandons nuclear power plant construction and expansion, other countries will continue to build and sell these plants, many of them in the third world, and that their vigilance for safety will not match ours. Therefore, we must stay in the nuclear game to help increase the probability of a safe future. How influential is U. S. leadership in the third world? Would our energy model be copied or ignored? Should we continue to give technological advice to those countries which follow the nuclear path?

AMORY: "It was long argued that the U. S. had to stay in the slave trade because the French would do it worse. This is precisely the same argument, that we can retain our influence in doing something wrong only by refusing to exercise that influence and going along with the game...The question of building nuclear plants in the third world doesn't arise if the sales aren't subsidized. No reactor has ever been exported to a developing country except on extremely favorable concessionary terms, which amounted to paying them to haul the reactor away, and the whole purpose of these exports is to keep the domestic reactor industry alive in countries like the U.S. or France or Germany.

I think the U. S. does have a crucial influence, and that is in the example we set. I think we have an enormous opportunity with the soft energy path. We have the political leverage there to promote the world psychological climate of de-nuclearization- when it comes to be viewed as a mark of national immaturity to have or want reactors or bombs.

QUESTION: (Double Standard) Some developing countries resent efforts of developed countries to sell them alternative energy technologies rather than nuclear. The attitude that nuclear technology is safe if produced and used by developed countries, but not when used by developing countries, supports a double standard unacceptable to developing countries. They suspect that the talk about appropriate technology for developing countries is a ruse to keep them from modernizing. Is there any justification for this suspicion? What principles should guide the transfer of technology to developing countries?



Salina Journal photo.

RUTH: "There is justification for that attitude. ...Look at who are the powers in the world. The countries who have nuclear weapons. They are the role models. It is very difficult for developing countries to have these role models who are playing in the big leagues say to them: "you play your own game," particularly in terms of recognizing we are not doing what we promised them in the nuclear proliferation agreements that went into effect in 1963. We said to non-nuclear countries, "Your part of the bargain is that you do not develop nuclear weapons. Our part of the bargain is that we will not increase our development of nuclear weapons. We will disarm." Obviously we have not been doing this, so they feel they are under no obligation to do what we want them to do in that respect."

AMORY: "If we with all our fuels, money and technical skills say we have to have nuclear power, and renewables aren't enough, then how can we expect other countries lacking all those advantages to come to a different conclusion?...There is further suspicion that our interest in renewable sources for developing countries is often just a way of opening up markets for our own aerospace industries. That suspicion is indeed justified, and the only way we can get around that is to transfer technology with no strings attached, give away free patent rights, deliberately cut ourselves out of many consumer markets. It's still worth our while to do that because of what it will do for world development, equity and peace.

Many developing countries now are very dismayed that we have programs on paper for non-nuclear energy aid, but nothing at all has happened. Congress has two or three times told D.O.E. in Washington to get on with that job, and nobody is doing it, not even the State Department. There is a new fashion I see coming up in developing countries which is very healthy development, and that is for these countries to say, "We are our own people with our own problems, and maybe the Western model is not appropriate for us. We're going to learn some things from your mistakes, but we aren't going to follow automatically. We won't necessarily take your advice. Maybe we even have something you can learn from us." I think that's a great thing to happen, and we ought to encourage it whenever we can by an attitude of much greater humility, and offering to

help where we can with no strings attached, but not pretending to have all the answers which we obviously don't have."

QUESTION: (Research) How could we make world energy research applicable to development? What are the prospects for international cooperation on energy development? How can present U. S. research capabilities assist energy development in third world countries? Would it be useful to establish an international World Energy Council to gather data and perform global energy analyses and planning?

RUTH: "I'd only like to say that- sure, it would be a good idea to have a world energy council, because how much better and how much faster we can move if there is some consolidation of the kind of thing we are talking about...We can, in effect, by working on this problem in an international context, give it that imprimatur of respectability and acceptability which is what we were saying we have to do."

AMORY: "How can we make world research applicable to development? By getting our own house in order! Our federal government would have gotten much better results on energy research by giving the money away randomly than the way they did it. What's going on at Wes's Land Institute and the New Alchemy Institute is much more important for both energy and development than anything I know of that is coming from Washington. The action is not in big research programs. The action is at a grass roots level where individuals and small businesses are doing the exciting work...

What's happening in places like Salina is quite useful, and I'm sure what's happening in Tanzania will be useful in Salina...but anyway, you'll never get that done through inter-governmental contacts. What we need is not so much more research as applying what we already know how to do.

I don't think it would be a good idea to set up a world energy council...It would be another talking shop in which some talented people would swim around in quicksand for awhile trying to come up with halfway competent answers to ten year old questions. I would very much encourage all kinds of international networking in informal non-governmental programs, but that's as far as I think we can go."

Afternoon Session

Kansans Relate to Global Energy Problems

In the afternoon session, five Kansans made short presentations: Robert Riordan, Paul Johnson, Vernon King, Jim Converse and Diane Tegtmeier. These commentators were asked to react briefly to the morning session, challenging the suppositions or conclusions of the guest speakers, asking a series of questions, or describing particular problems in Kansas. Following each commentary, Amory Lovins and Ruth Hinerfeld were given the opportunity to dialogue with the speaker about the issues raised. The floor was then open to the audience.

Four spokesmen for the hard energy path were invited to participate in this part of the program: William Wall, President of the Kansas Power and Light Company; Dr. Robert Robel, Chairman of the Advisory Committee for the Kansas Energy Office; and Dr. Dean Eckhoff, head of the Nuclear Engineering Department at Kansas State University; and Norman Jackson of the Kansas Power and Light Company in Salina, Kansas. All declined the invitations.

The following is a summary of salient points made by each speaker with selected responses by Amory Lovins and Ruth Hinerfeld.

ROBERT RIORDAN: Energy Research & Development Coordinator of the Kansas Energy Office.

Robert Riordan stated that although soft technology is economically viable in the long run, decision makers will look only at the short term basis. He asked Amory Lovins if we should continually strive to develop soft technology to bring the cost down before we try to influence decision makers, or should we try to convince them right now to see the advantages of soft energy technology. Amory referred him to his recent paper, "How to Finance the Energy Strategy" in Not Man Apart. He discussed the importance of clearing away institutional barriers such as obsolete building codes and mortgage regulations and sketched a plan whereby utilities would use their capital to make conservation loans rather than build more plants.

A member of the audience asked Mr. Riordan what was being done in the Kansas Office of Energy to promote the soft path. Mr. Riordan said that information gathering, inventorying what is going on in the state, and acting as a clearing house for information were some of the important activities of his office at this time.

PAUL JOHNSON, Kansas Legal Services (an umbrella organization for all legal aid societies of Kansas representing the legal interests of lower income people in Kansas)

"I would have to state that the consumers of utilities in Kansas are in a bad state of affairs." Paul went on to say that the Kansas Corporation Commission has never really taken its proper role in regulating utilities. They do not have a competent legal staff or competent economic ana-

lysts even though they do have the ability to assess the utilities for the money to hire such people and finance effective studies. Paul expressed doubts that the large electric generating plants being built in Kansas are really needed.

Amory commented on the costs of overbuilding. Utilities are saying that it is better to overbuild than to underbuild, and that they can always sell the excess to other utilities in the grid. So they are all planning to sell to each other, in a big circle. They are overlooking an important economic factor called opportunity cost. There is a cost for opportunities forgone when money is sunk into building another plant. That capital is tied up and can't be spent on something else like renewables and conservation.

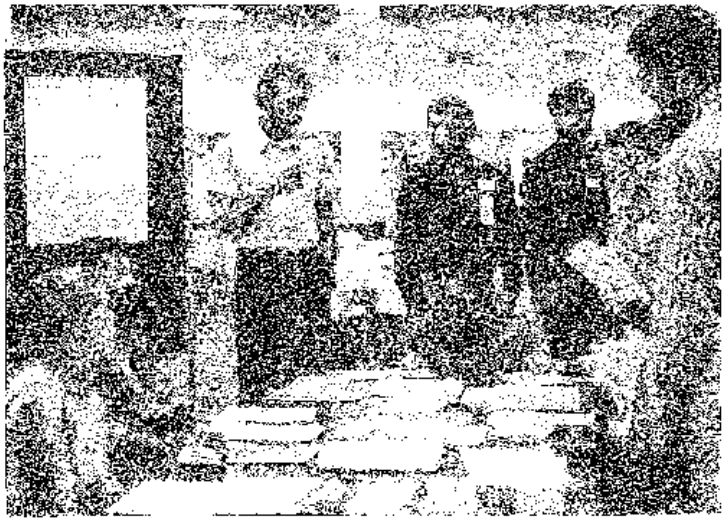
Paul then pointed out how rising energy costs are bound to hurt the poor more than anyone else. People who can afford it are going to "get off the sinking ship." They will see solar energy as the means of getting unhooked from ever-rising electric rates, although it has been suburbia's demand with the all electric homes, the complete electrification of their lifestyles, that has pushed us to expand the electrical system, to build for peak demand. "The people I represent, the low income, we're going to be stuck with an electrical grid to pay for."

After a question from the audience relating to the application of soft energy technology in the inner city, Ruth stated that a very important problem had been raised which policy-makers were not spending enough time thinking about. Providing adequate energy for the poor, especially in the inner city, needed more attention. "Sure there are neighborhood groups doing rehabilitation...getting some federal grants for the purpose of including soft energy technology in their rehabilitation programs. But that's peanuts!...Maybe someday we'll come to the point when there are energy stamps."

VERNON KING, former volunteer in Haiti for the Mennonite Central Committee.

Vernon began by saying that he had to differ with Ruth concerning our aid and its potential for change. Our aid in Haiti in the last four or five years has caused the streets to become congested with four wheel drive jeeps and pickups to transport the onslaught of highly paid Americans who are there to implement the foreign aid program. Vernon felt that we needed to get away from the delusion that foreign aid in terms of dollars brings on development. Haitians know, for example, that our aid is not humanitarian, that it's always tied to some contractor in the U. S. He said that our aid was an extension of colonialism, and he was sure that there is a net loss out of Haiti in terms of resources such as bauxite and coffee.

Ms. Hinerfeld replied to this and said that many books have been written about the faults, misallocations, misappropriations and mishandlings of government programs, including foreign



Paul Johnson (with coffee cup), Pat Dreese and Jeff Brown (facing camera) visit MACEA exhibit table and talk to Becky Burcham and Ron Henricks.

aid. However, "This does not vitiate their necessity; this does not excuse us from continuing with them. The need is there, the goals are there and perhaps there is need of reform. I can't deny that there are problems with aid... there are also great success stories about which more books have been written."

JIM CONVERSE, Department of Sociology, Anthropology and Social Work, Kansas State University.

Jim is one of the three editors of a newly-released book called Sources of Change in Rural America, and his comments reflected his interest in small, agricultural communities. "You can make a pretty case that a lot of the small towns in Kansas are colonies too. The agribusiness companies make a lot of decisions by way of the land grant college system." Jim told about an organic farmer who referred to the extension service as the extinction service, because their advice, if followed even partially, would be a long range plan for extinction. He talked about population decline in rural areas and the need for small farm resettlement programs to provide a future for rural Kansas young people.

Converse, who had two years of experience as a Peace Corps Volunteer on the island of Fiji, expressed some opinions about U. S. aid and technology transfer. "I have some real reservations about transferring Kansas type agriculture to a third world country. For one thing, there aren't many 2000 acre farms around in third world countries." He also commented that we in Kansas could do a lot more to deal with world hunger by dropping back in fertilizer use and shipping it in its most concentrated form to developing countries. "You can take a little bit of fertilizer and boost the yield a whole lot for the farmers in the third world, where Kansas farmers will boost the yield just a few more bushels."

DIANE TEGTMEIER, Mid-America Coalition for Energy Alternatives.

"I stand before you as one of the two regular soft path energy lobbiests in the Kansas Legislature, who also tries to see what the Kansas Energy Office is doing and the Kansas Corporation Commission is doing." Diane continued by urging conference participants to get involved in energy issues by working with local governments, talking to utilities and explaining the soft path economics to them, working in utility rate cases, working with organizations that have contacts and are involved in rate cases. When asked who should be talked to in the legislature, Diane urged people in the audience to begin with their own representatives first and educate them. "Also, talk to us (MACEA). We've established good relations and understanding about who and what can be done in the legislature." She also said to know what is happening in the Energy and Natural Resources Committees and know what bills are being introduced. Diane concluded by stating, "Now is the time for us to stop talking and start working."

After Diane finished speaking, the moderator, Maxine Hansen, exclaimed, "As President of an organization whose goal is citizen involvement in the political process, Amen, Baby!"

Useful Addresses

State of Kansas Energy Office
503 Kansas
Topeka, Kansas 66603

Mid-America Coalition for
Energy Alternatives
5130 Mission Road
Shawnee Mission, Ks. 66205

Brian Williams describes roof construction on the tamped earth Indian house to visitors following the conference.

Ruth Hinerfeld and Dana Jackson discuss the conference program.

Acknowledgments

SOFT ENERGY PATHS: ENERGY POLICY FOR A SHRINKING PLANET was the first conference which the Land Institute has sponsored, and it would have been impossible for our staff of two to arrange had we not received a grant from the Overseas Development Council and the cooperation of the League of Women Voters of Kansas and the League of Women Voters of Salina.

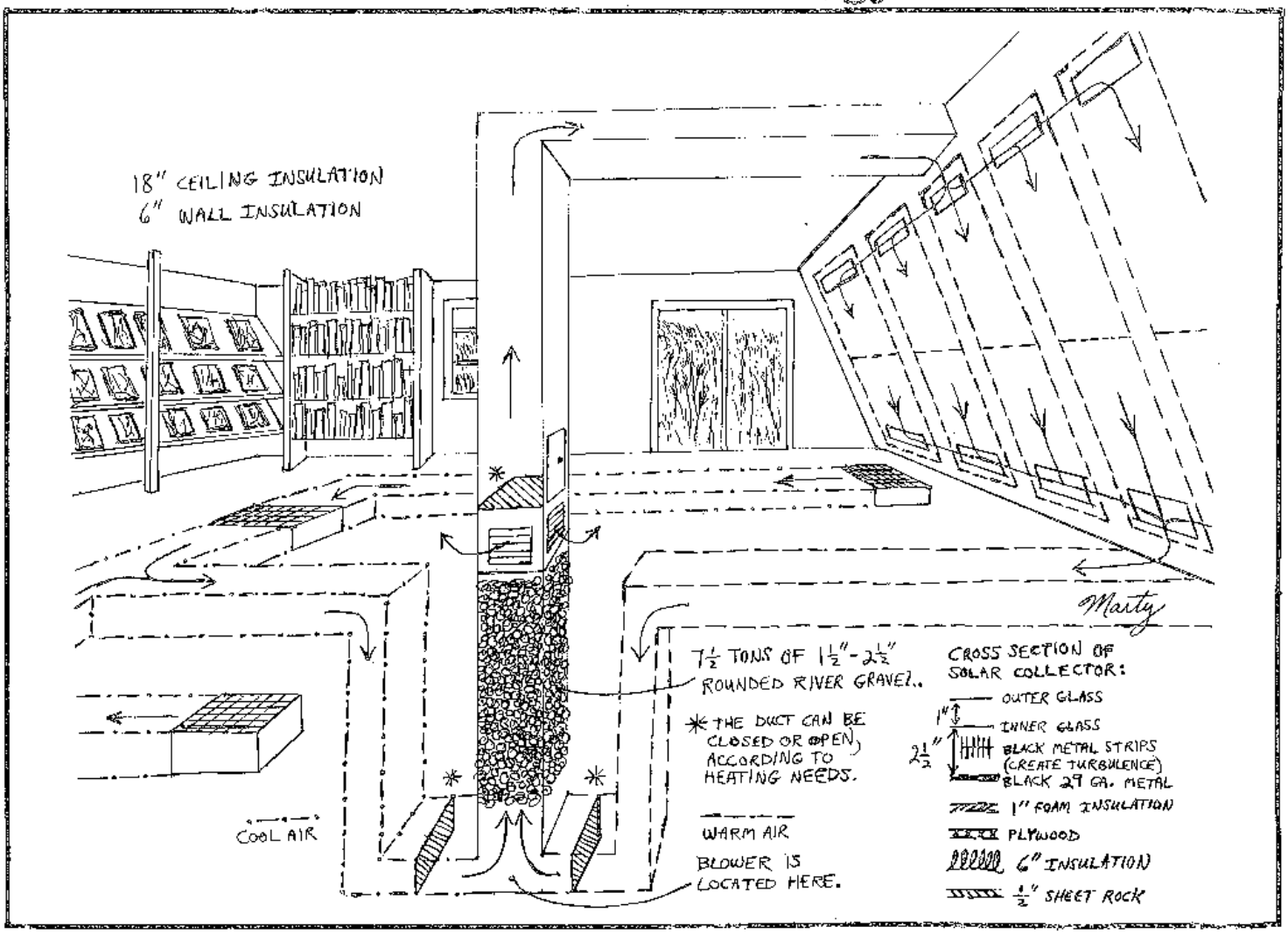
The Land was eligible to receive the $1200 grant due to Dana Jackson's participation in an O.D.C. project during the fall of 1977, the Transnational Dialogue to South Asia. Ruth Hinerfeld was also a participant in that project. A seed money fund was made available to participants to follow-up on the dialogue with public education programs relating to the needs of third world countries.

It was logical to co-sponsor the conference with the LWVK when one of the main speakers was the President of the LWV of the United States, Ruth Hinerfeld. Members of the LWVK Board of Directors, Maxine Hansen, Glorine Shelton, Mary Ruth Jaggard and Enell Foerster worked with The Land Institute Board of Directors in planning the conference. Most of the nitty-gritty work was done by members of the Salina LWV. Sharon Forster, International Relations Chairperson coordinated the conference with special assistance from Mary Anne Powell, Energy Chairperson. Carolyn Helbert received and organized registrations. Karen Black, President of the Salina LWV and also a member of the Board of Directors of The Land Institute, helped mobilize the many members of the Salina LWV who typed, made posters, glued labels, etc.

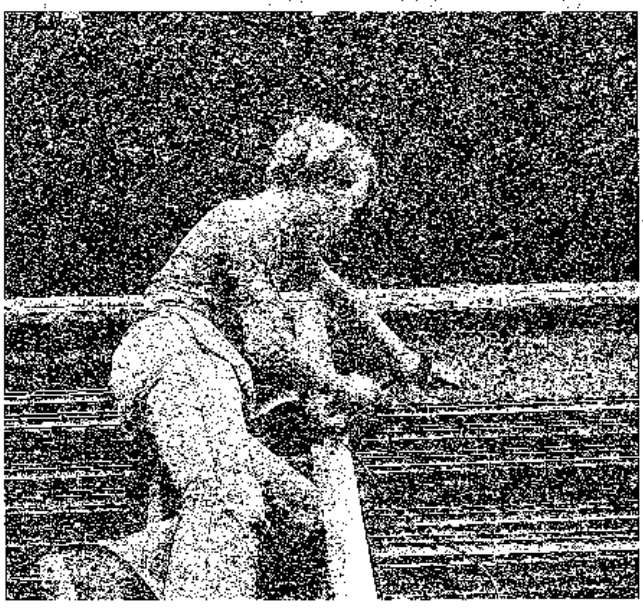
The Land Institute thanks every one of these hardworking women for their enormous contribution to the SOFT ENERGY PATHS conference.

In addition, we thank Dave Clark and Steve Burr for taping the speeches, and Bill Powell for frequent assistance during the day.

Alternatives in Energy



Turbulence Factor Added to Solar Collectors



Pat Dreese.

When Wes bought the 225 patio doors in 1977 ($4.50 each), he also bought the aluminum tracks (at scrap aluminum price). This fall an important use for the aluminum extrusions was discovered. Emerson Weins of Bethel College made several helpful comments about the solar system and suggested that greater air turbulence would increase the efficiency of heat collection. The aluminum tracks were cut to length on the radial arm saw with an old blade turned backwards and mounted horizontally on 1" X 1" X 13' strips which run the length of the collector alleys (7 of them, each 4 feet wide). The tracks were painted black and now air can pass both under and over these tracks which are uneven on both sides.

The duct work is mostly finished on the first floor now. The next step is to fill the heat storage area with river gravel and install the fan or fans to circulate the air. Raymond Streckfus pointed out that the rock pile could drain heat onto the concrete floor and into the earth, so 2 inches of foam insulation will be placed on the floor beneath the rocks. In the diagram, one sees the whole system from the southwest corner of the classroom.

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Four Week Energy Course

Emporia State University and The Land are cooperating on a four week graduate course on energy to be taught at The Land from June 4 to June 29. Dr. Charles Washburn, Professor of Mechanical Engineering at California State University in Sacramento will be the principal instructor. The first day, Amory Lovins, well-known author of Soft Energy Paths: Toward a Durable Peace, will speak on the diseconomies of centralized energy development.

The course will be about evenly divided between lecture/discussion and the "hands-on" experience. Students will have the opportunity to construct a 12 volt wind electric system and a small solar collector. John Craft of Hillsboro, a former associate at The Land, will assist students with the wind project. Nelson Kilmer, an associate Dean at Hesston College and partner in a solar energy company, will advise students on solar collector construction. The completed projects will belong to the students or their school systems to be used for classroom or community demonstrations.

The total cost for graduate credit and materials will be about $300. Further details will be available February 1, 1979.

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.

Wes Jackson and Amory Lovins.

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