New Hampshire Agricultural Experiment Station

The Wisdom of Small Farms and Local Food:

Aldo Leopold's Land Ethic and Sustainable Agriculture

By John E. Carroll

With Illustrations and Book Design By Karen Busch Holman

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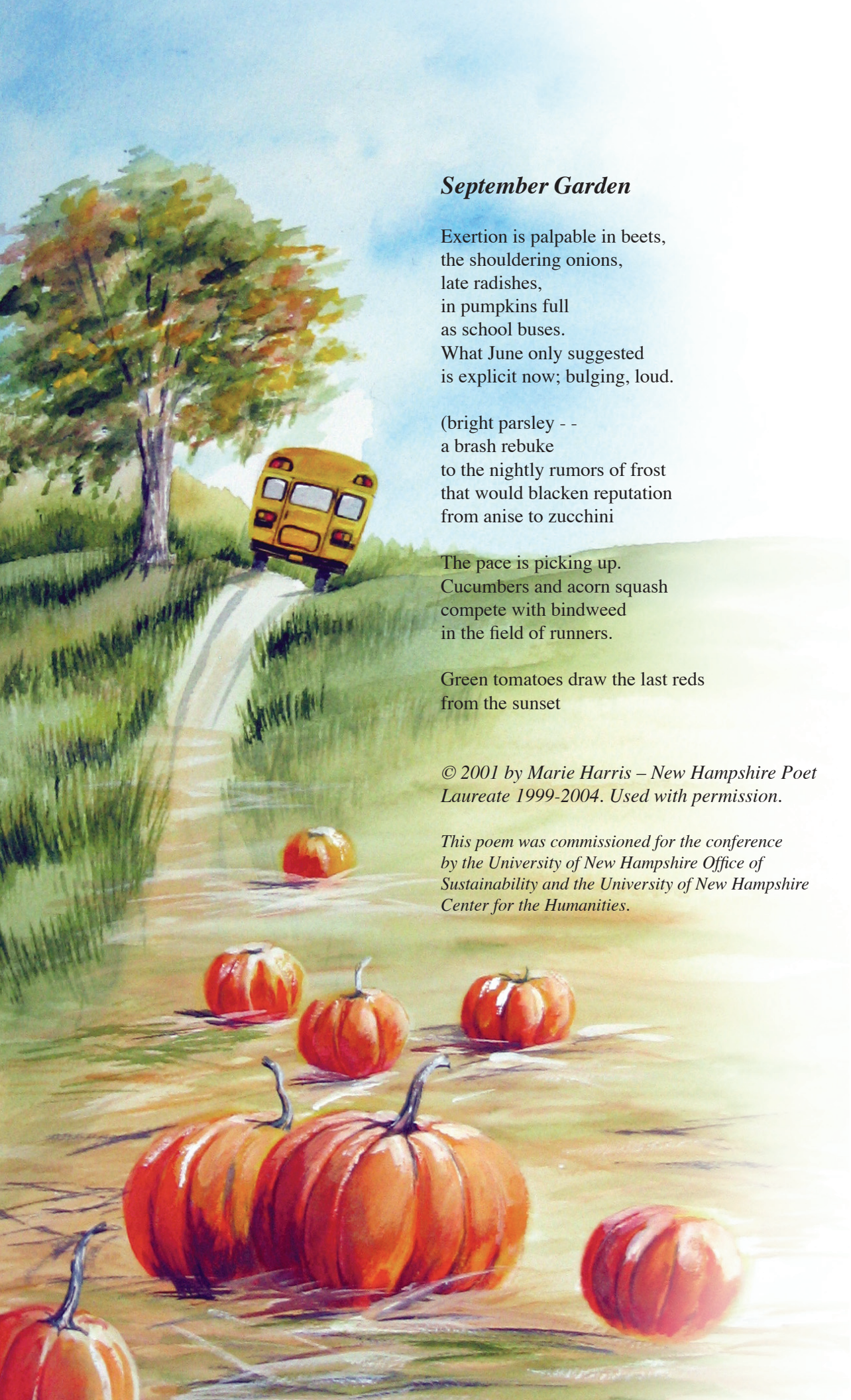


September Garden

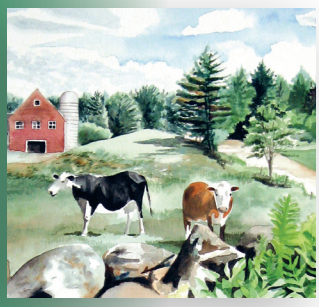
Exertion is palpable in beets,
the shouldering onions,
late radishes,
in pumpkins full
as school buses.
What June only suggested
is explicit now; bulging, loud.

(bright parsley - -
a brash rebuke
to the nightly rumors of frost
that would blacken reputation
from anise to zucchini

The pace is picking up.
Cucumbers and acorn squash
compete with bindweed
in the field of runners.

Green tomatoes draw the last reds
from the sunset

This poem was commissioned for the conference by the University of New Hampshire Office of Sustainability and the University of New Hampshire Center for the Humanities.



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"Sustainable agriculture is a socially responsible and economically viable agriculture so designed and implemented that it can be continued indefinitely, without exhausting its resources, corrupting its environment, or impoverishing its practitioners."

Ronald Jager
of New Hampshire

Introduction

by Ronald Jager

The Cooperative Extension Service of the United States Department of Agriculture has long been this nation's most distinguished educational outreach program, not just for farmers but for rural people generally. From the beginning much of this effort has been and was designed to be precisely focused and direct, geared to specific farms, particular problems and solutions. Today no one needs to be told that the Extension Service has been a great success.

But time passes, the American farm scene changes, and with it the very meaning of outreach undergoes shifts and realignments. Indeed, so rapid is today's transformation of the nation's farms that farming itself sometimes only vaguely resembles that of nearly a century ago when the Extension Service began. Traditional and cherished images of nuclear family farms nestled in close neighborhoods and wider rural communities become less valid every year, while large corporate undertakings and globalized food systems tend to dominate what was once the simple farm scene. As almost everyone now realizes, this kind of food system is increasingly dependent not only upon ecological violence, but also upon extraordinarily high levels of technology, fossil fuel, chemicals, capital, debt, and risk.

Meanwhile, a host of smaller and local farm-food entities have sprouted and spread like mushrooms all around us: farmers markets, niche farms with specialty food products, retail farms, farm-to-restaurant relationships, Community Supported Agriculture units, U-pick farms, organic farms, local co-ops, and numerous varieties and offshoots of these, most of them locally focused on the twin issues of quality farming and quality food. Civic Agriculture these local trends are now sometimes called, and they seem to be thriving everywhere, passively nourishing a growing resistance to the dominance of corporate farm-food systems.

What is the meaning of all this, and what does it portend?

One thing is very certain: today more than ever we have to recognize and deal with the fact that food and agriculture together form an intimate and crucial part of the larger culture: its concerns now run far beyond and more deeply than just questions of productivity and efficiency. We know that farmers, their associates, their families, their advisers, their communities, and all of us need to reflect more sensitively than ever before about the future of land and community, about food supply chains and all the related ecological and ethical issues. It follows automatically that effective agriculture outreach programs today may cast a wider net than ever before, and should bring to bear a very broad range of humane issues. This will include matters of history and sociology, of rural economics and lifestyle, of values and environment - ethical issues of many sorts. In particular, recent trends in farming give a new urgency to the idea of agricultural sustainability, and to questions of ecological and land ethics.

That is why this book by John Carroll is such a timely treatise. Here he plows up a new piece of territory and then rakes out a host of important topics for close examination. He focuses directly on sustainable farming programs as they are cultivated in four American land-grant universities. To start with, he employs the classic agrarian ideas of Aldo Leopold to structure and illuminate his detailed scrutiny. Next, he takes the reader on an agrarian tour directly to Wisconsin, Iowa,

Maine, and Vermont for a series of close studies of what's going on and how it's proceeding. Then he draws his conclusions, many of them of direct relevance to the future of New England culture and agriculture. Throughout, Carroll shows himself to be a sympathetic and knowing surveyor of sustainability programs both in these research centers and on their related American farms. Reading this book should incline anyone to think more keenly and responsibly about the prospects of American agriculture. Carroll's work falls squarely within the venerable traditions of the Cooperative Extension but, as this book so clearly shows, he is also willing to encourage these ideals to find new pathways of expression.

"An ethic, ecologically, is a limitation on freedom of action in the struggle for existence. An ethic, philosophically, is a differentiation of social and anti-social conduct. These are two definitions of one thing."

Aldo Leopold
of Wisconsin

Executive Summary:

Aldo Leopold, to many the greatest of American environmental philosophers, has given us in his famous essay, "The Land Ethic", a guide to sustainable agriculture. Wendell Berry and his contemporaries have given us an agrarian system of values and practice which serves as a modern day context for Leopoldian thought. True sustainable agriculture is the result.

Land grant universities, with their considerable research, teaching and extension infrastructure, can be an effective conduit for bringing this theory and this practice to the public. Some land grant universities, including those at Wisconsin, Iowa, Maine and Vermont, among others, are doing so, often with the help of citizens' organizations and the inspiration of citizen farmers.

This book presents the theory, the teachings, of Aldo Leopold and the values and practice context of agrarian thought. It further analyzes the programmatic efforts of four selected land grant universities, with a practical eye toward the application of these lessons.

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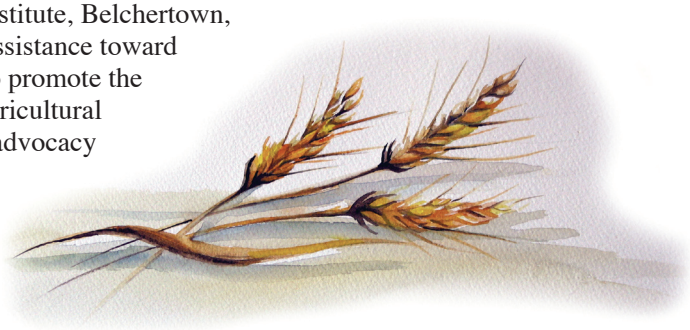
I am especially grateful to the New Hampshire Agricultural Experiment Station and its Director, Dean William Trumble, for necessary financial support and moral encouragement in support of this study. I'm grateful to the University of New Hampshire Master of Liberal Studies (MALS) Program, and its Director, Prof. David Andrew, for supplemental assistance. I am also indebted for printing assistance to Dr. John Aber, UNH Vice President for Research and Public Service; Director Burt Feintuch of the UNH Center for the Humanities; the Farrington Fund of the UNH Department of Natural Resources; and to UNH Printing Services. And I'm indebted to my colleagues in the University of New Hampshire Department of Natural Resources and its Chair, Dr. Bill McDowell, for providing a wonderful climate of support in which to conduct this work.

I am particularly indebted, first and foremost, to Professor Emeritus of Soil Science and former New Hampshire State Soil Scientist Sid Pilgrim for review of this work and for encouragement, to UNH Cooperative Extension's Peg Boyles for her enthusiasm and valuable editorial assistance, to New Hampshire artist Karen Busch Holman whose earlier fine work for UNH Cooperative Extension led to her collaboration on this project, and to Vern Grubinger of Vermont, Rick Kersbergen of Maine, Fred Kirschenmann of Iowa, Steve Stevenson of Wisconsin, and to all the other heroes and heroines among the land grant university faculties and Cooperative Extension Agents and Educators who daily carry on the work which makes this study possible and, indeed, so very necessary.

Special thanks to The New England Small Farm Institute, Belchertown, MA, for their interest in this project and for their assistance toward printing this book. NESFI was founded in 1978 "to promote the increased and sustainable use of New England's agricultural resources, and to provide educational support and advocacy for our region's small farms."

Finally, I am grateful to my wife, Diana, for close support throughout this effort, for being a frequent sounding board for ideas, and for reviewing and improving the final product.



"Conservation means harmony between men and land. When land does well for its owner, and the owner does well by his land; when both end up better by reason of their partnership, we have conservation. When one or the other grows poorer, we do not."

Aldo Leopold, "The Farmer as a Conservationist", 1939

"Dairy farming was what permitted very industrious people to earn a living on poor land, it's fundamental to our culture …".

Garrison Keillor

of Minnesota

Chapter One: Revolt Against the Merely Economic

"If I had the money, I'd …".

How often in life do we think this thought? I was recently encouraged to purchase a lake-front building lot on a lake in central Maine, land which today carries a high price tag, and to spend further money to build a lake-front camp or house on the site. As I do not practice a lifestyle which allows for such expenditure (and, after all, money is for the purchase of freedom, not luxury), it was a non-issue. But my friend who made the suggestion to me, who is himself building a lake-side house on an adjacent lot, has hired a builder who will use the money earned from this construction job to buy substantial farm acreage a few miles away, abandoned potato land, now so available in the region as conventional commodity agriculture continues its decline.

I immediately realized that, "If I had the money", that's exactly what I would do. And, like so many of us, not being a farmer myself, I would lease the land, in return for food, not money. I would lease it to a farmer, or, better, multiple farmers, who would pay me in food, not cash. My return would be a highly nutritious, ecologically generated, diverse food supply, organic or nearly so. It would include grass-based meat and dairy products. And my return would also be the satisfaction of providing opportunity to those farmers and so thereby benefiting the community with life's basic necessity, good food.

If I had the money…

This book is about finding a way to securing that goal of local food, ecologically and sustainably produced, for local people, wherever that may be. And it is about practicing farming which gives back to the land rather than taking from it.

It is not meant for all of us to farm. But it is meant for all of us to eat. And we all have a right to nutritious food to keep us "healthy, wealthy and wise". To the greatest extent possible, this means local food.

This book is the story of Aldo Leopold's land ethic, sustainable agriculture, and the land grant universities.

This book is about the wisdom of local farming and of all of us having access to local farms, to local farmers, to locally produced, and, therefore, to fresh and nutritious local vegetables, fruit, meat and dairy. The book begins with the wisdom of America's greatest land ethicist, Aldo Leopold. And it employs the strong set of agrarian values emanating from Leopold, from Wendell Berry, and from others, to fashion a foundation upon which to base practical local farming and local food systems. Finally, and significantly, this book draws upon the infrastructure and enormous potential of our established public land grant universities to demonstrate what can be done to help insure full stomachs, good nutrition and land health long into the future. And it demonstrates what is currently being done by a number of such institutions to point the way.

The book is also about land and open space protection, quality of life, continuation of at least some of the New England region's farm heritage, economic efficiency, and social values. It is also about a nutritious, high quality, locally accessible and secure food supply for the people of New England. This is not to suggest that New England could feed itself solely from its own larder. That, indeed, is not the case. But New England could significantly increase its local food production for its own people, thus achieving a higher level of independence from outside inputs, including independence from foreign oil and independence from environmentally destructive fossil fuels in general. This speaks to internal economic and social security, as well as a healthier economy.

My interest in and involvement with ecological agriculture, with sustainable agriculture, and with the food marketing and distribution systems which make such agriculture possible, starts with a very self-serving assertion, a fact of life for me: I like to eat. In fact, I'm probably among those who live to eat, rather than the reverse. Put simply, I like good food. And while part of good eating stems from good cooking, good food preparation, it all ultimately starts, and must start, with good food. And I believe that to fail to take pleasure from the food we eat is to violate the first rule of eating.

Good food must start with good soil, well cared for. And it has to start with good husbandry, of plants, of animals, of land. Thus, good food must start with a good land ethic.

Additional rationale for my involvement with such agriculture and food production is open space protection. It is protection of good well-stewarded agricultural land, fields and pastures. It is protection of healthy land. So many Americans are rightfully saddened by the loss of this land, of this open space, to commercial and residential use, to roads and highways, and yet so few see the connection between keeping farmers on the land and the protection and preservation of that open space which is so vital to our own human health, to the health of body, mind and spirit. Social efforts to protect open space for less than utilitarian purposes will never be sufficient, will never be more than token in its results. One of our most basic and predominant human activities is to eat. If the supply of that food cannot come from the lands around us, land which we see and feel much of the time, then such land can never be kept available for the feeding of future generations. So health, in body, mind and spirit, is what it's all about. Environmental pollution from fossil fuel uses and other sources in our modern economy, climate change, the geopolitics of foreign oil all contribute to a rationale in support of local food for local people but, if we don't have health in all three forms, body, mind and spirit, what does the rest matter?

Finally, as agricultural researchers begin to come to terms with the falsehood of the dominant scientific and agricultural paradigm, they've got to have a body of knowledge that they can turn to. And that body of knowledge is, according to agricultural scientist and agrarian thinker Wes Jackson, the body of knowledge given to us by the legacy of Darwin and Leopold, or, as Jackson puts it, the legend of almighty science vs. nature.

Aldo Leopold

Aldo Leopold got it.[1] Leopold, born a century and a quarter ago and gone over half a century, is, in the minds of many, the greatest of American environmental philosophers. And, importantly, Leopold had the talent and skill to convey to us what he had, what he knew, in ways that are truly accessible. Prescient in so many areas, Leopold connected all the dots. Leopold was the one who understood that the fusion of the line of thought between natural and social science is the great contribution of the 20th century. He was the one who found ecology to be the fusion point of all the natural sciences and, as well, the foundational science for all natural resource disciplines. He was the one who understood the existence of moral aspects to such conservation challenges as soil erosion. He was among the earliest to alert us to the problem of industrial agriculture and the path to the accumulation of singular power which it represents. And he was nearly alone in communicating these ideas effectively to the broader society. And, in having both a wilderness area and a sustainable agriculture institute named after him, Leopold himself became the fusion. He connects the dots for all of us.

What Leopold gave us was a gospel, the gospel of the land ethic. He was a deeply secular and, at the same time, a deeply spiritual thinker, par excellence. He was also a scientist, a meticulous researcher, a keen observer, the consummate professional; in fact, his work sets a standard for keen observation. Accomplished in ecology, in forestry, in wildlife biology and management, in scholarship broadly speaking, and, not the least, in hands-on ecological farming, Leopold has been granted a level of respect, among scientists and land managers, among academics and bureaucrats, among the public at large, achievable among few peers.

For Leopold, reality is thoroughly temporal, historical, changing, becoming, evolving, building and transfiguring itself over time. This earth is our primary worldly and natural evolutionary ecological and geological, if not cultural, home. The humanly spirited Leopold grows out of and beyond his scientifically inferred ethic. Thus, in the words of philosopher Strachan Donnelly, he has given us a realistic moral purchase for critically questioning our economic and technological progress, enterprise and ongoing aspirations.

My own path to Leopold has developed from the secular (through the thought of E. F. Schumacher, Wendell Berry, and many other "agrarian thinkers", and through a long career in the scholarship of environmental conservation and ecological ethics). And it has developed through the spiritual (through my research, teaching and writing in ecological and spiritual values, in ecology and religion, the latter of which alerts and sensitizes me to a new gospel when I encounter it). Leopold's land ethic is just that, and is substantially more accessible to the multitudes than is the work of many others.

Agrarian vs. Industrial Thinking

Following Leopold's path into agriculture and applying his land ethic to the production of healthy food involves the need to understand agrarianism. Agrarianism, the agrarian way, is far more a practice than an idea, and is best defined experientially rather than intellectually. It, too, is a kind of gospel, and can be best understood, as is the case with the Christian gospels, their parables and stories, through real world experiences, through stories, as are conveyed in these chapters. Agrarianism, among other things, supports the notion that food is sacred. With our fork we make moral choices, choices which have moral consequence for people and the planet. Such choices are unavoidable.

Opposed to the agrarian idea, or agrarianism, is industrial agriculture (sometimes called commodity agriculture). "Industrial" in this sense is well named, for it takes its character from the industrial or factory model of modern times. It applies the human organizational or engineering process of a factory producing manufactured goods to the farm and ignores, more or less, the biological nature of the farm and its food production process. Ignoring nature comes with cost, a cost which is becoming more evident. Lengthy books have been written in recent decades detailing these increasingly obvious costs which we all must pay, signifying food is much more expensive than it seems at first blush, and likely a good deal less nutritious as well. To paraphrase Dana and Laura Jackson in their new book, *The Farm as Natural Habitat: Reconnecting Food Systems With Ecosystems*, the agrarian model operates as if nature matters, the industrial model operates as if nature does not matter.

Sustainable Agriculture

The Leopoldian path also requires an engagement with something called "sustainable agriculture". Such a phrase may have many interpretations but the first thing that comes to my mind is that it necessarily allows for something which might be called "unsustainable agriculture". If sustainable agriculture is viewed as a special category of agriculture (which, in fact, it is) then the more common garden variety of agriculture must be unsustainable, which indeed it is. By its very definition, fossil fuel-based chemical agriculture is unsustainable in that it lives off the principal, not the interest, of the planet's natural resource base and ecosystem. Working against nature rather

than with nature, such agriculture rejects the valuable services (nowadays called natural capital) which nature has to offer. And with its foundation in non-renewable natural resources, its fate as unsustainable is sealed.

But what, then, is "sustainable agriculture"? Aside from being a form of agriculture which works with nature, which is guided by ecological principle, and which makes use of natural capital, of nature's services, one can choose from among a number of different definitions. I particularly like Ron Jager's definition from his book, *The Fate of Family Farming*. Jager writes that sustainable agriculture is "… a socially responsible and economically viable agriculture so designed and implemented that it can be continued indefinitely, without exhausting its resources, corrupting its environment, or impoverishing its practitioners".[2] The requisite word here is "indefinitely". Chemical agriculture, industrial agriculture, which Leopold would have called "exploitation agriculture", cannot make such a claim. Sustainable agriculture is agriculture which is not mining, is not extractive, not degradational, as is the industrial model. Jager continues "The energizing impulse of agricultural sustainability is direct and powerful, namely, that a pattern of agriculture that is not sustainable is pernicious, injurious to ourselves, and a form of thievery from our descendants, who will be saddled with our failures".[3] He concludes from this that "… (O)nce the idea of sustainability is fully appreciated, it becomes a moral imperative".[4] Food, and its production, truly are sacred. Sacred also must be the partnership between people and the land, where both end up better for it, for Leopold's state of harmony to be achieved.

Increasingly, Americans believe that we are here dealing with a moral imperative. Thus, Leopold's notion that moral consciousness evolves over time appears to hold true.

Organic Agriculture

Many people have found the word "organic" to be a source of confusion. Variously defined for a few decades by state-wide and regional organic certifiers, some public, some private non-profit, by a few international certifiers and, more recently, by the U.S. Department of Agriculture, the word has meant somewhat different things to different people. It probably has attracted more attention than it deserves. The term is here used more loosely, especially when not preceded by the adjective "certified", to refer to farming practice largely without chemical inputs, in fertilizers and in crop treatment, and without growth hormones and antibiotics in animals. (When "organic" is preceded by the word "certified" then the current definition of the certifying entity, nowadays the USDA, holds.) Organic agriculture is largely, though not totally, the farming practice dominant and nearly exclusive around the world for 4000 years, prior to the second half of the 20th century, in combination with many new organically acceptable (and largely small-scale) technologies designed for improvement and enhanced efficiency. Important, however, in the philosophy of organic agriculture, technology plays a subsidiary and never a dominant role over practice. Additionally, "organic" farming practice has come to mean local food for local people, a characteristic not at all present in the USDA definition, a definition which allows for energy-consumptive long-distance transport of food.

Crisis in the Heartland

All of this attention to agrarian, sustainable, ecological and organic agriculture in the American psyche and national discourse could not have come about if it hadn't been for the fact that the post-WWII energy-intensive and chemically intensive agriculture has run-aground on the shoals of what Leopold, were he alive today, would likely call its own "too much". Depletion and contamination of soil and water, ever increasing need for more and costlier inputs, ever-declining prices at the farmgate, indebtedness piled high, all led, by the early 1980s, to a farm crisis. This crisis was so severe as to be marked by farm foreclosures, evictions from land farmed by the same family for sometimes four generations, psychological depression of farmers and even farmer violence and suicide in the Heartland. The crisis persisted through the decade of the 1980s, experienced some

respite in the 1990s, and has significantly returned today with new bankruptcy, farm business and infrastructural collapse, and the disappearance of even more farmers. Economic crisis on the land has formed a backdrop for other national concerns over food contamination, loss of nutritional value of food, widespread obesity and other factors now favoring the alternative (yet, in many ways, truly traditional) farming practice and niche agriculture described in this book.

Land Grant Universities

Land grant universities are the public universities initially established through President Lincoln's signature on the Land Grant Act of 1862 and subsequent broadening legislation. They are fundamentally institutions for the study of agriculture and the "mechanic arts" (i.e., engineering), are located in each state and some territories, and are designed to be both available to and to directly serve the people of their state. Each land grant university has a three part mission to teach (i.e., degree programs and majors, undergraduate and postgraduate); to perform research designed to resolve problems and create opportunities in their state; and to conduct a program of assistance, termed Extension, to farmers and consumers, the landed and the landless, at the state and at the individual county level.

Any serious call to achieve social values change, and certainly the social values change which is sustainability, requires both a theory, a set of principles, and a method to apply and practice those principles. The theory, the set of principles given to us by Wisconsin's Aldo Leopold, revered and eminent American thinker, as augmented today by Kentucky's Wendell Berry and others, serves as a highly appropriate guide. And the land grant institutions, pragmatic, public institutions which derive from the essence of the American being, are proper institutions in which to seek praxis, both methodology and practice. Hence, the linkage of agricultural sustainability, Aldo Leopold, and the land grants.

> ***Garrison Keillor has written, with respect to the land grants, "American universities have seen plenty of radicals and revolutionaries come and go over the years, and all of them put together were not nearly so revolutionary as a land grant university itself on an ordinary weekday."*** [5]

A theory as radical as sustainability is appropriately linked to an institution as radical as a public land grant university, radical when functioning at its best and in the way it was designed to function.

The land grant agricultural and food sustainability programs described in this volume fit that design.

The Plan

Chapter Two focuses on Aldo Leopold and his famous "land ethic", the core value and philosophy which marks this manuscript. Perhaps America's greatest environmental philosopher, supremely accessible to all who work in natural resources and small-scale farming, and author of the clearest statement of ecological ethics extant in the American society and culture, Leopold epitomizes the holism, the whole farm holistic thinking, which is the core of this book. Though Leopold is better known in wildlife biology, in forestry, and perhaps in wilderness subjects, this chapter illustrates the critical role of Leopold in hands-on small farming practice which he championed so strongly in the last two decades of his life.

Chapter Three sheds light on agrarianism, the body of values contingent with ecological principle, which describes the value system held by all of the people described in this volume. To understand

agrarianism in the way Leopold used it and in the way that modern day proponents such as Wendell Berry understand it is to understand the governing values, to greater or lesser extent, of the farmers, researchers, extension agents and teachers described herein.

To understand agrarianism is to begin to understand the core of Chapters Four, Five, Six and Seven. These chapters focus on four selected land grant university sustainable agriculture programs, which, in turn, may serve as models for others. Each of these selected institutions has an approximately fifteen year history of formal, institutional work in sustainable agriculture reflecting the teaching, research and extension mission of a land grant university.

Chapter Four focuses on the work of the University of Wisconsin, and particularly its Center for Integrated Agricultural Systems (CIAS). This university was the professional home and base of Aldo Leopold for nearly a quarter century. The University Arboretum was one of his first important ecological restoration projects. Nearby is the farm on which Leopold developed much of his insight on ecological agriculture and land restoration in support of his land ethic and many other writings.

Chapter Five focuses on Iowa State University, and specifically on the only agricultural institution in the world named after Leopold, the Leopold Center for Sustainable Agriculture. Iowa is Leopold's native state and, as well, the state where a whole system of sustainable agricultural philosophy is being put into practice through the Leopold Center.

Chapter Six focuses on the University of Maine, home of one of the nation's first undergraduate degree programs in sustainable agriculture. The people of Maine are putting into place a large and varied number of practices which reflect Leopoldian philosophies of farming and the land.

Chapter Seven focuses on the University of Vermont and its Center for Sustainable Agriculture, among other programs. Vermont, too, is ripe for ecological farming and for the application and adaptation of Leopoldian principles. Likewise, Vermont is a rich locale for witnessing ecological principles in action.

Chapter Eight, the concluding chapter, focuses on connecting the dots, namely linking the specific elements of Leopold's land ethic to the practices taught and performed at these four land grant universities. This chapter asks the question, Can Leopold and his land ethic be used as a base, a guide, for the transition of our nation's public land grant universities through an agricultural renaissance toward a more ecological and environmentally friendly, not to mention farmer friendly and consumer friendly, system of food production and marketing? And can these selected universities serve as a model to help show the way forward?

Since Leopold's time, mainstream American agriculture, as a rule, has moved farther and farther away from Leopoldian and, indeed, of any form of ecological thought. And the gap between agriculture and natural resource conservation, a cultural gap of sorts, has likewise widened, in renunciation, it seems, of Leopoldian thought. Late century efforts in sustainable agriculture, what Leopold might have called "permanent agriculture", the kind of agriculture which is central to this book, is the exception to this rule, and has much to teach us. If we can't learn from that, if we can't imagine alternatives to the status quo, we can't make them happen.

Aldo Leopold's land ethic and philosophy represents, by his admission, a revolt against the merely economic. Agrarian values similarly represent a revolt against the merely economic. And the land

grant university programs described in later chapters represent, in pragmatic terms, a revolt against the merely economic.

Meeting Aldo Leopold, his land ethic and his alternatives is the start of the story and the first order of business.

ENDNOTES:

1. Aldo Leopold was not the first land grant university professor of agriculture to call for an ethical approach to the land, particularly farm land and farming. Liberty Hyde Bailey of New York's Cornell University (where he served as Professor and Dean of the College of Agriculture) preceded Leopold in that task by a generation or more. Bailey's book, *The Holy Earth*, published in 1915, is his classic statement on this subject. It was read by Leopold and perhaps influenced him. Although Bailey's was an important voice in New York and influential at Cornell and in a few other land grants, his was not an accessible voice to people of today, because of his earlier time frame and his greater accommodation to a religious approach in his writing. Bailey makes an important argument of the need for respect, and even reverence, for the land and the moral consequence of not doing so. But it was Leopold, coming from a more modern and more secular perspective, who gave broad access to this kind of thinking. Leopold thus was, is (and, I would add, could be) a more successful agent of change. Ongoing work by Scott Peters of Cornell may, however, increase the utility value of Liberty Hyde Bailey in the 21st century. Similarly, Wendell Berry of Kentucky, working a generation after Leopold, is doing work along the lines of sustainability which is philosophically valuable to the land grants. But Berry, like Jim Hightower of Texas, starts as a harsh critic, not a celebrant, of land grants, a critic of what he sees as their scientific and social corruption. The product of Berry and Hightower's work, and, as well, Bailey's, will likely be seen in land grant university reform along the lines of the direction described in this book.
2. Ronald Jager, *The Fate of Family Farming: Variations on an American Idea* (Hanover, N.H.: University Press of New England, 2004), p. 231.
3. ibid., p. 232.
4. ibid.
5. Garrison Keillor, *Homegrown Democrat: A Few Plain Thoughts from the Heart of America* (New York: Viking, 2004), p. 94.

"The Job Description of Agrarianism: … (T)o function in such a way that it honors and maintains the earth, sustains and perpetuates the community, shelters and benefits the citizens thereof, and respects the commonwealth for what it is: the common wealth."

Maury Telleen
of Iowa

Chapter Two: Aldo Leopold, the Land Ethic and Leopoldian Thought

"On Saturday night not long ago, two middle-aged farmers set the alarm clock for a dark hour of what proved to be a snowy, blowy Sunday. Milking over, they jumped into a pick-up and sped for the sand counties of central Wisconsin, a region productive of tax deeds, tamaracks and wild hay. In the evening they returned with a truck full of young tamarack trees and a heart full of high adventure. The last tree was planted in the home marsh by lantern-light. There was still the milking.

In Wisconsin 'man bites dog' is stale news compared with 'farmer plants tamarack'. Our farmers have been grubbing, burning, draining, and chopping tamarack since 1840. In the region where these farmers live the tree is exterminated. Why then should they want to replace it? Because after twenty years they hope to reintroduce sp(h)agnum moss under the grove, and then lady's-slippers, pitcher plants, and the other nearly extinct wildflowers of the aboriginal Wisconsin bogs.

No extension bureau had offered these farmers any prize for this utterly quixotic undertaking. Certainly no hope of gain motivated it. How then can one interpret its meaning? I call it Revolt – revolt against the tedium of the merely economic attitude toward land. We assume that because we had to subjugate the land to live on it, the best farm is therefore the one most completely tamed. These two farmers have learned from experience that the wholly tamed farm offers not only a slender livelihood but a constricted life. They have caught the idea that there is pleasure to be had in raising wild crops as well as tame ones. They propose to devote a little spot of marsh to growing native wildflowers. Perhaps they wish for their land what we all wish for our children – not only a chance to make a living but also a chance to express and develop a rich and varied assortment of inherent capabilities, both wild and tame. What better expresses land than the plants that originally grew on it?"

Aldo Leopold [1]

Many regard Aldo Leopold as the single most important philosopher of ecology in the 20th century. He has won wide recognition as the preeminent American voice for conservation philosophy and ecological ethics on the American landscape. And he was the consummate professional, adding significantly to his high credibility. Indeed, it's commonly said among great gatherings of ecologists and ecological philosophers that never has so much talent in these fields been found together in one place since Aldo Leopold sat alone on his bench outside the Shack before breakfast! There is so much philosophical analysis and biography written about Leopold that it would be difficult for me to make an original contribution in that area. Thus, I have turned to the effect of his work, the application of his theory.

On one level, readers might sense that this revered and acclaimed founding father of the "land ethic" in America has had little or no influence at all. Since his time and at present the powers that be have engaged in action directly counter to his philosophy. As one observes the contemporary circumstance of the American land and natural systems, the American ecosystem, as well as the attitudes in practice toward that system, one might conclude that Leopold and his land ethic have provided very little inspiration indeed. The forces of greed, consumption, unrestrained capitalism and ecological ignorance would seem to have carried the day in square opposition to the land ethic.

And yet Leopold himself, Leopold the realist, told us that the question of where to compromise is one that has no easy answer and is a question for which there is no comfort.

I am tempted to draw an analogy with the highly acclaimed and well regarded British economist and economic philosopher E. F. Schumacher, author of *Small is Beautiful*, whose work appears well respected but whose mark is still not visible. Schumacher's mark is nearly thirty years old, Leopold's a bit over fifty. Perhaps insufficient time has passed. Or perhaps, more simply, the forces which run counter to Schumacher's ecological – economic ethic or Leopold's land ethic still remain too powerful, in practice if not in theory, and are too compelling to abandon.

A Beautiful Mind: Perspective on the Thought of Aldo Leopold

Eric Freyfogle writes "Writing late in his life, Aldo Leopold bemoaned the reality that the average modern of his day (the 1940s) had 'lost his rootage in the land'. The 'shallow-minded modern', he penned, 'assumes that he has already discovered what is important; it is such who prate of empires, political or economic, that will last a thousand years. It is only the scholar who appreciates that all history consists of successive excursions from a single starting point, to which man returns again and again to organize yet another search for a durable scale of values.'" [2]

Studying the work of American environmental philosopher J. Baird Callicott can provide a strong entre into the mind of Aldo Leopold. Callicott has focused on Leopold and Leopoldian thought for years and has taken particular interest in the Leopoldian land ethic and the many approaches to its analysis and understanding. His numerous essays on the topic have been gathered together in two books published by the State University of New York Press: *In Defense of the Land Ethic,*

Tamarack (Larix laricina)

The Tamarack (or Eastern Larch, known in New England as Hackmatack) is the only conifer that loses its needles in the Fall. The Tamarack has soft needles that grow in bunches. It has strong wood that is used to make poles, railroad ties, and fence posts. (The Yellow-pored Bolete Mushroom can only grow on the Tamarack.) The Tamarack is usually found in wet, cool climates, on most soil types.

and *Beyond the Land Ethic*. The former establishes Leopold's place among a variety of leading environmental philosophers and views Leopold as a leader in environmental education and land aesthetics. The latter is infused with Leopoldian conservation ethics and a focus on ecosystem health.

For biography as a route to comprehending Leopold's land ethic, a reader may turn for intellectual biography to the work of Susan Flader (*Thinking Like a Mountain: Aldo Leopold and the Evolution of an Ecological Attitude Toward Deer, Wolves and Forests*, The University of Wisconsin Press, 1974), and to Curt Meine for the story of Leopold's life experience (*Aldo Leopold: His Life and Work*, The University of Wisconsin Press, 1988). (Other important biographical work on Leopold appears in Marybeth Lorbiecki's *Aldo Leopold: A Fierce Green Fire*; Knight and Riedel's *Aldo Leopold and the Ecological Conscience*; Flader and Callicott's *The River of the Mother of God*; Meine and Knight's *The Essential Aldo Leopold;* McCabe's *Aldo Leopold: The Professor*, among many others – see Appendices.)

Scholars commonly see Aldo Leopold in many different lights: field biologist, wildlife biologist, acknowledged "father of game management", ecologist, public servant, architect of important public policies, and philosopher, whose ideas, theories and positions evolved continuously over his lifetime. His career as a field biologist and ecologist is perhaps best summarized in the appellation, "Father of Game Management". As author of what is still the basic and definitive text in the field of wildlife biology, *Game Management*; as himself a wildlife biologist par excellence; as a forester; as a student of, manager of and architect of wilderness and wilderness policy; as a U.S. Forest Service administrator; as a student of the National Forests, the National Wildlife Refuges, of nationally-designated wilderness, of state fish and game policy and management, and of serious ecological restoration, we have the biological Leopold. That "biological Leopold" runs through his entire life, clearly dominating his earlier years.

The "philosophical Leopold" emerges through his many essays, papers and books, including what many claim to be the seminal and single most important paper in environmental or ecological philosophy, "The Land Ethic", which appears as a chapter in *The Sand County Almanac and Sketches Here and There*. Leopold even gave us, in his essay, "Conservation Aesthetic", a description of citizenship. Working the land thoughtfully is the highest form of citizenship, he said, and obligations of citizenship involve being an active participant in the land community. Collectively, Leopold's writings stand as perhaps the clearest and most powerful evocations of ecological philosophy yet produced, making Leopold a towering figure in this work.

Aldo Leopold's life was committed to the public domain. Following university he joined the U.S. Forest Service, seeing extensive service in the National Forests of New Mexico and Arizona and in the USFS National Forest Products Laboratory in Madison, Wisconsin. In his later years his association was with the natural resources and agriculture programs of the land grant University of Wisconsin, with considerable additional service to the state of Wisconsin, work he pursued to the time of his death. To find signs of the Leopold legacy, and specifically the legacy of his land ethic, it seems appropriate to look in the public sector and in the land grant universities. That is where the effort of this work is concentrated.

The geographical environments and natural ecosystems which influenced Aldo Leopold's view of nature and reality begin with the farmlands and river bottoms and prairie-woodland edge of eastern Iowa where Leopold spent his childhood. His family had the means and he had the academic discipline to pursue a rigorous classical education, after which he spent his early professional life in the mountain forests and deserts of the American Southwest (and a bit of Mexico). His later professional life, which included a study visit to the forests of eastern Germany (now Poland), was dominated by his work in the Upper Great Lakes forest region of northern Wisconsin and work at the prairie – woodland edge in central and southern Wisconsin. His creation of the land ethic was carried out at "The Shack" in the sand counties of south-central Wisconsin. At this place, home of *The Sand County Almanac*, he gave us a metaphor for 2nd home development, for simplicity, and for rootedness in the land.

Other than his academic experiences at Yale, Leopold had no New England experience and rarely mentioned New England or the Northeast in his extensive writings. And yet it is possible that one might find the influence of a Leopoldian land ethic on the ground in New England today, according to one's degree of openness to the conjunction of what we usually perceive as disparate forces: the grounded common folk heritage of people on the land for many generations in New England, and the ecological ethic of some of the recent arrivals to New England over the past three or four decades.

I contend that both of these populations and their very different patterns of thought – one group less formally educated, but deeply and physically attached to the land, the other more highly-schooled and intellectually attached to the land - have contributed to the evolution of a Leopoldian land ethic over broad parts of New England.

This ethic is agrarian in nature and in origin. It is skeptical of and even rejects and resists the more common industrial model of thought which dominates our society. This agrarian land ethic has just begun to see its reflection in the public sector within the land grant universities, perhaps most clearly in Maine and Vermont. Both states still have significant acreage of undeveloped open land which lends itself to natural resource management and agricultural cultivation, thus providing clear opportunity for the application of Leopoldian ideas.

I suggest beginning such a study of the congruence of Leopoldian thought with on-the-ground experience in New England by selecting from the considerable volume of books which have been written about humanity and the New England land. Readers will find especially useful those works comparing pre-Columbian and post-Colombian land use patterns and those which address New England folk culture on the land, with particular reference to use of the natural resource base for economic survival.

Thus, William Cronon's *Changes on the Land: Indians, Colonists and the Ecology of New England* (New York: Hill and Wang, 1983) and Carolyn Merchant's *Ecological Revolutions: Nature, Gender and Science in New England* (Chapel Hill: University of North Carolina Press, 1989) are especially valuable, as is the remarkable treatise *Common Lands, Common People: The Origins of Conservation in Northern New England* by Richard Judd (Cambridge: Harvard University Press, 1997) which focuses attention on land and sea-based common folk and their development of a sustainability ethic, a rule of life grounded in ecological principle. (See Appendix for a more complete list.)

Ironically, we owe it to Rachel Carson, another great American ecological philosopher, and one more directly connected to New England, for resurrecting and amplifying the ideas and the voice of Aldo Leopold. By 1962, Carson's peak in popularity with *Silent Spring*, Leopold was dead fourteen years and had begun to disappear from public attention.

Although Carson did not explicitly promote Leopold, the great rejuvenation of environmental ethics stimulated by her work directed public attention to his subject of land ethics. This brought about the re-publication and much greater distribution of *A Sand County Almanac* and made that book the widely read classic it is today.

Leopoldian Land Ethics as a Philosophical Base

Aldo Leopold gave us this definition of an ethic:

> "An ethic, ecologically, is a limitation on freedom of action in the struggle for existence. An ethic, philosophically, is a differentiation of social and anti-social conduct. These are two definitions of one thing." [3]

Leopold also explained that a land ethic is not a luxury – it's not something that you can afford or not afford to do. It's something that helps you avoid getting into that predicament in the first place. A land ethic is, therefore, not a luxury but rather a solution.

Given Leopold's place among the most esteemed wildlife biologists of his day and his recognition as the father of game management in the United States, many might assume his extensive writings about farm wildlife, wildlife conservation and agriculture were aimed at the production of extra wildlife from farming activities. Indeed, this represents one popular perspective on his writings. However, a closer reading of Leopold reveals his intent to demonstrate the equality of the two goals and their necessary integration if either was to succeed.

Leopold believed that abundant, diverse wildlife and quality habitat would emerge as natural byproducts of good agriculture. The reverse also held, as one would necessarily breed the other. From such analysis Leopold emerges as a far more important figure in American agricultural philosophy than scholars generally recognize. Although a man of many interests and talents, he ranks with Wendell Berry in contemporary times as a prime figure in American agrarian thought. For that reason alone, his famous "land ethic" deserves close analysis.

The opening paragraphs of "The Land Ethic" acknowledge the idea of the changing nature of ethics over time, placing a particular emphasis on an expansion or extension of ethics to cover ever broader categories and circumstances. We've witnessed three thousand years of ethical extension, Leopold tells us, with shrinkage of ethical judgement being motivated by expediency. To paraphrase Leopold's seven divisions of the land ethic:

1. **The Ethical Sequence:**

   The extension of ethics is an ongoing process, with sequences. The process evolves over time. An ethic is a limitation on freedom of action, and a differentiation of social from anti-social conduct. The origin of both is the tendency of individuals or groups to evolve modes of cooperation (which Leopold calls "symbioses"), examples being found in politics and economics. On this evolutionary scale, first ethics involve relations between individuals. Later ethics involve relations between individuals and society. Leopold tells us there is still no ethic dealing with humans' relations with land or plants or animals; land relations are still strictly economic, granting privileges to people but carrying no obligations. Such extension of ethics to the land is possible evolutionarily, and necessary ecologically: it's the natural third step in the evolution. The first two steps have been achieved. Individuals have always been around who asserted the third level, but society has not yet done so. The present conservation movement is the start of that effort. Ethics may be a mode of guidance, a community instinct in the making, to meet newly emerging circumstances.

2. **The Community Concept:**

   All ethics are based on the premise that the individual is a member of a community of interdependent parts. Instincts prompt competition but ethics prompt cooperation (perhaps to insure that there'll be a place to compete for). The land ethic enlarges the boundaries of that community. A land ethic can't prevent alteration, management or use of natural resources, but it affirms their right to continued existence. A land ethic changes our role from conqueror of the land community to plain member and citizen of it. The conqueror role is self-defeating because it implies full knowledge of the system and we don't have that knowledge. We will become much more humble about who we are and where we fit in once the concept of land as a community penetrates our intellectual life.

3. **The Ecological Conscience:**

   Conservation is a state of harmony between men and land. Conservation proceeds at a snail's pace. Too much "letterhead piety" and "convention oratory" is present (implying a lack of will). Too much emphasis is placed on the volume of conservation education and not enough on the content. Content is superficial and too easy: no definition of right or wrong, no obligation, no sacrifice, no change in values. Education has not been the answer and land use ethics are still governed wholly by economic self-interest. No important change in ethics can be accomplished without an internal change in our intellectual emphasis, loyalties, affections and convictions. Philosophy and religion have not yet heard of it. "In our attempt to make conservation easy, we have made it trivial ", he tells us.

4. Substitutes for a Land Ethic:

Most members of the land community have no economic value – a problem. But we try to assign narrow economic value when we want to save something (thus reducing it). No economic value means "leave it to government". People will not do things on their own unless paid (subsidy). They won't accept ethical obligations, and no ethical obligation toward land is taught in public agencies, in colleges of agriculture, or in extension services. This system eventually eliminates many parts of the land community (nature) that lack commercial value but that are essential to its healthy functioning. There is a false assumption that the economic parts of the biotic clock (i.e., the functioning of the machine aspect of our existence) will function without the non-economic parts, and this false assumption relegates to government many functions which government can't perform. "An ethical obligation on the part of the private owner is the only visible remedy for these situations ", he writes.

5. The Land Pyramid:

We need a mental image of land as alive, as a biotic organism/mechanism, because we can only be ethical to something we can see, feel, understand, love or have faith in. The balance of nature concept is not sufficient for this: the "biotic pyramid" does a better job. With the pyramid, evolution has added layer after layer, link after link. The trend of evolution is to elaborate and diversify the biota. Land is a fountain of energy flowing through a circuit of soils, plants and animals. Food chains are the living channels which conduct energy upward; death and decay return it to the soil. When a change occurs in one part of the circuit, many other parts must adjust themselves to it. Evolution elaborates the flow mechanism and lengthens the circuit, but humans are now making changes of unprecedented violence, rapidity and scope. Human altering of the pyramid releases stored energy which supports a deceptive exuberance of plant and animal life. These releases of biotic capital (i.e., fossil fuels) tend to hide or postpone the penalties of violence. In this section, Leopold presents three basic ideas:

Land is not merely soil.

Native plants and animals keep the energy circuit open.

Man-made changes are of a different order than evolutionary changes and have bigger effects than is intended or can be foreseen.

These ideas generate questions such as, Can the land adjust itself to the new order? Can the desired alterations be accomplished with less violence?

The less violent the man-made changes, the greater the probability of successful readjustment in the pyramid. The land's carrying capacity goes down with greater violence and with population density.

6. Land Health and the A-B Cleavage:

Leopold defines environmental health as the capacity of the land for self-renewal. Conservation is our effort to understand and preserve this capacity. With respect to attitudes and resultant actions, there are two categories of people:

Group A people, who see land as nothing more than soil and designed for commodity production.

Group B people, who appreciate land as biota (land here including the physiosphere, incorporating minerals and gasses, hydraulics and other physical forces), and who understand that it has a much broader function than just commodity production.

Forestry Group A people, who see trees as agronomic crops with cellulose as the basic commodity and have no inhibition against violence (destruction).

Forestry Group B people who see forestry as fundamentally different from agronomy, the natural environment more valuable than the artificial, who prefer natural reproduction. Type B's worry about loss of species and loss of other forest functions, such as providing wildlife habitat and

recreation, protecting water quality, wilderness. “Group B feels the stirrings of an ecological conscience ”, writes Leopold.

Wildlife Group A people appreciate wildlife for providing sport and meat; yardsticks of production are take-in/take-out (pheasants, fish, etc.)

Wildlife Group B people worry about many biotic side issues: predators, exotics, shrinking species, wildflowers.

Agriculture: poundage or tonnage is no measure of the food value of farm crops; the products of fertile soil may be qualitatively as well as quantitatively superior; we can bolster poundage from depleted soils by pouring on imported fertility but we’re not necessarily bolstering food value. Organic farming is biotic in its direction, especially due to the place it assigns to soil flora and fauna. The ecological fundamentals of agriculture are as poorly known as in other fields of land use.

“(F)ew educated people realize that the marvelous advances in technique made during recent decades are improvements in the pump rather than the well. Acre for acre they have barely sufficed to offset the sinking level of fertility “, Leopold wrote[4].

In all these cleavages the same basic contradictions re-occur:

- man the conqueror vs. man the biotic citizen
- science the sharpener of his sword vs. science the searchlight on his universe
- land as slave and servant vs. land the collective organism.

7. The Outlook:

An ethical relationship to land cannot exist without love, respect and admiration for land, and, as well, a high regard for its value (value in the philosophical, not the economic sense). The most serious obstacle impeding the evolution of a land ethic is our educational and economic system which is headed away from, not toward, an intense consciousness of land.

Modern people are separated from land (nature) by many middlemen and by technology. Some farmers even view land as an adversary and taskmaster that enslaves. There is no lifestyle relationship between education and ecological understanding – in fact, much higher education deliberately avoids ecological concepts. True ecological training is scarce. (This was true in Leopold’s time, and is true today, in spite of the fact that the word “ecology” and the idea behind it are much more with us today than in his day).

It only requires a small minority of people to rebel to save the land ethic. We must quit thinking about (decent) land use as solely an economic problem and start to think in ethical and aesthetic terms, not just in terms of economic expediency. As Leopold so famously wrote, “A thing is right when it tends to preserve the integrity, stability and beauty of the biotic community. It is wrong when it tends otherwise.”

Economics will always play a role. The fallacy is the belief that economics determines all land use. Land users’ tastes and predilections (preferences) and values all play a role.

A land ethic is never “written” – it is a product of social evolution and is always evolving. The evolution of a land ethic is both an intellectual and an emotional process. As the ethical frontier advances from the individual to the community, its intellectual content increases. The mechanism of operation involves social approval for right actions and social disapproval for wrong actions. Our present problem is one of attitudes and implements (i.e., values and technology: we need better values/attitudes and gentler technique).

Overall, Leopold has given us two important ecological insights: we need to develop the point of view of the life support system; and we need to maximize our sense of organic interrelatedness so that we can know and feel our rootedness in the land.

HOW THE LAND ETHIC CONNECTS IMPLICITLY TO SUSTAINABLE AGRICULTURE AT THE LAND GRANTS:

Leopold wrote of the evolution of ethics over time. In that context we recognize that the industrial agriculture model was both a logical and an ethical direction in which to proceed in the decades immediately following WWII. But this has ceased being the logical or ethical way, given its high input costs, its negative externalities and other problems. We move on to a new era. Leopoldian land ethics represents an extension of ethics in an increasingly holistic and comprehensive direction, a direction which takes into consideration context. In this new direction, expediency is minimized and long-term concern is maximized, continuing a three thousand year trend. We move from anti-social to social conduct, for what once was social is now, in the light of what we know today, anti-social. We evolve new modes of cooperation.

Sustainable agriculture is an application of Leopoldian ethics to the land, to the ecosystem, to the whole. It emphasizes local conditions, a sense of place, context. It is inherently grounded in and geared to a place. This new land ethic of sustainable agriculture is likely a new form of guidance, a community instinct in the making, suited to meet newly emerging circumstances (of reducing fossil fuel and other energy and capital inputs, of curbing soil loss, of becoming more economically efficient, of reducing greenhouse gas emissions, of saving open space, of bringing more direct income to farmers to enable them to stay on the land). It also represents a greater awareness that we are a member of a community of interdependent parts, and that, therefore, cooperation trumps competition.

Sustainable agriculture represents an acknowledgement of membership in a community rather than as conqueror of community. Sustainable agriculture models are inherently non-hierarchical, non-command and control, non-domination-oriented, in comparison to chemical and industrial agriculture, and are de-centralized and much more citizen-oriented. Sustainable agriculture assumes humility about who we are, what we know, where we fit in. Leopold's notion of conservation and the recent articulation of sustainable agriculture are both represented by a state of harmony between people and land. It means working with nature, not against nature. Harmony, ecological harmony, is the result.

Leopold claimed that education has not been the answer. He was referring to the traditional mechanical – Cartesian – reductionistic approach to education. He couldn't perceive, nor did he witness in his time, the more holistic education characterized by the new ecologically-based sustainable agriculture programs. Leopold wrote "No important change in ethics was ever accomplished without an internal change in our intellectual emphasis, loyalties, affections and convictions. The proof that conservation has not yet touched these foundations of conduct lies in the fact that philosophy and religion have not yet heard of it." In these first years of the new century philosophy and religion are awakening to their own inherent place in agriculture, and with that comes a recognition of the change of values which is needed.

Sustainable agriculture elevates all things, all of our perspective of organisms, ideas, systems, practices, to a value higher than or other than economic, while not forgetting the role of economics and the need for economic survival. It tackles basic economic questions in two particular areas of emphasis: significantly reducing the cost of inputs and marketing products directly to local consumers, the latter markedly increasing the dollar return to farmers. And the "leave it to government" mentality has almost totally disappeared from this form of agriculture, partly because government hasn't been there to begin with, and partly from placing a high value on true economic and political independence.

Sustainable agriculture as we witness it in practice today refutes Leopold's notion that people will not do things on their own unless paid. I've observed that farmers who use sustainable practices will readily accept ethical obligations and have somewhat less interest in subsidies. Such a system places a high value on "natural capital" and the services derived from it. It does not relegate to government functions which government can't perform – in fact, it relegates little to government.

This agricultural system is being taught in both the agriculture colleges (at least some of them) and in the extension services (likewise, some).

We have Leopold's image of land as alive, thanks to the development of ecology, and thus we can see, feel, understand, love and have faith in it – and thereby develop an ethic toward it. Sustainable agriculture accepts and celebrates Leopold's notion of the biotic pyramid, the trend of evolution, the idea of land as a fountain of energy, food chains as channels. It practices a gentle touch while rejecting a violent touch. Sustainable agriculture principles are especially copiscetic with less violent man-made changes than are those of industrial agriculture.

Since sustainable agriculture is based fundamentally on health, ecosystem health and human health (body, mind, spirit), including the important role of nutrition, it is very directly related to Leopold's definition of health as the capacity of the land (nature) for self-renewal, with conservation being our effort to understand and preserve this capacity. This speaks directly to the crop and animal rotation values, crop and animal integration values, animal welfare values, pasture grazing values and biodiversity values of sustainable agriculture.

Today Leopold's Group A people are those who would endorse the large-scale chemically and energy-intensive industrial agriculture model. Leopold's Group B people would be those who endorse small-scale, low energy-input and organic sustainable agriculture.

Sustainable agriculture strongly endorses the idea that the material production of the farm is no measure of food value. In emphasizing natural fertility and the health of the soil and in rejecting imported fertility, it places a very high emphasis on soil flora and fauna in both Leopoldian thought and in sustainable agriculture programs. Soil becomes central and the starting point.

As for Leopold's cleavages: Sustainable agriculture definitely favors "man the biotic citizen" rather than man the conqueror; "science the searchlight on his universe" rather than sword sharpener, and "land the collective organism" rather than land the slave and servant.

Leopold's definition of an ethical relation to land as one not being able to exist without love, respect and admiration, and with a high non-commodity respect for land's value, is identical to the philosophy of the sustainable agriculture programs. And the holistic liberal arts and humanities approach to agriculture, unlike the reductionistic science approach, represents an educational thrust which is toward, not away from, an intense consciousness of land, with an embrace of, not a rejection of, ecological concept.

Leopold's complaint that modern people are separated from land and nature by both middlemen and technology is answered by the kind of "relationship agriculture" and direct marketing represented by sustainable agriculture, not to mention sustainable agriculture's attitude toward technology (i.e., its embrace of appropriate technology and rejection of large-scale technology). ("Appropriate technology", a term employed by the British economic philosopher E. F. Schumacher, is technology of a scale appropriate to the task at hand. Much modern technology is inappropriate, in that it represents overshoot or overkill and brings with it its too large size and many ecological and social costs.)

Leopold suggests that it requires only a small minority of people "in revolt", questioning the system, to bring about change, and sustainable agriculture contains that small minority of people.

Sustainable agriculture clearly " tends to preserve the integrity, stability and beauty of the biotic community", and thus is "right" in Leopold's famous phrase.

While sustainable agriculture clearly does not negate economics, it does not place it front and center either – it does not see market economics as determining land use and rejects such determinism, placing ecological and community values as a higher determinant. So did Leopold.

Any study of farmers engaged in sustainable agriculture makes it clear that they are not following any written rigid formula but are rather more place-specific, evolving dynamically with the land and circumstance, precisely as Leopold writes as being necessary in any such intellectual/emotional process.

Leopold's expression of need for better values and attitudes and gentler techniques is observable in sustainable agriculture practitioners.

With this introduction to Leopoldian thought, and before taking a close look at the practice of sustainable agriculture at four selected land grant universities, we must now turn to the basic nature of agrarian thought and values, and to the contrast of the agrarian system with the more familiar industrial system and its thought and values.

ENDNOTES:

1. As cited in "Aldo Leopold's Land Aesthetic and Agrarian Land Use Values" by J. Baird Callicott (in *Agriculture, Change and Human Values, Proceedings of a Multidisciplinary Conference*, October, 1982), pp. 481-482.
2. *The New Agrarianism: Land, Culture and the Community of Life*, *Ed*. By Eric T. Freyfogle (Washington, D.C.: Island Press, 2001), p. xli.
3. Aldo Leopold, *A Sand County Almanac and Sketches Here and There* (New York: Oxford University Press, 1949), p. 202.
4. ibid., p. 223.

"The fundamental difference between industrialism and agrarianism is this: Whereas industrialism is a way of thought based on monetary capital and technology, agrarianism is a way of thought based on land..."

Wendell Berry
of Kentucky

Chapter Three: Understanding Agrarianism

"Home is roots. Same as with a tree. A good pine has got used to his ledges and knows where to go to find the water with his taproot. A man has to take hold of his land hard and grow into it. And shape his body to it… Farming ain't just plowing or running a machine. It ain't just turnips or beans. It's opening the earth up to the sun. It's putting in the seeds by the handful. Feeling seeds with your hands. Putting the heat of your hands into your seeds. And it's seeing the green things come up like crooked baby fingers and then slendering out. Farming is hoeing and weeding by hand. And picking your beans and threshing them with a flail your father made and swung before you was born or thought of. When you was just the ground he was working in and fine corn coming up for him with its yeller hair in the wind. When you was the strength and life he was looking for in the earth. When you was back there, the other side of his body, in the wind and the rain. That's what farming is. I guess it's good as religion. It's a kind of religion, when you come right down to it. Religion…

"Farming is doing different things in different times and seasons. It ain't working just to get grub. It ain't earning wages. It ain't so many dollars a day and a roof over your head. It's being out in the seasons and following them the year around. Bedding down your stock when the snow is flying at night. Making friends with your cows. Smelling the hay when the air is full of frost. Tending a baby calf and teaching him to drink with your fingers in the gruel. Farming is smelling the new grass when it comes. It's planting and hoeing, and pitching hay till the sweat runs down your back. Seining up some smelts, maybe. Hustling to get things in ahead of the snow. Carrying the apples down cellar. Tasting cider made from your own apples. Cutting your own wood.

You can't do farming the right way just with a lot of big machines. You've got to get down in the dirt. You don't work by the day. You don't work by the piece. You may have to put in fourteen hours on a hayfield or stay up all night when a cow's calving. Work from sunup to sundown. Make your day long as a day of summer. A small farm is a real farm. Where a man does all kinds of things for himself. Things that go right with the seasons. With his hands and his hind legs. Things for himself.

Kennebec farming is the real kind. Our farms ain't big enough to get away from a man. They ain't big enough to make money on. You couldn't run a tractor on most of'em if you tried. You'd knock the stuffing out of it. But we do a good job of farming on them just the same. We keep busy. We have more work than you can shake a stick at. And we don't keep an eye on no clock. We work for ourselves. We are our own boss. We don't take no orders from nobody…

They say it's the old-fashioned way. Maybe. But your Uncle Dudley notices that things ain't so hunky-dory with all them things the big efficiency experts has been running for the past fifty years. The wholesale business in raising grub and making money's sort of broken down. Gone to pot. And all this modern machinery's done for you and me is make a pair of pants so shoddy we can't straddle in'em. Make paint that don't last two years. Tools that break when we put a strain on'em. Maybe a little

old-fashioned handiwork might be a good thing again. Things not made for the sake of money but for the sake of pride. Honesty. Maybe a lot of this machinery is what ails the world.

And here we have all the smart alphabet-soup men from Washington down here doing their damnedest to make us Kennebec folks over. Make us measure work by the day and dollars we earn. 'Eight hours work, eight hours play, eight hours sleep, and eight dollars a day!' Four o'clock, time to knock off! Leave the last forkful of hay right in the air! Let the other six loads stay out overnight. Or charge yourself double wages if you get it in. Ain't that the hell of an idea?

Them smart fellers will spoil you and me if they get a chance. They'll make eyeservants of us all. Work just when the boss has his eye on us. They'll teach our sons to work for five hours a day and five dollars. Not for the sake of feeling good because you're working. They'll tax our farms to make us pay the five dollars wages for the five-hour day. They'll make us pay the cost of ruining our children. And our sons will get city ideas and first chance they get, off they'll go to the city and stay there. Then where'll our farms be? Gone up the spout like so many of them round here. Lying idle. Full of hawkweed and hawks. Good pasture land taken back by the junipers. That ain't right. Something's wrong when small farms go under. Something's wrong with the U.S.A. Something damned rotten!" [1]

The above passage, published in 1937 and reflecting a way of thinking in the early 20th century (and likely for many years before that) may be discounted by some readers as nostalgic romanticism, as unreality. But embedded in this passage is a philosophy, an ethic which is inherently ecological. The passage yields insight into a way to think about, conceptualize and practice an ecological ethic. It is far more than an ode to times gone by. Its insight provides a way to consider the core nature of ecological and particularly agrarian values, and place those values not simply in the past but also in modern life.

David Orr in his essay, "The Urban - Agrarian Mind", writes, "The largest barrier to a new agrarianism … is the vast gap that separates sound agrarian culture from the daily lives most of us now live. Agrarianism simply doesn't compute with the experiences of people whose lives are shaped by malls, highways, television, and cyberspace"[2].

Those who hold to an agrarian philosophy, to the agrarian model, implicitly rely on and practice a land ethic, a construct of behavioral governance toward the land. By far the most prominent land ethic to emerge in the United States, and the one given the most attention, is the land ethic of Aldo Leopold, as described in the preceding chapter. Leopold's land ethic is a significant part of American agrarian philosophy.

The Leopoldian land ethic, and the application of that ethic as described in this book, namely, through sustainable agriculture endeavors of land grant universities, can thus be viewed as an example of an agrarian value system. It is both necessary and appropriate, therefore, to describe what is meant by "agrarian values" and "agrarianism". It is the purpose of this chapter to do just that.

Wendell Berry's Interpretation

One of the most direct ways to understand the meaning of agrarian values is to read and study the work of American ecological philosopher and literary writer Wendell Berry. Berry's writing career spans the late 1960s to the present. Through his poetry, short stories, novels, and, most particularly, his nonfiction essays, Berry has re-invented agrarianism for modern times.

In his 2002 essay, "The Whole Horse", Berry refers to agrarianism as not just an idea or set of ideas but rather "… a practice, a set of attitudes, a loyalty and a passion … "[3]. Berry finds that agrarianism must be practiced in order to exist, and

> ***"Agrarianism is a culture at the same time it is an economy. Industrialism is an economy before it is a culture."***
>
> ***Wendell Berry***

that "The agrarian mind … is not regional or national, let alone global, but local"[4]. Agrarianism stands in contrast to industrialism: "Agrarianism is a culture at the same time it is an economy. Industrialism is an economy before it is a culture"[5]. Berry posits that "One of the primary results – and one of the primary needs – of industrialism is the separation of people and places and products from their histories"[6]. As in all else, agrarianism stands to the opposite.

Agrarians, and Wendell Berry, a leading agrarian proponent, believe that nature is a guide, a teacher (which is, in fact, the second principle of ecology), and that nature is measure, a base against which to assess and judge. "We should not work until we have looked and seen where we are; we should honor nature not only as our mother and grandmother but also as our teacher and judge; we should 'let the forest judge'; we should 'consult the Genius of the Place'; we should make the farming fit the farm; we should carry over into the cultivated field the diversity and coherence of the native forest or prairie"[7]. All of this constitutes a guide to Wendell Berry's agrarianism.

Agrarianism is a term called forth by its opposite, industrialism, and the two together, according to Berry, form two different ways of understanding ourselves.

Perhaps the finest, the clearest, the most elegant statement of agrarianism today comes from this classic essay of Wendell Berry, "The Whole Horse":

"The fundamental difference between industrialism and agrarianism is this: Whereas industrialism is a way of thought based on monetary capital and technology, agrarianism is a way of thought based on land.

An agrarian economy rises up from the fields, woods, and streams. It is not regional or national, let alone global, but local. It must know on intimate terms the local plants and animals and local soils; it must know local possibilities and impossibilities, opportunities and hazards.

It is interested in questions leading toward good work. What is the best way to plow this field? What are the best breeds and types of livestock for this farm? What is the best course for a skid road in this woodland? Should this tree be cut or spared? --- questions which cannot be answered in the abstract. Agrarianism can never become abstract because it has to be practiced in order to exist...

…An agrarian economy is always a subsistence economy before it is a market economy. It is the subsistence part of the agrarian economy that assures its stability and its survival. A subsistence economy necessarily is highly diversified, and it characteristically has involved hunting and gathering as well as farming and gardening. These activities bind people to their local landscape by close complex interests and economic ties. The industrial economy alienates people from the native landscape precisely by breaking these direct practical ties and introducing distant dependencies.

The central figure of agrarian thought is the small holder who maintains a significant measure of economic self-determination on a small acreage. The scale and independence of such holding implies two things that agrarians see as desirable: intimate care in the use of the land, and political democracy, resting upon the indispensable foundation of economic democracy.

The agrarian mind begins with the love of fields and ramifies in good farming, good cooking, good eating and gratitude to God. The industrial-economic mind begins with ingratitude, and ends with the destruction of farms and forests. Industrialism unchecked by the affections and concerns of agrarianism becomes monstrous." [8]

Norman Wirzba in his new book, *The Art of the Commonplace: The Agrarian Essays of Wendell Berry*, finds Berry to be, as do so many others, the foremost apostle of the agrarian ideal. He places Berry with Thoreau, who represents romantic naturalism, with Muir, who represents preservationism, with Leopold, who represents conservationism and modern ecological thought. Berry, in this schema, represents agrarianism. Wirzba writes that we integrate agrarian principles without ourselves becoming farmers. Like ecologists, agrarians ask subversive questions: Where was this food grown? How was it grown (chemical agriculture, organic agriculture, etc.)? Who grew the food? Were they fairly paid or exploited? What is the consequence to the land from the farming practices used? Follow-on questions include: Is this purchase necessary? Can the old article

be made to last longer? If the thing shouldn't be released into the environment when I'm done with it, then should it be created in the first place? Do I need it? What do I really need? These are both primary ecological questions and primary agrarian questions, in fact linking the ecological philosopher Aldo Leopold with the agrarian philosopher Wendell Berry.

Berry, in a manner coincidental to Leopold's idea of land health, has told us that how we treat the land is not separate from how we treat each other. He says that our agricultural practice should be ruled by a clear comprehension of what is needed to insure the long-range health of the soil, the communities it supports, and the individual organisms (both human and non-human) within those communities. These three kinds of life are one. Human health and the health of the planet are complementary, not antagonistic ideals. Berry has written that there can't be such a thing as a global village, that no matter how much we may love the world as a whole, we can live fully in it only by living responsibly in a small part of it. These and numerous other wisdom sources from Wendell Berry, including his much quoted "Eating is an agricultural act", provide a rich framework for us to come to understand the nature of agrarianism and agrarian values. Wendell Berry provides the foundation for our understanding of modern agrarianism and what constitutes agrarian values in contemporary times.

Contemporary Agrarian Voices

Eric Freyfogle, Professor of Law at the University of Illinois and an active Leopoldian scholar, writing in "A Durable Scale", his introductory essay to *The New Agrarianism: Land, Culture and the Community of Life*, sheds further light: "… (A)grarians believe that those who buy products are implicated morally in their production, just as those who discard waste items are morally involved in their final end"[9]. Freyfogle quotes Leopold himself discoursing on our connectedness to roots, to starting points, to durability: "The shallow-minded modern assumes that he has already discovered what is important; it is such who prate of empires, political or economic, that will last a thousand years. It is only the scholar who appreciates that all history consists of successive excursions from a single starting point, to which man returns again and again to organize yet another search for a durable scale of values"[10]. It was Leopold who told us that the greatest disadvantage of a person who had not grown up on a farm, or otherwise close to nature, was to come to think that heat came from a stove and food from a grocery store.

A clear image of industrialism as applied to agriculture is given to us by the writer Michael Pollan in his recent article "Cattle Futures" in which he writes, "… I'm offering an aesthetic judgement of a system designed not for beauty but for efficiency. Protein is protein, goes the logic of this system, whether you find it in an animal muscle, a soybean or a chicken dropping: This reductionism is the world-beating formula that drives industrial agriculture, and it works, up to a point. By feeding the absolute cheapest forms of energy and protein to animals it treats as machines, the industrial food chain has succeeded in making the protein we eat unimaginably cheap. Just look at what you can get for a buck or two at Wal-Mart or McDonald's"[11]. As an antidote to this mentality, and in response to the mad cow controversy, Pollan writes "Back to the future: a 21st century savanna. If, as seems probable, this landscape should now expand at the expense of the feedlot, then something good – even beautiful – will have come of this poor mad cow"[12].

Writing in his essay, "The Urban – Agrarian Mind", David Orr notes the absolute centrality of soil in agrarian thought: "Those calling themselves agrarians, from Hesiod to Wendell Berry, all agree that we know of no stable or decent way to organize human affairs that is not somehow rooted in a deep practical respect for soil"[13].

In agrarian practice, fertilizer should be viewed as a farm product in any measure of agricultural sustainability. And, according to Karl North and Donn Hughes, "The ruminant animal is the core of the notion of sustainability because it can provide both food and fertilizer ingredients from biomass grown without tillage energy, and therefore without disturbing the cover that protects the soil. The grass/ruminant complex is the core that drives the rest of the farm…"[14].

Professor Willie Lockeretz of Tufts University in Boston argues that people do not understand the difference between biodiversity and integration, an understanding which is a necessity

for understanding agrarian values. Biodiversity is a necessary but not a sufficient character of agrarianism, for biodiversity without integration of that diversity is not the agrarian way. Each element of the diversity, plant and animal, biological, physical, economic and social, must be integrated and interdependent to the maximum degree possible for true agrarian thought to be present. Professor Lockeretz also speaks for the agrarian value that, with respect to livestock, the animal knows best. The issue, he says, is one of interaction between animals and their caretakers. Not only do animals have an inherent and innate right to be who they are, as species, as breeds, as individuals, but agrarian values (and organic agriculture) dictates that we maintain respect for their "isness", their very condition of being, and that we recognize that they know best. "Let a pig act like a pig. Let a cow act like a cow. Let animals have some sense of their natural way of life", says Lockeretz, warning against industrial agriculture's disregard for the intrinsic nature of livestock[15].

Wes Jackson, agricultural scientist, environmental philosopher, Kansas farmer, founder and director of the Land Institute, and protégé of Wendell Berry, who has had much to say on this question in his many books, essays and speeches, tells us that the agrarian model can be differentiated from the industrial model through two queries: The agrarian model asks, What grows here? What does nature want? The industrial model asks the question, What can we get away with here? The latter, he tells us, is the child's question. The former is the mature moral adult's question.

Another model of agrarianism comes to us from our own American subculture, the Amish, farmers who live in a broad band from Pennsylvania to Kansas and Nebraska. And Elsie and David Kline of Ohio, he the author of *Great Possessions*, they the publishers of *Farming* magazine (perhaps the finest agrarian periodical in the country), are among the few well known examples from among these very private people. Steven Stoll, in the Epilogue to his book, *Larding the Lean Earth*, writes,

"David and Elsie Kline do not farm like other people. They never view wildlife as a threat to their livelihood. They use no pesticides, herbicides, or genetically modified organisms. They never spray anything. Feed corn will be harvested, dried, and stored in cribs for winter fodder, while the oats will be eaten off the stem when thirty-five dairy cows chew them down and manure the field at the same time. The Klines' implements for mowing, baling, binding, reaping, cultivating and threshing date from the 1930s to the 1960s, and all their field traction is provided by draft horses. They accept no government support and say they need none. They produce nothing for sale on the Chicago Board of Trade; says David, "Let those speculators speculate on themselves; they aren't using me as their pawn." Whenever possible they plant their own seed instead of buying it. By choice, they have no electric power in their home and own no automobiles. They buy few consumer goods, distrust centralized authority, and dress plainly. The Klines are Amish farmers. They are not dead-end hold-outs left over from the agrarian nineteenth century; rather, their system of food production represents the future of American agriculture[16]."

Amish values, Stoll writes, are governed by their understanding of what it means to be Christian. They are also governed by a few practical precepts: "(A)nything that undermines their ability to cohere as a community of neighbors and linked families, anything that isolates them in their work or places production for profit ahead of the collective process, is prohibited … (N)o practice will be allowed to denigrate the wholeness of land and its capacity to sustain wild as well as domesticated animals"[17]. Manure-centered husbandry, as Stoll calls Amish farming, represents, according to Stoll, "… an alternative – a progressive occupancy of land for the twenty-first century"[18]. He finds that "… there could be no land management better suited for a small and crowded planet. Amish farming is highly productive and environmentally stable and represents a profitable way for families to remain in control of rural places"[19]. Further, "… Amish farming is not modern, but it might be postmodern[20]. Stoll concludes that "Amish farmers are some of the best farmers in the world and the preservers of a genuine land ethic"[21]. Anyone who would discount Amish farming as primitive or as hopeless nostalgia must counter Stoll and others who view it not only as highly practical but who recognize it as one of the most efficient and progressive agricultural models that we have.

The Canadian ecologist and environmental philosopher Stan Rowe writes that the industrial model of agriculture has enjoyed the success it's experienced because the broader society consciously or unconsciously perceives an advantage in its going that way. Society's three goals of cheap food,

maximum exportable surpluses, and sales to farmers of fossil fuels, machinery and chemicals are all fulfilled. High production agriculture is high through-put and high cash flow agriculture. It is capital-intensive and needs all kinds of city goods and services to make it work, thereby keeping our economy humming, Rowe says. However, agriculture's original meaning is very different. Based on the original Sanskrit origin of the word, agriculture has to do with people dwelling on the land and caring for it. To maintain the "cultus", the care in the people-land relationship, farming is a valued way of life and not just a business. "Agriculture is ecological insofar as it is true to its original meaning, incorporating a spirit of care for the land that guarantees a sustained relationship between it and the user"[22]. By this measure, Wendell Berry's stance is a model of perfection. Rowe worries that "The central question is whether mainstream agriculture on the industrial model can or will take an interest in maintenance or sustainable production when its tunnel vision is on maximum yield and increasing production. With its priorities wrong, can it do anything but run down the soil? Can it support regenerative agriculture, or does it necessarily force degenerative farming?" [23] But, he continues, "The insidious thing about the mechanistic (i.e., industrial) approach is that it works, at least for awhile. Short-term success seems to confirm that Nature is nothing but a machine. But sooner or later the inevitable anti-life side effects begin to appear"[24]. Rowe's answer is the organic or ecological (i.e., agrarian) view of Nature, one opposed to the mechanistic view, which "… is religious in the true meaning of 'religio', to bind together, to make whole or holy"[25].

Maury Telleen of Iowa, farmer, writer, editor of *The Draft Horse Journal*, refers to agrarianism as a form of religion because it's concerned with consequences, moral and otherwise. Referring to industrialism's contempt for commonwealth, Telleen lays out his Ten Commandments of Agrarianism:

1. The earth is your Mother.
2. First try to do no harm.
3. Enough is enough; optimum is better.
4. Don't feed the seed corn to the chickens or steers or put all your eggs in one basket.
5. My country – all local places.
6. Accept limits with grace.
7. There is an inescapable and necessary order of things.
8. Beware of nature, free equations and computer models.
9. Be suspicious of the "gee whiz" mentality.
10. Distrust the big picture – where you live is where you matter most.

A final significant voice for agrarian values, in theory and in practice, is that of Frederick Kirschenmann, North Dakota organic/biodynamic grain farmer, philosopher, theologian, founder of the Northern Plains Sustainable Agriculture Society, and the Director of the Leopold Center for Sustainable Agriculture at Iowa State University (about which more later). Kirschenmann sees that

"…(W)e are in the grip of a cultural vortex that

- views nature as a static mechanistic structure which can be controlled with technology,
- assumes nature is stable and therefore largely immune to harm, and
- operates by an economy that is solely price-determined"[26].

As long as we are in that grip we are not likely to abandon our productionist ethic. Modern science tells us that each of these views and assumptions is false, but "Our approach to ethics prevents us from seeing our own dissonance, and therefore prevents us from appreciating the contradictory situations in which we all find ourselves"[27].

Although a philosopher by education, Fred Kirschenmann is also a practicing farmer and head of a very practically applied institution in higher education, the Leopold Center. The combination of these has led him to reject what Lewis Mumford called "authoritarian technology", a technology powerful but inherently unstable, and to support "democratic technology", a technology resourceful and durable. He speaks of the former as being large in scale; as concentrating power in the hands of the few; and with little power of adaptation and recuperation. And he speaks of the latter as consisting of small-scale units of production, dependent on human skill, "... remaining under the active direction of the craftsman or farmer, each group developing its own gifts, through appropriate arts or social ceremonies, as well as making discreet use of wide diffusion and its modest demands ... (and with) great powers of adaptation and recuperation"[28]. A key to understanding agrarianism at the production end Kirschenmann takes from the Japanese farmer whom Kirschenmann has helped popularize in the United States, Takao Furuno. Furuno describes his production design concept as "… to produce a variety of products within a limited space to achieve maximum overall productivity", but to do so in such a way as to allow more than a mere assembly of the components – "… it consists of allowing all components to influence each other positively in a relationship of symbiotic production"[29]. The use of complex biotic interactions thus becomes the key technology. And learning to listen to the wisdom of the system, to dance with systems as the late Donella Meadows once put it, is the key goal[30].

At the market end, Fred Kirschenmann's agrarianism takes root in what he calls "relationship agriculture". He notes that people increasingly want to have relationships as part of their purchasing experience, and that "When food customers go to the farmers market or buy from their local CSA, they are buying a relationship as much as a food product – this is the special magic behind today's direct market success"[31]. He speaks of urban people not liking to get their hands dirty, but liking to shake the hand of someone that does! Kirschenmann also writes of people's desire for trust and authenticity, something that the agrarian model does a good job of providing. "Smaller supply chains that have food provided for them by identifiable farmers whose products can be easily traced to specific farms … can more readily establish trusting relationships and provide information that can be authenticated than can the consolidated supply chains with mass-produced products", Kirschenmann writes[32]. And the increasing desire to purchase close to home also gives a comparative advantage to independent and smaller family farms.

In terms of linkage between agrarianism and agricultural sustainability, the late University of Wisconsin rural sociologist Frederick Buttel writes, "There is considerable debate in the sustainable agriculture community as to whether the best indicator of the growth of sustainable agriculture is the national market share of organic food – much of which is due to the activity of very large corporations like Whole Foods – or whether the extent of sustainable agriculture is most accurately measured by the prevalence of community supported agriculture (CSA), farmers markets, local co-ops, community gardens, and direct marketing of food. Those with the strongest commitments to sustainable agriculture are also most likely to see food system localization and the recreation of more local 'foodsheds' as the heart and soul of a genuine and enduring sustainable agriculture"[33]. It is the latter who represent agrarian values. Large-scale or industrial-scale organic, although organic in terms of legal certification, does not represent agrarian values.

Oklahoma farmer and founding Director of the Kerr Center for Sustainable Agriculture Jim Horne, writing in his book, *The Next Green Revolution: Essential Steps to a Healthy Sustainable Agriculture*, has given us eight such steps to achieve such a goal, all of which are representative of the agrarian value system. He applies these eight steps to a comparison of the two models, industrial and what he calls sustainable, the latter essentially an example of an agrarian system. Based on the work of the Kerr Center and a lifetime on the land in Oklahoma, Horne finds the following dichotomy:

The agrarian model thus revolves around notions of care for the soil, appropriate technology, and sustainable practices such as efficient use of hand and animal labor, focus on low energy input and non-capital intensive systems, and on direct marketing (CSAs, farmers markets). Further emphasis is placed on small to medium scale, on biodiversity, and on strong community values.

The industrial model revolves around cash profit, with emphasis on commerce, on monoculture, on machine technology, on high energy input, on capital intensity, on medium to large scale, on mass marketing, with no concern over community values. (In fact, the industrial model is implicitly anti-community.)

Similarly, Beus and Dunlap in their article in *Rural Sociology* have given us their widely published table, "Key Elements of the Competing Agricultural Paradigms": (see attached chart)[35].

Horne says the next green revolution will be a trio of revolutions: agricultural, ecological and social/economic, all entwined. And he says the last of the three, social/economic, will drive the first two, for the real change that agriculture needs is, he writes, social change: How society views food, farmers and natural resources. In this he is arguing for a change from an industrial to an agrarian viewpoint, precisely what Wendell Berry, Fred Kirschenmann and others are arguing for in this chapter.

The agrarian voice is, at its core, an ecological voice. Ecology is, literally, the study of *oikos*, to use its Greek root, the study of the "home" in the broad sense, the study of the planetary ecosystem and of our most local of ecosystems. It is predicated upon the idea of systems and it contains four principles, as eloquently expressed by the American environmental scientist Barry Commoner over forty years ago:

1. Everything is connected to, related to, interconnected to, and interrelated with, every other thing. Everything is a part of everything else, is implicated in everything else, spatially and temporally. We can never do just one thing.
2. Nature knows best. "Nature" here is fully inclusive of human beings.
3. Everything must go somewhere. What goes around comes around. There is no such place as "away".
4. There is no such thing as a free lunch.

This ecological voice, this environmental voice, is viewed by most people as having its greatest strength, regionally, in the Northeast and on the West Coast, rarely in the heartland. And yet, this ecological voice, as applied to agriculture and community, the agrarian voice, defies conventional wisdom, for it finds its greatest proponents in the heartland, in the South, in the prairies of the Midwest, on the Great Plains farther west. It comes to us from Kentucky (Wendell Berry); from Ohio (Gene Logsdon, David Kline, Louis Bromfield, David Orr); from North Dakota (Fred Kirschenmann); from Kansas (Wes Jackson); from Missouri (John Ikerd); from Nebraska (Chuck Francis and Marty Strange); from Virginia (Joel Salatin); from Minnesota (Dana Jackson); from Illinois (Eric Freyfogle); from Oklahoma (Jim Horne); from Mississippi (Allan Nation); from Texas (Jim Hightower); from Iowa (Laura Jackson, Maury Telleen and Fred Kirschenmann).

Agrarianism as Practice Over Idea

Although the writings of Gene Logsdon, Marty Strange, David Orr, Louis Bromfield, Dana and Laura Jackson, and others are rich with agrarian insight, and should be consulted by the reader, it is always wise to return to the anchor of Wendell Berry on this topic. In his 1990 book, *What Are People For?*, Berry has written:

"… (I)f agriculture is to remain productive, it must preserve the land, and the fertility and ecological health of the land; the land, that is, must be used well. A further requirement, therefore, is that if the land is to be used well, the people who use it must know it well, and must be able to afford to use it well. Nothing that has happened in the agricultural revolution of the last fifty years has disproved or invalidated these requirements, though everything that has happened has ignored or defied them"[36].

Writing in his 2003 essay, "The Agrarian Standard", Berry identifies the question that

"… begins the agrarian agenda and is the discipline of all agrarian practice: What is the best way to use land? … We are not asking what is the best way to farm everywhere in the world, or

everywhere in the United States. … We are asking what is the best way to farm in each one of the world's numberless places, as defined by topography, soil type, climate, ecology, history, culture and local need. And we know that the standard cannot be determined only by market demand or productivity or profitability or technological capability, or by any other single measure, however important it may be. The agrarian standard, inescapably, is local adaptation, which requires bringing local nature, local people, local economy, and local culture into a practical and enduring harmony"[37].

The central aim of this chapter has been to convey the spirit of agrarianism. Before we move on to agrarianism in practice in the land grant universities, I will make one more effort to convey that spirit. I do so through Iowa's Maury Telleen, farmer and editor of the *Draft Horse Journal*, to whom Wendell Berry's now classic 1977 book, *The Unsettling of America: Culture and Agriculture*, was dedicated: Industrial agriculture must per chance have only one superceding goal: bottom line profit for the investors. Agrarian agriculture lacks this goal and has at least four very different goals. Telleen identifies those goals in what he calls the job description of agrarianism: "… to function in such a way that it honors and maintains the earth, sustains and perpetuates the community, shelters and benefits the citizens thereof, and respects the commonwealth for what it is: the common wealth"[38].

Agrarianism, therefore, and the values that naturally stem from it, is an attitude, a state of mind. It is totally in synch with ecological science, ecological understanding. And it is ultimately a practice, a way of life, far more than it is a theory or an idea. It is in harmony with the Christian principle of subsidiarity which basically states that nothing should be done at a higher and larger level that can be done at a lower and smaller level. And the agrarian value system has maintained a great spark of vitality. Such agrarianism can readily be identified in the ideas, practices and activities of the land grant universities and extension services of Wisconsin, Iowa, Maine and Vermont, as described in the chapters that follow.

ENDNOTES:

1. "Cap'n Bibber Philosophizes", in *Kennebec: Cradle of Americans* by Robert P. Tristram Coffin, 1937/1965 (Camden, Maine: Downeast Books, 1965), pp. 204-207.
2. David Orr, "The Urban-Agrarian Mind", in *The New Agrarianism: Land, Culture and the Community of Life*, ed. By Eric T. Freyfogle (Washington, D.C.: Island Press, 2001), p. 98.
3. Wendell Berry, "The Whole Horse", in Freyfogle (ed.), *The New Agrarianism*, p. 67.
4. ibid., p. 68.
5. ibid., p. 67.
6. ibid., p. 64.
7. ibid., p. 70.
8. ibid., pp. 67-69.
9. Eric Freyfogle (ed.), *The New Agrarianism*, p. xx.
10. ibid., p. xli.
11. Michael Pollan, "Cattle Futures", *Mother Earth News*, April-May, 2004, p. 25.
12. ibid.
13. David Orr, "The Urban Agrarian Mind", in Freyfogle, p. 95.
14. Karl North and Donn Hughes, "Monitoring Farms for Progress Toward Sustainability", *The Natural Farmer*, Vol. 2, No. 6, Spring, 2004, p. 42.

15. "The Natural", *Tufts Nutrition*, Fall, 2003, pp. 22-23.

16. Steven Stoll, *Larding the Lean Earth: Soil and Society in Nineteenth Century America* (New York: Hill and Wang, 2002), p. 216.

17. ibid., p. 217.

18. ibid., p. 219.

19. ibid.

20. ibid., pp. 219-220.

21. ibid., p. 223.

22. Stan Rowe, *Home Place: Essays on Ecology* (Calgary, Alberta, Canada: NeWest Publishers, 1990), p. 171.

23. ibid., p. 172.

24. ibid., p. 174.

25. ibid.

26. Chuck Francis and Diane Ricker, *Ecological Morality: A New Ethic for Agriculture* (to be published in 2005).

27. ibid.

28. Lewis Mumford, "Authoritarian and Democratic Technics", as quoted in Frederick Kirschenmann, The Future of Agrarianism: Where Are We Now?" in Norman Wirzba (ed), *The Essential Agrarian Reader: The Future of Culture, Community and the Land* (Lexington: University of Kentucky Press, 2003), p. 108.

29. ibid.

30. For greater depth on the underlying philosophy of this view of agriculture and ecology, see E. F. Schumacher, *Small is Beautiful*, 1973. For depth on the question of specific application, see Takao Furuno, *The Power of Duck*, 2001. See also all of the books of Joel Salatin.

31. Frederick Kirschenmann, "The Future of Agrarianism: Where Are We Now?, in Wirzba (ed.), *The Essential Agrarian Reader*, p. 113.

32. Ibid., p. 114.

33. Frederick Buttel, "Social Dimensions of Sustainable Agriculture", Unpublished Paper.

34. Jim Horne, *The Next Green Revolution: Essential Steps to a Healthy Sustainable Agriculture*, pp. 261-263.

35. Beus and Dunlap, "Key Elements of the Competing Agricultural Paradigms", *Rural Sociology*, Vol. 63, No. 3, September, 1998, pp. 376-377.

36. Wendell Berry, "Nature as Measure" in *What Are People For*? (San Francisco: North Point Press, 1990), pp. 206-207.

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	INDUSTRIAL AGRICULTURE	SUSTAINABLE AGRICULTURE
STEPS TO A HEALTHY, SUSTAINABLE AGRICULTURE **1. Create and conserve healthy soil**	• Soil quality declining - soil erosion a chronic problem, organic matter not replenished, microbial activity damaged by farm chemicals, soil compacted by farming practices • Conventional tillage, conservation tillage combined with heavy chemical use	• Soil quality a central concern - soil protected from erosion by cover crops, residue, low-impact tillage, and conservation measures such as windbreaks; organic matter continually added, farming methods and smaller sized machinery keep soil loose and friable • Conservation tillage techniques combined with biofriendly management to cut use of chemicals
2. Conserve water and protect its quality	• Water is mined from dropping aquifers, agricultural chemicals degrade water supplies and threaten aquatic life • Conservation structures and areas take a back seat to more production	• Farming methods conserve water and soil moisture and protect surface and groundwater from pollutants and sediment • Conservation is a top priority; terraces, buffer strips, riparian buffers and other conservation structures, practices, and areas incorporated into the farm
3. Manage organic wastes to avoid pollution	• CAFOs concentrate large amounts of animal wastes in one place, overloading the ability of the area to utilize it and also increasing chances of spills and water pollution	• Animal wastes provide nutrients for growing crops without polluting watersheds; smaller numbers of animals are raised on integrated farms where they are part of a diversified system

	INDUSTRIAL AGRICULTURE	SUSTAINABLE AGRICULTURE
4. Select plants and animals adapted to the environment	• With large amounts of inputs, farmers can raise nonadapted crops	• Farmers raise animals and plants adapted to the existing environment
5. Encourage biodiversity	• Genetic engineering further narrows genetic diversity • Monoculture is the norm: farms are plowed fence row to fence row, wild "unused" areas are put into production, only the most productive few crop varieties or livestock breeds are raised	• Time-honored traditional breeding programs look to preserve genetic diversity • Diversity is the norm: of habitats, livestock, crops, wild plant and animal species, and of genetics within crop and livestock species
6. Manage pests with minimal environmental impact	• Therapeutic approach - chemicals are used routinely to control pests	• The use of toxic chemicals for pest control is minimized and ecologically based, benign management and cultural practices used
7. Conserve nonrenewable resources	• Powered by finite fossil fuels: fertility and pest control needs filled by agricultural chemicals • Use of fossil fuels encouraged • Food production is centralized in a few regions that specialize in certain crops, which are shipped around the nation and world	• Powered by the sun: fertility and pest control largely provided by cycling of plants and animals in the system using rotations, cover crops, trap crops, resistant crops • Renewable energy resources (biofuels, solar) substituted when possible and conservation of fossil fuels encouraged • Food production is decentralized to encourage local, biodiverse, environmentally adapted food systems which save fossil fuels

	INDUSTRIAL AGRICULTURE	SUSTAINABLE AGRICULTURE
8. Increase profitability and reduce risk	• Small and medium-sized farms are marginalized, pressure is on farmers to increase the size of their operations • Decreasing numbers of farmers are needed • Large corporations control farmers and markets through contracts and vertical integration • The farm is viewed solely as an agribusiness • Short-term profit is the focus • Farmers have little control over profits • Dependent on high-priced technology • Large scale, so debt and risk high	• Small and medium-sized family farms generate equitable returns so that farmers can protect natural resources, stay in business over the long term, and have a good quality of life • Believes that we need more farmers on the land • Free markets prevail and farmers have control over how they farm • The farm is viewed holistically, with the quality of life of the farm family one part of a whole • Long-term consequences of farming methods are given equal weight to short-term profit • Through adding value, direct marketing, and other profit-enhancing approaches, farmers can set prices and assert more control over the prices they receive • Works with low-input biological processes • Smaller-scale enterprises do not demand as much borrowed money (Source: *The Next Green Revolution* by Jim Horne and Maura McDermott (Haworth Press, 2001).

Table 1. Key elements of the competing agricultural paradigms

CONVENTIONAL AGRICULTURE	ALTERNATIVE AGRICULTURE
Dependence Large, capital-intensive production units and technology. Heavy reliance on external sources of energy, inputs, and credit. Consumerism and dependence on the market. Primary emphasis on science, specialists and experts.	Independence Smaller, low-capital production units and technology. Reduced reliance on external sources of energy, inputs, and credit. More personal and community self-sufficiency. Primary emphasis on personal knowledge, skills, and local wisdom.
Centralization National, international production, processing and marketing. Concentrated populations; fewer farmers. Concentrated control of land, resources and capital.	Decentralization More local/regional production processing and marketing. Dispersed populations; more farmers. Dispersed control of land, resources, and capital.
Competition Lack of cooperation; self-interest. Farm traditions and rural culture outdated. Small rural communities not necessary to agriculture. Farm work a drudgery; labor and input minimized. Farming a business only. Primary emphasis on speed, quantity, and profit.	Community Increased cooperation. Preservation of farm traditions and rural culture. Small communities essential to agriculture. Farm work rewarding; labor an essential to be made meaningful. Farming a way of life as well as. Primary emphasis on permanence, quality, and beauty.
Domination of nature Humans are separate from and superior to nature. Nature consists primarily of resources to be used. Life-cycle incomplete; decay (recycling wastes) neglected. Human-made systems imposed on nature. Production maintained by agricultural chemicals. Highly processed, nutrient-fortified food.	Harmony with nature Humans are part of and subject to nature. Nature is valued primarily for its own sake. Life-cycle complete; growth and decay balanced. Natural ecosystems are imitated. Production maintained by development of healthy soil Minimally processed, naturally nutritious food.
Specialization Narrow genetic base. Most plants grown in monocultures. Single-cropping in succession. Separation of crops and livestock. Highly specialized, reductionistic science and technology.	Diversity Broad genetic base. More plants grown in polyculture. Multiple crops in complementary rotations. Integration of crops and livestock. Locally adapted production systems.

Table 1. Key elements of the competing agricultural paradigms - *Continued*

CONVENTIONAL AGRICULTURE	ALTERNATIVE AGRICULTURE
Exploitation External costs often ignored. Short-term benefits outweigh long-term consequences. Based on heavy use of non-renewable resources. Great confidence in science and technology. High consumption to maintain economic growth. Financial success; busy lifestyles; materialism.	Restraint All external costs must be considered. Short-term and long-term outcomes equally important. Based on renewable resources; non-renewable resources conserved. Limited confidence in science and technology. Consumption restrained to benefit future generations. Self-discovery; simpler lifestyles; nonmaterialism. Source: Beus and Dunlap (1990:598-99) (1998:376-377)

"A thing is right when it tends to preserve the integrity, stability and beauty of the biotic community. It is wrong when it tends otherwise."

Aldo Leopold
of Wisconsin

Chapter Four: Wisconsin

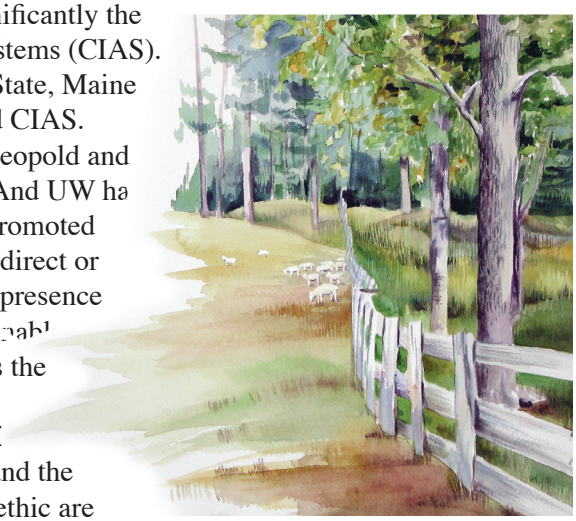
To study agriculture at the land grant universities of major farm states such as Wisconsin and Iowa is to compare New England's smaller scale agriculture with the scale, level of investment and legitimacy of mainstream American agriculture as found in the farming heartland of the Midwest prairies. And the choice of the land grants of Wisconsin and Iowa enables more direct focus on their connections to Aldo Leopold.

Leopold's many years in Madison and in the sand counties of central Wisconsin, his service to federal and state natural resources agencies in Madison, and his long years of service to the University of Wisconsin and its land grant College of Agriculture make a focus on Wisconsin a necessity for this study.

Likewise, Leopold's birthplace and family home and origins in the Mississippi River Valley of southern Iowa brings that state into the picture. His extensive wildlife and farm survey work in Iowa, and the decision of the people of Iowa and of Iowa State University to establish the nation's only major public institution dedicated to Leopold's memory, the Leopold Center for Sustainable Agriculture, makes the inclusion of Iowa logical for this study. Appropriately, this institution is, in its entirety, dedicated to sustainable agriculture.

Coincidentally, both Wisconsin's and Iowa State's formal efforts in sustainable agriculture are about the same age as those of the comparator institutions in this book, the Universities of Maine and Vermont. And Wisconsin and Iowa both have corollary features which can be compared and contrasted with their New England counterparts, in spite of the differences in geography, ecology and political economy. All four selected land grant universities have on-campus instructional efforts and some degree programs at the graduate and undergraduate levels; on-campus and off-campus research programs; and extension programs based both on-campus and in the counties fitting the philosophical values of sustainable agriculture.

Historical Development of Wisconsin's Center for Integrated Agricultural Systems



The history of sustainable agriculture at UW is significantly the history of the Center for Integrated Agricultural Systems (CIAS). In the late 1980s, simultaneous to activity at Iowa State, Maine and Vermont, the University of Wisconsin launched CIAS. Wisconsin had been the long-time home for Aldo Leopold and his work (from the early 1920s to the late 1940s). And UW ha been the institution that has, more than any other, promoted and honored Leopold's work. However, there is no direct or explicit connection between the earlier Leopoldian presence at Madison and the university's move toward sustainabl agriculture in the late 1980s. The latter move marks the culmination of a series of other events developing earlier in that decade. The familiarity, however, whi the UW community has with Leopoldian thought, and the honor in which Aldo Leopold and his famous land ethic are

held on campus and in the region, likely play a role in establishing the climate and circumstances in which sustainable agriculture and agrarian values might grow and flourish in Madison. (It must be said, however, that the Wisconsin Department of Agriculture, also located in Madison but fully separate from UW, maintained a program in sustainable agriculture for about eight years in the late 1980s-early 1990s which included a demonstration program and placed particularly heavy emphasis on rotational grazing. It actively assisted fourteen grazing networks around the state. This program largely ceased by the mid-1990s but it may well have left a legacy in the atmosphere it created around the importance of intensive rotational grazing, a legacy which UW was able to carry on.)

Wisconsin's Center for Integrated Agricultural Systems (CIAS) was established in 1989 and has served a research and extension/public service function (outside of the Wisconsin Extension service) for the university and its College of Agriculture. An instructional, curricular or degree-granting role has been noticeably absent, although that may be beginning to change.

CIAS is defined as a "sustainable agriculture research center at UW that brings together farmers, researchers, policy-makers and others to study farming practices, farm profitability, the environment and rural vitality"[1]. It applies a systems approach to agricultural research and communications. With structured input from citizens and faculty, it develops research, communications and education programs for Wisconsin citizenry. Its formal mission statement reads:

"Our purpose is to support farmers in their efforts to increase profitability, improve their family's quality of life, and enhance the environmental quality of natural resources. We will examine how the systems of agriculture, natural resources, economic organizations and human communities interact in order to find ways for agriculture to be conducted in a manner that sustains the environment and human communities in Wisconsin. We will spread knowledge regarding sustainable agriculture to those who use and regulate our social and natural resources. We will do this by fostering an interdisciplinary, participatory approach to research, education, and outreach by incorporating all relevant farmer and science-based knowledge into our efforts, coordinating the ideas and work of those with this knowledge, and by providing funds and other resources for research that supports our mission. We are committed to supporting family farms and rural communities in their efforts to thrive and prosper; to excellence and high ethical standards in all our activities; to supporting the spirit and intent of the 'Wisconsin Idea' (See ahead); and to creating and maintaining a working organization of respectful interpersonal relationships among faculty, staff, students and our many stakeholders" [2].

The nation-wide 1980s critique of the land grant colleges of agriculture presented by the writings of Jim Hightower of Texas, Wendell Berry of Kentucky and Wes Jackson of Kansas, among others, was further spurred on by declining farm profitability, loss of farms, and the environmental costs of chemical-intensive agriculture. In response to the critique, the Wisconsin College of Agricultural and Life Sciences created a 42 member faculty and staff committee charged with envisioning the organization that later became CIAS. This entity was to introduce innovative ways of operating, with much more citizen input than heretofore, and with a distinct philosophy and vision of sustainable agriculture. A coalition of farm and environmental groups, facilitated by the Wisconsin Rural Development Center, secured the commitment of UW, the legislature and the Governor's Office. CIAS and a companion program in Nutrient and Pest Management were established. Hard funding was secured, today complimented with USDA-SARE funds.

The University of Wisconsin has in recent years actively sought information on farmer views of its activity (or, as important, lack of activity). A survey of dairy farmers in 2000 revealed strong support for the idea that the need is greater than ever for publically-funded agricultural research in Wisconsin. Privately-funded research cannot replace publically-funded research in the minds of Wisconsin's citizens. But dairy farmers note that most of the publically-funded research benefit goes to large farms, while small and medium-size farms are short-changed. The greatest needs were identified for smaller operations, as well as for farmer entry and low cost technologies, both of which bode well for CIAS in particular and broader sustainable agriculture efforts in general at UW.

Empowering citizens and agricultural practitioners was an important component in establishing the Center. This particular characteristic helps restore the original image and mission of the land grant system and is a critical component of all the original land grant legislation. (It is a component, as well, of the "Wisconsin Idea", a concept unique to Wisconsin, about which more later.) In this effort, farmers are directly empowered at both the program level and the project level. All CIAS efforts owe their existence, to some degree, to citizen input or recommendations. With this high level of citizen involvement and voice, for which the CIAS structure provide, the CIAS research agenda was established. There was an attempt in the early years to establish an undergraduate certificate program at the Madison campus, in lieu of a degree program or major, but this effort failed and CIAS consequently remained outside the instructional/teaching mission of the college and university.

CIAS remains a small program designed to build UW sustainable agriculture research programs that respond to the needs of both farmers and non-farmers. It involves both of these populations in setting research agendas. Hence, farmer and non-farmer involvement is central and is facilitated through a twelve member Citizen Advisory Council. Faculty connection, and particularly the goal of multidisciplinarity among academic disciplines involved with and contributing to the Center, is facilitated through a nine member Faculty Associates group.

More specific to something which is uniquely Wisconsin, CIAS borrows from the "Wisconsin Idea", a legacy of the progressive era in the state more than a century ago. Applied to the university, this idea sees the university campus as encompassing the whole state, and positions the role of "experts" as "on tap, not on top", making the way easier for the on-farm and farmer-driven research agenda. UW has been recognized nationally for doing more with these principles and being more open to the people, particularly its farmer-citizens, than is the case with most land grant universities. Such historical realities smoothed the way for the original establishment of CIAS in the late 1980s, as previously noted.

Being committed to balancing differing visions, conventional and alternative, of land grant university responsiveness and effectiveness, "The multidisciplinary, multi-professional and systems approach to agricultural research that CIAS uses … can accommodate both visions of the land grants' role while building meaningful citizen involvement"[3]. Thus, the Center brings researchers, farmers, environmentalists, policy-makers, citizens and others together to conduct integrated agricultural systems research, to determine what that research agenda should be, and how it should be conducted and communicated.

Citizen Participation

Current components of citizen participation effort in CIAS include:

1. Research projects with an on-farm component
2. Involving citizens as members of research teams
3. Building citizen input into research agendas
4. Building citizen input into CIAS planning and decision-making (through the Citizens Advisory Council), and
5. Using citizen input to create new education and communications projects.

The twelve members of the CIAS Citizens Advisory Council serve four year terms and meet formally three times per year. They consult throughout the year informally, and also review CIAS research publications.

The idea of the Citizens Advisory Council builds soundly on the idea of the land grant university as a citizens' university devoted to solving the practical problems of ordinary citizens and providing post-secondary education in the practical application of scientific knowledge rather than just the theory or philosophy behind it. As CIAS says, "Building clear communication between farmer/citizens and the university and ensuring citizens have direct input into research agendas were

among the goals of the Morrill Act when it created the land grant system in 1862"[4]. The land grant universities in practice have significantly departed from this mission in the nearly century and a half since 1862. CIAS with its strong emphasis on formal citizen input might be said to represent a return to the original land grant mission. Where CIAS is breaking newer ground, however, is in its approach to on-farm research by the state's farmers, right alongside continued research by the professional staff. CIAS thus offers an alternative to the "cult of the trained expert" or to an exclusively "top-down" approach to research. This latter is in keeping with the trend in sustainable agriculture across the nation today, wherein on-farm research is accepted and "bottom-up" thinking encouraged.

CIAS staff seeks early input and frequent feed-back from the Citizens Advisory Council and treats Council and other public input as integral to its decision-making. The Council members, in turn, recognize and respect the university's administrative authority and, as well, the faculty's academic freedom.

Research Teams and Multidisciplinarity

Multidisciplinarity is also a critical goal of CIAS, and the nine-member entity, the Faculty Associates, is the vehicle to achieve this goal. Given that the goal is to approach and integrate agricultural sustainability with rural community development, multidisciplinary research, and emerging issues in agriculture, Faculty Associates currently include faculty from agricultural economics, plant pathology, family and consumer communication, dairy science, sociology, zoology, soil science, and agronomy.

The highly regarded multi-disciplinary approach of CIAS is perhaps best seen in its building of research teams. These teams involve farmers, extension specialists, food system practitioners, non-profit organizations, and farmer networks, among others, in addition to university researchers. The research system is sufficiently flexible to build in:

- team members' diverse perspectives,
- the changing nature of their perspectives as work progresses,
- balanced role reversal (for example, in on-farm research explorations, farmers and non-profits on the teams direct the studies and university scientists offer advice and assistance, while on the experiment station projects, scientists take the lead, with advice and assistance offered by farmers), and
- diverse research approaches (applied, basic or adaptive in focus, short or long-term in scope, and integrative of the biological and social sciences and the humanities).

This multidisciplinary research approach at CIAS has sponsored research on agricultural tourism; pastured poultry; grazing-based dairy systems (especially for farmer entry); support for the nationally significant Wisconsin Integrated Cropping Systems Trials; community supported agriculture (CSA); and reduction in state-wide pesticide use.

Programs of Education and Research

CIAS' work focuses programmatically on eight areas:

- sustainable livestock production and marketing systems (including grass farming and rotational grazing)
- fresh produce production and direct marketing systems
- grain production and direct marketing systems
- institutional participation in regional and local food systems
- specialty crops and value-added enterprises
- urban food systems

- food systems analysis
- pesticide use and risk reduction.

CIAS programming includes operation of the Wisconsin School for Beginning Market Growers and the Wisconsin School for Beginning Dairy Farmers.

The less well known School for Beginning Market Growers emphasizes sustainable production methods and direct marketing. It focuses on start-ups in small-scale vegetable production and marketing. Combining knowledge from both experienced growers and UW faculty, and using a holistic approach to the subject of market gardens and small farms and their operation, the School organizes intensive three-day programs and full-day mini-workshops. Bringing in three experienced growers (and therefore three different farm case studies), topics covered include capital, management, labor and marketing issues, and, as well, soil fertility, crop production, plant health, pest management and cover crops. The farms used as case studies vary in scale, cropping mix, marketing strategies and growing methods. Some special topics seminars are run for experienced growers as well. Philosophically, this is a model of horizontal or lateral and certainly non-hierarchical education. It operates from the assumption that everyone has something to teach from their own experience. It does not use a top-down hierarchical model of "experts" teaching students, and thus is in keeping with the broader philosophies of sustainable agriculture as described throughout this book. The School reports that it relies primarily on the work of experienced practitioners as teachers - this is the main theory of the School. All students, however, receive Vermonter Vern Grubinger's text, *Sustainable Vegetable Production*, the "Growing for Market" newsletter, publications and assistance from the ATTRA (Appropriate Technology Transfer for Rural Areas) program, and a selection of publications in small-scale farming, small-scale vegetable production, and direct farm marketing.

CIAS' program also includes the well known Wisconsin School for Beginning Dairy Farmers, a school which is specifically designed to attract young people into dairy farming, especially employing the practice of management intensive rotational grazing. This is the only school of its kind in the United States that employs experienced dairy farmer practitioners as teachers. The School has four objectives:

- to identify strategies for recruiting beginning dairy farmers from non-farm as well as from farm backgrounds,
- to use training approaches that creatively combine the theoretical and the practical, and make effective use of farmer-mentors and on-farm internships,
- to provide programs that help beginning farmers receive academic certification and earn income from meaningful farm jobs and apprenticeships,
- to build organizational capacity to oversee ongoing training and employment pathways as is done in New Zealand (where CIAS staff developed this concept).

The program of the School combines on-farm experience and in-class learning. It brings farmers, researchers and students together and helps students bridge the school-to-work transition. It prepares graduates for careers in grass-based dairy or livestock farming, and it provides significant follow-up support in the form of seminars, networking internships and short-courses (with scholarship support for the latter).

Also noteworthy in Wisconsin is the county-level Trempealeau County Beginning Farmer Program. Specifically geared to beginning dairy farmers, it involves a three year mentorship on a farm, lodging on the county-owned dairy farm, and salary, in return for labor and management. After one year, the program purchases fifty heifer calves for the beginner farmer to care for and to breed. At the end of the three-year apprenticeship, the beginner farmer graduates with a strong education and

training, with those fifty bred heifers as equity. This equity in cattle can serve as a down payment for a farm of their own. Staff assist graduating beginner farmers with finding a farm to rent or purchase in order to begin farming and housing the fifty bred heifers. UW Extension plays a key role in this program, although CIAS itself is not directly involved.

An exploration of the themes and sub-themes of CIAS research, as listed in the publication "CIAS Achievements for 2001-2002", yields clear insight into what CIAS is about and the philosophies and values governing its work:

Theme 1: Explore and promote environmentally responsible farming systems

Sub-theme a: Research and promote cropping and livestock systems that reduce pesticides, energy, soil erosion, etc.

Sub-theme b: Evaluate economic and quality of life parameters for family scale farms and disseminate information to make these operations sustainable

Sub-theme c: Research the effects of pesticides on environmental, animal and human health

Theme 2: Analyze critical links and relationships in food systems

Sub-theme a: Link production and marketing research for high quality, high value food, e.g., organic or grass-based

Sub-theme b: Evaluate production, economics, food quality, and consumer demand related to alternative markets versus commodity markets (for instance, institutional buying of sustainable food)

Sub-theme c: Evaluate the regeneration of mid-size farms and food enterprises through marketplace and policy options

Sub-theme d: Explore market and policy rewards for farming systems that provide society with multiple benefits. These benefits might include decreased soil erosion, clean water, employment opportunities in farming, and attractive rural landscapes

Theme 3: Study and promote social change that will create opportunities to farm and eat sustainably

Sub-theme a: Link urban people with farmers and food entrepreneurs through direct marketing relationships and education about agriculture

Sub-theme b: Provide under-served people with opportunities to grow and eat food sustainably

Sub-theme c: Research profitable strategies and opportunities for getting started in farming and sustaining farm families[5].

CIAS has also been conducting research on pastured poultry, focusing on five small poultry farms in Wisconsin and Minnesota, each of which raises less than 5000 birds per year. This work has now expanded to ten additional farms in the 5,000 to 50,000 bird range. CIAS is also studying Wisconsin and Iowa efforts at collective marketing of pastured poultry products, and, as well, specialty cheese production. The general goal of this work is to understand the challenges and obstacles facing mid-size rather than very small-scale producers. Another goal is direct marketing, a campaign to "take back the middle", to eliminate the middleman. The middleman is typically engaged in processing, packaging, transporting and retailing. These functions are the domain today of large corporations. Re-capturing the income inherent therein for the farmers themselves, both at the small and medium scale, is critical to the farmer's very survival.

It was noted in a 1998 CIAS evaluation and assessment document by an outside reviewer[6] that the CIAS was more oriented to Wisconsin than was the university's conventional agricultural work. Therefore, CIAS is of direct benefit to the state's grazers and small-scale and organic vegetable growers (in contrast to service to larger farms, high technology methods and agribusiness). The groups directly served by CIAS have been traditionally ignored by the university, according to this report. Thus, CIAS answers to a political need within the state. The Center's method of work was also found to favor those researchers who take an interdisciplinary approach, who engage farmers in research, and who study whole farming systems. None of these areas of research have been previously served, and are often looked upon unfavorably.

This same 1998 document proactively suggested additional areas of activity, including:

- expanding direct marketing efforts beyond vegetables to beef, bison, deer;
- giving more attention to crops for specialty markets, including food-grade soybeans, small grains and brewery-quality barley;
- exploring opportunities for new small businesses in agriculture, such as contract harvesting and planting, so as to reduce capital needs of small farmers;
- giving more attention to how infrastructure (local canneries, cheese factories, machinery dealers and feed mills) was lost, and how it might be retrieved;
- focusing political thought on the need for a more local agriculture;
- offering small competitive grants to farmers to test innovative ideas on-farm, including the model established by Practical Farmers of Iowa (PFI).

Necessary to an understanding of the work of CIAS is their approach to research, namely, radially organized teams, and their significant effort at farmer/citizen participation in agenda setting at the land grant university. Both are atypical of modern land grant university approaches and both are in keeping with the philosophical values of the sustainable agriculture movement across the nation.

Radially Organized Teams as a Research Approach

To insure the involvement of both farmers and non-university organizations as research collaborators, and to communicate with broader segments of the public, including consumers, a radial model of research organization has been implemented which expands inquiry from a traditional disciplinary base to a systems level. This radial concept resembles a spoked wheel. The center or hub consists of a few systems-oriented collaborators who are connected to satellite researchers who focus on specific discipline-oriented problems. The spokes are the means of communication that connect the hub with the satellites and these include field visits, team meetings, progress reports, and phone and e-mail networking. Though simple in concept, this research methodology is highly unusual in practice. It has enabled research coordinators to attract a wide range of university and non-university participants. The group at the hub might meet four to six times per year, while the entire team, hub and satellites, might meet twice per year. With these research methods, a broad understanding of the biophysical and the socio-economic dynamics of the farming systems under study is possible. And broad acceptance of the research results is facilitated among all affected parties in the society[7].

Farmer-Citizen Participation as a Research Approach

The effort to obtain farmer-citizen participation in the Center and its programs, including research, is achieved through advisory/oversight councils which set the research agenda. Inherent in this concept is the belief that citizen farmers, and particularly successful ones, have much to teach (considering such farmers as "master craftspeople", an approach from the earliest days of the land grants). The college farm was originally seen as the principal pedagogical tool. Taking seriously the idea of farmers as teachers, CIAS was founded with an eleven member advisory committee. At least half the membership consists of practicing farmers with considerable experience in low chemical agricultural practice. For their part, Council members, who are advisory only but who

confer frequently and are well used, are required to recognize the administrative authority of the university and the academic freedom of its faculty. For its part, the Center and its staff treats public input seriously and seeks it early and frequently. Interaction between the two is high, and to help insure this, Council members' spouses are encouraged to attend meetings with their expenses paid, and an honorarium is paid to all farmer members to help cover their labor costs while they are away from the farm. The Council is becoming a strong advocate of integrative holistic approaches to the work of CIAS[8].

To communicate with the public, CIAS publishes a series of "Research Briefs" which indicate the range of its work and interests. In addition to those titles published about the Schools for Beginning Dairy Farmers and Market Gardeners, there are briefs on:

"Starting Your Own Dairy Farm"

"Managing a CSA Farm 1: Production, Labor and Land"

"Managing a CSA Farm 2: Community, Economics, Marketing and Training"

"New Markets to Producers: Selling to Colleges"

"Wisconsin Grazing Networks: A Status Report"

"Dairy Grazing Can Provide Good Financial Return"

"CSA: More for Your Money Than Fresh Vegetables"

"Cropping Systems Trial Provides Unique Analysis"

"Pastured Poultry Study Addresses Broad Range of Issues"

"Dishing Up Local Food on Wisconsin Campuses"

"New Markets for Producers: Selling to Colleges"

"Community Kitchens: Key Elements of Success"

The Wisconsin Integrated Cropping Systems Trial

The Wisconsin Integrated Cropping Systems Trial (WICST) is an unusual long-term project in which CIAS has an important role. The trial occupies two sites in southern Wisconsin. This is an ambitious and unusual project, a blend of systems research with direct farmer guidance. Its purpose is to determine if environmentally beneficial crop rotations can improve farm profitability. It also creates a physical site where serious discussion on contrasting views and philosophies about sustainable agriculture can take place. It is a common meeting ground where one hundred one acre squares constitute a physical foundation for discussion. Conventional and organic farmers, big producers and little, are involved. Goals and aims of the studies include economic return, effect on the land, and social acceptance of the results. The real goals, however, are in the merging of philosophies. The whole constitutes, according to the organizers, a journey of the interaction of philosophies. WICST provides a place to come together and feel comfortable in philosophical disagreement.

Established in 1989 on university acreage in Walworth and Columbia Counties, WICST measures the profitability, productivity and environmental impact of six different cropping systems: three cash grain systems (continuous corn, corn-soybean, corn-soybean-wheat/clover), and three dairy forage systems (three year alfalfa-one year corn, oats/alfalfa-alfalfa-corn, and intensive rotational grazing). In addition to comparing the economic profitability of the systems, the study compares the systems' effects on soil fertility and structure, on weed populations, on ground water contamination, and on earthworm numbers. While the results of this study over fifteen years thusfar show that no

single system wins on every measure and that there are trade-offs, the results also clearly show that specializing in a single crop (i.e., monoculture) is costly. These results also show that lower input systems are better for the environment, and that lower input systems are not riskier than the higher input systems. The study results additionally show that leguminous cover crops are a viable alternative to purchased nitrogen (N) fertilizer; that forage rotations outperform cash grain rotations; and that high input management is the key to success. Among more specific findings were:

- that rotational grazing in particular, the most environmentally beneficial grazing system, stood out positively in a number of measures (soil ecology, soil conservation, nitrate leaching);
- that this and other low purchased-input forage systems were solid all-around performers equalling the highest input systems in profitability; and
- that organic management of these systems offers the potential for significantly enhanced profitability.

Management is the key here – it's all about management.

The results of these long-term trials conclusively indicate that management strategies which emphasize the long-term health of the resource base and, as well, system profitability, rather than crop yield, can be achieved by significantly reducing purchased chemical inputs. These are powerful and conclusive findings, especially for agriculture in the Midwest. And, for this study, the key is the success of the aforementioned CIAS research model and its farmer involvement (insuring greater likelihood of adaptation on the ground among farmers). Multiple collaborators with CIAS on WICST include the UW College of Agriculture and Life Sciences, the UW Cooperative Extension Service, local government, area farmers and, interestingly, the Michael Fields Agricultural Institute (described below), a private non-profit organization active with CIAS in other areas.

As one researcher colorfully put it, the WICST came to be a place where the "nozzle heads" and the "granola heads" could come together and talk. And the WICST team, including CIAS, could become an honest broker in addressing the divide between them. Among the statistically hard core findings of this study has been the conclusion that there is little yield from or economic justification for fine-tuning a continuous corn rotation, the least profitable system studied. And, further, that for an organic system to match the net returns of a "chem-lite" (i.e., reduced chemical) system would require consumer price increases of 6%. (In reality, actual certified organic premiums to farmers in the region have been significantly higher and range from 25% to 50% for corn and wheat and 200% for soybeans. Thus, organic product can easily sustain the 6% price increase and readily overcome any market loss.) These findings alone fly in the face of current day agricultural philosophy in the Midwest (and the nation) which has prevailed in practice for half a century, and mark sustainable agriculture as clearly an alternative form of agriculture. (Helpful additionally is the farmer realization that, in conventional agriculture, farmers are simply losing to weeds.) WICST stands as a justification for both the importance of systems research in agriculture and, as well, the importance and value of long-term studies[9].

Michael Fields Agricultural Institute

CIAS collaboration (and broader UW collaboration) with the Michael Fields Agricultural Institute (MFAI) provides an interesting bridging of philosophies. If the land grant university can be seen, at least by its critics, as representing the "nozzle heads", then Michael Fields comes much closer to representing the "granola heads", with the university's CIAS positioned as a bridge between the two. The Michael Fields Agricultural Institute is rooted in the biodynamic agricultural theories and practice of the European philosopher and farmer Rudolph Steiner. While it incorporates what most people think of as "organic agriculture". Steiner's thought and Michael Fields' practice goes farther than that in its holistic approach to soil, to biota, weather, the seasons, farmer attitudes, and even spirituality.

Encouraged initially by Kellogg Foundation grant requirements which call for collaboration between the public university and a private non-profit organization, the Michael Fields Institute and UW are a rather unlikely combination but a very healthy one, and perhaps a portent of the future. But, then, the philosophical and values approach of Steiner and the Michael Fields Institute is inherently ecological, and the University of Wisconsin is certainly regarded as one of the world's great centers for and teachers of ecology (if, sometimes, the more reductionistic kind). So perhaps it should not be surprising that what could be the first bridging in the United States of these two philosophies, biodynamics and land grant reductionism, should occur in Wisconsin rather than elsewhere. Certainly these two institutions in Madison and in Troy, Wisconsin have been of great assistance to one another. The Institute's publications today do not make direct reference to biodynamic agriculture and Steiner thought. But they do show the Institute's commitment to soil fertility (acknowledging the management of organic matter as the key), to food quality and human nutrition, to animal health, to questions of agricultural ethics, and to strength of the human spirit, all Steiner approaches.

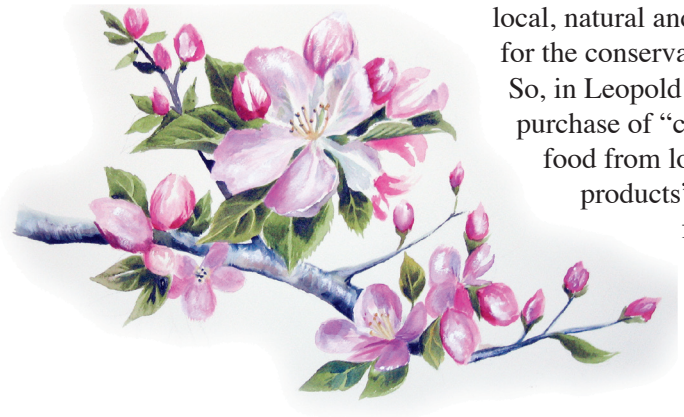
Michael Fields' involvement with CIAS and UW ranges widely through the areas of direct marketing for farmers, food systems, local and small-scale agriculture, agronomic practices (as in WICST), agricultural sustainability, and in UW's new effort toward a degree program in agroecology. Michael Fields' philosophy today might be summed up in the words of North Dakota farmer Terry Jacobson, as printed in Michael Fields' brochure: "The land speaks ever so softly, ever so persistently, in case we chance to listen – or fail to".

Another tangible area of collaboration between CIAS and Michael Fields (and the UW Agronomy Department) has been in the production of the Farmer's Guide and Resource to Quality Small Grains Production, which focuses on farmers not only in Wisconsin but also in Iowa, Illinois and Minnesota. This work, funded by SARE, is a strong rebuke of corn and soybean monoculture, hence a rejection of the status quo in today's conventional commercial agriculture. The work involves integration of high grade oats, barley and winter wheat, with emphasis on these three over corn and soybeans. The study is a forceful statement advocating for a far more holistic agriculture than the region now supports and it is a further indicator of CIAS' holistic values.

The UW/Michael Fields collaboration should be further strengthened by the advent of the new agroecology graduate degree program which will call for and reward student internships and thesis research for which Michael Fields can fulfill a very real niche. Michael Fields' location not far from Madison and especially close to the site of the WICST Field Trials has been a further asset strengthening this unlikely relationship.

Food Systems: Philosophy and Practice

Our shopping basket tells us, and everyone else, what we support. In the language of Aldo Leopold, we might ask ourselves the question, are we purchasing "conservation products" or "exploitation products"? If we are in the mainstream food and other retail markets today, we are likely purchasing exploitation products, that is, products which are temptingly inexpensive because they depend upon and are enabled by the exploitation of people, present and/or future generations, and/or the natural ecosystem, all or some of which have already paid part of the price. It is the purchase of more appropriately priced "conservation products", including local, natural and/or ecologically grown foods which provides for the conservation of ecosystems and the well-being of people. So, in Leopold's language, we must make a choice between the purchase of "conservation products", including particularly local food from local sources, and the purchase of "exploitation products", which includes most of the product available from industrial agriculture.



The Michael Fields Agricultural Institute has a particularly strong interest in developing consumer-driven markets for local farmers

(including farmers markets, CSA, local sourcing by stores and supermarkets), in growing alternative markets and in forming market clusters, including local processing and value added. This ties in directly with CIAS and UW Extension programs. Such relates to the important CIAS work in local food systems and the recognition that such food systems are a fundamentally necessary foundation to the continuance of local agriculture because of their economic yield to the farmer. Nationally important work in this field is thus being done by CIAS in collaboration with the Department of Rural Sociology at UW.

The University of Wisconsin is "walking its talk" in activating a system which promises to bring near-term significant economic benefit to central and southern Wisconsin farmers, not only through encouraging campus food systems to seek locally grown food from area farmers but in working closely to achieve this end with the very large UW on-campus dining services which serves up many thousands of meals every day.

From CIAS Interim Director George Stevenson's Presidential Address to the Joint Meeting of the Agriculture, Food and Human Values Society and the Association for the Study of Food and Society, "Agri-Food Systems for Competent Ordinary People", one finds a strong critique of the consumer culture, a link between local food production and food coops, healthier farmer-to-farmer relationships to better enable direct and cooperative local marketing, and a list of criteria for what we should expect from the food we eat. Included in that food should be representation of ecologically responsible farming, ranching or fishing; of humane treatment of animals; of equitable market, trade and labor relationships; and food "through which we can encounter the real people who are responsible for growing, distributing and preparing it so that we can thank them and rejoice with them, and struggle with them when it is necessary, or struggle against them when it is appropriate"[10]. These encompass aesthetic and spiritual competencies and, although the conclusion of one person, likely are not far off the broader CIAS system of values.

Professor Jack Kloppenburg and CIAS staffer John Hendrickson join with George Stevenson to write of "economic exchanges conditioned by such things as pleasure, friendship, aesthetics, affective loyalty, justice and reciprocity in addition to the factors of cost (not price) and quality"[11]. These writers, all key figures in CIAS for many years, adhere strongly to Wendell Berry's and David Orr's thinking that "… a fundamental principle of the foodshed is the need for secession. The principle of secession is based on a strategic preference for withdrawing from and/or creating alternatives to the dominant system rather than challenging it directly"[12]. And they note "This is essentially what grazier groups are engaged in as they rediscover their own indigenous capacity for producing the knowledge they need to be 'grass farmers' and as they withdraw from the agri-business firms and agricultural scientists who had been doing their thinking for them"[13]. These authors themselves make the direct link to Aldo Leopold and contend that such constitutes "thinking like a mountain", to use Leopold's famous phrase. Wanting to take an opposite tack from academic and popular analysts of food and agriculture, Kloppenburg, Hendrickson and Stevenson, three architects of CIAS, focus on people rather than on business, on solutions rather than on problems, and on local/regional rather than on national/international frameworks. They envision a sustainable food system as "… relational, proximate, diverse, ecologically sustainable, economically sustaining, just/ethical, sacred, knowledgeable/communicative, seasonal/temporal, healthful, participatory, culturally nourishing, and sustainably regulated."[14]

CIAS' activity in Community Supported Agriculture, a form of direct marketing, is further enhanced by the Center's involvement with the University of Massachusetts and two other East Coast entities, the New England Small Farms Institute and the Robyn Van En CSA Center at Warren Wilson College in North Carolina, to study more than 1000 CSA farms in the U.S. This was the only statistically definitive CSA study done to that time and has helped to elevate UW's interest in and CIAS' role in this emerging new area of sustainable agriculture.

To understand the viewpoint and value system of these writers on agriculture and food systems is to understand the value system of CIAS, implied if not explicit, and to understand the value system of a good deal of the sustainable agriculture movement, within and outside the land grants. It is also to understand the tensions that exist between "elitism" on the one hand and attention to poverty,

race and related subjects on the other. It is to understand the tension that can easily enter the discussion over activism vs. academic pursuit, especially when it comes to focusing on the food system vs. focusing on food production. And, finally, it is to understand the tension between the large-scale dominant reality in agriculture, the small-scale which is all too often completely ignored, and the disappearing middle between the two, a point further discussed in the chapter on Iowa.

> ***"All life is grass, because all life depends on what grass can do."***
>
> ***Ecclesiastes***

Wisconsin Extension

There is close linkage between CIAS and some parts of the UW Extension system, including Extension headquarters on campus in Madison and a number of counties in the south-central region of the state, Dane, Columbia and Sauk (Baraboo) being the most notable.

Perhaps the most prominent and obvious connection lies in the sustainable agriculture work of Laura Paine in Columbia County, whose monthly series of published Extension articles gives clear indication of her interests and work in sustainable agriculture. Her writings in recent years include grass farming and intensive rotational grazing, including an interest in grazing networks, grazing's contribution to wildlife habitat enhancement, stockpiling pasture, cattle and streams, the future of dairy farming in the state, new farmer entry, honoring Wisconsin's "green gold" (her term for pasture), and even a piece entitled "The (Grass) Farmer as Conservationist: Aldo Leopold's Legacy". In the latter she, like Leopold, situates land health, and not forage, crop and animal management, as the important consideration, the central ideal. Paine writes "A primary theme in Leopold's writing was encouraging farmers to take pride in the fact that their farms harbored many and diverse species of wildlife and native plants and to view this as a reflection of good land management. Leopold argues that 'The landscape of any farm is the owner's portrait of himself'"[15]. If Leopold were writing today he would undoubtedly write in non-sexist language, not to be politically correct but to acknowledge that so many farmers today, and likely the majority practicing sustainable agriculture, are women.

UW Extension is more broadly involved in the promotion of managed grazing, and sponsors promotional programs and publications to encourage farmer entry. (Nearly a quarter of Wisconsin dairy farmers are now using managed grazing, and over 50% of new entries to dairy farming are using managed grazing, suggesting a sizeable movement in this direction very soon, since land for pasture is not a limiting factor in Wisconsin.) One of Extension's publications, "Greener Pastures", asks the question, "Is managed grazing right for your operation?", and provides a useful checklist of questions to help particularly the small to medium dairy operations to decide. It is because of

programs like this that grazing has taken off in the Dairy State and now involves over 20% of the state's dairies, a true mark of sustainability.

Another source of support for managed grazing is the work in Wisconsin of the Great Lakes Grazing Network, including particularly UW's Center for Dairy Profitability and its Dairy Grazing Farms Financial Summary Report (informally called the Kriegl Report after its lead author, Professor Tom Kriegl)[16]. In addition to demonstrating the financial soundness of grass-based dairy, the report definitively points out the higher profitability of small grazing herds (under 100 cows) over larger herds (over 100 cows). If there are losses in the shift from animal confinement to pasture, these losses accrue to the fertilizer and equipment businesses. They, and for the most part older confinement-invested farmers, constitute the bulk of pro-confinement attitudes. As energy and other capital costs rise, however, the shift away from confinement accelerates.

Paul Dietmann's Extension work in Sauk County (Leopold's Baraboo) is based on assisting small growers, and emphasizes direct marketing, value added through processing, and assistance to low income and senior citizens. Dietmann focuses too on the important role that the WIC (Women, Infants and Children) funds available to lower income people can be to farmers, often netting them as much as an extra $80 per week in sales. And he promotes biodiversity on farms and economic diversity in the markets, and assistance in farmer transition to both direct marketing and high value organic farming methods. But most important to Dietmann is the high value of success for small farms. Small-scale farmers can try methods that others can't, with much less risk. He believes that that's where our sustainability models have come from and will come from in the future. Thus, it's very important to work with small farms and learn from their creativity and inventiveness.

Further Extension work along these lines, particularly with reference to small-scale grass-based dairy, is the work of nationally known County Agricultural Agent Vance Haugen of southwestern Wisconsin. Haugen's fame comes from two sources: his refinement of the art of the pasture walk, a demonstration technique which is becoming very popular among graziers and farmers seeking to transition from cow confinement to grass farming; and the construction of low-cost dairy parlors to reduce net capital investment. The beauty of his low cost milking parlors is the ability to put in new small milking parlors in older barns which thus saves the barns and helps older farms and older farmers at low cost. Haugen's goal is to help initiate a new farmer system in the state that is not costly in terms of capital expenses and provides a quick return on investment as the animal numbers rise. And while this area of Wisconsin is too distant from markets to enable much focus on direct marketing, nevertheless the area supports some of the most significant certified organic and CSA operations in the state (Organic Valley Dairy at LaFarge and Harmony Valley Farm at Viroqua, respectively). But Haugen's passion is the art of the "pasture walk" (i.e., a group walking tour of pastures), and he has fine-tuned this technique to a high degree. Haugen has a strong social justice as well as a strong sustainability ethic and his rotational grazing and milk parlor work strongly reflect this value system. Haugen is regionally and even nationally famous for his work and is widely influential. The development of such a reputation is an unusual feat for a county agricultural agent anywhere.

Paine, Dietmann and Haugen are all examples of a sustainability work ethic in the UW system which lies outside the purview of CIAS, from which CIAS could gain and learn. And their work is clear evidence, too, that agricultural sustainability philosophy and practice in the UW system is not limited to Madison.

As has been suggested, a weakness of CIAS has been its inability to influence much of the state outside of Madison. While some county agricultural agents are clearly open to and partial to CIAS and its values, they may (and frequently are) oriented to these values quite apart from any influence that CIAS might wield. Then there are county extension agents elsewhere in Wisconsin who pay little attention to CIAS and who perchance do not share CIAS values – they remain less influenced.

Teaching

CIAS has no authority or mandate to offer degrees or teach courses. But there is a contemporary effort to establish a graduate degree program at UW, a Master's degree in agroecology. And there

is so much philosophical overlap between this academic faculty effort and CIAS personnel that the two can't help influencing one another and having some interrelationship. Such an interrelationship could round out CIAS' role in the university by, at some point, giving it a teaching mandate and a curricular involvement.

A number of CIAS-associated UW faculty have written a vision statement, "Defining a Curriculum in Agroecology", a basic document to support the new Master of Science degree in this field. The degree would be interdisciplinary but largely housed in Agronomy. "Agroecology" here refers to the study and practice of devising and implementing interfaces between agriculture, the biosphere and the broader society, grounded in the belief that the agricultural endeavor is understood to emerge at the nexus of technology, natural resources and human values. In addition to a base in technical principles of agriculture and conservation, this new program requires knowledge of complex systems and their behaviors; an appreciation of the capacities and limits of human knowledge; and respect for the role of both political processes and moral values in public policy. Distinctive to agroecology, and absent from conventional agricultural science and economics, is the acknowledgement of limits to human knowledge and the need for a place for moral valuation. Equally different is the high priority given in agroecology to necessarily interdisciplinary knowledge as a requirement to understand complex systems, and the lack of such priority in reductionistic conventional agriculture.

This new program will sharply depart from most academic degree programs in agriculture. It will, in practice, blend with CIAS and its established research and extension activity. The program is also expected to spawn new courses in such areas as comparative agricultural systems and, as well, to offer a non-thesis "social contract" option, namely, an opportunity to carry out a project with social value in lieu of researching and writing a thesis. Conventional agriculture at UW starts from the premise that the central challenge is development of technology to increase production in the purely quantitative sense and, as well, profitability for selected combinations of suppliers, food processors and producers. On the other hand, agroecology starts from the premise that this paradigm is no longer adequate or appropriate. The new UW program transcends the boundary of the conventional approach, emphasizing the study and practice of devising and implementing interfaces between agriculture and the broader society. Underpinning this vision are three central ideas: that farmland is increasingly multifunctional; that the appropriate role of science in decision-making is subtle and a topic of ongoing discussion; and that stakeholder participation in environmental management is essential for both identifying and implementing the wisest choices. UW sees this program as a way for colleges of agriculture to anticipate their changing roles in postindustrial society, according to UW soil scientist Professor W. L. Bland in his paper "Agroecology – A Wisconsin Perspective"[17]. The SARE-funded State Sustainable Agriculture Professional Development Program is outside of CIAS but is an adjunct complementary effort at sustainable agriculture at UW. This program is highly aligned with CIAS goals and values, given its emphasis on bringing new people into agriculture; on developing a central source of organic/sustainable agriculture information; on developing local and state-wide farmer/producer networks; and on developing grants and loans for financing in-state agricultural production. There is also a goal of ensuring consumers a safe wholesome food supply from in-state sources, and maintaining a very high stakeholder (including farmer) involvement. County agricultural extension agents are directly involved, and even University of Wisconsin-system undergraduates are formally networked into the program.

All of the above is a product of the positive sustainable agriculture climate in which CIAS conducts its business.

Environmental Studies as an Alternative Path

An emerging phenomenon on some land grant campuses which is important to an understanding of the progress of sustainable agriculture theory and practice on these campuses is the increased interest in agriculture of graduate and undergraduate students in the Environmental Studies degree programs and institutes. Until relatively recently, Environmental Studies programs were focused on traditional environmental issues (pollution of water, air, land) and on matters related to forests, parks, wildlife and wilderness. They rarely dealt with agricultural questions. In some cases they

have even been averse to agriculture, having in mind the ecologically destructive industrial model. Such prevailed from the 1960s through the 1980s. About 1990, however, an interest in agriculture, farm land use and local food systems began to emerge in these programs, and their students and faculty felt freer to pursue objectives in what has become the agrarian model of agriculture. This freedom refers to a broadening of the culture of environmental studies (and sometimes natural resource management) to accept agriculture and farming as a legitimate object of study. It also refers to a realization that those students and faculty in traditional agricultural departments and programs (agronomy, animal science, soils, crop science, agricultural economics) were not moving in these ecological directions. In fact, it was noted in some states and land grants that traditional agricultural scientists, both natural and social scientists, were becoming scarcer as their positions were increasingly occupied by molecular biologists, geneticists and resource and environmental economists with no agricultural interests. Hence, significant agricultural attention was beginning to shift to these environmental programs, partly as a result of changing philosophy and partly by default. In some cases this shift is having a beneficial effect on traditional agricultural programs which, though much smaller today, are beginning to experience a conversion. For purposes of this study it will be seen that the above scenario has been the experience of Wisconsin and Vermont and, to a lesser extent, Iowa State. All of these institutions have seen a marked increase in agricultural scholarship in the form of undergraduate senior and honors theses, Master's theses, doctoral dissertations, and course opportunity in their broad-based environmental studies programs. Indeed, such programs can and often do provide a direct linkage between environmental humanities/ environmental literature with agriculture, raising important ethics and values questions along lines represented by the work of Aldo Leopold.

There are some courses within these programs, undergraduate and graduate, which directly or indirectly support sustainable agriculture. These might include course work in sustainable development, conservation biology, land and water resources, if not courses directly focused on agriculture or agrarian values. A more direct opportunity for course work, however, comes through registration in independent study where work in sustainable agriculture may be specifically undertaken for degree credit. A study of the extent of this practice would be difficult to carry out. More easily assessed, however, and ultimately more significant, is the focus of Master's theses and doctoral dissertations on topics in sustainable agriculture.

A study of "Environmental Studies" recent graduate research at UW yields such titles as:

"Alternative Marketing for Wisconsin Farmers: Moving Toward a More Sustainable Food System"

"Why Wisconsin Farmers Decide to Farm Sustainably: A Question of Strategy and Values"

"An Evaluation of the Sustainable Agriculture Demonstration Program of Wisconsin"

"Exchanging Knowledge, Building Community: Farmer Networks in the Sustainable Agriculture Movement"

"Systems Agriculture"

"Ecological Analysis of Wisconsin's Food Systems"

"Food Security and Local Agriculture"

"Investigating the Sustainability of Agricultural Land Uses"

"Defending the Land: Sustainable Agriculture in El Salvador"

"Toward a Community Supported Agriculture: A Case Study of Resistance and Change in the Modern Food System"

"Exploring Minds on Changing Farms: A Case Study of a Grass Farmer Network in Southwestern Wisconsin".

Being in Environmental Studies, these are all outside the College of Agriculture. A number of Environmental Studies faculty are listed as having research interests in sustainable agriculture. Although most of this work enters through the portal of social science, some also enters through ecological thought and through ethics and values concerns, both of which suggest the newly developing humanities' approach to agriculture about which Wendell Berry so eloquently speaks.

According to the Institute of Environmental Studies (IES), an increasing number of IES students are electing to choose courses in sustainable agriculture to fulfill their degree requirements. The number of IES graduate students choosing sustainable agriculture Master's theses and doctoral dissertation topics is also increasing, making IES an important secondary UW node for sustainable agriculture scholarship. About 10% of 30 to 35 M.S. students in the Environmental Studies Conservation Biology option are doing research in domestic sustainable agriculture topics. About 10% of 100 M.S. and Ph.D students in the Environmental Studies Land Resource option are doing likewise. These figures are more than comparable to sustainable agriculture degree activity in the entire College of Agriculture – all departments – making IES today the premier center at UW for graduate study in sustainable agriculture.

The CIAS Team Reflects on CIAS and Sustainable Agriculture at UW:

Some of the key figures at CIAS are "converts" from conventional agricultural backgrounds. Most are senior faculty, highly competent, and solid. They are good leaders, tough, courageous, competent, not afraid to speak their mind.

Margaret Krome is a long-time outside citizen activist, advisory board member and early designer of the CIAS structure, former Director for the now defunct Wisconsin Rural Development Center, and presently a lobbyist for the Michael Fields Agricultural Institute. She reports that soil scientist Dennis Keeney's late 1980s departure from UW (to establish the Aldo Leopold Center at Iowa State), and the public clamor in Wisconsin for greater responsiveness from the university to the agricultural community, both laid the groundwork for the sustainable agriculture initiative and the resultant birth of CIAS at UW. A key aspect of this history was the establishment of the Citizens' Advisory Panel with its mandated mix of membership. Another early recognition was the need for an external outreach program, initially filled by the Nutrient and Pest Management Program (NPM) which unfortunately today is fully separate from CIAS. (However, there is now a possibility of a reunification through the new eco-label potato program, a program funded through a court decision which awarded NPM $500,000 to find pesticide alternatives, money whose delivery was assisted by CIAS). But Margaret Krome does worry as to whether there will be sufficient farmers to heed the call for a return to the land. The loss of farm culture and expertise we've experienced through recent decades and the continuing low cultural opinion of farmers and farming (what Wendell Berry calls prejudice against country people) still evidenced by many individuals and institutions are detriments to a return to the land which Krome and others would like to see.

George "Steve" Stevenson, intermittently Interim Director of CIAS and present from the beginning, reflects on the lack of a teaching mandate for CIAS and the lack of any sustainable agriculture degree curriculum at UW. Stevenson recognizes an endowment of strong leadership at CIAS but believes it's been significantly marginalized. This marginalization is caused by virtue of the small total economic value of the farms actually served by CIAS compared to the total value of agriculture in the state. It is further caused by philosophical differences, by lack of respect for small scale farming, and by a feeling of instability and impermanence associated with that kind

of agriculture, at least as seen by critics. Additionally, there is only a weak recognition of CIAS outside the city of Madison and Dane County .

Stevenson notes the evolution of CIAS from its original core focus on intensive rotational grazing to a broader effort involving beginner farmer work and whole systems approaches, pasture poultry, certified organic, CSAs, and farmers markets and other forms of direct marketing. The philosophical and substantive base in intensive rotational grazing came from the ideas of Andre Voisin of France and Vermont's Bill Murphy, and less from Allan Savory's concepts of holistic resource management (HRM), the latter of which are more dominant in drier regions to the west and, as well, more associated with meat than dairy production. Joel Salatin's thinking is beginning to take hold with poultry and with smaller farm systems, according to Stevenson. CIAS has a strong affinity for helping small farms, the only response of UW to this need in the state. The dramatic increase in rotational grazing in Wisconsin dairy operations is one big success of CIAS (over 20% now practicing some rotational grazing). (I would suggest, however, that the fact that the university does not rotationally graze its own herds at all, but uses confinement exclusively, reduces the credibility of the university, making any university advocacy for these systems weak. Other land grant universities are in the same situation and face the same challenges.) Ironically, CIAS became a flagship for grazing over confinement, and also for farmer-driven research and for farmers taking the lead, thus placing it somewhat opposite to the university of which it is a part, but, at the same time, deflecting farmer criticism from the university.

Stevenson also notes that political and budgetary threats are likely forcing sustainable agriculture in general and CIAS in particular to compromise or show the appearance of compromise with the more powerful conventional agriculture. But the weakening of conventional agriculture through the implosion it is experiencing (including some reduction in investment in biotechnology) may provide an interesting opportunity. (I observe that some compromise is possible at the periphery but not likely at the core, given fundamental philosophical differences between agrarianism and industrialism. Farmers in the process of transitioning from one philosophy to another are, in practice, at a stage between the two, however.) One of the ways out of the dilemma is a strong commitment to the "agriculture of the middle" and, in connection with that, "alternative certification" such as the "Protected Harvest" program. The new Master's degree program in Agroecology also promises some protection for this work and some new opportunity for growth for both sustainable agriculture at UW in general and for CIAS in particular.

Professor Josh Posner, UW agronomist, notes that big agricultural subsidies destroy the potential for new technologies which would aid sustainability; that big industrial agriculture doesn't go to the universities much anymore; that the industrial model in the U.S. can no longer compete with overseas competition; and that the chemical feed control specialists among the land grant faculties will face an increasingly tough time with the movement of this kind of industrial agriculture away. CIAS stands to gain from all of these developments, especially given that Wisconsin still has adequate infrastructure to support the form of agriculture reflected by CIAS. Posner does note, however, that mainstream sustainable agriculture techniques like IPM, nutrient management-nutrient cycling, imbalances of fertilizer manure build-up, industrial waste and soil fertility are all done at UW but outside CIAS, a lost opportunity for CIAS which further marginalizes the Center.

Rick Klemme, former CIAS Director and now Associate Dean, notes that CIAS is only a small portion of the College of Agriculture budget. He speaks of the importance of "sustaining the middle" in agriculture (i.e., serving 200-400 acre farms), and of helping to carry the "middle" through the next few years. (This is also a central goal at Iowa State's Leopold Center.) (There is an implication in this line of thinking that something is going to happen after a few more years which will somehow rescue whatever remains of the middle at that time – perhaps a food shortage and crisis of the type that Wendell Berry writes about but which few will discuss openly at this time). Klemme remarks that, like Vermont and Maine, two other states in this study, Wisconsin has low tolerance for the byproducts of industrial agriculture, plus a fair degree of activism and populism, enabling the extremes of those problems to abate, to somewhat take care of themselves. He sees the exploitation of niches as the only way for CIAS to survive, especially the food systems

niche which he sees as having great potential. He sees CIAS leadership as committed to real and deep change, not cosmetic or superficial change, and believes that CIAS can be assisted by the only sustainable agriculture organization in the state, the Michael Fields Institute.

Professor W. L. Bland, UW soil scientist, is aware of UW's limited ability to change (which is not unlike the circumstance of any large public university). Using integrated assessment models from climate change and environmental management cases, he came to realize that future agriculture would be negotiated between farmers and other interests, a thought likely not given much attention by the conventional agriculture faculty. He believes that the expansion of the "option space" for decision-making is important and that this is enabled by the negotiation approach. Professor Bland is involved in the new agro-ecology Master's degree effort and is committed to a professional degree with a social contract (i.e., a non-thesis option) as an alternative to a conventional research thesis. He also sees new courses in comparative agricultural systems as coming down the pike.

Professor Gerry Campbell argues that the very concept of on-farm research is more important than the subject matter it chooses to address; that the community support base needs to be nurtured to support successful community development; and that on-farm research and its allowance, support and encouragement is an important part of this community support base. Professor Campbell, an economist and community development specialist with deep roots in Extension, is especially sensitive to the long-term personnel problem of the loss of good people overseas into international agriculture (not so much because of an interest in overseas work or international agriculture but because they could practice their values there, something they could not do professionally in this country). This emigration of such non-reductionistic (i.e., more holistic) natural and social scientists ultimately strengthened the hand of reductionistic science thinking, and weakened holism, virtually by default.

The newest member of the team is the new Director of CIAS, Brent McCown. His desires are shaped largely by CIAS' need to survive through a difficult time. His concerns are five-fold:

1. stability/survival of CIAS in the face of very serious budget cuts (or CIAS elimination);
2. the criticism of "elitism", especially in the area of food systems;
3. the economic stability of farms and farmers working under the principles of sustainable agriculture (a question at least partly answered by the current lack of stability in the conventional agriculture system);
4. the fear of the political danger of "putting down" the conventional system;
5. the question "Should we act alone or in concert with others?" when it comes to dealing with budget cuts, big commercial farmers, corporations and politicians who are influenced by all of the above.

Many critical issues do not appear in this list: the instability of the status quo; the land grant university's mission to small-scale farmers, to low-income people, to women, to new farmers and others who might in any way be disadvantaged; keeping people on the land; and farmer debt reduction and economic security. All of these arguably should be goals of sustainable agriculture, and thus of CIAS.

The new CIAS Director has his work cut out for him. The University of Wisconsin sustainable agriculture efforts, both inside and outside of CIAS, appear to bring to fruition in the early 21st century the thought of the late 19th century's Progressive Era and its offspring, the "Wisconsin Idea", applying it to both Aldo Leopold's land ethic and the needs of the contemporary world.

As Leopold's star continues to rise over a half century beyond his passing, the University of Wisconsin, operating in his shadow, cannot help but be measured, at least in part, against his philosophy.

CIAS is at the very center of Leopoldian agricultural effort in Wisconsin. It is now appropriate to view another version of Leopoldian land ethics as applied to food and farming, namely, the work of Iowa State University and its Leopold Center for Sustainable Agriculture, guided and led in its formative years by Wisconsin soil scientist Dennis Keeney who left Madison to take over the reigns in Ames.

ENDNOTES:

1. Perspectives: A Background Document (Madison: CIAS/UW, 1998), p. 1.
2. ibid.
3. ibid.
4. ibid.
5. CIAS Achievements for 2001-2002.
6. "Opinions and Perceptions Regarding the Center for Integrated Agricultural Systems: Summary of Interviews" by William Lockeretz, May 14, 1998.
7. For a detailed treatment of this topic, see "Addressing the Challenges of Sustainable Agriculture Research and Extension at Land Grant Universities: Radially Organized Teams at Wisconsin" by G. W. Stevenson, Joshua Posner, John Hall, Lee Cunningham and Jan Harrison, *American Journal of Alternative Agriculture*, Vol. 9, Nos. 1 and 2, 1994, pp. 76-83.
8. For a detailed treatment of this topic, see "Advisory/Oversight Councils: An Alternative Approach to Farmer/Citizen Participation in Agenda Setting at Land Grant Universities" by G. W. Stevenson and Richard M. Klemme, *American Journal of Alternative Agriculture*, Vol. 7, No. 3, 1992, pp. 14-20.
9. For full details on WICST, see "Comparing Upper Midwestern Farming Systems: Results from the First Ten Years of the Wisconsin Integrated Cropping Systems Trial (WICST) (Madison, Wisconsin: CIAS-UW, and Troy, Wisconsin: Michael Fields Agricultural Institute, 2000). Also see CIAS Research Brief #43, 1999.
10. G. W. Stevenson, "Agri-Food Systems for Competent Ordinary People", *Agriculture and Human Values* 15, 1998, p. 207.
11. Jack Kloppenburg, Jr., John Hendrickson and G. W. Stevenson, "Coming into the Foodshed", *Agriculture and Human Values*, Summer, 1996, Vol. 13, No. 3, p. 37.
12. ibid., p. 38.
13. ibid.
14. Jack Kloppenburg, Jr., Sharon Lezberg, Kathryn DeMaster, George W. Stevenson, and John Hendrickson, "Tasting Food, Tasting Sustainability: Defining the Attributes of an Alternative Food System with Competent Ordinary People", *Human Organization*, Vol. 59, No. 2, 2000, p. 177.
15. Laura Paine, UW Extension Columbia County Newsletter, July, 2000.
16. Tom Kriegl, Dairy Grazing Farms Financial Summary Report (Madison: UW Center for Dairy Profitability).
17. W. L. Bland, "Agroecology – A Wisconsin Perspective" (unpublished paper).

"Conservative agriculture is agriculture which conserves. It is agriculture which accepts and recognizes the organic nature of agriculture rather than an industrial model. It is an agriculture which reflects its base in ecology, its biotic quality. It is agriculture which produces food for local people, which is predicated on local production for those people, wherever it occurs. It is agriculture which provides security of food supply. It is agriculture embedded in a land ethic."

John E. Carroll
of New Hampshire

Chapter Five: Iowa

The Leopold Center for Sustainable Agriculture is the core of the sustainable agriculture effort at Iowa's land grant university. It is the only significant effort in Leopold's native state to honor him by name and the only effort in the United States to focus on his role in agriculture. Most other efforts to honor Leopold are directed to his better known roles in wilderness, wildlife management, forestry, environmental ethics and philosophy. Leopold the ecologist was concerned about the land itself and its ability to support wildlife and vegetation. The farmer in Leopold was concerned about yields and efficient livestock production, as well as the impact of such production on soil and water quality. The Leopold Center reinforces this combination. As the centerpiece of the Iowa land grant's work in sustainable agriculture, the Leopold Center is worthy of close attention.

Historical Development of the Leopold Center for Sustainable Agriculture

Iowa legislator Paul Johnson has written, "During the 15 years he spent at U-W (University of Wisconsin) he and his family bought and began restoration of a run-down sandy farm along the Wisconsin River. Out of this experience came a series of essays that culminated in the publication after his death of *A Sand County Almanac*. What is written in that small book by an Iowa native has influenced me more than anything else I've read on conservation and was the source from which came the Leopold Center for Sustainable Agriculture"[1].

The history of sustainable agriculture at Iowa State is essentially the history of the Leopold Center for Sustainable Agriculture. And Paul Johnson, respected Iowa lawmaker, dairyman and former Director of the USDA Natural Resources Conservation Service (NRCS, formerly the U.S. Soil Conservation Service) was a key figure in the creation of the Leopold Center for Sustainable Agriculture. His statement reveals the direct link, not only through Leopold's Iowa nativity but philosophically as well, between Leopold and Iowa State's effort in sustainable agriculture. Lawmaker Johnson further establishes the tie in stating, "The uniqueness of our act lies in its calling upon all Iowans to develop a conservation ethic through a host of programs in research, education and demonstration"[2]. One might add to this the decision to reject the name "Center for Excellence in Groundwater", or an equally narrow and unimaginative title. He relates "We called it instead the Leopold Center for Sustainable Agriculture and we structured it the way we did because we actually wanted to make people feel uncomfortable. We wanted the Center to stir our consciences"[3]. That it did, as Johnson admits: "The ideas Leopold espoused are also the source of much discomfort over the center today"[4]. That was in 1988, and there is no less discomfort at the present time.

Johnson's remarks, indeed prescient, go a long way toward defining the Leopold Center. Johnson notes that one of Leopold's most popular courses was a farm wildlife management course and that his work was conducted with numerous farmers in central Wisconsin (and also, in fact, on his own sand county farm). Johnson writes that, for these reasons, among others, what Iowan Leopold wrote in his famous book, A Sand County Almanac, has influenced him. It was, he admits, the direct source of inspiration for the establishment of the Leopold Center.

The Leopold Center is viewed by Dr. Charles Benbrook, Director of the Agriculture Board of the National Academy of Sciences, as "the last great hope of our land grant colleges to regain a constructive role in helping farmers practice and profit from resource stewardship"[5]. According to Paul Johnson, the Center is the heart and soul of Iowa's 1987 Groundwater Protection Act. The Center resulted from the problems brought about by the farm crisis of the 1980s, as discussed in Chapter One, and the groundwater contamination issues (namely, excess nitrates from fertilizer application) that were making themselves known in the late 1980s.

Although established at Iowa State University, the Center is not a creature of ISU. It has an external advisory board, and receives most of its funding from fees on nitrogen fertilizer and pesticides, with the remainder from direct state appropriations. In the years preceding the Center's establishment, it became known that losses of fertilizer from Iowa farm fields were much greater than people were willing to admit, in fact, over 50% of all fertilizer applied to these fields. This meant a much greater ground and surface water contamination impact to society and greater economic loss to individual farmers. (It also meant a great gain to the fertilizer and chemical companies that manufactured and sold the nitrogen). The growing realization of such losses in the 1970s and 80s and the resultant groundwater impacts led to a climate which enabled the Center to come into being. Growing legislative suspicions and ISU's public insistence that this fertilizer loss and resultant contamination were not a problem (when in fact the university knew better) led to the aforementioned Groundwater Act and Leopold Center establishment as a political resolution of this problem.

A conflict over the location of the Leopold Center characterized the Center's beginning. ISU won that locational battle but was sufficiently distrusted by both legislators and farmers that the creation of an independent advisory board was the compromise. This board included some critics of ISU. There is a continuing debate as to whether university administrators should be on the Board, and whether or not their presence compromises true independence for the Board, in appearance as well as in fact. If the Leopold Center is to speak differently, to provide an alternative, then it has to have the power to do so, and to do so it must be independent. However, a countervailing argument could be made that, with university administrators on the Board, the Center is linked to a network of power whose stamp of approval could be useful.

The Groundwater Act of 1987, a landmark piece of environmental legislation, focused on farming's relationship to groundwater contamination. It is viewed as the most significant environmental protection law in Iowa. It is also the strongest statutory advancement of sustainable agriculture anywhere in the U.S. to that time. As an attempt to rely on research, education and demonstration programs to encourage farmers to alter management practices to reduce chemical contamination, the Leopold Center became the $65 million carrot to the development and implementation of sustainable agriculture techniques in Iowa. It was funded largely by the fees and taxes charged to manufacturers and users of chemicals, thus requiring them to pay for the programs intended to reduce chemical dependency. The Leopold Center thus became the major vehicle to demonstrate to farmers the benefits of changing farming practices.

"The idea had to be sold that it was possible to develop an agriculture in which progress could be measured by its independence from the extractive economy."

Wes Jackson

Rep. Johnson and fellow legislators who authored this legislation had, as their stated objective, to bring environmentalists and agricultural groups together to develop a major initiative on land stewardship. They sought acceptance of a conservation ethic by the landowner, to place Leopoldian thought at the forefront as a guiding principle, at least across the state of Leopold's birth. Dennis Keeney, first and long-time Director of the Leopold Center, says it's a reach to apply Leopold's

land ethic to today's agriculture. He recognizes the challenge of translating writings made in another time to today. And yet he still tells us that Leopold was one of the first people to use the word "sustainable" in conservation and in agriculture. However, seeing, as Leopold did, that land harmony is a vision and not an objective, and believing that sustainable agriculture fits the same mold, and is today's "land harmony", Keeney asks,

"So what does this mean to the Center, or to any of the outstanding public and private institutions for sustainable agriculture? For me it means that when a program is set up we cannot ask for precise outcomes and time frames. Instead the vision should be clearly articulated and the institution committed to long-term support of that vision. This in fact is what is happening with the Leopold Center Issue Teams and initiatives. They are long term and will not directly achieve quantified endpoints. Examples are the managed intensive grazing and riparian buffer programs. Indeed, this is science itself, and society for that matter. Yet for some reason measured outcomes become the driving force of government programs and sadly even of foundations"[6].

The opportunities to be creative are quite limited in a two crop-dominated state (corn and soybeans). In Iowa research findings and product development in the university and the agri-business complex promote lowered diversity and the recognition only of yield and economic return. That being the case, Keeney nevertheless, reports some success: "The Center supports finding alternate ways to avoid the industrialization of agriculture and still make a profit (e.g., the hoop houses), ways to use knowledge instead of outside inputs (e.g., the soil nitrogen test), ways to save energy and minimize dependence on pesticides and external inputs"[7]. But in the final analysis Keeney recognizes the land ethic as a social movement, not a technical one. As such, he says "(T)he Leopold Center is placed in that uncomfortable spot for an academic institution, on the cusp of change in people's thinking"[8].

It might have been enough that Leopold was an internationally recognized conservationist, a scholar, and an Iowa native. But, according to Keeney, Paul Johnson's rationale for proposing to name the Center after Aldo Leopold was that "such designation not only gave honor to Leopold's great contribution to the preservation of the environment and ultimately the 'sustainability' of the United States and its natural resources, but also rooted the philosophy of the Center in Leopold's holistic approach"[9]. The Center's establishment, however, grew not from altruistic views about agricultural sustainability but rather because Iowa farmers were under financial and environmental stress, and clearly unable to sustain themselves. The legal definition of "sustainable agriculture" in this statute gave them hope, in that it was defined in the statute as "the appropriate use of crop and livestock systems and agricultural inputs supporting those activities which maintain economic and social viability while preserving the high productivity of Iowa's land"[10].

Keeney says it's important that the Center was established by legislative action and that it is not an internal university effort. Its hope of success, he says, is embedded in its ability to connect to Iowa agriculture. Without such, it will not have a future.

Initially the Center was funded on oil overcharge funds in its first year. After that, pesticide and fertilizer fees were phased in as the primary source of funds, later supplemented by legislative appropriation.

The Center's general objectives from the start were established as:

- *identifying concerns regarding the use of agricultural inputs and examining their impacts on the quality of Iowa's natural resources,*
- *developing and analyzing agricultural production practices that will maintain and enhance environmental quality,*
- *evaluating the on-farm and the economic and social feasibility of implementing these alternative practices or systems,*
- *integrating farm level sustainable agricultural systems into larger management units such as watersheds, rural water districts and wildlife corridors,*
- *developing education and extension programs to inform the agricultural community and general public of these practices and systems, and*
- *assessing how changing to a more sustainable form of agriculture would impact both agriculture and the environment.*

Leopold Center Programs

By the mid-1990s the Center was operating four major programs which defined its being: (1) competitive grants; (2) interdisciplinary team research; (3) educational programs; and (4) publications and outreach, including the periodical "Leopold Letter". The competitive grants program was the centerpiece, supporting projects, basic and applied, in soil fertility, pest management, livestock management, water quality, wildlife management, rural sociology and economics. (It is this area of its work, its "centerpiece", which was most affected by the recent state budget cuts.) But more novel was (and is) the interdisciplinary research teams ("issue teams", as they are called), functioning initially in cropping systems, in agroecology, in human systems, in pest management, in animal management, and in animal waste management.

Six years into the project, Director Keeney acknowledged continuing tenuous support for the Center in conventional agricultural circles. But, more positively, the public's view of the Center was becoming less polarized as attitudes toward sustainable agriculture gradually changed.

Outside perspectives of the early years of the Center, in 1992 and 1994, suggest that, in spite of dedication of state funds, the dedicated fee structure was compromised in 1991 by a governor and legislature anxious to make up for shortfalls in the state's general fund. This turned out to be a harbinger of more recent events, events that, if continued long enough, will threaten the sustainability of this sustainability center itself.

A resurgent sense of environmentalism arrived in Iowa in the late 1980s, a factor that certainly encouraged all of the sustainable agriculture programs described in this book. Additionally, however, there was, in farm states like Iowa, a strong sense of farmer entrapment. Farm chemical dependency had evolved and increased over long years, integrated into a production system of machinery, labor, management and markets. The farm crisis of the 1980s made farmers even more risk averse than usual, in spite of their entrapment, and inhibited their departure from existing chemically dependent practice. Their high input costs spiralled them ever downward. This greatly increased the importance of the support system represented by the Leopold Center, its educational resources, and particularly its grant-making.

Starting with a regional base in agriculturally more diversified northeast Iowa, and with an issue base in groundwater contamination from farm chemicals, the Leopold Center was able to address both environmental and economic concerns (the latter focusing on reducing input costs). It accomplished this through its Integrated Farm Management Demonstration Program. This program increased economic efficiency through energy input reduction and best management practices,

coupling this with reduction in ground water contamination. The Center supported farmers across the spectrum of issues from groundwater quality, farming efficiency, energy conservation and farming profitability. This became the Leopold Center's early raison d'etre and insured its place on the Iowa and national scene. This coupling enabled the Leopold Center to establish its place at Iowa State University and to launch its decade and a half of unique interdisciplinary research. With this help, nitrogen fertilizer application to agriculture, which had grown enormously in the 1970s and 1980s, peaked about 1990, leveled off, and has since declined. This is no small accomplishment in that, "Having been convinced over the past forty years that more agrochemicals are better, farmers are captive to them and would remain so unless presented with evidence of alternatives, regardless of price"[11].

At the conclusion of its first decade, the Leopold Center issued its substantive "1993-1998 Peer Review" which sheds much light on the work and role of the Center in its formative years under the guidance of the soil scientist Dennis Keeney. According to this document, funding for the Center derives from pesticide registration fees, pesticide dealer license fees, and nitrogen-based fertilizer fees. These fee types were designed to provide a stable revenue source, not to deter agricultural chemical use. However, it should be obvious that success in the Leopold program should reduce these revenue sources. A little over a third of the fees collected state-wide (35%) are designated for the Leopold Center, with the rest designated in the statute for the Iowa Department of Natural Resources, the Iowa Department of Agriculture and Land Stewardship, the University of Iowa's Center for Health Effects of Environmental Contamination, and the Iowa Hygienics Laboratory (specifically for well testing). The Leopold Center averaged about $1.2 million per year in revenue over the first ten years (money which leveraged much additional funding support from other sources).

Four major programmatic components constituted, and still constitute, the Center's work:

- *competitive grants*
- *multidisciplinary issue teams and initiative research*
- *education*
- *publications*

From early on, program reviews advocated enhancing the role of farmers in the research program, developing issue teams in the marketing of specialty crops, integrated weed management strategies, organic marketing, and soliciting proposals from the farm and conservation communities, all of which thrusts are present today. But in keeping with the original mission, all the farming practices research has erosion control and water quality among the ultimate goals. Early research was divided as follows:

IPM and biocontrol – 24%

Animal management, manure handling and hog production – 34%

Alternative weed management – 10%

Water quality monitoring and assessment – 6%

Forestry, energy, soil erosion management – 7%

Interdisciplinary research teams or "issue teams" were among the hallmarks of the Leopold Center's conduct of its work, and still are. "The core of these teams was faculty from various disciplines who focused on a problem that could be defined and approached scientifically, but that normally would be considered too diverse for an individual researcher or department. Team leaders were charged with organizing an effective group consisting of researchers from various colleges

and universities, professional conservationists, and farmers"[12]. Support for these teams includes long-term funding commitments, released time for the leaders, and close contact with the Center staff and advisory board, making this a serious commitment and a major Center feature. "Few if any other agricultural programs in the land grant university system have this type of outlook or problem-solving research and outreach", according to the Leopold Center[13]. Issue teams' work is within the six aforementioned fundamental areas of sustainable agriculture: cropping systems, agroecology, human systems, integrated pest management, animal management, and manure management. Some of the best known and most successful work of these teams is incorporation of buffer strips along stream edges to reduce soil erosion and improve water quality, and management intensive grazing (MIG) of beef cattle. Newer initiatives, also widely publicized, include the development of alternative swine systems, involving hooped hog structures ("hoop houses") and the impact of these on water quality; economics (input costs) and performance (output revenue); and the establishment of an organic agriculture program at Iowa State.

The emphasis on grass farming/rotational grazing has led to a major Center publication, *Pasture Management Guide for Livestock Producers*[19]. And attention to riparian buffers, another great success story for the Center, has led to the publication "Stewards of Our Streams: Buffer Strip Design Establishment and Maintenance" (1997) and "Stewards of Our Streams: Riparian Buffer Systems" (1997)[20], among others. Center work has also spurred renewed attention to the problem of nitrogen run-off, the Mississippi River, and the hypoxia problem in the Gulf of Mexico. Some of this work is being done by now Director-Emeritus Dennis Keeney, among others. Likewise, profitability of crop rotations in Iowa has been enhanced by the Center's work.

Citizen Participation

Education and outreach efforts in the early years, like today, was significantly conducted through Iowa State Extension, through numerous conferences, workshops and publications, and through the establishment of regional teams for the delivery of educational materials. Some of the outreach, and, indeed, some significant on-farm research, stems from the close working partnership of the Leopold Center with a state-wide non-profit organization, the Practical Farmers of Iowa (PFI). This relationship has even been formalized in a memorandum of understanding and a contract insuring long-term stability in the relationship. This will be described in a later section.

A further important element of the structure of the Leopold Center, mandated and described in the original legislation, is an active and involved external advisory board which is deliberately designed to enable representation of competing interests. By statute the Board is composed of:

- *three persons from Iowa State University (effectively, administrators and scientists)*
- *two persons from the University of Iowa*
- *two persons from the University of Northern Iowa*
- *two representatives of private colleges and universities within the state*
- *one representative of the Iowa Department of Agriculture and Land Stewardship*
- *one representative of the Iowa Department of Natural Resources*
- *one male farmer and one female farmer, appointed by the State Soil Conservation Committee*

Later, four ex officio representatives of agricultural organizations were added.

Listening to this Board has been a primary way for the Center to gain citizen input and to gauge the appeal of various research efforts.

Practical Farmers of Iowa (PFI):

An important element of citizen participation in Leopold Center affairs is the organization known as the Practical Farmers of Iowa (PFI). PFI was created by, among others, Sharon and Dick Thompson of Boone, two of the best known pioneering organic farmers in the United States. The Thompsons periodically publish *Alternatives in Agriculture: Thompson On-Farm Research*, a detailed treatment of all elements of agronomic research on their organic farm. This research report has become a basic source for the Midwest on this subject. And field days and tours on the Thompson Farm are legendary and nationally recognized. To some degree, PFI, a private non-profit but very public organization, contributed to the very birthing of the Leopold Center. It is fitting, therefore, that PFI is now formally a contractual partner working in collaboration with the Leopold Center, in addition to the longstanding formal advisory role that PFI has played on the Leopold Center Board. The Leopold Center provides $50,000 annually to fund PFI (in spite of the large Leopold Center budget reductions), and the money is used primarily to support the field days and on-farm research demonstrations held under PFI sponsorship. This has involved the support of ten regularly scheduled research field days and other events on the farms of research cooperators.

Publisher of the very well known quarterly, "The Practical Farmer", PFI is today a twenty-year old state-wide farmers organization that, like the Leopold Center (but historically preceding it) grew out of the farm crisis of the 1980s. Founded and always run by farmers, it is the granddaddy of all farmer-run sustainable agriculture organizations in the U.S. With equal interest in science-based approaches to sustainable agriculture and in the creation of new direct marketing relationships that can sustain farms, the organization has over seven hundred members in Iowa and across the Midwest. Fully half the membership are farmers and governance is by a ten member all-farmer board. Farming systems, food systems and student and youth leadership constitute PFI's three-fold thrust. The role of PFI cannot be overestimated in establishing the climate in Iowa for the Leopold Center. It is fitting that they now conduct research jointly with the Center and contribute to the Center's success (and even to its survival under strained circumstances), and that they contribute as well to the Center's position in Iowa agricultural and food systems.

Budget Crisis

The Leopold Center has experienced significant budget cuts in recent years. Under the leadership of the Leopold Center's second Director, Fred Kirschenmann, the Center's serious budget reductions have dominated discussion. The cuts have been so great as to lead to the perception of a financial crisis. After a fiscal year 2002 budget cut of a quarter of a million dollars, the Governor and legislature made a further one million dollar cut in 2003. These cuts are in spite of the fact that the money in question is "designated funding", governed, as we have seen, by the Groundwater Protection Act of 1987 and deriving from a fee on nitrogen fertilizer and pesticide sales. It is reasonable to assume that these designated funds should have been untouchable by the state, but they were taken anyway, likely reducing even further Iowans' faith in government. The primary and immediate impact of these cuts was elimination of all of the Center's grant funding support to sustainable agriculture research projects, together with elimination, at least for a time, of grant programs supporting educational events, pilot educational programs themselves, and state-wide conferences. This represents an 86% budget reduction, permitting only the infrastructural framework of the Center – its staff – to continue. Thus ended, at least temporarily, a fourteen year ten million dollar program which had awarded 250 competitive grants, the lifeblood of Leopold Center activity and the principle form of the Center's impact upon the state.

The following letter, written in response to the large state-mandated reduction in budget, was published and widely circulated across the State of Iowa on June 5, 2002. Because it offers valuable insight into the nature of the Leopold Center and its leadership, as well as information on the issue of the 80% reduction in budget for fiscal year 2003-2004, this important statement is reproduced here in whole:

"An Open Letter to Iowa's Citizens" by Fred Kirschenmann, Director, Leopold Center for Sustainable Agriculture

Dear friends:

On May 28th, 2002, the Iowa Legislature decided that the work of the Leopold Center for Sustainable Agriculture was no longer a priority for Iowa and transferred $1 million out of the Groundwater Protection Fund that makes our research possible. Ironically, that fund is derived from taxes imposed on farmers by the legislature to conduct research that enables farmers to "identify and reduce negative environmental impacts of agriculture practices" and to develop "emerging alternatives". Without the funds to continue this vital research, the Leopold Center faces a highly uncertain future.

As a North Dakota farmer, I am acquainted with adversity, and I know that sometimes it can bring out the best in all of us. Having made the decision to leave my farm to become part of the challenge to develop a new agriculture in Iowa, I have no intention of giving up without a fight. Tempting though it may be to return to my farm, the Leopold Center's work is too important to abandon, despite the verdict of the current legislature.

Last year's $250,000 cut in the Center's budget was a warning that the Groundwater Protection Fund was vulnerable. Accordingly, we have made every effort to protect ongoing research so that we would not lose the value of work in progress. We believe that we will succeed in that effort. But we have no guarantees for the future.

On a more personal note, it has been a little over two years since I was asked by the search committee to apply for the position of Director of the Leopold Center. The committee wanted at least one qualified farmer in the pool of excellent candidates. At first I thought they just wanted a token farmer so I agreed to submit my application, never thinking that I would have to face the tough decision between starting yet another new career or remaining on my farm. When I was selected as one of the six finalists, I knew I had to start taking that possibility seriously.

I came to Iowa for the interview – still not convinced that I would have to choose between my farm and this new possibility for my life. Then I met group after group of incredible people at Iowa State. I was especially struck by the number of scientists (mostly young) who were passionately dedicated to a different future for agriculture. They were committed to doing research that would make farming more profitable for family farmers, less damaging to the environment, and more conducive to building strong rural communities. These were the same values I held – values that I had been struggling to implement on my own farm in North Dakota.

It was at that point that I became a serious candidate for the position. I knew I didn't want to pass up the opportunity to work with a group of stellar colleagues who shared the same goals to which I was committed.

Since becoming Leopold Center Director nearly two years ago, I have traveled all over the state and spoken with hundreds of Iowans – farmers, urban and suburban dwellers, senior citizens and students. We held community "conversations" throughout Iowa and listened to a cross-section of Iowans share their views of the future and failures of Iowa's agriculture. The staff at the Center listened and worked very hard with the people of Iowa to develop a new vision for Iowa agriculture, an agriculture that would enable farmers to produce more value and retain that value on the farm while simultaneously restoring the natural resources on which all agriculture depends. The philosophy of the Center's namesake – Aldo Leopold – served as the guiding light for our vision.

We will now put all of our energy into finding alternative support and additional outside funding so that the vital work of this internationally recognized center can continue. We already have received suggestions and offers of support from friends all around the country for which we are enormously grateful. But we will need your help, too.

First, let your voices be heard. Take the time to share your views about food, family farms, and Iowa's natural resources with the elected representatives in your district. Second,

become informed about the food you buy. Ask for food that was produced by Iowa farmers who use sound land stewardship practices. Food retailers pay close attention to what their customers want. If just 15 people ask the manager of a supermarket for the same food items during the same week, there is a good likelihood that the retail outlet will make an effort to make it available. Of course, we welcome your suggestions about other ways you can help.

We have realized from the beginning that we could not implement a new future for Iowa's agriculture by ourselves. At best, we can be a catalyst to help make it happen. The new vision will only become a reality as Iowans become involved. In the months ahead we will fight for the opportunity to implement this new vision, limiting the amount of time we can devote to the programs that can move it forward. But we are determined to stay the course.

The alternative pork program that we launched last September is moving forward and has already assumed momentum of its own. While the $660,000 foundation grant we helped secure to provide support to farmers producing for new markets is now on hold due to our budget cuts, the foundation has pledged to continue working with us. We will do everything possible to secure the Leopold Center's future so the full grant can be restored.

In the days ahead, we will be guided by the wisdom of those who have preceded us. In recent days I have found the words of Harold Morowitz especially helpful: "Conformity is not necessarily a virtue, hard work is almost never a vice, optimism is a moral imperative and a sense of humor helps". I can only add, "Don't ever give up".

Frederick Kirschenmann, Director

Leopold Center for Sustainable Agriculture [16]

The New Work: Agriculture of the Middle

The Center is now recovering, however, for it has been and continues to be blessed with a vigorous and dynamic spirit and strong leadership capable of handling adversity. Because most of the financial impacts of these cuts was on the grants program, the staff infrastructure of the Center has been maintained. Thus the attitude of Center leadership was hopeful that it wouldn't happen again, along with a determination to cope and endure. The Center may be stronger for this bruising and disheartening experience, a view shared by Practical Farmers of Iowa's Dick Thompson. Some others are more sanguine. But the Center's leadership is determined that the Center remain focused on the future, particularly the future of Iowa farms.

Fred Kirschenmann has identified the principle future challenge, the center of this focus and work effort, as how to solve for the continued loss of the "middle" (that is, the middle level in terms of size) of agriculture, an idea introduced in the last chapter. Such assumes that the big is too big and, in any event, able to take care of itself. And it assumes that the small is less consequential in terms of food supply and, in any event, more easily able to survive without great help, at least in Iowa, due to its flexibility and efficiency, its better balancing of input-output ratios. With respect to the disappearing middle, however, Kirschenmann sees three areas of challenge: new production systems, the "market piece", as he calls it, (i.e., local foods and direct marketing), and public policy. According to Director Kirschenmann, the Center's future direction will focus on what he calls a total food systems approach, as applied to the agriculture of the middle, the latter defined as "that sector of the farm/food system that currently falls between the supply chains that move bulk commodities through consolidated firms and supply chains that feature various forms of direct marketing"[17]. This relatively new effort is a joint effort between the Leopold Center and Wisconsin's CIAS. Over 80% of U.S. farmland, according to Kirschenmann, is held by farmers in this category of the "middle", and they are disappearing farmers, fast losing access to markets. He sees this as our nation's last chance to develop a more comprehensive approach addressing both new enterprise structures and mid-tier value chains. On the basis of scale, it is a marriage of agrarian and industrial thinking, but by its values it represents the Leopoldian agrarian side of the coin. Answers as to its success will be quick in coming, given the rapid deterioration of large-scale industrial agriculture.

Teaching

As with Wisconsin, Iowa State's agricultural sustainability effort through the Leopold Center did not include a role for instructional teaching and academic degrees. Like CIAS at Wisconsin, however, the Leopold Center has spawned a new interdisciplinary graduate degree program (both Master's and doctoral) in sustainable agriculture. This is the university's first, with focus on integrated agricultural systems, livestock management, natural resource management, agro-forestry, and environmental quality. The university claims national leadership in sustainable agriculture and boasts the nation's largest group of faculty working on issues of sustainable agriculture. The Leopold Center supports this degree major through an unusual grant program. The grants are awarded not as conventional assistantships, as they might be elsewhere, but as awards to faculty/student teams working on specific topics, ranging from the study of prairie grasses and forbs for managed grazing to consumer behavior concerning local foods.

ISU does not yet have an undergraduate degree major in sustainable agriculture. And, unlike Wisconsin and Vermont, ISU has not had an undergraduate Environmental Studies degree and thus does not provide this outlet for agriculturally-oriented environmental studies students. However, provision in the undergraduate curriculum for a type of "secondary major" is beginning to yield some student interest in agriculture, if only in a modest way. There is hope, however, that, just as the university's research and extension efforts have now spawned an interdisciplinary graduate degree in this field, this degree may well spawn an undergraduate corollary. This effort may be helped by the existence of the ISU Student Organic Farm, a learning center that, according to its mission statement, is interdisciplinary, student-led, and integrated with the community. Overall, the new graduate degree program in Sustainable Agriculture is viewed as a direct result of the Leopold Center's influence, and it is especially appreciated since it came after two failed attempts to get an undergraduate major in this field.

The Leopold Center Team Reflects on the Institute and Sustainable Agriculture at ISU

Perhaps the ISU agronomist who has made the greatest impact on the Leopold Center's work is Professor Alfred Blackmer, a nitrogen fertilizer researcher with long-time Leopold Center involvement. Blackmer discovered that Iowa losses of fertilizer from farm fields were much greater than people were willing to admit, in fact over 50%. This signified much greater groundwater and surface water contamination, greater impact to society and greater economic loss to individual farmers (albeit with great gain to the fertilizer and chemical companies). Blackmer's long-term research determined that Iowa farmers can reduce N inputs by one-third from present applications and still make profits. Getting this across to farmers is another story, however. Blackmer has also found that, in Iowa, small-scale field trials and long-term research don't influence anyone, least of all farmers. On the contrary, research which is dependent on precision equipment and which is conducted continuously in a large-scale farm setting is what does influence them. Thus that's what works. In the book, *Civic Environmentalism*, DeWitt John reports "Since 1985, the use of nitrogen-based chemical fertilizers in Iowa has dropped steadily, even though fertilizer has become less expensive. Meanwhile, the use of fertilizer has kept rising in Illinois, Iowa's rival in corn production. However, acreage yields for corn in Iowa kept pace with yields in Illinois", a sign of possible progress by the Leopold Center and its allies[18]. Iowa's accomplishments are particularly noteworthy in this regard because no federal law has forced the state to act.

Blackmer sees the Leopold Center as the only outlet in Iowa for the Center's kind of sustainability research. But increased Center attention over the years to organic agriculture and to food systems work has not settled well with the farmers who are paying the tab with the fertilizer tax. In Professor Blackmer's view, these farmers then struck back with the big budget cuts (in conjunction with a state government desperate for the money to balance its budget). Blackmer believes the Center must address and cater to its funding sources, while continuing on with its new thrusts, as long as the Center doesn't ignore production agriculture. (Recent attention to preserving an agriculture of the middle appears to be following Blackmer's advice.) And Blackmer believes that the role of science must be enhanced in the Center's work. He sees the big budget cut as

representing an opportunity to get off the fertilizer tax dole (though he does not specify where he thinks the replacement money should come from).

College of Agriculture Associate Dean Wendy Wintersteen, who has served on the Leopold Center Board since 1990 and who offers high praise for Center leadership, believes that that leadership has changed the direction and manner of agricultural research at ISU, especially in two areas, grazing and buffer strip work. Holding the Center back, however, has been its "nibbling around the edges of corn and soybeans", rather than breaking rank with that Iowa combination. The Center must work for the farmers of Iowa, not the faculty of the university, and it must overcome its lack of communication with mainstream agriculture. Because of this weakness in communication with Iowa farmers, the state's Commodity Boards have been and continue to be a big problem for the Leopold Center. She finds these Boards are composed of farmers who pay specific taxes related to their commodity and some resent the Leopold Center. In answer to their criticism, the Center has brought to its own Board broader farmer interests. And the Center's vision through its two strong leaders, Dennis Keeney and Fred Kirschenmann, and its wise partnership with PFI, are enabling the Center to reach out to the commodity boards. Intensive rotational grazing initiatives represent one of the true bright spots in Dean Wintersteen's view.

Professor Jim Pease (Wildlife/Extension) also believes that the Center has changed the direction of agriculture in the university and the state, and sees the Leopold Center's great value as interdisciplinary research, including that which leads to increased competition for farmers. The Center's coming great challenge will be in finding funding from other sources. The Center, he believes, can continue to be the catalyst for big visionary ideas in agriculture. Ecologically sustainable mixed farming preceded the unsustainable soybean farming over thirty years ago, and Iowa may now need to return to that farming type "post soybeans", with the Leopold Center showing the way.

Professor Dick Schultz, forester and agro-ecologist, has career research based on fence rows, fence-row habitat, riparian corridors and riparian buffer systems, all of which focus on the sparse forested habitats of Iowa. And he's now moving into rotational grazing based on native grasses, along with upland buffers of native grasses on contours and in prairie restoration. He is also involved in prime Iowa walnut production and in high quality oak, both of which speak to biodiversity on the farm. Schultz credits the Leopold Center for enabling this work to be done today in Iowa, for it is all based on long-term research and not fundable by other means. The Leopold Center is changing the Iowa climate for rotational grazing, both dairy grazing in the northeast region (where grazing is most advanced), and, as well, beef cattle grazing across the state. (Schultz believes that rotational grazing in Iowa is bigger with dairymen than with beef producers because dairymen have physical contact with cows daily, while beef cattlemen do not – a fact which slows down rotational grazing conversion and practice among the latter.) The Center is even influencing NRCS and other federal agencies, and cattle owners in neighboring states. (In this respect, the state-wide reach of the Leopold Center is to all four corners of the state, a circumstance very different from CIAS' much more limited geographical reach in Wisconsin.) It is the grass roots support that comes from this wide reach, as well as friendly current administrators, which will likely enable the Center's survival in the face of current challenges. The interdisciplinary issue teams, which had fallen by the wayside, are coming back and are the heart and soul of this state-wide grass roots reach.

Agronomist Rick Exner celebrates the PFI relationship and the Leopold Center's pioneering role in on-farm research. He sees the necessity of the Center to engage with a broad cross-section of Iowa agriculture. Professor Exner is engaged in agronomic research which is demonstrating the desirability of putting small grains (oats in particular) back into the standard crop rotation in Iowa, along with corn and soybeans. Soil conservation, biodiversity, protection against drought and economic diversification would result, all adding to the sustainability of Iowa agriculture. Exner concludes that, if cropping systems (i.e., corn-soybean monoculture) are the problem, they may also be part of the solution, in that proper crop rotation can be a method of restoring a diversity that approaches the natural ecosystems.

Animal scientist Jim Russell is at the helm of the Center's acclaimed rotational grazing work. He chairs the Animal Multidisciplinary Research Team, with 30 to 36 members (four to six of whom are actually doing the research, the rest being advisory). Russell sees the interdisciplinary issues teams as great sources of ideas, and he acknowledges that they are responsible for much of his own research success. Russell's research is particularly oriented to year-round grazing. The difference between high and low profit for graziers is the amount of hay fed (the more hay fed, the lower the profits). Some of his research relates to utilization of Iowa's huge surplus of corn stalks, particularly grazing on corn stalks; stockpiling of forage for winter grazing; methods of producing beef cattle with truly minimal equipment; and the economically sustainable combination of hunting and grazing beef cattle production in southern Iowa. Overall, he values integrated resource management, low cost of production, and profitability of beef production. Russell sees future Leopold Center work as focused on phosphorus/nitrogen/water quality relationships; mitigation of farming effects on the environment; how to "make a buck" off a farm in diverse ways; and ability to work with an integrated system. He wonders what it would take to get a grass-finished beef cattle system to work in Iowa, and if corn stalks can play a role in that system.

John Cresswell, Extension agent with urban responsibilities, reflected on the Leopold Center's networking with other local and state-wide groups. This has opened people's minds to the merits of sustainability practice and reduced barriers to change, thus affecting the overall Iowa climate toward sustainability. He too lauds the value of the Center's interdisciplinary research teams, and the Center's support for research which would otherwise not be funded. Cresswell sees a special need for Center involvement with other colleges, particularly community colleges, and the value of investing in formal adult and youth education.

Another long-time Board member (and, as well, Interim Director between Dennis Keeney and Fred Kirschenmann) is Professor Allan Trenkle. Trenkle attributes particular value to the Bear Creek Stream Management Project (which is Professor Schultz' long-term riparian stream bank project); the early Spring nitrogen test work of Professor Blackmer (even though it has not yet been widely adopted by farmers); the Animal Issue Team with its rotational grazing work (work which is actually impacting more people than any other project at the Center); the hoop hog group and pork niche (marketing) work; and the on-farm research. But, he asks, if you put all Leopold Center projects together, what proportion of Iowa agriculture is affected? Very little. He believes it's important for the Center to impact a much greater proportion of Iowa agriculture if it's to get real notice and respect from the broader population.

Highly regarded Agronomy Professor Emeritus John Pesek has witnessed nearly a half century of evolution in Iowa agriculture and today still remains active with the Leopold Center. Pesek is concerned that county agents, even in a farm state like Iowa, very often do not have an agricultural background, limiting their ability and their interest in providing extension to the Leopold Center's work. He notes that relations between the Center and conventional state-wide farm organizations (with the clear exception of PFI) are "intense", meaning acrimonius, due to fundamental philosophical differences. On a more positive note, Pesek singles out the small research plot effort of the Center as the right direction to go in the conduct of the research.

John Pesek is the only person at the Center who commented on GMOs during a recent visit. He summarized the thinking of many when he commented with respect to transgenics (which

"...(I)f we wanted to produce more food, then the answer is not GMO's. The answer is synergistic, symbiotic, diversified models. The confinement house is not a new drug that they're not resistant to. The answer is to shut down the factory and grow the chickens under a totally different paradigm. It's soul-destroying to continue year after year, repeating the same mistakes."

Joel Salatin
of Virginia

he regards as their proper name, rejecting "genetically modified organisms" as less than accurate) that we don't know what we're doing and therefore shouldn't be "messing around" with them. And he spoke of the concern of many Midwestern farmers in particular when he remarked that, if we want to spoil our markets, we should keep producing transgenic plants. This advice has been borne out with respect to Iowa's (and this nation's) international markets, a significant portion of which is now closed to Iowa and American farmers due to lack of acceptance overseas of American transgenic soybeans, corn and other farm products.

Rich Pirog and Mike Duffy, veterans of the Center staff since the beginning, represent an explicit human dimension of the Center's work. Pirog believes that marketing is central, and that niche marketing and marketing working groups are good investments. The movement toward "identity-preserved" (i.e., labelled by farm of origin) vegetables, grains, meats and dairy products is growing, and Iowa farmers markets have increased greatly in the last decade. Such direct marketing means 40% to 60% more income for the farmer.

Pirog also believes that Center meetings should be held as much as possible off-campus and around the state, for values of inclusion, transparency and open communications. To identify steps to make a local food system key to broader economic development is important. Pirog reports on a new effort at Iowa State which works in the direction of legitimizing agriculture in economic development: two M.B.A. assistantships in sustainable agriculture have been created, something perhaps unique in the nation.

Mike Duffy's human dimensions work is with beginner farmer/farmer entry/land link programs (including passing the farm on, and matching farm retirees with new farmers). A key element of this is in linking people who are unrelated. Duffy says that, when trying to assist in passing on the land, it's always better to deal with unrelated rather than related parties. Duffy also recognizes that we're switching from a capital intensive management system in agriculture to a knowledge intensive management system. Some people can't do that, and others simply don't want to. But there is a need for transition for those who can and who will. All of this, along with possibilities for farmland leasing, opens up a new set of opportunities for sustainable agriculture across Iowa.

A final dimension of Leopold Center-sponsored activity, in which Mike Duffy is also involved, is biofuels, with particular emphasis on a little used but very prodigious crop, switchgrass. Duffy believes we need to get many more people working on switchgrass farming (for energy) and far fewer on corn and soybeans. It is the kind of ignored crop (even viewed as a pest plant) which can provide an income source. It can provide economic diversity and keep up the income stream during the transition to sustainable agriculture and to organic, low capital input systems. Income is key to the conversion to sustainable agriculture, not profit maximization, says Duffy. The "I have to get bigger" and the "I'll do what I can to keep the farm" mentality of the 1980s is changing today to "It isn't worth it". Thus, farmers are leaving and the "middle" in agriculture is disappearing rapidly. But opportunity for conversion to those lower cost sustainable systems, especially with new farmers, is growing. This includes the opportunity for conversion to niche crops, like switchgrass for energy production.

In a different but no less critical direction, local food marketing, the high costs and other disadvantages of our present system of long-distance food distribution (over 1500 miles from source to market, on average) is receiving a close look by Center researchers. Such long distance food transport involves not only great cost in fossil fuels for transport but it is responsible for many more times CO2 release (and thus impact on climate change) than is characteristic of a local food system. The recent Center program, "Local Flavor: The Connection Between Taste, Health, Farming and Economic Development", suggests the very holistic nature of this Center initiative in local food systems and direct marketing. This work shows promise of becoming a centerpiece of the Leopold Center's "Human Dimensions" effort[19].

Conversations With Affiliated Farmers

Discussion with farmers is most productive for additional insight and perspective.

Steve Hopkins, who is active with rotational grazing of dairy cows and pasture poultry, believes that the greatest values of the Leopold Center are two-fold: in raising the issues to be discussed in sustainable agriculture in the state (and thus in controlling the agenda); and in serving as an alternative funding source for researchers for projects that industry will not fund. He also holds in high regard the Center's research project teams (interdisciplinary teams), but believes that Leopold Center research is not necessarily making it out to the mainstream.

David Williams, who is involved with rotational grazing, organic crops and crop rotation practices, has served nine years on the Leopold Advisory Board. He praises on-farm research and early N (nitrogen) tests in Spring, as well as hog hoop buildings, buffer strips along streams, cattle and other livestock foraging on corn stalks, and on direct marketing and value added methods. He has been particularly pleased with Center leadership.

Jim Johnson, who is as well an Extension agent, places greater value on legitimizing on-farm research. He also cites local food systems, CSAs, hog hoop houses, and keeping important sustainability issues before the public. Future important work includes agricultural policy legislation, niche marketing/direct marketing, and organic research. He considers it vital that the Leopold Center continue to tell its story to decision-makers.

Kurt Johnson, also a Board member, is another advocate of the rotational grazing and manure research work. Knowing how important farmer success at direct marketing is, he applauds the Center's work in new markets for grass-fed and organic products, for he believes in the necessity of transition into direct marketing.

WHAT THE LEOPOLD CENTER FOR SUSTAINABLE AGRICULTURE HAS DISCOVERED AND CONTRIBUTED:

As a distinct Center at Iowa State, the Leopold Center has a record of findings and accomplishment in at least six areas:

Teaching/Instruction:

1. The Leopold Center has spawned Iowa State's first degree program in sustainable agriculture – a graduate program leading to both Master's and Ph.D degrees. The Center has spawned the endowed Chair in Sustainable Agriculture. This indicates that a non-academic, non-degree sustainable agriculture program can give birth to a degree program. Thus far, efforts to establish an undergraduate degree program in sustainable agriculture at ISU have not succeeded.
2. Multidisciplinary research teams and PFI are very valuable for graduate school opportunities for graduate students. (Thus, an annual meeting of all multidisciplinary research teams (i.e., issue teams) would be very valuable for them to learn from one another.)
3. M.B.A. Business School assistantships in sustainable agriculture are a direct contribution of both the Center and the College of Business.
4. ISU's Environmental Studies dual major program is beginning to show interest in sustainable agriculture. This is an alternative and an increasingly popular path to a degree in the field.
5. There are more animal science people involved at the Leopold Center than any other discipline – this is a strong reversal from Wisconsin, Vermont and Maine. It includes hog hoophouse work, the Pork Niche Marketing group work, rotational grazing, livestock/wildlife integration, and other areas. The Leopold Center is carving out a role for Animal Science in sustainable agriculture.

Research:

1. The Leopold Center is demonstrating an ability to change the direction of agricultural research in Iowa, especially with respect to rotational grazing, riparian buffer strip work, hog hoop houses, pork and other direct marketing, N research and reduction, and in other areas.

2. Legitimizing on-farm research has been an important role for the Leopold Center, and an important contribution to Iowa agriculture.

3. Center research has determined that there is a difference between intensive rotational grazing and longer-term rotational grazing (5-7 day rotations vs. 1-3 day, or even every 6-12 hours). Longer term is believed better for wildlife and wildlife habitat (although Vermont experience questions this – see Vermont chapter).

4. Rotational grazing works better culturally with dairymen than with cattlemen, at least in Iowa, because dairy farmers are much more used to handling cows/cattle. (This is likely less true in the Northeast.) This may be a reason why rotational grazing is not yet that strong with Iowa beef producers.

5. The Leopold Center has witnessed a growing interest in year-round grazing in Iowa. It is believed to be possible state-wide, but prospects are best in the southern half of the state. This is the centerpiece of the Animal Research Team's work. Since the difference between high and low profit is the amount of hay fed to cattle per year, this research leads directly to farmer profits.

6. There is a commitment to corn stalk grazing research and also to producing beef cattle with truly minimal equipment. Interest in different breeds is minimal for beef – they are all variants on Angus.

7. The phosphorus/nitrogen/water quality relationship is and must be a central future thrust of the Leopold Center.

8. Switchgrass production for biofuels holds future possibility, perhaps to replace soybean acreage. The entire soybean export market to Europe has been lost over the issue of GMOs, and biofuels can replace some of this loss.

9. The Bear Creek streambank (riparian) management project is a very important model which I believe needs to be replicated soon to further elevate its importance.

Boards and Teams:

1. It is now recognized that the Advisory Board's role can be critical, especially to neutralize opponents. This has elevated the place of citizen input into their land grant university. But the argument continues as to whether university administrators should be on the Advisory Board. Some say no, that it's a basic conflict of interest and a problem, but perhaps such membership and participation yields a valuable connectedness to rather than isolation from centers of power. This is a real toss-up and may relate to which particular administrators serve, in terms of both their philosophical position and their personality.

2. State-wide elected farm commodity boards have posed a challenge for the Center and have caused some compromises to be made – an Iowa reality.

3. The Leopold Center's relationship with the Practical Farmers of Iowa (PFI) is very important. It provides a model for the sustainable agriculture program to develop formal, even funded, linkages with other appropriate state-wide organizations.

4. The Leopold Center is reaching much of the state through its multidisciplinary issue teams, another advantage of those teams. (There are nine of them.)

5. The Pork Niche Marketing Working Group has been very successful and should be a model for other direct marketing and value added Working Groups.

6. Linking farm retirees and young people without land through beginner farmer programs is an important part of Leopold Center work.

7. The Animal Issue Team and its rotational grazing work are impacting more people than any other Leopold Center project.

Revenue Support:

1. The Center asks the question as to whether the revenue source and budget of the Center for Sustainable Agriculture should be based on N fertilizer sales which it is trying to significantly reduce. This is a corollary to dependency on tobacco taxes by state governments which are ostensibly trying to reduce tobacco dependency among their population. The choice is between an easy guaranteed source of income vs. independence.

Marketing:

1. There is importance to the idea of identity-preserved food products in direct marketing/retail marketing (akin to "relationship agriculture").

2. Direct sales marketing means 40% to 60% more income for the Iowa farmer, more than justifying direct marketing research.

General Observations:

1. There is universal praise for the Leopold Center's role in raising discussion of agricultural sustainability issues across the state; for being the only source of research funding in Iowa for sustainable agriculture; for the value of the unique multidisciplinary research or issue teams; and, as well, for on-farm research and for giving the farmer a role in research.

2. Farmers are reluctant to grant credibility to sustainability because yields are still going up in Iowa, if only a little, through genetic engineering. As GMOs become more and more questionable, the value of Leopold Center research rises as an alternative way of agriculture.

3. The Leopold Center is connecting to a broader cross-section of Iowa agriculture, but it has a ways to go. (This is not as much of a problem in the northeast U.S. because of the smaller size and scale of conventional industrial agriculture there.)

4. There is much expressed need at Leopold and in ISU departments, and among some farmers, for truly integrated farm systems.

5. We're switching away from a capital-intensive system of management and toward a knowledge-intensive management – not every one can adjust to that and some are leaving farming over it. The Leopold Center is working to assist the adjustment.

6. Leopold Center work has heightened the public's ability to ask insightful questions: for example, with respect to conventional agricultural research, where does the money come from to support this research? The public is thereby empowered to think more critically, to seek new information, and to be aware of research bias.

7. Leopold Center experience has taught that it's important to be especially sensitive to threatened people – for example, in Iowa, being aware of the possible response to any criticism of hog confinement. Another institution might be better positioned to issue such criticism.

   Some say a true conservation or sustainability ethic is lacking in Iowa because of the state's frontier mentality (albeit a mentality which is more tempered here than it might be farther west). Others say such an ethic is lacking because of the very forgiving soil. The counties of northeast Iowa are an exception. These counties contain land which is less forgiving. They have poor thinner soils, soils allowing for less abuse, and a smaller farm and dairy-based rather than beef cattle culture. A stronger ecological sustainability ethic has resulted. Further, Iowa provides the reality today of a fearful farmer population: in fear of government regulations in nutrient management, in fear of competition from Brazil for soybean markets, in fear of low crop prices. Many Iowa farmers are thus fearful and angry, a reality with which the Center has to deal.

   The situation prevailing over the bulk of the state suggests that the operation of an agricultural sustainability program of the type represented by the Leopold Center would be an uphill battle. And yet, the tally sheet presented above of Leopold Center activity and accomplishments suggests that a great deal can be done in Iowa. The state-wide situation in agriculture is changing as farmers are

forced up against a wall, creating the opportunity, at least, for some positive ecological results. So, for the Leopold Center, there is clearly opportunity here as well as challenge.

A Closing Observation

Iowa is, of course, a quintessential prairie state. In holding up nature as a standard, Leopold tells us that, based on the findings of prairie ecologist J. E. Weaver, prairie plants distribute their root systems to cover all levels. This means that native prairie plants can use all the water in the soil wherever it is. In contrast, agricultural plants overdraw one level and neglect another, thus building up cumulative deficits. An important agronomic principle, Leopold concludes, emerged from Weaver's researches: The prairie, the native flora, teaches farmers, teaches agriculture, why the prairie flora is more drought-resistant than the agronomic flora which has replaced it. The prairie, in other words, practices teamwork underground. This may well be analogous to the work of the Leopold Center in its relationship to the status quo of Iowa agriculture.

Overall, the Iowa State University and Leopold Center experience could contribute to the Northeastern states, in spite of Midwest/Northeast differences in agricultural scale, geography and ecology. We now turn to the New England examples of Maine and Vermont.

ENDNOTES:

1. Paul W. Johnson, "What is the True Value of the Land?", *The Des Moines Sunday Register*, June 26, 1988, p. 2C.
2. ibid.
3. ibid.
4. ibid.
5. ibid., p. 1C.
6. Dennis Keeney, "Translating the Leopold Legacy to Iowa Agriculture", Paper presented at the 1998 Prairie Festival, The Land Institute, Salina, Kansas, May 31, 1998.
7. ibid.
8. ibid.
9. Dennis Keeney, Five Year Review of the Leopold Center for Sustainable Agriculture, p. 2.
10. ibid.
11. Pamela Wexler, "Iowa's 1987 Groundwater Protection Act: A Case Study Prepared for the International Institute for Sustainable Development, Winnipeg, Manitoba, Canada, February, 1994, p. 14.
12. Leopold Center 1993-1998 Peer Review, p. 18.
13. ibid.
14. Leopold Center, *Pasture Management Guide for Livestock Producers*, 1998.
15. Leopold Center, "Stewards of Our Streams: Buffer Strip Design, Establishment and Maintenance" (1997) and "Stewards of Our Streams: Riparian Buffer Systems" (1998).
16. Frederick Kirschenmann, "An Open Letter to Iowa's Citizens", 2002.
17. Frederick Kirschenmenn, "Renewing the Agriculture of the Middle", Unpublished Paper on the Leopold Center Website.

18. DeWitt John, "Doing Things in the Right Order: Reducing the Use of Agricultural Chemicals in Iowa", in *Civic Environmentalism: Alternative to Regulation in States and Communities* (Washington, D.C.: Congressional Quarterly Press, 1995, p. 109).

19. The Leopold Center Annual Report for 2001-2002 described six initiatives which reveal much about the grass roots nature of the Center's activity: organic crop studies, agroecology, the animal management issue team, the ecology initiative, the marketing and food systems initiative and the policy initiative. These initiatives present a clear picture of the constituent elements of sustainable agriculture at Iowa's land grant. For a detailed description of on going projects in each of these areas, the reader is referred to that Annual Report, pp. 12-20. This information represents Leopold Center activity at its peak before the 80% budget reduction, but it reveals both the philosophical nature of the Center as put into practice and, as well, provides an indication of where the Center will be going, with some modification, as it returns to full budget. The 2002-2003 Annual Report shows a somewhat scaled down program. It focuses on three initiatives in Marketing and Food Systems, Ecology and Policy. Similar descriptive detail is to be found on pp. 28-34.

"Science takes you away from the world and art forces the world upon you … Because art is concerned with the ineffable – what cannot be translated – it will seem difficult to anyone who believes that explanation is the road to understanding. Artistic understanding comes from confidence in one's intuition."

Fairfield Porter
of Maine

Chapter Six: Maine

There is an old political maxim, "As Maine goes, so goes the nation". Politically, this has been less true in modern times than in the past – the state lately has been more iconoclastic and independent. But what Maine may lack today in the setting of national political direction, she does not lack in setting the pace for sustainable agriculture. And there is a powerful incentive: Russell Libby, Executive Director of the Maine Organic Farmers and Gardeners Association (MOFGA), has estimated that if Mainers were to purchase as little as $10 worth of Maine foods each week, a mere $520 per year, it would add up to $200 million staying in and circulating through the Maine economy, creating jobs and enriching Mainers, rather than flowing out to the Midwest, California, or around the world. So indeed a local foods movement and "relationship agriculture" are growing apace in Maine. Whether it's the leadership of the Maine Organic Farmers and Gardeners Association, its broad membership and its popular Common Ground Fair; whether it's the newer Maine Women's Agricultural Network (WAgN), or the Maine Sustainable Agriculture Society (MESAS); or, indeed, whether it's the state's land grant university and its pioneering sustainable agriculture degree program and Extension initiatives, Maine leads on presenting a workable and successful model to the nation. This model spans land ethics, ecological agriculture, local farm and food sustainability, and food security. Indeed, a recent article in the *Journal of Sustainable Agriculture* reported that "Among land grant universities, the University of Maine has led the way in the development of course and curricula in sustainable agriculture"[1].

To a degree, Maine and Vermont support organic systems of agriculture; biodiversity on the farm itself and in the local economy; intensive rotational grazing practices; direct marketing in many different forms; other land-based progressive movements; and small-scale and sustainable agriculture in general. This bi-state support might well relate to the fact that they were passed over and never really participated in the industrial agricultural model (with a few exceptions like Maine potatoes and Vermont dairy). This is in contrast to Iowa and other Midwestern states that have experienced the large-scale industrial model of agriculture for nearly a century, starting with the large Bonanza Farms of the early 20th century. Strangely enough, there is an international analogy here with East Africa, specifically the nation of Uganda. In contrast to, say, other East African nations, like Kenya and Tanzania, Uganda "missed" the entire Green Revolution, probably the greatest movcment toward chemical and large-scale technological dependency in agricultural history, due to Uganda's political instability for a very long period. As a result, it is much better positioned today than are its neighbors to serve European and global organic food demand, not only for physical (i.e., ecological) reasons, but for mental, psychological and cultural reasons. In other words, Uganda today is much more in synch with the philosophy of organic production and the mindset and values necessary to support and successfully carry out such production. Kenya and Tanzania, former British colonies each with a similar pre-Green Revolution history as that of Uganda, today find themselves lacking that necessary mindset and cultural approach. In this regard, might

Uganda be analogous to Maine and Vermont, and Kenya and Tanzania to Iowa and the Midwest? The differences and similarities, in other words, may not all lie in geography.

This is not the only connection one might draw between the U.S. land grants, domestic agricultural sustainability, and Third World development. American corporate, cultural and political attitudes, especially in professional circles, were negative toward small-scale, ecological and sustainable agriculture and agrarian values for decades following WWII. Thus, more than one generation of professionals (scientists, economists, rural sociologists) which had ecological instincts toward agricultural sustainability and agrarianism were persuaded that, if they wanted an academic career in which they could display and exercise those instincts, they had better establish their research overseas in developing countries (even while perhaps maintaining an attachment to or an affiliation with an American land grant university's agricultural programs at home). Removing such individual agricultural academics from the domestic agricultural research agenda suggests that those pursuing a domestic U.S. research agenda (USDA grants, etc.) were more those of an industrial agricultural mindset who could fit in well with the incentive and reward system in place here. Thus, American ecological agricultural research and application migrated to the Third World, while corollary domestic research became infused with industrial thinking. This is an interesting thesis suggested by more than one land grant agricultural researcher of my acquaintance. If there is truth to this thesis, we will never know how much expertise and talent in sustainable agriculture might have been lost to the people of Maine (or Vermont, Wisconsin or Iowa) in the last half of the 20th century.

Teaching – Bachelor of Science in Sustainable Agriculture

The historical development of sustainable agriculture at UMO is anchored in the teaching and undergraduate degree program.

The Maine story of sustainability thus begins in an unusual place, on the teaching side of the tripartite land grant mission of instruction, research and extension. Indeed, Maine's land grant university is the only such institution that can make the claim that its sustainable agriculture program and initiative stems from its pioneering role in giving birth to an undergraduate degree program of that name. Today, the degree-granting Sustainable Agriculture Program at Maine is the only agriculture degree an undergraduate can earn at Maine, as programs representing chemical/industrial agriculture, or production agriculture, the post WWII variety, have virtually faded away. They have been replaced, as they have been elsewhere, by molecular biology and related types of micro-biological endeavors.

Like Vermont, Maine is alive with innovative thinking in the new agrarian vision of agriculture. This is reflected in the health of the sustainable agriculture program at UMO. Unlike Vermont, however, Maine and UMO are freer to initiate work in this field and to expect at least tacit support, given the fact that Maine does not have the agri-business dominance of large-scale animal confinement agriculture which is still present in Vermont (though perhaps for not much longer). Maine's agricultural economy is more diversified than that of Vermont, and that diversification, too, that lack of narrow dependency, shows through in what UMO can accomplish.

The University of Maine Bachelor of Science degree program in Sustainable Agriculture, perhaps the oldest in the nation, began with a student initiative in the mid-1980s to establish an undergraduate agricultural program which would have sustainability as its central organizing principle. This effort bore fruit with formal program establishment in 1988. (This is not different from the story of the evolution of undergraduate degree programs in Environmental Studies at many universities some fifteen or so years earlier. Many of those degree programs resulted from student demand.) As luck would have it, eight new faculty positions in critical areas of agricultural science were created in the late 1980s from a series of scheduled retirements. Luck is not all, however, for the university and its then Dean of Agriculture, Wallace Dunham, were able to selectively use these positions and this opportunity, against some natural opposition, to craft a program in answer to the student demands and, as well, the state's needs. According to Professor Matt Liebman, first Director of the program (and now on the Leopold Center staff at Iowa State), "… administrators consciously

assembled a faculty team who could teach and conduct integrated research projects concerning sustainable agricultural systems. Within a period of about eighteen months, starting in 1986, those eight new faculty joined three existing members to create the core of the Maine Sustainable Agriculture Program". [2]

UMO had the good fortune to have determined and capable leadership at both the department chair and dean levels, leadership which valued sustainable agriculture, something unusual at this time. Dean Dunham in particular was committed to the notion that reducing reliance on synthetic fertilizers and pesticides was the way to increase farm profitability and better protect environmental quality and human health in Maine – a clear stance which only the sustainable method of agriculture, ecological agriculture, could fulfill. Dunham, the right person at the right place at the right time, saw sustainable agriculture and biotechnology as two trends in agriculture developing simultaneously in the late 1980s. He saw a need for sustainable agriculture to counterbalance the rise of biotechnology. Dunham was able to couple this with a growing state-wide interest in sustainable agriculture which was coming from the serious issue of non-point source water pollution, a serious economic problem with agricultural land use practice at the heart of it. Dunham was also the first land grant agriculture dean in the U.S. to visit Robert Rodale, founding father and icon of organic agriculture in the U.S. He became convinced that UMO should be moving forward in this direction. With this conviction, Dunham was able to promote the establishment and legitimacy of sustainable agriculture at UMO, basing this legitimacy on economic arguments. Overcoming opposition, he hired three new professors in a key department (Plant Science), filling open slots from the retirements mentioned above; engineered the creation of a much needed new position in social science (economics and policy); and hired the popular and well respected former Maine Agriculture Commissioner, Stewart Smith, to that position. Smith brought with him strong political and farmer connections across the state, high credibility with diverse groups, vision, and a notable ability to bridge differences between groups (i.e., "conventional" and "sustainable" groups of farmers). He was thus able to provide the leadership needed to solidify the agricultural sustainability program. About the only goal that Dean Dunham did not accomplish during his time at the helm was establishing a demonstration model farm for sustainable agriculture, a goal later achieved by his successors.

Some lessons to be learned from this UMO experience include:

1. A Dean can play a major role in promoting and organizing a sustainable agriculture effort if he or she truly values it and is willing to accept some opposition.
2. The UMO effort, although successful, is lopsided, in that animal science, which should be a key player, has in fact played a very small role.
3. Even in this Maine success story, the structure of the sustainable agriculture program heavily rests on only a few key individuals – if they leave, the effort can be lost.
4. There may be real merit in the land grant reality in balancing opposite philosophies such as biotechnology and sustainable agriculture, and in justifying one with the other. (This is the new and developing route of CIAS at Wisconsin.)

The 25-35 undergraduate majors in Sustainable Agriculture at Maine constitute a goodly number, given declining enrollments in conventional agriculture. They study:

- the principles and practices of sustainable agriculture,
- cropping systems,
- crop physiology and ecology,
- soil chemistry and plant nutrition,
- soil organic matter and fertility,
- pesticides and the environment,

- weed ecology and management,
- insect pest ecology and management,
- sustainable development and public policy,
- agroecosystem analysis and design, and
- directed field experience.

Notably absent in this list are courses in animal science, including livestock management and grazing, due to the continuing reluctance of those faculties to become involved. This will likely change with the current thrust toward organic dairy in Maine. Also absent is attention to direct marketing, a critical aspect if sustainable agriculture in Maine is to be successful. This places Maine sharply apart from Iowa and Wisconsin. The "human dimension" at Maine remains weak.

Insight into UMO's well developed undergraduate degree program in sustainable agriculture can be achieved through a close look at course syllabi and the philosophical values of those authors whose work is required to be studied in the courses. Undergraduate courses emphasize holistic "whole systems" approaches rather than the analytical reductionism dominant in conventional agricultural and other applied science areas. This is evident in courses on Cropping Systems, Applied Entomology, Field Experience in Plant and Soil Science, Soil Microbiology, Agroecosystem Design and Management. Emphasis is placed on alternative cropping techniques, crop ecology and physiology, soil chemistry and plant nutrition, pesticides and the environment, and the basic principles courses in plant biology and in principles and practices of sustainable agriculture. The latter course draws from such readings as *Farmers of Forty Centuries* (on 4000 years of sustainable Chinese agriculture), *Farming in Nature's Image* (the work of Wes Jackson), and texts on agroecological processes, polyculture, agroforestry, conservation tillage and biodynamic farming. All of this constitutes core material to be mastered in the program. But at the same time that the curriculum suggests strength in the plant and soil area, it suggests very evident weakness in animal science. This natural science course material is richly supplemented by a smaller social science effort centered on Stewart Smith's Sustainable Development Principles and Policies. The latter includes attention to the ethical underpinning of agricultural sustainability, based on such topics as preference utilitarianism, social justice, communitarianism, social ecology, deep ecology and ecofeminism, all ultimately applied to questions of policy in the real world of Maine. Included in the sources here are Wendell Berry, Vandana Shiva, Herman Daly, John Cobb, and the deep ecologists Bill DeVall and George Sessions, among others. This effort continues with Professor Smith's course in Sustainable Resource Systems and Public Policy, which draws directly from Aldo Leopold as well as Bob Costanza's ecological economics. Application of these theories is presented in the joint social science/natural science course Agroecosystem Design and Management, an application of these principles to that Maine reality.

There are additionally 12-15 graduate students working in the sustainable agriculture area through various other departments, but there has never been a stand-alone graduate degree program in Sustainable Agriculture at Maine. While Vermont and Wisconsin today find their curricular entre into sustainable agriculture through the route of the Master's degree, and have been unable to initiate an undergraduate degree program, UMO experience has been precisely the opposite.

Black Bear Food Guild CSA

The dream of a demonstration farm to support sustainable agriculture teaching (as well as research) has been realized. UMO's Rogers Farm has been established for this purpose. Likewise, the students, proteges of the early "founding" students of the 1980s program, have successfully established their Black Bear Food Guild. Since the mid-1990s there has been a student-run and community supported farm project, a CSA with three acres of organic vegetables, herbs and cover crops. The Guild also supplies to area farmers markets in Orono and Bangor, while simultaneously providing field experience in growing and marketing which has decidedly strong academic value. The Guild is self-supporting through CSA membership shares and the income from the two farmers markets. This Black Bear Food Guild is essentially an on-campus student-run community farm,

and is today a critical element in the UMO Sustainable Agriculture Program. It not only provides on-site and hands-on experiential sustainable agriculture opportunities to the program's students, directly in synch with the course work, but it also provides opportunity for undergraduate student research (including student-initiated and student-directed research). Finally, it provides farm income from crop production, together with the marketing experience which comes with that income. Not only is the Guild financially self-sufficient but it pays each student worker $7.00 an hour. The Guild also provides what is essentially a lure for other students' involvement, and thus it is a recruitment tool for majors and minors to the program. For the small investment by the university which the Guild represents, it pays a handsome dividend! Much the same could be said about similar campus community farm efforts at Vermont and Iowa, but neither of them has the longer years of experience characterized by Maine.

From 1989 onwards, on or near campus practical farm training at UMO was viewed as vital. Once again student initiative appeared and the goal of not only a campus community farm but also a CSA was achieved by the mid-90s. The CSA, providing twice weekly organic produce for pick-up at the farm for sixteen weeks or more each year, together with farmers market sales, has provided the necessary economic viability for the project. The organic production methods, in addition to their academic learning value, have made the production system largely independent of costly off-farm inputs. Students earn degree-credit for their work and they earn a ten-hour per week stipend during the growing season. The latter is attractive to lure students into remaining and working in the summer when they are not in full-time courses. Farmstand and farmers market sales supplement this income. Greenhouse production, poultry (meat) production, and making value-added products such as cereal, pancake and muffin mix offer additional education and training opportunities as well as sources of income. The farm and its students also teach workshops.

A separate operation, the J. F. Witter Teaching and Research Farm, supports a student-centered approach to a total animal science system. It offers work opportunity with dairy cows, beef cows, sheep and horses, as well as forage production in rotation. However, it is not integrated into the Sustainable Agriculture Program.

Program Development

Overall, the UMO Sustainable Agriculture Program is an interdisciplinary program offered cooperatively by the faculties of the Departments of Plant, Soil and Environmental Sciences, Biological Sciences, and Resource Economics and Policy. (Animal Science, in spite of the central role it should play, has been noticeably absent from the mix.) The academic program emphasizes

- how to build soil tilth and fertility through rotations, multiple cropping and nutrient cycling,
- how to protect water quality by decreasing the need to use synthetic agri-chemicals,
- how to manage crop pests and livestock diseases with integrated ecologically sound strategies,
- how to create a strong diversified agriculture that is stable through market and weather fluctuations, and
- how to increase farm profits by decreasing the costs of crop and livestock production.

UMO presented an unusually supportive base for this effort in the early to mid 1980s because of the value it placed on interdisciplinary collaboration. This shows in its reward system, with extra Agricultural Experiment Station funds being provided as an incentive to faculty to do such collaborative work, and by establishing groups not unlike Iowa's issue teams. The "waste utilization group", the "potato biotechnology group", and the "fisheries and aquaculture group" are examples. When student dissatisfaction over the narrower more specialized conventional agriculture courses arose in the 1980s and the students called for the establishment of an interdisciplinary sustainable agriculture program, the structure to facilitate this exchange was already in place. It took only the three initial new hires and obvious administrative go-ahead to seal the deal.

Today the UMO program has 25 undergraduate majors and 3-4 biology-based graduate students. (There are a few more graduate students doing sustainable agriculture work which is not based in

biology, mainly in social science disciplines.) The program is and remains stable but is not growing. It is viewed by most university students as too restricted to agriculture. Food consumption and food systems rather than food production, in other words, holistic food systems work, might attract student interest. The program's weddedness to crop production alone, with very little attention to livestock, is also a likely factor in its lack of growth. Interestingly, its close relations with the Maine Organic Farmers and Gardeners Association, an uncommon alliance, is likely a factor aiding its strength and stability and may provide an opportunity for growth.

UMO has found that its sustainable agriculture student body are largely out-of-state students who transfer in from environmentally oriented or liberal arts schools that don't offer agriculture (such as College of the Atlantic and other small private schools) or from ag schools (land grants) which do not offer the sustainability philosophy. (It should be noted that non-residents of Maine who are from other New England states can get a tuition reduction – in-state tuition plus 25% - since UMO's Sustainable Agriculture Program is recognized as unique in the region. UMO's program has some competition for students with the University of California at Santa Cruz, but has the advantage of having a more universal and perhaps less exotic approach.)

Once Matt Liebman (now at ISU) was hired in the late 1980s, he became part of the impetus behind the program and took a very practical "on the ground" approach. He and others convinced the UMO administration that they could "capture the market" with sustainable agriculture, and they could off-set the declining interest and low enrollment in the traditional agriculture programs. And, since UMO is not really large enough to have two separate agricultural programs, one conventional, the other sustainable, UMO's entire agricultural effort is now on the sustainable side, an annoyance to some students and residents. In the curriculum of UMO, sustainable trumps conventional agriculture. An ameliorating influence to achieve greater balance, however, is the effective bridge-building of Stewart Smith, both as a UMO sustainable agriculture faculty member and as the founder and director of a separate but UMO-integrated organization, the Maine Sustainable Agriculture Society (MESAS). This provides counter-balance with a broader cross-section of Maine farmers.

Weaknesses of UMO's sustainable agriculture effort center around the aforementioned lack of attention to livestock and, as well, the relatively minor interest in food systems, a whole area of critical work yet to be developed in Maine. The latter stems from a relative weakness in social science and humanities expertise as applied to food and agriculture. And, ironically, Maine dairy farmers want training in organic milk production because they see a profitable market there, but UMO's College of Agriculture does not have the expertise or the interest, a source of frustration for farmers who are more progressive than their land grant university. (This is analogous to UW's lack of ability and interest in serving Wisconsin farmers in the area of intensive rotational grazing.)

To understand UMO, one must see that the UMO focus is on congruence rather than on incongruence, that is, the congruence of organic and non-organic systems. UMO argues that the overlap in Maine of these two, the level of congruence therefore, is as much as 80% to 90%. That is the starting point for all discussion. Beyond congruence, a second major consideration at Maine is the aforementioned bridge-building, and it does that task well. A strong consensus exists at UMO that MOFGA and the state, the two philosophies, industrial and agrarian, must be bridged, and a great deal of effort is being expended to do so. MOFGA's Russ Libby (Executive Director) and Eric Sideman (Director of Technical Services and a man whom many refer to as America's "first organic agricultural extension agent") work very closely with UMO and Extension. Both believe that organic and non-organic have more in common than not. Such emphasis on the commalties rather than the differences (as would be found elsewhere) suggests the prestige and status that organic farming in general and MOFGA in particular enjoys in Maine. Another factor in the mix is that two of the hallmarks of conventional agriculture, Bst growth hormones and genetic engineering (and one could add large-scale animal confinement) aren't found significantly in Maine. This is no accident, given the difficulties in achieving herd concentration in the state because of the strength of mandatory nutrient management plans. The industrial model of agriculture thus can't secure a foothold in the state even if there were no opposition to that model. Stewart Smith predicts there will thus be very few industrial farms in Maine, making the bridging of philosophies easier.

Much emphasis is also placed at UMO on Maine's choice not to develop a Center for Sustainable Agriculture (as in the UVM model). The idea at Orono is to avoid the duality of sustainable vs. conventional agriculture and to achieve a much higher level of integration of the two. The intent is to open up a major place for organic agriculture without implying that other low energy-input but non-certified organic systems don't have a place. There is, indeed, a much greater opportunity for integration of organic and sustainable into other forms of agriculture, and an erosion of the "us vs. them" mentality. The decision to avoid a "Center" for Maine appears to be deliberate and well supported.

Maine Sustainable Agriculture Society (MESAS)

The tie between Maine's land grant university and private non-governmental agrarian organizations in the state is so strong and so intimate that one cannot help but deal with these NGOs in the context of the public university and its work. Maine Extension's new contract with MOFGA for assistance in intensive rotational grazing is a case in point. (This is not unlike Iowa State's relationship with the Practical Farmers of Iowa, the latter relationship also being contractual. The same is true, perhaps, in Vermont, where UVM Extension is the link to the NGOs in sustainable agriculture, particularly to the Vermont Grass Farmers Association with which it may be moving toward formal relationship.) Since there is such a strong linkage between the UMO program, Professor Stewart Smith, and former Agriculture Commissioner Smith's organization, the Maine Sustainable Agriculture Society (MESAS), it is appropriate to take a closer look at the latter at this point. MESAS is a private non-profit membership organization which is not part of the University of Maine. However, it was initiated by and is so embedded in the university and in its program in Sustainable Agriculture (through Stewart Smith and his former student and now staff assistant, Andrew Files) that it can be viewed in conjunction with UMO.

The mission of MESAS is to "explore, develop and promote agricultural systems and practices that allow Maine farmers to retain a greater share of consumer expenditures for farm products"[3]. In this work it is a perfect in-the-field ally of the UMO Sustainable Agriculture Program. With start-up in early 1998, MESAS has been first and foremost an organizer of tours and field demonstrations at particularly highly diversified farms around Maine. MESAS is ever searching for examples of integrated crop/livestock systems which maximize diversity among crop and livestock types, varieties and breeds; which incorporate other forms of on-farm income such as agri-tourism and farm bed & breakfasts; and which practice economic diversification through multiple forms of direct marketing, including on-farm stands and stores, CSAs and farmers markets, among other approaches. MESAS is very much aware of the economic and the political power of in-state and on-farm expended dollars for food, dollars otherwise re-directed out of the community and state via large out-of-state super market chains and food clubs.

Working with Professor Smith, a small group of diversified Maine farmers have anchored this organization since its inception. MESAS holds its annual meeting each winter at the annual Maine Agricultural Trades Show in Augusta, providing sustainability a presence at that event. MESAS publishes a quarterly newsletter which invariably provides profiles of Maine farms as well as informing the membership about sustainable agriculture events in Maine and among other organizations (including keeping Mainers abreast of UMO sustainable agriculture activities and progress). MESAS also promotes on-farm research at the production end; sponsors an "Institutional Buying Project" at the marketing end (focused on college and hospital food purchasing); hosts a mentoring program for new farmers and those wishing to transition to practices which are more sustainable; and sponsors a "Farm Fresh Connection" program which links central Maine institutional buyers with farmers to support locally grown foods; and assists farms to connect with public schools. But first and foremost MESAS is perhaps defined as a celebrant of successful models of sustainable agriculture farms in Maine, as it highlights such models in its newsletter and actively conducts tours and field days on such farms, on the premise that farmers learn best from other farmers. Successes are to be publicized and celebrated.

In its working definition of sustainable agriculture, MESAS symbolizes the middle way in Maine, as exemplified at UMO and, as well, across the state. MESAS bridges, in both its philosophy and

practice, conventional and organic forms of agriculture. In fact, the successful marriage of these two in Maine, both of them at the small to intermediate scale, owes its success at least partially to the work of MESAS over recent years. (In considering this bridging, it is plausible to think that Stewart Smith himself was brought on to the UMO Sustainable Agriculture faculty to avoid an overly strong programmatic tilt toward the organic interests in the state, and thus to maintain a bridge between those organic interests (i.e., MOFGA), the conventional farming community and state government. Since Professor Smith is in an excellent position to do that bridging, this action would bespeak not only earlier fear over MOFGA influence – which it might appear at the surface – but would also be symptomatic of the great widespread desire at UMO and in Cooperative Extension to cooperate and collaborate with MOFGA and to relate to that well regarded state-wide organization and its membership. As a strategy, if that's what it was, the decision to "bridge" philosophies and interests in this way has indeed worked well.)

Overall, MESAS is concerned about capturing (or re-capturing) the 80% of the crop price which is in the industrial rather than the agricultural part of the system (i.e., in the hands of the middle men, the processors, the wholesalers, distributors, transporters, rather than in the hands of the farmer). Such capture is to be achieved through direct marketing. The organization is also interested in increasing the viability of independent retail food stores in rural areas and in linking them directly with farmers. Stu Smith believes that the industrial agriculture model in Maine is self-limiting, due both to organized citizen opposition and to lack of space to put waste, the latter resulting from the previously mentioned state nutrient management plans now in effect. Herd concentration, therefore, is thus precluded. Both of these circumstances also preclude much genetic engineering work on livestock (and place a hold on GMOs in crops as well).

> ***"If Mainers were to purchase as little as $10.00 worth of Maine foods each week, it would add up to $200 million staying in the Maine economy creating jobs and enriching Mainers."***
>
> ***Russ Libby***
>
> ***MOFGA***

As part of its extension effort, MESAS has produced two revealing films. The first, "Conversations With Farmers", is a one hour production designed for public television (and broadcast state-wide on Maine PBS). This film tells the story of diverse farms and farm families across Maine producing all kinds of crops and livestock which Maine can produce. In the film, each farm itself represents great diversity and each farmer considers regeneration of the land rather than wearing it out as critical. Quality of life rather than short-term income or maximization of income is the primary value. These farmers are all successful practitioners of sustainable agriculture, and largely without debt. A key point the film makes is that most of these farmers do not come from farm backgrounds, are not educated in agriculture (or, for that matter, in science), were graduated from various liberal arts colleges and disciplines. And all of them have "made it", have survived more than two decades in farming. Such farmers are perfectly representative of what Wendell Berry calls the humanities approach to agriculture. They do not fit the conventional image of American farmers.

The second film is a two hour more technical production called "Elements of Sustainable Agriculture", involving some of the same farmers as the preceding film, as well as some others. This film identifies three types of sustainable agriculture farmers in Maine:

- the designer, who designs a sustainable agriculture operation from the beginning,
- the evolver, who evolves a sustainable agriculture farm from an industrial farm,
- the appender, who appends a sustainable agriculture part or element to an industrial farm.

The film instructs on "starting from scratch", avoiding large capital outlays, selecting the farm, financing, finding non-traditional capital sources, managing risks, adding sustainable agriculture

practices to industrial farms, designing cropping and livestock systems, and utilizing a range of aspects of direct marketing.

Both films are applicable throughout New England and beyond, and should attract would-be farmers to consider the possibility of farming. Both are powerful teaching tools, in Maine and beyond, and deserving of study. They fit the farmer recruitment and retention aspects of MESAS' mission. (They are available at modest cost from MESAS.)

MESAS' Stewart Smith speaks of the "economies of scope" rather than "economies of scale". He means by this that farmers can reduce the costs of production by using animal and crop systems that are complementary, and thus realize significant reductions in fertilizer and pesticide costs and other inputs because they gain these services naturally. MESAS seeks to identify what motivates farmers to adapt to or shy away from integrated systems, a key to understanding its research direction.

Overall, MESAS is strongly interested in on-farm research, on effective farmer use of SARE and other available Maine grants, on farmer networking, on direct marketing, and on institutional purchasing, as well as in showcasing model sustainable farms.

NEON and On-Farm Research

Research in sustainable agriculture at UMO has involved active participation in the Northeast Organic Network (NEON) and its "Focal Farm Studies", research which thus far involves one Maine farm (New Leaf Farm in Durham, one of only two in northern New England, the other being in Vermont). But, importantly, the Director of Sustainable Agriculture at UMO, Dr. Mariann Sarrantonio, is a founding member of the NEON Board, and one of only two board members from New England. An important element of NEON is not simply its farm-level research in organic agriculture (which is thus far restricted to crops) but the fact that it both champions and symbolizes the importance of on-farm and thus farmer-directed research. On-farm research has rapidly become a basic element of both sustainable agriculture and agrarian thought. While Iowa's Thompson Farm is the most famous progenitor of the idea, the concept has found fertile ground and is bearing fruit in the Northeast.

With its core at Cornell University, NEON is an innovative consortium of farmers, land grant researchers, extension educators and grassroots non-profits working together to improve organic farmers' access to research and technical support. NEON, in its work to understand and improve organic production and marketing, places growers and their knowledge at the center of the process. Thus NEON, albeit with full land grant university involvement, rejects the traditional top-down hierarchical approach and the "cult of the expert" which the land grants have traditionally espoused. The NEON approach also acknowledges the individuality of each and every place, of each and every farm, and the diversity of each, in a way which the traditional top-down approach and the institutional system it spawned, has never been able to do. The twelve "focal farms" under the NEON Project (including the ones in Maine and Vermont) involves 4-5 researchers in

multidisciplinary natural science and social science disciplines who seek to understand what makes such farms tick.

NEON is integrating crop production and marketing, biology and business plans. It addresses "knowledge gaps" in the Northeast, including

- What are the current contributions of various organic amendments to nutrient balances on organic farms, and in which cases might we be over-applying amendments?
- Which cover crops are best adapted to conditions in the Northeast and how do these types affect fertility and pests on organic farms?
- How can crop rotations, crop diversity and cover crops be used to reduce severity of insects, diseases and weeds in organic crops?
- How effective are organically accepted "rescue treatments" at reducing crop losses from pests?

Products from NEON's work, essential support tools for organic crop growers, include nutrient budgeting worksheets to optimize soil fertility management in various organic cropping systems; a grower and researcher-designed rotation planner to enhance farm profitability and optimize use of cover crops and crop rotations to manage soil fertility and crop pests; and an annual organic pest management product review of tested "rescue treatments" to address pest outbreaks in organic systems.

NEON is the vehicle for on-farm research in the organic sphere. But the research in Maine and New England is broader than organic and, once again, UMO's leadership shows through in the form of Maine Extension's leadership, from Orono and from the counties, in the organization of the recent "Farmer-Led Research Conference: Turning Ideas into Reality" (second in a series jointly with the University of New Hampshire). The main idea of this conference was to start the process of training agricultural extension workers in both states to work with farmers in establishing on-farm research. Participation in the conference-workshop was predicated on extension agents working with farmers. Farmers provide the leadership in the identification of important issues. Such is not only a rejection of past practices but an acceptance of the "farmer first" concept developed by Robert Chambers and others. (In this research the farmers are recognized as experts and integrators of their farming systems. It is they who determine the research agenda and who design and implement the experiments. The adoption rate of such research is much higher with this participatory process, when the farmers do the extension and are in control.) More such bi-state workshops are planned for the future as the University of Maine continues to exert clear leadership in this area.

An ultimate aim of this research is not simply new knowledge but rather the increasing independence and financial stability of the farmer. Such farmer-centered models which make farmers proactive buck the trend since WWII, as does any form of community-based research. That trend since WWII has been to reduce the role of the farmer and to shift the role of the farmer from artisan to laborer. On-farm and farmer-led research helps farmers go from being information consumers to becoming information producers. Since information is power, such on-farm research constitutes a social revolution in the role of the farmer. Interestingly, farmer innovation over millennia has given us most of the knowledge we have today – not top-down research. UMO's program in sustainable agriculture and Maine Extension, through NEON and in many other ways, are attempting a return to that path.

Integrated Systems Research

Perhaps the most significant focus of sustainable agriculture research at Maine is, however, integrated agricultural systems and the achievement made thusfar in the integration of cropping and livestock systems. Unlike Wisconsin, Iowa and Vermont, Maine's agriculture is, on net, more balanced and diversified. It is not dominated by any one sector and thus the culture of agriculture in the state is more open to such integration than might be the case elsewhere. (While Vermont is 80% dairy, Maine is 21% dairy, 21% potatoes, and 58% diversified crops and livestock.) MESAS is also taking a lead in the promotion of such research, partly from the research interest of its two principles, Stewart Smith and Andrew Files, in their project, "Agricultural Integration: Systems

in Action", a project of the Maine Agricultural Center at UMO. An integrated crop/livestock system is expected to build soil quality, reduce surface and groundwater contamination, build more cohesive farming communities, and maintain or increase farm income. The joining of crop and livestock operations is also expected to increase the use of locally produced inputs, an economically significant characteristic.

Sustainable agriculture requires integration and integral thinking. So also does ecological agriculture. So also does an agrarian value system. Hence, research on integration, a focus on integration, lies at the core of research in sustainable agriculture. Integration is predicated, of course, on diversity, biotic and economic, but it carries diversity a very necessary step further, for it does the job and yields the service that integration can provide, which is significant by-product benefits.

In Maine, crop/livestock integration can answer to the reality of tough state-wide nutrient management regulations, the limited availability of additional cropland, and the desire for larger more efficient farming operations. At the same time, it provides opportunity for farmers to farm effectively without the need to learn new management skills or expand production. Research in Maine has focused on the integration of dairy and potato systems. Results of this research have verified that soil quality, crop quality and crop yield have all increased. However, the research, which is predicated on the foundation of separately owned farms, was not able to determine the value of exchanged goods and services. It did, however, discover that trust between cooperating partners is essential, a possible weakness in the model in light of that lack of knowledge of the value of those exchanged goods and services. Trust will not always be present.

Another UMO integration initiative is the USDA-funded project on "Re-Integrating Crop and Livestock Enterprises in Three Northern States". This three year project involving forty working farms, in Maine, Michigan and Iowa, uses a holistic systems approach (research, education and extension) to evaluate six interrelated outcome elements: economic impact, marketing opportunities, community impact, ecosystem impact, farmer adoption and information transfer. Integrated systems require fewer external inputs, and thus operate at lower cost. Expected benefits of such spatially integrated crop and livestock production include economically viable farms, healthier farm communities, and healthier farm ecosystems. Such spatial integration involves crops and livestock that are produced in close proximity where feed and manure can be exchanged with minimal off-farm transport. While an integrated system may comprise the ideal of within-farm diversification (so typical of farms of the past), they also can comprise cross-farm cooperation where farmers with individual crop and livestock enterprises share a land base, labor, equipment or other capital, and exchange plant nutrients, primarily animal manure, for feed crops.

While UMO research in this project focuses on crop/livestock integration, a higher order of integration can also be achieved through the addition of agro-forestry, and, as well, through services such as agri-tourism. In principle, the higher the level of both biotic and economic diversity, and particularly integration, the higher the level of sustainability, of ecological practice, of agrarian values achievable.

As part of its sustainability research, UMO is also making notable progress in the integration of pasture management and rotational grazing (or grass farming as it's more commonly known in Vermont). From this research, grazing guides and pasture management home study courses are being developed by Maine Extension, programs to support Maine's currently very energetic transition to organic dairy production and, as well, its less well known but increasingly substantial progress in grass-fed beef and other meat product. The latter has perhaps been more of an exercise in extension than research, involving a number of extension agents in the counties, led by Rick Kersbergen of Waldo County. But it operates in practice state-wide. Kersbergen leads the way with pasture walks, grazing workshops, and alternative forage workshops for winter feed.

Maine Extension

Extension's role in Maine has ranged from the conduct of the broader and increasingly popular grass farmer efforts related to dairy and beef, to a specialized project on Katahdin hair sheep (a

breed developed in Maine, as the name implies, a breed which is easy to raise, largely disease and parasite-free, and exclusively raised for meat). It also includes urban and suburban efforts toward pasture poultry for eggs and meat. There is also significant new effort in organic grain production and particularly in developing processing infrastructure for such production in Maine. This is both for direct human consumption (including organic bread and cereals) and for livestock which are being raised for organic sales (and for organic dairy cows, although attention here is on grass more than on grain).

In 1999 the Maine Agricultural Center produced its report, "The Feasibility of an Organic Grain Milling and Handling Facility in Central Maine", written by UMO's Stewart Smith, among others. The thrust of this report was the high cost of certified organic grain for dairy cows, a necessary cost if certified organic milk is to be produced. However, interest is shifting toward grass, both on pasture and in forage crops, including winter feed, to produce milk. Thus, the true value of such work on organic grain milling might lie in grain production for other non-ruminant livestock, including poultry, and in direct human consumption in cereals and baked products. In this case, one form of sustainable agriculture and agrarianism, rotational grazing/grass farming, is overcoming another form, organic grain production for animal feed and meat and dairy production. Rotational grazing is the higher form of sustainability since it makes the system work for itself and thus reduces inputs. Maine Cooperative Extension maintains a strong interest in all of these matters through Waldo County Agent Rick Kersbergen and Aroostook County Agent Matt Williams.

Extension is also actively engaged in promoting and publicizing Maine's local and growing farmers markets, its CSA farms, its individual small-scale farms, and its farm stands. Together with MOFGA, Extension conducts seed-saving schools and courses. (Maine is also involved with New York and other Northeastern states in a Public Seed Initiative – PSI – to protect seeds, keep them in the public domain, and train seed producers and seed savers.)

Maine's well known Farmer-to-Farmer Conferences, held annually in November at Bar Harbor, were launched by the Maine Organic Farmers and Gardeners Association (MOFGA), and co-run with UMO Extension, giving them a legitimacy among the agricultural community which they might not have without Extension's involvement. These annual conferences, a well known fixture on the Maine scene, are well attended and generally restricted to practicing farmers. Featuring many practical workshops, a keynote address by a prominent personage, locally grown meals, an area farm tour or two, and many hours for social networking opportunity. Farmer-to-Farmer, as it's called, is becoming a familiar presence in Maine, and one which raises both the profile and the legitimacy of its two sponsors. The focus is entirely on sustainable, small-scale, and/or organic systems, balancing crops and livestock, balancing production and marketing, and always including diverse and helpful other subjects. The latter includes land-link (linking would-be farmers who are landless with farmland owners), agri-tourism (including farm bed and breakfasts), connecting with chefs (restaurants), on-farm research, locating farm labor, nutrition, overcoming national and global challenges, and other useful subjects.

Assistance to rural food retailers (small and mid-scale, independent and locally owned) is another feature of Maine Extension. The aim here is to strengthen the economic and social vitality of rural communities by strengthening the small food-oriented businesses and their relationships with local food producers, both growers and artisanal producers.

The urban/suburban oriented Maine Extension effort in and around the state's largest city, Portland, is further indication of a sustainable agrarian value system. This work includes the Maine "relief milkers program", a day-long school for inexperienced milkers which is designed to train non-farmers to provide relief services in milking to Maine dairy farmers. This program enables farmers to get relief in a pinch, as well as to take perhaps a much needed vacation. "Planting" farmers markets all over; conducting farm tours for urban and suburban people; bee-keeper training; conducting a five day shepherd's school, which includes dairy sheep, hair sheep (for meat), and pasture management, animal housing, artificial insemination and value-added fleece; assisting CSAs; Master Gardener programs; farm tractor safety; and the internationally known Katahdin hair sheep project (cooperatively with Bowdoin College – see below) are all indicators of the practical

farm sustainability engaged in by Cumberland County Agricultural Agent Dick Brzozowski. Given Portland's homeless population and food pantry needs, planting a row for the hungry is another of Dick's local efforts. This county agent also has a special interest in promoting pastured poultry and has developed a demonstration packet to accomplish this end, modeled somewhat after Joel Salatin but adopted for Maine. Other characteristics of Brzozowski's work include conducting on-farm discussion groups and alternating the farms on which they take place; developing farm visit forms and customized tours, an important activity in an urban – suburban area; and providing service and assistance to the growing number of CSAs in his area. Brzozowski is a believer in something he calls "goof plots", farming plots which teach us how not to do things, and he is also critical of "concrete grazers" on the animal side (i.e., indoor confinement feeding) which he also sees as ways not to do things.

What we find here in urban/suburban southern Maine is a multiplicity of sustainability projects emanating from a creative and dedicated mind focused on sustainability, small-scale farms, local foods, keeping farmers on the land, and local economic independence, not to mention farm and food security. The diversity of this agent's projects rivals the characteristic biodiversity of sustainability. That diversity includes small-scale, direct marketing, niche development, CSA, organic certification, the role of women's and starter farmer/beginner farmer programs, local food policy and food security, and local economic independence, all of which tend to be characteristic of sustainability-oriented Extension agents. A natural, even innate, affinity for ecological thought and action, whether implicit or explicit, is, as well, characteristic of the breed.

Continuing in the small-scale vein, Maine Extension has made a particular effort to strengthen the sustainability of the small farm sector, an agricultural sector so often ignored by land grant universities. The answer to meeting the needs of Maine's small farm sector is often in reducing their operating costs (rather than necessarily increasing their revenue stream). The way to accomplish this goal is very often to assist farmers in moving toward sustainability practices (which represent low capital input), toward organic (which, if achieved, will also improve their income flow), toward grass-fed, pasture and rotational grazing practices (which will reduce input costs), and toward biotic diversification and its offspring, economic diversification. In its special relationship with MOFGA, which also champions the small-scale grower, Extension can be particularly effective.

Maine Extension's recent Small Farms Conference was historic for its location: the MOFGA headquarters site in Unity, Maine. It is only very recently that a state extension service would choose to organize and host a public meeting at the headquarters of the state's state-wide organic growers association, such has been the conventional antipathy maintained between the two. This could not have happened in Maine, politically or philosophically, until recently. It still could not happen in most states. While some farmers attending were not happy or comfortable with this choice of site, most were, and both communities, at least in Maine, are indeed quite open to, respectful of, and accommodating to one another. Another unusual characteristic of this meeting was the great amount of available time allowed by the organizers for farmer networking, and thus farmer empowerment, a sure sign of an agrarian value system at work.

Further corroboration of a close tie between UMO, Maine Cooperative Extension, and the rather new Maine Organic Milk Producers (MOMP) is the annual Maine Dairy Forage Field Day. This event also suggests further corroboration of interest and enthusiasm of women farmers, and of younger farmers, in alternative and sustainable forms of agriculture. A cold and stormy winter day with poor driving conditions does not inhibit fifty-five central Maine dairy farmers from spending all day in Hinckley to learn about forages for dairy cattle which can replace corn. Why? Because corn is challenging to raise organically and these farmers are committed to the production of certified organic milk and other dairy products. This is also a sign of increased interest in transitioning to certified organic, and Extension is there to help them do so. It is a further sign of growing interest in natural and organic beef production in Maine, in spite of the fact that this annual meeting is organized as a dairy meeting. There is also here a clear interest in rotational grazing and grass-fed product. As a sign of the mutual interest between Maine and Vermont in this segment of sustainable agriculture, three of the field day's principal speakers were from Maine and the other two were from Vermont.

Maine Extension's dairy forage conferences are also characterized by much opportunity for farmer networking. These conferences, a further keynote of farm sustainability, are designed to assist farmers to discover and try out alternative livestock forages, particularly for dairy cows, with an eye to transitioning to organic and to doing so without a dependency on traditional corn forage, corn being difficult to wean from chemicals and thus hindering the organic transition.

A feature of the small farms conference, the livestock forage conferences and others of similar nature is the considerable numbers of women present. Women often constitute at least 40% of the farmers present, and sometimes are in the majority. This includes older women who are veterans of on-farm experience, and, as well, excited younger women anxious to start farming. In support of these many women farmers and would-be farmers, Maine Extension, through the leadership of Sagadahoc County Agricultural Agent Vivianne Holmes, has established Maine's Women's Agricultural Network (WagN), a new, dynamic and growing state-wide organization. (See ahead.) Although Vermont gets credit for initiating this idea, Maine has taken it to new heights, exceeding the more narrow business practices approach that has constituted much of Vermont's WagN endeavor.

Although fundamentally a research project, the Katahdin Hair Sheep Project arises more as the work of UMO Extension than of UMO research. The project is a collaborative effort between Extension and Professor Tom Settlemire of Bowdoin College. It is an Extension collaboration with a private college, a collaboration with strong agrarian characteristics and potentials. Professor Settlemire, a biologist, has determined that the design of the digestive system in farm animals can be used to determine the range of nutrient sources to which they are adapted, thus establishing a direct connection between internal anatomy and environment. Katahdins are of particular interest because they are very hardy, adaptable, low maintenance sheep that produce superior lamb crops and lean meaty carcasses. They could become an important element of farm biodiversity in Maine and also fit well into rotational grazing systems. They are ideal for grass/forage-based management systems. And they have exceptional mothering ability and lamb easily on pasture. Being hair sheep, they do not produce wool. Thus, no shearing is necessary. The market for wool today is so low that this is not a problem. It is meat for which there is a market. Katahdins are very parasite-tolerant and require little treatment, suggesting a lesser challenge to raising them for the organic market. The joint Maine Extension/Bowdoin College project is designed to provide the genetic base for a more profitable production of lamb using sustainable techniques such as local feeds and rotational grazing. Resistance to parasites and diseases, the requirements of fewer inputs, and leaner meat are all anticipated outcomes.

The rationale of the Katahdin Hair Sheep Breeding Project, in the context of sustainable agriculture, is ecological efficiency. That rationale includes prospects for intensive rotational grazing in support of crop/livestock integrated systems; low-fat meat with no chemicals or antibiotics; parasite-free sheep; and direct marketing of meat. This project includes the direct formal involvement of Cumberland County/Maine Cooperative Extension, and the indirect involvement of Aroostook County Cooperative Extension. Principle Investigator Tom Settlemire of Bowdoin College also farms his own sheep and vegetables for on-farm sales, and participates in and co-directs the Brunswick and Portland Farmers Markets. He also chairs the farm program at the new Crystal Spring Community Farm in Brunswick with their free-range poultry, sheep and meat goats. Bowdoin College's Environmental Studies degree program holds potential for supporting and sponsoring agricultural projects for credit, another example of the liberal arts and humanities approach to agriculture outside the land grant system, possibly in relation to the Katahdin Hair Sheep Project.

Overall, this project teaches that there is real potential for modern sheep breeding/sheep genetics as an aid to the sustainability of small-scale agriculture in New England – an excellent way to keep local farmers on the land and to help New England feed itself ecologically and thus sustainably, with very low input cost and no animal confinement. One wonders when UMO, its sustainable agriculture program and its Animal Science Department, will take up leadership in this work, as is appropriate for the land grant university!

Maine WAgN

Women farmers (as farm operators, not as spouses or others) are growing rapidly in number, as attendance at any meeting in sustainable or organic agriculture, on CSAs or farmer markets, or on rotational grazing will attest. Chiappe and Flora in their study "Gendered Elements of the Alternative Agriculture Paradigm"[4] identified a number of characteristics which fit well with the sustainable agriculture paradigm: independence, decentralization, community, harmony with nature, diversity, restraint, quality family life, and spirituality. These qualities are proportionally more characteristic of women than of men.

Vermont's WagN, founded in 1995, was predicated on the under-representation and lack of acknowledgement of women in agriculture. Women were considered to be atypical farmers in Vermont (and certainly in Maine in the same way). They engaged in more non-traditional agricultural endeavors. They did not participate in traditional educational opportunities related to agriculture. They felt isolated and did not have networks of support. They were not aware of available agricultural programs nor did they have easy access to them. They often had inadequate management skills. They were found to operate without goals, according to the Vermont WagN. Recognition of such characteristics of women in agriculture prompted the start-up in Maine of the Maine WagN in 1998, as a program of Maine Extension.

Maine WagN's mission is to enable women and other under-served people to successfully own, operate and support agriculturally related enterprises. Thus, Maine WagN membership is not restricted to women. Any under-served farmer (which might include in Maine the very small-scale and immigrant farmers) could participate, all of which suggests a desire to serve the disadvantaged. WagN conducts an annual conference, produces a newsletter, maintains its own website, conducts monthly meetings around the state, sponsors an events calendar, participates in fairs and trade shows, has carried out educational work in managing risk and in microenterprise, and maintains a membership. Undoubtedly its greatest role, however, is in networking and in strengthening women farmers through the modicum of networking. It also conducts hands-on farm visits and a mentorship program, and provides scholarships for education and jobs skills training.

Although WagN has a practical role in enhancing the business and farm management skills of its members, it is important to note here that the fit between Maine WagN and sustainable and/or ecological and organic agriculture in Maine is a near perfect one. Thus, Maine WagN should be viewed as a natural extension of sustainable agriculture in Maine and Maine's Extension Service. That is its philosophy and the work, in practice, which it carries out. Surely Maine WAgN is capable of assisting women engaged in the large-scale and agri-business oriented industrial model of agriculture and would certainly not deny assistance to such people. However, in practice, Maine WagN is engaged with the small-scale ecological/agrarian model addressed in this book, and thus correctly a part of making the case for UMO's involvement in sustainable agriculture. The extremely non-hierarchical and grass-roots nature of WagNs, their clear rejection of the "cult of the expert", the scale at which they operate, and their commitment to consensual decision-making all mark them as agrarian rather than industrial in mode, philosophy and dominant values.

Maine Farms and Farmer Perspectives

What might Maine farms put forth as models of sustainability? What might such farms look like? What kinds of farms might be of interest, for example, to the Maine Sustainable Agriculture Society? Farms described in this section exemplify those in Maine which are widely viewed as sustainable and operating from diversity and/or ecological principles.

Harris Farm in Dayton is one such farm. Biodiversity (cows, beef, milk in seven flavors (all in returnable glass deposit bottles), butter, cream, small vegetables, sweet corn, hay silage, decoration corn stalks, winter cross country skiing business) characterize this farm. Equally characteristic is the farm's complete conversion from dependency on commodity crop production marketing to wholesale markets, featuring no farmer control over price, over to direct marketing to retail markets with substantial control over price. This conversion took place over the last two decades, with the introduction of agri-tourism (the ski business and prepared lunches, starting in 1987), and a recent commitment to an on-farm year-round retail store replacing seasonal farmstand sales. Harris Farm also provides home delivery of food through internet sales to 50 to 60 homes, and, as well, participates in local farmers markets. This farm is reducing the cost of its chemical and other inputs but has not gone organic. In addition, it is limited in any conversion to grazing dependence due to its considerable sunk investment in confinement operations. The big element in farm sustainability here, however, is direct marketing in multiple directions, backed up by biodiversity, continuous reduction of input costs, and commitment to crop rotation. The farm fully supports two families.

Faulkner Family Farm in Groville, Maine makes it into sustainability consideration on the strength of acquisition of a wide variety of Midwest farm auction heavy machinery and the ability to repair and refurbish this equipment for re-sale; biodiversity, composed of grain seed production, mixed vegetables and flowers; and use of substantial municipal compost available free of charge. But the big role here is seed production (grains, and mainly rye) for sale to other farmers to support their need for crop rotation. In a way, this is a farm in service to the sustainability of other farms, albeit with some sustainability features of its own, including large equipment recycling.

Snell Family Farm in Bar Mills, Maine is another example, a farm which also champions direct retail marketing, through several farmers markets, through an on-farm farm store open year-round, and through retail greenhouses. There is, again, a major commitment to diversity on this farm: chickens, eggs, apples, mixed vegetables, ornamental plants, and the new specialty business in aquatic plants. These farmers are firm believers in spreading the risk through diversity. All of these characteristics are sustainability-friendly, but a risk exists on this farm of excess capital investment in areas which are particularly vulnerable in an economic downturn, such as greenhouse flower production, water gardens, and heavy investment in irrigation in a naturally wet region. On the other hand, the farm respects innovative and economically resilient small-scale "low tech" technology.

All of these farms are non-organic, although the last is closer to certification than the others. And all are more crop than livestock-oriented.

Sunrise Acres Farm at Cumberland Center, although highly diverse as well, focuses more on livestock as a centerpiece. Devotion to a grass base is strong, as is intensive rotational grazing. This farm is certified organic. The farmer, Sally Merrill, is a member of the MOFGA Board. Sunrise Acres is also highly biodiverse: sheep, beef cattle, laying hens, pasture poultry (broilers), bee hives, a three acre organic garden which supports a hundred member CSA, on-farm sales (a farmstand), a hoop house with 75 varieties of heirloom tomatoes and peppers, and a farm Bed and Breakfast. Stability of farm production is based on the production of thirty dozen organic eggs per day, largely raised on pasture. This poultry operation is predicated on improving the pasture through poultry grazing (which includes, as well, the work of Cornish Cross broiler chickens, an ideal pasture breed). The concern over pasture health on this farm also shows through in the five sheep paddocks – the Dorset sheep both improve the pasture and produce meat. Polled Herefords on pasture provide beef. Meat product is all direct-marketed to multiple farmers markets, natural food stores, and through on-farm and private individual sales. "Pasture Perfect" certification for meat is being sought from the certifier, the New England Livestock Alliance (NELA).

Crops at Sunrise Acres Farm feature a number of heirloom varieties, dependence on livestock for manure, and crop rotation, using buckwheat, oats and rye in that order. Intercropping and intense lettuce production are used for weed reduction. Mixed vegetables are produced in six quadrants which are all rotated. Commitment to heirloom crop varieties is high. The CSA is the market for 95% of all crop production, with the rest going to farmers markets. A new project is to winterize the

tomato hoop houses and heat them from restaurant vegetable oil waste, a significant recycling ethic. A driving factor at this farm is the interest in and concern for pastures, their quality, their condition, their renovation. On this farm there is a firm belief that it all starts with soil and grass, and that livestock should be used to improve the soil and grass, and not simply to serve as an end product. Sunrise Acres Farm works closely with MOFGA and with Cooperative Extension and is indicative of the integrated attitude of those two institutions. Sunrise Acres proves that a diversified grass-based meat and crop-producing operation will work in Maine without major problems, and that there is sufficient market demand in the state to support it.

Edgewater Farm in Phippsburg, an essentially organic (but non-certified) farm provides an average of over three thousand pounds of mixed vegetables and greens to Bath's food pantries and soup kitchens each year. In 2003, that figure topped 4,500 pounds! With this linkage between agrarian values and charity, the people served by the food pantries and soup kitchens of Bath, Maine, are perhaps, from a nutritional perspective, among the best fed people in Maine.

A prime potential for sustainable agriculture demonstration and modeling is found at Pineland Farms near Falmouth, Maine. With 1800 acres of farmland and nineteen buildings on an additional two hundred acres, Pineland Farms ranks with the thousand acre Appleton Farms at Ipswich, Massachusetts, and the similarly large and financially well endowed Billings and Shelburne Farms in Vermont, as perhaps the highest potential sites in New England for the future demonstration of sustainable agriculture practice. All of these demonstration farms can place particular emphasis on rotational grazing of livestock for meat and dairy product. Vermont's Shelburne Farm is, in fact, a source of some inspiration for Pineland, both for farm-based community economic development and for the testing and demonstration of new ideas in sustainable agriculture.

At Pineland, which at this point could perhaps be thought of as an institution in search of an identity, there are countervailing philosophies competing for position. The potential here is truly enormous. Today Pineland is involved in free range chickens and eggs, and has interest in MOFGA organic certification. It is growing a great quantity of hay to feed its dairy and beef cattle, and has some degree of biodiversity (chickens, sheep, beef, dairy), but has been uninterested in intensive rotational grazing which it could readily demonstrate with a number of livestock breeds. Pineland's commitment to animal confinement (of a dairy herd of Holsteins) and its concerns over aesthetics (i.e., fencing, which may trump ecological concern) inhibits its movement in the sustainability direction.

With Pineland's current serious commitment to and investment in therapeutic horseback riding, it could develop therapeutic programs in animal care, in gardening, and even perhaps for the old growth forests which it owns and which are an obvious source of pride at Pineland. Pineland Farms also represents a prime site for a beginner farmer program and school, should it so choose. In all, Pineland's opportunity for considerable diversity is present, a prime requisite for sustainability. But Pineland must first find its identity on the land before it can evolve much further. (The late 2004 use of Pineland as the site for the founding gathering of the newly formed Maine Grass Farmers Network, and the 2005 meeting of organic dairy researchers and farmers, perhaps suggests a change in direction. Pineland may be forming its identity.)

Maine's population of certified organic and grass-based dairy farms is rapidly increasing, and a visit to six such farms selected by and in the company of Rick Kersbergen of Maine Cooperative Extension provides a number of insights:

1. As of mid-2004, there were 65 certified organic dairy farms in Maine, about 17% of the state's dairies.

2. The relationship between grass-based dairying and organic dairying is strong, and any dairies that are traditionally grass-based find it easier to make the transition to organic.

3. Pasture graziers in dairy need to give attention to the seasonal transition to and from grazing at each end of the grazing season – this becomes another opportunity for the necessary intimacy between the farmer and the herd, between the farmer and individual cows. One Maine dairyman

related that he knows the line-up, the typical order of formation of cows coming in to milk: if a cow is out of order, either missing or in a different order from the typical line-up, the grazier knows this and takes it as a sign of illness of some sort in the cow. “Something’s up”, he believes. Such enables very early treatment and avoidance of any serious health problem. This is another example of the intimacy between cow and farmer that is (and must be) typical in the grazing system and, as well, in the successful organic system. Both systems in order to succeed need be management and information-intensive.

4. Holsteins can be successfully grazed in Maine (and Vermont) on organic dairy farms, though not as well as Jerseys and some other breeds.

5. Twelve hour grazing rotations, the best frequency, are quite common in Maine (and Vermont) pasture grazing, especially on organic farms.

6. Somatic cell counts, a basic measure of dairy animal health, are lower in organic dairy herds, indicating healthier animals.

7. A common hurdle for those dairy farms in transition is overcoming the notion that you’ve got to feed the cattle in the barn – such practice only deters and weakens grazing.

8. In grazing, cattle lanes (paths to the pasture paddocks), their lay-out and design, are an important investment.

9. More technical assistance is needed to support both organic and grazing dairies. Some such assistance is now flowing from Cooperative Extension at the county level but not directly from the land grant at Orono.

10. Conversion to organic and/or grazing sometimes requires a change in vet, as some vets don’t approve and many can’t handle organic (homeopathic) medicine. In general in these systems, organic and grass-based, there is a reduced need for veterinary service.

11. Hood, a major New England regional milk processor, is now joining Horizon and Organic Valley (CROPP) as a processor of organic milk. This sends a powerful signal to farmers that there is stability and room for growth in the organic milk market, a major incentive to transition.

12. The reasons for conversion of dairies to organic relate to a number of different factors, but often include the price of milk; the steadiness and predictability of long-term purchasing contracts (even more so than price); the temptation to use pasture land and grass when it’s available; and human health issues, particularly cancer mortality in farmers.

13. There is opportunity for organic dairy farmers who are located relatively near to one another to collaborate on investments to reduce their costs, including the high cost of organic feed. An example would be joint investment in a bean roaster for organic soybeans for dairy cattle feed. (More farmers are turning toward growing their own organic feed to avoid heavy feed costs.)

14. Farmer cooperation has also led to the establishment of MOMP, the Maine Organic Milk Producers, an organization originally set up to secure a fair price but now becoming the base of a secure organic network and support system for organic farmers and those in transition.

15. There has been such great need for service to organic dairy farmers and those wishing to transition to organic that Maine Cooperative Extension has had to seek formal contractual assistance from MOFGA to serve this need. (See later discussion.)

16. Visits with farmers in Maine and Vermont (and certainly elsewhere) reveals the notion that some farmers (as all of us) have a passion for doing certain things and doing them well. Some of the farmers I’ve observed obtain much pleasure and happiness from moving cattle on pastures (as does Joel Salatin), others from logging and cutting wood, others from tapping maple trees, others from cultivating forage crops, others from growing organic seed, others in repairing, renovating and recycling equipment, others in numerous other ways. This is what I call an “ecology of happiness”. This involves much more than finding and occupying

a particular niche simply because there is an opportunity to do so and perhaps a market – it is a deep-seated personal fulfillment, an inner peace and satisfaction, true happiness. And it is easily observable on the small-scale organic and particularly grass-based farms in northern New England.

Maine Organic Farmers and Gardeners Association (MOFGA)

Mention has already been made of MOFGA, the Maine Organic Farmers and Gardeners Association. MOFGA is a private non-profit state-wide organization now more than a quarter century old. It has been the only organic certifier in Maine throughout that period. MOFGA is not a part of the university. But in recent years it has become so integrated with UMO and its Sustainable Agriculture Program; with Maine Cooperative Extension, both in Orono and in the counties; with MESAS; and with other state-wide and local sustainable agriculture organizations across the state that its non-public role is in many ways blurring with its public one. Mention has likewise already been made of the well-regarded Farmer-to-Farmer Conference and Maine's Small Farm Conferences, both of which are MOFGA cooperative efforts with Extension. MOFGA also collaborates directly with Extension on the Land-Link Program which brings landless farmers and would-be farmers together with landed farmers seeking to dispose of farmland.

Further, Rick Kersbergen of UMO Extension has just entered into a contract with MOFGA (through Extension) to provide aid and technical assistance to livestock operators, dairy and meat. If MOFGA's Director of Technical Affairs, Eric Sideman, can be referred to as America's first "county agent" for organic agriculture (although he is not employed by the state), then UMO Extension Agent and livestock grazing specialist Rick Kersbergen could be called the nation's second. What Sideman is for organic crops, Kersbergen, an animal scientist, is for organic livestock. The existence of this contractual arrangement is a substantial and important bridging between two philosophies of agriculture.

MOFGA's numerous activities year-round around the state, including the farm apprentice/journeyman program and, as well, its famous quarterly periodical, the *Maine Organic Farmer and Gardener*, are purely in the mode of agrarian values and sustainable/ecological agriculture as described throughout this book. But perhaps the greatest single role MOFGA has played in Maine, from its start in the 1970s to today, is the acculturation of the people of Maine (or many of them) to sustainable agriculture values through the vehicle of the annual Common Ground Fair. This three day fair, held the third weekend in September, attracts as many as 60,000 visitors or more each year, and is likely the greatest celebration of both organic and sustainable agriculture to be found anywhere in the United States. The fair in all its aspects is steeped in the agrarian value system. It celebrates the life and work of the small-scale yeoman farmer on the land and the use of the best ecological knowledge and small-scale appropriate technology available. The Fair is also likely the greatest celebration of a sense of place, in this case the entire State of Maine, to be witnessed anywhere in this country. Much is made here of MOFGA, and particularly the so widely known Common Ground Fair, because it is likely that this non-public institution, this NGO, has laid the groundwork, has prepared the state, for the acceptance of so much of the agricultural sustainability which is described in this chapter. The role of MOFGA should not be under-estimated.

The well attended Common Ground Fair is a true example of modern agrarianism in New England as well as a celebration of a sense of place in Maine. The Fair might include workshops in pastured poultry, and perhaps one on funding sources for sustainable agriculture, and a meeting with members of the Maine Alternative Poultry Association. At the pastured poultry workshop one might learn that there is a big market for guinea hens in Maine; that you can pasture any animal; that pasturing improves the pasture (if done right); that "chicken tractors" will open up a planned new garden area in just three days; that oats can be planted for winter grazing (including beneath the snow); that older heritage breeds of chickens and turkeys are great on

pasture; that a new source of organic chicken feed is developing in Aroostook County in northern Maine; that the nutritional value of pasture-raised animals is higher than the other alternatives (i.e., barn-raised, non-pastured, confinement-fed); that Maine Cooperative Extension's Dick Brzozowski is a good source for pasture poultry assistance state-wide; that there are now over 1500 pasture poultry farmers in Maine, all of whom can sell as much poultry as they can raise (i.e., great demand and insufficient supply).

At the Sustainable Agriculture Funding Panel one might learn of the many small grant programs available in Maine to support sustainable and organic agriculture and hunger projects. One might also learn that food pantries are starting gardens and are working now with local farmers, and that institutional buying projects with local farmer linkages are starting up.

In a subsequent year's Common Ground Fair, one might learn in the workshops of

- an increasing interest in livestock rotational grazing in northern Aroostook County
- new certified organic feed production (for poultry) in northern Maine
- an increasing northern Maine presence and involvement in MOFGA and the Fair
- a spreading interest in grain production in Maine (perhaps for the first time since the Civil War era)
- rising interest in the local foods concept
- increasing involvement of many aspects of Maine Cooperative Extension at the Fair
- maturing of MOFGA gardens and pastures at the Fairgrounds, signifying a bigger long-term role for organic demonstration at the Fair itself.

A visit to the Common Ground Fair these days might lead one to the question, Who leads in Maine, the farmers or the land grant university? There is today lots of push from the farmers on Cooperative Extension, constituting reinforcement of those Extension agents whose values are oriented this way, who then can emerge and provide leadership. Both Extension and the farmers may wind up leading in a push-pull relationship. Active Maine farmers with MOFGA-type values are increasingly numerous, increasingly vigorous and organized, and becoming a potent force which can and will push the university and its infrastructure to support them.

For many years MOFGA was headquartered in offices in Augusta and held the annual Common Ground Fair on rented fairgrounds, in Litchfield initially, and then for some years in Windsor, Maine. With the acquisition of sizable farm and forest acreage in the central Maine town of Unity and the construction of a number of buildings there, MOFGA has consolidated administrative and fair functions on one site, enabling the organization to host and sponsor many more events and gatherings throughout the year. MOFGA is becoming an even stronger voice and a more potent force in the life of Maine as a result of this. And the calculated risk of moving its large fair, a significant income source, even further away from population centers and markets, has paid off richly: over 60,000 continue to arrive each September, in addition to the many new events and visitors hosted through the year. MOFGA's reach has magnified, as has the effectiveness of its message of sustainable agriculture and its economic development message of "buy local and support the local economy and community". The latter message, by MOFGA's own admission, trumps "buy organic". MOFGA is becoming a significant force in keeping Maine's money in Maine, in keeping farmers on the land, and in shifting Maine's culture in an agrarian-ecological direction.

> ***"American Democracy must either be fibred, vitalized, by regular contact with outdoor light and air and growers, farm scenes, animals, fields, trees, birds, sun-warmth and free skies, or it will certainly dwindle and pale"***
>
> ***Walt Whitman***

Maine Citizens' Organizations and Local Food

Alexis deTocqueville remarked in his famous tome, *Democracy in America*, that Americans were truly unique in their interest in and ability to associate with one another in an organized way. He found Americans to be masters at establishing and joining organizations. Across the United States today this is certainly less true than it once was, but Maine stands out as an exception to modern trends. Mainers do appear to be joiners, joiners that is, of their own local and regional organizations. This associational instinct is perhaps strongest in the field of agriculture, and it is agriculture in the small-scale, sustainable and agrarian vein of which I speak. There are far too many such state-wide and instate regional organizations to keep track of or even to list here, but a few such names will convey my meaning:

Maine Highland Cattle Association

Maine Organic Milk Producers (MOMP)

Northeast Organic Dairy Producers Alliance (NODPA), Maine Chapter

Maine Farmland Trust

Maine Working Horse and Oxen Association

Maine Cheese Guild

Maine Alternative Poultry Association

Southern Maine Pasture Poultry Association

Morris Farm and Morris Farm Trust

Maine Farms Project (Coastal Enterprises, Inc.) (a joint effort with the state to increase local food production as a way to economic self-reliance).

There are many more and all of these groups evince a strong agrarian values system. They stand for strong local community and for healthy local food systems.

And there are private entrepreneurs with dedicated social commitment. Entrepreneurs such as Jim Amaral of Borealis Breads and the organizers of Wolf Neck Farms are publically active around the state supporting Maine-grown wheat and Maine natural beef, respectively. Both of these firms also encourage producing and purchasing locally grown Maine foods and supporting sustainable agriculture. Borealis also advocates for Maine organic farm products and for creating a market-driven demand for Maine-grown organic wheat. New Hampshire's Stony Field Farms and O'Naturals restaurants are similarly very active in Maine, as is Tom's of Maine.

In some local areas in Maine, citizen activism in support of the local foods movement is strengthening the political climate in which UMO can operate in conducting its work in sustainable agriculture. An example is citizen and small business activism with local and organic foods and a GMO labeling effort in the Midcoast and Downeast portion of the coastal area. This activism is strong enough to make a difference in

- moving farmers toward sustainable and organic agricultural practice,
- keeping farmers on the land and keeping them in farming,
- encouraging new farmers to get started, and to do so on low capital investment if they can gain access to land.

"Buy local" food campaigns are especially evident in Maine (as they are in Vermont), both in restaurants and in retail food sales. This enables UMO and Cooperative Extension to accomplish certain goals, but it also means that UMO and Cooperative Extension and their sustainable agriculture programs need to be especially responsive. People in Maine are recognizing the taste difference and to some degree are accepting the price differential for local food. In fact, there are

signs in both Maine and Vermont that long-held American food preference criteria are shifting primary emphasis away from price and appearance to taste, nutrition and health (health of both land and people), and perhaps to environment and social justice. And we return to Leopold's question, do we choose to purchase "conservation products" or "exploitation products?"

Agricultural Sustainability in "The County"

Mighty Aroostook County in northern Maine is a world apart. Uncharacteristic of the rest of Maine or, for that matter, of New England, Aroostook is far from markets and has vast farm acreages by New England standards. It also has had more potential for embracing the industrial agricultural model. It has done this with potatoes, although this farm sector is now in decline. In addressing the question of sustainability, Aroostook County Agricultural Extension Agent Matt Williams (based in Houlton in southern Aroostook) sees non-sustainable systems in the County as attempting to override ecological principles, a losing proposition. Sustainability, he says, is about harmony and about diversity: the natural system requires diversity and re-installs it if it is taken away. A farm needs to be defined as an ecological unit which exists within other ecological units, he believes. Sustainability is based on the science of ecology and the human condition around it.

Extension's Williams, county agricultural agent for southern Aroostook County, conducts significant work in certified organic grain production in Maine, including several varieties of wheat, and even mustard to fulfill demand for an organic line of mustard for one of Maine's artisanal mustard producers. A particular challenge engaging Williams is the development of lost infrastructure to sustain the return of grains in need of milling and other processing in Maine. Cereals and particularly organic bread are already appearing in Maine as a result of this work, and the demand, including that for other organic baked goods, is rising.

Matt Williams lives and works in potato country with 67,000 acres of potato production remaining in his area (after peaking at 200,000 acres in the early 1960s). Williams observes that as you shrink in acreage from your poorest marginal land to your better land, you would expect the per-acre productivity to go up. But that has not happened, which proves a lack of sustainability of the whole system. Williams sees Extension as far too involved with commodities and commodity agriculture. He sees farmers as trapped in a production paradigm which they can't get out of, and Extension too often is in there with them perpetuating that system. Progress is being made, however, with Extension's identification of soil quality and economic diversity as the top issues, rather than pest and disease complexes as in the past.

Reflecting on these philosophies, Williams' projects include converting paper mill cellulose waste product into compost; tempering barley (i.e., introducing water to initiate the breakdown of the grain, maximizing nutrient values) and using the barley as feed for dairy cows, therein promoting barley in crop rotation; increasing the value of rotational crops to encourage more crop rotation; reducing the cost of inputs in dairying; and, perhaps most important, building interdependency and interconnection between potato and dairy, so that one might serve the other. In the latter effort, Williams, on the potato side, works closely with Extension's Rick Kersbergen on the dairy side. Williams reports that dairy farmers are the most intense production-oriented people there are (24-7-365, as he says), a fact which is hard to change.

Williams reports on the importance of barley, both in itself and in the potato rotation, a fact much in evidence across the border in nearby Canada. In Maine, on the other hand, there's prejudice against it as part of the potato rotation. The traditional rotation here is potatoes/oats or potatoes/potatoes/oats. As oats have a very low economic return, barley could improve this. But Maine potato farmers continue to look at grain production not as a profit center but as a necessary evil. Adoption of Canadian attitudes of introducing barley (and even wheat) into the rotation, and of feeding barley to dairy cattle, would be much more sustainable, more ecological, and even more profitable, with

barley as feed a further new area of interconnection between the production of both barley and cows. The coupling of grain and livestock farms takes agri-business right out of the middle, a fact not likely acceptable to agri-business. (Overall, however, the grain-feeding confinement system for dairy cows, a system laden with industry profit rather than farm profit, has been overdone, at cost to the farms and ecosystems.)

In dairy farming, the present reward system is based on enormous inputs. Williams, Rick Kersbergen and Stewart Smith are working together to break the cycle of high input and, as well, excessive nutrient output. The present system, according to Williams, is killing the dairy farm itself through damaging the reproductive ability of cows. He believes that excess potassium from fertilizer is the culprit, that plants are taking up excess potassium and passing it on to the animals, a problem which could eventually "buck the headwinds of agri-business".

A practical crop rotation for northern Maine, argues Williams, would be:

1. potatoes, with small grains planted for a cover crop five days before digging; (Year One)
2. then barley, as a cash crop, and feeding that crop to livestock; (Year Two)
3. then perennial ryegrass in May, followed by grazing animals in mid-June; (Year Three)
4. then return to potatoes in the 4th year. (Year Four)

Organic potato production is assisted through this rotation because the soil is fortified (although the insect cycle is not broken because there are so many insects in the vicinity on non-organic farms).

There's less emphasis on opportunity for rotational grazing in northern Maine than in southern Maine since larger farms lack the land base (in spite of their size) because they're increasing animal density. The land of the north, too, is very tillable and productive for crops, a higher value than pasture grazing. However, pasture barley works well and is being encouraged in paddocks, as is perennial ryegrass. To adopt sustainability practices, you have to have profitability. With respect to organic production in northern Maine, it has got to be done on an export scale, given insufficient local markets. An example is that of Borealis Breads, for which Matt Williams, as a farmer himself, is a principle wheat supplier. (He is overcoming the lack of processing infrastructure himself by building a processing plant, a plant requiring a minimum of 1000 acres of wheat in the local vicinity). (Williams grows wheat, barley, oats and he himself provides 60% of the wheat needs of Borealis.)

Direct marketing of farm products is not as doable in northern Maine due to insufficient population. However, grass-fed and/or organic beef might develop a market because of its high value which justifies the longer transportation.

Reflecting on the circumstance of local farmers, Williams believes the trend toward specialization and monoculture has increased reductionist thinking and decreased holistic thinking in production agriculture. He observes that farmers have little holistic input into their management when they primarily subscribe to commodity-oriented magazines, attend commodity-oriented conferences, and seek advice from commodity-specific advisors. Williams sees farmers as putting faith in agri-business because they (the farmers) are often lonely and agri-business salespeople will visit them, be loyal to them, and win their confidence. They make regular calls, and these "feed guys", as they are known, can increase a farmer's milk production. Much the same can be said for the sale of pesticides and potato production. And this is a reason why on-farm research is so important: it replaces the influence of the salespeople. An issue here is that anecdotal information too often wins the day over scientific information because real science is always in a state of flux and always represents uncertainty, while anecdotal information is stable, simple, and always appears certain. Hence, it's much more attractive to farmers.

A basic goal of sustainability should always be the search for those things that reward on-farm management, since high management input is a key ingredient of sustainability. And, since farmers are more attuned to peers than to anyone else, good high sustainability peer influence is going to be especially valuable, says Williams. At the same time, though, at least in New England, we've got to make sure we provide the infrastructure to support the biodiverse and integrated form of agriculture which sustainability represents.

Matt Williams believes that a test of Extension is when the people you teach come back to teach you the ideas you've taught them, especially if they've so adapted your ideas that they don't even realize they got them from you! Williams is a classic example of a committed and passionate, as well as competent, Extension agent with a strong philosophy and value system of sustainability and a record of practice and application (as a farmer himself) to back it up. Grounded, knowledgeable and critical, Williams is accomplished on

- on-farm research
- biodiversity and farm diversity
- potato and dairy integration
- potatoes and grains in rotation
- potato and grazing integration
- informed criticism of commodity production orientations, where found
- barley in pastures, for animal and for crop production
- integration of the whole community with the farm
- rectifying infrastructural weakness
- analysis of farmer psychology and replacement of salespeople with on-farm research
- organic agriculture

Williams comes from a wealth of experience, knowledge, wisdom and sense of place. He believes in a key principle of ecological and sustainable agriculture: agriculture starts with the soil. Take care of the soil and the soil will take care of the plants, the animals, and ultimately you. This is the key value assumption of sustainable agriculture. It is an assumption largely absent in other forms of agriculture.

A major challenge in New England for grain production, and one which Williams is much involved with, is the lack of infrastructure for the cleaning, milling and drying of wheat and other grains, particularly certified organic grains which involves separate facilities to avoid contamination. Williams is a wheat producer in a winter wheat/crimson clover rotation, processing on his own infrastructure in a three-producer cooperative, and marketing to Borealis. Fertilization is done with fish scales. Barley and oats are also grown. Winter wheat is best for weed control, and no Fall tillage is done so as to avoid weeds. Weeds can be controlled through intensive planting and double-seeding, and clover can be used to break the disease cycle as well as fix nitrogen. Barley is also very densely planted to stop weeds. Williams reflects on the social problem between farmers and weeds. Organic farmers must tolerate some weeds but social pressure arises against them when other farmers see weeds in their fields.

Fortunately for Williams and his cooperative, Borealis has the commitment to keep the farmer up front and always visible to the consumer. Williams sees a big problem in the anonymity of farmers to consumers and, like Fred Kirschenmann in Iowa, recognizes the value of "relationship agriculture". A very rural area like Aroostook County depends on crop export, but the challenge is to keep the farmer in the view of the consumer, to connect the two. For example, with modern technology, a live camcorder at the milling site can show the milling live to customers at, say, the Portland Public Market or any place where the wheat product is marketed.

Given his location near the Canadian border, Williams knows the differences in circumstances between Canadian and American farmers. These range from the healthcare difference (Canada has national public health care) and direct farmer subsidies which remain with the farmer, in contrast to U.S. subsidies using farmers as a conduit for profit going to corporations. In eastern and northern Maine and, as well, in northern Vermont and New Hampshire, American farmers can secure, across the border in Canada, parts, supplies and services that are supportive of smaller-scale sustainable agriculture. This contrasts with other American farmers who must either do without such supplies and services, or search farther afield and pay higher cost for them. This is a testament to the fact that Canada has not destroyed its small-scale infrastructure nor its skills supporting small-scale and sustainable agriculture, as has the U.S. American practitioners of sustainable agriculture know this and take advantage of it (even to the extent of bringing language interpreters with them when purchasing and contracting in Francophone areas of New Brunswick and Quebec).

Matt Williams' counterpart in northern Aroostook County, Dee Potter at Fort Kent, is to beef what Williams is to grains. She also champions diversification in a potato-dominated region. Potter farms as well, raising a grass-fed herd of Red Angus beef cattle, and works to assist local beef retail distributors in finding markets across New England in particular for a line of "natural beef" (i.e., without growth hormones or antibiotics in the feed).

Potter is personally supportive of and interested in intensive rotational grazing. She is a practitioner with her own herd on her own and on leased land, using single strand movable electric fencing and minimal infrastructure. She is influenced by the work of Joel Salatin and Allan Nation in this regard. Potter too works with potato growers who are converting to beef, although she notes the reality that most potato producers are not interested in livestock at all. However, their interest in the possibilities of income supplementation propels some into the beef direction.

Potter is involved in crop/livestock integration without grazing: the underseeding of small grains (i.e., clover under rye and clover after rye), with potatoes in the third year of the rotation. The clover and rye are then used as a cattle forage for both beef and dairy. There is also some pasture poultry integration in her work.

With beef production (involving three feedlots in northern Aroostook), infrastructure is once again in short supply, but Potter believes it's coming. (Most of the beef cattle raised in northern Aroostook are shipped all the way to Pennsylvania for processing, a very unsustainable and wasteful practice.) About 95% of Aroostook beef is "natural" (i.e., no growth hormones, no antibiotics in feed), but only 1% is organic. The conversion to "natural" was easy to accomplish in the area because of the guaranteed market and market price, and because the feedlots are small enough to avoid the need for antibiotics and hormonal implants. (However, the buyer, Wolf Neck Farms, has particular vulnerability to GMO in feeds, given that its customers seek a "natural" product and have high standards for food quality. Wolf Neck Farms is a non-profit and not fully private, with a formal and legally binding commitment to improving agriculture for producers in Maine)

Beef cattle feedlots are not normally considered an indicator of sustainable agriculture. The three in northern Maine are small, fatten their stock with barley rather than corn, put some of the waste manure on the potato crop, and provide a market for much local grain. They also contribute significantly to crop diversity and to the area's economic diversity and security. One of the major obstacles to the growth of this sustainability effort is the cultural divide between the potato and the livestock producer. Others include the lack of large animal vets (the demand for whom could be significantly reduced by rotational grazing), and the lack of local repair services (which is somewhat ameliorated by access to Canada).

Local buckwheat production (for ploys, an Acadian cultural delicacy, a very light version of a pancake) is another element of local diversity, as are the organic vegetables and potatoes of the Crown of Maine Cooperative. Both of these enterprises round out the northern Maine scene and are dependent on export south to population centers where there is market demand.

Williams and Potter both exemplify Extension agents who farm. Both are heavily committed to their own farms and projects, making them more effective Extension agents, even though such farming competes for their time, energy and possible future career direction. On the side, Williams is contracted to Borealis Breads and is organizing a local grain milling cooperative. Potter recently took a ten month unpaid leave from Maine Extension to work for Wolf Neck Farms as their beef consultant and buyer. (Since Wolf Neck is a non-profit legally committed to educating Mainers about local food, conflict of interest is avoided.) While Potter is wholly involved in beef work, the example of her own herd of Red Angus on pasture could interest area farmers who are not now involved with or interested in intensive rotational grazing, to become more so. This would be especially true if a steady market for grass-fed meat developed. Such a market, together with the temptation of low input costs, might be just enough to achieve this form of conversion to a higher form of ecological and sustainable agriculture.

Overall in northern Maine, the Presque Isle Cooperative Extension office and surrounding farms and farmers, located in central Aroostook County, reportedly appears to be more commodity-driven, with a strong linkage to chemicals and larger scale industrial agriculture approaches. It houses specialists more than generalists, and much monoculture (largely centering around potatoes). On the other hand, Extension efforts in northern Aroostook (at Fort Kent) and southern Aroostook (at Houlton) appear less commodity-oriented, more holistic, more biodiverse and polycultural, and more agrarian in their philosophical approach.

We have thus seen that UMO Extension enriches the climate in Maine for sustainable agriculture, even in the farthest corners of the state. Such a climate and such Extension activity both enriches and is enriched by the UMO teaching programs in sustainable agriculture.

This triggers a question: Which state, Maine or Vermont, offers more opportunity to succeed in the new farming, and, in succeeding, in involving the university and the Extension infrastructure in their effort? The answer is probably Maine by a small margin, due to Vermont's heavy commitment to large-scale dairy agriculture (constituting about 80% of the value of all Vermont farm product), and the lack of a true MOFGA equivalent in Vermont. The latter may change with the rapid growth of both Vermont NOFA and the Vermont Grass Farmers Association (VGFA).

It is now time for a closer look at Vermont.

ENDNOTES:

1. "Impact of Sustainable Agriculture Programs at U.S. Land Grant Universities" by Charles Francis, et. al., (*Journal of Sustainable Agriculture*, Vol. 5, No. 4, 1995), p. 25.
2. Matt Liebman, "The University of Maine Sustainable Agriculture Program – Factors in Success", *Consortium News*, No. 14, April-May, 1997, p. 5.
3. Maine Sustainable Agriculture Society (MESAS), Mission Statement. (MESAS is located at 5782 Winslow Hall, University of Maine, Orono, Maine 04469.) See also MESAS Newsletter (quarterly).
4. Chiappe and Flora, "Gendered Elements of the Alternative Agriculture Paradigm" (*Rural Sociology* 63(3), 1998), pp. 376-377, 387, 390-391.

"Local allows you to ask your own values questions."

Lisa Johnson
of Vermont

Chapter Seven: Vermont

When Vermont's freshly minted Commissioner of Agriculture, only two weeks on the job, walked into the gymnasium of Vermont Technical College in Randolph on a subzero Saturday morning, February, 2003, what he saw was the new face of Vermont agriculture: 350 enthusiastic and energetic Vermont pasture farmers (or grass farmers, as they are known locally), set to start a day of intense meeting and dialogue about cows, other livestock, rotational grazing, pastures, milk and other dairy and meat products, nutrition and health (of animals and people and even soils), and single strand movable electric fencing. (The whole scene was replicated in February of 2004, on an even colder Saturday morning, but minus the Agriculture Commissioner.) The event was the annual winter meeting of the Vermont Grass Farmers Association (VGFA), a growing state-wide organization of graziers that is otherwise known for its well attended "pasture walks" across the state. (This is the group that is bringing the art of the "pasture walk" from Wisconsin to the Northeast.) A few weeks later each February, also on a generally very cold Saturday, and at the same site, one can witness an equally sizable and enthusiastic annual winter meeting of Vermont NOFA.

My own experience, whether at a dairy forage conference in central Maine, a winter gathering at Maine's MOFGA in Unity, at MESAS and MOFGA Agricultural Trade Shows in early January, at New Hampshire's winter NOFA and Beginner Farmers meetings, or at the late summer Northeast NOFA conferences at Amherst, Massachusetts, has been that all present the same pictures: large (and growing) groups of enthusiastic sustainable agriculture practitioners and would-be practitioners in an atmosphere of excitement and optimism, invariably grounded in something much deeper than either romanticism or nostalgia.

And who are these people turning out in what is often the brutal cold of Vermont and Maine winters to spend all day Saturday at such gatherings? They are women and men, young and old, practiced farmers and serious would-be farmers, passionate, motivated, excited. And they are revolutionaries all, committed to the vision of a very different future. They are radical as ecology is radical. They are revolutionary as promoting the health of local economies, the health of community, is revolutionary. They are, indeed, the new face of agriculture.

When one attends a typical meeting of farmers in the United States, particularly in the Farm Belt of the Midwest, the Great Plains or the South, what can one expect to see? Often, in the room would be nearly all males. (If a woman or two is in attendence, she is probably the spouse of a farmer present, and perhaps one active with the books, but most often not a farmer herself in the operational sense.) These males would be old, perhaps averaging late sixties in age. And what would they be talking about, what would be on their minds? Low prices for their product, financial insecurity, debt, and disease: disease of their animals, of their crops, of themselves. These are the pessimistic, yet real, topics of conversation that prevail at such gatherings.

When one attends a typical meeting of America's "new farmers", as they might be called, or "alternative farmers", those who are practitioners of sustainable agriculture, one sees a different picture. There are many female farmers (often at least 40%, sometimes even a majority). Their average age is significantly younger, perhaps in the high 30s, with goodly numbers of both younger and older farmers. And what is on their minds, what are they discussing? Soils and soil health, nutrition, movable fencing and related new small-scale technologies, a sharing of obstacles and challenges and how they can be overcome, including development of infrastructure for grain processing, for meat and dairy processing, and related matters. These are the optimistic yet well grounded subjects on their minds.

Vermont exemplifies these differences as much or more than many other places, but other states are catching up. Vermont's revolution is occurring in spite of Vermont's handicap: 80% of Vermont's agriculture is concentrated in dairy, with significantly less diversification than one finds in Maine and other Northeast states, reducing Vermont's land grant university potential to play the kind of role that one finds at UMO. A lack of instructional programming in sustainable agriculture and limitations on research in the field are the result, with most of the land grant's sustainable agriculture effort accomplished through Extension and its Center for Sustainable Agriculture. Vermont, it turns out, is an enigma, with progressive ideas at the grassroots and a certain obstinacy to change at the university (at a cost to the university, I would add). That frustrated grass roots has thus given its energy to spawn two healthy state-wide organizations outside of the university, Vermont NOFA and VGFA, both cooperators with Vermont Extension, to lead the charge for the new agriculture in Vermont.

Vermont's sustainable agriculture effort arrived a little later than Maine's, and became a more visible effort with their formal Center (which Maine declined to establish). However, unlike Maine, UVM did not establish a degree major in Sustainable Agriculture, and the university headquartered its Center for Sustainable Agriculture at Brattleboro, literally at the other end of the state from Burlington, the seat of UVM and the state's largest city. Thus, UVM, while a bit more formal, was not as invested with its effort as it might otherwise appear.

UVM Center for Sustainable Agriculture (Vermont Extension)

The historical development of sustainable agriculture at UVM is anchored in the Extension Program, specifically in the Center for Sustainable Agriculture. UVM's Center for Sustainable Agriculture defines sustainable agriculture as " a farming system that is profitable, protects environmental quality, provides consumers with affordable, high quality products, while enhancing the quality of life for farmers and rural communities, and lasting for generations to come". At first glance this might appear to the reader to be a very safe, vague boiler plate definition, but there is, in fact, much more to it than that. Opening emphasis on the word "profitable" is a pragmatic way to attract the interest of both farmers and politicians. And it is indeed profitable from at least two perspectives: significant reduction in input costs, and premium prices for a premium product. Quality of life for both farmers and for rural communities is another key aspect, the latter of which in particular is not provided by the industrial agricultural model. Finally, "lasting for generations to come" is a critical aspect of the sustainable agriculture approach which stands in sharp contrast to the exclusively near-term focus of conventional agriculture. (The common business model today, in agri-business and elsewhere, is concerned with the return this quarter, a mere three months, never mind "generations to come".) The current working definition at the UVM Center has added an explicitly decreasing dependency on non-renewable resources. The Center for Sustainable Agriculture, therefore, is on a very strong political and pragmatic footing at the start.

Furthermore, the Center claims to "bring people with a diversity of interests together to foster an understanding of agricultural issues that will lead to personal, institutional, organizational and community decisions that encourage farming in Vermont". People "with a diversity of interests" goes well beyond conventional farmers to incorporate those not served or under-served by the land grant university today. And there is the focus on decisions, including personal, which encourage farming in Vermont. One does not have to reflect long to realize that virtually all decisions today in

conventional agriculture represent incentives which discourage, not encourage, farming in Vermont (or, for that matter, local and small-scale agriculture anywhere).

The Center in its basic literature demonstrates five ways that it functions to help to support, to inspire, Vermont farmers and those who would become such:

1. "We help farmers increase profits and protect the environment", citing the Pasture Network Program and collaboration with the Vermont Grass Farmers Association.
2. "We help keep land in farming", citing the Land Link Vermont program.
3. "We support emerging agricultural enterprises", citing as one of many examples the UVM Small Ruminant Dairy Program.
4. "We increase the knowledge and effectiveness of agriculture professionals", through participatory education drawing on farmer-based knowledge.
5. "We inspire citizen participation", involving conferences, farm tours, seminars, pasture walks aimed at farmers, consumers, chefs, policy-makers, educators and researchers, and publication of a quarterly newsletter, "Cultivating Connections".

UVM's "Strategic Plan for Sustainable Agriculture" identifies the need to address short-term educational needs in agriculture, even while laying a groundwork for the longer term. It implies that not a lot of time is left to turn around agriculture and the decline of farms in the state. It acknowledges the nearly half a billion dollars of product sold directly by Vermont farmers each year, as well as the fact that the tourist, recreational and wildlife value of the Vermont landscape is dependent on continuation of farming, lest Vermont's landscape disappear into forests and shopping plazas. The plan notes that Vermont is the most rural state in the nation in terms of proportion of people living in small towns and that it is agriculture that facilitates the survival of small communities. Hence, there is much riding on state intervention in agriculture to keep it alive and vital.

The Plan identifies specific problems and opportunities, focusing heavily on dairy, the majority of Vermont agriculture (at 80% of total value of the state's agricultural product). The Plan acknowledges recent significant decline in conventional dairy, with more decline expected, and is most optimistic about the future development and growth of grass-based livestock agriculture, both dairy and non-dairy. It suggests that such agriculture is "…the only realistic option for long-term sustainability of many farms due to Vermont's rolling landscape and the economic and natural resource costs of crop production"[1]. Movement in this direction of sustainable agriculture is emphasized including achieving a better balance between dairy and non-dairy livestock, and developing necessary support for both local markets and processing infrastructure.

In the horticulture sector (vegetables, berries, greenhouse crops), most attention is given to direct marketing and local markets and advocacy of local markets. Acknowledgement is also given to the integrative role of maple syrup, which is especially important in Vermont, and, as well, forest products in the local economy.

The Plan also focuses on the importance of professional development and training for Extension personnel. Emphasis is placed on participatory educational methods, on ecology and agroecology, on holistic resource management, on direct marketing and on specialty foods production, all of which are particularly important for the sustainable agriculture model. This Plan is well represented today in the thrust and work of the UVM Center for Sustainable Agriculture.

Another critical element in the background of the UVM Center is the Memorandum of Understanding signed between the Center and the Vermont Department of Agriculture, Food and Markets. This Memorandum establishes an unusual governance mechanism, a joint Sustainable Agriculture Council, an advisory council which advises equally the state agriculture agency and the UVM Center. The purpose of the Council is to advise both entities "… on research and education issues that encourage the development and use of sustainable farming systems in Vermont"[2]. This

Council grew from a state law enacted in 1990 (6 V.S.A., Chapter 209, Sec 4701). Structurally, the Council avoids duplication, in that it is giving the same advice to the state and the land grant university. It is "… the conduit for the representatives of the agricultural community to guide these public institutions: research, regulatory, education and outreach programs towards the development and widespread adoption of a more sustainable system of food and fiber production".[3] The Council is appointed by the Commissioner of Agriculture, who serves as Chair, with the concurrence of the Dean, who serves as Vice-Chair. Members serve for three years, with administration coming from the UVM Center for Sustainable Agriculture. There are currently sixteen members, and the Council's priorities include encouraging consumption of Vermont-grown food, maintaining community scale (i.e., small-scale) agriculture, developing alternative production and marketing techniques, preserving farming enterprises, and educating youth about agriculture.

The Center for Sustainable Agriculture at UVM, largely in fact a program of Vermont Extension, has always been, since its founding in 1994, the centerpiece of sustainable agriculture at Vermont's land grant. It remains so today. Unlike UMO, Vermont's effort did not start with an undergraduate degree program. Unlike UW and ISU, Vermont's effort did not start with research. Vermont's effort has always been Extension, i.e., outreach to a grass roots constituency state-wide. And, unlike the others, Vermont's effort is decentralized, partly because of the nature of Extension but partly also because its Director, Vern Grubinger, operates from Brattleboro in the far southeast corner of the state, while Assistant Director Allen Matthews and the program's office staff works from the UVM campus in Burlington in the northwest part of the state. The Center's linkages to state-wide organizations like the Vermont Grass Farmers Association (VGFA) and NOFA-Vermont assure further decentralization.

The Center is significantly involved in "farm to table tours" which link restaurant and hotel chefs and wholesale produce buyers with farmers. The Center:

- sponsors seminars on many topics around the state
- represents Vermont in a tri-state greenhouse IPM program
- collaborates formally with NOFA-Vermont and VGFA on their many programs
- collaborates with the Vermont Sustainable Jobs Fund to study the feasibility of producing organic barley, malted barley and malted barley extract in Vermont
- develops meat markets for kid, lamb and veal
- provides educator training to Russian agricultural professionals
- collaborates closely with the Vermont Women's Agricultural Network (Vermont WagN) and with numerous other agricultural entities across the state
- selects and recognizes a Sustainable Agriculture Farm of the Year.

The Center for Sustainable Agriculture at UVM is a significant trainer and educator, offering comprehensive training in sustainable agriculture for Vermont Extension across the counties. It also provides training for Extension Educators in other states, and for many other kinds of agricultural service providers. Adult education and training are more significant in the Center's role than is the case in the other three states studied in this book. Central topics for training are holistic resource management and whole farm management, participatory on-farm research, training through farm tours, organic agriculture and transitioning to organic, among other subjects. The production of resources to aid in this training is also key, and includes newsletters ("Cultivating Connections", "The Solar Dollar" – specifically for VGFA, "Small Ruminant Dairy Newsletter", and "Land Link Vermont Update"). All of these list, and encourage participation at, numerous events around the state. Videos on horticultural and small farm marketing strategies, on weed control machines, on

ecological corn production and on cover cropping have also been produced, along with fact sheets on IPM, farmer discussion groups, direct marketing, management intensive grazing, livestock watering systems, transferring ownership of farms, pasture events calendars, directories for grass-fed livestock for meat and dairy, and K-12 curricular guides, among others. (The Center formerly operated a very popular sustainable agriculture internship program which has ended, perhaps temporarily, due to budget cuts.) And it operates a formal program called Land Link Vermont which connects landless people who want to farm with people who have available land. The latter is a matching service not unlike similar programs in Maine (MOFGA) and Iowa (Leopold Center).

Two especially remarkable and noteworthy Center programs, however, both of which are livestock-based in ecological agriculture, are grass farming and small ruminant dairy farming. Grass farming is also known as rotational pasture management or management intensive grazing. Vermont's landscape is especially well suited to forage production and grazing, and working with farmers to promote intensive rotational grazing is, according to the Center, one of its main program priorities. Support for the founding of and ongoing affiliation with VGFA, discussion groups, conferences, pasture walks, publications, and internet discussion lists are all characteristic of the Center effort. Close collaboration with UVM's Plant and Soil Science Department (but noticeably less collaboration with UVM's animal science/dairy management faculty), with the Grazing Lands Conservation Initiative (GLCI), and with USDA's NRCS are equally characteristic. Such effort has considerably increased knowledge about and interest in grass farming as an important tool of both sustainable agriculture and human nutrition in Vermont. This is clearly a major thrust at the Center and across the state and will be further addressed in the Research and VGFA sections of this chapter.

The Small Ruminant Dairy Project is likewise a sustainable agriculture program of the Center deserving of notice. The market for goat and sheep dairy products is expanding, and Vermont is developing a reputation across the Northeast for high quality production of sheep and goat cheeses and, to a lesser extent, goat's milk. In this project, UVM's Department of Animal Science collaborates with the Center, with the assistance of Extension specialists, an advisory board, and the newly established Center for Food Entrepreneurship and Vermont's Sustainable Jobs Program. Marketing cooperatives, record-keeping projects, a regional goat and sheep directory, a newsletter and events calendar, and technical assistance through SARE grants are all program elements of this effort. Allied on the meat side of small ruminants is the Vermont Quality Meats Cooperative and surveys of ethnic markets so as to develop a market niche for goat meat, a growing business in New England.

Overall, sustainable agriculture in Vermont has focused on Extension. The 1995 SARE grant given to train Extension people became the focus of the Center and gave the Center its present high recognition around the state. Vern Grubinger of Brattleboro was named Director in 1995 at 25% time (although he devoted more to it than that because of his commitment). Kate Duesterberg anchored the Burlington end in those early days, being half supported by Extension and half by SARE. Vermont Extension's Center for Sustainable Agriculture thus has two bases: Brattleboro, under the leadership of Director Vern Grubinger, Extension Fruit and Berry Specialist, and Burlington, under the leadership of Assistant Director Allen Matthews (who himself is a nationally recognized dairyman). So, both ends of the state are covered. Personnel in this program, past and present, have been young, vigorous, passionate, and smart leaders. The program operates on a minimal budget, produces popular publications, videos and radio reports, has a grass roots base, and has close relations with Vermont NOFA and the Vermont Grass Farmers Association, among other organizations. What's missing is the Extension/Academia connection which Maine has achieved. The Center for Sustainable Agriculture has a strong land ethic (which has been missing in the weakly supported academic program), and actively teaches that ethic through Extension. Workwise, "rational grazing", as it's sometimes called, predominates in program content, along with CSAs, certified organic, farmers markets, Vermont WagN, holistic resource and whole farm management, and some significant fruit and vegetable work. The direction of this centerpiece of UVM's sustainable agriculture effort seems clear.

Teaching

At UVM, if the bright side of sustainable agriculture is clearly Extension, the weaker side is the academic program itself, with the exception of the degree-granting Environmental Studies Program, about which more later. Earlier accomplishment in the UVM academic and teaching effort in sustainable agriculture is due to the work of Professors Bill Murphy and Fred Magdoff. However, they and this work effort are fading from the scene as retirement approaches (Murphy has now retired) with still no undergraduate degree program in operation. (A program in Ecological Agriculture is being developed, however – see ahead.) Teaching zeal and hard work have centered in non-tenured contract faculty members, particularly Wendy Sue Harper and Dave Rogers. The latter two reach some number of students but have little influence within their departments. All efforts for over a decade to establish a formal degree program in sustainable agriculture have failed, in spite of the lack of organized opposition. New blood and a new leadership thrust are much needed.

Cancellation of the UVM Sustainable Agriculture Internship Program with Extension's Center for Sustainable Agriculture was a blow to the academic teaching effort, although there are signs it may be resurrected. (This cancellation also hurt Extension and the Center, but they survive and move in other directions.) On the other hand, and on the brighter side, UVM (like UMO) does have a student-run CSA (Common Ground Farm) which has survived and continues to thrive.

Ironically, sustainable agriculture infrastructure in and around Burlington and in the immediate campus vicinity is substantial. It includes Intervale Farm, other cooperative, organic and CSA farms, Burlington's City Market, farmers markets, and Shelburne Farms, among others. This makes it all the more surprising that UVM's undergraduate sustainable agriculture effort hasn't gotten off the ground. Inertia and a certain loss of spirit seem to pervade. A major difference between UVM, which is endowed with a local climate and infrastructure which should be supportive of a sustainable agriculture program, and UMO, which is not so locally endowed, is likely leadership at the top, or lack thereof, and the direction of new hires which follow from that leadership. So, on the UVM academic side, we find a small number of dedicated and highly experienced people in sustainable agriculture, among them the "father" of intensive rotational grazing in the U.S. and, as well, the long-time Northeast Regional Director of USDA's Sustainable Agriculture Research and Education Program (SARE). But we find formerly enthusiastic and passionate people who are dispirited and frustrated, moving toward retirement, essentially working in a vacuum and seemingly unappreciated by the powers that be, receiving little support or encouragement from either the university or the state.

The Vermont program began with the name "Alternative Agriculture" rather than "Sustainable Agriculture" and, while it has been possible over the years to build an undergraduate degree by cobbling together various existing elements of curricula, it has not been until the present (2004) that a defined degree has existed. Called "Ecological Agriculture", this new degree includes specific courses in Introduction to Ecological Agriculture, Ecological Agriculture Internship, Senior Seminar in Ecological Agriculture and Landscape Horticulture, Ecological Farm Management, Soil Fertility, Weed and Crop Ecology, and the usual supporting courses in ecology, soils, entomology, botany, and others. The fact that all of the courses in ecological agriculture and most of the supporting courses are in the Department of Plant and Soil Science is revealing of the fact that Animal Science, social science departments, and other departments are not significantly involved at this point, and that this effort is almost wholly an effort of one department. The undergraduate instruction that exists in sustainable agriculture at UVM is thus sponsored largely by the one department, and much of it is embedded in the teaching of Professor Wendy Sue Harper, particularly in her courses in agroecology.

Professor Harper's teaching is inspired by Steve Gliessman's landmark work in agroecology at the University of California, by Masanobu Fukuoka's natural farming teaching and methods (*One Straw Revolution* and other works), and by leading researchers in biodynamic agriculture, in bio-intensive farming methods (after John Jeavons), in organic agriculture (after Elliott Coleman), and

in permaculture. All of this is grounded philosophically in Wendell Berry, Wes Jackson, Vandana Shiva, and UVM's own Fred Magdoff.

Working with Professor Harper, UVM students can achieve grounding in Sustainable Agriculture (and, up until now, essentially a major in all but name) through her department – Plant and Soil Science – and/or through Community Development and Applied Economics, or through Animal Science. They can also minor in Sustainable Agriculture, drawing courses largely from these three departments, or they can self-design a major in the field. Likely because of the circuitous nature, until now, of cobbling a major in Sustainable Agriculture, UVM has fewer undergraduate majors engaged than the university might otherwise have with a clear and fully advertised major. So, while UVM has finally formalized its degree and teaching efforts in sustainable agriculture, this endeavor remains narrow and limited. Such stands in contrast to the breadth of the Center for Sustainable Agriculture's Extension efforts which are significantly broader and holistic.

Common Ground Farm

Enhancing the undergraduate teaching effort in sustainable agriculture is the Common Ground Student-Run Educational Farm. Under the guidance of the faculty of the Plant and Soil Science Department, this farm:

- provides students with hands-on education in growing, on a commercial scale, vegetables, small fruits, herbs and flowers;
- creates a very positive link between UVM and its urban environment, the Greater Burlington community, particularly through its donation of half of its produce to food shelters;
- provides weekly deliveries of produce to shareholders in and around Burlington.

Operating on the CSA model, this student-run farm offers 15 week shares and an extended harvest program for an additional three weeks, which includes winter storage vegetables. And the farm encourages individuals and institutions to purchase shares for donation to charity. This farm dates from 1994 and was born of the effort of undergraduate students in Professor Wendy Sue Harper's agroecology classes. (Professor Harper serves as faculty advisor to the Farm.) The similarly student-run Rutgers University organic farm in New Jersey was a model which provided advice and inspiration. The Common Ground Farm takes its name, interestingly, from the Common Ground, a restaurant far across the state in Brattleboro. This shows the linking of that strong sustainable agriculture-oriented community, Brattleboro, with Burlington which strengthens the overall sustainable agriculture effort there. An initial interest was in getting local food into campus dining service, but the charitable food shelter efforts (1995) and the CSA (1996) started quite early and have consumed much of the crop over the years.

UVM's Common Ground Student-Run Educational Farm has been a boon to the overall undergraduate educational efforts in Burlington, and undoubtedly a spur to the recent creation of the new major in Ecological Agriculture. It is unfortunate that UVM leadership missed so many opportunities to advance sustainable agriculture at UVM in the last fifteen years, but the enormity of the potential that is Burlington and UVM may well now come to fruition.

Environmental Studies as a Focus for Sustainable Agriculture

With rising undergraduate student interest in these fields, food and agriculture, a phenomenon developed at UVM not unlike that at Wisconsin. I refer to the utilization of the well-established undergraduate degree programs in Environmental Studies, extant at both institutions, by students seeking for but not finding what they sought in the Colleges of Agriculture. In the 1970s and 1980s the culture of environmental studies did not include agriculture. In fact agriculture, in the form of the prevalent industrial model, was viewed as an enemy of the environment. Environmental Studies students were rarely, if ever, interested in agriculture, and their course selections and research so indicate. But this changed by the 1990s, particularly with the emergence of a "greener" form of agriculture, the agrarian model, in contrast to the industrial model. With the emergence of this environmental/ecological interest, environmental studies students began to turn toward agriculture.

Conversely, agriculturally oriented students repelled by the industrial model began to realize that they could utilize the Environmental Studies degree programs to create a sustainable agriculture program. At both Wisconsin and Vermont, therefore, some number of students have taken advantage of this option.

The Environmental Studies degree program at UVM is more heavily social science and humanities-based than is the College of Agriculture. And increasing numbers of its students are choosing courses in sustainable agriculture to fulfill their environmental course credit requirements. More importantly, however, all Environmental Studies students must fulfill a Senior Thesis requirement, and some additionally must fulfill an Honors Thesis requirement. This naturally leads to an increasing number of humanities-oriented agricultural and food-related thesis topics, an enrichment of what Wendell Berry calls the humanities approach to agriculture. This approach at UVM is strengthened by the aforementioned philosophical and physical infrastructure in and around Burlington, all easily accessible to UVM undergraduates. (In fact, much of it is walking distance to all.) The latter is a situation not at all replicated at UMO, where there is an extreme dearth of such infrastructure.

A glance at recent issues of "Bittersweet Notes", the newsletter of UVM's Environmental Program, reveals talks on religion and food, Vermont "foodscapes", the Vermont Summer Land Conservation Program, Third World farming issues, promotion of the Northeast Organic Farming Association (NOFA) conferences, organic gardening and permaculture experiences, and various agriculturally related internships. Courses promoted by the program include landscape restoration; world food, population and development; the local economy (including food economy); soil science; and weed/crop ecology. There is also a liberal individually designed program which allows for a complete agricultural approach, if that is what the student desires. As well, the program features an Environmental Practicum fully usable for agriculture. And, of course, ecological and alternative agriculture are covered in the Environmental Studies courses themselves. But the most revealing story is the undergraduate theses, both Senior and Honors.

Organizing their theses under subject headings, some of the agricultural topics appear as follows:

Agricultural Theses:

1. "The Health-Diet-Environmental Link: A Case Study of Conventional and Organic Agriculture"
2. "The Historical Aspects of American Agriculture and Their Effects Upon Alternative Farming Methods"
3. "An Analysis of the 1990 Farm Bill's Alternative Agriculture Provisions and Their Effect Upon Vermont Dairy Farming"
4. "The Role of Environmental Education in Sustainable Agriculture: An Examination of the Northeast LISA Apple Production Project"
5. "Community Gardening in the Old North End Neighborhood of Burlington, Vermont: An Interest and Needs Assessment Survey"
6. "Sustainable Agriculture at Peter's Farm"
7. "Community Gardens: An Understanding Through Research and Hands-on Experience"
8. "Community Supported Agriculture: The Link Between Producer and Consumer: Case Study – Peter's Farm"
9. "Bovine Spongiform Encephalopathy and the Age of Industrial Agriculture"
10. "Agricultural Tourism and the Survival of Small Farms in Vermont"

Food-Related Theses:

1. "An Economic Feasibility Study of a Natural Foods Boarding House"
2. "Energy and Food Production: A Design for Passive Solar Greenhouse Addition to a Log Home in Central Vermont"
3. "Micro-T's Jubilee Environmentally Conscious Restaurant Operation: An Interdisciplinary Analysis"
4. "The Health-Diet-Environmental Link: A Case Study of Conventional and Organic Agriculture" (see also above)
5. "Attitude and Awareness of Burlington Area Residents Regarding Food Irradiation"
6. "Opinions and Source Reliance of Burlington, Vermont Consumers Regarding Organic Food"
7. "Making the Connection: Food, Farm and Forest"
8. "Setting the Table: An Investigation into a Student-Run Cooperative Café at the University of Vermont"
9. "The Greenhouse Cooperative Café, A Feasibility Project"
10. "Food Security in the Old North End of Burlington: Building a Community Around Food"
11. "An Examination of Food Choices, Dietary Habits, Eating Practices, and Attitudes Toward Food Among Buddhists as an Aspect of Buddhism and Ecology"
12. "A Clear Vision for Burlington Area Community Gardens: Collecting Gardeners' Feedback"
13. "Alternative Agriculture in Virginia: The Other Choice for Agricultural Development"
14. "The Effects of Bills H.247 and S.79: A Farmer's Perspective"

Herbalism:

1. "Healing: Reconnecting with Your Body and Reconnecting with the Earth Through Movement and Herbalism"
2. "The Birth, Death and Rebirth of Herbalism in America"

Organics:

1. "Organic Farming: A Choice for the Future"

Permaculture:

1. "A Permaculture Design for Slade Hall" (two students)

Sustainable Agriculture:

1. "Agricultural Policy and Existing Barriers to the Development of Sustainable Agriculture"
2. "Sustainable Agriculture at Peter's Farm" (see above)

More recent theses not tallied in the above include:

1. "The University of Vermont and Sustainable Development"
2. "A Clear Vision for Burlington Area Community Gardens: Collecting Gardeners' Feedback"
3. "Converting from Conventional to Organic Coffee Cultivation: Feasibility for Costa Rica's Farmers"
4. "A Study of the Environmental Practices of Shelburne Farms, with a Concentration on the Inn"
5. "Environmental and Economics Effects of Sustainable Agriculture on Family Farms: Extending the Benefits of Sustainable Agriculture to Young Farmers"
6. "Survey of Rooftop Gardens of the Northeast" (two students)
7. "The Alternative Coffee Market in Vermont" (two students)

This new fusion of the UVM Environmental Program with the field of sustainable agriculture offers an advantage not as easily realized in most agriculture colleges: an interdisciplinary fusion of agriculture (i.e., food production) with the food system (i.e., consumption). The latter fusion is an absolute necessity for the success of ecological or sustainable agriculture, especially at the smaller scale, the local, the community level. UVM is increasingly able to service that vital interdisciplinarity.

Northeast Organic Network (NEON)

As one might expect, research in sustainable agriculture in Vermont is dominated by work in rotational grazing and livestock matters. However, as in Maine, the NEON on-farm research program, which is focused on mixed vegetables, is also active.

The purpose of the Northeast Organic Network (NEON) is to get people working together at the systems level. Vermont is home to one NEON "focal farm", namely, the Harlow Kestrel Farm in Westminster, where mixed certified organic crops (lettuce, parsnips, winter squash) are being grown.

This NEON project is developing a rotation planner for organic farmers, nutrient budgeting tools, cover crop trials, studies of the economic success of farms and various efficiency studies and farm case studies. It also conducts studies on weed pressure, insect pressure, the role of "beneficials" (beneficial insects), and harvest yield studies. The Harlow (Kestrel) Farm features lettuce as its most valuable crop and places heavy emphasis on appropriate technology, especially in ice water coolers to keep the harvested crop fresh for shipping. In addition to three or four varieties of lettuce, the farm produces parsnips and winter squash on its rich Connecticut River bottomland soils. This farm also benefits from sheep wool mulch, called "woolsch".

There is also interest in and work on measures to grow sweet corn organically in this southern part of the state. Some of this work is collaborative with the University of Massachusetts College of Agriculture. The Harlow Farm is involved in a joint UVM/UMass sweet corn demonstration, a project which involves placing vegetable oil on the tip of the corn ear just after pollination. This research has received a 100% positive response in an effort to control corn ear worms and caterpillars, the number one barrier to organic sweet corn production in New England. (Corn oil kills the insects instantly so they keep away from it. But timing must be just right – there's a "silk" window of time. The high labor intensity of this application breaks even economically, since chemical spraying on corn is so intense and expensive, and yields a lower value product: conventional corn.) Enthusiasm runs high in these projects which are based on a strong ecological ethic.

"All flesh is grass."

Kathleen Norris

Rotational Grazing

Vermont is motivated in its ecological agricultural thought by questions of grass, pasture, grass-fed animals and pasture rotations. This is in keeping with the state's geography, its limey soils, its prominent dairy industry (which dominates over all the state's agriculture), its milk, cream, ice cream, cheese and yogurt production. And, although its organic ecological vegetable production, its CSAs and its farmers markets are all growing, Vermont is less diversified than Maine, given the position and influence of cows and dairy. It is not surprising, therefore, that the biggest story in sustainable agriculture in Vermont should be rotational grazing, and that among the greatest contributions in sustainable agriculture of the state's land grant university should be in grazing research.

So, in Vermont, towering over all other forms of UVM research in sustainable agriculture is the important, even seminal, work of Professor Bill Murphy in the area of rotational grazing, specifically management intensive grazing. Murphy is a native of Wisconsin, from a dairy farm in that state. He was trained by professors at the University of Wisconsin who were themselves graduate students of Aldo Leopold, and he is an icon today among progressive and grass-based dairy farmers in Wisconsin. Ironically, he has had most of his career in Vermont, in the Plant and Soil Science faculty at UVM. A grazier himself in nearby Colchester, Vermont, Murphy took an early interest in the 1950s-1960s work of Andre Voisin of France, author of the critical text, *Grass Productivity* (1959). Voisin's discoveries were not known to the English-speaking world until his now classic *Productivite de l'herbe* was translated by Catherine Herriot of Great Britain. His work was not known in the United States until Murphy essentially applied it to New England (and Wisconsin). (Voisin's less well known book, *Soil, Grass and Cancer: The Link Between Human and Animal Health and the Mineral Balance of the Soil*, was also translated into English in 1959.) Combining this knowledge with his own New England and Midwest experience, Bill Murphy made his own basic contribution to the literature with a work now going into its 5th edition, *Greener Pastures on Your Side of the Fence: Better Farming with Voisin Management Intensive Grazing* (1987, 1991, 1994, 1998). To Bill Murphy goes the credit for bringing the thinking of Andre Voisin across the oceans to America.

Intensive rotational grazing involves moving the animals from paddock to paddock, anywhere from twice a day to a minimum of once every three days. This timing relates to season, precipitation, soil, the botanical make-up of the pasture, and sometimes other factors. Such grazing is dependent, practically speaking, on a new development in technology from New Zealand: lightweight movable electric fencing. A mere single strand is all that is required for cattle (although some farmers use more). Multiple strands are required for sheep. But the light weight and mobility of this fencing is what makes all the difference. A water supply is the other tangible factor, while management intelligence and timing are what drives the whole system.

Bill Murphy's book, *Greener Pastures on Your Side of the Fence*, summarizes in one place the whole concept of intensive rotational grazing, from pasture plants, pasture ecology and pasture nutrition; to the role of grazing animals in the pasture (as a service provider improving the land as well as an end product); the Voisin system (with paddock numbers and size, stocking rates and densities, changing management over the seasons and through wet and dry conditions, and rotational sequences); paddock layout and fencing (including day and night pastures and provision of drinking water); livestock production (milking cows, beef cattle, sheep, goats, horses, pigs, poultry); feed planning; grazing season extension; social, environmental and economic benefits of these grazing systems; grazier support; and grazing disadvantages. The Voisin and Murphy books together form a kind of bible or handbook for how to do intensive rotational grazing correctly and successfully.

Adoption of these techniques and systems has been faster in Wisconsin (where nearly a quarter of all dairy farms are significantly grass-based in this largest of dairy states) than in Vermont. But Vermont, with its strong tendencies toward small-scale efficient farms, often certified organic, and with a stable nearby market, is moving in this direction and shows potential. (The Vermont Grass Farmers Association and, to a lesser extent, Vermont NOFA, are important state-wide

support networks for such grazing, and will be discussed later.) The seminal work of Bill Murphy in applying management intensive grazing to Vermont could well be the single most important research event in sustainable agriculture in Vermont. My own recent visit to five Vermont dairy farms, all of which significantly utilize intensive rotational grazing, all of which rotate at the maximum level (i.e., every twelve hours), and all of which are financially stable and out of debt, is an indication of the legacy of the Voisin-Murphy ideas in the state.

Bill Murphy paints a picture of management intensive grazing in a recent UVM Extension publication, writing that

> *"(M)anagement intensive grazing (MIG) involves subdividing large areas of pasture land into smaller areas (paddocks) that are grazed when plants are ready (mainly indicated by height) in flexible rotation … The key to successful grazing is adjusting recovery periods between grazings to conform with changes in plant growth rate; this is done mainly by observing plant height and the amount of pasture mass (total pounds of forage dry matter – DM/acre – that accumulates over time between grazings … Pasture plants should be grazed when they reach 6 to 8 inches for cattle or horses, or 3 to 4 inches for sheep, goats, pigs, or poultry … and should be grazed down to 1 to 2 inches … The total time that animals occupy a paddock in any rotation should not be longer than 3 days … Depending on how frequently animals are moved, 12 to 36 paddocks are needed in spring to mid-summer and 24 to 84 are needed in mid-summer to fall … Stocking density should be kept as high as possible … About 50% to 75% of the total area that will be grazed during the season should be removed from the rotation in spring, and harvested and stored as hay or silage … Surplus forage must be controlled – preferably by conserving rather than by just clipping – to maintain pasture plants in a vegetative and highly nutritious stage of growth during the entire season … Water is the nutrient needed in largest amounts by livestock … If water is near where the animals are grazing, they need to walk less to drink, and nutrients from manure remain in paddocks where they're needed, not in lanes, around water tanks or ponds, or in streams … Supplemental protein generally is not needed for livestock (which are) grazing well-managed pasture because the forage averages 23% crude protein … As pasture forage quality improves, cows can be selected to perform better on high-quality pasture forage and less supplement will be required, thereby improving farm profitability even more … The contrast in profitability between pasture-based and confinement dairying likely will become greater, in favor of pasture-based dairying."*[4]

Murphy in his frequent talks and pasture walks often stresses the importance of placing in agriculture a stronger emphasis on cost reduction rather than on increased income or production (even, under some circumstances, of reducing income in return for a better quality of life). He sees the great American social resistance to this concept. Murphy says that the early origins of animal confinement as a replacement for grazing, which occurred around 1960, relates to the terribly devastated condition of grazing land, land which could hardly support anything anymore. That devastation pushed "zero grazing" before the term "confinement" was even introduced. So this mindset sets the stage for what was to follow – animal confinement. Only after some experience with confinement did the realization of serious animal health and pollution problems and high input costs surface. Farmer exhaustion from the economic and other stresses soon set in, showing real disadvantages to confinement. Exacerbating animal confinement, economically, is the very high cull rate from confinement-related illness, a 50% rate which contributes to driving Vermont dairies out of business.

Of further note in Vermont is the Lake Champlain U.S. – Canada international pollution agreement, an agreement which directly challenges Vermont's refusal to stop phosphorus and other run-off. This pollution into Lake Champlain (and into other water bodies) results from the state's failure to change its way of agriculture. The dairy animal confinement system is the culprit. Rotational grazing is the direct remedy.

Being a student of New Zealand dairy practice, Murphy observes that New Zealand's good land health, in contrast to poor U.S. land health, relates to the difference between an island society which

understands limits and a frontier society with no sense of limits. Murphy believes that if we had had a history of good pasture management here in the U.S., we never would have gone into confinement systems in the first place. In further international observation, this time from the French grazing experience, Murphy finds that, as a rule, the French want small size and high quality, while Americans want large size and are very willing to accept low quality. He sees this reflected in livestock.

> ***"Farms that rely on grazing milking cows were much more likely to have low or no debt that their counterparts."***
>
> ***Bob Parsons, UVM***

Grazing has essentially been bred out of our animals and they no longer know how to do it. Thus, we must start new generations on grazing, and also seek heritage breeds that are still adapted to grazing. And Vermont is well situated for such development, having much available and unused permanent pasture: 85,000 to 100,000 acres open, not including convertible woodland. Murphy makes a good case for a very bright future in grazing and livestock production in his adopted state.

The farmer debt problem offers more promise for grazing. A recent survey of grazing on Vermont farms reveals that "Farms that rely on grazing milking cows were much more likely to have low or no debt than their counterparts. Confinement farms were much more likely to have debt in excess of 70% of the value of their assets. The smaller grazing farms can be more profitable simply from lower debt and less use of technology tools than their counterparts."(5)

Because Vermont is so well-pastured and has an established dairy industry, it perhaps is not surprising that intensive rotational grazing would occupy such an important position in Vermont's agricultural scene. UVM, therefore, produces numerous Research Summaries on pasture and grazing management. These focus on biology, management and markets. They encompass nutritional and economic aspects, social facilitation and behavior, management of differing grass combinations, managing parasites, and expanding profits. Most of the focus of this research is on dairy cattle, with some on beef and sheep. There are also publications on organic livestock grazing, on the variety of grazing practices on Vermont dairy farms, and on related subjects.

Finally, in terms of research, UVM and the state benefit in sustainable agriculture by serving as the U.S. Northeast headquarters for the national Sustainable Agriculture Research and Education (SARE) program. Northeast SARE Director Fred Magdoff, Professor of Plant and Soil Science at UVM and an expert on the central role of soil health in sustainable agricultural enterprise, believes that the SARE program has done more for the nation in sustainable agriculture than all other efforts combined.

Northeast Organic Farmers Association (NOFA-Vermont)

Vermont has a corollary organization to the Maine Organic Farmers and Gardeners Association (MOFGA). It is the Vermont chapter of the Northeast Organic Farmers Association (or Vermont NOFA, as it is called). Vermont NOFA is one of the seven state-wide NOFA organizations in the Northeast, and quite possibly the strongest and best organized of the seven. While not as much of a presence as Maine's MOFGA, and less integrated with UVM than MOFGA is with UMO, Vermont NOFA is becoming a clear second to MOFGA across the region. And NOFA does serve on the State Board of Sustainable Agriculture in Vermont, and could have influence on that Board if the Board were used by the state. (MOFGA's involvement with state government and the land grant in Maine is not dependent on such a Board.)

Testament to Vermont NOFA's growing strength are the large numbers now attending its annual winter meeting and various events around the state, and its membership and readership. Perhaps a greater testament is the fact that many certified organic dairy farmers and crop farmers claim to use Vermont NOFA as a basic source of technical support in place of Vermont Extension.

NOFA's history, in all the states where it is found, including Vermont, is one of separation from the land grant university. This is unlike the recent evolution of MOFGA in Maine, but there is increasingly great potential for collaboration with UVM and Extension, and a strong likelihood that such collaboration will further evolve, perhaps starting with the important dairy sector for which Vermont NOFA is developing greater expertise. Areas of such collaboration include local foods, direct marketing, farmers markets, apprenticeship and starter farmer programs, on-farm research and CSAs, as well as merged technical assistance.

Vermont Grass Farmers Association (VGFA)

Somewhat in contrast to Vermont NOFA, but bearing a very similar philosophy, is VGFA, the state-wide Vermont Grass Farmers Association. Mirroring MOFGA in Maine, VGFA has close relations with UVM (even occupying office space on campus) and to Extension. The two collaborate on newsletters and in many other ways. VGFA epitomizes a clear Leopoldian philosophy toward small-scale, ecological, low-input agriculture, toward care for grass, pastures, soil and animals, and toward a strong land and sustainability ethic.

The significance of VGFA to the life of Vermont is best realized in two fora : the annual winter meeting in February, and the art of the pasture walk, Spring through Fall. To attend VGFA's annual winter meeting at Randolph, held on the grounds of the Vermont Technical College, and often on a very cold Saturday, along with 300 to 350 interested, excited, committed, passionate Vermont farmers and graziers and those who would become such, is to know the future, or an important part of it. Arriving early, even after overcoming the obstacle of milking cows in subzero conditions, staying all day, sharing a locally grown meal, mingling late, buying books and other useful products, and participating in a profusion of highly practical workshops, not to mention listening to a much anticipated keynote speaker, paints a picture of what might well be the future face of agriculture in Vermont. Further reenforcing the theme of this book, a recent VGFA keynote speaker advocating grazing and the nutritional values of the resultant food was Dr. Tilak Dihmann, a veteran of the University of Wisconsin Agriculture faculty, and now with another large land grant university, Utah State. (This career land grant university scientist made the case for significant human health benefits of grass-fed meat and dairy product. And he believes the market is willing to pay double for this product.)

Such VGFA meetings epitomize the new look of farmer gatherings: nearly as many females as males, average age perhaps thirty years younger than the national average for farmers, and conversation and networking discussion sharing the latest techniques and experience. This stands in contrast to a typical American farmers' meeting of sixty-eight year old males talking about disease (of everything in sight, including themselves) and debt. Hope, vision and excitement characterizes such VGFA meetings, rather than depression, fear and dred which has taken over the atmosphere of so many farmers meetings in this country. (Most of the above also characterizes Vermont NOFA meetings these days as well.)

The other primary characteristic of VGFA is the numerous smaller events from one end of the year to the other, but particularly the pasture walk which has now become a fine art. Spurred significantly by UVM's Bill Murphy but now practiced by others around the state, the pasture walk can be viewed as the central teaching and learning tool of VGFA. It is farmer-friendly, a rejection of top-down expertise and the "cult of the expert", and based largely on real-world experience. It is the way farmers learn best: from their peers. There are now so many pasture walks and other grazing-related events across Vermont that their announcement fills the pages of the organization's newsletter, "The Solar Dollar", and its companion "Pasture Calendar". The quarterly "Solar Dollar", and the even more frequent "Pasture Calendar", are the basic forms of communication for VGFA and both are produced and distributed from UVM's Center for Sustainable Agriculture. Such collaboration is the reason why VGFA gets serious attention in this book. VGFA, although itself a private non-profit organization

"The pasture walk has become a fine art in Vermont."

John E. Carroll

with a membership, is so closely integrated with the state's land grant university that the claim can be made that VGFA stands as further evidence of Leopoldian land ethics in Vermont's land grant university.

VGFA refers to itself as "a group of farmers and neighbors growing the vitality of grass-based farming in Vermont". VGFA is "… dedicated to enhancing the Vermont way of life and its working pastoral landscape by supporting farms and rural communities as they work towards increased economic, social and environmental sustainability through ecological management of Vermont's unique grassland resource" (as noted on the letterhead of "The Solar Dollar", Newsletter of the Vermont Grass Farmers Association). The newsletter publishes information on programs, courses and conferences; grant opportunities; conference reports; book reviews; short features; classified ads; and support for networking, including support of the formal Vermont Pasture Network. In addition to member support, there is support from UVM and USDA's Natural Resource Conservation Service (NRCS), all working cooperatively. "Pasture Calendar" provides detailed information on numerous upcoming events locally and regionally, helping to insure strong participation. In addition to pasture walks and workshops, the annual winter grazing conference and periodical publications, VGFA organizes discussion groups to serve farmers needs, and produces a detailed Vermont Directory of Grass-Fed Products so as to aid the direct marketing efforts of Vermont graziers. In all of this effort, VGFA envisions the Vermont of a century hence as "a diverse environment of prosperous small farms, villages and towns where food is produced locally in a clean environment, and where Vermont people are connected to their food and its source"[6].

Functioning closely alongside VGFA is the Vermont Pasture Network Project. This network serves over 500 farmers and agency personnel through education and outreach activities. It is committed to the economic viability and quality of life of graziers, and does this through education in management intensive grazing techniques. The project centerpiece is a pilot demonstration farm project reaching many farmers through workshops, open houses and tours. Aside from provision of technical assistance to farmers and agency personnel, workshops, conferences and pasture walks, the project uniquely provides for facilitation of agency involvement in workshops, walks, conferences and technical training. The goal is to help agency personnel recognize grazing as a viable way to implement conservation practices so that they can more effectively steer resources towards grazing farmers. This is also a recognition that many agency personnel are not educated or acculturated to work with grazing compared to confinement livestock. The Vermont Pasture Network Project is also a testament to the ecological and Leopoldian idea that those with the experience, the farmers themselves, have much to teach those whom we have in the past referred to as "experts". It puts the farmer, and the on-farm experience, first, acknowledging that the land ethic must originate with the farmer on the land.

Reflections on Farmer Perspectives

Garrison Keillor has written, "Dairy farming was what permitted very industrious people to earn a living on poor land, it's fundamental to our culture …"[7]. We all know of the failure and collapse of most conventional dairy farms in Vermont and across New England. Agrarian and Leopoldian values posit a very different picture.

On a recent visit to five certified organic and largely grass-based Vermont dairy farms, I reached a few conclusions:

1. There's a laid back attitude toward animal health on these farms, not because the farmers don't care but because they encounter little in the way of animal health problems, particularly if they take grazing seriously. There is thus not much need for veterinary treatment. Farmers observe that this is also because they don't stress their cows. And loss of the ability to use antibiotics in certified organic dairies is not a big problem. The regular monthly herd visit by the vet is eliminated in grass and organic systems, further reducing input costs. (A Maine dairyman recently went from $8,000.00/year in vet bills to near zero with conversion to grazing.)
2. There is a notable lack of long-term debt among the grass-based and organic dairies.

3. Dairy and other farmers have a new income opportunity: growing certified organic grain to provide other dairy farmers with feed. The price is very good from the seller's point of view.

4. Serious graziers try to get cows outside every day of the year except the very coldest days (and clean out the barn while the cows are outside).

5. Many of the best organic and grass-based dairies exhibit strong diversity of input (including growing their own sources of feed and producing manure) and of output (forage and other crops, seeds, maple syrup, agri-tourism, yogurt, cream, etc.).

These discoveries begin to illustrate how important it is that farmers educate agency personnel, given that agency personnel over the past half century have been significantly educated in other directions, namely those of industrial agriculture and factory farming.

A St. Albans dairy farmer, speaking of the industrial model and its effect on farmers, notes that too many of our farmers have lost their wholeness, their integrity. They've lost a sense of who they are and they've lost their ability to think critically. They thus become ready pawns for agri-business and anyone else who would "snooker them" into anything for someone else's profit.

A pasture walk with a Weston dairy farmer yields insight into small-scale, high diversity farming practicing minimalism in every way, and operating strictly on leased land. Like Joel Salatin and Allen Nation, this farmer, a producer of cheese, eggs and meat, believes in putting one's money into the herd and not into land or other capital investment. This farmer is grass-based on a 24 hour rotation, organically certified, and small-scale (10 milkers, 100 laying hens, some meat animals). Characteristic of this farm are very light single-strand movable fencing, low vet bills, great longevity in animals, use of whey (a byproduct of cheese processing) in hog feed, use of supplemental hay for winter feed, and a bare bones minimum on equipment. This dairyman expects his animals and his grazing system to improve the pastures (and notes that intensive rotational grazing promotes white clover, an excellent pasture plant). He believes in simplicity (the simpler you can keep your life, the better) and low input cost (it doesn't matter how much money you run through your books, he says – it's where you're at at the end of the year). Trust in biology and nutrition, the idea of the land and livestock taking care of and improving themselves if given a chance, the idea of nature as service provider, adapting to specific local circumstances and recognizing differences from place to place, and persistence, are all Leopoldian (and Berryesque) values present in this farmer. In turn, he brings these traits to the VGFA table, and thus to Extension, in Vermont.

Flack Family Farm

Many Vermonters asked to identify a model of farm sustainability in the state cite Flack Family Farm in the northern Vermont town of Fairfield as such a model. Indeed, Flack Family Farm, operated by Doug and daughter Sarah Flack, offers frequent "how to" workshops and farm demonstration field days. There are many who seek to learn from this father/daughter team and their several decades of experience. Certified organic, certified biodynamic, a model of biodiversity and economic diversity, a model of crop-livestock integration and grass-based agriculture, and a model, too, of direct marketing: this farm would appear to feature all of the characteristics for sustainability described in this volume. Extensive woodland, about 150 acres of grazing and haying land, 10 acres in mixed vegetable tillage, complex rotations of cows (Milking Devons, among the oldest New England breeds and an all purpose cow: milk, cream, meat and beast of burden), sheep, pigs and poultry on pasture and hay meadows, mixed vegetable and medicinal herb production (and a good side business in production of the latter) are all characteristics of Flack Family Farm. Pasture improvement through intensive grazing, compost, rock powders and biodynamic practices (the latter of which suggests intimacy with the land, the plants, the animals and the seasons) are additional characteristics. "Mob stocking", applying intensive animal grazing pressure

> ***"The question of the survival of the family farm is really the question of who will own the people."***
>
> ***Wendell Berry***

in order to convert woodland and brush to pasture (and high quality pasture indeed), specialized cabbage and other vegetable production for fermented sauerkraut and kimchi, and direct marketing with on-farm pick-up and on-farm workshops, are additional hallmarks of this farm. Sarah and Doug are both strongly committed to the practice, and the promotion and teaching of the practice, of intensive rotational grazing.

Sarah Flack was the first Director of VGFA, and both father and daughter have written extensively on grazing basics, the art and science of pasture management, and grass-based dairying. Like Joel Salatin, they champion frequent animal movement from pasture to pasture. They have high respect for what they refer to as the incredibly complex ecology of a pasture. Not unlike the Amish, they have respect for the inherently deep spirituality of what they are doing. Doug writes "… (T)he pasture yields amazing annual tonnage which animals can graze from April until well into winter. This is grass farming"[8]. In a less obviously utilitarian and more poetic manner, Doug continues, "Think about clover, a lovely small bee-blessed, sun-loving plant. It is the kingpin of sustainable livestock farming!"[9]. Sarah in a recent article writes "One way to learn about pasture management is to get a grasshopper's-eye-view of it"[10]. And Sarah paints for us the full picture when she tells us to improve our understanding of the art of grazing by developing our intuitive and observational skills in the following manner:

"… Follow earthworms to see where and when they are in the pastures; watch for certain plants which may appear to help correct past years' management mistakes of overgrazing or soil compaction; follow the cows and sheep to see what they eat; watch how the texture, color and aroma of the manure changes as the animals graze different areas at different times of the year; lie down in the pastures often to meditate; taste the grasses and smell the soil; watch the color, texture and taste of the cream change as cows move from one pasture to another"[11].

Both Flacks would undoubtedly agree with the USDA scientists who believe that sustainable agriculture is eternal agriculture, that is, agriculture that can be practiced for eternity, an agriculture fully natural in that no finite, exogenous inputs (e.g., fossil fuels) are necessary for it to function, and that, furthermore, "… grazing is one of the most sustainable forms of agriculture known for there is no other agriculture less dependent on external, finite resources or environmentally disruptive resources"[12].

Flack Family Farm earns its place in this book through its role as a major player in VGFA and that organization's work and place within UVM's Center for Sustainable Agriculture and Vermont Extension Service. The Flacks are answering Aldo Leopold's 1938 challenge to humans to live on a piece of land without spoiling it.

These farms, farmers families and farmer organizations invariably make possible a stronger climate at UVM for the philosophy of sustainable agriculture and its practice.

Vermont agriculture, as well as New England agriculture more generally, may be on the cusp of a new era, given the rapid growth in interest in biodiesel fuels with their strong crop (as well as recycled vegetable oil) component. Mustard, canola or other oil-bearing plants may soon cover portions of Vermont's and New England's landscapes and supplement the income of these and other farm families in the region.

"Sustainable agriculture is about the pursuit of happiness, and grass farming represents the best potential for happiness we have."

John Ikerd

Delivering the keynote address in Burlington at the Tenth Anniversary celebration of the UVM Center for Sustainable Agriculture, Professor Emeritus of Agricultural Economics John Ikerd of Missouri's land grant, the University of Missouri College of Agriculture, instructed the Vermonters present on how low-input sustainable agriculture has come to be. He described how the social and ethical aspects of sustainable agriculture have kept away the "hard scientists" and "bottom-line economists", as he called them. He told how sustainable agriculture is today the big thing, not a small thing, predicated on love, faith, hope and even profit. He called it an agriculture which will last, necessitating that

it be both ecologically sound and economically viable. Its raison d'etre is, he said, the knowledge that we are part of something bigger. As part of something bigger we seek trust and integrity, things that can only come from relationships and from relationship farming as the source of our food. Economist Ikerd tells us that only 5% of the U.S. market food production is "organic" and/or "natural", whereas 25% of the population today wants such food and they can't get it because there is no alternative food system.

The next day in his keynote address to the VGFA winter meeting, Ikerd philosophized that what, as humans, we really want is not money or success but happiness. Connectedness to people around us is critical to happiness, he says, and happiness comes as a byproduct of right relationships. Sustainable agriculture, in Ikerd's view, is about the pursuit of happiness, and grassland farming represents the best potential for happiness we have, the best potential for true profit, for true sustainable agriculture. Giant organizations cannot build relationships so they can't enter relationship agriculture. Relationship agriculture, sustainable farming, is not a business, it's a way of life, it's about the pursuit of happiness. It is a great social movement, Ikerd reports, that will revolutionize this country.

The fact that Vermont's land grant university and the land grant-sponsored VGFA invites the Missouri land grant's John Ikerd to present this kind of a keynote message reveals much about where UVM is going in small-scale, relationship and sustainable agriculture. Aldo Leopold would undoubtedly be pleased.

ENDNOTES:

1. Strategic Plan for Sustainable Agriculture, University of Vermont Extension System, UVM, Burlington, Vermont.
2. Memorandum of Understanding Between the UVM Center for Sustainable Agriculture and the Vermont Department of Agriculture, Food and Markets.
3. Ibid.
4. Bill Murphy, "Introduction to Management Intensive Grazing", UVM Extension SARE Bulletin No. 1, 1998.
5. "Survey Shows Variety of Grazing Practices on Vermont Dairy Farms" by Professor Bob Parsons, Farm Management, University of Vermont.
6. Vermont Grass Farmers Association (VGFA), Mission Statement (VGFA, UVM Center for Sustainable Agriculture, Burlington, Vermont). See also VGFA Quarterly Newsletter, "The Solar Dollar".
7. Garrison Keillor, *Homegrown Democrat: A Few Plain Thoughts from the Heart of America* (New York: Viking, 2004), p. 157.
8. Doug Flack, "Grass-Based Dairying, Old and New", *The Natural Farmer*, Vol. 2, No. 57 (Summer, 2003), pp. 11-13.
9. Ibid.
10. Sarah Flack, "The Art and Science of Pasture Management", in Biodynamic Agriculture.
11. Ibid.
12. R. K. Heitschmidt, L. T. Vermeire and E. E. Grings, "Is Rangeland Agriculture Sustainable?", USDA-ARS Paper presented at the Symposium on Sustainable Animal Agriculture – National and International Perspective, 2003. (Published in the *Journal of Animal Science* 2004.82 (E. Suppl.), page E139.)

"Back to the future: a 21st century savanna. If, as seems probable, this landscape should now expand at the expense of the feedlot, then something good – even beautiful – will have come of this poor mad cow."

Michael Pollan
of New York

Chapter Eight: Conclusion: Assessing the Pudding in Light of the Ethic

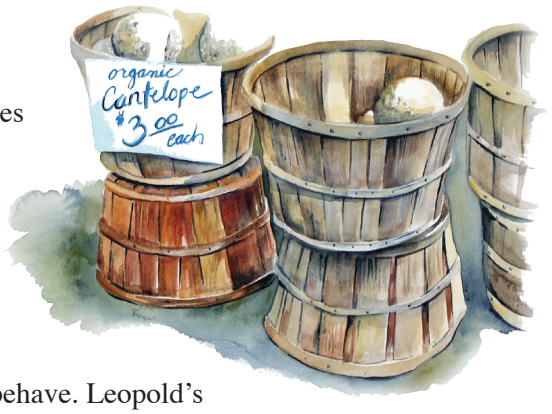
"The proof is in the pudding", goes the old saying. Do these four land grant university programs in sustainable agriculture reflect and/or put into practice, implicitly or explicitly, Aldo Leopold's criteria for a land ethic? Do they actively represent, are they a tangible example, of the Leopoldian land ethic? How might they be measured? It is the purpose of this chapter to find out.

Why Aldo Leopold's Land Ethic is a Foundation for Sustainable Agriculture, at the Land Grant Universities and for the Nation

As we saw in Chapter Two, Leopold defines an ethic, ecologically, as "a limitation on freedom of action in the struggle for existence". He defined an ethic, philosophically, as a differentiation of social and anti-social conduct. Broadly speaking, it is quite clear that all of the action, all of the practice, incorporated into the definition of sustainable agriculture, as found in these specific programs at the selected land grants, accepts limitation on freedom of action and an acknowledgement of limits. They do this through:

- their implied rejection of growth for growth's sake;
- their focus on scale (i.e., acceptance of small and intermediate scale and rejection of large scale, or, to put it another way, their attention to "human-scale"); and
- their embrace of ecological principle, of ecology as the governing principle.

Their strong philosophical and practical commitment to the values of community, a prime ingredient in true sustainable and civic agriculture, clearly demonstrates Leopold's concern about social conduct.



Union Square Green Market, New York City

A central idea of Leopold is the changing nature of ethics over time, leading to a continuous expansion or extension of ethics to cover ever broader categories and circumstances. This is precisely in synch with sustainable agriculture's grounding in ecological principle. It is not at all in synch with industrial agriculture's embrace of the principles of neoclassical economics. As more becomes known, through scientific discovery of the nature of ecosystems, local and global, the world widens, and with it the ethical framework in which we live and behave. Leopold's three thousand years of ethical extension continues with numerous ecological discoveries and realizations in the more than half century since Leopold's death. It is the expediency of reductionistic industrial agriculture which shrinks ethical judgement. Ecological agriculture magnifies that judgement.

1. **The Ethical Sequence**

   Leopold writes of "symbioses", evolving modes of cooperation. Land and biotic relations in the practice of sustainable agriculture, including placing soil at the center, and inferring obligations to concern ourselves with the health and well-being of generations yet unborn (i.e., through the building of soil, the planting of trees) transcend the strictly economic, and carry the notion of obligation. Leopold says such an extension of ethics is possible evolutionarily (1st step), is necessary ecologically (2nd step), but society has not done so, he tells us.

   However, these new sustainable agriculture programs are an example that we are now so doing. Thus, Leopold's 3rd step is beginning to be consummated, not just by individuals (i.e., good farmers) but by society through public institutions. If ethics be a mode of guidance, a community instinct in the making to meet newly emerging circumstances, as Leopold has written, then what we see in the land grants today is an implicit acknowledgement that the conventional way of the post-WWII era is not working. We had better try something else, we had better allow for a new ethic, a new value system, a new philosophy, even if a countervailing one.

2. **The Community Concept**

   Leopold writes that ethics prompts cooperation and enlarges the boundaries of the community. And ethics affirms the right of people, of life, to continued existence.

   Sustainability by definition elicits the notion of continuation of existence, in fact indefinitely into the future. "Relationship agriculture", that which connects the farmer and the consumer of food, and all forms of direct marketing so extensively addressed in these land grant programs, not only supports economic sustainability quite substantially, but essentially enlarges the boundaries of the community: it puts growers and eaters together communally and it teaches them that they have a shared destiny. The concepts of on-farm biodiversity and of ecological integration also enlarge the community. Likewise, so do beginner farmer programs providing access to those without any access in the industrial model. Likewise, also, so does the inherent circularity rather than linearity of the thought process of sustainable agriculture, projects such as enlargement of community and of intimacy, with nature and with one another. This sense of intimacy rejects the self-defeating conqueror role so characteristic of industrial agriculture. As well, the place-based nature of all of these land grant programs reflects the earlier (i.e., pre-WWII) sense of place of these land grant agricultural programs. And draws out the humility Leopold calls for when he says we will become much more humble about who we are and where we fit in once the concept of land as a community penetrates our life. To Leopold, ecology itself is the science of communities, and the ecological conscience, therefore, is the ethics of community life.

3. **The Ecological Conscience**

   In the formation of an ecological conscience, Leopold writes that no important change in ethics can be accomplished without an internal change in our intellectual emphasis, loyalties, affections and convictions.

   The conversion from the conventional industrial agricultural model to the ecologically sustainable model represents a fundamental change not only in our emphasis, a relatively mild matter, but also in our most basic convictions, a much more serious matter indeed. This change is hardly trivial, which is Leopold's assessment of all the change he himself witnessed. To change from an energy-intensive and capital-intensive oil and chemical base to a low energy management-intensive biological base is a fundamental change. Likewise, to convert from animal confinement systems of livestock production to grass-based pasture systems is basic. To move from commodity production for wholesale and export markets to direct marketing is basic. To move from having no control over the conditions of production (price, etc.) to significant control is basic. To move from limitless growth and short-term profit maximization to steady state economics and profit (and quality of life) optimization is basic. To move from minimal people on the land and widespread absentee ownership to maximum people on the land and to make independent ownership and livelihood possible is basic. These differences characterize the sustainable agriculture movement and are the

natural end result of the working philosophy and practice of the land grant sustainable agriculture programs being investigated here. They and others like them meet Leopold's criteria of substantive rather than cosmetic change.

4. Substitutes for a Land Ethic

Leopold writes that no ethical obligation toward land is taught in colleges of agriculture or extension services.

Today, this is not at all true in the four institutions studied in this book. The teaching, research and extension programs of these four are suffused with attention to land ethics questions, implicitly and explicitly. (One expects the same is true of those many programs in sustainable agriculture not addressed in this book.) Thus, the elements of the land community or of nature that lack explicit commercial value receive equal attention to those elements that have such value, since all is recognized as part of a unity, a whole, with all parts necessary for healthy functioning. In a truly sustainable farm model, these programs recognize the potential for each element in the system to support each other element, and for all to provide service to society and to the biotic unity. The false assumption Leopold describes, that the economic parts of the biotic clock will function without the non-economic parts, is rejected by the principles of sustainable agriculture, thus reducing the expectation of government intervention in the process and enhancing the freedom and independence of the farmer. Leopold writes that "No economic value" means "leave it to government" and that people will not do things on their own unless paid (i.e., subsidy). This is not the case with most of the farms and farmers modeling the principles of ecological agriculture and thus not at all the assumption or expectation of these land grant programs. Government has a severely reduced role with these ecologically-based programs, lessening the vulnerability of these programs to the whims of politics or public budgets. An ethical obligation on the part of the private owner is the visible remedy, writes Leopold.

5. The Land Pyramid

Leopold writes that we need to see land as alive, as a biotic organism, because we can only be ethical to something that we can see, feel, understand, love or have faith in.

Profiles of all farmers associated with these land grant sustainable agriculture programs quickly reveal that their relationship with their land fits this description. Likewise, teaching and research in these programs reflects the same. Leopold's image of land as a fountain of energy flowing through a circuit of plants, soils and animals is reflected in virtually all of the techniques and practices of ecological agriculture taught in these universities, from crop rotation, intercropping, soil fertilization through composting, green manuring, intensive rotational grazing, homeopathic medicine, biotic pest control (and the key recognition of the role of "good bugs" and "bad bugs"), attitudes toward the appearance of fields and crops, biodiversity and integration of crops and livestock, of plants and animals, and in the general attitude that, if we take care of the soil, the soil will take care of us. Death and decay are as necessary as birth and life – each requires the other. Thus, food chains, Leopold says, are the channels which conduct energy upward, while death and decay return it to the soil.

Sustainable agriculture researchers and practitioners know, as did Leopold, that human altering of the ecosystem, the food pyramid as Leopold called it, releases stored energy which supports a deceptive exuberance of plant and animal life, and that such releases of biotic capital hide or postpone the penalties of violence to the ecosystem. Industrial agriculture remains blind to this reality. Leopold and the land grant sustainable agriculture programs understand that land is not merely soil; that native species keep the energy circuit open (hence, the recognition by the land grants of wildlife benefits to this form of agriculture); and that human-caused changes often have unintended and unforseeable effects. Leopold's questions "Can the land adjust itself to the new order?" and "Can the desired alteration be accomplished with less violence?" are both prominent research questions on the agenda of all four land grants, and perhaps particularly that of Iowa State's Leopold Center for Sustainable Agriculture.

6. Land Health and the A-B Cleavage

Leopold identified "land health" as the land's capacity for self-renewal, and "conservation" as our effort to understand and preserve this capacity.

This is indeed close to the meaning of a word not used in this context in Leopold's day, that of "sustainability", literally a capacity to sustain or self-renew. The dichotomies which Leopold raises in his "A-B cleavage" are akin to the dichotomy of the industrial mindset (A) and the agrarian or ecological mindset (B) which we so clearly see in agriculture today. The four land grant sustainable agriculture programs described in this book are clearly of the Group "B" side of this dichotomy, the ecological side, the Leopoldian side. Group "A" people clearly represent the industrial approach (the post-WWII conventional and still dominant, albeit failing, approach of most land grant university programs outside of the sustainable agriculture/ecological agriculture efforts). And, while Leopold's dichotomy, and the modern one here presented, can err through oversimplification, it comes through as a reasonably accurate description of reality, as long as one accepts that there are also those in the process of transitioning from "B" to "A" status.

- Leopold's division of these cleavages into paradoxes, put forth with his inimitable flare for elegance, is still accurate today, and precisely so:
- Man the conqueror vs. man the biotic citizen;
- Science the sharpener of his sword vs. science the searchlight on his universe;
- Land the slave and servant vs. land the collective organism.
- To Leopold, conservation is a positive exercise of skill and insight, not merely a negative exercise of abstinence or caution.

7. The Outlook

Leopold writes that an ethical relation to land cannot exist without love, respect and admiration for land.

To the practitioners and teachers of sustainable agriculture, land is a subject, not an object, and is to be loved as such, as part of a broader communion which contains the lover and the loved. To the practitioners and teachers of industrial agriculture, most of whom are implicitly rather than explicitly so, land is object, a commodity, to be bought and sold. It is a machine, a substrate, a source of monetary wealth. The latter view precludes the ethical relation about which Leopold speaks, and is thus not in keeping with Leopoldian philosophy.

The educational system which heads away from, and not toward, an intense consciousness of land, about which Leopold writes, is not the educational system of these four programs and what they represent, even if it is the educational system of the dominant mainstream. These four programs and their agricultural philosophy do not separate people from the land, do not insert middlemen or technology, certainly do not view land as an adversary or task master that enslaves, about all of which Leopold wrote in this concluding section of the land ethic. And true ecological training is common in these programs. Leopold tells us it only requires a small minority of people to rebel to save the land ethic. If this be true, the efforts of these four universities, and their peers elsewhere, cast a hopeful sign.

If, as Leopold says, a land ethic is never written but rather is a product of social evolution and is always evolving, then the behavior of these four land grant universities and their practices and interests in sustainable agriculture are themselves carving out a further evolution of Leopold's land ethic. They are not only demonstrating what has been but they are active participants in creating what will be.

New England Land Grants: Our Role to Play

The land grant university, theoretically, is committed to the health of the land and the community, the health of plants and animals, the health of food and of the local economy. It is, when it is on

task, the public's first line of defense against food and natural resource insecurity, particularly at the local and regional level. Indeed, it is society's way of being public in this task.

This manuscript details and establishes a place for the land grant universities, and particularly the land grants of northern New England, in the future food resources of the people of New England, and in the conduct of agriculture on New England land. It is applicable to many other parts of the country. The role of the land grants is collaborative:

- with the farmers and gardeners and artisanal food producers of the region;
- with the non-governmental organizations committed to organic agriculture, beginner farmers, women in agriculture, direct marketing groups, sustainable agriculture societies, rotational grazing and grass farmer groups, and many others;
- with the consumers of food across the region and those committed to the health, nutrition and well being of New Englanders.

Some of the principle conclusions of this book, especially for New Englanders, are:

1. The land grant universities of New England are playing a significant role in sustainable agriculture in the region, and are so organized as to continue to have a major role to play. And Aldo Leopold, he of the land grants and a natural resource conservationist par excellence, together with his land ethic and agricultural research and writings, can be a significant inspiration to this involvement.
2. The re-direction of only a small percentage of the food budget of New Englanders toward purchase of locally grown foods and artisanal (locally processed) food products can shift a significant amount of money into the hands of local farmers enabling them to stay on the land and continue farming. (While this effort is true for any U.S. region, it is Maine, Vermont and other New England states which have the infrastructure, both social and physical, which can best support it. Short geographical distances and populous local market demand are supplemented by numerous and plentiful farmers markets, CSAs, locally owned natural food stores, and even regional "whole foods" supermarkets. All of these advocate for and buy from local growers, placing New England and its small farms, in many cases, ahead of other parts of the country. That infrastructure is likely to bring on, before too long, the needed processing infrastructure, especially for meat and grains, the lack of which currently inhibits further growth in the small farm/local food sector of the economy.)
3. New England has the cultural base and the cultural mindset and infrastructure, organizationally and otherwise, to significantly feed itself from its own resources. This cultural and organizational mindset is leading it to the recovery of its missing physical infrastructure which is needed to support a true local food system. Much more research can be fruitfully carried on in this area.
4. Through diversity and integration, New England has the ecological base to support food production, especially when due attention is given to meat and dairy production which is grass and pasture-based, together with crop-livestock integration and agroforestry. (This is even truer when New England is placed in context with its broader Northeast region and the agricultural potentials of nearby states such as New York and Pennsylvania.) Likewise, more research to achieve regional food security is justified.
5. Agriculture practiced ecologically attracts considerable interest in the New England region, a region increasingly interested in "relationship agriculture". It is a region interested in restoring the severed relationship between producer and consumer, and in predicating that relationship on a tangible feeling of connectedness between the two.
6. Like many other locales on the American landscape, New England suffers from sprawl, a sprawl which is facilitated partly by the economic inability of farmers to stay on the land and continue to farm. More New Englanders are today making the connection between loss of local food production and loss of open space, and are interested in supporting local farmers so as to contribute to saving open space.

7. "Buying local" food campaigns are catching hold in New England at the individual, the restaurant and the institutional levels, for the above-mentioned and other reasons, including the high nutritional value of fresh food. In many areas, demand is outstripping supply, as many farmers claim they do not need and cannot serve any more customers. Current demand, therefore, is for more farm operators and more local food production, regardless of price. Price of land and general limited availability of farming skills are the two forces slowing response to growing demand.

8. Aldo Leopold is both a perfect and an imperfect role model for grounding in this book. His imperfections - his Midwestern background with nearly no association with New England other than his education at Yale, and his primary fame in wildlife management, forestry and wilderness rather than agriculture - are overcome and superceded by his late-in-life focus on small-scale farming and agriculture and his powerful identification with land ethics. The latter make him eminently appropriate as a strong role model. Foremost, however, is the high esteem in which he is held in American land grant universities and in the broader environmental conservation and natural resource management role of those universities. The level of credibility which comes with Leopold is extraordinary. Formidable too is the form and scale of agriculture with which he dealt in Wisconsin and other Midwestern states, a biodiverse form and a small scale much reminiscent of New England today.

What has been accomplished in the area of sustainable agriculture at all four institutions examined in this book has been accomplished with limited resources, with very small allocation of money. It has largely been accomplished on the back of imagination and spirit, on clear vision, on dedication and commitment and will. Only minimal funds have been applied to this mix and such funds have been used strategically and successfully. The programmatic efforts that have emerged are, as a result, largely independent of government, of corporations, of institutions in general. These efforts are not significantly capital-intensive, and are more independent than dependent. Like the agricultural models they reflect, this programmatic effort is diverse, non-hierarchical, flexible, de-centralized, and bottom-up in their organizational philosophy and values. They can exist and progress in hard times. They themselves are sustainable. As with anything else, they do require resources, but at a different level and in a different mix than do those kinds of programs which have characterized and dominated American agriculture and food systems for most of the past century, whether the "Bonanza Farms" of the early 20th century or the capital-intensive and heavily government-subsidized dependent welfare agriculture and industrial food systems of more recent decades.

These sustainable agriculture programs are based on a clear philosophy and set of values, the agrarian way, which in turn is based on de-centralist philosophy and which easily transitions from theory into practice, from philosophy into concrete practical application.

The lessons for New England, for its small-scale de-centralized agriculture, and for its growing local food systems are especially prescient here. The history and practice of sustainable agriculture in the land grant universities of Maine and Vermont very much reflect New England history, culture and reality. Vision, imagination, determination and commitment have produced the result we have seen in Chapters Six and Seven, and have done so on a shoestring, quite the New England way, past and present. The lessons available for the other New England states are in keeping with present realities. And the lesson taught by New England, historically and culturally, is to **take care of your own place.**

To paraphrase Wendell Berry of Kentucky, all the world is made up of small places that must be cared for individually, one by one. There can be no global place without these local places: local farms, local communities, local neighborhoods, local foodsheds, local foods for local people. Neither Berry nor anyone else believes it ends with that, but it most certainly begins with that. To lose that realization is to lose the locale, the local place, which is, ultimately, to lose the global, to lose the whole.

This is not to deny the axiom that all places have their own characteristics, and thus their own specialties, which they produce best and are best able to share with other places. A clear example is the superior ability of New England to provide itself with pasture product more than with the products of the field, the products of tillage. New Englanders realized this a long time ago but have forgotten it in contemporary times. There is reason to believe they are today reviving this memory. Further research is needed to determine just how much pasture New Englanders can recover and just how much protein they can produce for themselves from the great diversity of meat and dairy product that can be supported by the lush grass which water-rich New England is capable of producing. Could it be that New England imagination and modern appropriate-scale technology can, in combination, produce a surprising result, especially when organized interdependently with vegetable and fruit production and agroforestry?

With clear philosophical principles in place, with goals derived and with vision and imagination applied, anything is possible. Whether New England, the Midwest or other regions of this country apply and gain advantage from that combination remains to be seen. Models for guidance are certainly plentiful.

Commenting on the land grant universities and their role in society, Garrison Keillor has written, "American universities have seen plenty of radicals and revolutionaries come and go over the years, and all of them put together were not nearly so revolutionary as a land grant university itself on an ordinary weekday"[1]. Are the land grant universities up to the task of leading, or at least of becoming serious participants in, the adoption of Aldo Leopold's land ethic, of institutionalizing true agricultural sustainability and food security, of leading this "revolt against the merely economic"?

ENDNOTE:

1. Garrison Keillor, *Homegrown Democrat: A Few Plain Thoughts from the Heart of America* (New York: Viking, 2004), p. 94.

"The greatest fine art of the future will be the making of a comfortable living from a small parcel of land."

Abraham Lincoln

APPENDIX I:

ALDO LEOPOLD: INTERPRETATIONS AND PERSPECTIVES

Scott Russell Sanders, American nature writer, in his Foreword to *Aldo Leopold: For the Health of the Land: Previously Unpublished Essays and Other Writings* (edited by J. Baird Callicott and Eric T. Freyfogle, Washington, D.C.: Island Press, 1999), writes that Leopold is one of the touchstones in American thinking about nature and culture. He quotes Leopold: "When the farm boy can no longer see a fox track in the snow, it will take a lot to replace the loss". – thinking which is apropos of Wendell Berry in our day. Leopold is thoroughly land – minded, among the first observers to tell us in scientific detail that our seemingly robust land is ailing. Leopold warned us about DDT more than twenty years before we received Rachel Carson's warnings. Leopold disputed the views that bigger is better, that novelty is proof of vitality, that profit matters above all else – foreshadowing the thought of E.F. Schumacher. Leopold supported a positive exercise of skill and insight (restoration, remediation) as well as preserving what has not yet been spoiled (preservation).

J. Baird Callicott and Eric T. Freyfogle in their "Introduction" to the same book called Leopold America's most perceptive and influential conservationist, and identified his central concern as how to promote conservation on privately owned land. They call his *A Sand County Almanac* the most influential conservation book of all time. Leopold was convinced that government alone, whether working through land acquisition or regulation, could never bring about effective conservation (and now we know that government can be an enemy of conservation, both in its own proprietary actions as well as in that which it permits). They consider Leopold's most important institutional base as being at a College of Agriculture at a land grant university in the Midwest. They see his wildlife approach as being through farm game, and not outside that lens. They remark that Leopold saw "wise use" and wilderness preservation as being on the same gradient, namely of restraint, while his own belief was more proactive – a positive exercise of skill and insight, not a negative exercise of abstinence or caution. His use of the word "land" was fully holistic; it included soils, water, plants and animals. His concept of "land stewardship" equates with ecosystem management, and his concept of "land health" relates to the capacity for self-renewal in the biota. It is closely connected with ecological integrity, the presence of the full complement of biota in all their diversity. Leopold challenged conventional wisdom on predators, on wetlands drainage, on what he called "slick and clean farming", on removing fence rows and windbreaks, on straightening streams, on attitudes toward weeds. And he became very angry at what he considered to be bad advice emerging from agriculture schools, agricultural experiment stations and the Cooperative Extension System, making him a very early critic of these institutions.

Stanley A. Temple in his afterword to this same book noted that, in contrast to the use of university experimental farms for field trials and farm tours, Leopold experimented on abandoned and depleted crop fields which became the UW Arboretum. His interest was not in new production methods but rather in new ideas for restoring farmland that had been degraded by traditional agriculture. He did similar field trials of restoration on private farms (Riley Game Cooperative, Faville Grove Wildlife Experiment Area, Coon Valley Erosion Project). His end product was not simply wildlife enhancement but better farming as well (which, indeed, is the very reason why it's basic to this project and its research direction). It is true that, as Temple writes, a portion of Leopold's concerns are no longer problems (such as planting steep erodible slopes, grazing in woods or wetlands, cropping poor soils, draining wetlands), but other things today are worse: agricultural intensity, "clean" farming (that is, farming which requires chemical input and mechanical practices just for appearances, farming which insists on the elimination of every single weed), chemical dependency, fewer pastures, livestock confinement, severe pollution, too much nutrient in the wrong places and not enough in the right places, too early crop harvesting (which destroys birds and habitat), the introduction of activism to the work of some ecologists (for example, through the emerging field of conservation biology). Finally, Leopold believed that the philosophy of colleges of agriculture and extension agencies must be turned inside out and that active management was far superior to passive protection.

A. L Herman in his book *Community, Violence and Peace: Leopold, Gandhi, MLK* (Electronic Book, 1999) sets Aldo Leopold and Rachel Carson in the same holistic tradition and in the same league with one another. He notes that Carson, who came a generation after Leopold, is actually responsible, through her very well known book *Silent Spring*, for many people listening to Leopold and his message today. So it is Carson the agricultural biologist (as in *Silent Spring*) who has gotten us to attend to the agricultural biologist Leopold. More particularly, it's the holistic Carson, the student of the science of relationships and community, who draws our attention to the holistic Leopold, equally a student of the science of relationships and community. Thanks in no small part to Rachel Carson, Leopold now stands as one of the most influential ethicists of the century.

Clay Schoenfeld in his article "Aldo Leopold Remembered" (*Audubon Magazine*, Vol.80, May 1978, pp. 28-37) gives us Leopold's "criteria of conservative land use", as Leopold himself presented it to his classes at UW, in Leopold's order of priority:

1. Maintain soil fertility
2. Preserve the stability of the water system
3. Yield useful products
4. Preserve the integrity of fauna and flora, with soil and water systems maintained only with the protection of flora and fauna.

This list of priorities suggests a very agriculturally-minded Leopold.

In her 1999 article, "Aldo Leopold and Environmental Citizenship" (in *Transactions of the Wisconsin Academy of Sciences, Arts and Letters*, Vol. 87, 1999, p. 26), Susan Flader recalls that Leopold considered husbandry (actually working with one's hands) the highest form of citizenship. Writing of a time more reminiscent of today, Leopold queried that, in a world with food shortages, what right have we to hold idle some of the best agricultural lands in our back yards? Or, in the contemporary context, what right have we to build on such soils and destroy their agricultural potential forever? Leopold says it would be better to turn them into gardens and learn to be good citizens (through the practice of husbandry). In a very modern way of thinking, Leopold told us that non-landowning citizens had responsibilities in their roles as consumers, for they could refuse to buy what he called "exploitation milk" from cows pastured on steep slopes and they could insist on "honest boards" from properly managed forests. All of this constitutes a predecessor of natural, organic and "green" certification. Leopold defined a "conservationist" as a citizen "who is humbly aware that with each stroke he is writing his signature on the face of his land". (p. 32)

In his 1982 paper "Aldo Leopold's Land Aesthetic and Agrarian Land Use Values", published in *Agriculture, Change and Human Values, Proceedings of a Multidisciplinary Conference*, October 18-21, 1982), Leopoldian analyst J. Baird Callicott characterized what he called Leopold's "land aesthetic" as more palatable than an ethic since Leopold focuses on assets and rewards rather than on obligations, self-sacrifice and restraint, emphasizing the private, not the public. Leopold (and Callicott) both hold that land has a great capacity to produce an aesthetic product for its owner.

Callicott further wrote in "The Metaphysical Transition in Farming: From the Newtonian-Mechanical to the Eltonian-Ecological" that how we produce food reflects our world-view - Classical Mechanics, Newtonian physics and chemistry. Callicott claims the ecological critique of industrial agriculture advanced by Wendell Berry and Wes Jackson was actually begun by Aldo Leopold, who was the first to recognize that ecology was a subversive science which undermined the foundations of the mechanical world-view, with profound implications for the future of farming. Leopold's ecological critique of the mechanical paradigm and its agricultural expression is especially pointed and acute. Callicott says that Leopold may have been the first critic of modern agriculture to characterize it as "industrial" or "factory-like", and to predict its short tenure.

Eric T. Freyfogle in his book *Justice and the Earth: Images of Our Planetary Survival* (University of Illinois Press, 1993) notes how unusual it was for its time (1930s and 40s) that Leopold didn't call for more government action, that he rejected a new government program, more taxes or more

government ownership, and that he presented as his solution "… a new attitude toward the land within each person who controlled a portion of the Earth's resources" (p. 181). Freyfogle quotes Leopold: "The real substance of conservation lies not in the physical projects of government, but in the mental processes of citizens".

J. Baird Callicott in his book, *In Defense of the Land Ethic* (State University of New York Press, 1989) focuses on the idea of a Leopoldian "land aesthetic", dependent on diversity. Callicott quotes Leopold: "(T)he extreme loss of biotic diversity and complexity is perhaps more insidious than chemical pollution or soil erosion. The latter are reversible processes … extinction is forever". (p. 245). He says Leopold's "land aesthetic", the basis of his land ethic, "calls attention to the psychic-spiritual rewards of maintaining the biological integrity and diversity of the rural landscape". (p. 245) Leopold wrote "If the private owner were ecologically minded, he would be proud to be the custodian of a reasonable proportion of such areas (wetlands, woodlots, native prairies, etc.) which add diversity and beauty to his farm…" (p. 239) (Also cited in *A Sand County Almanac*, p. 249).

In Thomas Tanner's book, *Aldo Leopold: The Man and His Legacy* (Ankeny, Iowa: Soil and Water Conservation Society, 1995), Curt Meine, Leopold's biographer, wrote in his essay "The Farmer as Conservationist: Leopold on Agriculture", of "Leopold's steadfast conviction that the farmer, for reasons both practical and philosophical, was the one to do conservation" (p. 43) and "Leopold never forgot that … it was the farmer who was on the front lines of conservation and had to be treated accordingly" (p. 44). Meine reports that Leopold wrote in an article in *American Forests*, "The crux of the land problem is to show that integrated use is possible on private farms, and that such integration is mutually advantageous to both the owner and the public". (p. 45). Meine reminds us of the many agricultural restoration projects that Leopold was involved in in the last two decades of his life, and calls attention to Leopold's early and sharp critique of industrial agriculture in general and of monoculture in particular: "… (T)he doctrine of private profit and public subsidy pushes constantly toward an extreme degree of crop specialization, toward the grouping of uses in large solid blocks. The idea of self-sufficient farm units is submerged. The interspersion of wild and tame crops approaches zero … (producing) a landscape just as monotonous as the inherent variability of soil will permit." (p. 48) This serves as a reminder that industrial agriculture dates from the pre- and not post-WWII era.

Arthur Hawkins in his essay "Return to Coon Valley", appearing in *The Farm as Natural Habitat*, edited by Dana and Laura Jackson, writes of Leopold's admission that only a small fraction of land, and the poorest fraction, would ever become public, so public acquisition was not the answer for land protection. Leopold wrote "The crux of the land problem is to show that integrated use is possible on private farms, and that such integration is mutually advantageous to both the owner and the public". (p. 64) In considering the Coon Valley Project and so many other farm restoration projects in which Leopold was involved, it would be a mistake to conclude that his interest and work was intended simply for wildlife benefit as an adjunct to farming, for it was no less intended for direct agricultural benefit over the long term. Sustainability was the business in which Leopold was engaged.

Dana and Laura Jackson in their "Introduction" to their book *The Farm as Natural Habitat: Reconnecting Food Systems With Ecosystems* tell the reader that their agricultural book is nothing less than a straightforward attempt to respond to and carry forward the insights of Aldo Leopold (p.4). They see Leopold as a scientist whose observations on farming and nature were "dead-on then and still accurate today".

They write "He wrote about the prairie ecosystem underlying current land uses, the incremental habitat loss caused by the industrialization of agriculture, the follies of land grant schools of agriculture (promoting exotic species and wetland drainage) and the awkward relationship between private land owners and government conservation programs … He points out the hope and the potential of conservation in farm country, where most of the losses of species and ecosystem services have been avoidable mistakes, not born of necessity".(p. 4)

Since Leopold was famous for his remark that a farm's landscape is a portrait of the farmer himself, the Jacksons note that today's farm landscape just as accurately portrays its ownership (or at least

control) by large multi-national agri-business corporations. Dana Jackson in her essay "The Farm as Natural Habitat" writes of Leopold's disapproval of the separation of natural areas, namely, unfarmed natural habitats, from farming, and Leopold's belief that conservation efforts on some parts of the land would fail if other parts were ruthlessly exploited. Leopold asked, "Doesn't conservation imply a certain interspersion of land uses, a certain pepper and salt pattern in the warp and woof of the land use fabric?" (p. 17).

A contemporary protégé of Leopold, Wes Jackson of the Land Institute in Kansas, comments on the importance of Leopold's view of the "land organism". Jackson sees this as a huge chunk or block of space/time involving an interaction amongst the living things and between the living things and the non-living things. For example, the chemistry of plant roots is at work in the making of soil, just as soil affects the plant roots. Jackson believes that the integrated whole is what we want to learn enough about so as to inform a research agenda, such as his own at the Land Institute, because this is the way ecosystems have been operating over the millions of years of evolution, rather than trying to understand agriculture in its own more reductionistic terms. In taking on Leopold's idea of an ethic as evolutionary, Jackson interprets Leopold that we need to be prepared to be constantly re-assessing one another's sense of what a given ethic means to each of us. Some may be less interested in components of the ecosystem for which they see no use, but Leopold made it clear that it's not whether it's useful or not but whether it's there. There is no justification for dismissing any part, so nature itself, Jackson (and Leopold) says, must be the measure, a notion diametrically opposed to most modern science.

In the video "Aldo Leopold: Learning from the Land", Leopold's daughter, Nina Leopold Bradley, tells us he changed the way we think about how we relate to the environment. As a person committed to the outdoors, to adventure, to writing and journaling, to observing and to recording all detail, Leopold knew early, at age 12 or 13, that he would become a forester and outdoorsman. As his thinking evolved, his evolution and maturing enabled him to change his mind about important issues, and he was committed to trying to understand how the land system worked, and where we fit in as part of it. He early became convinced that the land is a community, and that ethics is an extension of such ecological thinking.

Nina Leopold believes that her father's commitment to "The Shack" (a real chicken coop filled originally with waste-deep manure) and the slow and deliberative restoration of his sand county farm reveals much about who Leopold was.

Leopold restored The Shack with old boards from the nearby Wisconsin River, involving his whole family. His work involved restoring land to prairie, pine and oak, extensive and intensive tree-planting and bird-banding, woodcutting and burning (through each Wisconsin winter). Nina recalls that it was almost a game to see how simply the family could live at "The Shack", revealing not only Aldo Leopold the ecologist, naturalist and conservationist, but also Leopold the minimalist and devotee of the simple life.

Those familiar with Leopold can readily identify his famous books and some of his articles. Aside from *A Sand County Almanac and Sketches Here and There*, most people name his classic text *Game Management*, and perhaps other works. But some of Leopold's most direct observations on farming and agriculture made outside of *A Sand County Almanac* are contained in two much lesser known published articles: "The Farmer as Conservationist" (*American Forests*, June, 1939) and "The Outlook for Farm Wildlife" (*Transactions of the Tenth North American Wildlife Conference*, 1945). Both are now more widely available in the book *For the Health of the Land*, edited by J. Baird Callicott and Eric T. Freyfogle (Washington, D.C.: Island Press, 1999).

To read "The Farmer as Conservationist" is to read a 1930s version of Wendell Berry fifty years ahead of his time. In statements such as "When land does well for its owner, and the owner does well by his land; when both end up better by reason of their partnership, we have conservation. When one or the other grows poorer, we do not" and "It is customary to fudge the record by regarding the depletion of flora and fauna as inevitable, and hence leaving them out of the account. The fertile productive farm is regarded as a success, even though it has lost most of its native plants

and animals. Conservation protests such a biased accounting", we see the nearly unique (at least in contemporary times) thought of Wendell Berry's agrarian philosophy (see Chapter Three) and ecological application showing through. And "Overdrawing the interest from the woodlot bank is perhaps serious, but it is a bagatelle compared with destroying the capacity of the woodlot to yield interest" (p. 296) is a perfect exposition of the modern day philosophy of sustainability.

Leopold had a clear view of the problem that old ideas die hard, that ideas can in fact become dictators. He said

"We Americans have so far escaped regimentation by our rulers but have we escaped regimentation by our own ideas? I doubt if there exists today a more complete regimentation of the human mind than that accomplished by our self-imposed doctrine of ruthless utilitarianism. The saving grace of democracy is that we fastened this yolk on our own necks and we can cast it off when we want to. Conservation is perhaps one of the many squirmings which foreshadow this act of self-liberation." (p. 298).

"The landscape of any farm is the owner's portrait of himself … Conservation implies self-expression in that landscape, rather than blind compliance with economic dogma". (p. 316)

In Leopold's "The Outlook for Farm Wildlife", he recognized the central place of soil, the idea that chemically-based controls may be as dangerous as the pests themselves, and that "runaway populations are piling up in numbers and severity", an ode to pests and invasive species.

But nowhere was Leopold more prescient on agriculture than in his dichotomy of the farm as a food-factory (the industrial mindset, with salable products the result) vs. the farm as a place to live (an ecological mindset, with ecological balance the result, ultimately yielding salable products as well). On the industrial model, Leopold wrote "It was inevitable and no doubt desirable that the tremendous momentum of industrialization should have spread to farm life. It is clear to me, however, that it has overshot the mark, in the sense that it is generating new insecurities, economic and ecological, in place of those it was meant to abolish. In its extreme form, it is humanly desolate and economically unstable. These extremes will someday die of their own too much, not because they are bad for wildlife, but because they are bad for farmers."

Leopold's essays in the *Wisconsin Agriculturist and Farmer* in the early 1940s also focus on his involvement in agricultural thought and practice from an ecological perspective. Throughout these formerly obscure essays Leopold traces a path to successful farming and successful wildlife conservation, showing how the two can be made to work to favor one another. (The evolution of Leopold's thought in this area is now much more accessible to the reader thanks to the recent publication by Island Press of *For the Health of the Land: Previously Unpublished Essays and Other Writings of Aldo Leopold*, edited by J. Baird Callicott and Eric T. Freyfogle.)

A philosophical summary of these thoughts on the words and ideas of Aldo Leopold comes from *The Sand Country of Aldo Leopold, A Photographic Interpretation* by Charles Steinhacker and Susan Flader (edited by Anthony Wolff for Sierra Club Books, San Francisco, 1973). Wolff writes in his Introduction:

"*A Sand County Almanac* is … neither art nor science, but both inseparable … With Aldo Leopold's brief, productive tenancy, the isolated sand counties became the junction of two main currents in the conservation mainstream. One was the undying aesthetic – religious nature – passion of the 19th century Romantics and Transcendentalists … The other was the methodical dispassionate ecological research of emergent science. Leopold's life and work brought the two together in a synthesis for all seasons … (Leopold's) land ethic applied scientific reason to human values, without recourse to external authority, raising a secular, ecological standard to which even we of little faith can repair, and by which we can survive … Leopold's gentle manifesto (*A Sand County Almanac*) mediates the schism between science and humanism that has been diagnosed as symptomatic of our century".

In this same work, Susan Flader writes "His acquisition of a worn-out abandoned sand farm in 1935 initiated a different relationship with the land, at once more personal and more universal".

(p. 8) She continues "(F)rom that experience evolved a sense of place that required a word richer than land. He called it country". (p. 8)"There is much confusion between land and country", Leopold himself wrote; "Land is the place where corn, gullies and mortgages grow. Country is the personality of land, the collective harmony of its soil, life and weather". (p. 9).

Flader reiterates that Leopold spoke for a biotic view of land. But she says the word "biota" would not do for him, for it was "one of those cold and clammy fictions by which science seeks to separate truth from beauty". (p. 9) She notes that P. D. Ouspensky provided Leopold with the concept of the "numenon", the inner meaning or imponderable essence of a thing, as contrasted with the "phenomenon", or outward appearance (p. 10).

For Leopold, however, it was wildlife (i.e., biota) which fused the various aspects of land into country (p. 10). He was not, however, always as enamored of the role of people. With reference to tourists at Yosemite, Leopold said "I can't say whether it was more pleasure to see Yosemite than pain to see the way most people see it. It's a struggle for me sometimes to play ball with the crowd at all". (p. 9).

Concerning the evolution of his ecological thought, Flader writes that the sand counties of Wisconsin birthed the ecological ideas of John Muir, including the freedom of limits, and the historical evolution ideas of Frederick Jackson Turner (i.e., the requirement of American institutions to adapt themselves to the changes of an expanding people, and the driving force of the existence of free land which exerted a transforming influence on the nation). Turner affirmed the pioneer values. Muir questioned them, as did Leopold. Leopold and Turner became nearly immediate neighbors on Van Hise Street in Madison, Wisconsin. (The University of New Hampshire's distinguished ecologist and Vice President for Research, Dr. John Aber, also once lived on Van Hise.) Leopold experienced the sand country at the end of his life, as Turner and Muir did at the beginning of theirs, and drew from it values for a new generation. Flader claims that the new science of forestry, and Aldo Leopold's attraction to it, were a direct response to Frederick Jackson Turner as "original social adjustments" made in response to the end of the frontier. Leopold himself was perfect for this new profession because he combined a pioneer spirit with social consciousness and a love of nature with managerial acumen. Leopold wrote "The real end is a universal symbiosis with land, economic and aesthetic, public and private". The "shack experience" is what really gave Leopold his land ethic. It became a refuge, his refuge, from "too much modernity". Finally, Leopold again: "We of the minority see a law of diminishing returns in progress; our opponents do not".

In her vast research on Leopold, Susan Flader also tells us that Leopold juxtaposed "conservationist" and "citizen" as one and the same. And Leopold wrote, she tells us, that the best definition of either is written not with a pen but with an axe (i.e., not by what we say but by what we do). Leopold tells us it is a matter of what a man thinks about while chopping or while deciding what to chop. The conservationist (i.e., citizen) is one who is humbly aware that with each stroke he is writing his signature on the face of the land. Signatures, of course, differ, Leopold said, whether written with axe or pen, and that is as it should be. We all must, therefore, ask ourselves the question, What signature will we leave, as conservationist and, more generally, as citizen?

APPENDIX II: SELECTED READINGS

On Aldo Leopold:

A Sand County Almanac and Sketches Here and There by Aldo Leopold (New York: Oxford University Press, 1949)

Thinking Like a Mountain: Aldo Leopold and the Evolution of an Ecological Attitude Toward Deer, Wolves and Forests by Susan Flader (Madison: The University of Wisconsin Press, 1974).

Aldo Leopold: His Life and Work by Curt Meine (Madison: The University of Wisconsin Press, 1988).

For the Health of the Land by Aldo Leopold: Previously Unpublished Essays and Other Writings, Edited by J. Baird Callicott and Eric Freyfogle (Washington, D.C.: Island Press, 1999).

The River of the Mother of God and Other Essays by Aldo Leopold, Edited by Susan Flader and J. Baird Callicott (Madison: The University of Wisconsin Press, 1991).

The Essential Aldo Leopold: Quotations and Commentaries by Curt Meine and Richard L. Knight (Madison: The University of Wisconsin Press, 1999).

Aldo Leopold: A Fierce Green Fire by Marybeth Lorbiecki (Helena, Montana: Falcon Books, 1996).

Aldo Leopold and the Ecological Conscience by Richard L. Knight and Suzanne Riedel (New York: Oxford University Press, 2002).

Aldo Leopold: The Professor by Robert A. McCabe (Amherst, Wisconsin: Palmer Publications, Inc., 1987).

Community, Violence and Peace: Leopold, Gandhi, *MLK* (Electronic Book, 1999).

Aldo Leopold: The Man and His Legacy (Ankeny, Iowa: Soil and Water Conservation Society, 1995).

The Sand County of Aldo Leopold: A Photographic Interpretation by Charles Steinhacker and Susan Flader (San Francisco: Sierra Club Books, 1973).

Marshland Elegy by Aldo Leopold (Madison: Wisconsin Academy of Science, Arts and Letters, 1999).

Nature's Kindred Spirits: Aldo Leopold, *Joseph Wood Krutch, Edward Abbey, Annie Dillard and Gary Snyder* by James L. McClintock (Madison: The University of Wisconsin Press, 1994).

Companion to a Sand County Almanac: Interpretive and Critical Essays, Edited by J. Baird Callicott (Madison: The University of Wisconsin Press, 1987).

In Defense of the Land Ethic by J. Baird Callicott (Albany: State University of New York Press, 1989).

Beyond the Land Ethic by J. Baird Callicott (Albany: State University of New York Press, 1999).

Of Things Natural, Wild and Free: A Story About Aldo Leopold by Marybeth Lorbiecki (Minneapolis: Carolrhoda Books, Inc., 1993).

Voices in the Wilderness: American Nature Writing and Environmental Politics by Daniel G. Payne (Hanover, New Hampshire: University Press of New England, 1996).

On Agrarian Values and Practice:

Wendell Berry and the Agrarian Tradition: A Common Grace by Kimberly K. Smith (Lawrence: University Press of Kansas, 2003).

Sustainability and Spirituality by John E. Carroll (Albany: State University of New York Press, 2004).

Justice and the Earth: Images of Our Planetary Survival by Eric T. Freyfogle (Champaign-Urbana: University of Illinois Press, 1993).

Bounded People, Boundless Lands: Envisioning a New Land Ethic by Eric T. Freyfogle (Washington, D.C.: Island Press, 1998).

The Fate of Family Farming: Variations on an American Idea by Ronald Jager (Hanover, New Hampshire: University Press of New England, 2004).

Great Possessions: An Amish Farmer's Journal by David Kline (San Francisco: North Point Press, 1990).

The Agrarian Roots of Pragmatism, Edited by Paul B. Thompson and Thomas C. Hilde (Nashville, Tennessee: Vanderbilt University Press, 2000).

The Good in Nature and Humanity, Edited by Stephen R. Kellert and Timothy J. Farnham (Washington, D.C.: Island Press, 2002).

The Essential Agrarian Reader: The Future of Culture, Community and the Land, Edited by Norman Wirzba (Lexington, Kentucky: The University Press of Kentucky, 2003).

The New Agrarianism: Land, Culture and the Community of Life, Edited by Eric T. Freyfogle (Washington, D.C.: Island Press, 2001).

Small is Beautiful: Economics As If People Mattered by E. F. Schumacher (Point Roberts, Washington: Hartley and Marks, Publishers, 1999). (Originally published in 1973.)

What Are People For? By Wendell Berry (San Francisco: North Point Press, 1990). (The reader is directed to the entire body of Wendell Berry's work, nonfiction, fiction and poetry, the quintessence of agrarianism in modern America, for a deeper insight into the nature of agrarian thought.)

The Contrary Farmer by Gene Logsdon (White River Junction, Vermont: Chelsea Green Publishing Company, 1994). (The reader is directed to all of the work of Gene Logsdon for insight into the practical application of agrarian thought.)

On Sustainable Agriculture:

A Green and Permanent Land: Ecology and Agriculture in the Twentieth Century by Randall S. Beeman and James A Pritchard (Lawrence, Kansas: University Press of Kansas, 2001).

Holistic Management: A New Framework for Decision-Making by Allan Savory, with Jody Butterfield (Washington, D.C.: Island Press, 1999).

The Farm as Natural Habitat: Reconnecting Food Systems with Ecosystems, Edited by Dana and Laura Jackson (Washington, D.C.: Island Press, 2002).

Family Farming: A New Economic Vision by Marty Strange (Lincoln: The University of Nebraska Press, 1988).

The Real Dirt: Farmers Tell About Organic and Low-Input Practices in the Northeast, Edited by Miranda Smith and Elizabeth Henderson (Burlington, Vermont: Northeast Region Sustainable Agriculture Research and Education, 1998).

Reconstructing Conservation: Finding Common Ground, Edited by Ben A. Minteer and Robert E. Manning (Washington, D.C.: Island Press, 2003).

The Power of Duck by Takao Furuno (Sisters Creek, Tasmania, Australia: Tagari Publications, 2001).

The Next Green Revolution: Essential Steps to a Healthy, Sustainable Agriculture by James E. Horne and Maura McDermott (New York: Haworth Press, Inc., 2001).

Larding the Lean Earth: Soil and Society in Nineteenth Century America by Steven Stoll (New York: Hill and Wang, 2002).

You Can Farm: The Entrepreneur's Guide by Joel Salatin (White River Junction, Vermont: Chelsea Green, Distributor, 1998).

Family Friendly Farming by Joel Salatin (Swoope, Virginia: Polyface, Inc., 2001).

Why Grass-Fed is Best! The Surprising Benefits of Grass-Fed Meat, Eggs and Dairy Products by Jo Robinson (Vashon, Washington: Vashon Island Press, 2000).

Sustainable Vegetable Production From Start-Up to Market by Vernon Grubinger (Ithaca, New York: Natural Resource, Agriculture and Engineering Service, 1999) (NRAES Publication #104)

Greener Pastures on Your Side of the Fence, 4th Edition, by Bill Murphy (Colchester, Vermont: Arriba Publishing, 1998).

Grass Productivity by Andre Voisin (Washington, D.C.: Island Press Edition, 1988). (originally published in 1959.)

Changing the Way America Farms: Knowledge and Community in the Sustainable Agriculture Movement by Neva Hassanein (Lincoln, Nebraska: University of Nebraska Press, 1999).

Farming in Nature's Image: An Ecological Approach to Agriculture by Judith D. Soule and Jon K. Piper (Washington, D.C.: Island Press, 1992).

With an Ear to the Ground: Essays on Sustainable Agriculture by Vern Grubinger (Burlington, Vermont: Northeast Region Sustainable Agriculture Research and Education, 2004).

Silent Spring by Rachel Carson (Boston: Houghton Mifflin, 1962).

Rural Development: Putting the Last First by Robert Chambers (New York: Longman, 1983).

The One Straw Revolution: An Introduction to Natural Farming by Masanobu Fukuoka (Emmaus, Pennsylvania: Rodale Press, 1978).

Land Grant Universities and Extension: Renegotiating or Abandoning a Social Contract by George R. McDowell (Ames: Iowa State University Press, 2001)

The New American Farmer: Profiles of Agricultural Innovation (Washington, D.C.: USDA-SARE, 2001)

The Curse of American Agricultural Abundance: A Sustainable Solution by Willard W. Cochrane (Lincoln: University of Nebraska Press, 2003)

Grassland: The History, Biology, Politics and Promise of the American Prairie by Richard Manning (New York: Penguin Books, 1995)

People Sustaining the Land: A Vision of Good Science and Art by Cynthia Vagnetti and Jerry DeWitt (Privately published by the authors at 2605 NW 5th Street, Ankeny, Iowa 50021, 2002)

On the New England Region:

Changes on the Land: Indians, Colonists and the Ecology of New England (New York: Hill and Wang, 1983).

Ecological Revolutions: Nature, Gender and Science in New England (Chapel Hill: University of North Carolina Press, 1989).

Common Lands, Common People: The Origins of Conservation in Northern New England (Cambridge, Massachusetts: Harvard University Press, 1997).

A Long Deep Furrow: Three Centuries of Farming in New England (Abridged) by Howard S. Russell (Hanover, New Hampshire: University Press of New England, 1982).

Natural States: The Environmental Imagination in Maine, Oregon and the Nation by Richard W. Judd and Christopher S. Beach (Washington, D.C.: Resources for the Future, 2003).

Reflections in Bullough's Pond: Economy and Ecosystem in New England by Diana Muir (Hanover, New Hampshire: University Press of New England, 2000).

Hands on the Land: A History of the Vermont Landscape (Cambridge, Massachusetts: MIT Press, 2000)

Kennebec: Cradle of Americans by Robert P. Tristram Coffin (Camden, Maine: Down East Books, 1965) (Originally published in 1937.)

Landscape With Figures: Nature and Culture in New England by Kent C. Ryden (Iowa City: University of Iowa Press, 2001).

Periodicals:

Two of the finest periodical sources available today emanating from and describing agrarian thought and practice are *Farming Magazine* (Friends of the Agrarians, Box 85, Mt. Hope, Ohio 44660) and the journal *Agriculture and Human Values* (Department of Philosophy, University of Florida, Gainesville, Florida).

Two of the strongest periodicals focused on New England and Northeastern agrarian thought and sustainable agriculture in practice are the *Maine Organic Farmer and Gardener* (six times per year from the Maine Organic Farmers and Gardeners Association, P.O. Box 170, Unity, Maine 04988), and *The Natural Farmer* (quarterly from The Natural Farmer, 411 Sheldon Road, Barre, Massachusetts 01005).

About the Author

John E. Carroll, Professor of Environmental Conservation at the University of New Hampshire for over thirty years, teaches and does research on ecological ethics and values, land ethics and agrarian values, and applied environmental philosophy, all with a sharp eye to agricultural sustainability. He is the author of ten books, most recently *Sustainability and Spirituality* (State University of New York Press, 2004). A Kellogg Foundation National Fellow, he has also edited *The Greening of Faith* (University Press of New England), *Ecology and Religion* (Franciscan Press), *Embracing Earth* (Orbis), among other books, and contributed three articles to the *Encyclopedia of New England* (Yale University Press). He holds the Ph.D in Resource Development from Michigan State University, and resides in Durham, New Hampshire with his wife Diana.

About the Illustrator

Karen Busch Holman has illustrated the children's books *G is for Granite: a New Hampshire Alphabet Book*, *Primary Numbers: a New Hampshire Numbers Book*, both written by Marie Harris and published by Sleeping Bear Press. She provided an illustration for *P is For Passport: a World Alphabet Book* also published by Sleeping Bear Press. Karen's artwork was selected for the recently released New Hampshire "Heirloom Birth Certificate." She has created illustrations for numerous publications, as well as the New Hampshire 4-H Centennial poster and limited edition.

Karen is represented by Grantham Stonewall Gallery in Grantham, New Hamphire. She lives in East Andover, NH with her husband Jeff, and two boys, Tyler and Todd. She teaches private art lessons and paints in her studio.

Ongoing research at the University of New Hampshire Agricultural Experiment Station in the field of sustainable agriculture, including the role of intensive rotational grazing in future New England food supply, will lead to a sequel to this book. This sequel will focus on the food security prospects of New Hampshire, Massachusetts, Vermont and Maine.

"Conservative agriculture is agriculture which conserves. It is agriculture which accepts and recognizes the organic nature of agriculture rather than an industrial model. It is an agriculture which reflects its base in ecology, its biotic quality. It is agriculture which produces food for local people, which is predicated on local production for those people, wherever it occurs. It is agriculture which provides security of food supply. It is agriculture embedded in a land ethic."

John E. Carroll

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