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"A green and permanent land": agriculture in the age of ecology, 1935-1985

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"A green and permanent land":

Agriculture in the age of ecology, 1935-1985

by

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INTRODUCTION

"The genuine pain that keeps everything awake
is a tiny, infinite burn
on the innocent eyes of other systems."

- Federico Garcia Lorca[1]

"Now I am terrified at the Earth, it is that calm and patient
It grows such sweet things out of such corruptions . . . . "

- Walt Whitman[2]

In the American Midwest, that fabled "breadbasket of the world," persistent rains in the summer of 1993 brought catastrophic floods that drenched the vast agricultural lands of the Mississippi Valley. As floodwaters buried the usually verdant fields underneath lakes of murky water, environmentalists, agriculturists and social critics began to ask why yet another "500 year" flood had ravaged the nation's heartland. While these observers agreed that an unusual climatic pattern precipitated the flooding, critics of past land and water management policies also cited human contributions in exacerbating the Great Flood of 1993.

Assailing what they perceived to be the heavy-handed technology and misguided cultural values and political policies that over decades attempted to control the Mississippi and its sprawling tributaries, scientists, policy makers, societal commentators, environmental activists, and ordinary citizens decried the environmental results of "managing" the mighty river system. Antagonists of the Corps of Engineers' ambitious flood control projects lamented the fact that these river control systems had failed to take

into account the overall interrelationships between flood diversion and the ecological sanctity of the waters and the land that surrounds them. Though the dikes, levies, and dams effectively impounded and diverted water and promoted year-long river traffic, as well as protected fertile farms in river valleys, the manifold flood control projects also had caused a virtual "channelization" of the basin. This manipulation of the waters damaged ecologically vital wetlands, river ecosystems, and the general ecological health of the rivers and the biotic communities that surround them. Furthermore, according to challengers of past water management, the flood control plan worked at odds with itself, with upstream flood diversion projects actually increasing the incidence of flooding down the river. Critics of the flood control effort likened the channelization of the Mississippi system to the sluice-mining operations of American West in the nineteenth century, when rapid flowing water-cannons assaulted, gouged and gnawed away the soil, polluted the rivers and created vast wastelands of poisoned land and water.[3]

Numerous other ecological "lessons" emerged into the public spotlight after the flood of 1993. Agricultural researchers and practicing farmers found that land farmed under newly implemented "no-till" and "minimum-tillage" crop systems had fared relatively well against the erosive forces of the flooding. Land enrolled in the federal Conservation Reserve Program (CRP) and the Wetlands Reserve Program (WRP) in the previous eight years also helped absorb flood water and stem the flow of topsoil from some of the nation's most productive farm regions. Proponents of the environmental aspects of the 1985 and 1990 federal farm legislation that created these conservation programs called for increasing the amount of land enrolled in federal soil conservation programs and protection of CRP lands from eventual tillage. Critics of past policy also rallied for increased federal support for retiring farmland in flood-prone areas for the purpose of establishing wetlands to help lessen flood damage and provide habitat for fauna and flora.[4]

The agricultural-environmental lessons of the flood of 1993 and recent federal agricultural-environmental legislation are two examples, among many, of how ecological thought has recast the theory, practice, and legislation of agriculture, as well as land and water policy since the 1930s in the United States. Agriculture has been particularly infected with the ecological ideal. While many post-World War II Americans have defined or participated in agriculture in terms of token indulgences in mythical agrarianism or, more importantly, as the beneficiaries of inexpensive and abundant food, increasingly the agricultural community and the general public have tried to reassess the nation's food production regime in terms of consumer health, environmental protection of humans and wildlife, and long-term "sustainability" of the food supply. Farmers, politicians and agribusiness operatives, formerly concerned, it has seemed, principally with the issues as production, marketing and prices, were forced to address the environmental consequences of their activities, as have theorists and researchers within the agricultural and environmentalist communities.[5]

The story of how ecological thought has altered agricultural theory, practice and policy since the 1930s in an important and underdeveloped chapter in the agricultural, environmental and technological history of the United States. This particular account of agriculture in the "Age of Ecology" is primarily a history with ideas at its center, yet it is also a tale of colorful personalities and changed institutions, as well as the story of the introduction of specific farming practices and policies. A central theme is that agricultural issues were fundamental, if not central, in the rise of the environmental movement of the United States.

From the mid-1930s to the present, proponents of what can be labeled "ecological agriculture" were at the vanguard in communicating and sustaining to the general public, what would now be called "environmental" messages, framed as warnings and advice

laced with ecological thought. Thus, as culture hearths for the ecological ideal, the movements of ecological agriculture have served as crucial elements in the coalescence of the environmental ethic. Furthermore, the history of ecological agriculture illustrates changing American conceptions over the past sixty years towards farming, technology, and environmental health. Though we may never learn many lessons from history, the hope here is that this work will help foster a better understanding of the centrality of food production in the history of American civilization, and how, as a part of culture, agriculture has shaped and been shaped by its physical and intellectual environment. In addition to my lifetime exposure to both production agriculture and the cities that farming sustains, a line from a book read as an undergraduate prompted this study. Summing his thoughts on the Jewish holocaust of World War II, philosopher Richard Rubenstein extended the lesson of that tragedy to the possible fate of contemporary urban culture decoupled from its resource base in the hinterlands. "Even the richest and most powerful city," wrote Rubenstein, "can only survive as long as the umbilical cord to the countryside is not cut."[6]

Writing in 1975, Rubenstein obviously linked a human crisis that had happened thirty years prior to the sense of societal and ecological crisis in the 1970s. Indeed, Americans have always responded to a sense of crisis within their culture. Since we speak here of a crisis of the land, of the soil, and the people who rely on its bounty, it must be noted that since colonial days self-appointed American Jeremiahs have lamented the deterioration of the soil, warning that civilization was at risk because of the ignoble husbandry practiced by misguided American farmers, who virtually, in the classic phrase, "raped" the wealth of the soil for quick yet fleeting rewards. In the Depression and Dust Bowl depredations of the 1930s, the threat to civilization from losses of topsoil and other environmental distress became a particularly pressing reality, forcing Americans to understand the place of agriculture within the overall biological and social environment.

Throughout the late 1930s and 1940s champions of new agriculture planned fundamental changes in the agricultural system based upon the concept of societal permanence and on the all-encompassing new science and ethic of ecology. Looking to history and to other lands for lessons regarding the construction of a proper farming regime, proponents of what was labeled "permanent agriculture" sought to single-out villainous activities that had led to abuse of the soil in the past, and to promote methods that might foster permanence in agriculture and society. Citing cultural problems as the source of injurious husbandry, advocates of the new ecological agriculture lambasted the inappropriate use of science and technology, greed, ignorance and poverty in the farming community, poor leadership from the "agricultural establishment" (the USDA, land-grant colleges and what would come to be labeled agribusiness), and ill-conceived governmental policies that had contributed to the soil crisis threatening the future of American civilization. Invoking the spirit of interdependence that was so much a feature of the interwar years, and basing their claims on the emerging lessons provided by scientific and philosophical ecologists, critics of past agricultural practices formed an incohesive but definable group devoted to "permanent agriculture." Permanent agriculture's ranks included professional ecologists and ecological thinkers, governmental leaders, social observers, and actual farmers, who proffered various brands of ecological agriculture in the 1930s through the early 1950s. Though the programs and scope of permanent agriculture varied with the number of individuals latching onto the idea, the ultimate goal of all was to create a civilization that might last for scores of centuries in a climate of freedom, abundance, health and peace.

As a phenomenon, the concept of permanent agriculture grew from several sources and enjoyed a modicum of acceptance throughout the 1940s. Rejecting the mythology of rugged individualism, the loosely organized construction of ideas emanating from individuals, such as Rexford G. Tugwell and Hugh H. Bennett, centered on mutual co-operation among science, government, and farmers for the establishment of a planned and

permanent agriculture. This new type of farming was conceived as part of a broad recasting of society which integrated lessons from seemingly disconcerted sources. In other words, agriculture was no longer viewed as an independent pursuit of the farmer; the new agriculturist was to be made cognizant of the interrelations between farming, industry, democracy, and the life of the soil. Stalwarts of permanent agriculture looked for "balance" amid what appeared to be a chaotic world.

This quest for balance hinged upon the lessons provided by the ecologists. Ecology dictated both the basis of permanent agriculture and its specific practices. As life consisted as a delicate web of interelatedness, farmers had to find a new type of husbandry that respected and emulated "natural" conditions. Throughout the 1940s numerous schemes for an organic, ecologically based agriculture reached the public realm. The early "organic" farmers sought to tailor their crop and livestock raising systems to the perceived " balance of nature," emphasizing the use of humus-building composts and green manures and warning against the unchecked acceptance of mechanization and the introduction and widespread use of manufactured agricultural chemicals. They also posited questions about the ecological and economic portents of the then-evolving corporate agribusiness regime.

Yet ecology meant more to permanent agriculture than composting or biological pest control. For the advocates of ecological agriculture in the 1930s and 1940s "ecology" had an expansive definition. In the permanent agriculture milieu that emerged strongly in the 1940s, ecological thought formed the basis for a new type of civilization which nurtured bonds between humans and affected the more harmonious operation of society. The various schemes, or systems, of ecological agriculture promised to perpetuate the pastoral, or "Jeffersonian" ideal, and bring economic abundance, agricultural-industrial balance, and general prosperity to the world economy, thus ushering in an era of sustained prosperity, societal harmony, ecological stability, individual health and worldwide peace.

Despite the somewhat outlandish claims offered by the proponents of permanent agriculture, the leaders and practitioners of the new husbandry had an amazing degree of success in communicating their ideas to the general public by the end of World War II. By co-mingling mass publicity techniques, ecological messages, and the above-mentioned benefits of what was brandished "permanent agriculture," individuals, such as the agrarian iconoclast Louis Bromfield and experimental farmer-author Edward Faulkner, as well as organizations, such as the conservation group Friends of the Land, were able to articulate a message of hope in a time that historians have described as and age of anxiety and doubt. By linking the soil crisis to the human crisis, the new school of ecological agriculture reached the American public with a fundamental and widely dispersed inculcation in the far-ranging lessons of ecology two to three decades before the alleged rise of "environmentalism" in the 1960s.

Ecological agriculture's first stage, permanent agriculture, presented a challenge to entrenched practices of American agriculture. The optimistic claims offered by the leading exponents of the new husbandry were quickly overshadowed by a process of co-option by the agricultural establishment. Soil conservation also became inextricably tied to the contentious and oft-changing federal price and production programs. Furthermore, representatives of the land-grant colleges and agribusiness challenged by ecological agriculture often adopted tamed-down proposals of what Bennett, Bromfield, and others proposed. When it appeared profitable and popular to embrace soil conservation, then, researchers, agricultural corporations, legislators, and farmers looked favorably upon aspects of the often intangible permanent agricultural program. But the utopian, social reformist and "holistic" elements of permanent agriculture, armed by the "subversive science" of ecology, did not remain entrenched in the public imagination. Refusal to accept the wholesale prescriptions of the ecological-agriculturists resulted in

part from the natural conservatism of American's agricultural community, and also from agricultural scientists who opposed "organic" farming, and agribusiness, particularly representatives of the agricultural chemical industry. The drive for a permanent, ecological agriculture also suffered from a general shift in public concern away from the ideas of conservation to the Cold War era of high production and "big" farming.

Still, many of the tenets of the permanent agriculture movement after its halcyon years of the 1940s. Legislation devoted to preventing soil conservation became entrenched during the period from the creation of the Soil Conservation Service in 1935 through the federal "soil bank" program of the 1950s. Permanent agriculture helped establish the efficacy and long-term survival of the soil conservation idea, and inaugurated an ecological view of the land, a task so often attributed to a single individual, Aldo Leopold. The more idealistic visions of permanent agriculture became embedded in a flourishing subculture of organic farmers and social experimenters, such as the socialist and back-to-the-lander Scott Nearing. While Nearing and others from the "biodynamic" school of farming helped keep alive the agroecological tenets of permanent agriculture, traditional scientists and conservationists voiced a persistent concern for what they thought to be an ongoing pattern of ecological abuse in American farming practices.

Lingering concerns over the ecological effects of agriculture exploded with the publication of Rachel Carson's Silent Spring in 1962. Throughout the 1960s and 1970s a new soil threat appeared evident to a broad range of agricultural commentators and observers. While concerns over pesticide poisoning of land and water were major areas of discussion, the new soil crisis also linked American agriculture to the Neo-Malthusianism of the period. Critics of American agricultural practices assailed the perceived unquestioning faith that Americans held in technology and the "big" farming that it produced, claiming that misguided farmers were destroying the soils and waters, and that the postwar technological revolution in agriculture (including the "green revolution" and

later biotechnology) had led to the harm of the physical environment of the countryside and the demise of rural culture.

Chastising the land-grant colleges, the USDA, and agribusiness for their responsibility in creating the conditions that threatened agriculture and the very survival of humanity, the new soil messiahs offered messages that became important in the general environmental awakening of the 1960s. Because agriculture is such a prominent and pervasive human alteration of the ecology of the planet, agricultural issues were and are fundamental in the environmental crusade. The rise of sustainable agriculture linked farming to a broader quest for an ecological vision in the 1960s through the 1980s. Echoing the sentiments for a holistic, environmentally sensitive and "durable" form of husbandry, a new breed of agricultural theorists and practitioners began to call for a shift to an ecological form of agriculture, a mass of ideas which eventually coalesced in various forms under the broad rubric of "sustainable agriculture."

The rise of sustainable agriculture can be likened in many ways to the establishment of a religion. While the fundamental concept of permanence (eternal life) was central to the plans for a new ecological agriculture, various scientist-prophets and their respective sects had variations of what ideas and methods would lead to the "salvation" of agriculture and civilization. These individuals and schools had ecology at their center, whether they were called "permaculture" or "perennial polyculture." Like their predecessors in the permanent agriculture era, the proponents of sustainable agriculture sought to create farming systems that "respected" and emulated "nature." These systems emphasized various "organic" farming methods, including composting, integrated pest control, new types of tillage, energy efficiency, biodiversity, and increasingly, research in plant breeding and biotechnology.

The benefits of implementing the new agriculture would be multifold, according to advocates. They included creating a stable, healthy supply of food for a burgeoning

population, creating a better ecological climate that promoted maximum diversity of all species, and helping foster a sustainable society that encouraged a sense of community (especially rural community), social equity, a balanced economy, and ecological responsibility. Defining and communicating the ideas of what came to be called (by the mid-1970s) "sustainable agriculture" was obviously crucial to achieving its implementation.

Proponents of sustainability successfully communicated their ideas in a number of ways. Attacks on the "establishment" that created a sense of crisis and betrayal were coupled with appeals to the communitarian, counter-culture features of organic farming and the decentralized lifestyle. Also, messengers of ecological agriculture were able to link their ideas to the environmental, energy and farm crises of the 1970s and early 1980s. As their ideas took hold, various members of the sustainable agriculture camp enjoyed literary success, speaking invitations and considerable media attention, which in turn brought legitimacy to their ideas, increased funding, and the opportunity to establish an institutional framework of research and education programs. By the mid-1980s the champions of sustainable agriculture had succeeded in communicating and establishing their ideology throughout the United States. Agricultural issues helped nourish a rapidly maturing environmentalism in the 1980s, and sustainability became a household word. Academic and governmental programs began to include sustainable agriculture and farmers started to adopt some or all of the ideas of ecological agriculture. By the end of the 1980s it was nearly impossible to pick up a farm related publication without noticing pervasive references to environmental issues. Certainly, by 1985, agriculture had truly entered the Age of Ecology.

As the ideas of ecological agriculture took hold in the general farm population, agribusiness interests, academic researchers, and farmers formerly hesitant or antagonistic towards discussing or confronting environmental issues suddenly jumped on the

bandwagon of "sustainability." In this ongoing episode of co-option, the agricultural establishment began to embrace parts of the sustainable agriculture agenda, in the process they redefined the entire complex of ideas in ecological farming, often subverting canonical concepts with watered-down versions of a sustainable agriculture that would be tailored to their specific agribusiness and academic interests. For example, agricultural chemical corporations began to champion no-till agriculture, while at the same time insisting that their products were crucial to a "green" future.

Regardless of this co-option, American agriculture was unquestionably altered by the crusade for sustainable agriculture. Conservative farmers who formerly looked with disdain towards their "organic" counterparts have increasingly embraced the idea that agriculture is a crucial part of the planet's delicate ecology. In the realm of public policy, the influence of ecological agriculture is pervasive. Sustainable agriculture research has been, and is, supported by the USDA, the land grant colleges, and the United Nations. In 1985, the United States Congress passed the Food Security Act, which provided for further research into organic farming, and the establishment of the Conservation Reserve Program, a major piece of agricultural-environmental legislation.

While the ideas of sustainable agriculture were effectively communicated, many scientists, agribusiness representatives, and farmers remained hostile to ecological agriculture. Furthermore, persistent concerns regarding agriculture and the environment remain, particularly the potential effects of population pressures and the role of biotechnology in the agroecological environment. Still, as the history of ecological agriculture from the 1930s to the present illustrates, society is coming to terms with vulnerability of the food supply and the necessity to create what one of the great champions of permanency, Rexford G. Tugwell, envisioned in 1940 as "a green and permanent land."

A brief note on method, sources and other research related to this topic. Though they shared the idea of an ecologically based agriculture, the permanent agriculture and the sustainable agriculture movements existed in two distinct and differing periods in American history. Thus the story of agriculture in the Age of Ecology is roughly divided into two sections to help highlight these different epochs. Though the idea of ecological agriculture existed prior to 1935, and persisted after 1985, this rough 50-year period provides convenient bookends (the establishment of the Soil Conservation Service in 1935 and the passage of the Food Security Act of 1985) for an expansive subject. Sources include archival material from agricultural-related collections in the National Archives and Presidential Libraries and material from the Archives of American Agriculture, Parks Memorial Library, Iowa State University. Other primary sources include published material in the periods under question, including monographs, journals, periodicals, and governmental publications and documents. References to secondary material are used to provide historical context.

While a few putative stabs have been taken by historians and others in writing the history of "sustainable agriculture," the hope here is to provide an intellectual and social framework suggesting how ecological ideas changed agricultural theory, practice, and policy, and how agriculture shaped and was shaped by the rise of an environmental ethic in the United States. Thus it is not a history of "great men" in sustainable agriculture and organic farming, nor is it a detailed account of specific farming practices. Instead, the purpose is to seek the intellectual underpinnings, rhetorical promises, and policy issues in the evolving historiography of ecological agriculture in the hope that it will help lead a broader understanding of American society and the soil resource upon which it depends.[7]

Notes

1. Federico Garcia Lorca, Poet in New York, trans. Greg Simon and Steven F. White (New York: Noonday Press, 1988), 73. Quotation originally penned by Garcia Lorca in New York, 1929-1931.

2. Walt Whitman, Leaves of Grass (New York: Modern Library, 1891-92), 292.

3. A representative overview of the critique of past flood control of the Mississippi basin is Perry Beeman, "Re-examining Flood Control: Levees, Wetlands, Relocation Getting a Critical Look," Des Moines Register, 26 June 1994.

4. A more detailed discussion of the agricultural-environmental legislation of 1985 through the early 1990s is located in chapters 7 and 8, and in the epilogue. Sources cited for this paragraph include George Anthan, "A Set up for Disaster?" Des Moines Register 5 September 1993; Jerry Perkins, "'No-till' Fares Better Amid Erosion," Des Moines Register, 11 July 1993; Aaron Lehmer, "Ag Practices Reduce Topsoil, Aiding Runoff," Iowa State Daily, 15 July 1993; Dirck Steimel, "Some Farmers Jump at the Chance to Turn Farmland over to Wildlife," Des Moines Register, 23 May 1993; Dirck Steimel, "Wetland Program Embraced," Des Moines Register, 16 January 1994; Dirck Steimel, "Farmers Fear Missouri Plan: River Flow Would Change Dramatically," Des Moines Register, 13 November 1994. The effectiveness of the CRP was documented prior to the 1993 flood. For example, as Lester Brown reports, soil erosion was lessened by over one-third between 1985 and 1990. See Lester R. Brown, "US Soil Erosion Cut," in Vital Signs 1992: The Trends That are Shaping Our Future, ed. Linda Stark (New York: W. W. Norton, 1992), 96-99.

5. For examples of current fascination with sustainable agriculture, see Lester R. Brown, "Sustaining World Agriculture." in State of the World: A Worldwatch Institute Report on Progress Toward a Sustainable Society, ed. Linda Starke (New York: W. W.

Norton, 1987), 121-138; Kenneth Pins, "Selling Sustainability: Agriculture Weighs Cost of Progress," Des Moines Register, 20 March 1994; Shareen Hertel, The World Economy in Transition: Prospects for Sustainability, Equity, and Prosperity (New York: UNA-USA, 1993); Kenneth Pins and George Anthan, "Ag Groups Take Aim at the Green Giants," Des Moines Register, 22 February 1994); Dirck Steimel, "Farmers Worry about the Image of Ag Chemical Ads," Des Moines Register, 6 February 1994; George Anthan, "Experts See Precious Soil at Risk," Des Moines Register, 18 November 1993.

6. Several historians have provided inspiration for this work. Thomas P. Dunlap's Saving American Wildlife (Princeton: Princeton University Press, 1988) was particularly illuminating. Dunlap reestablished credence for the intellectual aspect of environmental history, reasserting (ix-xii) the concept that "there is a progression from ideas to organizations to implement them and finally to public policy." Also influential were the many ideas of Donald Worster, including his "Transformations of the Earth: Toward an Agroecological Perspective in History," Journal of American History 79 (March 1990): 1087-1105. Like many historians working primarily in postwar American environmental history, I am indebted to Samuel P. Hay's Beauty, Health and Permanence: Environmental Politics in the United States, 1955-1985 (Cambridge: Cambridge University Press, 1987). The final quote of the paragraph is from Richard Rubenstein, The Cunning of History: The Holocaust and the American Future (New York: Harper and Row, 1978), 95.

7. On the periodization of history, I have benefited from discussions with Alan I Marcus, Department of History, Iowa State University. Dr. Marcus has been particularly helpful on the "great men" issue, writing, "Rather than portray them as great thinkers . . . historians reevaluate the relationship of these distinguished individuals to their contemporaries and turn the time-honored interpretation on its head. Fame and influence in this view is not the product of unusualness or insightfullness but typicality." See Alan I

Marcus, "Back to the Present: Historians' Treatment of the City as a Social System During the Reign of the Idea of Community," in American Urbanism, ed. Zane Miller (Westport, Conn.: Greenwood Press, 1987), 7-10; and Ian Hacking, "The Archeology of Foucault," New York Review of Books, 14 May 1981; a number of individuals are working on aspects of the "history of sustainable agriculture," though often these accounts are tempered by the various authors' involvement with the "movement" aspect of sustainable agriculture. See Richard Harwood, "A History of Sustainable Agriculture," in Sustainable Agriculture Systems, ed. Clive Edwards et al.(Ankeny, Iowa: Soil and Water Conservation Society, 1990), 3-19; Barton Blum, "Composting and the Roots of Sustainable Agriculture," Agricultural History 66 (Spring 1992): 171-187; Charles E. Little, Green Fields Forever: The Conservation Tillage Revolution in America. (Washington, D.C.: Island Press, 1986).

PART I: PERMANENT AGRICULTURE, 1935-1960

CHAPTER ONE: SOIL AND THE CRISIS OF AMERICAN CIVILIZATION

A notable feature of the American condition is the historical trait of reacting strongly to real and perceived crises, rather than acting preemptively to avert them. As historian Page Smith has cautioned, American history has always been driven by a sense of lamentation and hoped-for salvation. Smith and others have documented several episodes in the historical legacy of "anxiety and despair." Writing in 1942, famed anthropologist Margaret Mead cited this periodic retreat to crisis-mongering as residual in the American preoccupation with "success" as a personal and societal virtue. Mead wrote of the American character as "geared to success and movement; invigorated by obstacles and difficulties; but plunged into guilt and despair by catastrophic failure and wholesale alteration in the upward and onward pace."[1]

In the 1930s and 40s, "despair" and "wholesale alteration" pervaded the American landscape and lexicon. Economic collapse, portentous international machinations leading to the crusade against fascism, and the appearance of ecological catastrophes in the form of floods and dust storms compounded lingering concerns regarding the general prospects of future civilization. A new era of mass culture and mass consumption challenged "many things once held dear," and required new systems of ideas and technologies to ensure the nation's survival amid a series of crises in an increasingly complex and intertwined world; a world abounding with "impoverishment, revolutions, wars, migrations, and the social decadence of billions of peoples" awaiting the "oncoming desolation of their lands." [2]

Agricultural issues embodied this deep sense of crisis in the 1930s. Though agriculture had been in a state of disrepair for a number of years prior to the Great

Depression, in the early to mid-1930s agricultural and societal commentators linked the crisis of humanity to a perceived crisis of the soil. Advocates of a more "rational" agriculture, often though not exclusively tied to the activism of the New Deal, sounded out the purported problems and possible solutions of rural America, particularly the potential effects of soil erosion.

In numerous soil jeremiads throughout the 1930s and 1940s, and in speeches, writings and broadcasts, these erosion apostles warned Americans about the fate that had encountered past civilizations that allowed the deterioration of their soils. Pointing to numerous perceived villains that created the soil crisis, the critics of poor land management called for the rejection of excessive individualism and the recognition of the need for planning and cooperation in a modern society rife with complex interrelationships. The erosion apostles were led by Hugh H. Bennett, Rexford G. Tugwell, and Morris L. Cooke, all prominent New Dealers committed to the idea and reality of a planned and permanent agriculture to avert chaos and ensure a future for American civilization.[3]

The Soil Crisis as a Human Crisis

A sense of crisis was not a new phenomenon in American agricultural history. Even prior to the Civil War, agricultural observers expressed concern over the decline of agriculture and the threat of soil erosion. Agriculture endured other crises in the late-nineteenth and early twentieth centuries, giving birth to the cooperative movement, the USDA and land-grant college-experiment station-extension service network, the Country Life Movement and other groups, ideas, and institutions whose collective goal was to bring "uplift" and "equality" to the agricultural sector. After the post-World War I price

deflation episode, low prices dragged upon agriculture in most regions of the country in the 1920s. The presence of a dominating urban culture and the perceived low status of farmers also burdened agrarians in the period. Farm groups, social planners, legislators and others offered remedies for the agricultural anxieties of the 1920s, calling for, among other things, increased cooperative efforts, expanded technology and production efficiency, soil conservation and the removal of so-called "marginal" farmers from the land, all to make rural life "more satisfying and beneficial," and to serve as a bulwark against "industrial serfdom." Thus, even prior to the soil crisis of the 1930s, individuals and governments at all levels worked to build a more prosperous agriculture that halted the wastage of topsoil and, correspondingly, the demise of rural life.[4]

The sense of crisis emergent in the 1930s, already exacerbated by the Depression, increased in scope with the appearance of ecological disasters, notably rampant flooding along the nation's river systems and the advent of the "Dust Bowl" in the Great Plains. Part of a deepening agricultural crisis, the omnipresence of eroded topsoil in the United States enhanced the overall state of despair in the period.

In essence, the individuals describing the soil crisis linked agricultural problems to the larger human crisis of the period. Secretary of Agriculture and luminary agricultural theorist Henry A. Wallace described the crisis in his New Frontiers (1934), opining that "human beings are ruining land, and bad land is ruining human beings, especially children," Morris L. Cooke, the social reformer-engineer and later administrator of the Rural Electrification Administration likened the soil crisis to a national case of "tuberculosis" or "cancer." Cooke wrote: "America is doomed agriculturally unless the problems of drought, dust storms, floods, and worst of all, erosion are taken seriously." Ecologist Paul Sears, in his typically poignant manner, illuminated the human dimensions of the soil crisis for readers of the American Mercury in 1937. Sears warned that "the soil is our national

meal ticket. It is also a marvelous and intricate phenomena which the ordinary person understands about as well as a Colonial barber understood the germ theory of disease." Sears continued, stating "Soil is truly a measure of abundance so far as living things are concerned. This fact is as vital to the city dweller as to the farmer." Hugh H. Bennett, the "father" of soil conservation and a central figure in this history of ecological agriculture, echoed the sentiments of Sears, stating, "the soil is indispensable not merely to the farmer but to everyone else as well. A source of trouble in the past and a danger in the future is that too often the land is thought of as an end itself, rather than a means toward greater ends." Bennett, Sears, and the like-minded spoke with a sense of urgency commensurate with the scale of the perceived threat. As another writer commented, the ecological problems of agriculture required an erudite description of the crisis: "Drama in presentation is the most effective tool that any speaker, teacher, or salesman can use in reaching the thinking process of the uniformed. Soil erosion control is a vital problem that concerns every living man, woman and child . . . it is imperative that we employ every ethical means to impress them with the peril of continued indifference."[5]

Lessons from History

In the numerous soil jeremiads produced from the mid-1930s through the early 1940s, Hugh Bennett and others who promoted the permanent agriculture concept linked the soil crisis to the overall problems of American civilization. The permanent agriculture cohort accomplished this goal in part by taking "lessons" from history regarding older civilizations that had perished or declined due to ill-treatment of the soil. Human hands created the soil problem, thus the erosion apostles conducted investigations of the human

record in the hope that history might reveal sources of abusive husbandry and provide a road map to a future of stewardship and permanence.

In a number of books, articles, and public comments, the individuals who represented what would emerge as the permanent agriculture movement looked to past civilizations and non-American cultures for messages about care or neglect of the soil. This group of commentators also identified a variety of American cultural traits that, in their opinion, fostered a particularly destructive form of agriculture. The list of America's soil villains included an arrogant and exploitative attitude toward the land, ruinous farming practices, misguided leadership from agricultural scientists, farm organizations and policy makers, and general greed, which the erosion apostles associated with an unplanned, speculative and short-sighted economy. After singling out past mistakes and lessons of soil neglect, the authors of these tracts inevitably offered prescriptions for the future based on history, a future they indicated would be built on the principles of interdependence and societal permanence.[6]

Fundamental to the "soil" interpretation of history was the stark consensus conclusion that "when governments disappear, they do so because they have reached crises for which they are unable to find solutions." More often than not, the crisis that crippled and destroyed past civilization was a crisis of the soil. Hugh H. Bennett, speaking at a conservation conference in Tyler, Texas, in July, 1935, asserted that "history has shown time and again that no large nation can long endure the continuous mismanagement of its soil resources. The world is strewn with the ruins of once flourishing civilizations, destroyed by erosion." Bennett punctuated his point with the admonishment that "the very fact you are met in a conference to consider the problems of soil and water conservation shows an understanding of the nature and extent of the task before us." Bennett later compounded this sense of the urgency of history with the suggestion that, with erosion, it

was "not just the land which goes. The people, the cities and towns, and the civilizations decay with the land. That's history. Not the kind if story you read in books, but the history you read on the land." Film maker Robert Flaherty even used an the historical approach in his 1941 film, The Land. Showing scenes of the eroded land, Flaherty's narrator told viewers: "Something has happened to the soil. When the soils moves, people move. When the soil fails, life fails . . . the ancient Chinese knew this; they wrote books about it forty-six centuries ago." As these quotes and other sources from the period show, for the apostles of the new ideology of soil conservation and restoration, history offered messages, meaning and mission.[7]

With a vested interest in illuminating the soil crisis, the Soil Conservation Service sent an "operative" into the field to discern present and historical lessons regarding the human relationships the soil. Walter C. Lowdermilk, one of the more committed erosion apostles, later described his mission for the USDA. "In 1938," wrote Lowdermilk, "in the interest of a permanent agriculture and of the conservation of our land resources, the Department of Agriculture asked me to make a survey of land use in olden countries, for the benefit of our farmers and stockmen and other agriculturists in this country." Lowdermilk spent the next two years touring Europe, North Africa, and the Middle East. He had also spent a number of years in China observing soil conditions. In his historical-geological observations, Lowdermilk felt that he had literally toured a "graveyard of empires." He was not alone in his perceptions. Stuart Chase presaged Lowdermilk in his 1936 book Rich Land, Poor Land. Chase noted that Saint Paul has chastised the city of Antioch for "its pride of wealth and sins," but that Antioch's glory had passed "not from its sins but from the erosion of the Taurus and Lebanon rivers. Protective terraces were neglected, forests were cut off, and the silt and gravel streamed down." Chase, Lowdermilk and several other authors in the period also cited the history of other

civilizations for lessons on the soil. For example, the Mayan society had "choked itself to death . . . with mud from its hillside corn patches" in "half a century." North Africa, "once a famous wine region," had fell victim to "creeping deserts."[8]

China, in particular, served as a wellspring for historical lessons on the soil and human-soil relationships. Lowdermilk and others discussed at length the long history of soil erosion problems in China, where periods of neglect and the overtaxing of resources had created hills "devastated and slashed with gullies," exacerbating already rampant seasonal flooding, that in turn created barren wastelands on the sites of once prosperous cities, villages and farms. Yet China, as well as other previous and then-current civilizations also learned from past abuses of the soil and worked to correct them, thus imparting a positive historical lesson of positive husbandry. The Chinese, despite an ongoing struggle with soil erosion and a burdensome population problems, developed over centuries a culture of stewardship and a system of land management that emphasized the use of terraces, dikes, and forest preservation, as well as the utilization of composts and night soil. The Chinese stewardship example emanated from a "sense of belonging to a particular place on earth," according to Pearl S. Buck. Paul Sears, in a chapter entitled "The Wisdom of the Ages," expressed an admiration for Chinese agriculture, which in his view was "almost unique in bringing forth as heavy yields today as it ever has." Sears cited contoured terracing and the incorporation of organic material into the soil as the most successful methods of Chinese soil stewardship.[9]

Other lands and people's history also provided insight for proper relationships with the soil and nature in general. Louis Bromfield was influenced by the simple yet productive husbandry he had witnessed in France and India, and he praised "the rule of agriculture in Denmark, Holland, Belgium, and most of France where each acre produced the potential maximum without loss of fertility." Other commentators praised the Japanese as a people

that "love the land and hope to keep it permanently productive." Within the United States, the authors describing the historical roots of the soil crisis noted that Amish and Mennonite minorities "generally combined the ancient practice of stewardship with common religious bonds" that produced an "obligation to the land [that] is fundamentally a matter of faith" and "spiritual fellowship." Even with these positive examples of permanence, the soil historians of the period still placed disaster as the historical norm in the soil life of civilizations. G. V. Jacks and R. O. Whyte, in the 1939 work The Rape of the Earth: A World Survey of Soil Erosion, noted that all too often "the soil upon which men have attempted to found a new civilization" has "disappeared, washed away by the water and blown away by the wind . . . on a scale unparalleled in history."[10]

Certainly, America's brief history offered few positive examples of proper soil stewardship. In the historical assessment of the roots of the soil and human crises in the 1930s and 1940s, many participants in this critique blamed the problem of the soil on a number of recurring American cultural traits, such as expansiveness and acquisitiveness, that led to exploitation of land and people. Critics of past farming conventions chided excessive American individualism, while noting additional cultural problems had helped to foster the soil crisis. These other cultural ills including bad farming habits, poor leadership and training in the farm community, and misguided scientific and technological endeavors. These critics also attacked what they viewed as the slavering willingness of farmers and researchers to embrace new technologies, even when new methods led to the further decline of the soil and rural life.

In the view of individuals such as Paul Sears and Hugh H. Bennett, American history typified modern, dysfunctional, soil destroying agriculture. Bennett, Sears and others presaged the "New Western History" by four decades by tarnishing the previously heroic record of the pioneers. The pattern of expansion onto and domination of the new

soils was not the inspiring, Turnerian epoch of yore, instead Bennett and the like-minded blasted the pioneers and descendants for their arrogance and idiocy regarding the way they farmed the land. Sears depicted the pioneers as purveyors of a "lustful march . . . across a virgin continent, strewn with ruined forests, polluted streams, gully-laden fields, stained by the breaking of treaties and titanic greed." This American callousness regarding the soil resource, a mixture of ethnocentric and anthropocentric attitudes, eventually resulted in what Bennett called " the fundamental cause of soil erosion--the reckless denudation of the soil, the removal of the integument of vegetation which serves as a protective covering of the earth." Bennett, speaking to fellow conservationists in 1935, stated to them that "the time has come . . . when we must make concessions to nature. The kingdom of Nature is not a democracy; we cannot repeal natural laws when they become irksome. We have got to learn to conform to these laws or suffer severer consequences than we have already brought upon ourselves." Noting that "Any successful program of erosion control must provide the means of making production compatible with protection," Bennett was one of many Americans who concluded that the crux of the soil problem was the desire to dominate nature for production and profit, regardless of the cost to the topsoil, which was "the true basis of wealth," in his rhetoric.[11]

In the soil jeremiads of the 1930s and 40s permanent agriculture episode, the American tendency towards horizontal land expansion, preoccupation with short-term profits, and pride in their "dominance" of nature were central sources of the sense of angst in the period. Those promoting the concept of a soil crisis tried to persuade their fellow citizens that "ours is a record of heedless land abuse and needless exploitation seldom, perhaps never equaled in the history of civilization." But why had this pattern of abuse become so engraved in the American farming character? According to the chief soil prophet, Hugh H. Bennett, "unconcern for the land had its root . . . in a national illusion of

abundance. White men found America a continent lusher and more fertile than they had dared imagine. For a century they pushed the frontier westward, and always found virgin land." Yet "gradually," according to Bennett, "a national land philosophy evolved. It was a philosophy of exploitation . . . a philosophy that permitted a man, in good conscience, to destroy his land and move onward to new and fertile fields."[12]

Louis Bromfield likened the westward expansion to "a plague of locusts" which "moved across the continent leaving behind here and there men who found the soil so deep and the mining so inexhaustible that there was no necessity for migration." For Bromfield, technological ingenuity and the immensity of America's soil resource implanted the notion that "man is the lord of creation--that he dominates the earth." The tremendously accelerated rate of soil erosion apparent in the 1930s, was, in the opinion of those who would call for ecological agriculture, "due to primarily one factor--human interference." Though a major re-evaluation of technology would not appear until after World War II, the proponents of soil stewardship in the years prior to and during the war had already begun to see technology as a nefarious force.[13]

Several films echoed this theme of heavy-handed human technology and human error in the onset of the soil crisis. Government produced films such as Pare Lorentz's The River and The Plow that Broke the Plains, both of which appeared in the late 1930s, are examples of how human folly was linked to the soil crisis. In The Plow that Broke the Plains, the "great plow up" of World War I and thereafter was especially damming, as was the advent of power farming and tractors, which were symbolized as mighty tanks conducting an attack on the unbroken sod. In Robert Flaherty's 1941 film, The Land, a view of gullies in Stewart County, Georgia, highlighted the theme of mismanaged technology. The accompanying soundtrack lamented: "This was a beautiful farm once on a

land of marvelous vigor. Soil that it took weather fifty centuries to make--gone now, gone, in a century or less."[14]

Bad cultural traits concerning the soil both led to and resulted from bad farming practices. Bad farming practices included the improper use of science and technology, poor cropping patterns (monocultures), and a lack of terracing, cover crops, and other conservation devices. Technology, labeled a "seductive force," had brought increased gains and cheaper labor costs, but the horizontal expansion of farming also disrupted rural life and the health of the soil.

For critics like Edward Faulkner, American farming suffered needlessly from the improper use of technology. (Faulkner's ideas of "trash mulch culture" will be discussed in Chapter Three). For example, Faulkner chided the use of the moldboard plow as an instrument of soil preparation, and advised farmers that their plows were heavy-handed instruments operating in an intricate web of life. Moldboard plows, while historically necessary for breaking the prairies, were, in Faulkner's opinion, destroying capillary connections and burying organic mass that would have been better left as soil cover or integrated into the topsoil as green manure, via the disc plow. Faulkner also lambasted the effect of tile drainage on land and waters, and questioned the use of "artificials," a derogatory term for manufactured fertilizers, herbicides, pesticides and insecticides then being introduced on a massive scale in American farming.

Faulkner thought that a "machine mentality" in American agriculture accelerated the crisis of the soil. He wrote, "the easy money to be made in the world food and cotton trade dictated the universal use of machines in farming. So long as the land remained naturally productive machine farming gave us still further advantages in trade." Rather than build their soil for long-term production, American farmers, judged Faulkner and his supporters, instead sought to increase production by expanding the number of acres they

could "mine," often losing their neighbors and their topsoil in the process. Louis Bromfield wrote that "one of the most striking evidences of the poverty and inefficiency of our agriculture has been the almost universal tendency of our farmers to expand horizontally rather than vertically when they seek to expand production." For Faulkner, the history of American agriculture sounded "a continuous series of disappointments." Sadly, Americans never "remained to solve the problems of the area it has worn out." Instead, wrote Faulkner, "they sold out, or left the land to its successors and moved on to richer fields."[15]

For Bromfield, one of the most trenchant critics of America's soil history, bad farming was the product of bad farmers. Bromfield thought "a great many of them actually hate the soil which they work, the very soil which, if treated properly, could make them prosperous and proud and dignified and happy men." From his perspective in the early to mid-1940s, Bromfield estimated "not 10 per cent of our agricultural population today could seriously be called good farmers." Yet they stayed on the soil because, in Bromfield's opinion, "they never had the gumption to get off it." The oft-rankled writer challenged that "the philosophy that anybody can farm has cost us billions of dollars of taxes, in high prices, and the destruction of the soil which is the fundamental and ultimate basis of wealth of every nation." Again, history had revealed a strong message to the erosion apostles; bad farming arose from an unsound culture that featured an arrogant attitude towards nature and an unquestioning posture regarding technological change.[16]

As the major dispensers of agricultural leadership and the misguided technology that it sponsored, the USDA and the nation's land-grant colleges were conspicuous villains in the history of soil abuse. "Distributist" agrarian Ralph Borsodi, in his typically bombastic style, put the land-grant colleges and the USDA on "trial" in a 1945 essay entitled "The Case Against Farming as a Big Business." Borsodi wrote: "I accuse them of teaching the rape of the earth and the destruction of our priceless heritage of land, of

impoverishing our rural communities, wiping out our rural schools, closing our rural churches, destroying our rural culture, and depopulating the countryside upon which all these depend." For Borsodi and fellow travelers, the USDA and the land-grant schools (and by implication their supporters in agricultural-related industries and the American Farm Bureau Federation) fostered "big farming" by promoting capital intensive scientific and technological innovations without regard for their impact on rural people or the ecology of the land. Professors of agriculture and agricultural researchers, so went the argument, had lost their connections to the soil and to their constituents, the farmers. Borsodi, Louis Bromfield, and others saw many other ominous offshoots of the allegedly misguided leadership of the USDA and the agricultural colleges, including over devotion to cash-crop monoculture and the perceivably urbanized, acquisitive culture that allegedly profited from a "colonial" relationship with the soil and rural people.[17]

A number of quotes illustrate the persistent badgering of the USDA/land-grant record. Bromfield, arguing with his farm manager for a diversified farm as opposed to a monoculture-commercial operation based on corn raising, sent the young man away with the chastisement "I can't really blame you, I suppose, for those half-baked ideas . . . Where'd you go? Ohio State?" Bromfield opined that "I've seen quite alot--a hell of a lot more than any of your autocratic college professors . . .what they know about economics you can put into a USDA pamphlet and chuck it in the waste basket." Bromfield led the chimera versus the agricultural "establishment," stating "the whole commercial fertilizer theory represented both the ignorance and arrogance of limited or greedy men, manufacturers, farmers, and professors, who are perpetually seeking a short-cut or a means of outwitting nature and the laws of physics, of chemistry, and even economics." A story in Science News Letter in July 1943 depicted Bromfield as "deploring" the "factory methods" validated by the USDA, the land-grant schools and other proponents of

"business" farming. "Especially pernicious," according to the article, was the danger monoculture cropping posed to the soil. Hugh Bennett also castigated the decline of crop rotation and diversified farming when he stated that "planting an entire region to a single cash crop is usually as precarious to soil resources as to economic welfare." Bad policy decisions also added weight to the tiresome American soil legacy. As Henry A. Wallace pointed out, "we have permitted our livestock men of the West to overgraze the public domain and so expose it to wind and water erosion. Much of the grassland of the Great Plains has been plowed, exposed and allowed to blow away."[18]

Morris L. Cooke summed the soil history lesson, saying "the pioneer was the first villain. For the sake of his own generation he sacrificed the future. He leveled forests, mined the soil, impoverished resources. Water engineering on false principles helped carry the process farther." Yet these depredations to the land had caught up with a nation that was no longer an immature, immune country. Americans had dominated the continent agriculturally, but according to one critic of the past stewardship, "this 'conquest' of nature is, however, a short-lived one. Man, in truth, does not conquer nature. At best, he has the privilege of cooperating on terms and conditions set by nature." History presented many clear messages and warnings about the soil and societal permanence to the erosion apostles. And, as the soil "histories" written in the period reflect, the then-current preoccupation with assessing blame for the soil crisis and human crisis also served as a starting point for planning a permanent agriculture. American culture faced many problems, but the soil problem singled out by people like Hugh Bennett emerged from cultural arrogance, misguided farming, and a devotion to short-term profit.[19]

But if history offered lessons, it also was useful in guiding future conduct, and the critics of past husbandry always offered a "way out" scenario at the end of their soil jeremiads. Two essential messages emanated from these "salvation" scripts. One message

expressed the need to recognize the interdependent reality of the modern world, which dictated that agriculture must be viewed as part of a interconnected set of components in which all parts played off of each other. In addition to realizing the complex interrelationships of modern life, the erosion apostles also called for a society based upon permanence as opposed to the past conditions that inculcated a short-term, exploitative and unplanned agriculture and land management system. The call for interdependence and permanence also led to the articulation of a new type of farming based on the principles of planned ecological harmony, a system that by 1940 became generally known as permanent agriculture.

The Call for Interdependence and Permanence

If the soil crisis was a human crisis with documented cultural causes, then surely with enough knowledge and publicity, reasoned the erosion apostles, Americans could adopt a more thoughtful and permanent attitude towards the land. Again, a crucial element in provoking a new soil mentality, (what Aldo Leopold would later characterize as a "land ethic"), related to the need for Americans to recognize the vast interconnections of their rapidly changing world. In the years between the wars, and during and shortly after World War II, Americans were beginning to cope with a new notion of "system" in their lives. Alan Marcus and Howard Segal have written on how the societal thought complex that emerged from World War I was more "dynamic" than the system of thought prior to the war. The new conceptualization of "system" in the interwar years effected all walks of life and was "predicated on a much more complex relationship among the parts. Each part seemed to acquire a share of its definition from interrelationships with other parts of the system." Agriculture was certainly not immune to this new systems construction. The

authors of the soil crisis sought to establish multidimensional solutions for the soil crisis, for it was a crisis with many roots and a crisis whose solutions would come from many, seemingly disconnected sources.[20]

While "inter-relations" between agriculture and other endeavors had long been recognized, the concept of "interdependence" enjoyed virtual cult status in the period from the 1920s throughout the 1940s. Henry A. Wallace proclaimed a "declaration of interdependence" in 1934, and the emerging science of ecology validated this approach by studying "the interrelationships between life forms and their environments." In the developing ideology of the "permanent agriculture" phase of the history of ecological agriculture, interdependence keyed the understanding the social and biological dimensions of the soil crisis.[21]

On the social plane, the concept of interdependence helped Americans at all levels of society become more cognizant of the vast dimensions of the soil crisis. Hugh H. Bennett constantly invoked the theme of interdependence throughout the 1930s and 40s. In speeches, pamphlets, and on radio programs, Bennett asked Americans to observe the omnipresent linkages in society. "The ability to support and produce, plentifully, made America great," claimed Bennett, "it must be sustained if America is to stay great." He told his audience that this greatness could be sustained only if "the fountain of production --the soil--is guarded and preserved." Bennett thought "the problem is by no means solely agricultural, it effects the urbanite as surely as it effects the farmer. Its solution is of as much importance to the industrialist as to the agriculturist. It is of vital concern to all America, because all America must have food and clothing taken from the soil." In another speech thirteen years later (1948), Bennett still preached the gospel of interdependence, claiming "every man, woman and child throughout the country depends on productive land for virtually all their food, as well as a large part of their clothing and all their wood,

leather and many other necessities." Bennett and many of his contemporaries in the United States and internationally sought to "see the soil problem as a whole," rather than repeating the mistakes of the past, when, as Paul B. Sears wrote, "Scholars (and here I include Scientists) may themselves, through preoccupation with a particular segment of a problem, fail to see the whole."[22]

For Bennett, Sears, and company, the methods for solving the soil crisis arose from the condition of interdependence and ran "the gamut of agronomy, biology, engineering, forestry and geology" with the "basic ideal underlying all is the maximum possible restoration of vegetative cover--nature's own method of soil stabilization, and the only one that affords any true permanence." Again, the permanent agriculture camp perceived the soil crisis as a human crisis with human causes, primarily the human disruption of nature's process of "self-stewardship." In order to correct past abuses and halt the soil crisis, those proposing "holistic" plans had to show the citizenry that they lived under the reign of biological, as well as social interdependence. Though it mentioned the word "ecology only once, the founding manifesto of the conservation organization Friends of the Land (1940) is a particularly telling example of the ideology of biological interdependence. It reads in part: "Any land is all of one body. If one part is skinned, bared to the beat of the weather, wounded, not only the winds spread the trouble, dramatically, but the surface veins and arteries of the nation, its streams and rivers, bear ill. Soiled water depletes soil, exhausts underground and surface water supplies, raises flood levels, dispossess shore and upland birds and animals from the accustomed haunts, chokes game-fish, diminishes shoreline seafood, clogs harbors, and stops with grit and boulders the purr of dynamos . . . . We too, are all of one body. We all live on, or from, the soil."[23]

The new concept of biological interdependence represented a shift away from the old values of the Theodore Roosevelt-Gifford Pinchot conservation era, with its purely

utilitarian and anthropocentric emphasis on the "wise " management of resources for human use, to a new era of seeing life as a vast web of interconnections with humans beings simply one delicate if obtrusive strand. This recognition of biological interdependence was in many ways an ethical re-awakening. Stuart Chase elaborated on the new way of thinking, telling his readers that "we are creatures of this earth, and so are part of all our prairies, mountains, rivers, and clouds. Unless we feel this . . . we may know all the calculus and all the Talmud, but have not learned the first lesson of living on this earth." Science could assist humanity, wrote Chase, "only if it recognizes basic realities and the unified order of enduring life." Fairfield Osborn added an ethical imperative to the message of Chase and others, cautioning, "There would seem to be no real hope for the future unless we are prepared to accept the concept that man, like all living things, is part of one great biological scheme." Clearly, the new attitude regarding the human interaction with nature revered the complex relationships of soil and water, the fundamental supporters of human and non-human life.[24]

Though humanity, as part of an interdependent world, formed part of a "great biological scheme," the soil crisis was nonetheless a human crisis in the final sum. While concern for other species of life emerged in the permanent agriculture movement, human concerns still remained the focus of the soil crisis. Still, the look to history and the call to interdependence fostered a broader definition of stewardship as well as a call for societal permanence. "The human race can destroy itself on this planet," wrote Chester C. Davis, "unless we can meet and solve some of the problems that confront us. The one is, can man master and control the industrial machine he has created? The other is, can man so organize his activities on the land that he can hand on to future generations a heritage, a resource not only unimpaired but increasing in ground line productivity." J. E. Knoll, a farmer and conservationist from Missouri, continued in the vein of luminaries, such as

Chase and Davis, telling readers of the periodical of Friends of the Land, the Land: "We are not going to be here long as individuals. We have to see that the support of future generations is guaranteed."[25]

The new call for a permanence expressed not only a demand for new soil conservation techniques, it would also involve a societal makeover along the lines envisioned by the legendary social critic Lewis Mumford. Antagonistic towards the pallor, squalor and uncertainty of the industrial-urban "megamachine," Mumford asked his contemporaries to "visualize a new framework of farms and villages and cities and regions, which will make industrial organization subordinate to the demands of nurture and education and living." For Mumford, the complexities of modern society demanded a new way of social organization, based on a "systematic spiritual culture, a body of common ideas that will make social cooperation possible once more throughout civilization." Mumford's voice was one among many in the period, all calling for a new epoch of planning, cooperation and rural-urban/agricultural-industrial balance.[26]

Common ideas emerging in the 1930s and 1940s included "the essential qualities of balance, order and reserve," with goals such as "opportunities and security, a better way of life." Rexford G. Tugwell, planner, social scientist-professor, and New Deal "brains truster," noted the sources of this new ethical imperative for permanence--a soil crisis and a human crisis, as well the new recognition of interdependence and the need to plan for the future. Tugwell wrote: "The shock of the depression has at last awakened us to a new attitude. We no longer regard land as land alone, we regard it as one of the central and controlling elements in our whole national economy. The recovery program brings us finally face to face with devising a plan which shall draw together our divergent efforts and look forward as far as possible toward permanent policy." Tugwell was at the center of a growing group of individuals from many walks of life convinced that disaster was

imminent yet avoidable. Their sentiment expressed the notion that "soil is a natural heritage. As such it should be safeguarded by the government. A good citizen regards himself not as an absolute owner of the soil but rather a manager set in charge of using it wisely. His duty is one of passing on to succeeding managers a soil which is as good as, or better than, when he found it."[27]

As the above statement suggests, the soil crisis and the general human crisis on the 1930s and 1940s were inexorably bound together. War and economic uncertainty, combined with a menacing soil erosion problem, spelled disaster for current and future generations, leading a group of people to call for a planned and permanent agriculture based upon the lessons of history and the principles of interdependence. Though Hugh H. Bennett, Chester Davis and Rexford Tugwell had personal, professional, and bureaucratic interests in publicizing the soil crisis, a crisis existed outside of Washington, D.C. and New York City, and it was not merely a "creation" of power mongering social planners.

Indeed, a number of people outside of New Deal social planning circles also saw the potential threat of an eroded and destabilized soil. Solving the riddle of a poor economy or defeating overseas enemies would mean little if America lost its vital force, the topsoil, then considered to be fundamental in the health and life of the nation. Walter C. Lowdermilk invoked the missionary zeal needed to build a permanent, ecological agriculture. Noting the crucial nature of stabilizing soil and water resources, Lowdermilk called for an "11th Commandment" which would read: "If any shall fail on this stewardship of the land thy fruitful fields shall become sterile stony ground and wasting gullies, and thy descendants shall decrease and live in poverty or perish from the face of the earth." Clearly the time had come for a new, more stable culture, a civilization based on an enduring husbandry which soon took the label "permanent agriculture," a form of farming rooted in

the new ecological view of the world, and which promised to save humanity from the long night of crisis.[28]

Notes

1. Page Smith, Dissenting Opinions (San Francisco: North Point Press, 1984), 3-13; Margaret Mead, Keep Your Powder Dry (New York: William Morrow, 1942), 193-194; for historical perspective on the sense of "crisis" in the American past, see Sacvan Bercovitch, The American Jeremiad (Madison: University of Wisconsin Press, 1978).

2. For an account of the sense of crisis and change in the 1930s and "technology as a social solution," see Alan I Marcus and Howard P. Segal, Technology in America: A Brief History (San Diego: Harcourt Brace Jovanovich, 1989), 255-314; Walter C. Lowdermilk, "The Eleventh Commandment," located in box 141, "Friends of the Land," Morris L. Cooke Papers, Franklin D. Roosevelt Library, Hyde Park, N.Y.

3. For an overview of how agriculture related to the general crisis of the Depression, and for information on New Deal agricultural history, see R. Douglas Hurt, American Agriculture: A Brief History (Ames: Iowa State University Press, 1994); Richard S. Kirkendall, Social Scientists and Farm Politics in the Age of Roosevelt (Columbia: University of Missouri Press, 1966); Arthur Schlesinger, The Age of Roosevelt (Boston: Houghton Mifflin, 1957); Rexford G. Tugwell, Roosevelt's Revolution: The First Year, a Personal Perspective (New York: Macmillan, 1977); Theodore Saloutos, The American Farmer in the New Deal (Ames: Iowa State University Press, 1982).

4. Past "statesmen" of soil conservation and restoration include Thomas Jefferson, George Washington, and Abraham Lincoln. Quotes from these and numerous other

figures in American history on soil erosion are featured in the founding manifesto of the conservation organization Friends of the Land, located in box 141, "Friends of the Land," Cooke Papers. For an examination of agricultural concerns in the post-Civil War era, see Alan I Marcus, Agricultural Science and the Quest for Legitimacy (Ames: Iowa State University Press, 1985); for a critical account of the country life movement, see David Danbom, The Resisted Revolution: The Country Life Movement in America (Ames: Iowa State University Press, 1979); see also L. H. Bailey, The Country Life Movement in the United States (New York: Macmillan, 1913); for accounts of agricultural problems in the 1920s, see Wheeler McMillen, Too Many Farmers (New York: William Morrow, 1926); and David Hamilton, From New Day to New Deal (Chapel Hill: University of North Carolina Press, 1991); for an interesting, prescient call for "ecologically"-inspired soil conservation, see Herbert Quick, On Board the Good Ship Earth: A Survey of World Problems (Indianapolis: Bobbs-Merrill, 1913), 290-304; for other pre-FDR pleas for conservation and rural uplift, see Harold Hotelling, "The Economics of Exhaustible Resources," Journal of Political Economy 39 (April 1931):137-149; also Rexford G. Tugwell, Thomas Munro, and Roy E. Stryker, American Economic Life and the Means of Its Improvement (New York: Harcourt Brace, 1925), 134-197; and Hugh H. Bennett, "Soil Erosion: A National Menace," USDA Circular No. 33, April 1928, 1-35; final quotation in paragraph taken from Rexford G. Tugwell, "The Reason for Resettlement" (speech broadcast over the National Broadcasting Network, 2 December 1935), box 169 Rexford G. Tugwell Papers, Franklin D. Roosevelt Library, Hyde Park, N.Y.

5. Rexford G. Tugwell, "Down to Earth," Current History 44 (July 1936): 32-38; Henry A. Wallace, New Frontiers (New York: Reynal and Hitchcock, 1934), 242; Morris L. Cooke, "Is America Doomed Agriculturally?" Philadelphia Evening Ledger, August 1936, box 327, Cooke Papers; Paul B. Sears, "Death from the Soil," American Mercury

42 (December 1937): 441; Hugh H. Bennett, Soil Conservation 5 (May 1940): 277; Charles D. Jarrett, "Erosion Control Drama," The Land Today and Tomorrow (n.p., ca. 1935); for more on the linkage of the soil crisis to the human crisis, see Ward Shepard, Food or Famine: The Challenge of Erosion (New York: Macmillan, 1945), 34-35; Rexford G. Tugwell, "Changing Acres," Current History (September 1936): 57-63; Russel Lord and Kate Lord, Forever the Land (New York: Harpers, 1951): 4-5; Rexford G. Tugwell, "Resettlement Administration" (address given in Los Angeles, 28 October 1935), Speech and Writing file 1935-37, container 57, Tugwell Papers; for accounts of federal land management in the 1930s, see Gilbert F. White, "The Future of the Great Plains Revisited," R. Douglas Hurt, "Federal Land Reclamation in the Dust Bowl," and Donald R. Worster, "The Dirty Thirties: A Study in Agricultural Capitalism," all located in Great Plains Quarterly 6 (Spring 1986): 84-116; for more on the Dust Bowl, see also "The Great Plains Committee," The Future of the Great Plains (Washington, D.C.: GPO, 1936); and R. Douglas Hurt, The Dust Bowl: An Agricultural and Social History (Chicago: Nelson-Hall, 1981); Donald Worster, Dust Bowl: The Southern Plains in the 1930s (New York: Oxford University Press, 1979); and Paul Bonnifield, The Dust Bowl (Albuquerque: University of New Mexico Press, 1979). General histories of soil conservation and the Soil Conservation Service include Frank E. Smith, The Politics of Conservation (New York: Pantheon, 1966); Roy M. Robbins, Our Landed Heritage: The Public Domain, 1776-1970, 2d ed. (Lincoln: University of Nebraska Press, 1976); Charles M. Hardin, The Politics of Agriculture: Soil Conservation and the Struggle for Power in Rural America (Glencoe, Ill.: Free Press, 1952); D. Harper Simpson, The Soil Conservation Service (New York: Praeger, 1970); Otis Tossett, Land, Water and People: A History (St. Paul: Webb, 1961); A. L. R. Owen, Conservation under FDR (New York: Praeger, 1983); R. Burnell Held and Marion Clawson, Soil Conservation in Perspective (Baltimore: Johns

Hopkins, 1965); Frank E. Smith, ed., Conservation in the United States: A Documentary History (Land and Water, 1900-1970) (New York: Chelsea House, 1971): Russell Lord, The Care of the Earth: A History of Husbandry (New York: Mentor, 1962); R. Neil Sampson, For the Love of the Land: A History of the National Association of Soil Conservation Districts (League City, Tex.: National Association of Soil Conservation Districts, 1985); and Fredrick R. Steiner, Soil Conservation in the United States: Policy and Planning (Baltimore: Johns Hopkins, 1990).

6. While it is possible to generalize that many of the authors quoted in this section were social planners associated with New Deal governmental activism, critiques of poor stewardship emanated from a range of sources, nationally and internationally, including people opposed to New Deal social engineering.

7. First quote of paragraph taken from Edward Faulkner, Uneasy Money (Norman: University of Oklahoma Press, 1945), 35; Hugh H. Bennett, "Program of the Soil Conservation Service" (paper presented to the 8th Southwestern Soil and Water Conservation Conference, Tyler, Tex., 8-9 July 1936), box 10, file 8, Hugh H. Bennett Papers, Archives of American Agriculture, Parks Memorial Library, Iowa State University; an early example of this "lesson of history" approach is in Russell Lord, Men of Earth (London: Longmans, Green, 1931); a later synthesis of this view is found in Vernon G. Carter and Tom Dale, Topsoil and Civilization (Norman: University of Oklahoma Press, 1955); H. H. Bennett would later heighten the pitch of his historical message in speeches during the war. See Hugh H. Bennett, "The Land and the War" (speech given before a meeting of Friends of the Land, Memphis, Tenn., 12 October 1942), box 10, file 44, Bennett Papers. Script of The Land quoted from R. Lord and K. Lord, Forever the Land, 30.

8. Walter C. Lowdermilk, Conquest of the Land through Seven Thousand Years (Washington, D.C.: USDA, 1948), 2-5; Stuart Chase, Rich Land, Poor Land (New York: McGraw Hill, 1936), 342-346; P. H. Walser, "Erosion Finished the Mayans," The Land Today and Tomorrow 2 (January 1935): 7.

9. The author would like to express gratitude to Dr. Adrian Bennett, Department of History, Iowa State University, for his comments on the author's unpublished manuscript "Perceptions of Permanence: Observation of Asian Agriculture and the Rise of the Permanent Agriculture Movement in the United States, 1935-1950." The focus on Asian agriculture was certainly not a new concept. In the late-nineteenth and early-twentieth century, so-called seed hunters had observed the enduring traits of peasant agriculture in the Orient. For examples of early contacts between Asian and American agriculture and for western perceptions of Asian farming, see Randall E. Stross, The Stubborn Earth: American Agriculturists on Chinese Soil, 1898-1938 (Berkeley: University of California Press, 1989); George Weidman Groff, "China's Place in World Agriculture," World Agriculture 2 (Spring and Summer 1921): 94-95; Martin Bronfenbrenner, Academic Encounter: The American University in Japan and Korea (New York: Crowell-Collier, 1962); John Lossing Buck, Chinese Farm Economy: A Study of 2866 Farms in Seventeen Localities and Seven Provinces in China (Chicago: University of Chicago Press, 1930); William Ashley Anderson, "The Amphibious Farmers of Chihli," Travel 36 (February 1921): 1-8; John Stuart Thompson, The Chinese (Indianapolis: Bobbs-Merrill, 1909), 310-311; Edward Alsworth Ross, The Changing Chinese: The Conflict of Oriental and Western Culture in China (New York: Century, 1912), 78-79; Edward Williams, China Yesterday and Today (New York: Thomas Crowell, 1927); University of Wisconsin soil scientist F. H. King, whose observations of Asian agriculture in the years prior to World War I would form the basis of subsequent

"lessons" from Chinese farming in the 1930s through the present period, described the concept of Chinese permanence in his Farmers of Forty Centuries, or Permanent Agriculture in China, Korea and Japan (1911; reprint, Emmaus, Pa.: Organic Gardening Press, 1947); King's attitude towards Eastern culture is also developed in F. H. King, Soil Management (New York: Orange Judd, 1914); see also Rexford G. Tugwell, "Conservation Redefined," box 69, Tugwell Papers; Wallace, New Frontiers, 239; Pearl S. Buck, "The Land and People of China," China and America: A Chronicle of Cultural Relations 1 (October 1948): 3; Paul B. Sears, Deserts on the March (Norman: University of Oklahoma Press, 1935): 10-12; Walter C. Lowdermilk, "Other Lands--Dispatches from Japan," Land 11 (Summer 1951): 209-211; "China Looks Forward," Science News Letter, 22 January 1944, 55-56; "Foreign Correspondence," Land 4 (Autumn 1945): 407; Bert D. Robinson, "'The Shape of a Better World' Seen in Land Meetings at Louisville and Memphis," Soil Conservation 8 (December 1942): 127; Louise E. Howard, The Earth's Green Carpet (Emmaus: Rodale Press, 1947), 23; Paul Sears, "Human Ecology," Land 10 (Spring 1951): 24; R. Lord and K. Lord, Forever the Land, 6-7, 289-291; G. C. Watson, The Soil and Social Reclamation (London: P. S. King, 1938), 10-11; James Cameron Scott, Health and Agriculture in China (London: Faber and Faber, 1949); fascination with Eastern culture was a tangent of the desire for "harmony" and "balance" in the period.

10. Louis Bromfield, A Few Brass Tacks (New York: Harpers, 1948), 102; Neil M. Clark, "Peasant Sage," in Forever the Land, eds. R. Lord and K. Lord, 289; J. I. Rodale, The Organic Front (Emmaus: Rodale Press, 1948), 11-12; Sears, Deserts on the March, 169; G. V. Jacks and R. O. Whyte, The Rape of the Earth: A World Survey of Soil Erosion (London: Faber and Faber, 1939), 18.

11. Sears, Deserts on the March, 120; Hugh H. Bennett, "Address to the 6th Southwest Soil and Water Conservation Conference," 8-9 July 1935, box 10, file 8, Bennett Papers.

12. Hugh H. Bennett, "Soil Conservation" (address before the 41st Annual Session, Illinois Farmers Institute, Belleville, Ill., 20 February 1936), box 10, file 12, Bennett Papers.

13. Louis Bromfield, Pleasant Valley (New York: Harpers, 1945), 103; Hugh H. Bennett, "Unmaking a Continent" (address before the Brooklyn Institute of Arts and Sciences, Brooklyn Academy of Music, 22 April 1937), box 1, file 15, Bennett Papers; Faulkner, Uneasy Money, 53.

14.The Plow that Broke the Plains (Washington, D.C.: USDA, 1937); The River Washington, D.C.: FSA, 1937); Lord, Forever the Land, 31.

15. Faulkner, Uneasy Money, 18-19: Edward Faulkner, Plowman's Folly (Norman: University of Oklahoma Press, 1943): 19; Bromfield, A Few Brass Tacks, 116-117; more on Faulkner and Bromfield can be located in Randal Beeman, "Louis Bromfield Versus the 'Age of Irritation,'" Environmental History Review 17 (Spring 1992): 77-92; and Randal Beeman, "The Trash Farmer: Edward Faulkner and the Origins of Sustainable Agriculture, 1943-1953," Journal of Sustainable Agriculture 4 (Winter 1993): 91-102.

16. Louis Bromfield, Out of the Earth (New York: Harpers, 1948), xii-xiii, 5-6; Bromfield, A Few Brass Tacks, 11; Faulkner, Plowman's Folly, 3-7, 22-23, 52-53; Faulkner, Uneasy Money, 102-107; Edward Faulkner, A Second Look (Norman: University of Oklahoma Press, 1947), 26-27; Edward Faulkner, Soil Restoration (London: Michael Joseph, 1953), 110-123.

17. Bromfield, A Few Brass Tacks, 11, 90-95; Ralph Borsodi, "The Case Against Farming as a Big Business," and Louis Bromfield, "The High Cost of Poor Farming," both appear in Land 5 (Winter 1945-46): 25-28, 446-449.

18. Many of the criticisms of past mistreatment of soil resources are echoed in the Great Plains Committee, The Future of the Great Plains (Washington, D.C.: GPO, 1936); Ellen Bromfield-Geld, The Heritage: A Daughter's Memories of Louis Bromfield (New York: Harpers, 1962), 83-84; Bromfield, Out of the Earth, 14-15; "Deplores Farming Evils," Science News Letter, 3 July 1943, 43; Hugh H. Bennett quoted in Town Meeting: Bulletin of America's Town Meeting of the Air 5 (11 March 1940): 19-20; Wallace, New Frontiers, 239.

19. Morris L. Cooke quoted in "Clippings," box 327, Cooke Papers.

20. Alan Marcus and Howard Segal, Technology in America, 255.

21. For a great deal on the concept of interdependence, or the "culture of the whole," see the important work of William S. Graebner, The Age of Doubt: American Thought and Culture in the 1940s (Boston: Twayne, 1991), 69-100; in the farm revolt of the late nineteenth century, the concept of rural-urban balance and interdependence was already an area of discussion, as was the concept of the "inter-relations" between country and city in Liberty Hyde Bailey's The Country Life Movement in the United States (New York: Macmillan, 1913), 14-15, 49; this train of thought was expanded upon and supported strongly by ecological, sociological and agricultural thought by the 1930s. See also H. H. Hamlin, ed., Readings Related to the Structures for Agriculture (Ames: Collegiate Press, 1934), 137-162.

22. Hugh H. Bennett, "Soil Conservation," box 10, file 12, Bennett Papers, and "Soil Conservation--Our Common Concern" (speech to Farm and Home Week, East Lansing, Mich., 28 January 1948), box 11, file 36, Bennett Papers; Paul B. Sears quoted

in Lord, Forever the Land, 271; see also Gove Hambridge, "Soils and Men--A Summary," in Soils and Men: Yearbook of Agriculture 1938 (Washington, D.C.: GPO, 1938), 3.

23. Hugh H. Bennett, "Program of the Soil Conservation Service," box 10, file 8, Bennett Papers; an original edition of the founding manifesto of Friends of the Land is located in "Friends of the Land," box 141, Cooke Papers.

24. Stuart Chase quoted in Lord, Forever the Land, 64; Fairfield Osborn quoted in Henry F. Pringle, "A Prodigal Agriculture Can't Feed the World," Saturday Evening Post 11 September 1948; for more on this ethical "shift," see Aldo Leopold, A Sand County Almanac (New York: Oxford University Press, 1953, 1966), 217-241.

25. Lord, Forever the Land, 59, 190.

26. Lewis Mumford, "Power and Culture" (delivered to a special session of the 3rd World Power Conference, 11 September 1936), box 280, "3rd World Power Conference," Cooke Papers. For other examples of groups and individuals seeking rural-urban/agricultural-industrial balance in the period, see Marcus and Segal, Technology in America, 270-276; see also Randal Beeman, "'Chemivisions': The Forgotten Promises of the Chemurgy Movement," 68 Agricultural History (Fall 1994): 23-45.

27. Rexford G. Tugwell, "The Outlines of a Permanent Agriculture," (ca. 1935), box 69, Tugwell Papers; E. G. Cheney and T. Schantz-Hantzen, This is Our Land (St. Paul: Webb, 1940), 48-49.

28. Lowdermilk, Conquest of the Land, 33.

CHAPTER TWO: A PLANNED AND PERMANENT AGRICULTURE

"We often say that the farmer feeds all
the people. He must do more than this:
he must leave his part of the earth's
surface in more productive condition than
when he received it. This will be accomplished
by a better understanding of the powers
of the soil and means of conserving them,
for every well-managed soil should grow
richer rather than poorer; and, speaking broadly,
the farm should have the power within itself
the power of perpetuating itself."

- Liberty Hyde Bailey, 1908[1]

The soil and human crises of the 1930s and 1940s resulted in a call for Americans to recognize the interdependent nature of their world and forced them to take steps beyond merely discussing the idea of societal permanence. Permanent agriculture demanded an entire cultural makeover, not simply a change of techniques on the farmstead. The new husbandry required a rejection of individualism and the wholesale acceptance of the idea of a planned and permanent agricultural and economic system. Hugh Bennett explained the need to bring about a plan of action regarding the soil. "Past negligence is water over the dam," Bennett stated, "the important thing is that we have finally come to a cognizance of the problem of erosion, and an understanding of the physical land crisis so definently at hand. . . . Out of that understanding the forces which will shape a new era of land conservation are arising." Bennett was one of many soil conservationists calling for surveys and land use studies, multidisciplinary research, and coordinated planning between farmers, federal officials and academic investigators.[2]

Though the planning idea was not new to American society, the supporters of the permanent agriculture movement overcame several cultural, political and economic barriers to planning. They accomplished this task in part by the New Deal relief and recovery programs, which were initial steps in the permanent agriculture movement. Legislation and agencies, such as the first Agricultural Adjustment Administration (1933) and the Soil Conservation Service (1935), helped institutionalize government intervention in the marketplace and support for soil erosion programs. Other New Deal programs, such as those in the Resettlement Administration, increased the vitality of the notion of planning for a permanent agriculture. These programs, including the Subsistence Homesteads division, also emanated from a call for agricultural-industrial/rural-urban balance.

Planning and Permanence in Agriculture

Overcoming a national heritage of antagonism to planning, and fostering a concern for the long-term, intangible (beauty, health, permanence) aspects of the economic life of the nation were major goals for Hugh Bennett and company. Their loosely assembled ideological vision of a permanent agriculture based on ecological principals required a shift in the American attitude towards planning and cooperation. In the intellectual and institutional preparation for permanent agriculture, the authors of the concept rejected excessive individualism and the decay and squalor inherent in what they viewed as the unplanned, unbalanced, and un-democratic economy of their time.

Building upon the urgency created by the soil and human crises and an ascendant planning ethic, the authors of the permanent agriculture idea honed their concept during the early years of the New Deal era, both within and outside of governmental circles. Though aggressive programs promoting prototypes of planned and permanent agriculture

emerged in the USDA in the 1930s, organized agriculture and individual farmers still displayed a hostility to what they saw as the heavily bureaucratic and centralized New Deal agriculture program. Farm groups, especially the Farm Bureau, successfully promoted less dramatic programs to fight the soil and human crises, as well as decentralized decision-making in the conservation plan and other agricultural programs. Though the New Deal conservation and stabilization programs helped assist a crippled agriculture into the rejuvenating days of World War II, the permanent agriculture program lingered as a diffused, if urgent and provocative, ideology, an ideology that gradually developed a guiding force--ecology--and an effective communications strategy to promote itself.

Rexford G. Tugwell

Throughout the life of the permanent agriculture concept, from its initial stages in the 1920s through its relative decline in the early-1950s, one individual effort represented a small case-study in these first stages of ecological agriculture. A central figure of the permanent agriculture movement, Rexford G. Tugwell had held the positions of professional planner, economics professor at Columbia, New Deal "brains truster" and confidant of Franklin Roosevelt, as well as Under Secretary of Agriculture with Secretary Henry A. Wallace in the 1930s. Tugwell, who became a nationally recognized personality, benefited from an exceptional ability to grasp ideas, synthesize them, and communicate new concepts to political allies and the larger public. Often criticized as arrogant, radical, and communistic for his role as a New Dealer, Tugwell's voice resonated above the crescendo in the chorus hailing a planned and permanent agriculture. Tugwell echoed what many of his contemporaries, famous and unknown, were discussing, but his ability to stir

controversy, his willingness to champion and implement the planning idea, and his national audience made him a major voice in a movement that included such nationally-recognized persons as Aldo Leopold, Hugh H. Bennett, Paul Sears and Louis Bromfield.[3]

From his days as a professor in the 1920s through his halcyon years in the New Deal, Tugwell preached a gospel of planning, cooperation and societal permanence laced with increased doses of interdependence and ecological thought. Tugwell thought society operated for the benefit of self-serving, short-sighted "plutocrats" whose pursuit of individual interest drained society of its ability to provide comfort and sustenance for all its members. Tugwell chastised the prevalent American "belief in rugged individualism," that in his view led to "the conclusion that society is best served by the pursuit of individual interests in production." Regarding the soil crisis, Tugwell asked fellow citizens to picture the ominous results of continued individualism in agriculture. To further his message, he created a fictional English traveler in the year 2135. Having crossed a nearly dry Mississippi River, Tugwell's imagined voyager of the future approached the once mighty Missouri River, where he recalled "there was once a considerable city [presumably Kansas City] and that this was a country devoted to the cultivation of grain." The traveler noted that the grain belt farms were "now only moving piles of dust for a least a thousand miles. Of the city little remains except some skeletons of twisted steel."[4]

Tugwell joined many others in agriculture calling for planning and permanence from World War I onward, many of whom were associated with academia (especially the land-grant colleges) and the USDA. Planning in this pre-New Deal period focused on ways to promote "a better rural life" through improved management, collective action, and governmental intervention. (Such as the price support for wheat in World War I, the establishment of statistical support via the Bureau of Agricultural Economics, the Federal Farm Board, and so forth).

Yet even though a soil problem had emerged along with other concerns for agriculture prior to the New Deal, Americans, content in the growing urban-oriented mass-consumer economy, were criticized by the permanent agriculture group for having neglected the need for planning throughout the 1920s. Tugwell and Harry Carman, in their 1938 essay "The Significance of American Agricultural History," elaborated on the continued pressing need for a planned, balanced economy when they wrote, "We do not know what a permanent agriculture is, to say nothing of ways to insure it. While the shadow of industry lengthened from east to west, a decline of interest in country things has taken place. The center of our attention was the city. We were learning to build and govern it, to manage its economic affairs, to enjoy its pleasures." Tugwell indicated to his fellow citizens that because of this urban focus, "We are beginning to pay, in the 1930s, for seventy-five years of agricultural neglect. . . . Farmers are unwise because they have supposed their status to be permanent, the rest of us are unwise because we have lost any sense of intimacy with the rich arts of agriculture." [5]

Obviously, for Tugwell and the planned agriculture advocates, organization and cooperation were requisite traits for attacking individualism and embracing permanence. Tugwell harped against what he labeled the "moralists who created an individualistic ethic" for their "identification of capitalism with democracy." For Tugwell, freedom and democracy entailed responsibility to society and to non-human life, not simply to a right to make profits. He wrote: "If the race is to survive with freedom it must have a majority of men who will choose ways which will lead to survival," and not to the few who had been "allowed to dominate policy." Again, the planning idea was more than a set of techniques, it was a new ethic. Tugwell's call to planned permanence recognized that "Man is earthbound, soilbound, seabound, but no longer in any simple ways which any individual may determine for himself. He has got to live with others in a very social world. It is time

he learned to do it and make a virtue of his learning." Indeed, Tugwell's call for a new stewardship was strikingly prescient of Aldo Leopold's oft-discussed "land ethic." Speaking to graduating seniors at the University of New Mexico in 1935, Tugwell said "Now if ever your generation is required to assume the full stature of Americans, regard not only your rootedness but also the sun, the air, the water, and the soil of your environment as your sphere of interest." Tugwell also told the young graduates "You can have a system of institution which is as modern as the concrete and steel of our architecture, as flexible and efficient as the science of factory management, and they can be turned to the uses of liberty, democracy and good living which are the canons of our tradition. But you cannot have these things by default, you will have to create them . . . protect and nurse them, and perhaps recreate them as conditions change again and again."[6]

Opposed to planning was the "speculative competition" which Tugwell portrayed as "the sickness of our system." Yet planning had to disengage from both a blind faith in profit and a fear of dictatorial control. Tugwell suggested "measuring prosperity by profits" was a poor economic indicator, feeling instead that "we ought to measure it by our people's living standards. Then we could find a way to permanent prosperity." In other words, permanent and planned agriculture required a fresh definition of "efficient" farming, which, according to noted agricultural economist Sherman E. Johnson "for the individual that does not necessarily mean the highest profitable combination of land, labor and equipment it would be possible to devise. Nor does it necessarily mean maintenance of land and buildings at a high standard of physical productivity, nor following the best-known technical production practices. It means rather the estimating of the highest possible in a given situation and a balancing of present and future incomes." Johnson went on to say, "In the public interest it may be desirable to prevent soil depletion which results

in the extreme need for present income by individual operators. The group as a whole is better able to strike a balance in favor of future income than is an individual."[7]

For USDA economist Bushrod Allin, farmers and other citizens required assurances "not only that planning is compatible with democracy, but that democracy cannot be preserved without planning." Though critics railed against the allegedly heavy-handed programs of the New Deal, for the most part the plans for permanent agriculture all sought to balance the rights of individuals versus the coercive duty of society to effect a program of permanence. To adhere to humane and democratic principles, the land program tried to develop "an economic policy in line with physical necessities. As such, the method appropriate for dealing with it must include economic and social techniques which provide adequate inducements for or remove existing handicaps to the adoption of proper physical techniques." This would initially include (ca. 1936) professional land management, government purchase of marginal land, and a dedication to non-dictatorial planning that still conceded an increased interventionist power for the federal government in agriculture.[8]

In an age devoted to the ideal of interdependence, a planned and permanent agriculture, from the view of Henry A. Wallace and other agrarian scientist-philosophers, would rise from a multidimensional understanding and approach to the soil problem. In a memo to Hugh H. Bennett in 1935, Wallace cautioned his subordinate that the plan to end the soil crisis, in order to be "effective, permanent and economically feasible," would involve "more than the use of vegetative and engineering methods" including general land use planning, proper crop rotations, and "the application of other sound farm management practices." Hence, for the Secretary of Agriculture, "every branch of the Department is concerned, should be called on, and should cooperate at all times in shaping and carrying forward a practicable program."[9]

Clearly, the concept of a planned and permanent agriculture infected the top level of national leadership in the 1930s. Franklin Roosevelt, who liked to call himself a farmer, asked Congress to sponsor a "prudent husbandry" in a 1937 address to that body. "Nature has given us recurrent and poignant warnings through dust storms, floods, and droughts" stated the President, "that we must act while there is yet time if we would preserve ourselves and our posterity the natural resources of a virile nation." Morris L. Cooke, engineer, planner and social reformer, added weight to FDR's challenge to effect planned permanence. In a 1938 article "Is the United States a Permanent Country?," Cooke told readers that "unless there is a marked change in our present agricultural methods, we have, as a virile nation, perhaps less than 100 years to go. The United States is not a permanent country unless we make it so." Cooke, Allin and others thought that the attitude of planning and permanence took hold by the late-1930s. People finally embraced the land "as a place to settle down and live instead of just camp on long enough to skim off the cream of resources and then move on." Still, a lingering sensibility from Cooke and others suggested that the permanent agriculture program should be "wisely and vigorously applied, not merely talked about." The alternative being a future where "we may wake up some bleak dawn to find ourselves indeed a poor nation, our chances for abundance vanished or seriously impaired."[10]

In the 1930s, a program for a planned and permanent agriculture evolved with varying degrees of success. New Deal programs, such as the Soil Conservation Service and the Resettlement Administration, offered ambitious but essentially piecemeal attempts at permanent agriculture. Furthermore, critics outside of government also offered ideas on what would bring a new and enduring husbandry. Eventually these efforts merged with the more cohesive guiding force of ecology, yet still the 1930s attempts at permanent agriculture did show a newfound reception in all quarters regarding planning for

permanence and abundance. Nonetheless, concerns over price, centralized control by Washington bureaucrats, and a lingering devotion to individualism, all vitiated against the permanent agriculture program, setting the stage for a greater incorporation of holistic ecological thought into the permanent agriculture camp.

The idea of a planned and permanent farming regime grew from its embryonic stage with the onset of the soil and human crises in the 1930s. Proposals for agricultural permanence, championed by individuals from diverse political persuasions, emerged even prior to the far-reaching agricultural legislation of the New Deal. The first specific plans for permanent agriculture emerged in the late-1920s and continued to escalate in scope and complexity through the 1940s. Critics of past practice and policy from outside of government were among the first to offer a platform for the new husbandry.

"Distributist," agrarian-intellectual Ralph Borsodi helped foment an agricultural ideal linked to the Back-to-the Land Movement of the 1920s and early 1930s. Despising the city and the mass culture that it appeared to produce, the Borsodi clique favored a decentralized, subsistence agriculture antagonistic to capital, capitalism, and science and technology as it was then guided. [11]

Borsodi agrarianism was eventually joined with the rhetorical impulses of other agrarian groups such as the fabled "Nashville Agrarians" (or "12 Southerners") who enjoyed brief notoriety in the early-1930s. These fundamentally conservative agrarians called for an attack on "irresponsible" agriculture through such compulsory measures as stiff inheritance taxes (except for inheritors who passed successful husbandry reviews from "soil court"), a ban on mortgage foreclosures that failed to pass a "court of equity," rights of escheat for government, a ban on "speculative" land purchases and land sales to real estate and insurance firms and banks, fines for not halting erosion, and a denial of credit to non-cooperating farmers. Much in the vein of Henry Ford's Village Industries concept,

Nashville agrarian Frank Owsley believed that society had to be balanced between agriculture and industry if America's farms were to continue feeding and clothing the nation. Owsley called for "a modified from of feudal tenure where, in theory, the King or state has a permanent interest in the land." The key idea here is that the state had an interventionist role in the quest for permanent agriculture. The program of Owsley and friends called for the creation of stronger regional governments, based on geographic and economic parameters, which had the power to impose land policy on states, counties, and localities. Again, the end behind these means of permanence was the creation of an enduring society, in this case based primarily on assumptions regarding the virtue of agrarian life. For Owsley, the ideal behind the new plan for agriculture was the advent of a society where "art, music and literature could emerge into the sunlight from the dark, cramped holes where industrial insecurity and industrial insensitiveness have driven them."[12]

While governmental outsiders promoted state intervention to preserve the soil and promote rural life, the rise of permanent agriculture was indelibly tied to the agricultural-social planning of the New Deal. While the initial focus of Roosevelt's USDA was to cut agricultural surplus and alleviate the general depression crisis, the concept of a soil crisis and a permanent agriculture also animated the New Deal agenda. Rexford Tugwell's theories epitomize the shift away from simple issues of prices and allotments towards a comprehensive land program geared for permanence. Speaking to a group of economists and statisticians in 1933, Tugwell told his audience that the federal government would "perform two functions with respect to our land in the future. It will directly hold and administer, as public forests, game preserves, grazing ranges, recreation centers and the like . . . and it will control the private use of the areas held by individuals to whatever extent it is found necessary for maintaining continuous productivity." Tugwell legitimized

his stand for federal interventionism, stating that "It is only by conceiving the government in this double active and supervisory role that we can expect to attain a permanent system of agriculture. . . . past developments . . . have demonstrated the ineffectiveness of a land system which depends on private management."[13]

For a time in the early to mid-1930s, the idea of planned permanence seemed ascendant. The sense of crisis had stripped down old barriers to governmental invention in the nation's economic life. Tugwell indicated that "the shock of the depression has at last awakened us to a new attitude . . . the necessity for devising a plan which shall draw together our divergent efforts and look forward as far as is possible toward a permanent policy." Tugwell finally positioned himself to implement ideas he had advocated as far back as the 1920s. While acknowledging the immediate need to correct the surplus and provide rural relief, Tugwell's ideas went far beyond manipulation of production and markets. For Tugwell, agriculture had to be profitable without being attached to monoculture, cash crop farming, which, recall, the erosion apostles deemed to be the major cause of both market imbalance and soil depletion. Tugwell lamented the monocultures of corn, cotton and wheat that brought tenancy, which he equated with modern serfdom. He called for, among other things, a withdrawal of public lands from public entry, (still in place from the 1862 Homestead Act), a prevention of the "familiar abuse" of overgrazing on public lands, and "careful investigation and planning" for the retirement of "sub marginal" lands in three select regions--Appalachia, the Michigan to Minnesota "cutoff" area, and the Great Plains. Tugwell's outline of permanent agriculture called for a devotion to cooperative planning and the employment of scientific expertise to attack the problems of farming and farm life. While he saw no quick or simple solutions, Tugwell envisioned a system of rural-urban balance, arising from new, smaller-scale manufacturing technologies and better transportation, and predicated on semi-agricultural

"rurban" villages where part-time employment in industry or forestry would be supplemented by five acre family subsistence plots. Tugwell fiercely advocated total soil conservation and a switch in land use from regional monocultures to regionally designated tree, fruit, or grassland agriculture. [14]

The intellectual Tugwell formed part of a faction in the Roosevelt administration which saw that the time had come for permanent agriculture. Other noted social scientists. such as Howard Tolley and M. L. Wilson supported the idea of structuring a long-term plan for agriculture. In 1934 Tolley thought it "imperative that we think ahead of the present stage of agricultural reorganization and set up a permanent land program." Wilson suggested that restoration of the soil presented "the opportunity for expressing our best instincts" as "the key for better standards of rural living." Higher ranking supporters of planned permanence included Agricultural Secretary and later vice-president Henry A. Wallace and President Roosevelt himself, although in a more tangential fashion than individuals like Tugwell, Bennett, and Cooke. Wallace wrote in 1934's New Frontiers that "we should outline a [land] policy to continue over many administrations, and stick to it for the sake of our children and their grandchildren." For Wallace, the alternative to interventionist land policies was to "maim and misuse our heritage." By 1937, Wallace reported to his boss that "our government is engaged in a vast land use program looking toward wise husbandry of our land resources, both public and private."[15]

A detailed account of the New Deal's attack on the soil crisis would require volumes. Generally speaking, the New Deal's vast, oft-changing and paradoxical plans for agriculture offered short-term relief in terms of price supports or production allotment programs, longer-term plans for recovery including increasing the amount of credit available to farmers, and long term reform ideas, such as soil conservation or the "ever-normal granary," that sought to stabilize and perpetuate the agricultural community

through governmental leadership. Though it would be easy to associate many of the New Deal programs with the concept of planning for permanence, it also fruitful to see how major supporters of permanent agriculture, including Bennett and Tugwell, presented and employed their ideas once they attained greater status and power as World War II approached.

Under Bennett's leadership, the SCS plan eventually coalesced into the watershed approach, a "coordinated plan of correct land use" that sought to juggle the rule of experts, local decision-making, and nationally mandated soil conservation policy. (Often linked to other USDA price programs, such as the Soil Conservation and Domestic Allotment Act of 1936.) Despite this jumbled approach, the Soil Conservation Service (SCS) program for restoring the soil was far-sighted and effective. It called for cooperation between farmers, the SCS and the land-grant colleges, which would provide the knowledge for creating "new farm operations." The program included retirement of erosion sensitive soils from production and the use of such conservation measures as reforestation, replanting crop land to grass, using grass strips between crop rows. the planting of cover crops, basin listing, contour furrowing, building ponds and terraces, and improving crop rotations. Though the SCS was by no means a perfect organization, its employees displayed zeal and expertise as they helped save the soil, and its leader, Hugh Bennett, used the soil to attain a national audience for his views on permanent agriculture.[16]

Rexford Tugwell also implemented many concepts for planned permanence during his days at the USDA. Most notably, his leadership of the Resettlement Administration (RA) represents the opportunities and pratfalls for the "planned permanence" idea in its formative years. The RA sought to relocate and retrain rural people who lived on land deemed sub-marginal. Behind the resettlement idea was the notion that the soil and human

crises could be countered through education, planning, and a respect for perpetuating rural-urban balance. Its Subsistence Homesteads Division (transferred from the Department of the Interior) supported the construction of model communities based in part on the ideas of individuals like Ralph Borsodi, who eventually participated in one of the RA projects. The RA also sponsored the fabled Greenbelt Cities program, another attempt at rural-urban/economic-ecological balance. Though a crucial chapter in the early quest for implementing the permanent agriculture idea, the radical social reform aspects of the New Deal were far less successful than the more tangible successes of other more "practical" programs such as that of the SCS, the Tennessee Valley Authority, and the Rural Electrification Administration. The RA often worked at odds with other policies intended to remove marginal farmers from the land, and suffered from a lack of support by labor, which felt threatened by the idea of a dispersed labor force. Tugwell also charged that the RA lacked money and congressional support and suffered from its "experimental" status and opposition from the press, the American Farm Bureau Federation, growing public disinterest in conservation issues, and the general reign of "sentimentalism" and "prejudice" in the rural community.[17]

Clearly, the bolder social reform programs of the New Deal were not as successful in implementing the permanent agriculture idea as were the more practical programs of the SCS. Still, the SCS drifted away from a focus on planning and permanence due to calls for decentralized control of the decision-making process, reflecting a challenge from the farm states towards the perceived heavy-hand of the Washington bureaucracy. The attack on the soil crisis also suffered from the oft-changing nature of the overall farm program, the vagaries of a market influenced by overseas affairs, problems over "local variations in physical and economic conditions," difficulties in coordinating federal, state and local officials and duplication and lack of communication between the SCS and the land-grant

schools. The SCS program also sustained damage by its rapid implementation and the sheer scale of the soil problem.

Though planning and permanence were given an effective trial in the early New Deal, the soil crisis lingered. Thus, Morris L. Cooke was forced to tell President Roosevelt in 1937 that though "more has been done in the last three years to curb accelerated runoff and erosion than in all previous history," the "damage is undoubtedly spreading faster than control measures are being applied." Cooke asked the President to approve a plan that would hit problem areas within fifteen years, and complete a total soil restoration of the country within forty years. Obviously, the concept of a permanent agriculture was not radically reshaping American farming, despite successes in the soil conservation program. Still, the evolution of permanent agriculture in the 1930s helped bring some changes in the theory, practice, and policy of agriculture. The putative attempts at a planned and permanent agriculture converted many to the idea that "farms must be treated as organic, integrated units," interdependent with the greater physical, social, and economic environment. Yet in 1940, the faith in a planned and permanent agriculture seemed to be floundering amid the many issues and concerns of the period, including the international crisis and debate over farm policy, including Henry Wallace's call for an "ever normal granary." [18]

The concept of permanent agriculture clearly needed a more defining science to describe its planned world, and, as a reformist-utopian ideology, it also required a more **spiritual** guide than simply planning for permanence. Like a religion, permanent agriculture needed an animating spirit and new evangelical zeal that would take the idea beyond a simple call for planning or the constant announcement of crisis to a information-laden public. Ecological thought would provide the scientific guidelines and missing spiritual, millennial animus to permanent agriculture, and its adherents would effectively

proselytize the new religion of permanent *ecological* agriculture before the American people.

Notes

1. L. H. Bailey, The State and the Farmer (New York: Macmillan, 1908).

2. Hugh H. Bennett, "Soil Conservation," record group 114, box 97, "Hugh H. Bennett," Papers of the Soil Conservation Service, Great Plains Regional Depository, National Archives, Kansas City, Mo. (hereafter NA KC).

3. Tugwell is one of the most notable and least understood of the "personalities" in the New Deal. His career placed him at the center of the soil and human crises in the period. Prior to his life as an FDR "brains truster," Tugwell had been a controversial economics professor at Columbia University, influenced in part by the social activism of his former professor, exiled academic Scott Nearing. Tugwell served as the highly influential and controversial assistant and then under secretary of agriculture at the USDA from 1933 to 1939, and in 1941 (after a brief tenure as a city planner in New York City) began a four-year stint as governor of Puerto Rico, where he focused on soil erosion problems. Tugwell also taught in the post-war years, and continued to expound on the concept of ecology at the University of Chicago in the 1950s. Tugwell's historical legacy is preserved in his vast collection of personal papers held at the Franklin D. Roosevelt Presidential Library. For general accounts by Tugwell of his New Deal Years see Rexford G. Tugwell, The Diary of Rexford G. Tugwell: The New Deal, 1932-35 (New York: Greenwood Press, 1962); Rexford G. Tugwell, The Battle for Democracy (New York: Columbia University Press, 1935); Rexford G. Tugwell, The Brains Trust (New York: Viking, 1968); Rexford G. Tugwell, Roosevelt's Revolution: The First Year, A Personal Perspective (New York: Macmillan, 1977).

4. Rexford G. Tugwell, "Conservation Redefined," box 69, Tugwell Papers.

5. Apparently, the term "permanent agriculture" was coined by University of Illinois agronomist Cyril G. Hopkins ca. 1868. For an exposition of his views on soil fertility, which are ironically distinct from the ideas of ecological agriculture, see Cyril G. Hopkins, Soil Fertility and Permanent Agriculture (Boston: Ginn, 1910); for more on planning in the period see O. W. Willcox, Reshaping Agriculture (New York: W. W. Norton, 1934); for more on a prominent early advocate of planning and permanence see Morris L. Cooke, Our Cities Awake (New York: Doubleday, 1918); for more on Cooke see Jean Christie, "New Deal Resources Planning: The Proposals of Morris L. Cooke," Agricultural History 53 (July 1979): 507-606; Bushrod W. Allin, "Historical Background of the United States Department of Agriculture" (lecture delivered to the Agricultural Workers of the United States Department of Agriculture and the North Carolina State College for Agriculture and Engineering, Raleigh, N.C., 4 October 1940), box 1, file 8, Bushrod W. Allin Papers, Archives of American Agriculture, Parks Memorial Library, Iowa State University; Harry J. Carman and Rexford G. Tugwell, "The Significance of American Agricultural History," Agricultural History 12 (April 1938): 100-103.

6. Rexford G. Tugwell, "Earthbound: The Problem of Planning and Survival," Speech and Writings file, box 69, Tugwell Papers; Tugwell quoted in Washington Star, 29 June 1941, Press Clippings, box 27, file 1, Tugwell Papers; Rexford G. Tugwell, "Your Future and Your Nation" (commencement address, University of New Mexico, 10 June 1935), Speech and Writings file, 1935-37, box 57, Tugwell Papers.

7. Rexford G. Tugwell, "Resettlement Administration" (speech given at Olympic Auditorium, Los Angeles, 28 October 1935), Speech and Writings file, 1935-37, box 57, Tugwell Papers; Sherman E. Johnson, "Definitions of Efficient Farming," Land Policy Review 2 (September-October 1939): 22-23.

8. Bushrod W. Allin, "Is Planning Compatible With Democracy" (speech given to the Society for Social Research, University of Chicago, 22 August 1936), box 1, file 1, Allin Papers.

9. Memo, Henry A. Wallace to Hugh H. Bennett, June 6 1935, Henry A. Wallace Papers, microfilm IA 20-845, University of Iowa Library.

10. Franklin D. Roosevelt quoted in Edgar B. Nixon, ed., Franklin D. Roosevelt and Conservation, vol. 2 (Hyde Park, N.Y.: National Archives, 1957), 68-69; Morris L. Cooke, "Is the United States a Permanent Country?" Forum and Century 49 (January-June 1938): 236-240; Bushrod Allin and Ellery A. Foster, "The Challenge of Conservation," and Hugh H. Bennett, "Our Soil Can Be Saved," in Yearbook of Agriculture 1940 (Washington, D.C.: USDA, 1940), 416-437.

11. For an introduction to Borsodi's thought, see Ralph Borsodi, Flight from the City: The Story of the New Way to Family Security (New York: Harpers, 1933).

12. Quotes taken from Frank Owsley, "The Pillars of Americanism," (originally published 1935), reprinted in The Superfluous Men: Conservative Critics of American Culture, 1900-1945, ed. Robert M. Crunden (Austin: University of Texas Press, 1911), 164-207; for more on Henry Ford's village industry concept, see Marcus and Segal, Technology in America, 270-272; and Reynold Wik, "Henry Ford's Science and Technology for Rural America," Technology and Culture 3 (Summer 1962): 247-258.

13. Rexford G. Tugwell, "The Place of Government in a National Land Program" (address to joint meeting of the American Economists Association, the American Statisticians Association, and the Farm Economic Association, Philadelphia, 29 January 1933), Speech and Writings file, 1932-33, box 55, Tugwell Papers.

14. Rexford G. Tugwell, "Farm Relief and a Permanent Agriculture," Annals of the American Academy of Political and Social Science (March 1929), reprint in box 55,

Tugwell Papers; Rexford G. Tugwell, "An Outline of a Permanent Agriculture," (n.d.), box 69, Tugwell Papers.

15. Tolley and Wilson quoted from compilation of quotes related to soil conservation located in box 141, Cooke Papers; Henry A.Wallace, New Frontiers (new York: Reynal and Hitchcock, 1934), 248; Wallace quoted in Edgar Nixon, ed., FDR and Conservation (Hyde Park: National Archives, 1957), 144-145; see also Morris L. Cooke, "An Engineer Blueprints a New America," New York Times Magazine, 15 November 1936, 4-5, 19; and Charles E. Kellogg, The Soils that Support Us (New York: Macmillan, 1941), 273-291.

16. Hugh H. Bennett, "A Major Effort at Erosion Control," The Land--Today and Tomorrow 1 (October 1934): 1-5; Hugh H. Bennett, "Emergency and Permanent Control of Wind Erosion on the Great Plains," Scientific Monthly (November 1938): 381-399; Hugh H. Bennett, "A New Farm Movement takes Rapid Root," Soil Conservation 6 (February-March 1941): 1; T. B. Chambers, "Field Operations of the SCS," (radio broadcast on NBC network, 7 August 1936), box 1, CPR7, Papers of the Soil Conservation Services, RG 114, NA KC; Bushrod W. Allin, "The County Planning Project: A Cooperative Approach to Agricultural Planning" (address to the American Farm Economists Association, Philadelphia, 28 December 1939), box 4, Allin Papers; for critiques on New Deal policy from outside of government but within the permanent agriculture camp, see Louis Bromfield, A Few Brass Tacks (New York: Harpers, 1948), 38, 152-57. Charles E. Kellogg, a soil scientist whose views often supported the concept of permanent agriculture, would later remark to his colleagues that prior to the early 1940s, the vast changes in agriculture resulting from science and technology had led to confusion and duplication in research. See Charles E. Kellogg, "A Challenge to America's

Soil Scientists," Proceedings of the Soil Science Society of America 25 (November-December 1961): 419-23.

17. Rexford G. Tugwell, "The Resettlement Idea," Agricultural History 33 (October 1959): 159-163; for more on the inception of the resettlement idea, including the ideas of Borsodi and the back-to-the-land movement, and for the workings of the RA, see Russell Lord and Paul Johnstone, A Place on Earth: A Critical Appraisal of Subsistence Homesteads (Washington, D.C.: USDA, 1942), Raymond P. Duncan, A Federal Resettlement Project: Granger Homesteads (Washington, D.C.: Catholic University of America, 1937), 6-22, 164-173.

18. Morris L. Cooke to Franklin D. Roosevelt, 31 January 1937, Presidential Papers of Franlklin D. Roosevelt, Official File 728-736 box 1, FDR Library; Ward Shepard, Food or Famine: The Challenge of Erosion (New York: Macmillan, 1945), 206; Russell Lord and Kate Lord eds., Forever the Land (New York: Harpers, 1951), 52-54.

CHAPTER THREE:
AN ECOLOGICAL BASIS FOR CULTURE AND AGRICULTURE

In the most fundamental sense, the concept of permanent agriculture required far more than soil conservation and production allotments, price-support programs or bold social engineering. While these programs and techniques were steps toward permanent agriculture, the new farming system was also an ethical, almost spiritual ideology. It required a rejection of past assumptions regarding the land and a new governing cosmology for agriculture. Increasingly, from the late 1930s through its decline in the 1950s, the loosely assembled permanent agriculture school had the science and philosophy of ecology at its vortex. As a science, ecology, at that time, based itself on then-prevailing currents such as interdependence, "balance," and harmony. As a philosophy, ecology's then current body of ideas were easily adapted to the social and biological dimensions of the soil crisis. Throughout the late 1930s through the early 1950s ecological ideas permeated the message and method of permanent agriculture. Ecology offered a foundation for both culture and agriculture, as agricultural issues helped herald a new epoch of human history--the Age of Ecology.

Ecology presented a new way of looking at society. Humanity no longer enjoyed a privileged seat at the center of the table of creation. Instead humans were revealed as an obtrusive yet influential element in a delicate, intricate web of life. To its advocates and investigators, the holistic ecology of the interwar years offered a guide to organize society in a more harmonious fashion, as dictated by the ecological observation of nature's enduring balance. In other words, ecological thinkers had to find ways to understand human interactions with each other and with the biological universe that surrounded them

and supported them. This quest entailed a greater respect for life and a greater understanding of the environmental consequences of human activities.

As the major human interaction within the biotic community, agriculture was particularly ripe for ecological inspection, and was already infected with ecological thought from the 1930s onward. For the ecologically minded permanent agriculture camp, proper farming was no longer a matter of simply getting a good price for crops or building some terraces to prevent erosion. In the proposed regime of permanent, ecological agriculture, a sound agriculture arose from a consideration of multiple factors under which agriculture functioned. It also dictated a more comprehensive understanding of the broader physical and social environment of which agriculture was a part. Ecology became the mind of the new agriculture. Planning became its nerves. Social reform and societal salvation became its heart. As a body, the new type of farming operated under the simple dictum of following the "timeless and effortless" model of nature.

Specifically, the exponents of permanent, ecological agriculture championed such agroecological ideas as soil restoration via humus building cover crops and composts, multiple cropping and crop diversification as opposed to monocultures, tillage systems, terracing and other soil saving techniques, biological versus chemical control of pests, use of on-farm fertilizers as opposed to the use of purchased chemical fertilizers, among other ideas. These and other changes on the farmstead were purported to effect a great transformation in which the culture of waste and soil exploitation gave way to a new husbandry that mirrored the perennial bounty of nature. The new farming would also save and rebuild soil and create dynamic increases in crop yields per acre with lower costs for farmer and better, cheaper food and fiber for the consumer.

Yet in keeping with the expansive definition of ecological thought in the period, the promoters of permanent, ecological agriculture thought beyond simple changes in farming methods and machinery. To the most convicted advocates, the new ecological

agriculture embodied part of a more general awakening of holistic, organicist thought. In the period from the mid-1930s through the splintering of holistic, balanced ecology in the 1950s, ecology was as much a philosophy as well as a physical science. Ecology's central ideas for describing nature--harmony, balance, stability, also served as keywords in fighting the general societal crises of the time, including depression, war, and the difficulties of urbanity and mass production. For the proponents of permanent agriculture, whether they were small farmers, powerful bureaucrats, noted scientists, or conservationists, an ecologically based agriculture promised hope for a world that appeared near ruin. The alleged benefits of permanent agriculture were sundry: By farming "vertically," producing more per acre rather than expanding output by expanding land under cultivation, efficient small-scale farmers could survive economically and thus help preserve rural culture. Furthermore, permanent, ecological agriculture promised to bring "true efficiency," sparking giant yields of new and old market crops, used partially for inexpensive food and partially for low cost and renewable supplies of raw materials via chemurgic processes. The new abundance would also mean that "marginal" land could be retired for forestry, grasslands, and wildlife preserves.

Also, crops produced under ecological guidelines promised to be healthier to humans, according to advocates, and the new tillage systems promised to help revitalize the nation's waterways. By creating rural-urban/agricultural industrial balance, and producing incredibly inexpensive supplies of food and fiber, permanent agriculture also promised to usher in a new era of permanent peace and prosperity. Among the most idealistic of the permanent agriculture camp, the new ecologically inspired farming system promised to create a world with such abundance that people would simply have no reason to go to war. While this utopian or dystopian aspect of the permanent agriculture movement would contribute to its fading away, for a brief culminating in the war years of

the 1940s, the apostles of permanent agriculture effectively broadcast their message to a surprisingly interested public.

Communicating the ideas of ecology and conservation became the most important and fascinating aspect of the permanent agriculture movement. Though books, speeches, radio programs, education programs, and most importantly, the conservation organization Friends of the Land, the most vocal adherents of the permanent agriculture concept were at least able to purvey their ideas before a nationwide audience. Throughout the 1940s permanent agriculture merged ideologically with the war crisis and to considerations of the post-war world. But as an idea, an ecologically based culture and agriculture appeared implausible to Americans as a whole in the period. Several factors worked against the entrenchment of the permanent agriculture idea, including resistance from agricultural scientists and agricultural corporations, the onset of the Cold War, a lapse in concern regarding soil conservation and the environment, high farm prices and government supported production programs.

Still, by reaching a large audience of Americans, the promoters of permanent agriculture were at the vanguard of the American environmental movement. Three decades prior to Earth Day I in 1970, they preached ecological ideas that seem pertinent to current, 1990s environmentalists, even if these messages were not heeded in their day. But these voices, though prescient in many ways, reflected more the concerns of their day than the concerns of the postwar "lifestyles" revolution. In a time when the future appeared bleak, the proponents of permanent agriculture sought to build a lingering prosperity to achieve peace and the fulfillment of American democracy. Hugh Bennett illustrated the sense of ethical urgency in the permanent agriculture agenda when he stated "Productive land and the sensible agriculture that goes with it are indispensable to a decent standard of living and prosperity. . . . That is why I believe this Nation cannot afford to delay the prosecution of a far-reaching, determined, and persistent program for

conservation. . . . Defense of the land . . . is an inescapable part of national defense." Thus Bennett tied his training as a scientist with his idealistic visions of a world prosperity based on sound ecological management and the spirit of stewardship.[1]

Bennett was not alone in suggesting a scientific basis for ethical reform. In modern times and particularly since Darwin, many individuals and "schools" used science, or what they labeled science, as the basis for constructing systems of personal and societal ethics. Social Darwinism (or more correctly Social Spencerianism) or the racial supremacy idea manifested in the Eugenics movement present two cases where people employed "science" to justify misguided and ignoble endeavors such as imperialism and institutional racism. In contrast, the science of ecology became a foundation for a proposed new ethical system devoted to the individual dignity of all life, mutual cooperation among individuals and species, and the increase and perpetuation of a prosperous and peaceful civilization.

Though Aldo Leopold is often lauded by historians and environmentalists for his elucidation of the "land ethic," Leopold was simply one of many scientist-philosophers in the interwar period who had recognized that humanity's survival was hinged upon recognizing the delicate and vital interrelations among life forms in what began to be called "the environment." For the practitioners and proponents of permanent agriculture in the 1930s and 40s, ecological thought nurtured the adoption of a new mentality geared toward plenty, permanence, and aesthetic beauty.

For academic ecologist and noted conservationist Paul B. Sears, writing in his Life and Environment (1939), the "social function" of ecology was to "provide a scientific basis whereby man may shape the environment and his relations to it, as he expresses himself in and through his social pattern." Sears and colleagues used ecological concepts to form an ethical system that incorporated both anthropocentrism and biocentrism and a range of ideas that would embody the environmental ethic as it emerged in the postwar years. On one hand, ecology suggested a new respect for the non-human world, effectively

illuminating the notion that humanity posed the greatest threat to life on earth. On the other hand, ecology also presented an avenue for salvaging a nearly bankrupt human society by harnessing the "economy of nature" for such ends societal permanence, physical beauty, and overall human health and prosperity. Though Sears found many like-minded thinkers in his push for an all-encompassing ecological world view, Professor Sears thought that presenting the new ethical system to the public at large would be an arduous endeavor, as Americans, "with a few notable exceptions . . . despise the earth upon which [they] depend." Sears (following in the footsteps of Russia's eminent biologist, geographer and anarchist, Prince Kropotkin) saw Darwin's evolutionary theory in a different light than the followers of so-called Social Darwinism. For Sears the "highest opportunity for eventual human freedom and dignity lie[s] precisely in the fact that we are products of evolution. As responsible units in the great web of life, we can be guided by an infinitely long inherited experience, built into our bodies and minds and shaping our decisions in the interest of our own species." [2]

Understanding the call for a planned and permanent agriculture in the 1930s and 1940s requires an understanding of the ecological-ethical underpinnings of the major adherents of the permanent agriculture idea. Coined in 1866 by German Darwinist Ernst Haeckel (oecologie), the term ecology literally means "household economy," but has been defined over the years as the science dealing with the interrelations between life forms and their environments. (Though ecology has consistently been built on the study of biological and social interrelationships, exactly what ecology means and what ecologists do has varied greatly over the years.)

Several currents led to the development of ecology as an academic discipline and as a foundation for a new ethical system in the nineteenth century. European organicist thought (such as that of Baruch Spinoza), the rise of natural history (culminating with Darwin) and the growth of scientific disciplines such as entomology, botany, mammalogy,

and limnology, as well as the work of sundry individuals from German phytogeographer Alexander von Humboldt or American scientist Stephen Forbes, all fed into the growing stream of ecological thought. Also, as Anna Bramwell has suggested, German romanticism and the British rural folk heritage (including the agrarian/planning influence of Patrick Geddes) also contributed to the more holistic, social reformist and political aspects of ecological thought in its early stage.[3]

By the 1890s American scientists such as botanists Henry C. Cowles, Charles Bessey, and Frederic Clements, began to pursue "ecological" research, though the term ecology was still unknown to most dictionaries at the turn of the century. Clements and animal ecologists help make the United States a leader in ecological research in the first decades of this century. Defining what ecology was supposed to do and who was to undertake ecology was a major area of contention in the early years. By the onset of the World War I British scientists formed an ecological society, and in 1915-16 the Americans followed suit by founding the Ecological Society of America, (with the journal Ecology appearing a few years later in 1920). Though the field found some unity between those studying the ecology of plants and animals, the discipline of ecology was still divided and ripe for criticism in the post-World War I years, as it lacked theoretical and academic-bureaucratic unity. Barrington Moore, writing in the first issue of Ecology in 1920, saw the need for a new synthesis in the field between plant, animal and human ecologists. Moore expressed his desire for ecologists to rise above internecine squabbles and expand their discipline by offering some threads of theoretical unity, as well as practical, applied research that would allow ecology to catch up with its burgeoning academic competitor--the field of genetics.[4]

Though the discipline of ecology remained divided over theory, method, terminological excess, and academic turf wars, in the interwar years Frederic Clements, Victor Shelford and many others pursuing ecological research offered a definition of

ecology which synthesized plant, animal, and eventually human ecology. Clements defined himself as an early synthesizer, having written the first American guide to the field in 1905, entitled Research Methods in Ecology. Clements and company defined ecology not as a science of collecting and describing individual specimens, rather they saw ecology as the "science of communities." Clement's fabled "climax" concept was the key of this early synthesis. The early American ecologists also sought to give their work a practical hue by integrating ecological research into the burgeoning revolution of agricultural science in the United States. Ecology also became an important aspect in such fields as meteorology and game management.[5]

In the theoretical or methodological sense, for the first half of the twentieth-century the "climax" concept guided (with exceptions) ecological endeavors. In brief, Clements and followers saw units of vegetation (or in the case of Victor Shelford, animals) as parts of interdependent, evolving, successional communities. These communities, over time and space, would eventually develop from simple units to complex, evolved systems that would eventually reach a stable-state, or climax. In a process of dynamic equilibrium, plant or animal communities rarely reached a true state of climax, still for Clements and the climax school, the course of nature was a directed process, a process always advancing toward an eventual, perpetual state of harmony and balance. Though the climax school dominated ecological investigations in the first decades of the century, this unifying theory of ecology would be increasingly altered and questioned from the 1920s onward. For example, critics of the ecological discipline attacked the lack of quantitative analysis, biochemical analysis, and the tools and mission for increasing the importance of the field within the academy. Influences from Europe in the 1920s, such as Sir Arthur Tansley's concept of an "ecosystem," which focused on caloric energy transformations, or Charles S. Elton's formulation of the "food chain," also changed the theory and practice of ecology. These second stage ecological investigators successfully distanced the field from

mere taxonomy or description, forcing a focus instead on quantitative analysis, and even sparking a debate over the reliability of the hallowed community/climax concept.[6]

In the late-1930s numerous ecologists, including Clements and Shelford and later Eugene P. Odum, attempted to encompass and embrace the theoretical criticisms of ecology into a new synthesis that still maintained an allegiance to the concept of climax, or the inherent "development" of nature into an ideal and harmonious state. What also came out of this late-1930s soul-searching among ecologists was the idea that, as the major modifier of the planet's overall ecology, humanity needed to fall under the study of ecological researchers. Bio-ecology, written by Clements and Shelford and published in 1939, hailed a major attempt to find a new synthesis that would qualify as "ecology in the widest sense." Bio-ecology and other representative offerings from the period not only attempted to elaborate on field, laboratory, and classroom techniques, but also tried to merge plant, animal and human ecology. And while the hard scientific evidence provided by ecology and other disciplines regarding human influences on what was now being called the "biome," "biosphere," or "environment" would be crucial to the formulation of ecological agriculture, human or "social" ecology gave the authors of permanent agriculture an ethical basis to construct their ideological system.[7]

For Paul Sears, Aldo Leopold, and others preaching the new ecological ethic, ecology presented "a way out" of the troubled state that humanity found itself in during the 1930s and 40s. Competition, crass and hubristic attitudes towards the soil and other resources, and misguided scientists, industrialists, and farmers had led to a soil crisis, again a manifestation of the overall human crisis in the period. If ecology taught that nature dictated an eventual state of harmony, then certainly humanity, particularly the arising mass production-mass consumption-mass culture, was the greatest contributor to disharmony in the overall scheme of nature's economy. Recognizing that "the sensitive and intimate relationship to the natural world characteristic of indigenous culture is lost or

obscured," the task for the ecologist became documenting the "disastrous maladjustments" of humanity and offering "laws of community development and behavior in such a way that they may be applied not only within the human community but to the wider community of living things which man is integrated, and whose control he has assumed."[8]

Clearly, ecology dictated a biocentric message that "we're all in this together," but it also imposed the more realistic anthropocentric assumption that as the major (and indeed most important) player in the overall environment, humanity needed to "work toward a new equilibrium of nature fitted to his own survival" and stop "the waste of our natural resources, soil, forest, grassland, fish and game, water and minerals." Humanity demanded an enforceable new ethic which priced goods and services to the scale of their "social cost," with individuals being made well aware they would no longer "be permitted to find it profitable to work against the interests of society." Ecology, for Sears, Leopold, and many others both in and outside of the academy, offered an opportunity for human understanding of the natural world and a chance "to better understand each other." One prominent example Sears used to illustrate the practical results of the new ecological ethic was his call for engineers to receive ecological training, hoping they would become more sensitive to the biological ramifications (such as the effect of highway development upon streams, or the impact of a dam on the ecology of a river system) of their projects.[9]

Ecology, both as a science and an ethical imperative, proved crucial to the emerging idea of permanent agriculture. In an article which appeared in Ecology in 1936 entitled "What is Ecology and What Good is it?," Walter P. Taylor echoed then Secretary of Agriculture Henry A. Wallace's call for a "Declaration of Interdependence," as he defined ecology in the holistic sense as "the science of all the relations of all organisms to all their environments." Ecology already guided game management, as Thomas Dunlap has shown, and had increased the scope of ethical consideration of non-humans, as Rod Nash has successfully argued. In the realm of soil conservation and land management, ecology

was the crucial element. In his article, Taylor wrote, "Harmonious and satisfactory land use and efficient conservation of natural resources can be obtained only through programs based on a sound ecological foundation." If heeded, then the lessons of ecology, for Taylor, would "help assure the basic essentials of a more abundant life." Ecology would thus provide "a unifying point of view" regarding the use of resources and their effect on the biological universe and "upon our own social structure."[10]

Agriculture and the survival of American and world civilization were central concerns emanating from the explosion of the new ecological ethic of the 1930s and 1940s. Again, in a time of crisis, with, at least in rhetoric, an atmosphere of communalism and interdependence hovering over the populace, the new ethic of ecology seemed to be sown in fertile ground, a soft and nurturing environment for the concept of permanent agriculture. As Donald Worster has written in his classic study Nature's Economy, "in the 1930s, largely as a direct consequence of the Dust Bowl experience, conservation began to move toward a more inclusive, coordinated, ecological perspective. A concern for synthesis and for maintaining the whole community of life in stable equilibrium with its habitat emerged." But the new ecological ethic dictated more than just manipulating fields and forests with new, less intrusive farming techniques, the new ethic revealed that "conservation is not a subject which can be taught. It is a way of life into which we must grow as a people." The tense international situation and the need to mobilize and secure America's future also added to the message of the new ecological ethic. In the frontispiece of Sears' Life and Environment, an illustrated flow chart offered this simple but effective rationale for adopting an ecological point of view. With a soldier saluting an American flag at top, the chart read: "Flag needs man, man needs beef, beef needs clover, clover needs bee. . . . " and so on down the food chain.[11]

An Ecological Basis for Agriculture

One group of individuals embodied the transition in the late 1930s and early 1940s to the new ecological ethic. Friends of the Land, a conservation organization conceived in the late 1930s and chartered in June 1940, provided an organized impetus for the infusion of ecological thought into the conservation ethic and in the call for and promotion of the idea of permanent agriculture. In a retrospective account of the organization written in 1951, Russell Lord noted that "The word *ecology* appears but once, and then unobtrusively in our society's founding manifesto; and it is doubtful if more than a few of the sixty men and women who came to the organization meeting knew at the time what the word meant, but from the minutes and proceedings of Friends of the Land from the outset show that most members, be they technicians, farmers, bankers, writers, or -- most particularly--physicians, have been ecologists at heart."[12]

Ecological thought had two major influences in the formation of the permanent agriculture concept in the 1930s and 1940s. First, ecology provided hard scientific information about the place of agriculture in the biotic universe, offering practical lessons for agriculturists trying to work toward a long term agriculture. Furthermore, ecological ideas also lent themselves to the philosophical musings and ethical imperatives offered by the proponents of permanent agriculture, ideas that were often laced with a desire for societal reform or quasi-utopian visions of a boundless future for humanity. The doubled-edged sword of ecology would merge in various systems of permanent agriculture in the 1940s. And, importantly, this dualistic conception of ecology also appeared in the reinvigoration of ecological agriculture in the 1960s and 70s. Ecological agriculture, at least as it was conceived in the permanent agriculture milieu of the 1930s throughout the early 1950s, became a unifying force for researchers within the academy, and between scientists and the theorists and farmers who would try to build a "permanent system of

farming." It is essential to recall that the ecological consensus in the interwar years hinged on such ideas as the climax concept, which taught that communities (including people and nations) evolved from rudimentary to complex systems, eventually reaching a stable state of harmony and equillibria. Ecology taught that society, especially its linchpin agriculture, had to become symbiotic with other biological communities in the eventual development of a stable-state world biotic community. As Hugh H. Bennett and his colleagues often suggested, ecological awareness showed the need for "adjustment of agriculture to its environment."[13]

Since its fruition in the American university system, especially the land-grant colleges under the tutelage of Charles Bessey and others, the science of ecology proved important in the overall scheme of agricultural research. Ecology provided information about the overall interrelationships between such things as predators and range control, insects and vegetative cover, and other aspects of agriculture including the effects of erosion on the overall productivity of the land. Still, as ecologists and others often lamented, the majority of ecological research prior to the 1930s focused on non-agricultural topics such as undomesticated plants and wildlife. The human-fostered erosion problems of the 1930s prompted ecologists to call for more ecological research in the field of agriculture.[14]

Herbert Hanson, president of the Ecological Society of America, addressed the need for "invasion" of ecology into the realm of agriculture and conservation in December 1938. Hanson noted that while ecological researchers had focused on wild plants and animals, agronomists, geographers, sociologists and economists, among others, incorporated ecological ideas and tools with great degrees of success. Hanson asserted that ecological thought had also benefited such areas as soil conservation, range management, and forestry. Hanson called for ecologists to enter the practical realm of agriculture, asking them to explore such topics as the flax plant, which was very sensitive

to environmental conditions. He also thought ecology could help tackle many problems in the American West, including the range management problem (as witnessed in the federal "land use committee" recommendations of 1939), as well as difficulties with insect infestation and drought. For Hanson, ecology provided the "concepts and tools that are needed" for "achieving harmonious relationships of organisms between themselves and to their environments, the concept of natural tendency toward stabilization of the environment, and the need for natural areas as checks, or standards, by which the values and effects of tillage, irrigation, drainage, grazing, lumbering, and other uses may be measured."[15]

Hanson went on to quote the fabled British ecologist Arthur C. Tansley, who lent efficacy to the use of ecology to counter "the forces which are making for the wholesale destruction of our civilization." Hanson suggested that "man is inherently ecological" and hence had "a commonalty with nature," and that the academy need not "dub as 'agroecologist' the man working in these fields," or any other terminology. He simply wished for simple ecologists to enter into the fray of constructing permanent agriculture and to teach people to "use all available scientific information in order to adapt their modes of living to the environment." For Hanson this would probably result in restricting cultivation in ecologically sensitive areas, more land devoted to grazing, larger farms, "regrouping" of people outside of marginal land, and the use of planning for "greater stability and higher standards of living" and for the "building of a culture far beyond our present dreams." For Hanson, permanent agriculture could be defined as an adjustment of humanity with the environment in the hope that past mistakes with the land could be avoided in the passing of American civilization from "its pioneering stage to more advanced stages."[16]

Apparently the desire for the infusion of ecological thought and ecological research into the realm of agriculture was a sentiment shared by many of Hanson's contemporaries.

In the 1940s a number of articles appeared linking ecology and the call for a permanent agriculture system. Edward H. Graham, Chief Biologist of the Soil Conservation Service, led the way in establishing the validity of ecology in understanding agriculture. Graham provided several specific examples of how ecological ideas could help reform the abusive practices of American agriculture. For example, he noted that the old practice of keeping the ground "clean" around orchards, which was thought to work against the insect problem, the problem of mice eating the tree bark, and the problem of weeds or ground cover as competition for irrigation water, was actually a bad idea. Ecological research, according to Graham, showed that a vegetative cover of legumes and grass actually harbored predatory insects and birds that worked against pest infestations, provided food for the mice so they wouldn't consume tree bark, and acted to preserve soil moisture. Hence, ecology provided lessons that would increase agricultural productivity while accounting for the health of the overall environment. For Graham, the ways of nature "were not easy to learn," hence, "a sound agricultural program" would arise from "a balanced condition where crops and soil, rainfall and run-off, birds and insects, yields and markets, and all other components of the farm as a habitat, are in adjustment. Graham and fellow scientists found that ecology provided lessons for agriculture that ranged from the causes and impacts of erosion to the co-relation of agricultural practices, (like strip cropping and range management), and wildlife populations. Ecology also proved useful in land classification schemes that would be necessary to build a planned and permanent agriculture.[17]

Edward Ackerman, a ecological geographer, indicated that the principal practical lesson ecology offered agriculture seemed to be that "the greatest single area for improvement probably lies in the more wide-spread adoption of humus-building cultivation, and less dependence on commercial or mineral fertilizers." Ackerman, while considering the prospect of a world-wide ecological farming regime, recalled his visit to a

sugar cane estate in Cuba that used crop residue and leaves as a compost mulch. This system produced high yields over a long period of time with no need for manufactured fertilizers. This led Ackerman to the conclusion that this particular plantation was essentially emulating the process of nature. On a more general level, Ackerman indicated that ecological lessons were going to bring tremendous changes to life, which would "disturb politicians, economists, and plain citizens for a long time." He wrote: "Resettlement, education, large scale engineering, and world-wide integration of crop production may be involved." For Edward Graham, ecology showed that "a great deal of our physical and material well-being depends upon our ingenuity of thought. Not only ecologists, but politicians who lose sight of this fact let slip from their grasp one of the most potent influences in the human prospect."[18]

While ecology as a science provided specific and practical information for farmers and "land management biologists," ecology also provided a philosophical-ethical underpinning for what could best be labeled the "holistic" side of permanent agriculture. Indeed, ecology served as a vital force for the proponents of the new agriculture, giving the movement a quasi-spiritual significance and broadening its appeal to intellectuals and the general public. The source of this agricultural-environmental ethic was the new synthesis of ecology emerging in the interwar years. Again, while historians look to Aldo Leopold's grandly stated "land ethic," Leopold simply followed the lead of several others who grasped the ethic dimension of ecological concepts and their relation to farming and the life of the American nation and the human species itself.

For SCS biologist Edward Graham and his boss Hugh H. Bennett, their attempt at establishing a soil conservation ethic meant "more than wise use of resources. . . . It may well be the foundation of a new social philosophy." Ecology, as Paul Sears pointed out, could help make society more aware of its natural resources and serve as a tool for political decision making. Yet ecological thought also attacked the "triumph over nature"

attitude Americans displayed in their long battle to conquer nature. Graham compared traditional American ignorance of nature with the Roman misdiagnosis of malaria as the result of "night air." Other advocates of the new agricultural-ecological ideal compared the Christian sacraments of wine and bread as symbolic of the fact that life had material resources at its root, and that "spiritual survival, no less than physical, rests upon compliance with the order of the universe." A medical doctor involved with the Friends of the Land suggested that ecological diagnoses for agriculture helped him learn to think "in terms of soil, health, population and human weal," leading to recognition of "a profound dependence of Man, even in his intellectual and perhaps spiritual outlook, on what he gets from the soil."[19]

Here the proponents of permanent agriculture were drawing upon a long history of linking ecological ideals with a spiritual responsibility of the farmer for the earth. Liberty Hyde Bailey called for an ethical relationship with the land in his books and activities, and Sir Albert Howard, the patron saint of organic farming, echoed similar Albert Schweitzer-like "reverence for life" admonitions in the 1930s. Howard and his wife Louise profoundly influenced the American permanent agriculture movement in this construction of a ecological-ethical tie to the soil. Writing in 1947, Louise Howard spoke of human cultivation as one, albeit important, component in "the earth's green carpet." Howard asked her readers to envision the earth as a living and delicate landscape which operated on such principles as inalterability, persistence, regeneration, the "law of return," stored reserves, and "the principle of mixed existence." Mrs. Howard also tried to give her readers a conception of the Buddhist concept of a "wheel of life" as opposed to the Western construction of linear, ladder-like progress.[20]

Howard joined the always eloquent Paul Sears, who expressed a lucid "land ethic" at a 1946 conference entitled "Food and the Future." Sears' speech is a well-reasoned statement tying agriculture to the realities of an ecologically interpreted world. Crediting

Darwin and Kropotkin's "biological basis for human ethics," Sears told his audience "our responsibility now has two facets -- we are custodians of ourselves and our environment as well. We did not make and cannot change the laws under which we must work, but at least we can understand them." He reminded his audience that, "The stuff that life is made of must be used and re-used by succeeding generations and shared among many forms of life." The system "maintains itself," wrote Sears, "But when man takes over the system is disrupted. Too often he sustains himself by mortgaging the future instead of maintaining true economy." Sears asked farmers to look to other occupations for a guide to cooperating with nature. "Man has conquered the sea by learning to live with it--not by violence and self-will, but with patient wisdom in shaping vessels to meet the waters and ride them." Sears then wrote, "perhaps the sea, which so quickly engulfs our failures to deal with it, is a better tutor than the land, which protracts its penalties through the years, even generations."[21]

In her 1979 dissertation, "The Land in Trust: A Social History of the Organic Farming Movement," Suzanne Peters notes that ecological agriculture has many diverse roots, from Jefferson and subsequent back-to-the-land movements to the holistic preaching of Rudolf Steiner's anthroposophy movement which arose in the 1920s promoting the "biodynamic" school of farming, (a sub-field of ecological agriculture which exists to this day). Peters and others have also noted the influence of businessman-turned-agricultural theorist and publisher J. I. Rodale, who began to seriously promote the ideas of ecological agriculture in the 1940s with his books and the Organic Farmer magazine, which appeared in 1942. Rodale and other lay people outside of scientific ecology were crucial communicators bringing the ethical messages of ecology to the permanent agriculture movement.[22]

In the merger of ecological ideas into the ideology of permanent agriculture, the musings of author and agrarian iconoclast Louis Bromfield brought the ethical imperatives

of ecology home to a large public audience. Bromfield, whose "restoration" of his "Malabar Farm" in Ohio in the 1940s focused national attention on permanent agriculture, expressed his almost spiritual view of ecology frequently in the 1940s. Bromfield's ecological orientation centered on "the premise that God and Nature have produced an orderly universe governed by immutable laws, the most obvious of which is the life cycle, and that man violates them only at his own peril." For Bromfield, "the secrets of life" were "combined in a cubic foot of soil." Bromfield thought farmers were susceptible to ecological messages because of their close contact with nature. He wrote: "the men and women of no other profession are as content to die when their time is come . . . they know by living with the earth and sky and in companionship with their fellow animals that we are all only infinitesimal fragments of a vast universe in which the cycle of birth, death, decay and rebirth is the law which has permitted us to live."[23]

As the science and ethic of ecology merged with the notions of a planned and permanent agriculture, various specified and often well-publicized visions of permanent agriculture emerged in the 1940s, all with the "model of nature" as a central component. In essence, basing ecological agriculture upon the model of nature meant that agriculturists needed to mirror nature's process of soil building, in turn crafting a new type of farming that would eventually evolve into a state of perpetual, low-maintenance fertility. Understanding the lessons of nature required both scientific knowledge and the use of personal observations of the given condition of any particular parcel of land. Hence, the guideline of nature infused permanent agriculture with both scientific empiricism and mystical-intuitive deductions, imbuing the movement with what present-day observers might call a "new age" quality.

Paul B. Sears illustrated the desire to build permanent agriculture via a scientific understanding of the model of nature. In his many literary offerings during the late 1930s and 1940s Sears championed the old notions of "directed" ecology, using the terminology

of "climax communities" and "balance" in nature. In his frequent attacks on the history of America's poor stewardship record, Sears suggested that the mechanized and unplanned agriculture that emerged in the United States broke the equilibrium with nature. Thus, the America farmer, by not recognizing and acting upon the evidence ecology provided, "failed to develop his artificial plant cultures in a way to simulate nature in holding and building soil." Sears reminded his sundry audiences that "the idea of balance--of a flexible system of give-and-take--seems implicit throughout nature." This erstwhile member of what would grow to be a large group of ecological literati warned his audiences that the idea of balance was fundamental to biology, physical and chemical theory, and that there was "no reason to think that human activities are exempt " from nature's model. Though science was already being cited as "a monster which may turn on man and destroy him," (Sears is writing here in 1946), the ecologist proclaimed the contrary, noting that "knowledge of natural forces can be utilized to promote a new equilibrium which will make the landscape efficient."

Permanent agriculture on the model of nature required three essential components--the building of humus through the incorporation of organic material into the topsoil, maximum diversity or mixed farming, and providing a permanent cover of vegetation as a "skin" for the soil. Humus building and soil holding procedures were ancient ideas, and in the late 1930s and 1940s these techniques became canonical components of the permanent agriculture idea. Though many sources verified the efficacy of humus building and providing a vegetative cover for the land, none was as instrumental as that of Sir Albert Howard, a British colonial and mycologist whose research and writings on crops over the 1920s and 30s extensively developed the idea of emulating nature.[24]

Indeed, though the permanent agriculture movement was an essentially American phenomenon, Howard's ideas (as well as that of other British and the farming systems of the orient), provided the foundation for many of the tenets of permanent agriculture.

Howard asked fundamental questions, such a how nature manufactured humus and built reserve fertility, and, "What does she do to control such things as insect, fungus, and virus diseases in plants and the various afflictions of her animal kingdom?" Sir Albert thought traditional agricultural science had neglected nature's "great law of return," and his "Indore Process" sought to mirror and expand upon nature's power to regenerate fertility and build soil. Howard linked his scientific pronouncements with claims that would resurge in the holistic agriculture systems of permanent agriculture. He claimed that what he called "healthy" soil would produce healthy crops that would be disease and pest resistant, which would in turn provide the same qualities to humans who consumed these crops. Howard served as a constant source of reference for the American champions of permanent agriculture, and he, and later his wife Louise, often lent their commentary to the overall rhetorical and social construction of permanent agriculture.[25]

Though Howard's substantial influence on the ideology and technique of the proposed systems of the new farming were formed from his experimental work, the less "empirical" proponents of permanent agriculture would blend a mystical sense of interdependence into the scientific assumptions of those preaching for permanency and ecological stability. Above all, the ecological world view was a central component of permanent agriculture, as it best illustrated the vital interconnections involved in food and fiber production. Ecology offered as sense of balance in an apparently disharmonious world.

Louis Bromfield was one of the more devout preachers of holistic ecological agriculture, as he presented a model of nature to his readers, friends, and anyone else who would listen. Bromfield re-asserted the major claims of Howard, Sears, and others in the "scientific" side of permanent agriculture by admonishing readers that though science provided a guide to nature-emulating agriculture, humanity as a whole knew less than 5 percent of what happened inside a cubic foot of soil. He spoke of three essential

"balances" in nature--between mineral and organic material, between the "four major elements" (calcium, nitrogen, phosphate, and potash), and between these and other vital trace elements. "We are inclined to believe that there are a series of balances, absolute in character," wrote Bromfield, "which, when attained, produce optimum production, which is simple maximum production . . . both in quantity and nutritional quality." Farmer-author and self-described experimental farmer Edward Faulkner wrote of the model of nature as "perfectly organized to supply the right amount of oxygen to every plant," which assisted "the universal use of all nature of the direct transfer of organic compounds from the decaying dead to the growing living." Faulkner and Bromfield were two individuals who presented some specific ideas on just how one might emulate nature in their farming operation. While their methods may have not been unique, the national publicity showered on these two Ohioans allowed them to highlight the systems and benefits of permanent agriculture before a large and apparently captive audience.[26]

Notes

1. Hugh H. Bennett, "Permanent Systems of Farming" (address delivered before the Thirteenth Annual Meeting of the Texas Agricultural Workers' Association, Dallas, 12 January 1940), box 10, file 30, Bennett Papers.

2. Paul B. Sears, Life and Environment: The Interrelations of Living Things. (Columbia University Press: New York, 1939), 129-132; Paul Sears, "Darwin and the Living Landscape," in Nancy Pittman, From the Land (New York: Island Press, 1990): 406-407; Paul Sears, "Science and the Living Landscape," Harpers, July 1939, 207. A brief note on Sears: Paul Bigelow Sears was born in Bucyrus, Ohio, in 1891. He was awarded a Ph.D. in botany in 1922 from the University of Chicago, which was at that time a center of ecological research. Sears taught at various places over the years, including Ohio State, Nebraska, the University of Oklahoma, and Oberlin (Ohio), and from 1950

until his retirement in 1960 Sears chaired the Conservation of Natural Resources Program at Yale University.

3. Many overviews and a few detailed histories of ecology have emerged in recent years, the best being Donald Worster's Nature's Economy: A History of Ecological Ideals (Cambridge: Cambridge University Press, 1977), 205-252; another account of ecology that covers the idealistic and social philosophy aspects of ecological thought is Anna Bramwell's Ecology in the Twentieth Century: A History (New Haven: Yale University Press, 1989); for more on the changes in thought emanating from emergent ecology, see Thomas Dunlap's Saving American Wildlife (Princeton: Princeton University Press, 1988), 65-110; Roderick Nash, The Rights of Nature: A History of Environmental Ethics (Madison: University of Wisconsin Press, 1991), 55-86; see also Frank Egerton, ed., History of American Ecology (New York: Arno Press, 1977); for glimpses of early ecological thought, see the classic statement of George Perkins Marsh, Man and Nature: Or Physical Geography as Modified by Human Action (Cambridge: Harvard University Press, 1967), reprint of original 1864 edition of Marsh's treatise, which underwent several revisions in the decades following its release; an early statement linking science to biocentrism and what could be termed "the ecological imperative" is located in Lawrence J. Henderson, The Fitness of the Environment: An Inquiry into the Biological Significance of the Properties of Matter (New York: Macmillan, 1913), 274-312. Henderson offered this statement: "For the whole evolutionary process, both cosmic and organic . . . [reveals] the biologist may now rightly regard the universe in its very essence as biocentric." See also Leslie A. Reals and James H. Brown, eds., Foundations of Ecology: Classic Papers with Commentaries (Chicago: University of Chicago Press, 1984).

4. For more on ecology during its nascent stage as an academic discipline, see Ronald C. Tobey, Saving the Prairie: The Life Cycle of the Founding School of American

Plant Ecology, 1895-1955 (Berkeley: University of California Press, 1981); Richard Overfield, "Charles E. Bessey: The Impact of the 'New' Botany on American Agriculture, 1880-1900," Technology and Culture 16 (April 1975): 162-181; see also "Comments," Ecology 19 (1938): 164-66; Barrington Moore, "The Scope of Ecology," Ecology 1 (1920): 1-13; Richard Brewer, "A Brief History of Ecology," Papers of the C.C. Adams Center for Ecological Studies 1 (1960): 1-13;

5. Frederic E. Clements and Victor E. Shelford, Bio-ecology (New York: John Wiley, 1939).

6. See Nash, The Rights of Nature, 54-67; for a synthesis of changes in ecology as they emerged from the 1930s, see Orlando Park, "Observations Concerning the Future of Ecology," Ecology 26 (January 1945): 1-9

7. Clements and Shelford, Bio-ecology, 1-9.

8. Sears, Life and Environment, 11, 62-66, 129-135; Sears, "Human Ecology," 23-26.

9. Sears, Life and Environment, 11-135; Paul Sears, "The Importance of Ecology in the Training of Engineers," Science, 4 July 1947.

10. Walter P. Taylor, "What is Ecology and What Good is It?" Ecology 17 (July 1936): 345; see also Edward H. Graham, Natural Principles of Land Use (London: Oxford, 1944). For a critique of "human ecology," see Milla Aissa Alihan, Social Ecology: A Critical Analysis (New York: Columbia University Press, 1938). For a later overview of human ecology from an early advocate of using ecology to study and guide humanity, see Sir George Stapledon, Human Ecology, ed. Robert Waller (London: Charles Knight, 1971). For accounts of how ecological thought helped augment the social and environmental engineering of the New Deal, see Rexford G. Tugwell, "The Meaning of the Greenbelt Towns," New Republic 17 February 1937, 42-43; Joseph L. Arnold, The

New Deal and the Suburbs: A History of the Greenbelt Towns (Columbus: Ohio State University Press, 1971), 1-30; and Phobe Cutler, The Public Landscape of the New Deal (New Haven: Yale University Press, 1985).

11. Worster, Nature's Economy, 232-233; Paul Sears, "Science and the Living Landscape," Harpers, July 1939, 213; Sears, Life and Environment, cover insert.

12. Russell Lord, "The Whole Landscape: An Appraisal," Land 11 (Winter 1951): 423.

13. Hugh H. Bennett, "Adjustment of Agriculture to Its Environment" (address to the 40th Annual Meeting of the Association of American Geographers, 18 September 1943), box 10, file 50, Bennett Papers.

14. For more on the infiltration of ecological thought in agricultural research in the 1930s, see the presidential address to the Fiftieth Annual Meeting of the American Association of Economic Entomologists, F. C. Bishop, "Entomology in Relation to Conservation," Journal of Economic Entomology 31 (February 1938): 1-10.

15. Herbert C. Hanson, "Ecology in Agriculture," Ecology 20 (April 1939): 111-117.

16. Ibid.

17. Edward H. Graham, "Ecology and Land Use," Soil Conservation 6 (November 1940): 123-26; Edward H. Graham, "Soil Erosion as an Ecological Process," Scientific Monthly 55 (July 1942): 2.

18. Edward Ackerman, "The Geographic Meaning of Land Use," and Edward H. Graham, "The Biologists Viewpoint," both located in the special "Symposium on Ecological Agriculture" in the Journal of Soil and Water Conservation 1 (October 1946): 54-70; Edward H. Graham, Natural Principles of Land Use (London: Oxford University Press, 1944), 226.

19. Graham, Natural Principles of Land Use, 230-31; Lord, Forever the Land, 192; Jonathan Forman and Ollie Fink, Water and Man: A Study in Ecology (Columbus: Friends of the Land, 1950), xv.

20. Louise E. Howard, The Earth's Green Carpet (Emmaus: Rodale Press, 1947), 15-24.

21. Paul B. Sears, "The Conditions of Life," Land 5 (Summer 1946): 237-241; see also Paul B. Sears, This is Our World (Norman: University of Oklahoma Press, 1937), 280; for more on the ecological-ethical elements of permanent agriculture imported from Britain, see Friend Sykes, Food, Farming and the Future (London: Faber and Faber, 1950), 31-240; G. C. Watson, The Soil and Social Reclamation (London: P. S. King, 1938), 2-3; for more from the American angle, see Paul W. Chapman et. al., Conserving Soil Resources: A Guide to Better Living (Atlanta: Turner E. Smith, 1950), 305-309. While noting that Aldo Leopold was simply a representation of the broader quest for permanent ecological agriculture, his contributions are nonetheless important and elegantly stated. For more on Leopold's approach to agriculture and the land ethic, see Curt Meine, "The Farmer as Conservationist: Leopold on Agriculture," in Thomas Tanner, ed., Aldo Leopold: The Man and His Legacy (Ankeny: Soil Conservation Society of America, 1987), 39-52; and Aldo Leopold, A Sand County Almanac (New York: Oxford University Press, 1966), 217-242; see also Hugh H. Bennett, "Wildlife and Erosion Control" (address to the 31st Annual Convention of the National Association of Audubon Societies, New York, 29 October 1945), box 10, file 9, Bennett Papers; Charles E. Kellogg, The Soils that Support Us (New York: Macmillan, 1944), 2-3.

22. Suzanne Peters, "The Land in Trust: A Social History of the Organic Farming Movement" (Ph.D. diss., McGill University, Toronto, 1979), 12-122.

23. Charles E. Anderson, ed., Louis Bromfield at Malabar Farm: Writings on Farming and Country Life (Baltimore: Johns Hopkins, 1988), 154-55; Louis Bromfield, Out of the Earth (New York: Harpers, 1950), 8.

24. American sources of the "model of nature" and past work in soil revitalization are sundry. For examples, see Liberty Hyde Bailey, The Outlook to Nature (New York: Macmillan, 1911), 1-11; Charles E. Kellogg, "A Challenge to American Soil Scientists: On the Occasion of the 25th Anniversary of the Soil Science Society of America," Proceedings of the Soil Science Society of America 25 (November-December 1961): 419-421.

25. For a sampling of Howard's ideas, see Sir Albert Howard, The Soil and Health: A Study of Organic Agriculture (New York: Devin-Adair, 1947), 30-31, 257-260; Sir Albert Howard, An Agricultural Testament (London: Oxford University Press, 1940), ix - 223. An influx of literature on humus building and organic farming from the United Kingdom helped shape the ideas of permanent agriculture, including a number of books from the London publisher, Faber and Faber. For an example, see G. T. Wrench, Reconstruction by Way of the Soil (London: Faber and Faber, 1943); see also G. C. Watson, The Soil and Social Reclamation (London: P. S. King, 1938), 2-5; for more on the history of organic farming, see Philip Conford, ed., The Organic Tradition: An Anthology of Writings on Organic Farming, 1900-1950 (London: Green Books, 1988). The most devoted follower of Howard and the most vocal advocate of organic farming from the 1940s until his death was businessman turned publisher J. I. Rodale. For an example of his thought, see J. I. Rodale, The Organic Front (Emmaus: Rodale Press, 1948).

26. Bromfield, Out of the Earth, 5-17; Faulkner, Plowman's Folly, 10-11.

CHAPTER FOUR:

THE SYSTEMS AND BENEFITS OF PERMANENT AGRICULTURE

> "As soil washes downhill, down the streams, down to the wastes of the ocean, so goes opportunity, security,--a gradual wasting away of the chance for men to make a living on the land. In a very real sense, the man of the land is our national backbone. Permit his base to wash out beneath him and we leave the whole economic and social structure undermined, threatened."
>
> - Hugh H. Bennett[1]

In the minds of Edward Faulkner, Louis Bromfield and the like-minded, finding a natural model for agriculture required investigation, observation, awareness, and introspection, not simply the manipulation of nature in an isolated laboratory. The permanent agriculture camp often spoke harshly regarding the "billion dollar" USDA and "countless" agricultural colleges, which they thought had less to offer the builders of permanent agriculture than the "county agent or a farmer who had the power to observe, the imagination to speculate and the logic to deduce a process from which vast benefits have developed." In the reasoning of the permanent agriculture ideology, the best farmers knew "every foot" of their land and the overall conditions of plants, soil and animals on their farms, and thus could learn more from observation of flora and fauna than at "any college of agriculture." In essence, the model of nature taught the progenitors of the new farming a respect for nature, both in trying to "imitate the forest" (in the words of Henry A. Wallace), and in realizing "our immediate superiority" over nature came "from a clever exploitation of earth" which left society prone to "long-run disaster." As Rexford Tugwell would suggest in the ominous days of 1941, the only hope for American civilization was

to encourage "those traits and activities which will find satisfaction in the prospect of permanency."[2]

Systems of Permanent Agriculture

New farming systems were prominent among the "traits and activities" proscribed by Tugwell. The new husbandry would have to emerge from the desire for planned permanence and be based upon ecological principles. The systems of permanent agriculture had some general characteristics, including a devotion to planning and co-operation in all levels of agriculture, the use of anti-erosion techniques developed extensively in the 1930s, and dedication to the concept of organic farming and the model of nature. Importantly, while specific farming ideas and techniques are important in understanding permanent agriculture, what makes them particularly interesting is the purported benefits awaiting those who embraced the new farming concept.

Once again, planning, hailed by New Deal-era social scientists like Rexford Tugwell, and expansion of soil and water conservation, guided by Hugh Bennett, functioned as an integral component in any overall design of permanent agriculture. In the New Deal of Franklin Roosevelt, planned agricultural policies merged preservation of the soil with the land retirement and land classification programs of the Agricultural Adjustment Administration, the Resettlement Administration and the Soil Conservation and Domestic Allotment Act of 1936. Though Hugh Bennett's ideas represented the thoughts of many theorists seeking a planned, permanent and ecological agriculture, his key leadership at the SCS truly gave body to the often abstract notions of permanent agriculture, a concept based as much upon ideas as the physical contact with the earth.

Harry C. Diener, a Bennett subordinate, gave a succinct definition of Bennett's policy of building permanent agriculture. "At the core of the Service's program is the idea

of cooperation with nature," wrote Diener. Accordingly, the SCS attempted, through inter-agency and intergovernmental and farmer-government cooperation, to scale back the land devoted to tillage agriculture away from hilly soils to areas that were level or gently sloping, and to restore a vegetative cover to ecologically sensitive and often de-nuded areas like the Dust Bowl. (Often in the form of grasslands, tree farms, or as wildlife refugees, and to enhance such traditional conservation techniques as using a perennial cover, contour farming, terracing, and strip cropping). For Bennett, the key ingredient in this recipe for permanent agriculture involved restoring vegetative cover to denuded areas, which he equated with providing a epidermal coating to the earth. Another Bennett contemporary defined the surge of permanent agriculture as "nothing less than a systematic reorganization of agriculture and other types of land use on naturalistic principles in a great overall design aimed at stabilizing the earth's soil, rebuilding their fertility, and conserving and regulating the flow of waters." [3]

Although the ideal, technique, and bureaucratic authority of Bennett's program of permanent agriculture is important, in cannot be over stressed that the movement also emerged from the tenets of organic farming, especially reading the building of "healthy" humus-laden soil. Sir Albert Howard's work deserves the most credit for introducing organic farming to America, but others (both foreign and American) also gave rise to this important aspect of permanent agriculture. For South African J.P.J. Van Vuren, soil erosion was symptomatic of a "specific disease of the soil, caused mainly by a humus-deficiency." Other proponents of organic farming and humus building in the period championed harnessing the earthworm to build humus, using composts and green manures, and treating the topsoil like a precious and delicate life form, unlike, as J. I. Rodale opined, "your scientific agronomist, who should know better, but who recklessly throws a monkey-wrench into this microbial universe, by dousing it with strong corrosive chemical fertilizers. He believes that the conveyor-belt method must be introduced into

every aspect of farming. He even applies it to cows who wearily yield five times the quantity of milk Nature intended them to, only to discover that it contains less vitamins than the milk obtained in smaller quantities from scrub animals."[4]

As the above statement indicates, the culture of organic farming in the late 1930s through the 1940s hinged on some central ideas, whether from the planning camp, the ecologists, the "biodynamic" school of the anthroposophists, Sir Albert Howard, or American observers of peasant agriculture. Essentially the organic farming philosophy sought to see the topsoil and crops from the viewpoint of ecological inter-relatedness, which would allow the organic farmer to emulate the natural growing conditions and fertility production of nature. Again, by incorporating composts, green manures and even recycled sewage into the soil, a healthy humus might be produced, and this productive soil would grow sturdy pest and disease resistant crops and pass these vigorous qualities to humans who ate the organically produced food. Many of the grand claims made by the organic farmers fueled the drive for permanent, ecological agriculture, including the proposed farming regimes of two of permanent agriculture's chief stalwarts, Louis Bromfield and Edward Faulkner.[5]

Louis Bromfield versus the 'Age of Irritation'

Though twentieth-century "movements" look to hallowed events and individuals as "milestones," in reality complex ideas emerge over time and from a variety of sources. Such was the case of the permanent agriculture idea, as noted by Louis Bromfield in 1945. Bromfield hailed the "new agriculture developing slowly in America for the past thirty or forty years." In hundreds of places, wrote Bromfield, "observant and intelligent farmers, school teachers, bureau or academic men, men and women in back gardens or on an acre or two of land, have been *watching* their soil, living with it, *feeling* it under their feet,

learning from it." For Bromfield, permanent agriculture represented an "evolution in methods, seething beneath the surface, waiting to take form."[6]

Ever the student of Sir Albert Howard, Bromfield sought to emulate the laws of nature while restoring a worn-out thousand-acre patch of land that "represented hundreds of millions of acres of once-rich agricultural land reduced to this condition over the whole country." Bromfield envisioned himself as a "Michaelangelo" of the earth, reshaping and restoring "a desolate farm, ruined by some ignorant and evil predecessors." Much in the spirit of another iconoclast of his day, Lewis Mumford, Louis Bromfield became a self-anointed knight waging battle against the what he saw as the pervasive and destructive "illusions of prosperity," and the "ambitions, greed and intricate mechanical ingenuity" of a crass industrial-urban society that he labeled the "Age of Irritation."[7]

Bromfield became the most effective voice for permanent ecological agriculture, while at the same time pursuing his quixotic Jeffersonian dream of perpetuating a nation of small, independent farmers to serve as a permanent anchor for the republic. A Pulitzer-prize winning novelist, expatriate, and World War I ambulance driver, Bromfield returned from Europe in 1939 and established Malabar Farm in his native state of Ohio. This collection of worn-out fields represents one of the most unique agrarian experiments in American history. Bromfield gained national attention in his fight against ruinous farming from his experiment, and Malabar Farm became a clearinghouse for agricultural conservation, ecological agriculture, and the ideology of the independent farmer.[8]

Bromfield's life experiences formed his vision of proper agriculture. He grew up in and near Mansfield, Ohio, the son of a local businessman and politician who aspired to return his family to its agrarian roots. As a young man, he enrolled in the College of Agriculture at Cornell University in 1914, only to be forced to return to Ohio to help manage the newly reoccupied family farmstead. Bromfield returned to college in 1916, this time (at his mother's urging) in the distinctly urban environs of Columbia University.

Bored with college and enticed by the war in Europe, he joined the French Ambulance Service in 1917 and served meritoriously, finding French life suited to his taste for a blend the rural and the cosmopolitan.

He returned to the states after the war, married, and began a productive and lucrative career as a novelist, climaxing in a Pulitzer Prize for the book Early Autumn in 1927. With many of his books being converted into Hollywood films and with substantial revenues flowing in from royalty checks, Bromfield and family removed to a pastoral village outside of Paris in 1927, remaining there until 1939, with occasional jaunts to ski in Switzerland and to explore India's bucolic Malabar Coast. Bromfield often related his intense attraction to simple but fruitful lives of the peasantry surrounding his French home, but when war arrived in 1939 the Bromfields were compelled to return to America, where Louis would begin his luminous career as an agricultural commentator, experimental farmer, and prophet of permanent agriculture.

Upon his return to America, Bromfield first stopped in New York City, but quickly found himself at the Ohio community where he was raised, hoping to establish a farmstead that would find answers to rectify the errors of modern farming and be a successful investment, both in financial terms and in re-building a sense of rural community in the region. Bromfield, his wife, and his agent-manager-friend George Hawkins arrived in Ohio on a dreary winter day. As he passed the once prosperous farms of his youth Bromfield recoiled at the apparent neglect of farmsteads that formerly enjoyed "A rich, well-painted appearance." Buildings had fallen in disrepair and many fields suffered from erosion and were sparsely vegetated. Bromfield found the farm of an old neighbor and later recalled how "All these great memories came flooding back during the short walk from the house to that great barn. Then I pushed open the door and walked into the smell of cattle and horse and hay and silage and I knew that I had come home and never again would I be

separated from that smell because it meant security, stability . . . it had reclaimed me. It was in my blood and could not be denied."[9]

Bromfield's system of ecological agriculture borrowed from numerous sources, and expressed many of the contemporary currents in the permanent agriculture milieu. In building permanent agriculture, the new agriculturist needed to reconcile the forces of nature with the knowledge provided by ecology, chemistry, economics, and nutrition. Characteristics of the new farmer included not only a mastery of science and technology, but also such values as love, respect, intelligence, and usufruct. Bromfield's version of permanent agriculture sought to combine a peasant's intuitive stewardship with American notions of efficiency and independence.

Bromfield used Malabar Farm to implement and test his ideas for a productive and ecologically sound agriculture and to promote the benefits of rural life. The author, his wife, two children and entourage moved into an older farmstead on his new property and began to draw the blueprints of Malabar, which included an impressive new 32-room country home. Bromfield was excited to be back among familiar friends and territory, but the land he had purchased, as described by his daughter Ellen, was "worn thin by years of unimaginative farming; Deep gullies slashed its hills and remained like open wounds kept festering by wind and rain and never allowed to heal. . . . the final stage of land which had been abused by foolish, thoughtless men who have no business calling themselves farmers." Bromfield claimed that some of his acreage was not rentable even at five dollars per acre per year. He established a plan to rectify the destruction and restore the farmland, woodlands, and pastures of what he christened "Malabar Farm."[10]

While constructing "the big house" and entertaining an endless stream of visitors (including buddy Humphrey Bogart, who married Lauren Bacall at Malabar in 1945), Bromfield began to apply his multidimensional (ecological) prescription to the ills of his debilitated farm. Practical application of ecology at Malabar meant restoring the land and

streams to a pre-1800s condition by halting erosion, using only a minimum of manufactured agricultural chemicals, rebuilding the pasturages and grasslands by planting grass or nitrogen-fixing legumes, extensive of green manures, organic mulches and composts, and by gaining a overall scientific and psychic knowledge of the intricacies of the land so that, in Bromfield's words, "we could restore the soil infinitely more quickly [working] with nature rather than against her as our predecessors had done." Bromfield, via his reading, publicity status, and immersion into Friends of the Land, was personally acquainted with individuals like Paul Sears and Aldo Leopold, who taught Bromfield that "hard" scientific information should be coupled with personal observation of local conditions. In accordance with this thinking, Bromfield divided his time between the library, reading authors like Selman Waksman and Sir Albert Howard, and in walks around Malabar, checking plant, soil and water conditions, and planting willow switches along the creek beds. He wrote: "Expansion into the whole field of ecology became inevitable, as indeed it must become on any well-managed farm. We discovered very early that trees, water, and soil do not exist merely as isolated factors in a specialized study. They were hopelessly involved with the very basic welfare of man and the conditions of his daily life."[11]

Bromfield employed many techniques to bring ecological agriculture to Malabar. He experimented with imported strains of grass to hold the soil against erosion, planted crops which he claimed "matched" the soil, and pursued the aforementioned humus-building "organic" techniques espoused by Sir Albert, Rodale, and others. Many of his ideas defied empirical proof and were based primarily on personal observations and the unproved claims of the cultish adherents of organic farming. Bromfield planted test plots to "discover the relationships of given soil balances suited to given plants in their resistance to both disease and insects," and indicated that "by 'sorting out' crops into different gardens and parts of gardens where soil composition suited a specific plant, we

have arrived at a high degree of resistance to both disease and insects." By incorporating surface residues, green and animal manures, composts and mulches into the topsoil of Malabar, Bromfield claimed his farm had drastically increased the productive capacity to the land with virtually no reliance on manufactured chemicals. (He did briefly use some fertilizers on his replanted pastures). Bromfield reported that fields yielding a paltry five bushels of wheat per acre in 1940 yielded 33 bushels two years later and 52 bushels in 1944.[12]

In Bromfield's description, Malabar became a mighty compost heap teaming with fertility by emulating and enhancing the recycling abilities of nature. Bromfield also worked to capture water via ponds and natural (untiled) drainage areas, and was particularly proud of his restoration of Kemper's Run, a dirty channelized creek that had once been a clear fishing and swimming redoubt for a young Louis Bromfield. By planting Babylonica Willow along it banks and by slowing the flow of water and soil running into the stream by careful and effective land management, Bromfield could report that the stream had recovered by the late 1940s, and was once again well-stocked with bass and other fish. Bromfield also cited a return of wildlife to his little valley as signatory of his restoration of ecological balance to his locality. His ideas and accounts are verified by the remarks of others in the period, and by the fertility apparent at the Malabar site today.[13]

No General Utopias: Edward Faulkner's Trash Farming

While Louis Bromfield's experiment at Malabar Farm provided a dramatic episode in the early stage of ecological agriculture, many of Bromfield's ideas were infected by the messages preached by another focal figure of the permanent agriculture movement of the 1940s, those of self-labeled experimental farmer and best-selling author Edward Faulkner. Faulkner, whose ideas regarding a permanent ecological agriculture garnered national

attention amidst the great crisis of World War II, created a system that became the most publicized and representative of the sundry proposed systems of "permanent agriculture."

Faulkner's controversial 1943 tract Plowman's Folly formed the basis for his national notoriety, but his ideas regarding permanent agriculture crystallized over a number of decades. Born in Kentucky in the 1890s, Faulkner claimed his father's stewardship ethos influenced his later deliberations. He studied agriculture at the University of Kentucky and became a county agent in that state for a number of years until he was apparently forced from that position for his non-conformist ideas. Faulkner settled in suburban Elyria, Ohio, by 1930, pursuing a career as a businessman. He continued his study of agriculture, poring over extension station reports and a variety of works including those of Sir Albert Howard. He maintained contact with the soil in attempting to create a garden in the hardened clay of his suburban plot. During the 1930s, as his garden grew larger and more productive, Faulkner's agricultural ideology began to solidify, an ideology which in Edward Faulkner's mind offered a chance at ecological harmony, permanent prosperity, and enduring peace to a world wearied and threatened by war, economic strife, and hunger of potentially catastrophic proportions. Despite these lofty goals, Faulkner claimed he offered "no general utopias."[14]

Faulkner's ideology of farming incorporated the tenets of permanent agriculture that had evolved in the 1930s. He offered a critique of what he thought were misguided past farming practices and the misguided use of science and technology, and he presented a "way out" of the problem via an ecologically based husbandry that featured societal permanence as an eventual goal. Faulkner claimed that the short-sighted agriculture practiced by farmers and propagated by the agricultural colleges had sapped the "cream of fertility" from the land, thus eroding the principal basis for societal wealth, and fostering a reliance on expensive and possibly unhealthy manufactured agricultural chemicals. Faulkner thought farmers actually worked against nature and were forgetful that "the earth

is self-sufficient . . . its failure to deliver to its plants everything they need can be traced to the manner in which we handle the land . . . in part from the unnecessary disturbance of the upper layers of the soil." Faulkner's diatribes regarding the heavy-handed use of machinery and science heralded a new era in which technology, formerly hailed as a solver of problems, increasingly became viewed as a source of problems in society.[15]

Faulkner's main attack on the tradition of American soil abuse centered on the use of the cherished moldboard plow as a tool for soil preparation. While the moldboard had been necessary in its pioneer role as a sod breaker, its continued use, according to Faulkner, led to a decline in fertility, an increase in erosion, and impoverishment of land and people. Faulkner argued that the moldboard's action in the soil created "an explosive separation of the soil mass [which] wrecks temporarily all capillary connections; the organic matter sandwiched in further expends the period of sterility of the soil because of dryness." Faulkner noticed that plowed fields, when left fallow, grew few plants the next year while adjoining unplowed areas grew flora in abundance. Thus, to Faulkner, the moldboard "hardened" the land by leaving fields laden with plastic-like clods. In Faulkner's view, deep plowing trapped undecayed organic material underneath the topsoil, which in turn "leeched," or poisoned the ground, thereby creating a hard surface layer that released moisture instead of absorbing it into the ground, thereby creating runoff, erosion, evaporation and climatic change. The result of the moldboard's battle against "nature's process" of soil building was an increased dependence upon manufactured chemicals, a need to expand the amount of land under cultivation (horizontal farming), and crop yields that were highly inefficient when judged by bushels per acre and in the amount of investment needed to sustain yields. In Faulkner's description, American agriculture had failed to develop "self-sufficiency of the soil" and "permanence in soil productive power" by neglecting the "almost automatic provisions of nature for supplying plants with

complete rations." Furthermore, farmers were becoming hooked on quick but expensive technological "fixes" instead of fixing their problems permanently.[16]

What was Faulkner's plan to correct past abuses and provide for an abundant future? Labeled "trash farming," or "trash mulch culture," Faulkner's system was a derivation of other concepts in the period, including conservation tillage, humus farming, and organic farming. Simply stated, Faulkner proposed to emulate organic farmers and ancient peasant agricultural systems by incorporating large amounts of organic material into the topsoil. Unlike the organic farmer who spaded or roto-tilled barnyard waste, composts and mulches into the soil bed, the trash farmer would stir green manures and crop and weed residues (trash) into the topsoil via the disc plow or yet to be designed implements, instead of burying the natural or planted organic material underneath the surface layer via the deep plowing action of the moldboard. The result would be a humus-building topsoil teeming with "trashy" residue that Faulkner claimed would assist in "restoring the conditions which prevailed upon the land when it was new, [and which] will cure erosion and restore productiveness in a single stroke."[17]

By incorporating more organic matter into the soil, Faulkner believed that more water could be infiltrated into the soil, thus providing more nutrients to plants and working against water erosion. Additionally, "decayed vegetable growth, trash, and dead and living roots of all kinds . . . [was] a poor field for the forces of wind erosion." Trash farming purportedly created what Faulkner described as "real soil," which was "black, crumbly, loose enough to be springy when walked over, free from crusts in all circumstances, and may be worked almost at once after a rainfall." Real soil, claimed Faulkner with characteristic bombast, would produce up to five times the yield per acre over standard American farms, without the expensive pesticides, fertilizers, herbicides and other manufactured agents which swamped American agriculture. Indeed, Faulkner railed against these "poisons," claiming, like Sir Albert Howard and J. I. Rodale, that healthy soil

would nurture healthy, disease resistant crops which in turn would nurture healthy people and societies. Faulkner also offered ideas for new machinery, such as large roto-tillers, to effect trash mulch culture, and he provided advice on the best green manure crops (usually rye or legumes), and the correct machines and angles to work "trash" into the ground without mucking up planter shoes and other machinery. Again, while claiming "no general utopias," Faulkner recognized that his vision of trash farming went beyond simple techniques. His ideology offered as drastic reversal of American farming away from abusing the land to a new era of stewardship and ecological and societal harmony. Faulkner found many opponents to his highly generalized and scientifically dubious plan. nonetheless, this self-described experimental-farmer found many influential supporters, including Hugh H. Bennett, who indicated that, "By personal observation, by the results of scientific study and by the practical experiences of farmers, I believe it is becoming increasingly evident that the passing of the turning plow from general use in our cultivation would be a boon, Some day it may be regarded as a notable event in history."[18]

The Benefits of Permanent, Ecological Agriculture

Permanent agriculture promised to foster ecological stability and enhance the productive capability of the land. Beyond its promise of ecological health and agricultural-industrial/rural-urban balance, permanent, ecological agriculture offered an array of agrarian, economic, and other societal benefits which made the permanent agriculture idea into something far greater than mere advice to farmers. For proponents in the late 1930s through the early 1950s, but especially in the mid-1940s, the new agriculture offered the opportunity to salvage the small farmer and the Jeffersonian, agrarian ideal. It also afforded the chance to bring long-term stability and prosperity to the national economy emerging from two decades of domestic and civil strife. Most fantastically, the advocates

of permanent agriculture portrayed their various systems as brightly lit avenues leading toward a future America endowed with health, abundance, and permanent peace.

First, permanent agriculture was based on restoring ecological harmony between people and the land, the central tenet of permanent agriculture being "cooperation" with nature. "Once this collaboration with nature is accepted, and a program of biologically sound planning is undertaken," wrote a proponent of the new farming, "we will realize at once that our traditional cash accounting has given rise to fundamental error." In other words, permanent agriculture helped establish the idea that societal wealth was more than economics and was part of a greater complex of ideas that included a reckoning with the environmental costs of exploitative agriculture. As an ideal, permanent agriculture represented the onset of a new "recognition and acceptance of the responsibility that [humanity] adjust properly to [its] total environment.[19]

A second general benefit promised with the adoption of permanent agriculture included the salvation of rural life and the revitalization of the oft-resurrected "Jeffersonian" ideal (what historian David Danbom labels romantic agrarianism, and what others have labeled agricultural fundamentalism) of a nation of small, independent, and prosperous farmers rewarded by the economic and psychical values of country life. Louis Bromfield's agrarian experiment epitomized this agrarian feature in the general ideology of permanent agriculture. Bromfield's non-fiction books in the 1920s and 30s invoked the American agrarian tradition, and his non-fiction works in the 1940s and 50s continued this theme of the farmer as guardian of republican virtue.[20]

In his many attacks against the "Age of Irritation" Bromfield, in a most exaggerated fashion, proclaimed permanent agriculture as an alternative to a future of urban industrialism. He wrote: "The farm, the earth, appeared to be the sound base from which man, especially one who was weary and disillusioned through too much experience in the modern, complex, industrial, imperialist world, could re-examine his own

significance." The truculent Ohioan also asserted that, "There is in all the world no finer figure than a sturdy farmer standing, his feet well planted in the earth, looking over his rich fields and beautiful, shiny cattle." Bromfield deigned himself part of a "natural rural aristocracy," a superior "soil being" who could enlighten both urbanites and the small-scale (read peasant) farmers in his locale. (Which in Bromfield's case was the entire nation). He subscribed to the view that "the vast majority of the great men and women of the nation and those who have built it come from farms or hamlets." Indeed, for many Americans in the 1940s agriculture was "more than a basic economic industry" but was "a special social order" with distinctive "moral, intellectual, and cultural points of view." These claims were echoed by others in the period, including Yale University President A. Whitney Griswold, who would write of the "soft spot we have in our hearts for farming. Who talks of saving business or manufacturing as a way of life? Who does not lament an abandoned farm?" Griswold, while noting "the Jeffersonian ideal is a hardy perennial," agreed with Franklin Roosevelt's concern that the "agricultural ladder has become a treadmill." Thus, in the permanent agriculture mindset, the notion existed that, "If agriculture is sick, the whole structure is effected. If agriculture collapses, all else goes with it--health, banks, insurance companies, currency, high standard of living,--everything."[21]

Bromfield's message of permanent, ecological agriculture was rife with his devotion to the agrarian ideal. He invited thousands to visit his farm to witness the "terrifying" fertility of his land, where, according to Louis at the time, "There is no smell quite so good as fresh-turned sweet earth . . . tinged with the vanilla-like smell of sweet clover being crushed by the moving wheels of the tractor." Special visitors invited to the grand table of the Bromfield home enjoyed the proprietor's bounty, detailed by "King Louis" as "young White Rock broilers, mashed potatoes, gravy, cauliflower and sweet corn fresh from the garden, quantities of fresh butter churned Thursday, tomatoes like beefsteak and the first limestone lettuce, newly made peach butter and freshly made

pickles . . . ice cold cantaloupe, watermelon, big bunches of Niagara and Concord grapes and fresh peaches . . . Guernsey milk . . . everything . . . produced on the place."[22]

Literati and sometime visitor to Malabar, E. B. White authored a tribute to Bromfield's attempt at a pastoral utopia in the New Yorker, writing a lengthy poem that read in part "Malabar Farm is the farm for me, Its the greatest place in the whole countree, It builds the soil with stuff organic, Its the nearest thing to a planned panic." Even the cosmopolitan and defiantly unsentimental Rexford Tugwell coupled the concept of permanent agriculture with mythical agrarianism. While lancing the backwardness and burdensome (especially for females) back-to-the-land or subsistence element in permanent agriculture, Tugwell thought Americans had "everything to gain from the recovery of lost companionship between men and women who have a common task, to the renewal of the joys of sound appetites and healthy bodies which come from tending gardens and making honest flour." Tugwell envisioned a countryside laced with "the wide-shouldered house surrounded by edible and fragrant growing things . . . hills to rest the eyes . . . and there is the slow rhythm of natural succession, day and season and year, turning toward a ripe and fruitful age. There is a place to put down roots, with people and animals to care deeply and permanently about."[23]

Permanent agriculture's alleged agrarian benefits also merged with oft-expressed desire for rural-urban/agricultural-industrial balance in the period. At the end of Tugwell's vision of a prosperous countryside, he noted that this dream had "all been lost." The causes of social dislocation in the period were as varied as the commentators who belabored the problems of modern civilization. But there was a general agreement in the permanent agriculture camp that a sound agriculture was fundamental to a balanced, prosperous and peaceful civilization. For Louis Bromfield, Edward Faulkner, Hugh Bennett and others, the true gauge of a nation's wealth was productive land, the vital element needed to build a vigorous rural society that would counter industrial urbanism. A

nation of cities which, left unchecked in their growth, would, thought the permanent agriculture camp, "produce tensions, prejudices and bitterness which would scarcely exists at all if industry were dispersed into smaller communities over the whole of the nation." Also, by farming "vertically," America's farmer's could produce more on less land, thus eliminating the need to displace neighbors by farming "horizontally."[24]

How then, would the ideal rural civilization envisioned by Bromfield and companions be established? In addition to promoting rural civilization and its supposed virtues, permanent agriculture also promised a third general benefit--economic prosperity. Edward Faulkner's remarkably simple reasoning best illustrates the economic claims made by the proponents of permanent agriculture. Faulkner (again the one who offered "no general utopias"), claimed that his system would allow farmers to take "full advantage of the productive power of real soil" while "maintaining their mechanical lead over other farmers the world over." Hence, American farmers could "undersell the rest of the world" in a program of planned abundance and deflation of prices. Because they would be producing more per acre while lowering costs via the Faulkner system, farmers could accept reduced cost for their products, thereby lowering prices and eliminating inflation. Highly erosion sensitive land would then be retired, placed in perennial grasses, reforested for commercial use, or set aside as wildlife preserves and refuges. Additional acres could also be devoted to fruit and vegetable production, and, most importantly, be farmed for chemurgic purposes, thus creating a supply of renewable raw materials for industrial use and further padding the farmer's wallet. For Edward Faulkner, ever the idealist, with such abundance in effect food and industrial products would become extraordinarily cheap, the need for economic competition and war would be eliminated, farmers would become fretless "middle class consumers," and "some of the tensions of civilization" would be relaxed "and our lives would become more comfortable."[25]

Faulkner was not alone in projecting a solid future economy based on permanent agriculture. Hugh H. Bennett suggested that the new farming was "not limited in its effects and benefits just to the farm which it is practiced. It is closely related to the profitability of industry, the well-being of municipalities, and the health and welfare of all the people." The chief of the SCS constantly reminded bankers and farmers, industry and labor, professional people, and "everybody else" that they had "a vital stake in the permanent welfare of the country's productive land." Bennett constantly linked a federal program for permanent agriculture to concerns over post-war unemployment and depression. The Soil Conservation Service claimed in late 1943 that their plan for permanent agriculture could employ 470,000 people for one year at 1,200 to 1,600 dollars per person, or 117,000 people for four years, at a cost of 831 million dollars plus 100 million for hiring engineers. Bennett would always claim that no matter the cost, his soil conservation and rebuilding program was a sound financial investment in the future. "Economic stability grows from good soil used intelligently" was one of Bennett's favorite slogans. In 1947, the stalwart Georgian, already hailed as "the father of soil conservation," claimed that he could put America on a program for permanent agriculture for the cost of 5.5 billion dollars over seven years. While a steep outlay, Bennett asserted that his program would result in a fifty dollar per acre dividend over ten years when accounting for increased productivity and reduced costs.[26]

Faulkner and Bennett's claims of economic rejuvenation via permanent agriculture were echoed by others in the period, including Louis Bromfield, who presented a loud and needlesome voice in the debate of the future of postwar farming in the years during and immediately after World War II. Sensing that permanent agriculture was part of a longer-expressed desire for "equity for agriculture," Bromfield wrote, "Eventually, out of grim economic necessity, the level of our agriculture will be raised and we shall have lower costs for consumers and higher profits for the farmer arising out of higher and efficient

production." While devoted to the idea that farming was a "special" segment of the economy endowed with psychic benefits, and while they held-out for at least partial self-sufficiency on the farm, Faulkner, Bromfield, and most members of the permanent agriculture movement were devoted to a commercialistic interpretation of farming, and their new faith in ecological agriculture was not a "philosophy of despair." In other words, permanent agriculture was about making money as well as being ecologically healthy and economically sensible. It was, in essence, an idea based on superabundance. Farmers were going to make everyone wealthy for the long term, so went the ideology, by combining American technological and marketing expertise with the permanent, ecological tenets of permanency on the land, creating in turn a "greater pride and satisfaction in farming along with greater material returns." For Edward Faulkner, his humbly inspired plan had disclosed "that the world is not yet the burned-out cinder some writers have suggested in their fear of Malthusian certainties for the future."[27]

Permanent agriculture promised to restore ecological balance between humanity and the biotic community, to resurrect and sustain ideals of a Jeffersonian small-farmer nation, and to promote the overall economic wealth of the nation. These heady, often outlandishly simplistic claims were augmented by a fourth general benefit proclaimed by the proponents of permanent agriculture in the years surrounding World War II--that the new farming regime would bring societal health and wealth and a culture of peaceful abundance to a world that had suffered from years of economic and military disruptions, a world threatened with an even worse future.

The idea that the new ecological farming would produce nutritional crops, people and environments was a central feature of "organics" advocates in the permanent agriculture movement. Edward Faulkner boldly proclaimed in 1943 that "Agronomists as well as nutritionists are aware that lands which have been exhausted of their essential nutrients produce foodstuffs which are deficient in the end-products required by human

beings." Faulkner, Bromfield, Rodale and others actively promoted the link between ecologically "healthy" soil and human health ("The foundation for life") and nutrition as imported from the likes of Sir Albert Howard and Erhenfield Pfieffer. Faulkner proclaimed that his trash farming system would serve as "groundline health insurance" and would provide "abounding health through a rich soil, restored to produce abounding nutrition. Faulkner also asserted that encouraging "natural health" for the land was a proactive alternative to American agriculture's increasing dependence upon chemical prescriptions for ex post facto soil problems. Louis Bromfield supported Faulkner's claims, noting that "At Malabar we know that we have a remarkably low rate of sickness and infections among plants, animals and people." He also claimed that, due to his program of ecological agriculture and livestock management, outbreaks of mastitis and Bangs disease were anomalies in his cattle population. Friends of the Land, the major organized group promoting the permanent agriculture idea, also attempted to legitimize the health claims of permanent agriculture adherents by sponsoring a conference (and publishing the proceedings) entitled "Soil, Food and Health: 'You Are What You Eat,'" which again served to link ecological farming with the health of the general population.[28]

Beyond creating health for the masses, the champions of permanent, ecological agriculture joined their cause to the greater concern for postwar peace and prosperity. Walter C Lowdermilk, minister and diplomat for the Soil Conservation Service, summed the mentality of those working for permanent agriculture in 1945 when he wrote that "this war will not be ended by the mere cessation of hostilities. Great world problems will have to be solved, and deep wounds will have to be healed by many years of united effort. Otherwise the end of the war will only prove to be a pause before a new and more horrible holocaust." While particularly fearing for the future of his area of intrigue, the Levant, Lowdermilk expressed the concerns of many Americans for the post-war future of the entire world. While some concerned for world peace looked to the solidification of United

Nations rule under a form of a world constitution, and while other groups put forth technological solutions to the threats facing humanity, Lowdermilk and the permanent agriculture cadre were convinced that "The partnership of land and farmer is the rock foundation of our civilization; if either member of this partnership weakens or fails, the whole structure civilization built upon is likewise weakened and fails; Nations rise or fall upon their food supply."[29]

On an individual level, permanent agriculture, advised Edward Faulkner, would work for those willing to "wait patiently to work their way to soil conditions such have now developed in this tiny plot of mine." If patient, eventually under the Faulkner plan "they could relax their fear tensions and look forward with confidence to a completely balanced future so far as productivity of their land was concerned." Ward Shepard described permanent agriculture, as initiated in soil conservation districts, as a path to "democratic social action," while others, such as Bennett and Bromfield, envisioned permanent agriculture as a tool to build a balanced economy.[30]

But the promised societal benefits of permanent agriculture went beyond the farmstead and extended across national borders. "Well fed, secure people are not readily persuaded to take up arms," was the message preached by Hugh Bennett in the years during and immediately after the war. Erosion and unproductive land caused hunger and poverty, which in turn created civil strife, reasoned Bennett. People turned over their freedom for food, and lack of productive land and abundant food and fiber was sure to produce "discontented people, disturbers of the peace, given to uprisings, and breeders of war." Bennett illustrated his point by reminding listeners that Germany and Japan had both gone to war to find resources, especially land, to feed burgeoning, industrialized nations. He also suggested frequently that neglect of the soil led to national decline. Hence good soil was to Bennett the "hub on which the wheels of industry turn," essential in ensuring "a prosperous agriculture [as] the nation's foundation." An agriculture, as Bennett would

always note, which contributed not only food and fiber, but also economic sustenance to schools, churches, communities, businesses, and homes, not to mention serving as a weapon in the "defense from attack by treacherous enemies."[31]

Bennett, Lowdermilk, and other advocates of permanent agriculture felt certain that the process of building the new farming would bring prosperity and world peace. Indeed, Bennett's SCS support group Friends of the Land actively promoted the idealistic and technical ideas of permanent agriculture around the world, particularly in Latin America and other under-developed nations, thus inserting the permanent agriculture idea, albeit quietly, into the postwar battle between the allegedly diabolical systems of capitalism and communism. Permanent agriculture also aligned itself with the war effort. Future Secretary of Agriculture Claude Wickard highlighted the strategic component of planned, permanent agriculture when he indicated his belief in 1941 that "conservation is not a competitor of national defense for attention, it is an adjunct to permanent peace and welfare. It is a force whose worth times of crisis only emphasize."[32]

Yet Hugh Bennett was the most vocal apostle of the idea that permanent agriculture would restore peace and prosperity to a world crippled by bloodshed and angst regarding the future. He posited a very near future when every acre of land would be restored in such fashion as to produce permanently in "millions of communities throughout the world." In the new era of abundance and harmony, planned, permanent, ecological agriculture would be the main solution to the problems confronting humanity, including "famine, food distribution and human nutrition."[33]

Like many ideologies that offer comprehensive answers for myriad troubles, permanent agriculture emerged in a time of crisis, and used the sense of crisis to serve as a justification for proposed changes in the way society functions. In this case, the proponents of permanent agriculture used the ecological and societal crises of the 1930s and 1940s to bolster the urgency of their challenge of traditional farming methods and

policies. Like other ideologies, permanent agriculture cited problems in crystalline fashion, but offered more opaque solutions. A loosely affiliated set of ideas dispersed in a shotgun fashion from a number of sources, permanent agriculture grafted itself first onto the soil crisis of the 1930s, then to the Second World War, and increasingly into the postwar milieu, a time which historian William Graebner has ably depicted as "the Age of Doubt."

Ecological ideas began to expand outward from the academy, and they joined with other emergent concepts, such as conservation, organic farming, and the principle of planned permanence to create the ideology of permanent agriculture. Permanent agriculture not only promised to salvage the land from ecological ruin and restore it for long-term production, it also promised a economy of abundance, the perpetuation of a small-scale farmers, unemployment relief, better health, and the hope of permanent world peace and harmony.

While it would be easy to dismiss the permanent agriculture idea as the ranting of a vocal minority, or to discount the dreamy, meandering, and scientifically questionable observations of an Edward Faulkner or Louis Bromfield, the surprising fact is that the concept of permanent agriculture did receive national attention, especially in the late 1940s, thereby altering the theory, practice, and policy of agriculture and serving as an incubator for the ecological ideals that would emerge in the postwar world.

Notes

1. Hugh H. Bennett, "Permanent Systems of Farming," box 10, file 35, Bennett Papers.

2. Henry A. Wallace quoted in Lord, Forever the Land, 223-24; Rexford G. Tugwell, "Racial Thrift," Land 1 (Winter 1941).

3. Harry C. Diener, "A Conservationist Looks at Conservation Farming," Soil Conservation 6 (April 1941): 259; Shepard, Food or Famine, 29; for more on the SCS,

see Edward H. Graham, "Grasses fo Soil and Wildlife Conservation," Biology and Land Use (April 1942): 244-253.

4. J. P. J. Van Vuren, Soil Fertility and Sewage (New York: Dover Publications, 1948), 7-29; Thomas J. Barrett, Harnessing the Earthworm: A practical inquiry into soil-building, soil-conditioning, and plant nutrition through the action of earthworm, with instructions for the intensive propagation and use of Domesticated Earthworms in biological soil building (Boston: Bruce Humphries, 1947), 9-75; Rodale, The Organic Front (Emmaus: Rodale Press, 1948), 15.

5. For more on 1940s era organiculture, see Leonard Wickenden, Make Friends With Your Land (New York: Devin-Adair, 1949), 1-130; Ehrenfield Pfeiffer, Soil Fertility, Renewal and Preservation: Biodynamic Farming and Gardening (London: Faber and Faber, 1947), 15-186; R. P. Faulkner, Garden Manures and Fertilisers: Embodying Special Recommendations for Fruit, Vegetables and Flowers (London: Collingridge, 1949), 24-30; Kellogg, The Soils That Support Us, 14-66.

6. Louis Bromfield, "Trash Farming at Malabar," Land 4 (Summer 1945): 322; Portions of this section originally appeared in Beeman, "Louis Bromfield Versus the 'Age of Irritation,'" Environmental History Review 17 (Spring 1993): 77-92.

7. Bromfield, Out of the Earth, 297; Bromfield, A Few Brass Tacks (New York: Harpers, 1948), 2-7.

8. Some biographical information was provided in a brochure, Louis Bromfield's Malabar Farm, (Columbus: State of Ohio, n.d.). Additional background information on Bromfield was provided by the staff in a visit to Malabar Farm State Park, Lucas, Ohio. The help of Andrew Ware and Dr. Clive Edwards of Ohio State University aided research on Bromfield. Bromfield's literary career is documented in David Anderson, Louis Bromfield (New York: Twayne Publishers, 1964). More biographical information on

Bromfield was garnered from commentary in Charles Little, ed., Louis Bromfield at Malabar Farm: Writings on Farming and Country Life (Baltimore: Johns Hopkins, 1988), 1-15.

9. Louis Bromfield, "Pleasant Valley," Farm Quarterly (Autumn 1946): 33-36..

10. Bromfield-Geld, The Heritage, 68-75.

11. Louis Bromfield, "Ecology at Malabar," Land 7 (Winter 1949): 515.

12. Bromfield, Out of the Earth, 42; Little, Louis Bromfield at Malabar, 30, 90-102, 132.

13. Bromfield, "Ecology at Malabar," 515-517; Louis Bromfield, "Spring," Farm Quarterly 8 (Spring 1952): 68-70; Bromfield, Out of the Earth, 35-36; Little, Louis Bromfield at Malabar Farm, 26, 40-41, 90-102.

14. Some of the material in the section on Edward Faulkner appeared in Beeman, "The Trash Farmer," 91-102; among the sources on Faulkner are his monographs, including Edward Faulkner, Plowman's Folly (Norman: University of Oklahoma Press, 1943); Edward Faulkner, Uneasy Money (Norman: University of Oklahoma Press, 1945); Edward Faulkner, A Second Look (Norman: University of Oklahoma Press, 1947); Edward Faulkner, Soil Restoration (London: Michael Joseph, 1953).

15. For more on Faulkner's acid critique of scientific and technological malfeasance, especially regarding the agricultural science establishment see Faulkner, Soil Restoration, 42-43, 66, 104-109; Faulkner, A Second Look, 26, 182; Faulkner, Plowman's Folly, 43; Faulkner, Uneasy Money, 28-36.

16. Faulkner, Plowman's Folly, 3-9, 46-53, 104-109; Faulkner, Soil Restoration, 13, 20-122; Faulkner, A Second Look, 61, 81, 92, 126; Faulkner, Uneasy Money, 28-36, 53, 100-105. Faulkner was also critical of the use of drainage tile, which in his opinion "robbed" the land of water and created to erosion and downstream flooding. See Edward

Faulkner, "Do We Need More Tile?: A Critical Note on Artificial Drainage," Land 2 (Winter 1941-42): 29-34.

17. Faulkner, Plowman's Folly, 12-13, 104-105. Faulkner was one of many in the permanent agriculture movement to base part of his ideology on the idealistic vision of peasant agriculture in Asia, garnered primarily by reading the before-mentioned F. H. King's Farmers of Forty Centuries.

18. Faulkner, Plowman's Folly, 26-107; Faulkner, A Second Look, 18-41, 110-135; Faulkner, Soil Restoration, 32-33, 206-207. After Faulkner's ideas became widely circulated, many machinery manufacturers began to produce equipment that would assist in mixing "Trash" into the soil. For instance, advertisements for large-scale roto-tillers (an idea that had existed since at least the 1850s), started appearing in farm magazines in the years after Plowman's Folly. For example, in late-1945, Farm Journal, Wallaces' Farmer, and California Cultivator printed advertisements for what was described as an "amazing new implement" called a Till-Master that assisted in working green manures and surface rubbish into the soil. West Virginia farmer John F. Hensler described for readers of the Land a machine Mr. Hensler called "My Faulknerizer"--a device which rolled down a cover crop, chopped, and pulverized it, and mixed the substance with the topsoil. See John F. Hensler, "My Faulknerizer," Land 4 (Winter 1945): 83-84. Faulkner did later admit that in his backyard experiments in the 1930s he did briefly use some manufactured fertilizer. See Hugh H. Bennett, "The Abolition of the Plow," New Republic, 10 October 1943, 83, 453-454. For analysis of one attempt to adopt the ideas of Faulkner, Louis Bromfield, "Trash Farming at Malabar,"321-325.

19. See "Design for Plenty," in Food at the Grass Roots: The Nation's Stake in Soil Minerals (Knoxville: Tennessee Valley Authority, 1947), 5-15; William Vogt, "The Survival of Man," in Conservation in the Americas 5 (October 1947): 1-8.

20. David Danbom, "Romantic Agrarianism in Twentieth-Century America," Agricultural History 65 (Fall 1991): 1-12; the subject of "Jeffersonianism" has produced some excellent scholarship on the meanings of American agrarianism. For examples, see Joyce Appelby, "Commercial Farming and the 'Agrarian Myth' in the Early Republic," Journal of American History 68 (March 1982): 833-847;for more on the meaning of Jeffersonianism, see Paul Thompson, "Agrarianism and the American Philosophical Tradition," Agriculture and Human Values 7 (Winter 1990): 3-9; other classic treatments of the agrarian myth include Merril D. Peterson, The Jefferson Image in the American Mind (New York: Oxford University Press, 1960); and Morton and Lucinda White, The Intellectual Versus the City (New York: Oxford University Press, 1977); see also M. Thomas Inge, ed., Agrarianism in American Literature (New York: Odyssey Press, 1969); for examples of twentieth-century agrarian movements, see Bolton Hall, Three Acres and Liberty (New York: Macmillan, 1910); Isaac Phillips Roberts, Ten Acres Enough (New York: Orange Judd, 1918); E. Benjamin Andrews, The Call of the Land (New York: Orange Judd, 1913); Harvey N. Wiley, The Lure of the Land: Farming After Fifty (New York: Century, 1919); Donald Davidson, I'll Take My Stand (New York: Harpers, 1930); Ralph Borsodi, Flight From the City: The Story of a New Way to Family Security (New York: Harpers, 1933); William B. Daryee, A Living from the Land (New York: McGraw-Hill, 1934); M. G. Kains, Five Acres and Independence (New York: Greenburg, 1935).

21. Bromfield, A Few Brass Tacks, 2-9; Bromfield, Out of the Earth, 297-298; Winfield Scott and Joseph B. Paul, Permanent Agriculture: A Textbook of General Agriculture (New York: John Wiley, 1941); A. Whitney Griswold, Farming and Democracy (New Haven: Yale University Press, 1952), 15-23; Louis Bromfield, "Forward," in P. Alston Waring and Walter Magnes Teller, Roots in the Earth: The Small Farmer Looks Ahead (New York: Harpers, 1943), vii; for related testimonies and for an

interesting view on the prospects of rural life as viewed from the 1940s, see Ralph Borsodi, O. E. Baker, and M. L. Wilson, Agriculture in Modern Life (New York: Harpers, 1939), 3-8, 187-203, 228-245; see also Allan B. Kline, "What the Farmers Want," Annals of the American Academy of Political and Social Science 259 (September 1948): 122-127.

22. Bromfield quoted in Little, Louis Bromfield at Malabar Farm, 46-48, 75.

23. E. B. White, "Malabar Farm," New Yorker, 8 May 1944, 104; Rexford G. Tugwell, "This Ugly Civilization," (book review), box 69, Tugwell Papers.

24. Bromfield, A Few Brass Tacks, 112,199.

25. Faulkner, Uneasy Money, 38-97; Faulkner, Soil Restoration, 125, 203; Faulkner, Plowman's Folly, 159.

26. Hugh H. Bennett, "Businessmen and Soil Conservation," box 13, file 27, Bennett Papers; Hugh H. Bennett, "Permanent Systems of Farming," box 10, file 30, Bennett Papers; John Bird, "Jobs for Half a Million," Saturday Evening Post, 27 November 1943, 20-21; Hugh H. Bennett, "The Economy and Soil Conservation," Speech to Banker-Farmer Meeting, Pulaski Virginia, (March 25, 1949), box 13, file 26, Bennett Papers; Hugh H. Bennett, "The Utilities Stake in Soil Conservation," Speech to Annual Meeting of the Edison Electrical Institute, Atlantic City, New Jersey, (June 3, 1948), Bennett Papers, box 12, file 1; Hugh H. Bennett, Elements of Soil Conservation (New York: McGraw-Hill, 1947), 1-9; Other examples from the period of the linkage between permanent agriculture (or at least a strong conservation program) and overall economic prosperity include the writings and speeches of Franklin Roosevelt's last and Harry Truman's first Secretary of Agriculture, Claude R. Wickard. See "Related Interests of Agriculture and Industry" (speech to Farm and Industry Conference, College Station, Tex., 16 November 1944), box 48, "Speeches Nov-Dec 1944," Claude R. Wickard Papers, FDR Library; see also Iowa State College Agricultural Economics professor

Arthur C. Bunce, The Economics of Soil Conservation (Ames: Iowa State College Press, 1942), vii-x, 97-128; see also "Developing Our Resources," New Republic, 3 January 1949, 18-21; on other economic benefits of permanent agriculture, see William A. Albrect, Good Horse Require Good Soils (Chicago: Horse and Mule Association of America, 1948), 3-11.

27. Louis Bromfield quoted in Wellington Brink, Big Hugh: The Father of Soil Conservation (New York: Macmillan, 1951), ix; Hugh H. Bennett to Conservation Workshop for Teachers, Murray, Ky., 1949, box 12, file 37, Bennett Papers; Faulkner, Soil Restoration, 206-207; see also Louis Bromfield, Reader's Digest (August 1943): 111-118.

28. Faulkner, Plowman's' Folly, 160-161; Faulkner also quoted from "proceedings," Land 4 (Winter 1945): 4; Louis Bromfield, "Foundation for Life," (Review of Sir Albert Howard's The Soil and Health), in Land 6 (Spring 1947): 69; Jonathan Forman and Ollie Fink, eds., Soil, Food and Health: "You Are What You Eat" (Columbus: Friends of the Land, 1948), 11-35; see also "The Farmer's Stake in Diet and Jobs," Country Gentleman, April 1946, 30-31; Rodale, The Organic Front, 9-14; E.B. Balfour, The Living Soil and the Haughley Experiment New York: Universe, 1947): 12-32.

29. Walter C. Lowdermilk, Palestine: Land of Promise (New York: Harpers, 1945), 12-25; a discussion of post-war concerns and efforts to create a world government can be found in Graebner, The Age of Doubt: American Thought and Culture in the 1940s (Boston: Twayne, 1991), 71-74; see also Paul Boyer, By the Bomb's Early Light: American Thought and Culture at the Dawn of the Atomic Age (New York: Pantheon, 1985), 29-170; Rex Tugwell, a strong advocate of permanent agriculture, was also involved in the world government movement at the end of World War II. See for example

"Reflections on Our Preliminary Discussion of Planning and Cautions for the Future," box 50, "World Constitution," Tugwell Papers; see also "The Policy of the United World Federalists," and other pamphlets and materials in boxes 1-4, Kenneth A. Carlander Papers, University Archives, Parks Library, Iowa State University.

30. Faulkner, Soil Conservation, 33; Shepard, Food or Famine, 36-55.

31. Hugh H. Bennett, "Permanent Peace--A World's Soil Problem" (address to the Seventh Annual Meeting of Friends of the Land, Houston, 7 November 1947), box 11, file 32, Bennett Papers; "Good Soil is the Hub . . . " quote taken from pamphlet prepared by the Fifth Annual Texoma Soil Clinic, Madill, Okla., 11 June 1948), located in box 1, "Correspondence file," Bennett Papers; Walter C. Lowdermilk, "The Flag is on the Plow," speech located in Henry A. Wallace Vice-Presidential Papers, FDR Library, box 45, "Lob-Lou."

32. On the international aspect of permanent agriculture, see Faulkner, A Second Look, 176-177; see also "Wallace Encourages International Cooperation," Courier-Journal (Louisville), October 1942, located in box 14, file 4, Tugwell Papers; Claude R. Wickard, "Conservation--A Lasting Emergency," Land Policy Review 4 (April 1941); see also Bert D. Robinson, "'The Shape of a Better World' See in Land Meeting in Louisville and Memphis," Soil Conservation 8 (December 1942): 127-131.

33. Hugh H. Bennett, "Permanent Peace--A World's Soil Problem," box 14, file 4 Bennett Papers; see also Hugh H. Bennett, "Soil Conservation and National Security" (speech at Staunton, Va., 3 August 1950), box 13, file 26, Bennett Papers; and Hugh H. Bennett, "Conservation Against the Background of War" (speech presented ca. October 1941, box 10, file 35, Bennett Papers.

CHAPTER FIVE:

INTO THE ARENA: THE PUBLIC LIFE OF PERMANENT AGRICULTURE

In the period from the 1930s through the early 1950s, many individuals and groups proposed technologically oriented schemes as panaceas to the soil crisis as well as the general crisis of human culture in the period. Thus, the permanent agriculture concept was very representative of its time in the sense that as an ideology, it offered a comprehensive world view, material abundance, and the prospect of the salvation of culture and civilization (particularly American civilization). What makes the idea of permanent agriculture important is that it centered on a very basic aspect of human survival--the food system. Permanent agriculture also existed in an era when the small farmer ideal, or agricultural fundamentalism, quickly faded away from the American scene. A major question the historian must ask about the permanent agriculture movement is one of relevance. In other words, did permanent agriculture matter? Did it spark debate and change? Were the movement's ideas disseminated into intellectual, agricultural, industrial and popular culture circles? Or was the permanent agriculture concept only an exercise in rhetoric, fuzzy science, and vague utopianism?

In its brief and salubrious history, purveyors of the ideology of permanent agriculture communicated the permanent agriculture idea to a national audience and sparked an intense debate and resistance within the scientific and agricultural communities. The movement underwent a co-option and watering down by traditional agricultural forces, and suffered a relative decline for a number of internal and external reasons. Still, the permanent agriculture idea persisted in both the academy and in various sub-cultures through the 1950s, later lending itself, both tangibly and mythologically, to a later ideology of societal permanence labeled sustainable agriculture.

Communication of the Idea

As various notions of planned, permanent, ecological agriculture coalesced in the late 1930s and early 1940s, advocates of the new farming recognized the necessity for publicizing their ideas. Rexford Tugwell, Morris L. Cooke and many others in the permanent agriculture movement had entered public discourse in the progressive era, when reformers used the publicity tool to educate the public about societal problems. In the permanent agriculture milieu, public education regarding the new farming emerged as a task to be undertaken with great zeal by individuals and organizations, especially the conservation group Friends of the Land, founded in 1940 to support the work of Hugh Bennett's cadre at the SCS. Emergent from the soil crisis of the 1930s, the permanent agriculture concept became attached ideologically and in a publicity sense to the national campaign for conservation education in the period, and also to the battle against fascism and later, with less success, to the Cold War. Proselytizing by "erosion apostles," such as Louis Bromfield and Hugh H. Bennett, brought national attention to the permanent agriculture movement, especially with the added attention resulting from the debate over the controversial ideas of Edward Faulkner. By 1945-47 the general ideas of permanent agriculture had permeated throughout society, and the term itself increasingly appeared in agriculture journals and trade pamphlets.

As an idea, the communication of the permanent agriculture concept emerged in the previously described soil jeremiads that appeared following the societal and ecological crises of the 1930s. The quest for a planned and permanent agriculture seemed quite sensible to ordinary farmers and citizens witnessing events like the Dust Bowl and dreadful agricultural economy. For agricultural theorists such as Henry A. Wallace, secretary of

agriculture (1933-1941) and later vice-president (1941-1945), the soil crisis offered the opportunity to present the new ethic of interdependent living before large audiences. Wallace was particularly convinced that the Pare Lorentz films (The River and The Plow that Broke the Plains), financed by the USDA in the late 1930s, employed an ideal medium to foster soil permanence. Writing to Morris L. Cooke in November 1939, Russell Lord indicated that Wallace had "come to see conservation as something of Mr. James 'moral equivalent' and was supportive of Lorentz idea of shooting "'The Grapes of Wrath' outdoors, and make it better." Lord continued his discussion of the film's purpose, writing "I guess we shall show both soil and human displacement, and the beginnings of stabilized soil and greater human security."[1]

This new remake of John Steinbeck's classic tale was never made, though one film maker did attempt to document the abuse of the land and proposals for a new system of permanent agriculture. Director Robert Flaherty, known for his previous work, including Nanook of the North, released his USDA sponsored The Land in 1941. A critical flop, the film quickly disappeared from public view, in spite of support from the permanent agriculture cadre. The content of Flaherty's film embodied the general attempt to publicize past abuses of the soil, as the movie promoted all of the major concepts of planned and permanent agriculture, including a vitriolic tirade against the past, and support for planning, interdependent living, and ecologically oriented conservation of the soil.[2]

Building permanent agriculture required far more than a few films and staid USDA pamphlets. The new agriculture demanded an inculcation in values that incorporated new blend of a conservation and ecological thought. Aldo Leopold elaborated on this values inculcation concept, writing that "the evolution of the land ethic is an intellectual as well as an emotional process. Conservation is paved with good intentions which prove to be futile, or even dangerous, because they are devoid of critical understanding either of land, or of economic land use." Hugh Bennett echoed Leopold, informing the permanent

agriculture cadre that building a permanent agriculture was a "major national objective." Bennett admonished his audience that "this conservation-needs concept must become a habit, from our youth onward, and part of our culture, sunk deeply into our physiological make-up. Herein lies the challenge for thought and a call to action for every Friend of the Land." Leopold asserted that "many products of land-abuse can be identified as such, and can be discriminated against, given the conviction that it is worth the trouble." Leopold was especially concerned with teaching ecological conservation to the youth, as were Bennett and company. Bennett wanted the new agricultural-ecological ethic to be incorporated at all levels of education and in American business culture, so that people would have the "incentive" and "training" to "look at the landscape around them and wonder what was happening."[3]

By focusing on education and inculcation in what Leopold called the "land ethic," proponents of agricultural permanency were part of a larger conservation education crusade in the 1940s. The overwhelming concern of those fostering this conservation crusade was that "Much of today's conservation problem grew out of the fact that people in this expanding nation never really learned the relationship between their daily lives and the natural resources of the earth." This faith in the uplifting abilities of education sparked a conservation education campaign in the National Education Association and other bodies, a campaign whose purpose was to teach conservation as "basic to American life, that each generation recognize its obligation to future generations." Hugh Bennett, with his typical sense of urgency, stated in 1941 that, "It is high time to introduce into our schools courses which deal with the soil as a resource basic to continuing national welfare--as something to be preserved."[4]

As the conservation education message reached all levels of society, the ideology of permanent agriculture also began to reach a broader audience. As a defined ideological program, the concept of permanent agriculture was illuminated by a number of individuals

and groups, but found its most lucid advocate in an organization designed initially to augment and support the work and message of Hugh Bennett and the SCS. "Knowing that whole regions of our country, once incredibly rich, were on the verge of becoming deserts," wrote Louis Bromfield, "these men [and actually a few women] forestry experts, industrialists, doctors, government officials, writers, bankers, professors, farmers--resolved to educate the American people to the danger." The group Bromfield described was the conservation organization Friends of the Land, whose organizational life in many ways reflects the historical events of the permanent agriculture concept. For Friends of the Land the major question confronting conservationists was: "How can a people who seem for the past four centuries to have been doing the wrong things to their land . . . turn in their tracks, change their minds, their basic designs of ground line culture, their implements, their ways?"[5]

The desire for a new conservation organization that would serve as a private auxiliary to the SCS had been kicked around in USDA and agricultural conservation camps in the late-1930s. The genesis of Friends of the Land was a letter from Hugh Bennett to Morris L. Cooke in 1938 in which Bennett singled out Cooke as the likely leader of "A group of thinking people having the interest of the nation at heart as the nucleus of a national organization." The idea for this new conservation group was partially influenced by a similar effort to promote stewardship, the Society for the Holy Earth, founded by Liberty Hyde Bailey in 1917. Friends of the Land served as the main font of publicity for permanent agriculture, and its history also contributes to a greater understanding of American environmental history, in that the group's history dramatically illustrates the transition of ideas and values from Progressive-era, "wise-use" conservation thought, to the new era of recognizing ecological interdependence. Often historians cite the life experience of Aldo Leopold (himself a prominent member of Friends of the Land) as representative of this shift in values from human-centered "use" of resources to a more

holistic, or biocentric approach. Historians might also cite Friends of the Land as an example of this transition into the Age of Ecology. The history of the group also shows the enduring importance of effective publicity in the shaping of a new idea within the public mind set, as well as the centrality of agricultural issues in the development of an environmental ethic in the United States.[6]

Friends of the Land's formal organizational meeting occurred on March 22-23, 1940, with about 60 individuals attending at the Wardman Park Hotel in Washington D.C. Working with Henry A. Wallace, Hugh Bennett, Rexford Tugwell and several others, agricultural journalist and New Dealer Russell Lord and Morris L. Cooke, the group's first President, began to define the group's mission and to build the membership roster. The group's initial charter proposed that the organization serve as a font of information on conservation, to promote regional and local conservation associations, to prepare a magazine for the general public, to support and reward conservation work and research, to influence legislation, promote youth conservation indoctrination, to integrate with like-minded organizations, and to hold periodic conferences on soil and water conservation. Founders of Friends of Land wanted to be the locus of conservation information, hoping that in the end their efforts would "possess a strong continuity of purpose to reconcile the ways of Man to Nature and make this a green and permanent land."[7]

Though Friends of the Land was conceived to augment the New Deal and was initially comprised of reformers and left-leaning social critics, the group quickly expanded beyond its New Deal sentiments in an attempt to offer "A wider, patriotic appeal to the business community in particular." In 1940, the group sent out hundreds of membership appeals to prominent industrialists, government officials, publishers, doctors, professionals, academics, conservationists, and prominent farm leaders. The goal was to form the nucleus of a national organization that would eventually expand to form regional and local chapters. While the war presented an opportunity to appeal to the conservation-

minded, Friends of the Land experienced some initial organizational problems, including lack of money and the distraction of public interest due to the war mobilization. In early 1941 the group shifted its headquarters to Columbus, Ohio, with Editor/Secretary Russell Lord firmly in charge of The Land.[8]

In order to promote such ideas as societal interdependence and the quest for an ecological permanence, Friends of the Land first had to attract interest and build membership ranks and financial support. By employing some key personalities, and by attaching its ideas and work to the war crisis, Friends of the Land successfully garnered national attention in its fledgling stage from 1940-42. In a concept often linked to selling war bonds, Friends of the Land received publicity and needed memberships when it sent Hugh Bennett, Louis Bromfield, and other celebrity orators across the nation on what one observer labeled a "Flying Conservation Circus." These disciples of permanent agriculture preached their gospel in person and on radio and newsreel to conservation districts, farm, civic, and business groups, schools and universities, garden clubs, and sundry other audiences. The svelte Bromfield, who earned the moniker "Sinatra of the Soil," (and who asserted his life was divided between "night clubs and manure piles"), stated that after the first promotional tour to support the nascent organization in the spring of 1941 "scores of converts to conservation were made . . . several dozen returned home to become evangelists, some nearly fanatics. They went back to their own communities to rouse interest in conservation programs. The Friends were besieged with request for speakers."[9]

In addition to the mercurial activity of Bennett, Bromfield, Russell Lord, Kate Lord and others, Friends received publicity and editorial support from a number of national media outlets, including The New York Herald-Tribune, The New York Times, the New Yorker, Harpers, Reader's Digest, and numerous other publications. Along with this national attention, the group and its journal benefited from contributions from the likes of E. B. White, John Dos Passos, Henry A. Wallace, Sir Albert Howard, Rachel

Carson, Aldo Leopold, Paul Sears, and many other nationally recognized authors, politicians, and social critics.[10]

Judging from the volume of speeches, articles, books, and other propaganda, there is no question that the idea of building a permanent agriculture became widely disseminated. As historian David Wright has suggested, it is difficult for present-day Americans to comprehend that in the 1930s and 1940s, agricultural leaders and commentators were national personalities. Individuals preaching the permanent agriculture concept, including Hugh Bennett and Louis Bromfield, had a national audience and following that extended beyond the farm community. Bromfield wrote books to "lure readers who never had any interest in agriculture or whose interest had been dulled or killed by pamphlets."[11]

Friends of the Land, particularly the journal The Land, served as a unifying force and a forum for internal dialogue between pedestrian conservationists in the organization and committed advocates of permanent agriculture. (Necessary in the loosely organized ideology of permanent agriculture.) The gospel of the new farming also reached the public via articles in a vast range of journals and popular periodicals, through pamphleteering, public testimonials and appearances, conferences, thought pieces, poetry, conservation camps, monographs and conferences proceedings, radio appearances, and other methods. Bromfield, Bennett, Cooke, and others traversed the land in the war and afterward, from Atlanta to Memphis, rural Pennsylvania, Texas, or Des Moines. They offered sermons on the canons of the movement--planning, permanence, ecology, abundance and rural-urban balance. Indeed, according to local legend, "Mt. Jeez," a prominent hill at Bromfield's Malabar Farm, (where up to eight thousand people once attended a conservation field day), was so-christened as a humorous tribute to Bromfield's messianic drive.[12]

For the prophets of the religion that was permanent agriculture, education was always the preferred route (as opposed to coercion) to converting the heathen American

public on the virtue's of understanding the "complex interrelationships of social and economic forces with the physical." Schools became the battleground against waste of the soil. Hugh Bennett wanted his idea to reach every level of the educational structure, from "kindergarten grade to post-graduate work in our colleges." Bennett wished to challenge Americans to view their material goods and "Trace their sources to the soil; relate the everyday life of the pupil to the land he depends on."[13]

A typical example of the publicity consciousness of the permanent agriculture camp, as related in this account of a conservation field day (co-sponsored by Friends of the Land and the Grange) in Maryland in 1945 from a partisan reporter in The Land: "Either Bromfield or Bennett would have been enough to draw a crowd, but we had them both, plus the proper mixture of state conservationists and, quite unnecessarily, a couple of eminent state politicians, including the governor. The whole affair kicked up a lot of interest." Friends sponsored weekend country seminars, "Conservation Laboratories" for teachers, veteran or granger "short courses" and seminars on conservation, radio programs, and conservation clubs." Keeping faith with the tenets of permanent agriculture, Friends sought to promote the work of "intelligent farmers, school teachers, bureau and academic men, men and women in back gardens or on an acre or two of land [who had] been *watching* their soil, living with it, *feeling* it under their feet, learning from it." The Land printed advice from educators, scientists, farmers and small-plot/garden theorists, the only requirement was that somewhere in the educational process one had to employ "the good earth as a textbook," with the end of that text being the promotion of the new conservation-ecological ethic as "a way of life."[14]

The permanent agriculture cadre worked to show how the new system of food and fiber production would contribute to the building of a peaceful and prosperous postwar world. Major voices in the movement, like Bennett and Bromfield, chortled on behalf of the new farming in the agricultural and national press as the war approached its end.

Bennett and others envisioned the integration of the permanent agriculture idea into a proposed job-creating program (tied to a strong postwar USDA). Bromfield feared government policies would produce a post-war food shortage. Also, a major fear highlighted by the permanent agriculture group was that the high production demanded by the war would lead to another epoch of ecological devastation as had, they reasoned, the "Great Plow Up" of 1917-1918.[15]

As the now-recognized "father of soil conservation," Hugh Bennett challenged farmers and landowners in Athens, Georgia, to follow the precepts of permanent agriculture in the quest for high production and profit: "This is a great country--a land of unmeasurable opportunity. Let's fight this war through for civilization and for our lives and for our kind of government. Taking care of the land--husbanding and cherishing it and fighting for it--will keep us free and permanent and great." Another commentator, Vernon G. Carter, asked farmers to be weary of another "plow up" type adventure, cautioning his readers that, "Man does not live by bread alone, but certain it is that he cannot live without bread." Educator Otis W. Freeman summed the sense of both anxiety and opportunity at the end of World War II in the permanent agriculture camp, noting that, "Outstanding problems of conservation must be solved in the postwar America if our country is to retain its social standards and national rank."[16]

In the attempt to communicate the values of permanent agriculture, the most success advocates of the new farming enjoyed was in the months following the release of Edward Faulkner's Plowman's Folly in 1943. Faulkner's book rocked the agricultural community, and gained national attention even amid the monumental events of World War II. Faulkner's diatribes against the moldboard plow, drainage tiles, agricultural chemicals, and the agricultural establishment touched on many raw nerves throughout the land.

His harangues also appealed to the state of anxiety and concern in agriculture due to fears over a potential postwar depression, the influence of science and technology, and

the decline of rural life. Plowman's Folly quickly sold 50,000 copies and went into a second printing. Commentators of all stripes debated the Faulkner concept in major national outlets such as Time and the New Republic, and The Land devoted several issues almost solely to the Faulkner controversy. Henry Ford, Henry A. Wallace, Hugh Bennett, Sir Albert Howard, and many other prominent agricultural and national figures discussed Faulkner's ideas, and in varying degrees accepted much of the Faulkner system of permanent agriculture. Russell Lord later claimed that Faulkner's revelations had "resounded around the world with a vigor and intensity worthy of such a subject as the atomic bomb." Louis Bromfield claimed that Faulkner's book "aroused so much interest and controversy" because, "It exploited and defended the principal upon which all the New Agriculture is based--the thesis that what is natural in agriculture is always more desirable and sound than what is unnatural." [17]

Faulkner's ability to draw attention to himself and his ideas indicates the overall communication skills of the permanent agriculture camp. Faulkner, Bromfield, Bennett, Rexford Tugwell, and others were effective partisans for the cause. Even in the war crisis, the general ideas of permanent agriculture unquestionably reached millions of people. Furthermore, events like the controversy over Edward Faulkner and the post-war debate over agricultural issues also led to more recognition for the movement. Friends of the Land enjoyed a modicum of success, with its membership roster climbing from the initial sixty members to nearly 10,000 members in 1947. Though a loosely affiliated coalition, the adherents of the new farming had some initial success promoting the concepts of societal longevity, ecological interdependence, and the utopian possibilities of a permanent agriculture. Permanent agriculture's many precepts circulated through the late 1940s, reaching Americans of all stripes with its infectious promises of health, wealth and abundant prosperity. Evidence of the persuasiveness of the permanent agriculture ideology (a mix of science and mysticism) is evidenced in a 1951 letter to President Harry S.

Truman from Henry B. Miller, of the Miller Brothers, "Breeders of Pedigreed Seed Oats." Miller, writing in passionate if disjointed prose, sprinkled his letter with the essential ideas that resounded in the public life of permanent agriculture. Miller told the president that "After a life time of hard work in factual research, seeking the key to soil conservation and its related problems" he had found "the universal key" in understanding the complex interrelationships between conservation and the "indispensable existance [sic]" of "plants, animals, and the microscopic forms of life." Miller told his leader with all seriousness that his ecological view of soil conservation "unfolds the immensity of power, strength and health" of nature-designed agriculture when "permitted to perform with true entity in true unity."[18]

Resistance and Co-option

As Miller's letter and numerous other similar farmer-conversion testimonials indicate, the holistic notions of the permanent agriculture camp had been widely dispersed by the early-1950s. With The Land earning critical acclaim and Edward Faulkner's ideas being debated nationally, the concept of permanent agriculture became a subject of national scrutiny in the 1940s. While Faulkner's and similar diatribes against past soil abuses were generally supported, the scientific, political and social claims of permanent agriculture were harshly attacked, particularly by agricultural scientists and members of the USDA/agricultural college/Farm Bureau/"agribusiness" nexus. While naysayers proclaimed permanent *ecological* agriculture to be pseudo-scientific and laden with unrealistic utopian social expectations, for the institutions critical to the concept of a holistic, nature-based farming, the actual term "permanent agriculture" became favored in the agricultural establishment. In essence the idea of permanent ecological agriculture became co-opted and watered-down by the USDA and companies and institutions selling

their goods and ideas to the nation's farmers. This co-option, added to other factors, led to the virtual demise of the permanent agriculture idea by the mid-1950s.

Though the ideas generated by the likes of Edward Faulkner and Louis Bromfield engendered much support from both farmers, conservationists and non-farm commentators, as had Hugh Bennett's work at the SCS, agricultural scientists offered quick, emotional and vitriolic rejoinders to the many canons of permanent agriculture, especially the efficacy of what had by then become labeled "organic" farming.

When Plowman's Folly appeared in the summer of 1943, the excitement and publicity created by Edward Faulkner caused a great consternation among America's professional agricultural community, which then and now is centered on the USDA and the land grant colleges. Surprisingly, the first resistance to Faulkner and hence the entire philosophy of organic, ecological agriculture came from the USDA's Soil Conservation Service, itself a major font of permanent agriculture ideology via its leader, Hugh H. Bennett.

William Albrect, Professor of Soils at the University of Missouri, also led a strong attack on almost all the tenets of Plowman's Folly, including Faulkner's diatribe against the plow to his promotion of a chemical-free agriculture. Albrect, who would later become a convert of sorts to ecological agriculture, found that "the most sensational feature of the work is the non-chalance with which he sweeps aside the accumulation of years of scientific research and farmer experience while staking his reputation on meager personal experience with a few crops grown in a backyard garden." Albrect asserted that Faulkner's focus on the plow neglected other factors in soil mismanagement. He also attacked several other assumptions in what Faulkner opponents labeled "Faulkner's Folly." Albrect dismissed Faulkner's concern about severed capillary connections, (a theory abandoned by soil scientists 30 years prior to Plowman's Folly), noting that plants establish their roots

deep in the soil, and that factors such as soil temperature and subsoil moisture were more important than having a moist, "trashy" subsoil.

Albrect and others attacked the idea that nature was a great model for establishing soil fertility, citing the poor, acidic soils of the forest as a prime example of how nature did not always know how to produce the best soils. Albrect also attacked other aspects of Faulkner's "seat of the pants" observations, including his co-relation of "Faulknerized" soil with increased wildlife populations and reduced problems with pests, weeds and diseases. For Albrect, the author of Plowman's Folly offered "many pseudo-scientific claims centered in water and temperature" that would "not stand against the facts of science nor the judgment of experienced farmers." In their attack on Faulkner in 1943, Albrect and SCS scientists noted that Faulkner's ideas were by no means new, and that the obvious influence on Faulkner, Sir Albert Howard, had also been lambasted by the agricultural science profession. In the initial resistance to the Faulkner permanent agriculture concept, the attacks centered on Faulkner's willingness to base his system on assumptions and observations, but also featured some emotional diatribes. One soil scientist from Iowa suggested that if Faulkner's idea's on tile drainage had been implemented, American civilization would have never crossed the Mississippi. And another more mild critic lamented the fact that if Faulknerism was accepted, the cherished symbol of the plow might have to be removed from numerous official seals and banners, including that of the Future Farmers of America.[19]

University of Wisconsin soil scientist Emil Truog joined Albrect and the USDA scientists in dismissing Faulkner, Bromfield, and most of the tenets of permanent, ecological agriculture. Writing in the July 1944 issue of Harpers, Truog first acknowledged that while too much plowing was bad, especially on hills, and while the war had fostered interest in Faulkner's book, Faulkner had drawn far too many insights from his tomato patch to be taken seriously. Truog rejected the idea that the interruption of

capillarity was a violation of nature's laws, noting instead, like Albrect, that most crops were deep-rooted and relied more on subsurface rather than surface moisture. In fact, asserted the professor, dry surface soil served as insulation for subsurface moisture. Truog defended the plow as necessary to pulverize a seed bed, to rejuvenate the soil by "alternation," and to create a deep soil layer necessary for plants.

As for the "model of nature," Truog suggested that agriculture in fact was a defiance of nature, which was at best an ambivalent model for building soil fertility. By taking fertility from nature, according to this soil scientist, humans had to artificially replace nutrients and Faulkner's simplistic tillage system would not suffice. As for plants, whether they received its food from raw organic mass or from a more discerning 50 lb. bag of calcium nitrate was of no matter. Truog also rejected the "myth" that Asian peasant "organic" farmers had better soils, citing the malnutrition and prevalent state of famine in that region of the world.

Truog rejected Faulkner's faith in a non-chemical future of abundance, and asserted that, "Absolutely no evidence exists to the effect that the judicious use of mineral fertilizers is at all injurious to soils, or tends to produce crops that are unsatisfactory for animals or food for man." Truog represented a number of agricultural scientists in his day in his faith that the miracle chemicals being produced in scientific laboratories offered a burgeoning world population a chance at an insurance policy versus winter kill, drought, poor crop quality, excessive seed costs, soil erosion, and low yields. In Truog's vision, like that of others long before him, agricultural science, not the musings of verbose and speculative soil philosophers, offered the true vision of permanent agriculture. For Truog and the like-minded, the school of permanent, ecological agriculture did not recognize that establishing a long term productive agriculture required a battle against nature, not a nebulous and arbitrarily dissolvable partnership as proposed by Faulkner enthusiasts.[20]

Resistance to the permanent agriculture ideal included attacks on the Louis Bromfield, Rexford Tugwell, Russell Lord, and other promoters of the new farming. Agricultural functionary Paul Appleby derided Bromfield's status as an agricultural commentator during the war, and others saw in Tugwell and Lord the embodiment of coercive USDA social engineering. Recall, that by the end of World War II, the influence of the New Deal social scientists was on the wane. Some of the attacks on permanent agriculture were particularly nasty. One Clarence Armstrong, in a letter to the Nation, called the ideas of Faulkner, Lord and cadre "Ridiculous." Armstrong charged that the idea of permanent ecological agriculture "ignores entirely the whole purpose of the soil, which is to raise crops." Again, agriculture was a defiance, not an emulation of nature -- an industry based on extraction of resources from the soil. Armstrong scolded the permanent agriculture ideal, stating: "We cannot have our cake and eat it. We cannot put everything that grows on the soil back into it and still raise enough food to feed the people of the country."[21]

Lord, Faulkner and others anticipated these attacks and were quick to fire back at critics. Responding to the above message of Clarence Armstrong. Russell Lord suggested that Armstrong had probably not read Faulkner's book, and noted that his views were "quite in line with the soil-mining tradition," and denied "the possibility at arriving at a permanent agriculture." While observing that many of his opponents were honest people working hard for farmers, Edward Faulkner also alleged that "Powerful interests have built up enormous business supplying these aids [manufactured farm chemicals] to farmers, and they will not see their investments made worthless without a struggle." Faulkner believed that, "A few among the higher officials know that approval of a completely organic agriculture would doom their business." Faulkner also noted resistance from land grant-extension service experts, and actual farmers, who were "jittery" at "the prospect of having none of the accustomed chemicals" despite "the fact that most of the world gets

along nicely without using commercial fertilizers." Though no methodical studies could support them, the proponents of organic-type farming claimed that they could produce nearly equal yields as chemical farming, with greatly reduced production costs.[22]

While resistance arose to the major ideas of permanent agriculture, particularly the concept of "organics," the general faith that America should work toward "permanent agriculture" remained a stated goal by nearly all the actors in agriculture circa 1945-1950. Indeed, even as the ideology of permanent agriculture spread across the land, opponents and luke warm supporters co-opted the term "permanent agriculture," while at the same time diminishing and disregarding many of the major ideas of the new farming. While championing a rhetorical form of "permanent agriculture," the very institutions that Edward Faulkner, Paul Sears, and others had attacked, came to promote themselves as front-line warriors for conservation and a long-term agriculture. But permanent agriculture was far more than conservation, it required an ecological world view that dictated a reverence for life and respect for nature. Furthermore, the permanent agriculture concept envisioned a society of planned abundance, with corresponding desires for social equity, the perpetuation of rural civilization, and a sense of belonging and humility in a complex and interdependent world.

Even as agricultural scientists rejected Faulknerism, politicians, agricultural college researchers, USDA officials, farm leaders, and agricultural manufacturers embraced, in theory, the goal of a permanent agriculture. Some of these johnny-come-latelys hoped to make money marketing machines that would effect a Faulkner-like system on the farmer's fields, others sought to promote themselves as stalwarts for conservation and the American farmer. Judging by the literature, advertisements, and monographs that appeared at the end of World War II, the permanent agriculture idea evolved from moral crusade to business imperative. Ford, John Deere, J. I. Case, and International Harvester all illustrated why their products would help build a permanent agriculture. By the late-1940s,

the USDA and agribusiness concerns bandied the word "permanent agriculture" in their slogans and advertisements, with little or no devotion to the original social and ecological concerns of the authors of the permanent agriculture ideal. Goodyear Corporation supported soil conservation awards, and small firms like Golden Annual Clover advertised their product as "A New Legume for Soil Building." Yet while all these firms, as well as the land-grant agricultural colleges, all promoted soil conservation for permanent agriculture, the holistic concerns expressed by Faulkner, Tugwell, Bennett, and others were neglected or dismissed by realists, such as agricultural economist John D. Black. In 1948 Black praised soil conservation efforts, but, in the spirit of Gifford Pinchot, noted that in the land program the guide had to be "balancing of present uses and income from the land against future uses and income." [23]

Clearly, the permanent agriculture idea attracted the attention of those groups who might have felt threatened by Faulkner's ideas. While agricultural scientists reacted to the scientific pronouncements of an Edward Faulkner, professors, politicians, the USDA and individuals from what would later (1955) be called "agribusiness" also responded to the concept of permanent agriculture as it had evolved since the 1930s. They responded by embracing the new terminology of permanence and abundance, and even some of the ideas of Faulkner, Bromfield, and company, while at the same time glossing over the holistic and grandiose intentions of the original authors of the permanent agriculture ideal. In essence, permanent agriculture lost its edge as opponents co-opted their terms but not their concepts. Thus when Goodyear enjoined farmers in a pamphlet, "Lets Practice Permanent Agriculture," the company obviously viewed selling its tires as the key to permanent agriculture, not a commitment to biological diversity, ecological health and social equity. Dr. Jonathan Forman, President of Friends of the Land in 1952, summed the frustrations of the early disciples of a new, ecological agriculture when, in a defense of organic farming, he said, "We need, indeed, to define our terms, for these are questions of grave

consequence and the arguments pro and con are now being circulated in print to hundreds of millions of people."[24]

Forman might well have referred to an important document in this co-option process, Grass: The Yearbook of Agriculture, 1948, whose lead section was entitled "A Permanent Agriculture." In the opening essay, P. V. Cardon defined permanent agriculture as "an agriculture that is stable and secure for the farm and farmer, consistent in prices and earnings; an agriculture that can satisfy indefinitely all our needs of food, fiber, and shelter in keeping the living standards we set. Everybody has a stake in a permanent agriculture." While Rexford Tugwell might have embraced that statement in 1939, and Edward Faulkner would have agreed with it in 1943, by 1947 the concept of permanent agriculture had lost much of its holistic, reformist, and comprehensive impulses and was quickly becoming divorced from many of its original tenets. While the resistance to Faulkner and "organics" damaged the fabric of permanent agriculture, and the co-option of the term loosened its already loose weave, many other factors led to the demise of the permanent agriculture idea in the 1950s.[25]

Demise

Despite successes in communicating the idea of permanent agriculture, the concept began to dissipate by the mid-1950s. Certainly the movement suffered from the often outlandish claims of advocates as well as from the attacks and co-option of opponents. But the fall of the permanent agriculture is also related to the changing structure and definition of American agriculture in the period, and to divisions in the conservation camp and in the guiding force of ecology.

"When I look back now, the vague and visionary idea I had in returning seems ludicrous and pathetic," wrote Louis Bromfield the year prior to his death in 1956, on the

financial and social failure of Malabar Farm. Bromfield, Hugh Bennett, and many of the old idealists in the permanent agriculture movement died in the 1950s, and so did their vision of a interdependent, cooperative society based on permanent agriculture. America was growing far more cynical when assessing the utopian possibilities of the future technological state. The idealism, the bold social engineering and dreams of an agrarian-chemurgic horizon, were subsumed by a more realistic public determined to participate in the postwar epoch of corporations, consumption, and suburban living. With the crises of the 1930s and 1940s far behind them, the American public of the 1950s, looked apprehensively at visionaries and agrarian iconoclasts like Louis Bromfield and Edward Faulkner. The communitarian, interdependent, reformist universe of the interwar years shifted to the postwar age of atomization, "individuation," and the "bigger is better" mentality.[26]

Permanent agriculture, with its focus on a long-term plan for an ecologically based husbandry, and with its reliance on technique as much as technology, truly confronted the many currents of the day. American agriculture underwent drastic change in the years from the 1930s through the 1950s. The "get big or get out" mentality triumphed over the desire for a nation of small, self-reliant farmers that supported small towns and industry. Fewer and larger farms were the trend in postwar America, with farmers expanding horizontally via mechanization, genetic manipulation, and chemical immersion.

Many farmers, industrialists, educators and government officials demanded an agriculture that was more business-like, decentralized, and less reliant on government. This vision of a technologically/chemically intensive farming base, so contrary to the permanent agriculture ideal, emerged in part from the call for high production to help fight the Cold War, with the obvious side-effect being a decline of soil fertility and more soil erosion problems. Adding to these affronts to permanent agriculture, farm policy after World War II, while devoted in theory to planning for permanence, frequently vacillated

due to the contentious debates and shifting political winds in agriculture from roughly 1944 to 1954. The result of this changing structure and definition of American agriculture: It effectively altered the status of the permanent agriculture movement from that of a vocal minority to that of a silent clique.

The changing definition of how agriculture was supposed to function is illustrated in the relative decline of the agrarian ideal in the immediate postwar years. Louis Bromfield's desire for a neo-Jeffersonian, self-reliant small farmer appeared quite dated in the postwar world. Farmers of the 1940s and 1950s were far less concerned with ecological issues and in working together for total soil conservation and chemical-free farming than they were a mere decade prior. Farm income reached rebounded strongly in World War II, and many competitors and "marginal" farmers left the farm during the war, hence farmers were less receptive to the messianic religion (everyone can farm) that was permanent agriculture. Instead of worrying about his farm's role in the delicate biological web, the average farmer of 1945, (or 1955, 1965, and even 1975) was far more concerned with such issues as price, price supports, exports, the next farm bill, loan rates, and acquiring more land, more technology, and more science to assist their work. Though the idea of the "farmer as businessman" was long in development, the concept achieved priority status in the years following World War II.

True D. Morse, President of Doane Agricultural College, offered telling testimony that farming was now a hard edged business rather than a lifestyle choice. Morse asked GIs and war workers in 1944: "Should I gamble on a life of drudgery for Mary, and possibly, the college education of the children, to buy a farm now." Still, as Fortune noted that same year, "People who evidently know little about farming are agitating for a great postwar back-to-the-land movement for veterans . . . [ignoring] the tragedy after World War I." These statements are indicative of the confused, often bitter, and extraordinarily complex agricultural situation in America in the decade after the war.[27]

One certainty in this period, however, was that the future of American farming would be based on the expanded use of labor-reducing machinery, genetic technology, and manufactured agricultural chemicals, not the holistic "trash mulch culture" of Edward Faulkner. Prior to, but especially after, the Second World War, American farmers wholeheartedly embraced science, technology and horizontal expansion. Among the major technologies revolutionizing postwar agriculture were machines like the cotton picker, enhanced marketing and transportation systems, the expansive use of artificial insemination and the development of synthetic growth hormones, sulfa drugs and antibiotics, and numerous commercial fertilizers, herbicides, fungicides, and pesticides, such as the family of chemicals related to DDT.[28]

For example, production of manufactured fertilizer skyrocketed from 800,000 tons in 1946-1947 to 17 million tons in 1947-1948. Even with land retirement and conservation controls, agricultural production continued to expand. In the late-1940s through the 1950s, the major questions of agriculture often were decided by short-term vacillations between price supports and controls, and income guarantees for farmers. Instead of adhering to Hugh Bennett's vision of a planned, permanent agriculture and embracing the lofty promises of social harmony offered by Rexford Tugwell and Paul Sears, American agriculture became further enslaved to agribusiness, capital, the "experts" in the agricultural colleges, interest group politics, scattershot programs, and internecine squabbles within the agricultural policy community. Louis Bromfield's thoughtful dialogues on the small farmer suddenly seemed out of place to a new generation of agriculturists driven by Ezra Taft Benson's famed admonition for farmers to "get big or get out." Farmers in the 1950s also apparently became far less interested in long term soil building programs, especially when the prices were good in the Korean War years.[29]

Unquestionably, international events also shortened the public life of permanent agriculture. Permanent agriculture required time and increased expertise before

implementation. It also needed an atmosphere of cooperation, moral purpose, cultural change, and devotion to the often vague and long-to-realize concepts entailed in the new farming. With the war creating record demands and profits, farmers naturally wanted to continue those conditions. Despite recurrent surplus problems, high production continued to be both the boon and bane of American farming in the postwar years. A major reason for the enthronement of this high production regime, in addition to science and technology, were the demands created by the Cold War, wherein food served as a vital strategic weapon.

During World War II, high production obviously stood out as both a moral imperative and a financial incentive. Farmers concerned over postwar surpluses found that postwar famine in Europe and Asia, and the need for food as a strategic tool, meant that high production would continue to receive federal support. Arthur C. Bunce, an agricultural economist at Iowa State College, acknowledged that high production in wartime had led to the sacrifice of the soil. After the war, with Europe and Asia desperate for food and with the ideological battle against communism being fought in both minds and stomachs, agricultural leaders such as Secretary of Agriculture Claude G. Wickard could report that future export opportunities might help preserve the rebuilt agricultural economy. According to Edward Faulkner, the prevailing attitude in postwar America made it hard for farmers to "resist a chance to take extra income from the land." As a speech by Assistant Secretary of Agriculture Clarence J. McCormick in late-1950 shows, the immediate concern for American agriculture in the post-war years was national security, not a utopian brand of permanent agriculture. McCormick told USDA bureaucrats that "The world today is a battleground upon which two ideas -- democracy and communism -- and fighting for survival. It is our particular job to help American agriculture to a position where it will be able and ready to do its full part in meeting any threat against the security of our nation . . . . If we put our shoulders to the

wheel." McCormick and his USDA cadre also linked high American agricultural production to the ongoing efforts of the United Nations' Food and Agriculture Organization.[30]

As the need for high production shifted attention from the concept of permanent agriculture, the new farming also suffered from the contentious, confusing, and highly politicized debate over farm policy. As agricultural leaders mulled such issues as price supports, income stabilization, and crop insurance, bolder visions of social engineering at the USDA were out the window after the war's end. Though Hugh Bennett remained in public service even after age 70 and until his death in 1953, the bold prognostications of Bennett and cadre began to fall on deaf ears as actual (as opposed to rhetorical) support for agricultural conservation waned after the war.[31]

Part of the decline of the agricultural conservation idea, and hence part of permanent agriculture's demise, was the dissipation of governmental support and leadership. Saving the soil remained a key rhetorical objective, but the sense of urgency sparked by the soil crisis of the 1930s had passed away. One problem was that conservation issues were divided among a number of federal agencies (both within the USDA and between the USDA and the Department of the Interior, and so forth), defying attempts at a consolidated policy for saving the nation's land and waters. Another problem was this lack of federal support and leadership. In 1947, Acting Secretary of Agriculture N. E. Dodd documented the erosion of federal support in a letter to President Truman regarding the Agricultural Appropriation Act of 1948. Dodd wrote: "The people of this country have demonstrated time and again that they want to encourage conservation of the soil, the basic source of our life and wealth. Yet this act will reduce the public effort in soil conservation, in disregard of a congressional promise on the statute books, in spite of the drain placed on our soil resources by extremely heavy production in recent years, and in the face of needs indicated by this year's disastrous mid-western floods."[32]

To his credit, President Truman gave strong support to the concept of permanent agriculture, asserting in 1952 that "There is no greater domestic problem in America than soil conservation and improving our land . . . the speed with which conservation farming is adopted, and the degree to which it was maintained, will play a key part in determining how well we and our children eat in the years ahead." Despite Truman's rhetorical tribute to conservation, Hugh Bennett's expensive plan for permanent agriculture, partially funded at best, came under strong attacks from the rising Republican Party. Leaders in agricultural conservation complained that federal support for conservation was insufficient, and GOP leaders, such as Milton Eisenhower, complained that New Deal-era conservation programs were wasting taxpayer money. As the conservation impulse began to unfold with Republican ascendancy in the early 1950s, the vision of an ecological agriculture also fell prey to a public weary, it was supposed, of big and coercive New Deal-style government programs. "Oratorical tributes" to conservation appeared everywhere in the period, while a renewed form of soil mining was "successful in skimming the cream of our soil resources," according to one report in 1951. Increasingly, Congress and the farming public led the push towards voluntary and decentralized (read piecemeal and unenforceable) conservation programs. Gone was the comprehensive dream of a permanent, planned, ecological agricultural supporting a holistic, healthy, peaceable population. The land was still a mere commodity, and agriculture a matter of slicing of "a big job into little pieces."[33]

Yet the demise of permanent agriculture resulted from several issues besides federal inaction and the intransigence of the GOP. In the early 1950s the memories of the Dust Bowl were receding, and a confident citizenry preoccupied with domestic consumption and the Cold War had little time for a nebulous soil crisis. Furthermore, the cloak of the nation's conservation community frayed into "the multicolored strands of which the fabric of conservation is woven." Simmering divisions developed between

Pinchotian "wise-use" conservationists and, as one commentator noted, "those who love living creatures and the beauties of nature," with agriculture generally falling on the side of the former category. Noted conservationist Alexander F. Skutch reported in 1954 on the differing interpretations of "conservation" that were increasingly apparent in American life. Bernard Devoto, offered a sharper attack trend developing in the postwar milieu, noting in August 1952 that the GOP leadership, poised to win the Presidential election that fall, planned to appoint business and industrial leaders to the major conservation posts in the federal government. Devoto also reported that in the recent re-organization of the SCS, the nation's 2,500 conservation districts were not even consulted in the process. Devoto also lamented that the SCS re-organization was "An aggrandizement of the land-grant colleges and the extension service at the sacrifice of conservation values." Bennett-era idealists and technicians were leaving the SCS in droves, reported Devoto, and the "SCS is half flux and half chaos." Friends of the Land, a major support group for permanent agriculture, reflected the decline in the conservation ethos, slipping from a 10,000 member peak in 1947 to below 7,000 in 1954, when the group effectively disbanded.[34]

While the permanent agriculture ideal suffered from resistance, co-option, a decline in government leadership and public support, and the break-up of the conservation consensus of the New Deal/World War II years, the new farming also fell apart due to dogmatic shifts in the all-important science and ethic of ecology. Permanent agriculture, though part and parcel of the SCS and general world of agricultural conservation, drew its animating force from the findings of the ecologists, and for Paul Sears, Hugh Bennett, Louis Bromfield, and other exponents of permanent agriculture, the new farming centered on the adoption of a scientific/ethical ecological philosophy. This philosophy dictated that nature had certain "balances," that nature was all-knowing and was directed towards eventual harmonious ends. Hence, agriculture had to model itself on the "balance" of nature, and an ecological agriculture would foster a more ethical, harmonious relationship

among peoples. As a religion, permanent agriculture had as its end a state of perpetual abundance and harmony, as taught by the god of nature and the evolving ethics of humanity. But "directed" ecology, the central canon of the new agriculture, fell prey to revision by the 1950s with the advent of so-called "chaotic ecology."

Frederic Clements long-hallowed climax theory had come under attack long before the 1950s, but in the postwar era his ideas suffered from a dual assault within the discipline of ecology. On one hand, ecology became much more quantitative and technologically sophisticated in the postwar era, as ecologists were gainfully employed at such places as Oak Ridge, Tennessee, measuring the effects of radioactivity with complex machines and large staffs. Quantitative, or "economic" ecologists wanted little to do with the ethical/pseudo-science of human ecologists such as Paul Sears. More importantly, after the 1950s the field of "chaotic" ecology began to expand. Far from seeing nature as a series of great balances and a place directed towards eventual harmony, the chaotic ecologists saw no great scheme or order in the universe. Nature led nowhere. In the description of nature provided by chaotic ecology, nature was an irregular, ambivalent force, not a guide for permanent agriculture. The demise of balanced, directed ecology dealt a final blow to an ideal whose age had passed. It was possible for Americans during the New Deal and World War II years to see the world in terms of harmony and optimism for a better future. For postwar Americans, grand visions of societal harmony seemed unreachable. With its heroes dead and forgotten, and with its sense of urgency evaporated, permanent agriculture, as an announced concept and set of ecological ideas, was effectively dead as a movement by 1955.[35]

Persistent Influences

While the permanent agriculture concept failed to take hold as a major social movement, the new farming did influence the theory, practice, and policy of agriculture in many ways from the mid-1930s through the mid-1950s. The movement also fostered an increased public awareness of ecological principals, and helped spawn further agricultural-ecological endeavors, both within the agricultural establishment, and in the sub-culture of organic farming.

Certainly a major achievement of permanent agriculture was that the movement highlighted abuses of the soil, ecological considerations, and the need for vigilant soil conservation. Apparently the farming public got the message. By 1942, seven years after the birth of the SCS, 2 million farmers in 142 states had set up 793 conservation districts covering 463 million acres of land. Hugh Bennett, Louis Bromfield, Paul Sears and other permanent agriculture cadre deserve credit for enlightening the public on soil conservation issues, for spreading new ideas about farming, and for nourishing a long dormant stewardship ethos among the public. For example, Edward Faulkner is unquestionably the greatest communicator in American agricultural history regarding the abuses of the moldboard plow and on the efficacy of stubble mulch tillage. Permanent agriculture helped keep the issues of soil and water conservation in the public spotlight during the war years, and influenced federal legislation to support work towards a permanent agriculture.[36]

For students of American environmental history, the permanent agriculture episode is useful to explain the shift from conservation to environmentalism. Permanent agriculture was an idea conceived by individuals born in the progressive-era, to whom conservation was generally conceived of as the managing of resources for human use and a task to be pursued mainly by extractive technocrats, symbolized in a Gifford Pinchot or Herbert Hoover. Despite, or perhaps because of their solid indoctrination in conservation

values, the permanent agriculture cadre were susceptible to nascent ecological ideas, which dictated a far more complex set of values than did mainstream conservation, including the cult of interdependence and a heightened reverence for all life forms.

Though Aldo Leopold, himself a preacher of permanent agriculture, is often cited as a John the Baptist figure in the rise of environmentalism, the permanent agriculture movement shows that Leopold's ideas were standard concepts in the call for the new ecological farming, emanating from a variety of sources besides the erstwhile Leopold. Agriculture, as a central activity in American life, provided an outlet for ecological thought, so that ecological ideals--the basis of postwar environmentalism--could escape the confines of academia and wildlife management. No one can truly know how many future environmentalists were influenced by a discussion of Plowman's Folly, an article by Louis Bromfield, or an appearance in their town by an influential speaker such as Hugh Bennett.

Friends of the Land brief but interesting history is quite illustrative of the association between agriculture and ecology. Friends was founded by old guard conservationists, but, transformed by the preaching of ecologists like Paul Sears, became a font for holistic ecological thought, which recognized that no human action, such as farming, could occur without a subsequent impact upon the overall web of life. Russell Lord wrote in 1951 that in the group's founders only had a vague concept of ecology in 1940. From that limited focus on ecology, Friends evolved into an ecological think tank, fostering conferences and publishing books on such issues and "Soil, Water and Health," and giving valuable space in The Land to ecological writers, such as Sears and the young Rachel Carson.[37]

In addition to promoting agricultural conservation, and in spreading a growing gospel of ecology, permanent agriculture forged other lingering influences. Certainly, many of the most active proponents in the permanent agriculture camp did not die or fade

from the scene. Paul Sears would live on to 1990s, writing many books designed for ordinary readers that could be described as "popular ecology" in the 1960s and 1970s. Indeed, the concerns over soil debility that launched permanent agriculture, such as extensive wind erosion, reappeared in the mid-1950s, prompting new soil jeremiad's such as Vernon Gill Carter and Tom Dale's 1955 book Topsoil and Civilization.[38]

In the late 1950s many of the central ideas of permanent agriculture, such as enhanced soil conservation research and the need to teach ecological principals, were being actively pursued in the agricultural establishment. The major difference is that the comprehensive, social equity and utopian pleas of permanent agriculture were no longer in the equation. Soil conservation "had come to mean efficient abundant production."[39]

Still, minor elements in the USDA-agricultural college complex explored the ideas of ecological agriculture, especially organic farming, after the demise of permanent agriculture. University of Missouri professor of soils William A. Albrect, once an opponent of Edward Faulkner, numbered himself among a small group in the agricultural establishment that supported the holistic, ecological concept of agriculture in the 1950s and early 1960s, a period before such issues as pesticide poisoning were debated by the public at large. Albrect, while disassociating himself from the cultist organic farming camp, told Farm Quarterly upon his retirement in 1960 that his main concern had been that American agriculture was "producing bulk and sacrificing quality." The highly regarded Albrect stated: "All I am doing is defending the biology of the plant and animal against being overwhelmed by the industrial concept." Clearly the permanent agriculture idea had resounding influences, as Albrect recounted his philosophy of agriculture in terms Edward Faulkner could have sympathized with in 1942, including: viewing pests and plant disease as the symptoms, not the causes of a failed crop; citing the need for nature appreciation among farmers; acceptance of Sir Albert Howard's linkage between healthy soil and healthy people, plants, and animals; requiring beginning logic for agricultural college

students; and offering damnation to the "chemical empiricism" then overwhelming American farming. Albrect joined a few others, such as chemist Lewis Herber, in breathing life into the corpse of ecological agriculture. Herber wrote in 1962 of his fear that Americans had replaced their "natural system" of diversified agriculture, having "congregated into congested polluted cities which require monoculture and chemicalized forms of agriculture." In part, through the movement for permanent agriculture, young 4-Hers were being taught by the early 1960s that "the farmer, but more importantly, those who seek to modify and regulate his behavior, must understand that man is an integral part of nature, suspended in its equilibrium and subject to its laws."[40]

Strands of the permanent agriculture movement were also woven into the underground culture of organic farming in the late 1950s and early 1960s. Scott Nearing, the aging socialist agitator and back to the lander, published, with his wife Helen, the fabled tract Living the Good Life in 1954. The book, and the Nearings, achieved virtual cult status in the following years and decades. Scott and Helen Nearing practiced a simplistic lifestyle based on vegetarianism, vigorous physical and intellectual work, and tilling the soil according to the principles of ecological agriculture established in the prior decades. As a well-known leftist agitator, Nearing drew attention to his lifestyle and to agricultural ecology over the years as he mixed political and social messages with testimonials for ecological farming, health food, "appropriate" technology, and diatribes against the city. The Nearings were among a small untraditional group of farmers, gardeners, svengalis, and theorists, mainly acting outside of the academy and establishment agriculture, that helped sustain ecological agriculture in its lean years. The years after the demise of permanent agriculture and before Rachel Carson's monumental Silent Spring (1962) would ignite latent concerns about what was now called the "environment," and spark new interest in creating a long-term, ecologically oriented food production system.[41]

Born and sustained in crisis, nurtured by a planning ethos, and animated by ecological ideals, the permanent agriculture movement enjoyed a relatively brief time in the sun, historically speaking. As an ideology, permanent agriculture was loosely assembled but widely communicated, especially from the late 1930s until briefly after World War II, when other concerns decoupled the notion of linking agricultural permanence and ecological awareness. The permanent agriculture episode illustrates how Americans in the crisis years of the 1930s and 1940s looked to broad solutions for society's problems, solutions that emphasized concepts such as interdependence, social harmony, and societal prosperity, and longevity. Permanent agriculture also gave witness to the rapid and deep infusion of ecological ideas into the world of old-line conservation. Finally, the permanent agriculture movement provided, both mythologically and in a tangential sense, a useful history for post-1960 proponents of ecological agriculture to use for their own conceptions of an agriculture devoted to more than the bottom line and next fall's target price.

Notes

1. Russell Lord to Morris L. Cooke, 14 November 1939, box 144, "Russell Lord," Cooke Papers. Wallace was enamored with Lorentz. One time when recalcitrant federal bureaucrats resisted giving Lorentz some footage of Grand Coulee Dam, Wallace wrote to the person in charge of the film, "It is needless for me to say that Pare Lorentz is one of the great men of our time. He has done as much as any single man in America to make us love and appreciate the land in which we live." Henry A. Wallace to General Phillip B. Fleming, 19 December 1941, Henry A. Wallace Vice-Presidential Papers, box 45, FDR Library.

2. For information on Flaherty's work on the film The Land see Richard Griffin, The World of Robert Flaherty (New York: Capo Press 1972), 139-147; Richard Barsam, The Vision of Robert Flaherty: The Artist as Myth and Filmaker (Bloomington: Indiana University Press, 1986), 72-84; William T. Murphy, Robert Flaherty: A Guide to Reference and Research (Boston: G. K. Hall, 1978), 31-37; for an overview of Flaherty's life, see Paul Rotha, Robert Flaherty: A Biography (Philadelphia: University of Pennsylvania Press, 1983); for support of Flaherty's picture, see sample reviews "Beauty, Danger and Terror," Land 1 (Autumn 1941): ii-iv; the script of The Land is reprinted in Lord, Forever the Land, 21-35.

3. Aldo Leopold, Sand County Almanac (New York: Oxford University Press, 1966), 225; Hugh H. Bennett, "Effective Soil Conservation Demands Level Thinking" (speech to Seventh Annual Meeting of Friends of the Land, Milwaukee, 20 September 1947), box 11, file 20, Bennett Papers; Aldo Leopold, "Land Use and Democracy," Audubon 44 (September 1947): 359-65; Hugh H. Bennett, "The Coming Technological Revolution on the Land" (speech at Princeton University, 2 October 1946), box 12, file 37, Bennett Papers, Archives of American Agriculture, Parks Memorial Library, Iowa State University.

4.National Commision on Conservation Education, Report of the National Commission on Policies in Conservation Education 1 (February 1948): 1-5; George E. Barnes, "Conservation in the Classroom," Soil Conservation 6 (October 1940): 87-89; Hugh H. Bennett, "Education for Soil Conservation," National Education Association Journal 30 (January 1941): 8-11; for examples of the conservation education crusade in the 1940s, see Susan Myrick, Our Daily Bread (Danville, Ill.: Interstate Publishers, 1950), 100-197; V. H. Culp, "Youth Serves the Community Thru Conservation of Resources," in Community Resources in Our Schools: Yearbook of Rural Education 1939 (Washington

DC: NEA, 1939): 33-42; Vernon Gill Carter, "Education, Resources and this War," National Education Association Journal 32 (February 1943): 41-42; Ayers Brinser and Ward Shepard, Our Use of the Land (New York: Harpers, 1939), 23-25; Theodore E. Eckert, "Extending Conservation Education Through Teacher Training," Nature 45 (May 1952): 230: Edward A. Cohen, "Conservation Takes to the Air," Nature 44 (March 1951): 146-148; Ed Adams and Earl Wallace, "Conservation Clubs," Recreation 4 (May 1947): 89; Large Was Our Bounty: Natural Resources and the Schools (Washington, D.C.: NEA, 1948), 5-38; Jay N. Darling, "Why King Midas Starved," in Effie G. Bathurst, ed., Conservation Education in Rural Schools (Washington, D.C.: NEA, 1943), 1-14; Otis W. Freeman, "Conservation as a Post-War Problem," Education 65 (January 1945): 316-322. Apparently this push for conservation achieved quick success. Claude R. Wickard, secretary of agriculture in FDR's last term, wrote of a "growing interest in conservation among the rank and file of people on the land . . . . It represents a definite break with the exploitative tradition." Claude R. Wickard, "A Foreword to This Issue," Soil Conservation 6 (January 1941): 166.

5. Bromfield, Pleasant Valley, 260-262; Russell Lord, "If My Land Cry," Land 3 (Review of Summer 1943): 70.

6. Hugh H. Bennett to Morris L. Cooke, 13 July 1938, box 140, Cooke Papers, FDR Library. Much of the information regarding the initial organization of Friends of the Land, including copies of the group's manifesto, pamphlets, memberships lists, budget, and so forth, are located in boxes 140-144, Cooke Papers. Other information on the group can de discerned from reading the volumes of the group's organ The Land from its inception in 1940 through its demise in 1954. Other overviews of the group's inception may be found in Lord, Forever the Land, 46-195; and Bromfield, Pleasant Valley, 260-265.

7. The founding manifesto and statement of goals of the group is located in boxes 140-141, Morris L. Cooke Papers; see also Lord, Forever the Land, 1-10; final quote from Rexford Tugwell, "Proceedings," The Land 4 (Winter 1945).

8. For more on the initial life of Friends of the Land see the correspondence between Russell Lord and Rexford Tugwell, box 14, "Russell Lord," Tugwell Papers.

9. "Personal Mention," The Land 5 (Summer 1946): 139; Lord, Forever the Land, 114, 196; for information on the stressed financial situation (initial yearly budgets were less than eleven thousand dollars per year), see materials in box 141, files 1 and 2, "Friends of the Land," Cooke Papers.

10. Lord, Forever the Land, 74-109, 179-180, 340-341. The journal The Land also featured contributions from "ordinary" readers, including farmers and farm wives. Its pages were an interesting combination of serious articles, editorial musings, poetry and short stories, and pastoral drawings.

11. Author's conversation with Professor David E. Wright, Department of History of Science, Michigan State University, in Little Rock, Arkansas, June 1994. Professor Wright has found that the leaders of the chemurgy movement enjoyed national notoriety. Bromfield, Bennett, Tugwell, and company published in diverse journals and magazines, from the Nation and New Republic to Reader's Digest and the Saturday Evening Post; Bromfield quoted in "Review," Farm Journal 5 (Summer 1950): 266-67.

12. For more on the efforts of Friends of the Land, see "Proceedings," The Land 2 (July 1942): 81-136; "Proceedings," The Land 6 (Summer 1947): 134-136; Lord, Forever the Land, 178, 334-345; Little, Louis Bromfield at Malabar Farm, xviii; pamphlets, brochures, membership forms, newsletters, chapter directories, financial papers, conference-related publications, and other miscellaneous items are located in file "Friends of the Land," PA box 25-562, box 14-279, Ohio State Historical Society, Columbus,

Ohio; more information on the push for agricultural conservation education in the period was garnered from two papers written by colleagues in the Agricultural History and Rural Studies Program at Iowa State University--Denise E. Dial's work on "The National Plowing Match and Field Conservation Days," and Alison P. Kovac's "Louis Bromfield's Agrarian Appeal and the 'Rhetoric of Ecology.'"

13. Hugh H. Bennett, "Education for Soil Conservation," National Education Association Journal 30 (January 1941.

14. Description of October 1945 Conservation Field Day supported by Friends of the Land was found in "Land Week," The Land 10 (Winter 1950-51): 586-587; see also Lord, Forever the Land, 40-41, 194-213, 256-259. Evidence that Friends was committed to this educational focus is apparent in the fact that the national executive secretary from 1944 until past 1950 was the former Curriculum Supervisor for the State of Ohio, Ollie Fink. Increasingly the educational focus shifted from techniques of conservation to promotion of an ecological view of soil, food, and health; "Proceedings," The Land 5 (Autumn 1946): 193; Hugh Bennett presented another aspect of the communication of permanent agriculture--the importance of women's clubs and other civic organizations in the promotion of an idea. For example, Bennett told the membership of the Texas Garden Club to spread his message to other groups and community leaders, to urge education about and demonstration of conservation-ecological concepts, and to support essays, projects, and awards devoted to societal permanency. Hugh H. Bennett to Annual Meeting of the Texas Garden Clubs, San Antonio, 5 May 1949, box 12, file 32, Bennett Papers.

15. Evidence of the credence given to Bromfield, Bennett, Cooke, and other major figures in the permanent agriculture movement is suggested in correspondence between these figures and Vice-President Henry A. Wallace, as evidenced in numerous letters

located in the Microfilm Papers of Henry A. Wallace, University of Iowa Library. Another indication of the strength of the permanent agriculture camp is a memo from FDR to aid Steve Early in early 1944, in which the president wrote, "Do you think I should see Bennett and tell him that I think what he is doing is all to the good but not send him any written communication? I do want to tell him about some ideas I have anyway, outside of this." Memo, FDR to Steve Early, 31 January 1944, Franklin D. Roosevelt Papers, Official File 1K-1T, "Department of Agriculture."

16. Hugh H. Bennett, "Conservation Farming is High Production Farming" (speech in Athens, Ga., 1 March 1943, box 10, file 47, Bennett Papers; Vernon G. Carter, "Education, Resources and this War," National Education Association Journal 32 (February 1943): 41-42; Otis W. Freeman, "Conservation as a Post-War Problem," Education 65 (January 1945): 316-322.

17. The attention given to Faulkner's ideas from roughly 1943-47 is tremendous. See Sir Albert Howard, "Mr. Faulkner Has A Touch of Genius," The Land 3 (Proceedings and Remark, 1943-44): 155-161; see also entire issues of The Land 4 (Summer 1943), and The Land 5 (Autumn 1946). Henry A. Wallace supported many of Faulkner's ideas, but felt that the trash mulch concept would prove impractical due to the corn borer problem that would be created with the stubble mulch system. Nonetheless, Wallace asked Henry Ford to send an engineer to Faulkner to assist with the design of a tillage implement to effect Faulkner's ideas. Ford replied that the Ford Ferguson tractor had attachments that would work the ground as prescribed by Faulkner. See for example H. A. Wallace to Russell Lord, 4 October 1943. Wallace Microfilm Papers, IA 25-290; Hugh H. Bennett, "The Abolition of the Plow," New Republic 4 (October 1943): 154-57; "Down With the Plow," Time, 26 July 1943, 44; Faulkner claims to have taken a 7,500 mile tour to talk with scores of agricultural college researchers, farmers, and agribusiness persons in the

months following the release of Plowman's Folly, and he also claims to have received tens of thousands of letters in support of his ideas. See Faulkner, A Second Look, vii-10; on support of Faulkner from within the permanent agriculture camp, see Hensler, "My Faulknerizer," 83; Lord, Forever the Land, 38; Bromfield, "Trash Farming at Malabar," 321; Edward Faulkner and Richard Bradfield, "To Plow or Not to Plow," House and Garden 85 (March 1944): 100-101.

18. Lord, Forever the Land, 338-340; Chester C. Davis, "Unfinished Business," The Land 5 (Winter 1945-46): 101-103; Henry B. Miller to Harry S Truman, 17 February 1951, Harry S Truman Presidential Papers, President's Personal File, OF 660, PO box 1555.

19. For initial attacks on Faulkner, see William A. Albrect, "The Indictment Will Not Stand," H. E. Middleton, "In the Face of Known Facts," F. L. Duley, "No Contribution or Check . . . Too Many Assumptions," Firman Bear, "Faulkner's Folly," and Paul W. Chapman, "Shall We Change Symbols," all located in The Land 3 (Review Summer 1943): 71-79. Duley, in addition to attacking Faulkner, also throws a barb at the University of Oklahoma Press for publishing Plowman's Folly.

20. Emil Truog, "Plowman's Folly Refuted," Harpers, July 1944, 73-177; see also Emil Truog, "Organics Only?--Bunkum!" The Land 5 (Autumn 1946): 315-323; see also Donald P. Hopkins, Chemicals, Humus and the Soil (London: Faber and Faber, 1945), 237-239.

21. Paul Appleby, "Appetite First," Nation, 25 September 1943, 348-351; for opposition to the "coercive" aspect of permanent agriculture, see Karl B. Mickey, Man and the Soil (Chicago: International Harvester, 1945), 96-97; Clarence Armstrong, "Ridiculous," Nation, 13 November 194, 567; see also, "The Farmer and the Plow,"

Nation, 12 June 1944, 714; and "Two Revolutions in Plowing," Nation, 9 October 1943, 412-413.

22. Russell Lord, "Shocking!" Nation, 13 November 1943, 567; Faulkner, A Second Look, 3-12, 81; Faulkner, Soil Restoration, 20-29, 198.

23. Evidence of the co-option and dilution of the permanent agriculture ideal exists in several forms. Advertisements in farm journals in the late 1940s and early 1950s are particularly illustrative. See for example various advertisements that appeared in The Land in 1950 on pages 309, 311 and 350. They include John Deere's "Still Water Runs Down Deep," International Harvester's "He's Practicing Soil Conservation With His Regular McCormick Equipment," and ads for Allis Chalmers and the Ford Ferguson. See also L. G. Samsel, "Is Special Equipment Needed for Stubble Mulch Farming?" Journal of Soil and Water Conservation 1 (October 1946): 67-70. Samsel, a public relations person at J. I. Case, claimed, among other heresies, that a Faulkner-like system could be effected with a modified moldboard plow; see pamphlet, A New Legume for Soil Building (Ames, Iowa: Ed Coe Seed Store, ca. 1945); see also pamphlet, "Let's Practice Soil Conservation for a Permanent Agriculture (Chicago: International Harvester, 1947); John Donald Black and Maxine Enlow Keifer, Future Food and Agriculture Policy: A Program for the Next Ten Years (New York: McGraw-Hill, 1948), 99-105; and R. S. Wilson, The Trilogy of American Conservation and the Eternal Question (Ankeny, Iowa: Soil Conservation Society of America, ca. 1947).

24. Jonathan Forman, "Words, Words, Words," The Land 11 (Summer 1952): 177.

25. P. V. Cardon, "Our Aim: An Introduction," in Grass: The Yearbook of Agriculture, 1948 (Washington, D.C.: USDA, 1948), 1.

26. Little, Louis Bromfield at Malabar Farm, 221.

27. The subject of postwar agricultural issues from roughly 1945 to 1955 would require several monographs for adequate treatment. Essentially, the previously defined "Agricultural establishment" promoted a vision of fewer farmers, high production, enhanced rural incomes, education, transportation, voluntary, decentralized soil conservation, and recreational opportunities, with some guarantees against economic downturns and natural disasters. See for example, True D. Morse, "Watch Out Before You Buy That Farm," Science Digest 16 (December 1944): 64-66; "If GI Joe Goes Back to The Land, Fortune 30 (September 1944): 166-168; "Poor Time to Start Farming," Wallace's Farmer, 7 April 1945, 6; Harold Titus, "Please! No More Crackpot Land Schemes for Veterans," Saturday Evening Post, 18 November 1944, 24-25, 47-48; "Reconversion on the Farm," Business Week, 24 February 1945, 123; "To Hold Up Farm Incomes," Wallace's Farmer, 6 October 1945, 1; see also Association of Land Grant Colleges and Universities, Postwar Agricultural Policy (October 1944), 39-47.

28. Marcus and Segal, Technology in America, 280-283; see also Crop Engineering Research Branch, List of Publications (Beltsville: USDA, August 1967); for opposing visions on the future of post-war agriculture that in many ways reflect the debate between the vision of permanent agriculture and the postwar reality of American farming, see Ayers Brinser, "What the Small Farmer Needs," New Republic, 19 February 1945, 254-259; and Clinton P. Anderson, "Farm of the Future," Farm Journal (December 1945) 110; for more on the farm policy debate, see Allan J. Matusow, Farm Policies and Politics in the Truman Years (Cambridge: Harvard University Press, 1967), 1-19; and Donald R. McCoy, The Presidency of Harry S. Truman (Lawrence: University of Kansas Press, 1984), 54-57.

29. USDA Report, "The Fertilizer Situation for 1947-48," located in Official Correspondence, box 7, "Fertilizer," Clinton P. Anderson Papers, Harry S. Truman Library, Independence, Mo.

30. Arthur C. Bunce, "Using Our Soils For War Production," Number Seven: Wartime Farm and Food Policy (Ames: Iowa State College Press, 1943), 1-29; Claude R. Wickard, "Moving Forward Together" (speech to Kiwanis Club, Richmond, Ind.,9 May 1945), box 48, "Speeches January-June 1945," Wickard Papers; Faulkner, Soil Restoration, 107; Clarence J. McCormick, "Strengthening the Family Farm" (speech to Annual Meeting of the Production and Marketing Administration, Chicago, Ill., 12 December 1950), located in White House Central Files, Official file (hereafter WHCF:OF) 1 (1949) to 1 (January-March, 1951), box 2, file 5, Truman Papers. See also speech by Secretary of Agriculture Charles F. Brannan to Washington Day Dinner, Topeka, Kans., 23 February 1952, WHCF:OF 1 (February 1952), box 3, file 5, Truman Papers.

31. A telling example of the bitter debates over agriculture in the late 1940s and early 1950s is the controversy over the so-called Brannan Plan, ca. 1949-1951. In a letter from Secretary of Agriculture Charles F. Brannan to American Farm Bureau President Allan B. Kline, Brannan wrote, "I had some faint hopes for a while that the Korean situation, you might find reason for redirecting your own energies and those of your immediate staff away from the vicious personal attack you have leveled against me and the Department of Agriculture and the things that must be done by, for and with the American farmers in the month to come." Charles A. Brannan to Allan B. Kline, 15 September 1950. WHCF:OF 1 (1949) to 1 (Jan-Mar 1951), box 2, file 4, Truman Papers.

32. N. E. Dodd to Harry S. Truman, 23 July 1947, WHCF:OF 1, box 1, file 3, Truman Papers. See also file 1 in same collection.

33. Harry S. Truman, "Prepared Statement," June 13, 1952, President's Personal File 6113, Truman Papers; for lack of federal funding for agricultural conservation and divisions between the Agricultural Conservation Program in the USDA, the Soil Conservation Service, the Forestry Department, and various agencies and bureaus in the Department of the Interior, see Clarence J. McCormick, "Conservation Production" (speech to State Meeting of SCS District Conservationists, Columbus, Ohio, 17 February 1952), WHCF:OF 1 (February 1952), box 3, file 5, Truman Papers; Clarence J. McCormick, "Agriculture's Role in the Nation's Peace Program" (speech to Production Marketing Association County and Community Committeemen, Huron, S.D., 15 February 1952), WHCF:OF 1 (February 1952), box 3, file 5, Truman Papers. Milton Eisenhower, "Do We Get Our Money's Worth Out of Soil Conservation?" Farm Journal "(March 1948) no p.n.; Charles F. Brannan to State Agricultural Department Heads, 9 November 1951, WHCF:OF 1 (April-June 1951) to (March 1952), box 3, file 4, Truman Papers; Clarence J. McCormick to Democratic Banquet, Kansas City, Kans., 25 January 1952, WHCF:OF 1 (April-June 1951) to (March 1952), box 3, file 5, Truman Papers; on the push for a decentralized soil conservation, see "America's Crossroads," American Soil Conservation District News 2 (1 November 1951): 1.

34. On the divisions in conservation, see comments in Nature 37 (March 1944): 145; Alexander F. Skutch, "The Tangled Strands of Conservation," Nature 47 (May 1954): 258-260; Bernard Devoto, "Conservation: Down and On the Way Out," Harpers August 1952, 66-74; for differences between the Republican and Democratic ideas regarding conservation, see J. B. Oakes, "Conservation: The Party Platforms," New York Times, 3 August 1952; the formation of the right-of-center conservation organization Resources for the Future (RSFF) in 1952 particularly illustrates the divisions in conservation circles. RSFF may be considered as representing a more wise-use, pro-

business point of view, and quickly received the scorn of individuals such as James G. Patton of the National Farmers Union. See material on RSFF, box 157, Cooke Papers; on the decline of Friends of the Land, see material in box 14, "Russell Lord," Tugwell Papers, and material in boxes 140-144, Cooke Papers; see also Jonathan Forman, "Growth and Change," The Land 11 (Winter 1953): 351-352; and The Land 13 (Spring 1954): 87-99.

35. On the history of postwar ecology see Donald Worster, "Organic, Economic and Chaotic Ecology," in Carolyn Merchant, ed., Major Problems in American Environmental History (Lexington, Mass.: D. C. Heath, 1993), 465-479.

36. See Robinson, "'The Shape of a Better World' Seen in Land Meetings at Louisville and Memphis," 128; A. L. Riesch, Conservation Under FDR (New York: Praeger, 1983), 233; today, Edward Faulkner is cited as a fundamental influence in the abandonment of the moldboard plow, what commentator Hugh Sidey called a "cultural revolution." See Hugh Sidey, "The 'Cultural Revolution,'" Des Moines Register5 July 1992).

37. Russell Lord, "The Whole Landscape: An Appraisal," The Land 11 (Winter 1951): 413.

38. Paul B. Sears, The Biology of the Living Landscape (London: Allen Unwin, 1964); Paul Sears, "Ethics, Aesthetics and the Balance of Nature," in Henry Jarrett, ed., Perspectives on Conservation (Baltimore: Johns Hopkins, 1958), 106-114; Vernon Gill Carter and Tom Dale, Topsoil and Civilization (Norman: University of Oklahoma Press, 1955), 257-275.

39. Robert M. Salter, "The Job Ahead" (speech to National Association of Soil Conservation Districts, Cleveland, Ohio, 28 February 1952), General Correspondence, "Robert M. Salter," box 157, Cooke Papers. Dr. Salter, an SCS official, lambasted the declining conservation ethic but was also proud to note that by 1952, one-fifth of the

nation's farms had conservation plans, covering 80 percent of agricultural land; for more on soil conservation research in the period, see "Soil Erosion Lab One of a Kind for K-State," Manhattan Mercury, 16 November 1962; and Sam Teaford, "Two Kansas State Experts Create Dust Storms to Study Wind Erosion," Topeka Daily Capital, 6 March 1955.

40. Charles R. Koch, "William Albrect Sums Up A Career in Soil Research," Farm Quarterly (Winter 1960): no p.n.; Charles Walters, ed., The Albrect Papers: Volume Two (Kansas City: Acres U.S.A., 1975), ix-182, 112-116; Lewis Herber, Our Synthetic Environment (New York: Alfred A. Knopf, 1962), 1-239; Johnson D. Hill and Walter E. Stuermann, Roots in the Soil: An Introduction to a Philosophy of Agriculture (New York: Philosophical Library, 1964), 14-20; on the persistence of ecological agriculture in the land grant colleges in the late-1950s through the early 1960s, see George D. Scarseth, Man and His Earth (Ames: Iowa State University Press, 1962), 64-116, 181-199; and Firman E. Bear, Earth: The Stuff of Life (Norman: University of Oklahoma Press, 1962); Firman Bear, ed., Soil Science: Food For America's Future (New York: McGraw Hill, 1960), 3-16.

41. Helen and Scott Nearing, Living the Good Life: How to Live Safely and Sanely in a Troubled World (New York: Schocken, 1970), 3-177; Helen and Scott Nearing, Continuing the Good Life: Half a Century of Homesteading (New York: Schocken Books, 1979), 1-185; see also John A. Saltmarsh, Scott Nearing: An Intellectual Biography (Philadelphia: Temple University Press, 1991), 245-264. The Nearings' contribution to permanent agriculture is documented in greater detail in Chapter 7. J. I. Rodale, businessman turned agricultural publisher, actively promoted ecological agriculture from the 1930s onward at Rodale Press. Rodale, as previously noted, strongly

supported organic farming, "health food," and holistic living. He created a dynasty at Rodale Press, now a major national publishing house.

PART TWO: SUSTAINABLE AGRICULTURE, 1960-1985

In the years following 1960, lingering concerns about agriculture's role in the overall environment re-emerged amidst a new set of societal concerns and ecological investigations. American agriculture became directly linked to the human future. Some observers feared the onslaught of a Malthusian crisis, while others, such as Rachel Carson, illustrated the dangerous side effects of the agricultural technology. By the late 1960s agricultural commentators, farmers and environmentalists leveled a crescendo of criticism at the agricultural establishment (the nexus of farm and commodity groups, "agribusiness," the USDA, experiment stations, extension service and the land-grant colleges and universities) regarding the misguided technological advances in agriculture. Holding up the social and ecological failures of the Green Revolution technology as the ultimate example of scientific hubris, critics of the agricultural establishment from both within and outside the "system" began to offer a new vision of agriculture that can be loosely grouped under the guise of "sustainable agriculture."

The proponents of the various ideologies of sustainable ecological agriculture modeled the "new farming" on chemical-free "organic" techniques and what they perceived as the scientific and ethical imperatives provided by ecological theory. Part and parcel of the overall environmental movement, the new farming embraced the "holistic" flavor of the late 1960s and early 1970s, and was partially affiliated with counter-culture communalism and visions of agrarian revival. But sustainable ecological agriculture also emerged from contemporary concerns for human survival in a world defined by an apparent sense of geographic and technological limitation. In addition to its association with the quality of life issues of the environmental movement and millennial agrarianism, the new farming also embraced such time-honored concepts as societal planning, ethical or "social" ecology, a redirection of research and planning focus within the assailed agricultural establishment, and the inculcation of a new stewardship ethic.

By the late 1970s several systems of ecological agriculture appeared on the American scene, schemes laced with the well-developed tenets of organic farming and stewardship, yet fleshed out with new concepts such as agroecology, appropriate technology, renewable energy, and biotechnology. Sustainable ecological agriculture promised to contribute to the growth of a healthy and ecologically diverse environment, the onset of economic balance and long-term prosperity, and the salvation of civilization and culture against the advance of Malthusian crisis and a material, cultural, and spiritual decline.

Like the crusaders in the permanent agriculture movement before them, the founders and disciples of the sustainable agriculture ideal first defined themselves and the movement via the issuance of apocalyptic jeremiads that warned of impending ecological crisis. Leaders in the sustainable agriculture movement promoted their ideas by joining ecological farming with the burgeoning environmental movement of the 1970s and 1980s, and by linking their schemes to the energy crisis of the 1970s and the rural economic crisis of the 1980s. Individuals and groups promoting the sustainable ideal, such as biologist Wes Jackson and "soft technologists" at The New Alchemy Institute, enjoyed success in communicating the expansive concepts of the new farming, as ecological agriculture became an organized force with supporting constituencies and institutions.

Often castigated by the proponents of sustainable ecological agriculture, members and supporters of the agricultural establishment, particularly agricultural scientists, farm chemical manufacturers, and agricultural economists, offered a strong initial resistance to the new farming. Even while some components in the agricultural establishment fought the challenge offered by ecological agriculture, the concerns expressed by the sustainable agriculture camp tapped nascent environmentalist concerns within that reviled establishment. By the time "sustainability" became a household word in the 1980s the USDA and land-grant schools were hotbeds of research and discussion of sustainable

agriculture. Even the manufacturers of farm chemicals began to embrace the rhetoric of sustainability and ecological stewardship by the late 1980s. In this co-option of sustainable ecological agriculture, many of the original canons of the new farming, such as the desire for a chemical-free agriculture and devotion to smaller-scale farming, were abandoned or watered-down in the establishment version of sustainable agriculture.

While many of the original goals of sustainable ecological agriculture dissipated as the movement was co-opted and adopted by traditional agricultural forces, this movement profoundly influenced how Americans perceived farming, food and fiber, it sparked drastic changes in farming practices that reduced soil erosion and environmental pollution, and it reshaped the policy guidelines of American agriculture. The history of sustainable ecological agriculture highlights the centrality of agricultural issues in the rise of the environmentalism in the United States, and illustrates the problems and promises inherent in adopting some form of ecological agriculture..

CHAPTER SIX: SOIL AND THE CRISIS OF HUMANITY

In the years after 1960, a more educated and informed generation of Americans increasingly desired environmental amenities, such as wilderness areas and national parks, as well as healthier food, water, and air. The ever present threat of nuclear contamination, coupled with other concerns about pollution, urban and suburban ugliness, lack of wilderness and protected areas, species decline, and limited resources, helped launch an environmental movement in the 1960s. Though farmers were rarely categorized as environmental activists, agricultural issues were fundamental in the rise of environmentalism in the United States.[1]

A prevailing sense of crisis animated the environmental movement, from the outburst over Rachel Carson's Silent Spring and the Everglades jet port crisis to the oil spill at Santa Barbara and the Love Canal. Agriculture also suffered from a series of crises beginning in the 1960s which tied the development of sustainable ecological agriculture to the broader crisis of humanity in the period. What was agriculture's role in the environmental crisis facing humanity? First, with the dramatic technologically assisted increases in population growth, especially in less developed nations, the world appeared to face a Malthusian crisis by the 1960s. Furthermore, the national battle against soil erosion still had not halted the loss of topsoil, and the nation's farmers and rural citizens faced economic decline and environmental degradation.

Agriculture's role in the overall biological environment appeared in stark form after the publication of Silent Spring in 1962. Farming was intricately tied to the pollution crisis of the 1960s, from the Carson episode to concerns over ground water contamination and chemical residues in the food supply. Agriculture's contribution to the ecological crisis of the 1960s and 1970s was well-documented by various critics examining the fallout of

"Green Revolution" technology and chemical-based, mechanized agriculture in the United States. As the principal proponents of the technological "megamachine" agriculture, the agricultural establishment, especially the USDA and land-grant schools, suffered from vitriolic attacks by anti-establishment farmers, scientific outsiders, and ecological thinkers. By singling out the role of the USDA/land-grant nexus in the promoting an unhealthy farming system, proponents of sustainable ecological agriculture were able to highlight the centrality of agriculture in the environmental crisis and to set the stage for a new system of farming based on ecological diversity, appropriate technology, and societal permanence.

Agriculture and the Human Future

When John F. Kennedy won the presidency in 1960, American agriculture rightfully envisioned itself as the envy of the world. America's soil had won wars and fed the vanquished, and the major problem confronting President Kennedy's Secretary of Agriculture, Orville L. Freeman, was to somehow reduce the gargantuan surplus problem he inherited from the Eisenhower Administration. Despite foreign food aid, domestic consumption programs, and land retirement under the Eisenhower era Soil Bank program, advances in science and technology continued to increase the yield taken from America's farms.[2]

While farmers and farm policy makers fought over price supports and subsidies, more fundamental problems, such as world overpopulation and hunger, promised to extract great demands from American agriculture in the very near future. Lester Brown, an agricultural researcher for the USDA, wrote in 1963 of the tremendous importance of American agriculture within the world community. Brown expressed his belief that a burgeoning world population and a decline of available productive land would force America's farmers to heighten their use of the resource-demanding Green Revolution

technologies pioneered by Norman Borlaug and the Rockefeller Foundation. Food and hunger, like hydrogen bombs and helicopter armies, were part of America's Cold War arsenal. In addition to confronting a potential Malthusian crisis, American farmers had to revive efforts to hold the soil, protect the nation's waters, and confront the continued severe decline in small-scale farming and rural life.[3]

For those agriculturists, researchers and observers with an ecological world view, the threat--actually the reality--of a hungry planet seemed to be the prevailing environmental problem facing agriculture and humanity. Overpopulation and soil degradation were obviously not new concerns exclusive to 1960s America, but threats of a Malthusian crisis burgeoned in that decade. Fairfield Osborn, a holdover from the permanent agriculture era, often expressed in his fears that agricultural production could no longer match population growth. Osborn wrote in 1962 that, "The results of population pressures are not merely physical, such as the daily crisis of starvation facing hundreds of millions of people, they generate as well a host of other undesirable conditions in human life affecting not only happiness and conduct of the individual, but also involving the basic questions of economics, religion, forms of government, and finally, the ultimate dilemma of war and peace." Throughout the 1960s and 1970s, books such as Paul Erhlich's The Population Bomb (1968), and Garrett Hardin's essay "The Tragedy of the Commons," (1968) reaffirmed Osborn's thesis that agriculture might be potentially exhausted by leaps in world population and resulting stress on land, fuel, water, and other resources.[4]

Farming, Pollution and Health

The perceived threat stemming from overpopulation was partially relieved in the 1960s and 1970s by the success of genetic, and mechanical and chemical technology championed by the American agricultural establishment. In spite ever increasing numbers

of people to feed, ongoing topsoil loss, and the encroachment of suburbia, America's farmers continued to produce record yields and enjoy profitable years in the 1960s. Though the problem of feeding the world seemed solvable and profitable, establishment agriculture endured an increasingly trenchant series of attacks in the 1960s and 1970s.

Attacking the misguided leadership and ecologically devastating teachings of the agricultural establishment was not new. Unlike the permanent agriculture cadre, the critics of agribusiness, the USDA, and the land grants found that their trenchant attacks were more acceptable to a new generation of Americans concerned with preventative environmental health. Concerns about agriculture's role in pollution served as the locus in the attacks pointed at the agricultural establishment, which, in the critics perception, was the font of the misguided science and technology leading American agriculture into ruin. William Albrect spoke to the pollution problem in 1961 when he wrote, "We must characterize man, at this stage, as the main biological liability, not only for himself, but to the populations supporting him. He is the contamination of the environment."[5]

Rachel Carson was a forceful opponent of traditional agricultural practices, and the catalyst for the agricultural-environmental awakening. The furor resulting over the publication of Silent Spring in 1962 rocked the agricultural establishment and federal government and ushered agriculture full fledge into the Age of Ecology. Questions over pesticide contamination of food and the safety of DDT-related "biocides," as Carson called them, were vocalized in many quarters for several years prior to the publication of Carson's book. Through her prose and well-reasoned, meticulously researched arguments, Rachel Carson forced Americans to seriously consider the environmental effects of mechanized, chemically intensive production agriculture, and to ponder the overall state of environmental quality. Stewart Udall, an environmentalist icon in his own right, who served as Secretary of the Interior throughout the Johnson Administration, recalled the impact of Silent Spring in an oral history interview in December 1969. Udall thought that

"the crystallization of thinking that took place in the 60s was to a substantial degree encouraged and pushed on by Racheal [sic] Carson's book. . . . I talked to my scientists about the time the book came out. They felt that in the main she was on target and that we ought to come down on the side of that argument." Udall mentioned that "agricultural interests generally pooh-poohed the book," but that he and the scientists in the Department of the Interior, after first seeing the book in terms of the food chain, "began to see . . . that man himself was going to be ultimately endangered and imperiled."[6]

As Linda J. Lear, Thomas R. Dunlap, and other historians have documented, the public response to Silent Spring overwhelmed the federal government, especially the USDA. Carson reserved her strongest indictments for the Agricultural Research Service (ARS) for their wholesale advocacy of chemicals without regard to biological control and ecological consideration. Fighting the agricultural chemical industry, antagonistic agricultural scientists, and some of her own faulty findings, Rachel Carson succeeded in making the public more cautious regarding the previously unassailed agricultural technology promoted by the agricultural research and production establishment. Carson created an uproar in traditional agricultural circles, ensuring farming would never be the same again. Silent Spring taught farmers about the impact of their chemicals on the food chain, and urban dwellers started to express heightened concerns over the safety of their food and water supply.[7]

But the linkage between farming, pollution, and health extended beyond the Rachel Carson episode and continued throughout the 1960s and 1970s. As Carson's fellow "politico-scientist" Barry Commoner noted, agriculture's environmental problems were "more than DDT." Commoner recognized that a polluting agriculture was symptomatic of a culture that wasted its resources with little regard for the future. For Commoner, the pollution problem could in no way be "glossed over." America's agricultural pollution problem (for example, ground water contamination by nitrates) "represented a failure on

the part of modern chemical technology to predict a vital consequence of a massive intervention into nature." Commoner noted that for a million years humans had "survived and proliferated on the earth by fitting unobtrusively into a life-sustaining environment." Sadly, technological human had wrecked this "elaborate network of mutual relationships." Despite American agriculture's effort to create factories on the farm, Commoner asked his readers to understand that "agriculture remains a part of the larger, over-all system of life which occupies a thin layer on the surface of the earth--the biosphere." Dorothy and Gerald Slusser, in their appropriately titled book Technology: The God That Failed, echoed the findings of Carson, Commoner and others, when noting that agricultural practices, "more than most of man's other activities" had "disturbed the ecological balance of nature." The Slussers cited the negative effect of chemical fertilizers and biocides on the natural bacterial content of the soil and upon the earthworm population as prime examples of how agriculturists both knowingly and unwittingly degraded the environment.[8]

Technology Misguided

Carson and Commoner's attack on agricultural pollution and environmental contamination pointed to a larger questioning of the role of technology in American life. Alan I Marcus and Howard P. Segal have noted that technology, formerly viewed by many Americans as "a social benison, pristine in every way," had in the post-1950s world become to some observers "a villain, a destroyer of communitarianism." While the debate over technological advance became a key question for intellectuals, the public at large seemed to realize that, good or bad or ambivalent, technology was now a "driving force behind modern life." Advanced agricultural technology, formerly enshrined as the ultimate representation of American efficiency and production, became the focus of a debate that would be central in the rise of sustainable, ecological agriculture.[9]

Critics of establishment-fostered agricultural technology first associated the endless technological advance on the American farm with an overall critique of Western scientific hubris, anthropocentricism, and ecological unawareness. Barry Commoner summed the general mood of the period when he wrote in 1971 that, "The environmental crisis is somber evidence of an insidious fraud hidden in the vaunted productivity and wealth of modern technology-based society. This wealth has been gained by rapid short-term exploitation of the environmental system, but it has blindly accumulated a debt to nature." Commoner attributed the misguided technological advance in America to what he labeled "reductionism"--the tendency to design technology to solve "singular, separate problems and fail to take into account the inevitable 'side-effects' that arise because, in nature, no part is isolated from the whole ecological fabric." Thus, "the reason for the ecological failure of technology" was that "unlike the automobile, the ecosystem cannot be divided into manageable parts." Commoner suggested that "In the popular image the technologist is often seen as a modern wizard, a kind of scientific sorcerer. It now appears he is less sorcerer than sorcerers apprentice."[10]

Commoner found many like-minded critics of technology in general, but in particular he found many fellow critics of the agricultural technology. The problem, as viewed from an ecological framework, was that agricultural technology did work. Hence we have the notion of what has often been called "the failure of success." Pesticides killed bugs, but they also effected the biological web outside of agriculture. Huge tractors allowed one person to replace the labor of ten or twenty others, but that same giant tractor also contributed to the decline of rural life and the compacting of the soil. Yet, reasoned supporters of the *ancien regime*, America's farms provided the most abundant and inexpensive food supply in the history of modern civilization. The spread of American agricultural know-how appeared to be the lodestar that would lead humanity out of a potential Malthusian crisis.

Despite optimistic assessments by export oriented commodity groups, agricultural scientists, the USDA and agribusiness, and a Nobel Peace Prize for Norman Borlaug, the Green Revolution technology came under persistent and effective attack both abroad and at home. Critics of the agricultural establishment lashed out at the ecological and economic folly involved with extensive use of genetic, chemical and mechanical technology in less developed countries. These critics, many of whom became "founders" of sustainable, ecological agriculture, also castigated the industrialization of America's farms.

John Todd, a marine biologist and co-founder, in 1969, of an alternative-technology enclave centered in Massachusetts, was among the more effective critics of the Green Revolution. Todd and William O. McLarney labeled their research center The New Alchemy Institute, and began a long quest for sustainable, ecological agriculture. John Todd offered many attacks on Green Revolution that are representative of the voluminous indictment of technology misguided. Todd deigned the Green Revolution as "the agricultural equivalent of the Titanic, only this time there are several billion passengers." Writing in 1971, the scientist asserted that "the Green Revolution has not been shaped by an ecological ethic and its keenest enthusiasts are usually manufacturers of chemicals and agricultural implements backed by government officials."[11]

Todd's attacks on the Green Revolution were supported by vast evidence that the hybrid seeds, expensive chemical and mechanical technologies, and monoculture farming of the Green Revolution program had disrupted economies and ecologies worldwide. For example, Filipino farmers found Norman Borlaug's "miracle rice" strain IR-8 expensive, distasteful to consumers, and lacking resistance to pests and drought. Furthermore, Borlaug's "miracle" dwarf wheat varieties developed to assist Mexico were too low in gluten content to be made into bread. (Of course, corn and beans, not bread, are the staples of the Mexican diet). Thus the Green Revolution miracle of Mexican wheat

production, in the view of the ecologist, was a triumph only of monoculture agriculture, was affordable only to elites, and was devoted primarily to export market as livestock feed, not to feeding hungry Mexicans. To critics of the Green Revolution, misguided technology, forced on developing nations by the American agricultural and foreign policy establishment, appeared to be a form of cultural imperialism that disrupted rural social patterns and made poorer nations even more dependent upon energy for irrigation and machines, and capital for seeds and chemicals. Furthermore, Green Revolution monoculture polluted rural ecologies, and the crops offered by the Norman Borlaugs of the world threatened to make billions potential victims of the genetic vulnerability, as hybrid seed varieties and genetic mutations presented many risks as well. (Such as the development of pesticide-resistant pests and fungicide-resistant crop viruses).[12]

Though the Green Revolution still has its apologists and supporters, throughout the 1970s the attack on this perceivably misguided technology continued unabated. One commentator wrote in 1972 that, "Many agriculturists think the Green Revolution will overcome the earth's biological limitation. It is an extremely dangerous attitude, an illusion that leads to a slowdown in the efforts to save man and his environment through ecological planning." [13]

Barry Commoner noted that same year that American agricultural "experts" had failed to understand that "introduction of a new technology into developing countries is always an *ecological* operation." Commoner and others offered numerous examples of Green Revolution folly, from mice infestations in Malaysia resulting from pesticide contamination deaths of the feline population, to parasitic outbreaks in human populations resulting from large irrigation projects. Susan DeMarco and Susan Sechler, in their trenchant 1975 study The Fields Have Turned Brown, noted "there is an increasing concern around the world about the dangers of a chemically dependent agricultural system." Robert Steffan, an organic farmer and popular ecologist from Nebraska, in a

letter to a USAID (United States Agency for International Development) official in 1972, noted that "The 'shining success' of this technology even in the developed countries is now beginning to fade for various reasons. The realization that even our resource and energy stores are not limitless is giving reason to pause. So the Green Revolution is no longer quite so green when one comes to the realization that out technology can't really help them."[14]

As Steffan's statement indicates, and as many others were quick to point out in their attacks on misguided agricultural technology, America, as the font of the latest agricultural revolution, was far from immune to the ill-effects of industrial agriculture. Richard Merrill, one critic of the agricultural establishment, offered this indictment of traditional agricultural science and technology in 1975: "We brag of being a nation where food is relatively cheap and agriculture efficient, yet ignore the fact that most measures of food processing and farm efficiency fail to take into account the endangerment of such valuable resources as soil fertility, water, wildlife, public health and a viable rural economy." Robert Steffan, who also served for decades as Farm Director at Boys Town in Omaha, Nebraska, pointed to other ecological failures or "hidden costs" of modern agriculture, such as the demise of grass and legume rotations, the decline of vital bee populations, and the pollution created by concentrated lot feeding of livestock. Steffan, a man with daily ties to the soil, thought the American farmer had "become a misfit in his own environment." Wes Jackson, whose concept of ecological agriculture would draw much attention in the 1980s, compared modern till agriculture to a "global disease" that, if unchecked, would "wilt" the human race "like any other crop." Throughout the 1970s critics of misguided technology gnashed their teeth loudly over the social and environmental consequences of large-scale farming, agricultural mechanization, and the genetic and chemical "victory" over nature.

By the late 1970s and early 1980s, those bashing the bad technology of American agriculture could draw upon voluminous evidence to support their critiques, including American farmers reliance on expensive, imported energy supplies, as well as lingering problems with heavy silting, salinization, ground water depletion and contamination, the appearance of chemical-resistant strains of pests and fungi, the decline of small farms and the increasing domination of the food industry by corporate conglomerates, as just a few examples of where American agriculture had gone wrong.[15]

If American agricultural technology appeared misguided toward adverse ecological ends, then by implication someone or something was guiding this "bull in a china shop" system of farming. While the individuals attacking the Green Revolution, such as Wendell Berry, correctly attributed cultural traits (a "crisis of the spirit," lack of stewardship, obsessive greed and disregard of nature) as the root for the ecological crisis in agriculture, nearly all of the ecological critics of the American farm and food system targeted the agricultural establishment as the source of misguided technological advance. In books, speeches, and protests throughout the 1970s and 1980s, farmers, scientists, ecologists, writers, and others seeking to promote an ecological vision of agriculture singled out various elements, institutions, and individuals responsible for the soil and human crises that apparently faced America in the period. These attacks on the agricultural establishment made conditions ripe for an organized movement in sustainable ecological agriculture.

Just as Ralph Borsodi charged the land-grant-USDA complex with "treason" and "rape of the land" in the 1930s and 1940s, the critics of the agricultural establishment in the 1970s and 1980s threw a great number of slings and arrows at agribusiness, the land-grant schools, the USDA, and the "Farm Bureau mentality." (i.e. Alleged support for larger, wealthier farmers at the expense of their less fortunate or "efficient" comrades in agriculture). Farmers concerned over the perennial question of why wheat prices were

always low and bread always expensive, also questioned the environmental and social fallout of misguided agricultural technology and unchecked "bigness" in American farming. While worries over the negative consequences of food processing conglomerates, corporate farms, contract farming, agricultural chemicals, and governmental policy were core concerns in the attack on misguided technology, the land-grant colleges appeared to critics as the most conspicuous villains in the faulty apparatus of American agriculture.

Why single out the tyranny of the land-grant schools, formerly viewed almost universally as fonts of agricultural efficiency, rural uplift, and American expertise? As anyone aquatinted with America's giant food production establishment may readily observe, the entire system, including government researchers, university staffs, USDA and agribusiness personnel, Farm Bureau leaders, and quite often farmers, nearly all graduated from, or are affiliated with, the land-grant college system. Schools such as Iowa State, Kansas State, and the University of California-Davis and many others enjoyed large budgets, bureaucratic power, and institutional prestige in postwar America as the fonts of life-science research. The Green Revolution at first appeared to be another affirmation that the research complex was guided by wise and ingenious scientists working in the service of humanity.

In their pervasive attack on misguided technology, observers making an ecological and social cost/benefit analysis of the land-grant schools found these institutions to be the source of an insidious evil perpetrated on American farming and culture. Two representative attacks deserve attention for their potent and well-received arguments, Jim Hightower's Hard Tomatoes, Hard Times (1973) and Wendell Berry's The Unsettling of America (1977). While Hightower's book did not deal with environmental issues, both of these tracts are canonical in sustainable agriculture circles, and detail the sundry problems leading to the perceived ecological, economic, and cultural crisis confronting American farming in the 1970s.

Hightower, formerly the elected State Commissioner of Agriculture in Texas, was a founder of the non-profit research group, the Agribusiness Accountability Project, in the early 1970s. Hightower steered a research project on the USDA/land-grant/U.S. Extension service/experiment station complex. Hard Tomatoes, Hard Times documented the establishment agriculture focus on wealthy farmers and "corporate structures" at the expense of small-scale farms and rural communities. Most unsavory, in Hightower's opinion, were the linkages between academia, government and industry. Nixon-era Secretary of Agriculture Earl Butz epitomized the inbred state of contemporary agriculture. Butz, the top federal agricultural official and hard core disciple of megamachine export-oriented farming, was also a former professor at Purdue University and served as a board member of several corporations, such as agribusiness giant Ralston-Purina. In Hightower's opinion, men like Butz divorced agricultural production from the maintenance of an economically and environmentally healthy rural America. Land-grant products like Butz had slavishly labored for the demands of implement and chemical manufacturers, the Farm Bureau, and prosperous farmers, while ignoring the demise of rural American civilization under the onslaught of exorbitant land prices, high debt, foreign competition and technological unemployment. Consumers also suffered, as they confronted fewer choices in the food market, higher prices, and less healthy and tasteful food. The land suffered as well, when farmers, bureaucrats and scientists continually attempted to outwit nature in the battle for high production. Hightower called for a public information campaign regarding the misguided technology affecting American agriculture, legislative and academic reform, and end to racial discrimination in USDA programs, and an eventual restructuring of the entire national farming system.[16]

A fundamental concern of Hightower and the Agribusiness Accountability Project was the increased tendency towards vertical integration of the food system, contract farming and large corporate farms. Hightower and others thought that the "economy of

scale" mentality in agriculture neglected to consider such issues as environmental pollution and soil stewardship, energy consumption, and the value of rural culture and smaller-scale independent "family" farmers. Hightower's concerns about the failures of establishment science and technology were echoed by another central figure in the history of ecological agriculture, the Kentucky farmer, essayist, poet and teacher Wendell Berry. Berry's 1977 book The Unsettling of America: Culture and Agriculture stands as one of the most lucid contemplations on the meaning of agriculture in American life. In this and other works. Berry, whom Edward Abbey labeled "our contemporary Isaiah," offered some of the more reasoned and deeply penetrating blows at the misguided technological development of American agriculture.

Like Hightower, Berry assailed the research establishment's blatant disregard for ecological considerations and the health and value of rural culture. Berry suggested that many problems had led to the ecological crisis in agriculture, including the American preoccupation with specialization, what Berry labeled "the disease of the modern character." For Berry, the main "hazard of the specialist system is that it produces specialists--people who are elaborately and expensively trained *to do one thing*." Berry cautioned against "inventors, manufacturers, and salesmen of devices who have no concern for the possible effect of those devices."[17]

Attacking "farm boys" who had turned into calculating agricultural economists, scientists, and bureaucrats, Berry viewed the onset of industrial, chemical, mechanized, corporate agriculture as the successful outcome of a generation of agricultural research from individuals, such as famed Iowa State University agricultural economist Earl O. Heady, who had rationally redefined the farm as a mere mechanical component in the larger "input-processing" and "food processing" industrial machine. For Berry, one could expect agricultural chemical and implement manufacturers to stop nowhere in the pursuit of an industrial agriculture, but for educators and public servants to embrace the "too

many farmers" doctrine represented an ultimate betrayal of small farmers, rural communities, and the social and ecological constitution of the nation. Berry wrote: "If the farmer sells his foodstuff to 'agribusiness' at a narrow profit and buys it back ready-to-serve from 'agribusiness' to its great profit, then the cash flow has at that point deftly inserted its tail into its mouth, a wonder of sorts has been accomplished, and a reverent 'Golly!" is heard from certain agricultural economists."[18]

Berry, Hightower, and other critics of the agricultural establishment attacked misguided policies and values that gave rise to misguided technology. Beyond the quest for efficiency and profits, a sense of hubris, of human dominance over nature's limitations, drove the misguided technology of American agriculture. Wendell Berry cited broad cultural failures as the source of misguided technology. Scientist and visionary agricultural theorist Wes Jackson saw a more clearly defined threat--the field of molecular biology. Since the discovery of DNA in 1953, and the increased science budgets after the Sputnik controversy of the late 1950s, molecular biology had been a favored child in the research establishment. Just as the attacks on Green Revolution technology had begun to infiltrate traditional agriculture circles and the public consciousness, fantastic claims in the field of biotechnology offered yet another technological miracle to avert potential Malthusian crises. Yet as with other cutting edge agricultural technologies, the molecular biologists showed little interest in the ecological and social ramifications of their findings. This "single vision focus," as Jackson called it, was symptomatic of the failed vision of technology offered by the agricultural establishment.

As the expose of misguided agricultural technology suggested, clearly the time had come to bring change to agriculture and society at large. For those individuals and groups with an ecological vision of agriculture, the "faulty technology" of postwar America had to be rebuilt. Barry Commoner asked Americans to take lessons from nature. Nature taught people that "nothing can survive on this planet unless it is a cooperative part of a larger,

global whole. . . . Human beings have broken outside of the circle of life." Commoner was not alone in his belief that "present productive technologies need to be redesigned as closely as possible to ecological requirements." A new type of agriculture and society had to be built. But a new, ecological agriculture had to have more than revamped technology and social criticism at its heart; it required animation from the domain of ethics, practical research initiatives, and sweeping changes in the structure and practice of agriculture. As the threats of overpopulation, pollution, and misguided technology illustrated, the stakes of building a sustainable ecological agriculture were nothing less than human survival.[19]

Notes

1. For general overviews on the development of the environmental movement see Samuel P. Hays, "From Conservation to Environment: Environmental Politics in the United States Since World War II," Environmental Review 6 (Fall 1982): 14-41; Donald Fleming, "Roots of the New Conservation Movement," in Donald Fleming and Bernard Bailyn, eds., Perspectives in American History (New York: Macmillan, 1971), 7-63; and Kirkpatrick Sale, The Green Revolution: The American Environmental Movement, 1962-1992 (New York: Hill and Wang, 1993).

2. See Orville Freeman, "Statement," in Food and Agriculture: A Program for the 1960s (Washington, D.C.: USDA, 1962), 1-5.

3. Lester Brown, Foreign Agricultural Economic Report No. 11 (Washington, D.C.: USDA, November 1963), 1-10; for more on Lester Brown in the period, see Lester Brown Oral History Transcript, AC 74-185, LBJ Library.

4. Fairfield Osborn, ed., Our Crowded Planet: Essays on the Pressures of Population (New York: Doubleday, 1962), 7-23; see also Fairfield Osborn, The Limits of Earth (Boston: Little Brown, 1953), 3-5; Fairfield Osborn, Our Plundered Planet (Boston:

Little Brown, 1948), vii-201; Erik Eckholm, Losing Ground: Environmental Stress and World Food Prospects (New York : W. W. Norton, 1976), 1-23; Garrett Hardin, "The Tragedy of the Commons," Science, 30 July 1968, 99; and Michael Hamilton, ed., This Little Planet (New York: Scribners, 1970).

5. William Albrect, "Wastebasket of the Earth," Bulletin of Atomic Scientists 17 (October 1961): 335-340.

6. On the stated threat of pollution and contamination form agricultural chemicals before Silent Spring see James Whorton, Before Silent Spring: Pesticides and Public Health in Pre-DDT America (Princeton: Princeton University Press, 1974); and Pete Daniel, "A Rogue Bureaucracy: The USDA Fire Ant Campaign of the Late 1950s," Agricultural History 64 (Spring 1990): 91-121; Stewart Udall, Oral History Interview, Tape 1 of 1, 16 December 1969, 1-4, LBJ Library. Udall noted that the debate over Carson's book developed into a "little Cold War between Interior and Agriculture. We, by pointing to the scientific evidence, by pointing to increasing public concern, we just had to slowly back them off."

7. Several treatments of Rachel Carson, Silent Spring, and the pesticide/agricultural pollution-contamination issue have been written. See Linda J. Lear, "Bombshell in Beltsville: The USDA and the Challenge of Silent Spring," Agricultural History 66 (Spring 1992): 151-170; Thomas R. Dunlap, DDT: Scientists, Citizens, and Public Policy (Princeton: Princeton University Press, 1981); Frank M. Graham, Since Silent Spring (Boston: Houghton Mifflin, 1970); John H. Perkins, Pesticides and Politics: Insects, Experts and the Insecticide Crisis (New York: Plenum, 1982); Christopher J. Bosso, Pesticides and Politics: The Life Cycle of a Public Issue (Pittsburgh: University of Pittsburgh Press, 1987); for more on the scientific "fallout" over Carson, see "Administrative History of the Office of Science and Technology" Container 1 (1968) LBJ

Library; Lyndon B. Johnson, "To Renew a Nation," Televised Address (8 March 1968). Lyndon Baines Johnson, Presidential Papers, White House Central Fil SP2-3/1968/NR box 129, LBJ Library; Memo, Donald F. Hornig to Joseph A. Califano Jr., 12, December 1967, on the release of OST, "Report on Agricultural Pollution," Presidential Task Forces Subject file box 38, LBJ Library; "Comments on the Recommendations in Report on 'No-Residue' and 'Zero Tolerance,'" (June 1965), Records of the USDA, box 3, LBJ Library; see also N. W. Moore, "Environmental Contamination by Pesticides," in Gordon T. Goodman et al., Ecology and the Industrial Society (New York: John Wiley, 1964), 219-237; Harrison Wilford, Sowing the Wind: A Report for Ralph Nader's Center for Study of Responsible Tomorrow on Food Safety and the Chemical Harvest (New York: Grossman, 1972); James S. Turner, The Chemical Feast: The Ralph Nader Study Group Report on Food Protection and the Food and Drug Administration (New York: Grossman, 1970); see also Robert Steffen, "Modern Agriculture and Environmental Problems" (speech to symposium, "Our Threatened Environment," Omaha, Nebr., 12 October 1970, Robert Steffan Papers, box 1, file 4, Archives of American Agriculture, Parks Library, Iowa State University; and Robert Steffan, "Statement on Pesticides to the Legislative Interim Committee on Environmental Problems, Lincoln, Nebr., 10 June 1970, Steffan Papers, box 1, file 4, Archives of American Agriculture.

8. Barry Commoner, Science and Survival (New York: Viking Press, 1963), 10-22. Commoner started his career studying the effects of nuclear fallout, but he later gained fame when he declared the "death" of Lake Erie due to algae build-up in the 1960s; Dorothy M. Slusser and Geral H. Slusser, Technology: The God That Failed (Philadelphia: Westminster Press, 1971), 80-105.

9. Marcus and Segal, Technology in America, 315-364.

10. Barry Commoner, The Closing Circle: Nature, Man and Technology (New York: Alfred A. Knopf, 1971), 153-295.

11. Background information on the New Alchemy Institute is located in the collections of the Green Center (New Alchemy Institute), Archives of American Agriculture, Special Collections, Parks Memorial Library, Iowa State University. John Todd, quote taken from The New Alchemy Institute Bulletin, 2 November 1971, located in "The New Alchemy Institute: Search for an Alternative Agriculture," Science, 28 February 1975, 728.

12. John L. Hess and Karen Hess, "The Green Revolution," in Alexander Cockburn and James Ridgeway, Political Ecology (New York: Times Books, 1979), 180-189.

13. Kai Curry-Lindhal, Conservation for Survival: An Ecological Strategy (New York: William Morrow, 1972), 305-307.

14. Barry Commoner, "Summary of the Conference: On the Meaning of Ecological Failures in International Development," in M. Taghi Farvar and John D. Milton, eds., The Careless Technology: Ecology and International Development (Garden City, N.Y.: Natural History Press, 1972), xxi-xxix; Susan DeMarco and Susan Sechler, The Fields Have Turned Brown: Four Essays on World Hunger (Washington, D.C.: Agribusiness Accountability Project, 1975), 63; Robert Steffen to MacDonald R. Mitchell, 18 April 1971, box 1, file 2, Steffan Papers. For an example of support for the Green Revolution, see Robert Katz, A Giant in the Earth (New York: Stein and Day, 1973), 93-118; for more attacks on the Green Revolution, see the Third World Network, The Violence of the Green Revolution (London: Zod, 1991), 33; Arthur Simon, Bread for the World (New York: Paulist Press, 1973), 16; Frances Moore Lappe and Joseph Collins, Food First: The Myth of Scarcity (Boston: Houghton Mifflin, 1977); Wes Jackson

describes the Green Revolution technology as "chemotherapy for the land," in his New Roots for Agriculture (San Francisco: Friends of the Earth, 1980), 38.

15. Richard Merrill quoted in "New Alchemy Institute: Search for an Alternative Agriculture," Science, 28 February 1975, 727; Robert Steffen to Mrs. Richard Weirc, 27 June 1972, box 1, file 2, Steffan Papers; Robert Steffen, draft of article for Organic Farming, box 1, file 2, Steffan Papers; Jackson, New Roots for Agriculture, 38; for more on concerns over misguided agriculture technology, see Morton Rothstein, "The Big Farm: Abundance and Scale in American Agriculture," Agricultural History 49 (October 1975): 583-597; Wayne D. Rassmussen, "The Impact of Technological Change on American Agriculture, 1862-1962," Journal of Economic History 22 (December 1962); Wayne D. Rassmussen, "Advances in American Agriculture: The Mechanical Tomato Harvester as a Case Study," Technology and Culture 9 (October 1968): 531-543; Sam B. Hilliard, "The Dynamics of Power: Recent Trends in Mechanization on the Farm," Technology and Culture 13 (January 1972): 1-24; The Cornucopia Project, Empty Breadbasket: The Coming Challenge to America's Food Supply and What We Can Do About It (Emmaus: Rodale Press, 1981), 2-7.

16. Jim Hightower, Hard Tomatoes, Hard Times: A Report of the Agribusiness Accountability Project on the Failure of America's Land Grant College Complex (Cambridge, Mass.: Schenkman, 1973); for another, more conspiratorial view of the establishment culpability in fomenting misguided technology, see the National Farmers Organization (NFO) oriented tract of Charles Walters, Jr., Angry Testament (Kansas City: Halcyon House, 1969).

17. Wendell Berry, The Unsettling of America: Culture and Agriculture (San Francisco: Sierra Club, 1977), 19.

18. Ibid., 143-169; for more of Berry's challenge to the agricultural establishment, see Wendell Berry, What Are People For? (San Francisco: North Point Press, 1990), 123-125; Wendell Berry, Home Economics (San Francisco: North Point Press, 1987), 123-136.

19. Commoner, The Closing Circle, 284.

CHAPTER SEVEN: AGRICULTURE AND THE NEW HOLISM

In many ways the sustainable agriculture phase of ecological agriculture reflected the earlier quest for permanent ecological agriculture. In the 1930s and 1940s the crisis of the soil appeared to threaten American civilization. In the 1960s and 1970s the ecological crisis of the land appeared to threaten the very survival of humanity. Both groups cited misguided technology and science as the major obstacle confronting any attempt to build a new, ecologically oriented husbandry, and both looked to ecology as a scientific and ethical guide for piecing together the new farming.

In the 1960s, the concept of holistic, balanced ecology made a pronounced comeback. Along with the ecological revival, the sense of holism apparent in the 1930s reappeared in the 1960s and early 1970s in some pronounced forms. The ideology of the new holism dictated that agriculture had to be refashioned in order to promote better health for all life in general but especially human life, and to find less disruptive technologies that would preserve the planet's overall ecological community.

Calls for a new type of holistic farming systems arose from many corners, especially from the underground, or "counter-culture" ranks of "alternative" scientists, organic farmers and back-to-the-land communalists. While the 1960s and 1970s proponents of ecological agriculture often came from outside the ranks of establishment agriculture, many voices within the previously described and much lambasted agricultural establishment also suggested that agriculture had to be recast by "green thinking" and "soft technology."

While ecological agriculture in the 1960s and 1970s had many spokespersons who offered varied definitions of what the new farming was supposed to entail, promoters of the new holism in agriculture all sought to create a long term farming system that would

support a world faced with hunger, pollution, and other ecological, economic and technological threats. Sustainable ecological agriculture was to have several components, including a devotion to the idea of human limitations and the limitations of technology, and a need for planning to prevent disaster. But more than planning and recognizing limits, agricultural sustainability required a cultural change entailing a new devotion to ecological stewardship and responsibility. Yet while a certain spirituality and stewardship ethic animated the sustainable ideal, the roots of the new farming drew their nourishment from the science and ethic of ecology.

Holism Re-Emergent

In the 1930s and 1940s, permanent ecological agriculture emanated in part from the construction of an ecologically based ideology of holism represented in such figures as Lewis Mumford, Rexford Tugwell, and Paul Sears. Even though the permanent agriculture concept enjoyed some successes, the movement's decline mirrored the dissipation of its guiding force--holistic or balanced ecology. For people like Paul Sears, ecology described the "balances" inherent in nature, balances that dictated an eventually stable and harmonious world. With the rise of quantitative, or "economic" ecology, and chaotic ecology in the 1950s and beyond, ethicists and dreamers like Sears were subsumed by these other schools. Quantitative ecologists focused on "energy budgets" and statistical models that benefited from advanced monitoring and counting technology and greater academic and budgetary prestige. Chaotic ecologists revised the idea that nature dictated any sense of "balance." For chaotic ecologists, the concept of seeking a harmonious ecological state seemed nebulous. Nature itself caused environmental catastrophe according to chaos theory, thus, as Donald Worster has written, chaotic ecology poses the

question, "What can ecologists possibly know about all the forces impinging on, or about to impinge on, any piece of land?" [1]

While the discipline of ecology took many different directions in the post-World War II era, the holistic, ethical notions of a balanced and directed ecology re-emerged in the early to mid-1960s, animated by a new and seemingly more complex set of crises to confront than had their counterparts in the 1930s. Ecology reclaimed its status as a scientific and ethical guide in the 1960s and proved central to the development of the environmental ethic and sustainable ecological agriculture.

This re-assertion of holistic, ethical ecology is illustrated in the career of ecologist Stanley A. Cain. Trained as a traditional field ecologist in the 1920s, Cain went on to embrace the quantitative, technical revolution in ecology in the 1930s and 1940s. Cain served a term as President of the Ecological Society of America, and as the Assistant Secretary of Interior for Fish and Wildlife and Parks in the Department of the Interior during the Johnson Administration. In his many speeches and pronouncements from that post, Cain represented the new focus of ecology as a scientific and ethical guide in the 1960s.

Referring to the multi-faceted environmental crisis readily apparent in the mid-1960s, Cain suggested, "We do not have to endure the Apocalyptic revolution by the Four Horsemen: War, Conquest, Famine and Death. We do not have to do this any more than we have to live by gathering the wild fruits of the field like our forebearers." Cain advocated population control, and ecological training for engineers, resource managers, medical personnel, biologists and agricultural researchers, as he realized that, "We do live in a finite world" where "We tend to exaggerate the meaning of physical goods in the concept of progress." Cain was not opposed to the advances in biochemistry, genetics and "hard science," yet he did assert that "our concentrated attention to physical technology with quick, profitable pay-offs has worked--up to a point--but we are now appreciating

that the relative neglect of systems of nature, especially the vastly more complicated systems of biology and culture, have given us the urgent critical problems of our time." Cain was convinced that "ecology--or perhaps better, the ecological way of looking at nature--is beginning to provide the means of synthesizing the sciences and finding out how nature really works."[2]

Injecting contemporary concerns with the older notion that ecology could serve as a guide for scientific and ethical conduct, Cain noted in 1966 that, "We have historically proceeded as though the facts of nature and the raw materials of our economy were discrete entities and not parts of complex, interacting systems. Doing things this way, we have had book keeping on the benefits, but generally not on the costs of our procedures. We have mined each mineral, cut each tree, farmed each acre, and used each body of water as though there would be no significant effects on any part of the environment. In doing so we have bought economic progress out of nature's capital." For Cain ecology represented an avenue leading away from environmental catastrophe. He noted that, "The ascendancy of ecology . . . in recent years seems to be due to certain very human concerns" which included the population threat, the nuclear threat, the pollution threat and the concern for natural beauty. For Cain and the like-minded ecological prognosticators, American could not afford to abandon ecological investigations in the all-out pursuit of "hard science." Ecology would guide humanity to a better cooperation with non-human nature, and help overcome the "compartmentalization" of science and culture, serving as a "cognitive, appropriate, and moral" guide for the human ecosystem.[3]

Cain's concept of ecology and a holistic foundation for science and ethics found great support in the ecological community. In a special issue on ecology in 1964, the journal Bioscience printed several testimonials to the re-emergence of holistic, ethical, political forms of ecology in the period. Among the contributors was a holdover from the earlier period of holistic ecology, Paul B. Sears, who wrote, "By it's very nature, ecology

affords a continuing critique of man's operation within the ecosystem. The application of other sciences is particulate, specialized, based on the solution of individual problems with little if any attention to side effects and practically uncontrolled by any thought of the larger whole." Another contributor suggested that "Most of the problems facing man's ability to live happily and survive on this planet are largely concerns with environment, which is closely allied to his renewable resources. His ability to obtain enough food, clear water, and clean air along with his needs for leisure, recreation, and aesthetics involve sound ecological understanding and action."[4]

The re-emergence of ecology as a scientific and ethical guide influenced a rising environmental awakening and fostered new visions of building a holistic society devoted to long term survivability. Paul Sears, who by the early 1960s held the distinction of Emeritus Professor in Biology at Yale University, thought Bertrand Russell had correctly perceived the essence of the modern dilemma when he posed the question: "Will men be able to survive the changes in environment that our own skill has brought about?" Sears contended that "to cope adequately with our environmental problems will demand effort, not only on the local and state level, but also on the regional, national and international level. Modern man must be helped to see the whole wood as well as the single tree, the well-being of all, rather than that of one street or town or state. This is one world, in which we share our inheritance and our future." Another commentator wrote that, "The goal of the biological community is to achieve both stability within its physical setting and maximum ability to adjust to whatever changes may take place." Charles Reich spoke to the main focus of the maturing new holism in his 1970 environmentalist classic The Greening of America, stating that "The great question of our times is how to live in and with a technological society; What mind and what way of life can preserve man's humanity and his very existence against the domination of the forces he has created."[5]

The rising environmental ethic of the 1960s and early-1970s appealed to many groups, from ordinary citizens worried about clean air and water to dreamers determined to rebuild America's cities on the ecological "Holipolitan" pattern. Inherent in the new conception of ecological holism was the realization that agriculture had to be redirected to "the soft path" of ecologically conscious technology. While individuals like ecologists Stanley A. Cain and Paul Sears sought to infiltrate ecological ideals into the academy, industry and government, they and others also sought to blend the new ecological holism into mainstream public and the agricultural establishment by creating a new ethic and new ecological-technological foundation for American farming. Charles Reich claimed in 1970 that, "America is dealing death, not only to other lands and other people, but to its own people" in the form of pollution and mismanagement of natural resources. Reich claimed "There is a revolution coming. It will not be like revolutions of the past. It will originate with the individual and with culture, and it will change the political structure only as a final act." For Reich and others thinking in terms of human survival, peace, and ecological harmony, one prominent method of changing the "machine rationality of the corporate state" was to disdain the "mindless" technology of the past and present with the "small is beautiful" technology of the future. An holistic ecological revolution in America had to encompass all segments of society, and also had to appeal to the public consciousness. For advocates of this new way of thinking, one area for immediate action lay in a revitalization of the American land. For no other area so symbolized the misguided ethic and technology of the past than the nation's food production machine. Hence we have the birth of what may be labeled the "counter-culture" agriculture of the 1960s and 1970s, a loosely-affiliated group that would make significant contributions to the conception of sustainable ecological agriculture.[6]

Counter-Culture Agriculture

While the science and ethic of ecology re-emerged within the ranks of the ecologists in university and the government, those working outside of the agricultural establishment were the first to effectively link agriculture to the new holism of the period. Part of the drive for a new ecological agriculture came from disaffected, back-to-the-landers who practiced the fundamentals of organic farming on farms, individual plots, on hippie-style communes. Scott and Helen Nearing, intellectuals who fled the city during the depression epitomized the counter-cultural roots of sustainable ecological agriculture. The Nearings Living the Good Life, first published in 1954, was re-issued in 1970 and became a best seller. Thousands of young, ecologically conscious young people disenfranchised with politics, the Vietnam war, and the "movement" either read or had personally descended upon the Nearing's New England farmstead to study their organic farming techniques and simple lifestyle. As Current Biography stated in 1971, "The society that rejected Scott Nearing as a political heretic a half a century ago has come begging at his door for ecological wisdom."[7]

The Nearings, who derived their income from lectures and writing as well as maple sugar production, were advocates of the concept of biodynamic farming, a system of organic farming originally devised in the 1920s. They advocated simple, non-consumptive living, vigorous physical and mental exertion, and the use of composts and natural fertilizers and pest fighters in their greenhouse and gardens. But the Nearings represented much more than advocacy of organic farming, their lifestyle and ideas represented the new holistic conception of life in the period. Other manifestations of this new holism appearing in intellectual communities and on the American countryside included the publication of such journals as The Futurist, Future's Conditional, The Vegan, and Natural Living. These journals, in addition to monographs, preached such ideas as organic farming and

gardening, health food, and "appropriate" technology. Scott and Helen Nearing also represented an alternative lifestyle devoted to independence, ecological health, and antagonism to industrial and corporate capitalism.[8]

In farms, reclusive communes (such as the anarchist Cold Mountain farm in New Jersey or the Benton Farm near Frankfort, Kansas), at self-styled experiment stations, and in garden plots in cities across America a new breed of agrarians sought to promote an ecologically aware husbandry. If Scott and Helen Nearing were prophets of the new farming, canonical texts included the Whole Earth Catalog (1970), E. F. Schumacher's soft technology guide Small is Beautiful (1973) and the works of philosopher-technologist R. Buckminster Fuller, father of the geodesic dome. John Todd, an academic biologist turned counter-culture agriculture pioneer, is particularly representative of the blend of ecological training and counter-culture ideology in the rise of sustainable ecological agriculture. After reading a Paul Ehrlich essay in the Woodstock summer of 1969, Todd, his wife Nancy Todd, and fellow scientist William O. "Bill" McLarney left the confines of university life to found the New Alchemy Institute in 1970. Located at Falmouth, Massachusetts, the work of the New Alchemy Institute worked as an adhesive bonding agriculture to holistic ecology. The goals of the New Alchemists, or "Alchies," as they quickly came to be called, was to build a place "Where individuals will learn good stewardship of the earth as they assist us in the development of new world skill and technologies."[9]

Work at the New Alchemy Institute commenced with a seriousness founded in fears that America was "a society whose technology tends to be more and more centralized, increasingly impersonal, and remote from the control and comprehension of its ultimate users." For John Todd and the cadre of the New Alchemy Institute, the goal of ecological survival would result from the application of "small and innocuous" technology that was an "autonomous, human-scale, low energy, low pollution alternative to 'supertechnology.'" Throughout the 1970s the New Alchemists worked on projects

devoted to solar energy, microcomputer application, aquaculture, composting, and small, high-yield gardens. The Alchies pioneered the "biosphere concept" as well, with the building of several self-contained, self-sufficient "Arks," as they were called. They will be needed," wrote Todd, "if mankind is to avoid famine and hardship and manage to shift to modes of living which restore or rekindle our bonds with nature." The New Alchemists successfully drew attention to themselves, prompting one writer to describe the Alchies as visionaries, "Dedicated to the principles of an earlier age when science, art and philosophy were regarded as parts of a unified whole, the people who tend the farm are musicians, philosophers, feminists, craftsmen and trained scientists."[10]

As sustainable ecological agriculture emerged in the 1970s and 1980s, the association of the new farming to health food fanaticism and hippie communalism that followed the Nearings, and to New Age types like the New Alchemists could never quite be shaken from the public and farmer conception of "organic" thinking. Nor should it. After all, any new form of ecological agriculture was an alternative and challenge to traditional American agriculture. The new holism also confronted the cultural maladies that had, from the then-contemporary mindset, fostered racism, imperialism, and ecological devastation. Yet the ecological challenge posed to America and to traditional American agriculture also emerged from other counter-culture farmers in "middle America," and in consumer demands for safer, healthier food.

As the farm manager of the expansive fields at Boys Town, Omaha, Nebraska, farmer Robert Steffan presents a fascinating example of one college-trained production agriculturist devoted to linking agriculture and the new holism in the 1960s through the 1980s. Steffan was a follower of the biodynamic school of organic farming, an environmental activist, and regular contributor to J. I. Rodale's Organic Farming magazine in the early-1970s. A photo of Steffan in the Omaha Sunday World-Herald in 1975 showed a gapped-tooth Steffan with a pitchfork and a farmer cap, ever the image of a

midwestern farmer. Yet despite this hayseed look, Steffan held some rather unconventional views for a production farmer. Rejecting his college teachers, Steffan managed the 2,000 plus acres of farm land at Boys Town for over three decades on a totally organic regime, with no chemical application and extensive use of composts, green manures and crop rotations.

Steffan also concerned himself with suburban encroachment, agricultural pollution, and other environmental issues, and described his agricultural philosophy as "a form of land use designed to produce optimum yields for crops and livestock of the highest nutritional values free from anything detrimental to health and impairing future productivity." Steffan contended that, "The organic farmer is telling the technologist 'enough,' there must be a way that will be better for me as well as all of society." Steffan suggested in 1970 that, "Agriculture is deeply involved with the religion of production and the god of efficiency, which of course are the basic tenets of any successful industry. Until we realize that more is not always better and that quality is not always something that inevitably follows quantity we will never solve the current environmental problems." For Steffan, farmers, researchers, and agribusiness need to realize that "man's survival still depends on this thin layer of soil."[11]

As Garth Youngberg suggested in 1978, "alternative agriculturalists" held that the "conventional agriculture is destructive of both human and natural resources and is therefore destined to destroy itself as well as the larger population." Youngberg detailed the rise of organic farming from its counter-culture roots to its growing intrusion into traditional agricultural circles in the 1970s. Though relatively unorganized and anarchistic by nature, those seeking a unification of ecology and agriculture in the 1970s could point to a growing number of organic producer's associations with links to large food processors and distributors, to the burgeoning supply business for organic farmers, and to the formation of such groups as the International Federation of Organic Agriculture

Movements in 1972 as signatory of the successful infiltration of the new holism into American agriculture. Proponents of the new holism in agriculture could also gain inspiration from the growing academic reception to organic farming research, and to heightened consumer demands for so-called "organic" food. Clearly, ecological agriculture was moving from counter-culture threat to the status of aspiring challenger to traditional agriculture by the mid-to late 1970s.[12]

Sources from Within the Establishment

Sustainable ecological agriculture, as it began to emerge in the 1970s, had roots in the overall environmental crisis, in the ongoing critique of technology, and in the counter-culture, alternative agriculture practiced by scientists, communalists and regular farmers. Yet the rise of the new farming was not entirely a good versus bad gut scenario, for minority elements within the much-castigated agricultural establishment also showed susceptibility to a holistic conception of agriculture. Ecological thought had became well-established in land-grant colleges by the 1920s, and ecological investigations by academic researchers in fields such as botany and entomology had given ecology legitimacy as a scientific discipline in the United States. The biological and ethical implication of ecological ideas that gave rise to the ecophilosophical musings of Aldo Leopold and Paul Sears did not die a total death within academic ranks in the 1950s and early-1960s. Also recall that USDA and agricultural college personnel such as University of Missouri soil scientist William Albrect and Iowa State University Professor George Scarseth indicated in their writings that the ecological vision of life simmered quietly within establishment agriculture.[13]

In a role that could be compared with Rexford Tugwell's place in the permanent agriculture movement, Orville L. Freeman, Secretary of Agriculture (1961-1969) built an

intellectual foundation for the sustainable ideal. Freeman, a liberal who, unlike Tugwell, was far more of an "establishment man" in the American agricultural scheme than was the collectivist Tugwell. Though confronting a different set of crises than Tugwell, Orville Freeman joined the New Dealer in the view that agriculture operated as a vital part in an interdependent economy, and that any solution to the problems in agriculture had to come from comprehensive planning and not the politicized, sentimental, single-issue approach that dominated agricultural policy.

Faced with huge crop surpluses, an agricultural pollution problem, rural poverty and a lack of rural services, and growing demands for safe food, Freeman advocated several "visionary" policies in the 1960s. Freeman's agricultural program remained embroiled in the price/subsidy/surplus debates that characterized farm policy, but the USDA under Freeman also worked towards some ecological ends under the guise of the Great Society. Freeman told the National Association of Soil and Water Conservation Districts in Cincinnati in 1967 that, "We are a nation bedazzled by technology, and addicted to crash programs. But there are no instant ecologies or instant forests. And so, in the final analysis, we must devote much more attention in the future to assessing each new technological development for its ultimate impact." Freeman noted the problems of pollution had been fostered by traditional agriculture, especially the USDA, yet he remained convinced that the environmental problems of agriculture could be best solved by traditional agricultural researchers and leaders.[14]

Freeman envisioned the USDA as the vanguard in the fight against "galloping suburbanism and creeping pollution." He also worked strongly to increase the food stamp and other entitlement programs, and to supply nutritional, land use planning, and other advice and support to the inner-city and suburbs. Freeman wished to improve life in the city and country, part of his quest for "rural-urban balance," and supported a study and proposal for rural "opportunity homesteads"--designed to provide resettlement and

vocational training for impoverished urban families in the countryside or suburban fringe. In his speeches throughout the 1960s Freeman spoke of such issues as "total environmental management," "quality of life," and the need to "smell the flowers" via federal-sponsored beautification programs. Freeman sought to guide suburban development in an aesthetically pleasing and ecologically healthy fashion, and organized numerous task forces or gave speeches on agricultural pollution, wildlife and recreational opportunities in the countryside, biological pest control, soil conservation, and retirement of millions of acres of highly erodible or ecologically important lands. While part of the ecological idealism of Orville Freeman unquestionably stemmed from efforts to reduce crop surpluses and allay public fears of pollution, Freeman claimed that his efforts were also aimed toward promoting preventative health, attacking poverty, and asserting the non-utilitarian principle that humanity must not forget "the 'inner prosperity' of human spirit."[15]

Freeman's ecological vision of agriculture was one of many similar responses within the agricultural establishment emerging the mixture of agriculture and the new holism in the 1960s and 1970s. Indeed, the new holism had infected certain elements within the very bastion of the agricultural establishment's misguided technological apparatus--the land-grant colleges and universities.

Roger Mitchell, agronomist and vice-president of the College of Agriculture, Kansas State University, gave witness to the permeation of the ecological ideal into the agricultural establishment in a speech to the American Society of Agronomy in Los Angeles in 1977. Mitchell spoke of new ideas entering the agricultural science in the period, stating that "the mid-1970s have been a time of broader vision, reevaluation, and renewed emphasis on the global condition. . . . A global view calls for a conscious concern that technology be viewed in proper perspective." While opposed to the view that the Green Revolution was a total failure, Mitchell did indicate a belief that agricultural

scientists had to operate in the context of the "total culture," and not simply away in the lab or the classroom on singular problems. Continuing in this vein, this establishment functionary admitted, almost sheepishly, that he had "been captured" by the "Small is Beautiful" syndrome. "Yes, I do believe," stated Mitchell, "that E. F. Schumacher's ideas about appropriate technology are very germane . . . we will make the greatest contribution by using care to adapt to the culture in which we work."[16]

Another rogue in the agricultural establishment, Iowa State University agricultural engineer Wesley F. Buchele, in a paper originally presented to the Social Concerns Committee of the American Society of Agricultural Engineers meeting at the University of California-Davis in 1975, expressed many ideas that would have been acceptable even to the most pure holistic agricultural ecologists. Buchele called for interdisciplinary agricultural research focused on solving the interrelated ecological, economic, and cultural ills of American farming and food production. Professor Buchele also demanded a multi-faceted program to promote a new stewardship ethic among farmers and the general public, and governmental support for small-scale farmers and small farms, as well as small-scale, ecologically cognizant technology.[17]

Sustainability

Ecologists and other scientists and environmentalists, in addition to agriculturists and commentators of all stripes, sought to integrate the holistic principles of agriculture into the American farm and food system for many years, even decades prior to the 1970s. Yet with the scale of the environmental problems in agriculture looming so large in the 1970s, and with general support from a burgeoning environmental ethos, holistic ecological ideals infiltrated the domain of American farming and agricultural research quite deeply in that crucial decade. Ecological agriculture emerged from its counter-culture

shadow in the 1970s by attaching the new farming concepts to the greater cause of human survival. As the link between agriculture and the new holism of the period solidified, a new term entered the American lexicon--sustainable agriculture.

Sustainable ecological agriculture, as a definable ideology, emerged in the mid-to late 1970s from the aforementioned intellectual currents of the period. But as the proponents of sustainable agriculture recognized, "ecology" alone was not a cure-all for America's agricultural and environmental problems. Sustainable agriculture blended ecological concerns with a new sense of human limitation, a renewed push for planning, and call for a revived stewardship ethic.

The term "sustainability" first appeared in the environmental movement in 1972, and the word increasingly appeared in environmental literature in the 1970s before becoming an established part of the lexicon in the 1980s and 1990s. As the crest of ecological problems seemed to have no end, and with the energy crisis of the 1970s only exacerbating a sense of environmental doom, individuals throughout society called for Americans to recognize that the resources of the world were finite.[18]

Lester Brown, a foremost expert on food and hunger issues and a key figure in the inception of sustainability, led the drive to make Americans aware of the physical and technological limitations facing a very small and hungry world. Brown, originally trained as an agricultural scientist at Rutgers University in the 1950s, wrote (in 1978) that, "The need to adapt human life simultaneously to the carrying capacity of the earth's biological systems and the [use] of renewable energy sources will require a new social ethic. The essence of this new ethic is the accommodation of human numbers and aspirations to earth's resources and capacities." For Brown, "The deterioration of biological systems is not a peripheral issue of concern only to environmentalists. Our economic system depends on the earth's biological systems. Anything that threatens the vitality of these biological

systems threatens the global economy. Any deterioration in their systems represents a deterioration of the human prospect."[19]

Brown's call for sustainabilty and recognition of limits represents the overall desire to avoid Doomsday in the late 1970s. Political observers have noted that President Jimmy Carter suffered further damages to his public image when, in his fireside "sweater" chats, the nation's leader called his citizens to battle against the energy and environmental crises. Carter commissioned the much-publicized Global 2000 Report to the President of the United States (1980), whose dour summary report indicated that the prospect of "sustaining the possibility of a decent life for human beings" were "enormous and close upon us." This apocalyptic observation resounded from other sources as well in the late 1970s, as a slew of jeremiads appeared warning Americans of a global ecological crisis that was particularly threatening to agriculture. As Lester Brown, the Global 2000 Report, and sundry other studies from the period show, the world appeared to face a deluge of environmental problems ranging from a lack of arable land and overpopulation and desertification to the over-reliance on ecologically damaging agricultural chemicals and the genetic vulnerability of hybrid crop strains. The ongoing erosion problem, exacerbated by the export-driven plow-up of farm land in the 1970s, also drew an extraordinary amount of attention in the national press.[20]

Lester Brown and many other observers of agricultural and environmental trends noted in the late 1970s and early 1980s that the "safety valve" of cheap energy and technologically inspired production increases appeared nearly tapped. Need for food continually expanded with the rise in human population numbers, yet the amount of arable land was on the decline with more land subsiding to erosion, infertility, desertification, and non-agricultural use. Problems in the world agricultural situation would only increase the ecological demands placed upon American soil. Brown and other social scientists and academics, government officials, and corporate representatives agreed that family and

food planning were essential to survival. Yet the concept of planning became reshaped by the sustainable ideal from planning for "growth at all costs" to variations of "zero growth" and "sustainable development." Planning a sustainable future demanded attention to resource inventories and limitations, human health and happiness, the need for biodiversity and wilderness and open recreation spaces, and the re-orientation of human values from a "technological world view" to an "ecological world view."[21]

Sustainable agriculture required more than an a holistic ecological conception of farming and a sense for limitation and planning. A long-term ecological agriculture demanded a revival of the stewardship ethic among farmers and the general public. Cultural change had to occur if the ideas of sustainable ecological agriculture would ever come to fruition. People had to recognize that the continuation of the status quo in American farming would eventually lead to ruined land, economic blight, and societal decline. The sustainable ethic challenged Americans to redefine success outside of the traditional standards of material consumption and economic growth. In essence, Americans had to abandon their long held devotion to an endless quantity of goods and services for a better long-term, sustainable quality of life for citizens present and future.

E. F. Schumacher, the British guru of sustainability, suggested that "the foundations of peace cannot be laid by universal prosperity in the modern sense, because such prosperity, if attainable at all, is attainable only by cultivating such drives of human nature as greed and envy, which destroys intelligence, happiness, serenity, and thereby the peacefulness of man." Bill Mollison, another sustainablity promoter who began work in ecological agriculture in the 1960s in Australia, claimed that in the sustainable societies of peasants and pygmies there was an emphasis on "duties and responsibilities to nature equal to those of people to people." For Mollison and Schumacher, sustainability meant far more than continuing the supply of food, it also meant a right to an independent livelihood, a right to be debt-free, and a duty to be socially and environmentally responsible. Wes

Jackson and Wendell Berry, chief icons in sustainable agriculture, also suggested that the basis of the new farming would be both technical and cultural/spiritual, as technical efforts alone, such as the terrace-building activity of the Soil Conservation Service, had failed to affect any true permanence on American farms.[22]

Berry's words deserve attention, as his words were among the most widely noticed in the rise of sustainable ecological agriculture as a public issue. Speaking of the cultural changes necessary to build a holistic, enduring agriculture, the Kentucky farmer and poet wrote that, "The great question that hovers over this issue, one that we have dealt with mainly with indifference, is the question of what people are *for*. . . . Is the obsolescence of human beings now our social goal? One would conclude so from our attitude toward work, especially the long-term preservation of the land." For Berry the overmechanization of agriculture and industry had led to rural decline, urban squalor, and suburban ignorance regarding the sources of food and fiber. In a society geared primarily to comfort and leisure, Berry could hardly find it surprising to find America rife with "permanent unemployment and welfare dependency." Berry did see a way out of America's cultural and agricultural dilemmas. If a new stewardship ethic, a true work ethic, could be instilled in the citizenry, then, thought Berry, American could begin "inescapably necessary work of restoring and caring for our farms, forests, and rural towns and communities--work that we have not been able to pay people to do for forty years and that, thanks to our forty year 'solution to the farm problem,' few people any longer know how to do."[23]

In the late 1970s and early 1980s agriculture and the new holism had been linked under the guise of sustainability, an ideology that also dictated adherence to such ideas as material limitation, long range societal planning, and deep cultural change. Clearly, building a sustainable ecological agriculture would only result from cooperation among an

educated citizenry, a citizenry that had to stop focusing solely on short-term reward instead of long-term economic and ecological stability.

As the term "sustainable agriculture" gained wider usage in the early 1980s, the advocates of the new farming started to reach beyond discussion of agriculture and the new holism and the ringing of ecological alarm bells. Talking about "limitation," and "cultural change" needed to be augmented by some sort of definable program for sustainable ecological agriculture. The Rodale Institute, funded from the largesse of the Rodale Press, commissioned a study of America's farms and food supply labeled The Cornucopia Project. The summary of that group's report, Empty Breadbasket, appeared in 1981. The study detailed the major problems facing the sustainability of the food supply, including the aforementioned problems of agricultural pollution, suburban sprawl and rural decline, soil erosion and soil debility, high energy costs, concentrated lot feeding, and the ecological problems presented by monocultural, chemical dependent till-agriculture.

Empty Breadbasket called for drastic changes in the American farm and food system. Among other suggestions, the study called for a re-diversification of American farms, decentralization of feed lots (which would cut both pollution, transportation and grain drying costs), abandoning and/or reforming the irrigation system of the Great Plains, biological control of pests, a shift from hybrid monoculture to local-based varieties and crop patterns, renewable farm energy sources, recycling of all agricultural wastes, and governmental support for more farmers regardless of gender or race. The Cornucopia Project also prescribed local distribution and marketing of food, an educational campaign against junk food and tobacco, establishment of a Department of Food to encourage local production of food for cities, creation of urban gardens, greenhouses, and aquaculture centers, experimentation with new crops and crop uses, and a more sound ecological management of the country's farms, forests, and fisheries. Readers of Empty Breadbasket were challenged to recognize that farmland was a "national trust," of equal importance to

all citizens. Thus, America's future, according to the study, depended upon finding solutions to the complex quandaries of providing safe and affordable food without destroying the precious resource of land.[24]

As the Cornucopia Project indicates, by 1980 the theory of sound agriculture was indelibly merged with holistic ecological thinking and with the ideals of sustainabilty. The time had now arrived for new systems of farming to be designed and implemented, and the public had to be made aware of the benefits of sustainable ecological agriculture. In other words, the new farming had to be removed from books and speeches and placed into the scientific laboratory and, more importantly, in the farmer's field and on the consumers table.

Notes

1. Quantitative, or "Economic" ecology first emerged in the 1920s as did the concept of Chaotic ecology. Chaotic ecology however, is more on a phenomenon of the 1960s to the present. What is important is that the ethical imperatives of holistic, or "organic" ecology that emerged in the 1930s and early 1940s declined in the 1950s through the early 1960s, re-emerging in the holistic "environmental" movement of 1960s. For an overview the distinctions in ecological thought and development of various schools, see Donald Worster, "Organic, Economic, and Chaotic Ecology," in Carolyn Merchant, ed., Major Problems in American Environmental History (Lexington, Mass.: D.C. Heath, 1993), 465-479.

2. Stanley A Cain, "Population Ecology" (speech to American Assembly on the Population Dilemma, Alma, Mich., 9 April 1967,AC 69-12 Stanley A. Cain Papers, LBJ Library; Stanley A. Cain, "The Importance of Ecology in Land Use Planning" (speech to Conferencio Latino Americana, 27 March 1968, Ac 69-12 Cain Papers; Stanley A. Cain, "The Political Ecology of Conservation" (speech to Annual Convention of the Federation

of Western Outdoor Clubs, 5 September 1965, AC 69-12, Cain Papers; Importantly, Cain recognized that this new conception of ecology as a holistic ethical and scientific guide was tempered by the fact that "the environment cannot be completely analyzed, and that diverse analytical data cannot at present be synthesized back into anything like the ecosystem as a whole." Put another way, nature was not totally stable, but rather, operated on a tendency towards stability and balance. Stanley A. Cain, "Man and His Environment" (speech to International Horticultural Congress, College Park. Maryland, 19 August 1966, AC 69-12, Cain Papers.

3. Cain, "Man and His Environment."

4. Paul B. Sears, "Ecology--A Subversive Subject;" Robert B. Platt and John N. Wolfe, "Introduction;" W. Frank Blair, "The Case for Bio-Ecology;" and Eugene P. Odum, "The New Ecology" all located in Bioscience 14 (July 1964): 9-43; see also Paul B. Sears, Where There is Life (New York: Dell 1962), 21-41, 176-187.

5. Paul Sears quoted in "The Environmental Revolution," a proposal for a National Education Network television series on the environment, ca. 1965, WHCF 648, box 19, 1-8, Richard Goodwin Papers, LBJ Library; Osborn Segerberg, Where Have All the Flowers, Fishes, Birds, Trees, Water, and Air Gone? (New York: Van Rees, 1971), 90-95; Charles A. Reich, The Greening of America (New York: Random House 1970, Bantam Edition 1971), 382-383, 425.

6. For an example of an extreme vision of ecological holism in the period, see Clive Enthwhistle, "Holopolis: Herald of A Great Society," (2 July 1965), box 19 (648) Goodwin Papers; Reich, The Greening of America, 1-17.

7. Stories about Nearing and the revived back-to-the-land movement appeared in numerous national journals and newspapers throughout the 1970s. A sampling of these

accounts is located in boxes 1-11, file boxes 1 and 2, Scott and Helen Nearing Papers, Special Collections, Mugar Library, Boston University.

8. Nearing and the biodynamic school were constant promoters of organic farming techniques from the 1930s onward, as was J. I. Rodale, whose Rodale Press would eventually become the largest health and fitness related publisher in the nation. Rodale gave little attention to Nearing's books however, due to Nearing's association with socialism. Evidence of the Nearing's vast influence as a force for counter-culture agriculture was apparent to the author, when, traveling on the East Coast, he randomly met two individuals who as former hippies had journeyed to meet the Nearings at their homestead in Maine. The Nearings claimed, among other things, that each used only a simple wood bowl and spoon as tableware, practiced a pure vegetarianism, and avoided all processed sugar, and that they had not seen a doctor in over four decades. For more on Scott and Helen Nearing, see Roy Reed, "The Nearings: After 43 Years on the Land, They're Still 'Living the Good Life,'" New York Times, 7 May 1975; Peter Gelzing, "The Counter-Culture Pioneers," Boston Herald, 17 June 1979; "Scott Nearing: The Man and the Monument, 1883-1983," The New Socialist 9 (Spring 1983): 101-107.

9. For more on the early 1970s communalism, see Juliette de Bairacli Levy, Nature's Children (New York: Schenken, 1971); "Prophets of A Good Life," Newsweek 14 September 1970, 102-103; John Thompson, "Getting Away from It All," Harpers, November 1970, 129-130; John N. Cook, "Scott Nearing's Ninety-Three Year Plan," Horticulture 55 (November 1976): 23-30; see also E. F. Schumacher, Small is Beautiful: Economics as if People Mattered (London: Blond Briggs, 1973); Greg Watson, "Who Was Bucky Fuller, and Why is the Geodesic Dome the Least of His Ideas," New Alchemy 13 (Fall 1983): 14; on the founding of the New Alchemy Institute, see Kate Eldred,

"Promise Rediscovered: New Alchemy's First Twenty Years," New Alchemy 11 (Fall 1981): 4-18.

10. Wade Green, "The New Alchemists," New York Times Magazine, 8 August 1976, 4, 13, 32, 42; Paul T. Libassi, "The Transmuted Farm," The Sciences (August/September 1975): 11-15.

11. Robert Steffan donated a small but useful collection of his papers to the Archives of American Agriculture, Special Collections, Parks Memorial Library, Iowa State University. Material in the collection includes personal and professional correspondence, draft articles for Organic Farming, and miscellaneous articles about Steffan. See Fred Thomas, "Boys Town Farm Boss 'Conservationist of the Year,'" Omaha Sunday World-Herald, ca. September 1975; Steffan, draft or article, 2 July 1971, file 2, box 1; Steffan Papers; Robert Steffen to Mr. Dave Garcia, Redding, Calif., ca. 1971, file 1, box 2; Steffan Papers; Robert Steffan, draft of article "Agriculture and Your Environment," October 1971, file 2, box 1, Steffan Papers.

12. Garth Youngberg, "The Alternative Agriculture Movement," Policy Studies Journal 6 (Summer 1978): 524-530; for more on consumer demands for chemical-free food, see discussion of a National Fruit Growers' study conducted in 1971 in Richard Merrill, "Ecosystem Farming," in Radical Ecology, eds. Alexander Cockburn and James Ridgeway (New York: Times Books, 1979), 217-228;

13. On the persistence of holistic ecological thought in the 1950s, see William Albrect, "Wastebasket of the Earth," Bulletin of Atomic Scientists 17 (October 1961): 335-340; George Scarseth, Man and His Earth (Ames: Iowa State University Press, 1962), 64-116; Bear, Earth; Lewis Herber, Our Synthetic Environment (New York: Alfred A. Knopf, 1962), 1-239.

14. Orville L. Freeman, "Agriculture 2000: Resources" (speech to National Association of Soil and Water Conservation Districts, Cincinnati, Ohio, 6 February 1967), box 16, Daniel Pierson Papers, LBJ Library.

15. For examples of Orville L. Freeman's ecological ruminations at the USDA in the 1960s, see Orville L. Freeman, "Statement," in Food and Agriculture: A Program for the 1960s (Washington, D.C.: USDA, 1962), iii-vii; Orville L. Freeman, "Rural Resources in the 1960s" (speech to National Conference on Land and People, Washington, D.C., 15 January 1962), box 11, Orville L. Freeman Papers, John F. Kennedy Presidential Library, Boston, Mass; Orville L. Freeman, "Conservation of Man's Total Environment" (speech at USDA, June 1967), box 25, Freeman Papers, JFK Library; Orville L. Freeman, "Remarks to International Shade Tree Conference," Philadelphia, Pennsylvania, 29 August 1967, box 25, Office Files of Ceil Bellinger, LBJ Library.

16. Roger Mitchell, "Agronomy in a Global Age," in Agronomy in Today's Society (American Society of Agronomy Special Publication No. 33, 1977), 1-5.

17. Wesley F. Buchele, "Healing this Wounded Earth: An Agricultural Engineer's Proposal," Webbs Ag World 1 (December 1975): 1-5; see also Lloyd F. Seatz, ed., Ecology and Agricultural Production (Knoxville: University of Tennessee, 1973).

18. Charles V. Kidd, "The Evolution of Sustainability," Journal of Agricultural and Environmental Ethics (1992): 2-23; for a comprehensive view of the idealized vision of the "stable-state" or sustainable society ca. 1975, see Ernest Callenbach, Ecotopia: The Notebook and Reports of William Weston (New York: Bantam, 1975).

19. Lester Brown, The Twenty-Ninth Day: Accommodating Human Needs and Numbers to the Earth's Resources (New York: W. W. Norton, 1978), 16-25.

20. Gerald O. Barney, The Global 2000 Report to the President of the United States: Entering the 21st Century, vol. 1 (New York: Pergamon, 1980), 3, 94-100; for

more on the rise of sustainability and the onslaught of environmental crises in the late 1970s and early 1980s, see Jeremy Rifkin, Entropy: Into the Greenhouse World (New York: Viking, 1980), 52; "Our Thinning Soil," Is for Human Survival (New York: Vintage, 1971).

21. Lester Brown, Building a Sustainable Society (New York: W. W. Norton, 1981); Agriculture and the Human Future (February 1977): 1-7; entire issue of Future's Conditional 1 (November 1973); Pierre Eliot Trudeau, "Remarks on the Opening of the New Alchemists Ark, Spry Point, Price Edward Island," ca. 1980, located in the Papers of the New Alchemy Institute/Green Center, Archives of American Agriculture, file 8, box1; Erik Eckholm, Losing Ground: Environmental Stress and World Food Prospects (New York: W. W. Norton, 1976); Richard A. Falk, This Endangered Planet: Prospects and Proposaton, 1981), 260-263; James C. Coomer, "The Nature of the Quest for a Sustainable Society," Paul R. Ehrlich, "Diversity and the Stable State," Tom Stonier, "Science, Technology and Emerging Post-Industrial Society," and Edward Clark and W. John Coletta, "Ecosystem Education: A Strategy for Social Change," all located in James C. Coomer, ed., Quest for a Sustainable Society (New York: Pergamon Press, 1979), 1-31, 70-88, 183-200.

22. E. F. Schumacher, Small is Beautiful (London: Blond Briggs, 1974), 28-30; Bill Mollison, Permaculture: A Designer's Manual (Tyalgum, Australia: Tagari, 1988), 507-510; Wes Jackson, New Roots for Agriculture (San Francisco: Friends of the Earth, 1980), 82-89; on differing views of sustainability, see Gordon K. Douglas, "The Meanings of Agricultural Sustainability," in Agricultural Sustainability in a Changing World Order (Boulder: Westview Press, 1984), 3-15; and Robert Rodale, "Past and Future of Regernative Agriculture," in Sustainable Agriculture and Integrated Farming Systems, Thomas C. Edens, et al. (East Lansing: Michigan State University Press, 1985), 312-317.

23. Wendell Berry, What Are People For? (San Francisco: North Point Press, 1990), 125; see also Wendell Berry, A Continuous Harmony: Essays Cultural and Agricultural (San Diego: Harcourt Brace Jovanovich, 1970), 86-168; Wendell Berry, Standing By Words (San Francisco: North Point Press, 1983), 64-79; Wendell Berry, Home Economics (San Francisco: North Point Press, 123-192.

24. The Cornucopia Project, Empty Breadbasket: The Coming Challenge to America's Food Supply and What We Can Do About It (Emmaus: Rodale Press, 1981), 111-177.

CHAPTER EIGHT:
THE MODELS AND THE METHODS OF SUSTAINABLE AGRICULTURE

By the early 1980s, the idea of sustainable ecological agriculture had rocked the theoretical foundations of traditional American farming. Defining sustainable agriculture became a cottage industry in itself by the late 1980s, but for historical purposes sustainable agriculture may be defined as a farming system that seeks to regenerate land, people, and energy. Sustainable agriculture was rooted in the science and ethic of ecology, a doctrine that taught that farming was inextricably related to all other aspects of biological and social life.[1]

Ecology gave sustainable agriculture lessons on such matters as the distinction between food wants and food needs in nature, on nature's model of renewability, on the limitations humans could impose upon natural systems, on the cyclical flow of energy in a relatively stable environment, and on how ecosystem interactions grow more complex over time. Sustainable ecological agriculture had ethical as well as biological goals, including helping society recognize the failure of using finite energy sources in farming, and in nourishing a societal imperative that all people had a fundamental right to food. Sustainable ecological agriculture had one overriding tenet: "If our species is to survive and individuals to realize their full potential, we must develop a supportive, partnership role with the environment. Otherwise we could return to the subservient [to nature] position of our ancestors, through the inevitable development and multiplication of crises."[2]

Yet building an agricultural philosophy without grounding it in the real world renders the idea meaningless to everyone outside of academic and intellectual circles.

While drawing heavily upon ecology as a scientific and ethical guide, sustainable agriculture had to find practitioners and working models to become a truly viable alternative to establishment agriculture. Drawing upon the observations and experiences of world agricultural history, upon the techniques established by organic farmers over several decades, and imbued with the new holism of the environmental movement, scientists, theorists and actual farmers by the late 1970s had begun to offer some definitive models and methods for sustainable ecological agriculture. Along with specific techniques, programs and demonstrations, the proponents of sustainable agriculture also suggested to their assorted audiences what great benefits might allegedly result by implementing the various systems of the new farming, and what strategies might be employed to cast these ideas out to the general public.

The Models and the Methods

Sustainable agriculture in many ways represented a leap of faith for many farmers and researchers, as several technical, financial, and psychological barriers faced the new converts to ecological farming. It seemed easy to criticize past mistakes in agricultural technology and to single out the cultural maladies leading to the environmental, social, and economic crises of farming and rural life. But as the followers of Marx had found out, it was far easier to proclaim the dawning of a bold new age than to carry out its actualization. To become a viable farming system that fit the particular nuances of the American scene, adherents of sustainable ecological agriculture had to find practical models, methods, and techniques for the new farming. Among the mundane but complex problems researchers, farmers and policy makers needed to address were matters such as replacing monocultures with proper crop rotations and crop types, replacing manufactured agricultural chemicals and inorganic fertilizers with biological pest control and compost

and mineral applications, and dealing with necessary political and economic issues such as marketing and distribution reform, and federal support for small farms and research in ecological agriculture.[3]

Though a score of volumes could be written on the models and methods of sustainable agriculture as practiced both by experimenters and practical farmers, for the sake of analysis several "varieties" of sustainable agriculture can be singled out as representative of the general concept. Agroecology, a term favored by scientists in the sustainable agriculture camp, describes the "scientific basis" for alternative agriculture. Organic farming represents a broad sweep of farm models and methods that had emerged over several decades before gaining national recognition in the 1970s and 1980s. Permaculture is a brand of sustainable agriculture which emphasizes small-scale technology and personal and societal self-sufficiency. Perennial Polyculture is the strain of sustainable agriculture which combines stewardship and organic-type farming with genetic manipulations aimed at producing a mixed crop polyculture that would require little if any tillage. While all of these and many more varieties of the sustainable ideal emerged upon the American agricultural scene in the 1970s and 1980s, these systems had ecological holism and a "respect" for nature as their heart and soul. Also inherent in all of these systems was the notion that cultural renewal and ethical revival were required for a truly sustainable agriculture to take hold on the American landscape.

Agroecology

Agroecology represented a scientific response to the perceived shortcomings of agriculture as practiced and preached by the agricultural establishment and mainstream farmers. From the view of the agroecological wing of sustainable agriculture, modern farming seemed to be a victim of its own successes. For example, agroecologists noted

that hybridization, monoculture, and massive chemical application had led to a reliance on genetically vulnerable, biologically uniform plants that had most of their natural pest and disease resistance bred out of them. For agroecologists, the task for researchers and agriculturists of the future was to model agriculture upon the example of the natural ecosystems. In other words, American farms had to become more self-sufficient, self-regulating, energy efficient, ecologically diverse and biologically complex entities.

Though the concept of an blending ecological research into practical agriculture had been long practiced, agroecology, as a self-aware concept, emerged in the late 1970s and early 1980s in various academic and scientific circles. In essence, agroecology was a new term for the much older field of Applied Ecology. Phytopathologist J. Artie Browning presaged the agroecological ideal in a 1974 paper on biological (as opposed to chemical) pest management. Browning wrote: "A sound pest management system must be based on natural or biological means of pest management, especially the use of resistance and the encouragement of antagonisms as our first line of defense." Secondly, stated the scientist, biological pest control could not count on one gene or other type of resistance to always work. "Finally," wrote Browning, "we must study natural eco-systems from which knowledge can be gained that is readily applicable to agro-ecosystems."[4]

For the agroecological branch of sustainable agriculture, farming was "not just about producing food, but is increasingly about conserving elements of a natural (if albeit, planned) environment on behalf of society." As agroecosystems covered 30 percent of the earth's landscape, agroecologists thought that agricultural scientists had to look at the model of natural ecosystems, and then provide information to agriculturists on ways to achieve high yields without manufactured "inputs," and to make their farms less susceptible to the perturbations of nature. Agroecologists envisioned their role in building sustainable agriculture as the providers of advice on such topics as how to get crops to mimic ecological succession, on nutrient recycling, on finding rotations that would

enhance decomposition of organic material and contribute to an active soil community, and on establishing natural methods to fight pests and diseases.[5]

Though they hailed from the scientific branch of the new farming, agroecologists nonetheless envisioned themselves as "outsiders" seeking to use the science and ethic of ecology to overthrow the old agricultural regime and install sustainabilty. Stephen D. Gliesman, later head of the Agroecology Program at The University of California at Santa Cruz, helped define the scope of agroecology in his 1984 essay "An Agroecological Approach to Sustainable Agriculture." Gliesman stated that agroecology was based "on the premise that the short-term mainly economic focus of food production must be directed to long-term management systems--systems based on cycles and interactions found in natural systems. The term agroecology is new, yet its practice is as old as cultivation itself. Past civilizations often modeled their farms after the natural environment."[6]

Miguel Altieri, a research scientist in the Division of Biological Control, University of California-Berkeley, also envisioned agroecology as a scientific and ethical guide for sustainable agriculture. In his self-published 1983 testament, Agroecology: The Scientific Basis of Alternative Agriculture, Altieri suggested a multitude of applications that would stem from the development of agroecology as a discipline. In Altieri's view, the agroecologist would be a true interdisciplinarian, drawing upon diverse sources, empirical evidence, and subjective observations to give the farmer and the public advice on cropping, rotations, row spacing, soil nutrients, integrated pest management, energy and resource conservation, environmental quality, public health, and "equitable development." Furthermore, in Altieri's opinion, agroecologists needed to present an alternative to the "Western capitalist view of agricultural development." Opposing the generalized research of the land-grant colleges and the experiment stations, the agroecologist had to proffer "holistic" plans and "site-specific" techniques for sustainable ecological agriculture.[7]

Prototype agroecologists like Gleisman and Altieri recognized that agriculture represents the major human encroachment into the natural ecosystem. By combining the knowledge provided by conventional agricultural science with the study of traditional, pre-modern and organic farming systems, agroecology could help solve the monumental environmental and social problems of agriculture. Agroecologists, drawing upon a long-history of research, would serve, as Altieri suggested, as a "scientific basis" for sustainable ecological agriculture. "In agriculture," he wrote, "the appropriate level of organization to be studied and managed is the agroecosystem and the corresponding discipline is agroecology. All that ecologists study--such as the distribution, abundance, and interactions between organisms and within their physical environment, succession, and the flows of energy and materials--are important for the understanding of agroecosystems."[8]

Serving as warriors of holism in a time of social and scientific atomization, the agroecologist would blend such fields as meteorology, entomology, and social sciences into a new formula for farmers that would ensure long term production sans the ill-effects of chemical based monoculture. Agroecologists recognized that modern agricultural science and technology had captured the productive potential of nature. Agroecology sought to harmonize the productive potential of agriculture while maintaining the ecological diversity, environmental health, and long-term fertility of the land.

In the early stage of the new discipline in the 1980s, the ideology of agroecology appeared all-encompassing. Speaking to this totalistic approach, Miguel Altieri noted that, "Agroecologists study ecosystems long affected by people where experimentation is frequently impossible. Furthermore, people and their social systems are as important to agroecology as are ecological systems themselves." Thus agroecology encompassed both micro-concerns over the best treatment and techniques of a plot of land, as well as macro-concerns over such issues as the politicization and unification of small-scale farmers. Agroecology also concerned itself with public education for consumers regarding the

benefits of ecological agriculture. Agroecologists thought that their knowledge would be especially useful for farmers in the 3-5 year transition stage to an ecological agriculture regime. For agroecologists such as Altieri, "the requirements to develop a sustainable agriculture clearly are not only biological or technical, but also social, economic, political, and illustrative."[9]

Organic Farming

While agroecology began to define itself in the 1980s as an academic discipline supportive of the desires for a sustainable ecological agriculture, adherents of various systems of organic farming could rightfully claim that the development of "organics" over several decades provided appropriate models and methods for sustainable, ecological agriculture. Like the agroecologists, the organic farming element of sustainable ecological agriculture operated under the conviction that the new farming would correct mistakes of the past. Organic farming advocates in the 1970s and 1980s saw their models and methods of ecological agriculture as survival tools "in a resource-limited world with an increasingly fragile environment" overwhelmed by ecologically disruptive establishment agriculture. Sustainable organic farmers sought to enhance "natural systems," rather than replacing them with the chemical/mechanical monocultures of contemporary agriculture.[10]

For protagonists of organic farming, their systems represented a higher form of technology than was offered by the "single enterprise agriculture" of the machine-like research/production establishment. Sustainable organic agriculture, as portrayed by adherents, was a complex system involving "crop and animal co-existence with naturally occurring flora and fauna" founded upon more "intricate biological relationships than are found in conventional systems." Organic farming, is in essence, "a production system which avoids or largely excludes the use of synthetically compounded fertilizer, pesticides,

growth regulators, and livestock feed additives." Not opposed to mechanical or genetic technology, the code of "organics" proscribed the use of "naturally occurring chemicals" such as green and animal manures and various types of crushed rock or herbal preparations. Employing a broad definition of ecology, the ideology of sustainable organic farming expanded the definition of ecological agriculture to include far more than composting strategies and the use of earthworms. The organic approach also factored in support for smaller, "family" farms, and a dedication to reshaping the distribution and consumption of food in America.[11]

The Rodale Press and the affiliated Rodale Research Center and Institute of Emmaus, Pennsylvania, have been central institutions in the proliferation of organic farming and ecological agriculture since the 1940s. Robert Rodale, son of J. I. Rodale, the founder of Rodale Press, was also a major actor in the solidification of sustainable agriculture as an ideology until his tragic death in the 1980s. Just as Edward Faulkner demanded soil *restoration* as well as soil *conservation* in the 1940s and 1950s, Rodale called for *sustainable* agriculture to expand beyond the limits of "sustainability" and to call itself *regenerative* agriculture. Regardless of Rodale's semantical challenge, his ideas were, in essence, quite similar to those of others promoting the idea of sustainable ecological agriculture in the 1970s and 1980s.

Rodale thought that the ecological crisis facing agriculture and humanity could be avoided with the wholesale adoption of organic farming techniques. Through the publication of books, the sponsorship of research, and his stable of magazines, the publisher-agriculturist tried to inform farmers and the general public that "with the aid of advanced technologies, we will be able to combine resources from the air, water and soil into regenerative systems that will build continuously and will be the basis of ever greater security and health." Rodale and fellow travelers in the organic movement had a long legacy of research, observation and practice to assist their construction of sustainable,

ecological agriculture that, in their hope, "first looks at building a quality environment without people, then it looks to see if there is a place for people."[12]

What then, were the models and methods organic farming presented to sustainable ecological agriculture? As organic farming had developed numerous schools since the time of Sir Albert Howard, Rudolph Steiner, J. I. Rodale, and Edward Faulkner, two representative organic farming models can illustrate the ideas and techniques organiculture in the 1970s and 1980s. One model, "biodynamic farming," is an older version of organic agriculture that has persisted to the present and is representative of the major ideas of the overall organic movement. Another model, the "ridge-till" method advocated by noted organic farmer Jim Thompson of Boone, Iowa, highlights how individual organic farmers pursued sustainable ecological agriculture in the 1970s and 1980s.

Biodynamic agriculture, founded in Europe by Rudolph Steiner in the 1920s, continued to enjoy intellectual support and popular implementation in organic farming and health food/vegetarian circles in the United States since the 1930s. Adherents of the biodynamic method perceived organic farming as a sane alternative to the destructive monoculture and technologically misguided industrial agriculture being practiced in America in the 1970s and 1980s. Human agriculture, from the view of the biodynamic school, appeared to be an ecosystem in peril because of monoculture and the destructive forces of large-scale machines and manufactured agricultural chemicals.

To counter the perils of modern, establishment farming, the proponents of biodynamic farming asked agriculturists and consumers to "look at agriculture in its totality as a whole," and the individual farm as an "organism." According to the spiritual and scientific philosophy of biodynamic agriculture, the farmer had to show "Concern for the farm organism, for the cosmic environment of growth, and for the application of dynamic measures." Biodynamicists combined traditional restoration procedures, such as the use of soil-building crop rotations and legume plantings with applications of a

organic-based "natural" sprays composed of various "herbal preparations." Biodynamic agriculture stressed the necessity of diversified farm operations, total recycling of crop wastes and manure, and the establishment of a decentralized agricultural system characterized by such marketing techniques as farmer markets, roadside stands, and other direct and wholesale sales to consumers and distributors of relatively unprocessed "healthy" food.

By treating the farm as a living organism, by not dousing the soil animals with poison chemicals, for example, biodynamic agriculture could purportedly produce crops and livestock that would be less susceptible to stress and endowed with greater abilities to withstand the chaos of nature. Described as a "Goethian approach to agriculture," the biodynamic model provided for biological and "natural" (via the herbal sprays) pest and disease control, extensive use of crop rotations and soil building crops and composts, and the production and marketing of increasingly popular "organic" food.[13]

One feature of sustainable ecological agriculture that appeared in the organic farming manifestos in the 1970s and 1980s is the search for examples in non-western sources for sustainability. Just as Edward Faulkner could cite F. H. King's observations of Asian peasant farming as a form of permanent agriculture, so to could organiculturists draw upon numerous examples of "natural farming" around the world. Indeed, the canon of texts that emerged in the organic movement included Masanobu Fukuoka's, The One Straw Revolution. Fukuoka, a Japanese microbiologist trained in the World War II era, later abandoned his academic post in order to work on restoring an old farm plot near his home village. Fukuoka's system employed terraces, the extensive use of rice and barley straw as a mulch, and a perennial ground cover of white clover. Onto this mixture he planted rice and other small grains without the use of any tillage equipment save for a planting stick, employing no chemical fertilizers or biocides, and producing without any need to cultivate for weeds. Fukuoka experienced high yields on his land in the 1960s and

1970s, and he and numerous other pioneers of organic agriculture gained worldwide fame by successfully integrating holistic ecology into the realm of agriculture.[14]

While the case of Masanobu Fukuoka and the experience offered by the biodynamic school and other organic farming schools provided many lessons for America's organic farmers, proof of economic viability was necessary in order for sustainable ecological agriculture to take hold in American agriculture and in the public imagination. Organic-type models and techniques had to go beyond organic gardening, health food fanatics, and experimental pronouncements, and find their way into production agriculture. One such example of the infiltration of organic ideas onto mainstream farms lies in the case of Iowa farmer Jim Thompson.

Thompson, who earned an M.A. in animal husbandry at Iowa State University, began farming in the 1960s as a conventional corn grower, borrowing heavily each year to pay for expensive seed and applications of inorganic fertilizer, pesticides, herbicides, and fungicides. Thompson found it increasingly difficult to pay for the cost of production, even with the increased yields resulting from his conventional chemical-based farm system. He also noticed that his cattle always seemed to be sick, thus requiring expensive antibiotics which further tapped his bank accounts. In the late 1960s the Iowan finally realized that in the realm of establishment agriculture, "enough was never enough, and quick was never quick enough." Thompson abandoned monoculture and chemicals "cold turkey," switching to a five year mixed rotation of corn, soybeans, oats and hay. Like other commercial farmers embracing organic farming in the period, Thompson found motivation for this change in the growing environmental and consumer safety movements, in concerns for the health of his family and community, and from the awareness that the average Iowa farm in the 1970s and early 1980s experienced an eight to ten ton topsoil loss per acre per year, twice the acceptable standard set by soil scientists.[15]

Thompson's organic system utilized cover crops, crop diversity, and the extensive use of green and animal manures. Always experimenting, he found particular success with what he describes as a "ridge till" system. Using a 1965 Buffalo Till planter, Thompson would build ridges in a field during the June cultivation of the previous year's corn crop. As these 12 inch wide ridges were built, buried foxtail seeds would come to the surface, germinate, and then die out as they were smothered by the corn. Any remaining foxtail had an allelopathic effect on broadleaf weeds. In the following spring planting, Thompson's planter apparatus would scrape any remaining weeds (that had held the topsoil over winter) from the top two inches of soil while it planted soybeans. Thompson's system utilizes fast-growing varieties of soybeans with thick canopy shade and high pod clearance to further assist in non-chemical weed control. With careful cultivation, soybeans planted in this ridge-till method could, according to Thompson, nearly equal the average yield of conventional growers, with substantial reductions in cost due to the non-use of chemicals. With the organic model in place, Thompson found he could survive economically, even with increased tillage costs.

Dick Thompson's case represents the ingenuity and experimental verve required to become an organic farmer practicing a relatively sustainable, ecologically oriented type of husbandry. Thompson, who publicly challenged the idea that organic farmers were granola-crunching dreamers, also realized that what he attempted was part of a cultural shift to holistic thought and ecological ethics. He made many mistakes in switching to the new system, but saved himself economically by diversifying and becoming more self-sufficient, with his wife in charge of a large garden for home consumption and local sale. Thompson also became an active member of the boards of the Institute for Alternative Agriculture and the Regenerative Agriculture Association. Thompson also promoted the ideas of sustainable ecological agriculture for a number of years as a leading member in

the Practical Farmers of Iowa, one of the nation's most vocal and successful organizations promoting the practical side of ecological agriculture.

Thompson's model and method of ecological agriculture extended beyond the field to the livestock pen. Using common sense and ecological insight, Thompson resolved to produce healthier animals at less expense than he had under the guise of establishment food animal production. In his hog lot, Thompson spread "ag lime" in sleeping hutches to raise the pH level and control abscesses in his sows. He also "immunized" gestating sows by exposing them to manure from the farrowing pens. Instead of inoculating his animals with antibiotics, Thompson fed them beneficial "pro-biotic" bacteria. He picked medium frame hogs with large lung capacities, feeling that this type of hog best survived the effects of cold weather. Thompson also weaned his hogs a couple of weeks later than conventional agriculturists tended to do, and he chased his hogs out of their bedding area early in the morning, so they would "develop good toilet habits."[16]

By practicing ecological agriculture, Jim Thompson was one of many farmers who found they could "go organic" and survive economically. After initial resistance from bankers and the local agricultural college, Thompson found that the ideas of organic farming were spreading quickly in the late 1970s and 1980s. He also found that, along with economic success and intellectual recognition, his farm enjoyed greater populations of wildlife, reduced wind and water erosion, more organic matter in the soil, faster seed emergence, higher quality grain, and healthier livestock with a superior feed-to-meat ratio than achieved by most conventional livestock producers.[17]

Thompson and followers of the biodynamic school joined tens of thousands of other farmers and "intentional community" homesteaders in the 1970s and 1980s pursuing an "organic" form of sustainable ecological agriculture. Organic farmers helped popularize many techniques and ideas that epitomize sustainable ecological agriculture, including a commitment to non-chemical farming and increasing the diversity of crops for both

ecological and financial reasons. Organic farmers in the 1970s and 1980s could be found discussing the role of earthworms in agriculture, planting shelter belts to prevent wind erosion and increase wildlife numbers, and practicing strip-cropping to increase ecodiversity and reduce water erosion. Furthermore, as sustainable agriculture emerged in the culture of "organics," the organic farming community emphasized the need for escaping monoculture and increasing market options and home self-sufficiency via farm diversification into aquaculture, the raising of "exotic," animals, such as Vietnamese potbellied pigs, growing biomass fuel, planting fruit orchards, switching to various types of non-traditional crops for seed oil and other markets linked to the "alternative use" movement.[18]

Both the practitioners of biodynamic farming, and the thousands of converted organic farmers like Jim Thompson sought to bring the ideas of sustainable ecological agriculture into the mainstream of American farming. In doing so they found an increasingly receptive food consuming public and a grudgingly less hostile research establishment. As one account from the mid-1980s noted, "From Virginia to Oregon, tens of thousands of farmers have reduced their costs and increased their profits by replacing conventional industrialized farming techniques with sophisticated organic ones. They are not, however, the backyard gardeners usually associated with back-to-the-land organic movements. They include some of the biggest farms, some of the largest users of petrochemical pesticides and fertilizers." Like Dick Thompson, many farmers shifted from conventional to organic techniques out of both personal ecological concerns and out of a desire to make more money. Farmers switching to the organic route "cold turkey," usually experienced about a 40 percent drop in yields the first year, recovering within three years to 80 to 90 percent of pre-conversion yields. While success depended on a number of factors including crop type, climate, and the resources of a given farmer, those switching to organic methods often found they made more money even with reduced yields, due to

lower costs for chemicals and energy, and increasingly, the higher price paid for organically produced products. As its popularity increased during the 1970s and 1980s, organic farming became more mainstream, more organized and self-defined, more successful, and a major contributor to the idea of sustainable ecological agriculture.[19]

While farmers like Jim Thompson tried to illustrate the practical efficacy of the immediate adoption of ecological agriculture, others in the sustainable agriculture movement looked for more visionary solutions to the long-term problem of finding appropriate models and methods for the new farming. Building upon ecology and organic farming, other systems added new technological and ethical flavors to the recipe of the new farming.

Permaculture

If agroecologists presented themselves as scientific advisors for ecological farmers, and if organic farmers served as the front-line fighters for sustainable ecological agriculture, then practitioners of other schools in the new farming could claim they presented more far-reaching and visionary models and methods for agricultural sustainability. One such branch in the sustainable agriculture movement is the concept of permaculture. Permaculture, a term coined by Australian Bill Mollison in the 1960s, represents a strain of ecological agriculture devoted to both "organic" principles and to designing and testing self-sufficient farmstead and village models, replete with appropriate "soft" technology models and techniques of sustainable agriculture.

"Permaculture (permanent agriculture) is the conscious design and maintenance of agriculturally productive ecosystems which have the diversity, stability, and the resilience of natural ecosystems," wrote Mollison in 1988. He envisioned permaculture as "the harmonious integration of landscape and people, providing their food, energy, shelter, and

other material and non-material needs in a systematic way." Rooted in the Taoist notion of "necessitous use," in past prophets of stewardship, such as Chief Seattle, and in the ideas of technologist R. Buckminister Fuller, permaculture sought to create a world of small-scale, self-sustaining villages with ecological agriculture at their center.[20]

Emerging from the survivalist imperative of the 1970s, permaculture emphasized high-yielding, small-plot and greenhouse agriculture and aquaculture ponds combined with forage agriculture, forest agriculture, and the development of individual and "village" self-sufficiency and on-site alternative energy sources. Any permaculture model had to be based on the conditions of the bioregion in which it was designed, and had to comply with ecological guidelines regarding energy cycles, food pyramids and webs, biological and ecological diversity, and a tendency towards ecological stability with the highest possible yield. For the permaculturist, finding the appropriate model and techniques for sustainable agriculture would result from an understanding of science and a willingness to observe, deduce, cooperate with society at large, and care for the earth. Like others in sustainable ecological agriculture, Mollison insisted that any change in agricultural models and methods had to be accompanied by a corresponding shift in ethics. People had to give up the idea of accumulating wealth beyond one's needs, especially in the acquisition and use of land and the propagation of large families. For Mollison, "the only ethical decision is to take responsibility for our own existence and that of our children." For without permaculture, he reasoned, there would be "no possibility of a stable social order."[21]

Employing many of the same rationales and techniques as Mollison, the scientists and technicians at the New Alchemy Institute pioneered the use of soft technology models of ecological agriculture. According to co-founder John Todd, the "core of the effort" at New Alchemy was to build "an ecologically derived approach to the intensive culture of foods--systems that are independent of food and fuel shortages, systems that can be adopted to many climates throughout the world, even urban areas." Devotees of the

Renaissance chemist Giordano Bruno, who saw science as "a sacred discourse with nature," the New Alchemists conceived of their efforts as an alternative to the ecologically vulnerable and unhealthy system of establishment agriculture and the "Doomwatch" of 1970s environmentalism.

"We aren't anti-science or anti-technology," claimed Todd, "I think it's essential to *save* science and technology--but it can and must be done on a human scale." As an 1975 article in The Sciences suggested about the New Alchemy Institute, "the electronics, the microcomputers, attests that this place is far from a Luddite-like rejection of technological innovation." The New Alchemist contribution to sustainable ecological agriculture centered on building family and village level permaculture models and techniques that employed small-scale, but practical, durable and inexpensive technologies.[22]

The new alchemist permaculture model featured high-yield plots and greenhouse food crops; traditional organic farming techniques such as biological pest management, multiple cropping and companion planting for allelopathic and mycorrchizal effects; use of experimental crops such as the Jerusalem artichokes, amaranth and sunflowers, composting; and extensive planting of nitrogen rich cover crops such as clover, and hedges to prevent wind erosion. New alchemy researchers, in geodesic domes, greenhouses, and in their proto-biosphere "mini-arks," sought to refine and understand ecological relationships between plants, animals, and humans in order to found a self-sustaining living system for small groups and communities.

One method of permaculture-style sustainable agriculture practiced at new alchemy was the "solar tube." In common 55-gallon plastic barrels and in other receptacles, New alchemy scientists raised a fast growing (3 month), high protein, and tasty species of African *tilapia* (St. Peters) fish, recycling their waste into shellfish on the bottom of the tanks and as fertilizer for garden plots. The New Alchemist vision of ecological agriculture also utilized old fashioned guard dogs for livestock manipulation

and predator control, and "weeding" varieties of geese, chickens and ducks. Solar energy and windmills with dacron sails were among the alternative energy sources explored at New Alchemy. "By weaving together the elements of micro-climate, annual and perennial plants, water and soil management, and human needs," claimed the "Alchies," the permaculturist forms an energy-efficient, low maintenance, high-yielding, and intricately inter-connected system."[23]

Perennial Polyculture

Like the founders of the New Alchemy Institute, Wes Jackson abandoned a job in the university to pursue his own vision of building a sustainable ecological agriculture at the Land Institute in Salina, Kansas. Trained as a biologist and geneticist in the 1960s, Jackson left a faculty position in California and returned to his native state of Kansas to form his own research and training facility in 1976, dedicated to "Sustainable alternatives in agriculture, energy, waste management, and shelter." Starting with a meager piece of land, a sparse budget of less than $15,000 per year, and a handful of students, Jackson sculpted his ecological model of agriculture with tools provided by history, classical biology, modern genetics, personal observation, and the classic Kansan mixture of entreprenuership and evangelical mission.

Just as John Todd and cadre had a revelatory experience to re-direct their lives after reading a Paul Ehrlich essay, so did Wes Jackson and his wife Dana become imbued with a sense of mission in a world desperate for answers to the sprawling environmental crisis in the 1970s. Jackson recognized that the inbreeding between agribusiness and the academy would never lead to the construction of a truly permanent and ecologically oriented agriculture. Thus Jackson left his departmental chairship for a less certain future as the founder of the Land Institute in Salina, Kansas. After years of ruminating the ideas

of his personal and literary mentors, who ranged from his major professor Ben Smith and the 1920s and 30s work or Russian geneticist N. I. Vavilov to the poems of Homer and Wendell Berry, Jackson's mission crystallized on a field trip to students to the Konza Prairie, a native tall-grass preserve near Manhattan, Kansas.

Observing the luscious, self-sustaining ecological and biodiversity of the prairie, Jackson could note that, "From the point of view of the ecologist, the prairie is doing everything right." Jackson contrasted chemical-dependent American till agriculture with the prairie: "Like the wheat field, the prairie is a sprawling factory for turning sunlight into fiber, starch, fat and protein: but while the prairie relies on today's sunlight, the wheat field lives on mummified sunlight in the form of fertilizers and pesticides derived from oil and gas. The prairie lives on income, the wheat field on capital." For Jackson, a proper model for sustainable ecological agriculture derived from nature's model of self-renewal, altered by human needs and appropriate technology.[24]

Calling his system "perennial polyculture," Jackson and researchers at the Land Institute and elsewhere embarked upon a program devised to design systems and techniques of agriculture that could emulate the prairie. The idea was quite revolutionary: Jackson devised to reduce or eliminate row crop monoculture and supplant modern American farming with a mixed crop, polyculture that would also be perennial and free of both tillage and the need for chemicals.

The idea of mixed polyculture was of course not new. Native Americans, in their classic corn, beans, squash polycultures, enjoyed a nutritious and self-fertilizing *annual*, yet highly sustainable agricultural system. What Wes Jackson proposed to accomplish over time was to combine the old Indian technique with a sense of stewardship and a genetic "bio-technical fix" to produce a *perennial* sustainable polyculture of seed-bearing herbaceous crops. The problem with modeling agriculture after the prairie, Jackson quickly realized, was that humans were seed eaters, and the plants of the prairie, for

evolutionary reasons, produced far more root structure and leafy material than they did seeds. Thus came the mission of the Land Institute: To breed new strains of prairie grasses with seed yields that would match those of traditional small grain agriculture.

Jackson and fellow supporters of perennial polyculture attempted to use seed selection and cross breeding to produce composite polycultures of grass, legume and seed crops. Choosing strains, crosses, and hybrids not just for mutant yield qualities but also for desired ecological effect (such nitrogen fixing or anti-pest qualities), Jackson and disciples sought to identify and breed for human use such crops as Maximillian sunflower, Illinois Bundleflower, eastern gamma grass, bee balm, lespedeza, winebark, white snakeroot, crosses between milo and Johnson grass, and wild forms of rye. Jackson's work has been augmented by researchers worldwide, including the discovery of a high-producing mutant strains of eastern gamma grass. Inherent in Jackson's vision of perennial polyculture is the co-development of food, feed and industrial uses of alternative crops. Researchers supporting the polyculture idea have devised healthy, allegedly palatable dishes, such as "gamma grass flakes" and multi-grain "prairie rolls."

Also inherent in the philosophy of Wes Jackson and others devoted to perennial polyculture is an ecological vision of agriculture, ecology and the human future. Perennial polyculture researchers look for ecological relationships between plant, animals, microbes, genes and people, and claim that polyculture might eventually (50-200 years) bring about a high-yielding, soil saving, energy efficient, chemical free farming system. But Jackson and the like-minded also recognize that cultural changes are necessary for the implementation of sustainable ecological agriculture. Jackson has been one of the most vehement opponents of establishment agriculture, and often lashed out at the misguided technology of the land-grant colleges and at the increased power and prestige of molecular biology, which he perceives as an ecologically dysfunctional discipline.

Even though Wes Jackson recognizes that all human activity represents an intervention into nature, like others in ecological agriculture, he asked that humans respect the productive power and internal maintenance systems of nature when building an agriculture for the future. Jackson and cohort represent the general vision of ecological agriculture in the 1970s and 1980s in expressing the quest to understand and develop "nature's model" of farming, and "permaculture" models for human survival. Jackson and cadre have also studied and advocated the re-introduction of horse power onto American farms as an ecologically and economically viable option, and have sought to develop solar and other alternative energy strategies for the farmstead.[25]

Furthermore, the work of Wes Jackson and the perennial polyculturists represents the broader, "holistic" notion of ecological agriculture in expressing the desire for saving humanity from ecological ruin and promoting the revival of stewardship and rural culture. Jackson has often referred to Homer's hero Odysseus as metaphorical of America's struggle to return to the soil. As outsiders entering a fertile ecosystem with our intrusive technologies and cultural arrogance, reasoned Jackson, Americans had nearly destroyed the land and their future. Jackson challenged fellow agriculturists to remold agriculture on an ecological model. While Jackson and others often lambasted the notion that the "family farmer" held any inherent virtue, he did claim that his vision of ecological agriculture was a "moral system" that embraced an "ethic of sustainablility." In the work of perennial polyculture, and in Land Institute projects such as the model solar-powered "Sunshine Farm," and in the recent small community redevelopment project at Matfield Green, Kansas, Jackson illustrated the notion that the various strands of ecological agriculture are united by a devotion to ecology and nature as a guide, and in the need to redirect American agriculture towards environmental responsibility and the uplifting of ecologically and culturally impoverished rural America.[26]

Means to an End

Born out of the environmental crises in agriculture and the new sense of ecological holism in society, the sustainable agriculture movement of the 1970s and 1980s promised to lead American into a future endowed with a safe and abundant food supplies and a revitalized environment. As defined in its conceptual and experimental stages, sustainable agriculture sought to incorporate the science and ethic of ecology into agriculture. By proposing various interrelated systems, including agroecology, organic farming, permaculture and perennial polyculture, advocates of the new farming sought to re-harmonize industrial agricultural with the natural environment, creating long-term productivity and ecosystem health.

Sustainable ecological agriculture offered health benefits for both farm people and city dwellers, economic uplift for rural America, and the prospect of long-term societal and ecological harmony. All of the above-described systems promised to lessen soil erosion and to build the topsoil; all sought to use ecological measures to increase fertility and fight pests and disease, as opposed to using chemical measures; and all proposed that sustainable ecological agriculture would contribute to eliminating most agricultural pollution, feed the hungry with abundant, nutritive food, and replenish non-human life in the countryside. The only difference in these systems of ecological farming were the sources of the sundry systems, and the spiritual, scientific and public relations orientation of the differing schools.[27]

Proponents of sustainable ecological agriculture claimed, with some justification, that the new farming would offered better long term economic benefits for American farmers, and that sustainability in agriculture would promote an overall cultural devotion to rural revival and to long-term ecological accountability. Like the permanent agriculture

movement before it, sustainable agriculture, as a self-defined ideology, also offered to contribute worldwide societal harmony and a chance for humanity to achieve a renewable, enduring prosperity and progress. As an ideology, sustainable ecological agriculture, as it emerged from in the 1970s through the mid-1980s, presented a challenge to the traditional, well-entrenched American agricultural establishment. Thus, the task for adherents and supporters of the new farming emerged as the need to further define the benefits of sustainable ecological agriculture, and to communicate the challenge of the new systems and methods to farmers, researchers and the general public. To be more than another speculative technological/environmental panacea, sustainable ecological agriculture had to reach beyond the confines of its experimental, "alternative" status and reach the public's attention, as well as the attention of its "opponents" in the agricultural establishment.[28]

Notes

1. Further discussion on the definition of sustainable agriculture appears in Chapter 9; definition of sustainable agriculture derived in part from a definition offered by Professor Donald Worster, discussion with author, November 1992.

2. Stuart Hall, "Steps to A Holistic Ecological Food System," in Basic Techniques in Ecological Farming (Boston: Bagel, 1978), 15-21. For more on the ethical imperative of agricultural sustainability, see Francis Moore Lappe and Joseph Collins, Food First: Beyond the Myth of Scarcity (New York: Ballantine, 1979).

3. Claude Aubert, "Conversion to Biological Agriculture," in Basic Techniques in Ecological Farming, ed. Stuart Hall, 22-25.

4. J. Artie Browning, "Relevance of Knowledge About Natural Ecosystems to Develop Pest Management Programs for Agroecosystems," Proceedings of the American Phytopathological Society 1 (1974): 191-195.

5. V. G. Thomas and P. G. Kevan, "Basic Principles of Agroecology and Sustainable Agriculture," Journal of Agricultural and Environmental Ethics 3 (1993): 1-19.

6. Stephen D. Gliesman, "An Agroecological Approach to Sustainable Agriculture," in Meeting the Expectations of the Land: Systems in Sustainable Agriculture and Stewardship, eds. Wes Jackson, Wendell Berry, and Bruce Colman (San Francisco: North Point Press, 1984): 153-159.

7. Miguel Altieri, Agroecology: The Scientific Basis for Alternative Agriculture (Berkeley: Miguel Altieri, 1983), 129-131. Altieri, who can be considered a "founder" of agroecology, has been a major contributor to the literature and organization of the field.

8. Miguel Altieri and Helen Vukasin, Environmentally Sound Small-Scale Agricultural Projects: Guidelines for Planning (Berkeley: Godel, 1988), 4-16.

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CHAPTER NINE:

BACK IN THE ARENA: THE PUBLIC LIFE OF SUSTAINABLE AGRICULTURE

By the late-1980s the concept of sustainable agriculture had become a household term. It seemed as if everyone--agriculturists, politicians, businessmen and common folk--demanded that America confront the future and adopt programs that would lead to societal permanence. By broadcasting the ideas of the new farming in the 1970s and 1980, sustainable ecological agriculture not only remodeled the structure of American farming, the movement also helped sustain a floundering environmental ethic in the dark years of the early-1980s. The public life of sustainable, ecological agriculture again highlights the central role of agriculture in the human interaction with nature. The public life of the new farming movement also illustrates how ideas in America evolve from theory to practice and policy, and why even the most utopian concepts and cultural challenges eventually tailor themselves to the realities of the American commercial scene.

Since the mid-1970s the drive for sustainable, ecological agriculture has enjoyed an interesting evolution in the public arena. Like the permanent agriculture movement which began in the 1930s, the concept of sustainable agriculture first emanated from prophetic figures who issued jeremiad-like protestations regarding the impending ecological and economic crisis facing farmers and the general citizenry. Sustainable agriculture successfully linked itself ideologically to the environmental and energy crises of the 1970s, and the farm economic crisis of the 1980s. Throughout the 1980s the movement became more organized, self-aware and nationally recognized. In time sustainable, ecological agriculture began to enjoy institutional support in the form of academic and governmental recognition, research funding, and political backing.

As a challenge to the perceivably misguided technology and culture of establishment agriculture, the sustainable ecological agriculture movement first facedintense resistance in academic, governmental and agribusiness circles. Despite entrenched opposition, the advocates of the new farming could not be removed from the American agricultural equation. While resistance to sustainable agriculture lingered, in a brief period of time many of the ideas and most of the terminology of the new farming were co-opted by the agricultural establishment, the original enemy of sustainable, ecological agriculture. While this co-option gave legitimacy to many of the ideas and techniques of sustainable agriculture, the establishment versions of sustainability, while giving lip service to the long term ecological health and social reform, were primarily concerned with short-term "profitability" rather than ecological integrity.

Though the holistic concepts of sustainable, *ecological* agriculture eroded in the face of the public and intellectual acceptance of "sustainability," the movement, when judged from a broad perspective, has led to far-reaching changes in the theory, practice and policy of agriculture in the past twenty years. Though many lingering ecological, social, and economic problems still must be solved to bring true sustainablity, one could easily characterize the public life of sustainable agriculture as an overall success.

Communicating the Idea

On a warm May Day in the mid-1980s, amidst the friendly and quite conservative confines of Kansas State University, a group of 20-30 angry, placard-bearing, bullhorn-carrying farmers attracted a crowd in front of the student union. Of the several farmers that spoke that day, one Stephen Anderson ably communicated to the amassed student audience the reason for that day's protest. Anderson and colleagues were on the campus of a leading land-grant university to express their belief that the land-grant schools and the

overall agricultural establishment had failed the average American farmer and consumer. For these embittered farmers, "conventional" farming and research had to be recast in order to sustain the fragile economies, ecologies and cultures of rural America. By advocating policies and technologies that had created the decline of rural America and the physical environment, reasoned the angry farmers, agricultural college professors and researchers (usually the offspring of rural America themselves) were, in essence, the ultimate traitors to the very people whom they were supposed to uplift.

After some additional speechmaking, the procession of protesters, and perhaps 100-200 new student followers, proceeded across the campus to the College of Agriculture. The farmers demanded that one individual agricultural economist, long a promoter of "industrial" agriculture (and chief mentor to current Secretary of Agriculture Dan Glickman), come down from the ivory tower to explain his views to these disenfranchised agrarians. After a period of time, with no professors emerging from the building to debate or reason with the crowd, the protesters ended their rally by dumping a wheelbarrow of manure in front of Waters Hall, the building housing the College of Agriculture.[1]

The above episode illustrates the emotional and intellectual furor and social turmoil created by and expressed in the sustainable agriculture movement as it developed in the 1970s and 1980s. Perhaps Robert Steffan, the old organic farmer from Nebraska, best expressed the sentiment of the new farming as far back as 1971 when he noted that "Hundreds of thousands of farmers know what they are doing is wrong, but they are hooked." Forecasting the upcoming battle between ecological agriculture and the traditional agricultural establishment, Steffan told the Omaha World Herald that "Some people will tell you that we'll all starve if farmers give up chemical fertilizers, pesticides, etc. . . . but that's alot of bunk." Steffan thought that ecological agriculture had to educate

farmers, consumers, and policy makers on the need for cultural reappraisal and technical change in farming and food production.[2]

Communicating the ideas of ecological agriculture were almost as important as conceiving them. Borrowing from a long tradition of American crisis-mongering and messianic visions of societal renewal, the task of communicating sustainable agriculture first fell upon self-appointed prophets who quickly became the icons of the movement. The primer for the movement's communication impulse was unquestionably Wendell Berry's work, especially the classic 1977 treatise The Unsettling of America: Culture and Agriculture. Berry provided insightful analysis regarding the ecological foundation of sustainable agriculture, and offered great rhetorical ammunition against the misguided technology of the agricultural establishment. Berry also contributed a poet's sensibility and a sense of Christian zeal to the overall critique of the misguided culture of a nation apparently stricken by a pathological devotion to thoughtless consumption, rampant materialism and social decay, and impermanent agriculture.[3]

If Wendell Berry served as a central figure--a John the Baptist--of sustainable ecological agriculture, then Wes Jackson is the movement's messiah. In his speeches, interviews, articles, books, and work at the Land Institute in Salina, Kansas, Jackson emerged in the 1980s as the chief communicator in the public life of sustainable agriculture. Jackson's work in the realm of perennial polyculture became portrayed by the media and in intellectual and farming circles as visionary and of potential vital importance in the future. But the lanky Midwesterner offered more than his ideas on plant breeding and ecological models for farming, Jackson also embodied the sense of mission, social responsibility, and faith in human and environmental renewal that characterized the contemporary culture of sustainable ecological agriculture. From the 1970s onward, Jackson became a central figure in the movement, appearing or garnering attention at one time or another from nearly every important national media outlet. National Public Radio's

"All Things Considered," for example, devoted a half-hour segment on Jackson and the Land Institute in the late-1980s, and Smithsonian and other periodicals ran feature stories on the eloquent Kansan.

Evan Eisenberg, in a 1989 piece on Jackson for the Atlantic Monthly, offered a classic portrait of Wes Jackson as alternative scientist, ecological steward, and communicator of sustainable, ecological agriculture. Eisenberg wrote, "From a hillock on this Kansas prairie Wes Jackson *is* watching, and what he sees, and says, and does, makes him the most radical of America's agricultural prophets." Following the lead of Wendell Berry, Jackson offered a cultural critique as well as an ecological "fix" on American farming. For farmers, not merely the monolithic agricultural establishment, were culpable for the destruction and pollution of the American land and the fracture of cultural bonds in the rural community. (Such as shopping at a local town's WALMART instead of the family-owned stores in the community, or buying out your financially troubled neighbor).[4]

Jackson, who Eisenberg described as a cross between Charles Darwin, William Jennings Bryan, and Will Rogers, could point out to his listeners and readers that in the present agricultural system, farmers used 160 pounds of non-renewable nitrogen, phosphorus, and potash fertilizer each year for every American. Jackson also likened sustainable agriculture to the general agricultural-environmental concerns in the 1970s and 1980s, including topsoil erosion, the depletion of the Ogallala aquifer, silting of dams, soil compaction by large-scale equipment, and the threat of misguided science in the form of unchecked devotion to the products of molecular biology. In his work Jackson also addressed the decline of rural culture, fostering projects intended to revive the cultural wealth of rural America, as well as sustain a future food supply in an ecological fashion. His work has won praise, financial support, and national recognition, causing one commentator to opine that "If you cut out the contiguous United States and balanced it on a finger, you would be pointing at the Land Institute. The country's center of gravity is

here, and you can feel it. There is a sense of poise and deliberation, something in the air that counsels against rashness." Along with Jackson's favorable press coverage in the national media, he has also been successful in communicating the idea of sustainable ecological agriculture as a popular speaker at the land-grant schools he has consistently assailed.[5]

Jackson effectively stated what many others were thinking: Humanity had reached the Age of Limitation. In the 1970s and 1980s the recognition of technological, resource, and production limitations altered the landscape of American farming. General public environmental concerns, including the topsoil scare of the late 1970s and early 1980s and the 1970s energy crisis, made various audiences susceptible to the ideas of sustainable ecological agriculture. Furthermore, the farm economic crisis of the early to mid-1980s also created an atmosphere conducive to change, both within the public mindset and within the ranks of establishment production agriculture.

By the late 1970s the public became increasingly aware of several agricultural-environmental crises or potential crises, including agricultural pollution, genetic narrowing, desertification, the ills effects of mechanization, and the loss of farmland to suburban sprawl. American agriculture, as practiced in the 1970s, was chemically dependent, petroleum dependent, export dependent, and threatened with ecological catastrophe, from the view of the nascent sustainable agriculture camp.

Sustainable ecological agriculture drew attention as it emerged with the general public and intellectual concern over the environment. For example, in the late 1970s a topsoil scare brought the soil conservation issue back into the national spotlight for the first time since the 1930s. The Soil Conservation Service (SCS) had enjoyed a long history that has been mostly glorified but sometimes assailed. Though the politics and administration of soil conservation were often vitriolic, ill-conceived, and unecological, (for instance, the fabled "soil bank" program of the 1950s ensured greater use of

agricultural chemicals and the over taxation of non-idled acres), few would argue that soil conservation was not a national imperative. Yet despite nearly fifty years of political support and conservation work by the SCS and farmers, soil conservation measures had failed to stop the erosion and debilitation of the American land. Studies conducted under various government directives, including the Soil and Water Resource's Conservation Act of 1977, and the National Agricultural Lands Study (NALS), and the Global 2000 Report, all suggested that America's soil erosion problem was at an all time high, exacerbated by the export-driven "great plow out" of the 1970s. Topsoil loss appeared as one of many significant environmental problems in agriculture in the late-1970s and early-1980s.[6]

By pointing out the various environmental crises in agriculture, especially the topsoil crisis, the proponents of sustainable ecological agriculture could establish their ideas as legitimate solutions to the problems confronting American farming and food production. Conservationist R. Neil Sampson, writing in 1981, claimed that in the Age of Limitation, "new realities" demanded "a new set of individual actions and collective, or public policies." Sampson warned that "the clock is running. . . . so what is needed--and soon--is enlightened action by people working to improve the world for themselves and their children." The author called for a truly sustainable agriculture that went beyond piecemeal conservation measures and environmentalist rhetoric to embrace holistic farm plans that would provide "the right of humans to a life where they can meet their basic needs and have the opportunity to achieve a high quality of life within the cost ranges they can afford."[7]

The energy crisis of the 1970s also boosted the cause of sustainable ecological agriculture. Writing in 1979, Des Moines Register farm editor Lauren Soth noted that "the energy crisis may turn farmers back toward crop rotations with legumes and fewer chemicals--something the environmental movement has not been able to accomplish." That same year, in a presentation to Secretary of Agriculture Bob Bergland, organic farmer

Robert Steffan indicated that "The increased cost of fossil fuels has finally drawn our attention to modern farming practices and what the future holds. Farming today is an energy and capital intensive system of food production." As the energy crisis worsened in the 1970s, farmers across the country began to search for ways to cut fuel costs and develop on-farm and renewable energy sources. Farmers trying to pare energy costs could look to the developing systems and methods in the sustainable agriculture community for answers to both their energy problem and the topsoil crisis.[8]

While the environmental and energy crises helped the apostles of sustainable ecological agriculture communicate their ideas to a more receptive audience, the farm economic crises of the late 1970s and early 1980s particularly assisted the case of the new farming. Having been convinced during the Nixon Administration that the export market continue to burgeon, the agricultural establishment, epitomized in Secretary of Agriculture Earl Butz, enjoined farmers to tear out their hedgerows and plant "fence row to fence row." Borrowing heavily, with overvalued land as collateral, many farmers expanded their production with more expensive seeds and chemicals, larger equipment, and by bringing more land into production. As the export market crashed in the late-1970s due to the perceived American grain embargo against the Soviet Union, and due to increased production in competitor nations, farmers, small town banks, and rural communities endured the worst economic downturn since the 1930s.

Farming has long held a sacred emotional grip on the nation's imagination, and the farm economic crisis of the late 1970s and early 1980s created a general feeling among Americans and ruralites themselves that something should to rescue "family" farmers from a misguided food and agricultural system. As one commentator noted in 1986, "the farm crisis of the early 80s has caused many farmers to consider how they approach their operations," seeking at all corners to cut costs and regain financial independence. Economic problems compounded the environmental and energy crises, stripping many

farmers of their long held values regarding establishment agriculture and causing them to get "back to basics," such as employing crop rotations and reducing their use of manufactured chemicals. As the protesting farmers on that May Day at Kansas State pointed out so eloquently, many voices within and outside of agriculture used the farm crisis to challenge the research and production-oriented establishment to examine the attributes of sustainable, ecological agriculture. Farmers, to borrow a line from the movie "Network," were "mad as hell and not going to take it any more." The new farming appeared to many farmers, agricultural observers, and researchers as the best avenue away from the many problems confronting American farming. As many small-scale and more "old-fashioned" farmers seemed to survive the crisis better than large-scale farmers, the farm crisis of the 1980s also seemed to indicate that "bigger" and "more"--key words in the establishment lexicon--did not always translate into "best."[9]

As sustainable agriculture experienced a transition from "cult" status to that of recognized contender to the agricultural establishment, the communication strategies of the new farming became more sophisticated. Sustainable agriculture ideology infiltrated the public sphere through its lively personalities, organized demonstration and action, and institutional and media support.

Across the nation in the 1970s and 1980s small groups of farmers banded together to form support and action organizations for organic farming, and later, sustainable agriculture. Organic farming organizations in the 1970s helped set the stage for an organized communication effort for sustainable agriculture by lobbying for organic farming research, setting standards for "organic" certification, and making the public, farmers, and policy makers aware of the alleged benefits of ecological agriculture.

In the 1970s into the 1990s numerous groups like the Practical Farmers of Iowa (PFI), the Center for Rural Affairs, the Institute for Alternative Agriculture, American Farmland Trust, and the National Family Farm Coalition appeared on the American

farming scene, promoting organic farming, ridge till, sustainable rural redevelopment, and other models, methods and ideas implicit in sustainable ecological agriculture. The Practical Farmers of Iowa (PFI), founded in 1985, for example, includes several hundred Iowa farmers of varied philosophies, including nationally recognized organic farmer Dick Thompson. The PFI members sponsor and host tours, workshops, well-attended field days, on-farm demonstration and experimentation projects, publish a newsletter, and lobby for legislative support for sustainable ecological agriculture.

New Farm magazine, a Rodale Press publication claiming a 100,000 person readership in 1987, cited the PFI as one of the most effective and organized groups promoting the new farming. A secret of PFI's communicative success, according to a founder of the group, Gary D'Agroza of Boyden, Iowa, was that "Farmers respond best to other farmers." He continued, stating that farmers who wish to continue in their profession would have to "Figure out how to farm as economically as possible, and be as environmentally sound as possible. . . . the name of the game today is how to grow corn for $1.25 to $1.50 a bushel. There's no way to do that by using traditional inputs." PFI drew attention to ecological agriculture, and its newsletter, which contained information on techniques and reports on experimental projects, also illustrated the emotional support-group and "networking" quality of the new farming, as it featured poems, conference reports, a "hotline" number for those with ideas and problems, and news notes and book reviews related to sustainable ecological agriculture.

PFI also benefited from the national recognition accorded to member Dick Thompson, whose on-farm field days were quite popular and whose successful "ridge-till" techniques garnered national attention. Thompson, (who reports suggested could "never be taken for a back to the earth guy"), served as an effective communicator for sustainable agriculture because, as an ordinary sounding farmer, he and others like him helped shed ecological agriculture of its counter-culture trappings that, for better or worse, vitiated

against mainstream adoption of an ecological farming program. On a "field days" at his farm, often attended by over 1,000 interested observers, Thompson, standing with a bull-horn in a field of corn "strong, vibrant and oozing with the juice of life," communicated the ideas of sustainable ecological agriculture to ordinary farmers and citizens as well as USDA, USAID, and World Bank officials.[10]

Just as the publicity afforded to Dick Thompson helped launch the PFI, so to did the attention given to Wes Jackson and the New Alchemy Institute spawn organized programs to communicate the message of sustainable ecological agriculture. Jackson's Land Institute rose from its meager origins to the point that, by the early 1990s, his research and teaching facility supported fourteen staff members plus several interns on 275 acres, with a budget exceeding $350,000 a year and growing institutional ties to Kansas State University and other research institutions. Jackson personally received national media attention, substantial grants to support Land Institute research, and increased support for his ideas within the land-grant schools and other bastions of establishment agriculture. Furthermore, through Jackson's mercurial personality and mixture of science, philosophy, and entrepreneurial talents, the Land Institute became a focal point of the increased national coverage and distillation of sustainable, ecological agriculture. The Land Institute now issues newsletters, a quarterly summary of research and concepts entitled the Land Report, and sophisticated fund-raising appeals. The facility also sponsors tours, field day demonstrations, workshops, publications, a model solar farm and community redevelopment project, and an annual "Prairie Festival" featuring local and national speakers, workshops, dances, and other festivities.[11]

Far removed from the plains of Kansas, the new alchemists at Cape Cod also represented the successful widespread communication of sustainable ecological agriculture in the 1970s and 1980s. Like the Land Institute, the New Alchemy Institute rose from humble roots to eventually enjoy favorable assessments in the national media, from

researchers, as well as fiscal support of grant-providing institutions and governments. New Alchemy would eventually offer courses, seminars, workshops, publications and conferences in such areas as "Sustainable Design" and "Biological Agriculture." It also hosted weekly tours that brought over 10,000 people into the facility each year, including 1500 schoolchildren, who marveled at such features as the self-contained "ark" ecosystem and the other abundances of life, fertility, and technological ingenuity at New Alchemy. The institute also engaged in highly professional fund raising efforts, offered research internships, and held social events such as the annual "Harvest Festival."[12]

Though the message of sustainable, ecological agriculture benefited from the pronouncements of icon-figures, such as Wes Jackson, and the organized efforts of innovators, such as the New Alchemy Institute, in many ways these groups and individuals preached their message to already converted audiences. The ultimate communication task for supporters of the new farming would be to blend the prophecies of a Wes Jackson, the innovations of alternative technology, the work or everyday farmers and farm groups, *and* general political and institutional support. As the 1980s drew to a close, this institutional support was evident throughout the spectrum of organized agriculture. Numerous and divergent groups such as National Research Council of the National Academy of Sciences, American Farmland Trust, and, quite importantly the publishing giant Rodale Press, all offered support for sustainable, ecological agriculture. The movement also grew increasingly popular in governmental, academic, and agricultural research circles, as expressed in such institutions as the Kerr Center for Sustainable Agriculture in Oklahoma, and the Leopold Center for Sustainable Agriculture at Iowa State University, and in the founding of new journals such as The Journal of Sustainable Agriculture.[13]

Though the new farming movement received increased media and public attention and growing organized and institutional support throughout the 1980s, the battle over sustainable agriculture was an emotional, intellectual, financial, and cultural challenge to a

century-old agricultural establishment. While nominally in favor of "sustainability," and the environmental responsibilities of agriculture, many opponents within the agricultural establishment questioned the efficacy of the new farming. Though the public and farmers were receptive to the communication of sustainable ecological agriculture, the new farming nonetheless faced a stiff challenge from the well-entrenched, well-funded, and highly productive agricultural establishment.[14]

Resistance

Just as the pronouncements of the permanent agriculture movement sparked an immediate and vociferous response from the agricultural establishment, so to did sustainable, ecological agriculture endure attacks from representatives of production agriculture. Throughout the land, agricultural scientists, agricultural chemical manufacturers, agricultural economists, "Farm Bureau types," USDA and land-grant officials, the agricultural press, and ordinary farmers, consistently assailed the ideas, models and methods of ecological agriculture from the 1960s through the 1980s.

As far back as the mid-1960s, the reaction to the ecological critique of establishment agriculture singed the nerves of some very important members of the agricultural establishment. Wheeler McMillen, a prominent agricultural commentator since the 1920s and long time Farm Journal editor, issued the first rejoinders to the ecological agriculture agenda in his 1965 response to Silent Spring entitled Bugs or People?.

For McMillen, Rachel Carson's dedication of her treatise to the "reverence for life" dictum of Albert Schweitzer was a twisted irony. The true people "revering life" in the 1960s, in the eyes of McMillen, were the scientists and other agents of the Green Revolution who fed the multitudes and helped effective farmers become successful businessmen. The agricultural journalist wanted his readers to know that in the battle of

bugs or birds versus people, the only ethical choice was to fight nature "with the best weapons" humanity could command. "Let the insects go unchecked?," enjoined McMillen, "They will go their relentless ways. For humankind they will produce disease and death, poverty, hunger and discomfort."[15]

He also disdained what he viewed as the misinformed "alarmists" that "spread the impression that the entire American landscape is being doused with insecticides" when actually, according to McMillen, 95 percent of the nation was uncovered by pesticides. McMillen painted a rosy picture of past efforts to control bugs and increase production, of the ability of the Food and Drug Administration to monitor pollution problems, and then-current efforts to instruct farmers on the safer use of agricultural chemicals. For those tempted to believe the warnings of Carson and the ecologists, McMillen asked them to first picture "A hungry child, sick from malnutrition, starving hopelessly toward a troubled future." Hence, this early critic of the ecological imperative in the sustainable agriculture milieu attempted to juxtapose the "morality" of industrial agriculture against the dreaminess of the organic farming crowd.

McMillen found support in his attacks on Carson and others calling for an ecological assessment of agriculture in the 1960s. Long time Chair of the House Appropriations Subcommittee for Agriculture Jamie L. Whitten (Democrat-Mississippi) echoed McMillen's diatribe in his 1966 tract That We May Live. Whitten asked readers to recall the exaggerated public fright during the cranberry contamination fiasco of 1958, which had cost cranberry growers 10 million dollars in losses. Americans were blessed with productive farmers and well-intentioned scientists who, in Whitten's view, were the chief source of America's unprecedented high standard of living. The congressman asked urban Americans in particular to "understand somehow that Silent Spring, which they read so avidly, is not a balanced account of the place of pesticides in the world."[16]

Donald F. Hornig, chief science advisor to President Johnson, though active in forming an effective research response to the issues posed by Carson and other environmental problems, also offered caution about the ecological critique of production agriculture in the 1960s. For example, the ecological critique of technology was ludicrous to Hornig, as he saw technology as morally ambivalent. Referring to a distracting phrase he had noticed in an upcoming speech by the President, Hornig told Presidential aide Joseph Califano: "The recurrent references to 'technology' in this draft are naive and will cause the President no end of trouble. 'Technology' means a collection of skill, methods or means. It is not to be confused with doing. I would like to protest strongly . . . the notion that technology brings us the pollution problem." Hornig pointed out that doomsayers had been predicting pollution catastrophes 500 years prior regarding the condition of the Thames, and England seemed to have survived nonetheless.[17]

Norman Borlaug, Nobel Peace Prize winner and "father" of the Green Revolution, did not let the ecological critique on agricultural technology go unnoticed. Throughout the 1970s and early 1980s Borlaug defended the Green Revolution, agricultural chemicals and hybrid seeds, attacking the "smug" view of the ecologists who would, in his view, prefer to see a world devastated by perpetual want, eternal hunger, and subsistence level "sustainability." Fearing that the Green Revolution was "being betrayed by the same scientists that once fostered it," Borlaug called for stepped-up research on artificial fertilizers, new agricultural chemicals, and biotechnological solutions to impending hunger problems. For the scientist Borlaug, his "Green Revolution" was one of many in the glorious history and bright future of agricultural science.[18]

Denial of the ecological critique of agriculture continued through the 1970s, resurging with a vengeance during the topsoil crisis that appeared in the late 1970s. Under the auspices of the Soil and Water Resource Conservation Act of 1977, the USDA conducted the first national inventory (National Agricultural Lands Study) of farm lands

since 1934, finding, along with the 1980 release of the Global 2000 Report, that despite long efforts, soil erosion was still a national menace. While the topsoil crisis drew national attention and helped bring about the sustainable agriculture movement, many members of the agricultural establishment dismissed the erosion crisis as a hysterical non-problem created by reactionary environmentalists and misguided scientific assumptions.

Two of the nation's most noted agricultural economists, Earl O. Heady of Iowa State University, and Theodore W. Schultz of the University of Chicago, presented the agricultural establishment's rebuttal to ecological critics regarding the topsoil crisis. Heady and University of Illinois agricultural economist Earl R. Swanson concluded in 1983, "after a review on crop yields and livestock efficiency, that the nation could count on continued gains in crop and livestock productivity into the next century" thus "the need to reduce soil erosion would be lessened, since minor soil losses would be offset by technology."[19]

Farm journalist Lauren Soth responded to Heady and Swanson's study by noting "continuing technological improvement and the consequent decreasing importance of land as a factory farm product can lead to complacency about resource depletion." But Heady and Swanson were supported by fabled agricultural economist Theodore W. Schultz, who crafted a response he hoped would echo James Malin's 1946 attack on the erosion hysteria created during the New Deal. Schultz maintained that because the measuring methods used in the 1977 soil survey differed from those of the 1934, no accurate depiction of soil loss could be drawn. Furthermore, Schultz suggested that soil erosion was specific to climate and site, and that farmers in the 1980s practiced better soil stewardship than ever before in American history. Finally, Schultz argued that ecological critics were actually snobbish in implying that America's most efficient and productive farmers had "no perception of the value of their soil resources and they act as if they were indifferent to soil losses." Shultz's opinions were augmented by Julian Simon and Herman Kahn's

optimistic assessment of the soil erosion problem in their much noted 1984 response to the Global 2000 Report entitled The Resourceful Earth.[20]

As various types of ecological agriculture gained credence among some farmers in the 1970s, the agricultural establishment reacted harshly to the challenge of the new farming. Reacting to the organic farming craze of the early 1970s, Secretary of Agriculture Earl Butz stated on national television his opinion that if America wanted to try an organic farming regime, somebody had to decide "which 50 million Americans we are going to let starve or go hungry." Later that decade, though, Jimmy Carter's Secretary of Agriculture Bob Bergland expressed interest in ecological agriculture as he commissioned a well-received a study of non-chemical farming, and later appointed a full-time organic farming coordinator at the USDA, I. Garth Youngberg. Youngberg worked diligently to promote what he labeled "alternative agriculture," but due to resistance from the incoming Reagan Administration agricultural secretary John Block, and the Council for Agricultural Science and Technology (CAST), Youngberg's position at the USDA was soon eliminated, as was USDA support for the new farming.[21]

CAST, a research and opinion group formerly headquartered at Iowa State University and now located in an office in Ames, Iowa, is partially funded by agricultural chemical and agribusiness concerns, and is comprised, principally, of agricultural economists, scientists, policy makers, and commodity group representatives, and other members from scientific and academic societies mainly supportive of the establishment view of agriculture. Often expressing sentiments about improving the environment and supportive of a few of the new farming ideas, CAST and the Center for Agriculture and Rural Development (CARD), headquartered at Iowa State, nonetheless served as the lead weapons in the establishment resistance to sustainable ecological agriculture from the late 1970s onward.

For instance, following the issuance of the National Research Council's (NRC) Alternative Agriculture (1989), a favorable report on the new farming, Indiana Congressman Lee Hamilton, Chair of the Joint Economic Research Committee, asked CAST to offer an appraisal of the report and on the ideas of ecological agriculture in general. *Alternative Agriculture* Scientists' Review, a major CAST response to sustainable ecological agriculture, detailed the reservations traditional agriculture holds regarding the new farming. While not totally critical of the NRC report's support of some of the concepts of ecological farming, CAST suggested that the ecological critique of establishment agriculture would assist in "fine tuning" and "correcting unforeseen consequences" of an American production agriculture system that "has served us well . . . from a long history of solid research." Still CAST noted that the National Research Council's tentative support for ecological agriculture failed to take into account the total economic, political, and social framework under which farmers operated. Furthermore, CAST noted, in a thinly veiled reference to the sustainable agriculture camp, that "the subjective approach used in this, or any report, is fraught with the danger of being interpreted as conclusive evidence or legitimization of a movement or advocates of particular philosophies that, while mostly rooted in sound husbandry practices, have not been verified through established protocols. . . . Despite qualified statements to the contrary, the report goes on extensively in places as if alternative agriculture [is] a proven, if not exclusive, option."[22]

CAST represents a long-held establishment antipathy toward sustainable, ecological agriculture that persisted in the 1980s through the early 1990s. Lauren Soth noted that "Agribusiness and other big-farming interests have laughed at the new farm movement, labeling it unscientific and a retreat to the inefficient technologies of our great-grandfathers." CAST and other opponents of ecological farming always were quick to note that "The long-term viability of American agriculture cannot be taken for granted. . . .

But without supportive macroeconomic, science, education, trade, resource, and environmental policies, the competitive advantage of agriculture can be lost at great cost to farmers and consumers at home and abroad." For CAST and the agricultural establishment, any environmental concerns had to balanced with the economic concerns of farmers, agribusiness, and consumers, and "investments in human resources, science, technology, and the wise use of soil, water, and other natural endowments."[23]

As the above statements suggests, CAST and other opponents of sustainable ecological agriculture, judged by the scale and seriousness of their response to the new farming, saw a direct threat to their way of life and to the food production system as they had known it all of their professional lives. Many of the opponents to sustainable, ecological agriculture apparently did not study the ideas, methods and systems of their nemesis in great detail. For instance, opponents of the new farming insisted, contrary to the written record, that ecological agricultural stood as a neo-Luddite opposition to science and technology. And by employing the term "wise use," and focusing principally on economic viability as sustainability, CAST, and by association, the agricultural establishment, suggested that the true stewards of the American land were the farmers and scientists providing an abundant and ever increasing bounty of inexpensive food and fiber to the world. In the eyes of CAST and the like-minded, Americans did not need to fear greatly about agricultural-environmental problems, the decline of family farmers, or the future of the food supply, due to the "remarkable fusion of science, technology and practice." Establishment agriculture, especially agricultural scientists, agricultural economists, and politicians, continued to express disdain for ecological agriculture while positioning themselves as the "wise use" stewards of optimistic future.[24]

Feeling especially threatened by the ecological agriculture agenda, the nation's farm chemical manufacturer's also issued stiff rejoinders to sustainable ecological agriculture, particularly during the 1980s. Jack Early, president of the American

Agricultural Chemical Manufacturers Association, expressed his concern in 1980 that his industry "needed help" as it was under siege from environmentalists and an ill-advised public. Early stated that his industry was "one of the most closely, tightly regulated industries in the United States today, our products are regulated from cradle to grave" by the USDA, CEQ ,EPA, FDA, FTC, OSHA, DOT, and other government agencies. In trade journals, such as Farm Chemicals, and via public relations, political lobbying, support of pro-chemical research, and consumer awareness campaigns, the chemical industry shot back against sustainable, ecological agriculture, claiming their efforts were vital in the effort to avoid famine and sustain America's role as the leader in the world economy. Throughout the 1980s, as sustainable, ecological agriculture appeared as a defined threat, the chemical industry fought for regulatory relief, and attempted to re-engineer their products, packaging, and public image in order to present themselves and farmers as environmentally conscious stewards of the land, and as the victims of misinformation. In turn, groups like Chemical Producers and Distributors Association and Lyndon LaRouche's Schiller Institute attacked sustainable ecological agriculture as immoral, unscientific, and inhumane.[25]

Co-Option

Just as in the 1940s, when establishment agriculture dismissed the core assumptions of the permanent agriculture movement while linking themselves rhetorically to conservation and the term "permanent agriculture," so to did the concept of sustainable agriculture become co-opted by the very establishment it attacked. As the ideas of sustainable, *ecological* agriculture surfaced on the American farm scene and underwent an attack by forces in the agricultural establishment, the very agents attacking the

ecological, technical, economic and cultural assumptions of the new farming also attempted to present themselves as the true champions of sustainable agriculture.

This co-option of the sustainable, agriculture movement happened in several ways and for several reasons. First, the agricultural establishment engaged in an extensive debate over the "meaning" of sustainable agriculture, usually divorcing the paramount concerns for ecological diversity, smaller scale farming, and cultural change from the concept of sustainability, replacing those original tenets with an emphasis on "resource conservation" and, most importantly, a devotion to "economic viability" as sustainable agriculture. Sustainable agriculture thus became less of an ecological imperative and opportunity for rural revival and environmental harmony, and more of an economic ideology laced with semi-committal environmental concerns. Second, the agricultural establishment attempted to merge the no-till/minimum tillage revolution of the 1970s and 1980s with the interrelated but different concept of sustainable agriculture, thus allowing agricultural chemical manufacturers to engage in an impressive publicity campaign to refashion themselves as environmental stewards. Third, sustainable ecological agriculture is essence co-opted itself by the virtue of its own success. Rather than remain outsiders with sparse intellectual and budgetary prestige, the advocates of sustainable, ecological agriculture chose to seek change from positions within the establishment system.

An initial evidence of the establishment co-option of sustainable, ecological agriculture is the intellectual re-definition of the term sustainable agriculture. As sustainable, ecological agriculture emerged in the 1970s and 1980 as a defined movement, the term sustainable agriculture, though ambiguous, evoked standard connotations and some fairly specific models and methods. Sustainable, ecological agriculture, a challenge to the traditional establishment view of agriculture, developed as an idea to make agriculture "ecologically sound, economically viable, socially just and humane." Ecological viability meant working to emulate "nature's model" of growth, virtual elimination of

agricultural chemicals and incorporation of an "organic" style crop and livestock regime, and devotion to ecological and biological diversity and human health. Economic viability, from the original conception of sustainable, ecological agriculture, meant both the planned survival of smaller-scale "family" farmers, as well the production and equitable distribution of abundant and inexpensive food that took into account "hidden costs" of environmental degradation. Sustainable, ecological agriculture also emerged out of a devotion for cultural change, out of the human recognition of resource and technological limitation and from the need to phase out the unsustainable acquisitiveness and megamachine values threatening the survival of humanity.[26]

As the sustainable agriculture movement took hold in its protest, contrarian form, the agricultural establishment shifted from actively resisting the concepts of sustainable ecological agriculture to borrowing its terminology and some of its ideas. Resisting many of the ecological and social concerns of the movement, the USDA, land-grant schools, and agribusiness presented a far more watered-down vision of the meaning of agricultural sustainability from the mid-1980s onward. This intellectual co-option of the new farming terminology and piecemeal use of its ideas presented what might be labeled the American politics analogy for sustainable agriculture. Just as politicians attempt to please all peoples all of the time, so to did the re-definition and co-option of sustainable, ecological agriculture try encompass and please all segments of establishment agriculture, many of whom had been singled by the ecological critique of postwar farming.

In the establishment vision of sustainable agriculture, the ecological, holistic notion of agriculture succumbed to an overarching emphasis on economic viability as viewed within the traditional framework of production agriculture, though support for "improving the environment" also fit under the establishment umbrella of "sustainable agriculture." In other words, sustainable agriculture meant, even with rhetoric to the contrary, building a form of farming that was economically profitable with the side benefit of improving the

environment. By co-opting the emotionally popular term sustainable agriculture and giving adherence to some of the ideas of the new farming movement, the agricultural establishment helped justify ever more research into defining and pursuing sustainable agriculture.

An initial co-option of the term sustainable agriculture occurred in the language of federal farm legislation establishing the USDA's Low-Input Sustainable Agriculture (LISA) program in 1990. The Senate defined sustainable agriculture as a system "that, for generations to come, will not only be productive and profitable but will conserve resources, protect the environment, and enhance the health and safety of the citizenry." Agricultural economists, such as the Oklahoma State University's Michael R. Dicks, also assisted in the establishment's intellectual co-option of the term sustainable agriculture. Dicks revealed the emasculated establishment re-definition of the concept in a 1992 article, writing "The more moderate environmental groups are defining sustainability as long-term workable solutions between agriculture and the environment. These groups seek adjustments within agricultural institutions that will enable agriculture to maintain renewable resources at the current level; avoid wastes beyond the environment's assimilative capacity, and avoid the use of non-renewable resources while maintaining production efficiency and capacity to ensure a future standard of living at least as high as the current level."[27]

While the agricultural economist Dicks lent credence to many of the original tenets of the new farming, he represented a strain of thought that is discernibly different than the ecological manifestos which spawned sustainable ecological agriculture. Dennis R. Keeney, Director of Iowa State University's Leopold Center for Sustainable Agriculture (created in 1987), represents an institution which epitomizes the establishment co-option of sustainable agriculture in lashing out against "vague" versions of sustainability, looking instead for "The relevant concepts and terms in a manner conducive to progress in

research outreach and farm practice . . . . that can be tested scientifically and transferred to farmers." Keeney and others at the Leopold Center and like-minded institutions, naturally viewed themselves and farmers on the whole as environmentalists working for practical solutions to the problems of agriculture. Though committed to enhancing stewardship and creating a better quality environment, and while offering tributes to the icons and ideas of the movement's founding ideology, (such as continual reference to the work of Aldo Leopold and Wendell Berry), in fact, the ecological, holistic, reformist conception of sustainable ecological agriculture is somewhat of an anathema to the establishment practitioners of "sustainable agriculture," with their hardened focus on relatively short term steps to sustainability that center on the old, unchallenged devotion to "bottom line profitability." [28]

Though some involved in the debate over re-defining sustainable agriculture noted that the infiltration of the sustainablity idea into the establishment signified the successful adoption of new ideas into the research and policy establishment, others were less sanguine regarding the co-option of sustainable agriculture. William Lockeretz noted in 1988 the "some people interested in sustainable agriculture--both within mainstream institutions and on the outside--do not view with undiluted optimism the changes that have already occurred in mainstream research, teaching, and extension. For some, the established research institutions are under some very powerful constraints, especially the constraints imposed by disciplinary boundaries and by researchers' need to publish frequently. The latter in turn may discourage long-term projects such as studies covering several cycles of a many-year rotation." Furthermore, Lockeretz noted that critics of the establishment co-option of the new farming "argued that such institutions not only have failed to grasp the spirit of sustainable agriculture, but do not even want to. The flurry of recent programs is said to be merely a way to appear to be responding to outside pressures, and perhaps also to blunt the full thrust of the movement. In this view,

advancing the cause of sustainable agriculture means challenging some far-reaching economic, social or political constraints, a challenge that mainstream agricultural institutions are unlikely to make."[29]

Lockeretz and others correctly suggested that the establishment co-option of the terminology and some of the ideas of sustainable ecological agriculture allowed the establishment to choose the "least-threatening" version of ecological agriculture, and to "sanitize it further to make it bureaucratically acceptable, and appropriate it on their own." With the concepts of ecological holism and social and institutional reform passed over via the co-option process, establishment critics feared the term sustainable agriculture would "degenerate into just another bureaucratized buzz word used to show that something new and exciting is going on; even though nothing really changed."[30]

The most important and obvious tool used by the mainstream agricultural establishment in the co-option of sustainable agriculture came with the no-till/minimum tillage revolution on American farms in the 1970s and 1980s. The idea of reducing tillage and leaving a surface mulch, particularly eliminating fall plowing and the use of the deep-plowing moldboard, was an idea that had been suggested and employed in a small degree since the 1930s and 1940s, especially in response to Edward Faulkner's Plowman's Folly, published in 1943. In the 1970s, concern over high energy costs and topsoil erosion led to a renewed emphasis on no-till and minimum tillage research, techniques, and equipment, especially within the land grant complex.

Like the Faulkner system from the 1940s, the no-till/minimum tillage systems in the 1970s and 1980s used disc plows, chisel plows, and mulching equipment to "chop up" crop and weed residues for spring planting. By using little or no tillage, the surface residue would hold soil, water and nutrients, and add organic material to the soil, while requiring less energy for seed bed preparation. New equipment such as grain drills, complex coulter and press wheel mechanisms, and hydraulic planters, allowed farmers in the 1970s and

1980s to "blast" or "blow" their seed into the ground through the surface rubbish. Also, unlike Faulkner's system and that of subsequent organic farmers, which envisioned minimum tillage as one part of a comprehensive, chemical-free ecological agriculture, the no-till/minimum tillage revolution of the 1970s and 1980s was severely dependent on chemical treatments for pre-planting "burndowns" and pre-harvest weed, bug, and disease control. While no-till and minimum tillage systems held the soil better than terraces, and were in some cases part of multi-crop, biological pest control schemes, the no-till/minimum tillage revolution was not sustainable, ecological agriculture by any means, despite the protestations of many land-grant scientists and agricultural chemical manufacturers.[31]

While land-grant researchers, farmers, and agricultural chemical and implement dealers could note that no-till/minimum tillage saved fuel and labor costs, and substantially reduced soil erosion, "conservation tillage" as no-till/minimum tillage is sometimes called, required heavy doses of agricultural chemicals, it increased ground water pollution in most instances, and was single-focus in the sense that it sought not to question the efficacy of monoculture and standard production agriculture. Furthermore, no researchers seemed to know the effect of reduced tillage on the size of farms. Despite the praise given to the "No-till Tigers" that used their products, the agricultural chemical companies had great difficulty convincing the public and farmers that they were the great environmental stewards as suggested by their corporate propaganda. As farmers on millions of acres across the United States switched to minimum tillage and no-till farming in the 1980s, the agricultural establishment assured them nonetheless, that by reducing tillage and using re-engineered environmentally "friendly" chemical products, they were indeed practicing sustainable agriculture.[32]

That corporate America would adopt an environmental ideal for the purposes of self-justification and maintaining sales is not a novel discovery. As many participants in the

first Earth Day in 1970 noted, the whole affair seemed to symbolize corporate America's neophyte affiliation with environmentalism. As the co-option and dilution of sustainable, ecological agriculture proceeded in the 1980s and early 1990s, agricultural equipment and chemical manufactures spent great amounts of money to convince farmers and the public that they were working diligently for a safe and permanently productive food and agriculture system.[33]

Agricultural equipment manufacturers such as Deere and Company actively linked their equipment and corporate image, merging support for reduced tillage, organic farming, soil conservation, and sustainable agriculture as happily interchangeable ideas. In Deere's mouthpiece publication The Furrow, a writer glowingly reported on the developing relationship between the staunch ecological agriculturists and the establishment research complex. In the opposing page Deere advertised their line of "Land Preserver" equipment, including the Mulch Tiller, the Mulch Finisher, and the 7000 Conservation Planter. Another advertisement suggested farmers could drastically increase the amount of acres they farmed under "conservation tillage." Among the successful "alternative" farmers highlighted in The Furrow were one Reichers family, who were "Diversifying but staying with chemicals." Deere's attempt to capture the reduced tillage market and promote their view of sustainable agriculture were mirrored by others in the industry, such as DMI, Inc. of Goodfield, Illinois. DMI produced "knifing" fertilizer applicators designed to "knife nutrients down into the seed zone," cutting through surface rubbish and allegedly lessening ground water pollution. DMI also marketed a tillage tool called the "DMI Ecolo-Tiger Yield Till Tool" featuring "Quad/Spring parabolic shank assemblies that have patented winged Q/P Tiger-Points for an open, mellower and healthier soil."[34]

The attempt by equipment manufactures to cash-in on the co-option of sustainable, ecological agriculture pales before the effort of the chemical industry to assert itself as the paragon of environmental virtue while continuing to draw vast profits from sales of their

products to America's farmers. In a rather revealing series of testimonies, leaders from the nation's top agricultural chemical manufacturers talked of their vision of sustainable agriculture in the January-February 1990 issue of the Journal of Soil and Water Conservation. Samuel J. Barrick, a public relations representative from Dow Chemical U.S.A., characterized his industry's definition of sustainable agriculture when he said "We believe sustainable agriculture is a management system that maintains and enhances the ability of U.S. agriculture to meet environmental needs now and in the future." Barrick continued, stating "It is also a farming system that uses inputs--both those available as natural resources and those purchased--in the most efficient manner possible to obtain productivity and profitability from farming while minimizing adverse effects to the environment."[35]

In 1991 Wallaces' Farmer, one of the nation's most respected farm magazines, quoted Mobay Corporation scientists Leroy Cobia as saying "Industry and university weed control specialists are listening to what farmers and the general public want. We're working to help farmers improve yields by controlling weeds as well as protecting the environment." The magazine also reported on the recent formation of the Alliance for a Clean Rural Environment (ACRE), an "independent organization which collects and dispenses information to help farmers use chemicals safely" funded by Dow, Mobay, Ciba-Giegy, Du Pont, and other chemical combines.[36]

Chemical manufacturers and their supporters in the agricultural establishment co-opted the sustainable agriculture ideal in a number of other ways. Some examples: the Iowa Fertilizer and Chemical Association and Iowa State University sponsored a "Farm Agricultural Resources Management" conference at Ames, Iowa, in March, 1992. Devoted to "Concerning Iowa's Soil: Our Natural Heritage," the conference held sessions and displays on tillage practices, equipment needs, weed, insect and disease control, and other traditional non-ecological farmer concerns. Other examples: Chemical giant Du Pont

started a campaign in the early 1991 to recycle herbicide containers, and the Iowa Fertilizer and Chemical Association followed Du Pont's lead with the onset of their own container recycling campaign later that year. DowElanco sponsored a 1990 television special aired on 118 stations intended to highlight for urbanites "how farmers, the agricultural chemical industry, university researchers, and government regulators are working together to eliminate potential water problems from developing." DowElanco spokespersons suggested that "You see alot about environmental problems on the television news, but much less about what's being done to prevent potential problems from developing." The chemical industry also funded the creation of "Foodwatch" in 1990, a non-profit organization dedicated to "Safe, Abundant Food For All." The Chemical Manufacturer's Association also sponsored a booklet for Earth Day 1990, entitled "Earth Day Idea Bank," and other "informational" materials suggesting how the chemical industry supported agricultural sustainabilty and environmental responsibility.[37]

Agribusiness co-option of the sustainable agriculture reached an art form in the print, radio and television advertisements for agricultural chemicals in the first half of the 1990s. One advertisement appearing in Wallaces" Farmer in 1991 pictured a grizzled farmer's finger being grasped by an infant's hand. The accompanying passage read "From one generation to the next farmers have taken care of the land to preserve their unique way of life. And for more than 30 years, CIBA GEIGY has been there with them providing products that farmers need to produce the best crops possible." Another advertisement for a FS Crop Specialist displayed a small boy at on old fashioned pump at sunset, with heads sprouting above the horizon line. Its caption read in part "The image of the family farm has changed dramatically in recent years. But its heart hasn't. Take your input management, for example. Your FS Crop Specialist knows that simply prescribing the right fertilizers, herbicides and insecticides isn't good enough. That's why he uses the Green Plan to develop a careful balance between Mother Nature and your bottom line

profits. Why are we so concerned about he world in which you farm? Because we realize that if agriculture is to remain a viable profession for all of us, we must become better stewards of the land today to preserve the land for tomorrow."[38]

Anyone who watched television in a farm state or has perused agricultural journals in recent years has at one time or another had to notice the deluge of images such as farmers holding children while over viewing the "bounty of the land," wildlife bounding through farm fields, farm youth splashing through the clear streams or the pond, as chemical firms tried to tell Americans that their industry were at the vanguard of agricultural environmentalism. Biotechnology and seed firms, often owned by the chemical giants, also ensured the public that they were developing herbicide-resistant crops "which will be a lot safer for both the person applying the herbicide and for the environment." The engineering of less toxic chemicals also fit into the chemical industry's vision of sustainable agriculture, such as herbicides that quickly degrade or that bonded to the soil to prevent leaching into ground water supplies.[39]

By the mid-1990s, the establishment co-option of sustainable agriculture appeared to have backfired in some areas. For example, various farm commodity groups in Iowa and elsewhere complained in 1994 of the excessive environmental messages from the onslaught of chemical company advertising. The Iowa Corn Growers and other farm groups thought the ads depicted farmers as ruthless users of chemicals, thus defeating the intended purpose of the advertisements, while at the same time inflating advertising budgets that transferred to higher costs for farmers. Furthermore, in the late summer of 1994, several fields that had received an application of DowElanco's "Broadstrike," one of the new environmentally "friendly" chemicals, produced only 1/5 of the plants per acre than is standard for an Iowa corn "jungle."[40]

While many supporters of the original holistic, reformist conception of sustainable ecological agriculture often expressed chagrin at the dilution of the original imperatives,

models, and methods of the new farming, many also took the co-option of their ideals as a sign of success, and as a recognition of their own need to cooperate with the less than monolithic establishment. Farmers, scientists, and agribusiness representatives, though not flaming environmentalists, were generally supportive of the need to infuse agriculture with the scientific and ethical lessons provided by ecological thought, as long as these insights supported their native sense of stewardship and experience in the world of production agriculture. Furthermore, as Donald Worster commented, "knowledge offered by ecologists is deceptive in one vital respect: It does not afford a general or comprehensive measure of what it means to be successful or unsuccessful in agriculture." For Worster, an historian and staunch advocate of sustainable agriculture, the American farmer was often "trapped by his own past," and the field of ecology remained difficult to apply in a practical ways. Worster enjoined "both science and agriculture" to look beyond any narrow definitions and quick judgments, and to seek answers "from ethics and philosophy, from politics and social discourse, from the community at large trying to discover a new relationship to nature."[41]

Whether or not sustainable agriculture remains true to its original ecological, reform-tinged ideology, or follows the path proscribed for it by the production-oriented agricultural establishment, is an issue yet to be decided. Most likely, a hybrid, or many hybrids, of sustainable ecological agriculture will develop over the years. One fact is certain, sustainable ecological agriculture has dramatically altered the theory, practice and policy of American agriculture in recent times.

Change

When this project was in it genesis, I talked with a friend from the undergraduate years who farms a substantial acreage of irrigated land in the "big farming" and ranching

country of Western Kansas. I was wary to even suggest to him my budding interest in sustainable agriculture, for fear he would identify me with the "environmentalists" he complained about at length in an earlier portion of our conversation. Recently I spoke with this young farmer again, listening with interest as he described the return of large numbers of wildlife to his land due to his enrollment in the Conservation Reserve Program (CRP), a land retirement program of the federal government that started in 1985 Food Security Act (FSA). He also spoke of his wide usage of no-till agriculture (with chemicals), and his attempt to branch into alternative crops such as growing chemical-free sunflowers for a major retail chain. Though his operation was traditional in many ways, (such as the overarching connection to "the banker"), my friend's case is an example of how one American farmer attempted to find practical ways to survive economically and attempt to improve the chances of agricultural sustainablity, even while facing the complex world of modern food production and farm politics.[42]

Ecological ideas, particularly as expressed in the many visions of sustainable ecological agriculture, drastically altered the theory of how agriculture was modeled and how agricultural research was pursued in the 1960s through the present day. Furthermore, the sustainable agriculture movement altered the practice of American farmers as well as the conduct and focus of governmental agricultural policy. As has been the case throughout the twentieth-century, the connection of ecology and agriculture has fueled the greater overall development of an environmental ethic in the United States.

As sustainable, ecological agriculture emerged as a major force, and the influence of the new farming altered the way mainstream agricultural observers, theorists, researchers, farmers, and non-farm consumers envisioned how agriculture should best function in America. Lauren Soth, writing in 1989 in the nation's leading farm state newspaper, the Des Moines Register, told his readers that "The current evolution towards something called sustainable agriculture [is] a reversal of exploitative practices. In

America, this movement began outside the governmental apparatus of farm science and education. Farmers themselves and public crusaders for environmental protection are the movement's leaders." Orville Bidwell, another long time agricultural observer and soil scientist presaged Soth with a proclamation of a "New Age" of sustainable agriculture in 1986, which he thought "involves farming in the image of Nature and [is] predicated on the spiritual and practical notions and ethical dimensions of responsible stewardship and sustainable production of wholesome food." Ralph Grossi, of American Farmland Trust, echoed the above sentiments in 1993, writing of the "Green Evolution" in agriculture, which he described as a gradual shift "toward principles of resource stewardship and marketplace economics, which we must recognize are not mutually exclusive goals!"[43]

Emerging from its roots in agriculture, the generalized concept of "sustainability" eventually earned a connotation equivalent to apple pie, and the cause of ecological farming and societal sustainability came to enjoy international support by the early 1990s. Nathaniel Adams, editor of the Smithsonian magazine, spoke to the vigor of the sustainable ideal in 1993, noting "The term 'sustainability,' which once meant little more than an ill-defined index of generalized worry about increasing environmental strains, has now begun to take on more concrete meaning. As a vital first step, a wide gamut of studies is under way on how to expand traditional national-income accounting in order to include measure of non-renewable resource consumption and other forms of adverse environmental impact." Clinton Administration Interior Secretary Bruce Babbitt also shows the influence of sustainable ecological values in his pursuit of funding for the National Biological Survey, and his promise to practice "ecosystem management" on federal land.[44]

Though the agricultural research establishment co-opted many of the ideals of sustainable ecological agriculture, that same research establishment also changed its collective vision of agriculture in what could be termed an "ecological reappraisal" of its

central beliefs and values. Distinguished political scientist Don Hadwiger addressed changes in the agricultural research establishment in 1982, noting that the establishment was once "privileged to determine U.S. agricultural policy in all its aspects . . . . envied for its size, its aggressive leadership, its effective use of 'down home' imagery, and its successes both in economic productivity and political influence." Hadwiger noted that in an increasingly urban society, farm policy was going to be shaped, in part, by consumer interests and a tightening of federal subsidies for agriculture as well as environmental interests. Establishment researchers, many of whom were naturally idealistic, were quite responsive to the ecological and cultural critique regarding their guidance of postwar agriculture. As Hadwiger noted, the establishment was not a faceless entity, but staffed with intelligent persons who could not help but to recognize "out in the country enormous farm implements parked alongside decaying barns" and decayed farmtown mainstreets, the products of labor-saving technology and big-business farming.[45]

In America, a complex of researchers, writers, policy makers, bureaucrats and farmers all shape the definition of American agriculture. Due to the challenge presented by sustainable, ecological agriculture and the general values that movement represented, major changes in the future direction of agriculture became apparent in the early 1990s. Questioning such traditional agricultural tenets as "the possibility of scientific mastery" and abandoning the monocultural "commodity form," a new breed of researchers has emerged throughout the agricultural establishment devoted to "Acknowledging the authority of other voices," and devoted to working for a smaller-scale, decentralized, ecological diverse and economically sustainable agriculture. Arguably, a new establishment view is slowing taking hold in the agricultural research nexus, dedicated to the construction of a system of family and small-group oriented farms "closely linked with nearby rural communities, supporting the economic, educational, and cultural vitality within those communities." In this view, food distribution networks and food processing

industries "would be closely connected to nearby food production so that consumers in local communities would benefit from the freshest, locally produced foods in season" and "Food producing resources--land, water, technologies, marketing, processing, and distribution networks . . . much more democratically controlled and equitably distributed among many individuals." In the least, researchers throughout the traditional agricultural establishment have increasingly favored many of the agronomic aspects new farming and the sustainable ideal.[46]

Sustainable, ecological agriculture not only reshaped the theory of American food and fiber production, the new farming movement contributed to important changes in the practice of agriculture in recent years. Farmers seemed to rise above academic and industry debates over the meaning of sustainable agriculture, agreeing that it implied "a system that can function perpetually." As sustainable, ecological agriculture rose from its fledgling status, farmers across the land adopted various measures and methods designed to help them remain economically viable for the long term. At the same time, farmers could cite their attempts to preserve, as best as possible, what they and their society viewed as the environmental health of the land, water, air and, to an extent, the rural community. Thus, while the world was not full of Dick Thompsons, Wes Jacksons, and New Alchemists, environmentalists and production agriculturists could agree that, by the mid-1990s, farming changes resulting from the quest for sustainable, ecological agriculture had worked toward the betterment of the soil resource and the future of society.[47]

In a very apparent cultural shift, farmers have either become or remained environmental stewards due to economic and political incentives, and a genuine mood that seems to welcome technical information, environmental responsibility (including respect for non-human, non-livestock animal life), as well as a devotion to redeveloping rural life and culture via farm and industrial diversification and thinking "beyond the bottom line." One Iowa farmer in his mid-40s illustrated the realities of 1990s agriculture when he noted

"I listened to Earl Butz, who said we should grow more food so that we could feed the world and we would never have to worry about prices again. It seems like that's all I've worried about since I got into farming." Another farmer of roughly the same age, who had embraced sustainable agriculture, was more upbeat, saying that same year that "We're not out here chewing granola bars or anything, but it's amazing what happens when you let nature do what she wants." [48]

Within the last fifteen years, due to environmental and economical impulses, hundreds of thousands of farmers in America have of practiced some of the methods or ideas first enunciated by the adherents of sustainable, ecological agriculture. Though fewer than 100,000 farmers practiced anything near the holistic, organic-type farming as originally conceived by founders, their model is increasingly studied, and more mainstream farmers have borrowed many ideas from ecological agriculture as well, thus expanding their conception of stewardship beyond the mere building of terraces and watersheds. More and more farmers are attempting to use fewer chemicals, and to employ more biological pest and disease controls, more crop rotations, more cover and alternative crops, and reducing their tillage. In fact, one of the original tenets of ecological agriculture, the abandonment of the moldboard plow, had nearly been accomplished by the mid-1990s. Also by the mid-1990s, many farmers, if not a slight majority, were beginning to warm to the idea of making America "a green and permanent land."[49]

The influence of sustainable ecological agriculture changed the policy as well as the theory and practice of agriculture. Though the myriad agriculturally-related environmental regulations, laws, and political debates could fill volumes, a few general trends and laws illustrate how the policy process has co-evolved with the rise of sustainable agriculture. The federal farm apparatus grudgingly changed its response to environmental concerns and sustainable agriculture, eventually jumping on the sustainability bandwagon. A first response to the sustainable agriculture impulse within the

federal agricultural establishment came with the creation of the USDA's Science and Education Service (SEA) in 1977. Though short-lived, the SEA did attempt to blend the concerns of environmentalists with the agricultural research establishment, in part, by sponsoring research on integrated pest management. Also in 1977, former Wilderness Society lobbyist Rupert Cutler was appointed to the influential post of Assistant Secretary of Agriculture for Conservation, Research and Education at the USDA. Upon his appointment Cutler confirmed that he shared Secretary of Agriculture Bob Bergland's determination to change the image of the USDA from that of the servant of agribusiness to the servant of all the people, rural and urban, rich and poor, black and white . . . we will show a sensitivity and concern for the quality of life, in terms of protecting environmental values."[50]

Impressed by some of organic farm operations in Minnesota, and a flurry of requests about organic farming, Jimmy Carter's Secretary of Agriculture, farmer Bob Bergland, commissioned a USDA study on organic farming in 1979. The study's summary, entitled "Report and Recommendations on Organic Farming," (1980), concluded that chemical free organic farming was "being successfully practiced by a small minority of farmers across the nation and that these farmers are environmentally sound, energy conserving, productive, stables, and tended toward long-term sustainability." One result of the report was to appoint one of it s writers, Garth Youngberg, as organic farming coordinator at the USDA. The USDA report favoring a form of sustainable ecological agriculture received support a decade later in the findings of the National Research Council's favorable appraisal of alternative agriculture. In 1977, partially influenced by environmental concerns--erosion and the loss of prime farmland to non-farm uses--the Carter Administration also commissioned the National Agricultural Lands Study (NALS). During the late 1970s and early 1980s states such as Maine and California recognized organic farming in various laws and statutes, and several environmental and activist

groups, from the Izzaak Walton League to Farm-Aid, also formed political support groups for sustainable agriculture.[51]

Around 1980, the political climate seemed to favor acceptance of sustainable agriculture within the agricultural policy establishment. But incoming (under President Reagan in 1981) Secretary of Agriculture John Block, himself a heavy user of farm chemicals on his patch of Illinois earth, worked against USDA support for ecological agriculture, eventually demoting, then firing Garth Youngberg, while virtually ignoring legislation mandating research on organic farming. To the right of Block stood Interior Secretary James Watt, the notorious anti-environmentalist, who chaffed at Block's support for increased soil conservation spending and would later become a vociferous opponent of sustainable agriculture. Yet it was the soil erosion panic of the late 1970s and early 1980s, as well as the huge federal outlays for subsidizing surplus crop production, that rescued federal support for sustainable agriculture in the 1980s.[52]

Public reaction to the Reagan Administration's anti-environmentalism, the appeal of sustainable agriculture to an economically besieged farm population, along with the rising threat of soil erosion and costly surpluses, led to a spate of agricultural-environmental legislation between 1985 and 1990. The monumental Food Security Act (FSA) of 1985 included a massive short-term and long-term acreage reduction program, a "Sodbuster" provision halting the plow-up of erosion prone unused land, a "Swampbuster" compliance designed to protect sensitive ecological area from the plow, and a "conservation compliance" requiring farmers to put in place a conservation plan on highly erosion prone ground or lose their eligibility for federal commodity programs. The 1985 legislation also provided for USDA support for sustainable agriculture research and education, and the USDA even appointed an organic farming researcher to the Rodale Center, once the most vocal enemy of the agricultural establishment. In addition, the FSA funded and sponsored the Appropriate Technology Transfer for Rural Areas (ATTRA)

project to spread sustainable ideas into the countryside, and the Low Input Sustainable Agriculture Program (LISA), beginning in 1987. LISA, later called the Sustainable Agriculture Research and Education Program (SAREP), made sustainable agriculture a household word on the farm, and funded numerous research, demonstration, and educational projects involved in sustainable agriculture.[53]

As a follow-up to the FSA, in 1990 Congress passed the Food, Agriculture, Conservation and Trade Act (FACTA), a piece of legislation that in many ways legitimizes over six decades of work for agricultural conservation and ecological agriculture while also portending to the future of agricultural policy. FACTA offered incentives for farmers to adopt an "Integrated Farm Management Program" to promote 3-5 year small grain and legume crop rotations, and expanded the Conservation Reserve Program (already designated to include 45 million acres of land) to include marginal pasture land, shelter belts, windbreaks, grass waterways, and contour strips in producing fields.

The legislation also included water quality incentives up of to 3,500 dollars per year per farmer, a requirement for strict on-farm pesticides records, and it established a tough set of standards defining organic produce, while lessening cosmetic standards for fruits and vegetables as a concession to organic growers. Among its numerous provisions, FACTA also attempted to increase SCS enforcement of conservation requirements by allowing SCS officials a more flexible penal response to non-compliant farmers, as opposed to the FSA "sudden death" punishment. FACTA also stipulated that eighty million dollars be directed towards research and extension in sustainable agriculture, and proved for the establishment of the Wetlands Reserve Program (WRP), designed to restore ecologically vital wetlands across rural America. Furthermore, FACTA provided for reforestation, conservation assistance for developing nations ("debt for nature" program), and a Integrated Pest Management Program Option (IFMPO) to encourage the planting of legumes and grass crops on CRP acreage while allowing farmers to graze 50

percent of their set-aside acres as well as income support to assist the transition to a new cropping system.

Though many farmers, researchers and agribusiness representatives and policy makers resisted the environmental provisions of the 1990 farm bill, as well as the general movement for sustainable agriculture, the FSA and FACTA still represented a culmination of years of effort to reform American agriculture along environmental lines. While legislation is difficult to implement, and even harder to fund, advocates of sustainable, ecological agriculture could take heart in realizing that many of their long-cherished ideas had now gained formal recognition, albeit in forms that were sometimes difficult to recognize as sustainable agriculture. The agricultural-environmental legislation of recent years has helped reduce soil erosion substantially, decreased water pollution, protected prime farmland and ecologically sensitive areas, provided an income to farmers, and has helped legitimize sustainable agriculture as the "prime directive" in America's agricultural future.[54]

Lingering Concerns

Sustainable ecological agricultural has not yet triumphed over the long tradition of short-sightedness, conservatism, and ecological degradation so endemic to an otherwise productive American farm and food system. Many barriers still block the path towards a truly "durable" agriculture. As the sense of crisis prevalent in the 1970s and early 1980s slips from the collective memory, the sense of urgency originally aiding introduction of the new farming has also passed away. Many farmers still resistant the ideas of ecological agriculture and continue to farm poorly, in the ecological sense, while others have had technical (finding the right equipment, crops, and management plan) and financial problems (surviving the transition period) when attempting to adopt an organic regime.

Lingering pollution problems still plague agriculture and by association the entire nation, (such as the rise of large confinement livestock feeding operations), prime farmland continues to be devoured by the "sluburban" sprawl, soil erosion is still above acceptable rates on some of the nation's best land, and biotechnology threatens to create unforeseen environmental problems and lead to even greater genetic vulnerability in our crops. Furthermore, the concept of "sustainability" became more of a code term for "development" rather than an ecological strategy for survival.[55]

Farmers and researchers also have many political, social, and economic obstacles on the path to sustainability. The contentious and oft-shifting winds of agricultural policy keep farmers guessing on many issues, such as what they will do when CRP contracts on erosion-susceptible land end after the ten year program expires, and as to what federal help they will receive with an uncertain role ahead for the USDA and agricultural subsidies in the Age of Diminished Budgets and GOP ascendancy. Farmers and environmentalists scoff at the lack of compliance and enforcement of rules related to FSA and FACTA, and the loopholes created by farmers and corporations to skirt environmental provisions, such as those specified in the "Swampbuster" directive. Furthermore, America is apparently going to experience the loss of hundreds of thousands of more smaller-scale "family" farmers in the very near future, a cultural and technical loss compounded by the fact that the average American farmer is over age 60. The decline of people pursuing agriculture as a profession and lifestyle illustrates the concern expressed by many environmentalists and farm activists that agriculture and food production is increasingly controlled by corporate farms and contract farming. With the loss of independence and variety of options for farm and rural people, and with the general public unaware and unconcerned with rural issues, so goes the argument, a further loss occurs in the form of declining stewardship and the dissipation of local culture.[56]

While many of the issues of modern agriculture seem complex, and the problems difficult to solve given the current cultural atmosphere that impinges on planning and true cultural change, ecological agriculture, in its "permanent" and "sustainable forms," has provided a beacon for individuals concerned for creating a future based on true prosperity. Ecological agriculture sought to make a future abounding in concern and action for the long-term ecological health of the planet, as well as an immediate and enduring effort for human health, happiness, and progress. For six decades the new farming movement lent to Americans a growing awareness of ecological values, and a sense of generational responsibility. Though numerous and often forgotten, the champions of ecological agriculture sought to make a better world for people, animals, and plants. Despite stunning gains, the cause of ecological agriculture is far from won. Indeed, as a viable ideology, its future seems limited, as we live, in the words of Secretary of Labor Robert Reich, in "A society divided between haves and have-nots . . . between the well-educated and the poorly educated," infertile ground for the growth of a "prosperous or stable society."[57]

Notes

1. Author's personal observation.

2. "Big Promoter is Farm Boss at Boy's Town," Omaha World-Herald 12 November 1971, 13.

3. Wendell Berry, The Unsettling of America: Culture and Agriculture (San Francisco: Sierra Club, 1977). Berry, though considered a radical to conservatives preaching sustainable agriculture, and a "puritan" to those on the left of the issue, is still cited by nearly everyone purporting themselves as advocates of sustainable agriculture. His books are mentioned in nearly every philosophical treatment of sustainable agriculture,

and his notoriety as an essayist and poet helped draw a national spotlight on sustainable agriculture.

4. Evan Eisenberg, "Back to Eden," Atlantic Monthly, November 1989, 57-74.

5. Ibid., 65; For more on Wes Jackson as a communicator of sustainable ecological agriculture see Brian Button, "Speaker: Follow Nature's Example," Iowa State University Daily, 26 March 26, 1992, 1, 3; Karen Uhlenruth, "Roots of A Revolution," Kansas City Star, 27 June 1992, E1, E6-E7; Douglas Hand, "Breadbasket Ecology," American Health 8 (September 1989): 66-68; Barbara Joseph, "Ceremony Marks Plowing of Prairie," Topeka Capital Journal, 22 November 1992, 1H; information on Wes Jackson was also garnered from material provided by the Land Institute, and through general observations from reading various copies of the Land Institute newsletter and the Land Report.

6. R. Neil Sampson, Farmland or Wasteland: A Time to Choose (Emmaus: Rodale, 1981), 5-10.

7. R. Neil Sampson, Farmland or Wasteland, 12-13; for an overview of farm issues, soil conservation, and the rise of sustainable agriculture see the collection of stories by long-time Des Moines Register farm writer Lauren Soth, The Farm Policy Game Play by Play (Ames: Iowa State University Press, 1989); see also Don Muhm, "In Celebration of Soil Conservation," Des Moines Register, 20 September 1984, 1T.

8. Lauren Soth, "For Energy, Topsoil Crises, Rotation May Be the Answer," Des Moines Register, 3 April 1979: no p.n.; Robert Steffen, Statement to Secretary of Agriculture Bob Bergland, 4 December 1979, box 1, file 4, Steffen Papers; Jim Head, "Futuristic Farm Looks at Tomorrow's Farming," Wallace's Farmer 6 June 1979, 10; during the late 1970s a number of institutions sought to help solve the energy crisis on the farm. For example, at Colby Community College in Colby, Kansas, ca. 1977, the school started an ethanol production program replete with an experimental production facility.

The program was disbanded by the early 1980s, sacrificed in part by lower oil prices and the Reagan Administrations gutting of alternative energy funding.

9. Mike Williams, "Back to Basics: Sustainable Agriculture Both Praised and Questioned," Iowa Farmer Today, 12 August 1988, 14A; Lauren Soth, "Just How Bad Is It on the Farm?," Des Moines Register, 3 February 1986, no p.n.; "Soil Erosion and the Iowa Soil 2000 Program," (Ames: ISU Cooperative Extension Service, PM-1056, July 1982): 1-8; Marty Strange, Family Farming: A New Economic Vision (Lincoln: University of Nebraska Press, 1986), 13-30.

10. Jerry Perkins, "Practical Farmers Looking For Ways to Grow," Des Moines Register, 8 February 1987, 1A, 2F; Practical Farmers of Iowa, Newsletter, Spring 1989, 1-6; Mike Williams, "Innovation: Keeps Farm in Spotlight," and "Sustainable Agriculture Attracts International Attention," Iowa Farmer Today, 13 August 1988, 1A; 15A; "PFI Farm Tours," Des Moines Register, 7 August 1994, 3G; Nancy Kimball, "Personal Goals Steer Farmers Sustainable Efforts," Iowa Farmer Today, 13 August 13 1988, 14A; Finn Bullers, "The New Farm: Manure, Common Sense," Ames Daily Tribune, 4 April 1987, A1, A7; Jerry Perkins, "Activism Takes Iowa Woman to Top of Farm Group," Des Moines Register, 6 March 1994, 1J.

11. Examples of the communication of sustainable ecological agriculture via Wes Jackson and the Land Institute are found in various Land newsletters, publications, fund raising letters, the Land Report, and other materials in the author's possession. See also brochure Prairie Festival 1994: The Pattern Which Connects (Salina: Land Institute, 1994); see also, entire issue of The Land Report No. 46 (Spring 1993).

12. Evidence on the New Alchemy Institute's role in communicating the ideals and goals of sustainable ecological agriculture is located in box 1, files 2-12, Green Center

(New Alchemy Instititute), Archives of American Agriculture, Parks Memorial Library, Iowa State University.

13. "Interest in Sustainable Ag Rising as Requests for Technical Information Balloon," ATTRAnews, May 1991, 2; Kerr Center for Sustainable Agriculture, "Newsletter," May/June 1993, 1-8; Andrew Ware, "Louis Bromfield Sustainable Ag Library Launched," Sustainable Agriculture News, Spring 1992, 1; "Leopold Center Educational Programs," New Release, (September 1992); Raymond P. Poincelot, "From the Editor," Journal of Sustainable Agriculture 1 (1990): 1-3; Iowa Division-United Nations Association, Beyond Rio: Earth Charter Iowa (Iowa City: Iowa Division-United Nations Association, 1993): 1-12; Lynn Betts, "Better Land, Better Water," Wallaces' Farmer, February 26, 1991, 6, 8; "Lines on the Land," Wallaces' Farmer, October 1991, 35.

14. On the emotional, quasi-spiritual aspect of sustainable agriculture see Mike Gangwer, "Sustainablility and American Agriculture," Pacific Northwest Sustainable Agriculture 4 (December 1992): 7; See also Geoffrey R. Lilburne, "Theology and Land Use," Vital Speeches 53 (December 15, 1986): 139-141; Jay P. Wagner, "Monks Making Changes on the Farm," Des Moines Register, 10 July 1994, 1J; Pope John Paul, in his 1979 visit to Des Moines, Iowa, also called rural Americans to a new stewarship ethic. Evidence on the Papal visit and its tie to the agricultural environmentalism is located in unprocessed boxes in the William Murray Papers, University Archives, Iowa State University.

15. Wheeler McMillen, Bugs or People (New York: Appleton-Century, 1965), ix-103.

16. Jamie L. Whitten, That We May Live (Princeton NJ; D. Van Nostrand, 1966), 208-216.

17. Donald Hornig to Joseph Califano, Memo, 28 February 1968, White House Central Files SP2-3/1968/NR, box 129, LBJ Library.

18. Diedre Cox, "Borlaug: Rights Must Take Back Seat to Needs," Iowa State University Daily, 10 February 1978, 1, 9; William Inman, "Nobel Winner Raps Anti-Pesticide Movement," Ames Daily Tribune, 29 June 1985, C7; Norman Borlaug, "The Green Revolution: Can We Make it Meet Expectations," Proceedings of the American Phytopathological Society: Symposium on World Food 1 (1977): 6-8.

19. Lauren Soth, "Soil Erosion: Getting Better or Worse," Des Moines Register, 26 September 1983, no p.n.; Lauren Soth, "Hiding Soil Losses Under Increased Productivity," Des Moines Register, 10 January 1983, 1J.

20. Lauren Soth, "Hiding Soil Losses Under Increased Productivity," Des Moines Register, 10 January 1983, 1J; Theodore W. Schultz, "A Dissenting Opinion on Soil Erosion," Des Moines Register, 20 June 1982, 1C; "Economist Says Erosion Fears Exaggerated," Des Moines Register, 18 March 1982, 5B; Julian Simon and Herman Kahn, The Resourceful Earth: A Response to Global 2000 (New York: Basil Blackwell, 1984), 1-27, 39-45, 200-219.

21. James Risser, "As Costs Soar, More Farmers Going 'Organic'," Des Moines Register, 10 June 1984, 1A, 9A.

22. Council for Agricultural Science and Technology, "*Alternative Agriculture* Scientists' Review," Cast Special Publication No. 16 (Ames: CAST, July 1990), vii-3, 84-85.

23. Lauren Soth, "Case for Sustainable Agriculture," Des Moines Register, 5 May 1989, 10A; Council for Agricultural Science and Technology, "Long-Term Viability of U.S. Agriculture," CAST Report No. 114 (June 1988), 1-7; Another telling example of the resistance to sustainable agriculture was the dismissal of Robert Steffen as farm

director at Boys Town, due to his continuing advocacy of organic farming techniques. See Dave Sink, "Boys Town Ends Organic Farming," Omaha Sun, 13 October 1977, 1.

24. CAST, "*Alternative Agriculture* Scientists' Review," 131-137; establishment agriculture's resistance to the new farming has been a pet project of agricultural economists. For example, at a session at a historical conference in 1994, the author witnessed a presentation by an ag economist whose paper was on the social effects of mechanizing the cotton harvest. In his introduction, the presenter mentioned that his research emanated from his interest in sustainable agriculture. After showing an initial slide from the 1930s of a black child in tattered clothes spraying lead arsenate on cotton plants, the professor intoned: "Can you believe that people in the sustainable agriculture movement want to go back to these methods?" He never mentioned the term "sustainable agriculture" again in his presentation; For more on recent antagonism between sustainable ecological agriculture and the agricultural establishment view see Leonard Gianessi, "The Quixotic Quest for Chemical-Free Farming," Issues in Science and Technology 10 (Fall 1993): 29-36; Council for Agricultural Science and Technology, "How Much Land Can Ten Billion People Spare For Nature?" CAST Task Force Report No. 121 (February 1994); Gene Logsdon, "Death of A Sacred Cow," Ohio Magazine, May 1992, 30-49, 56-59; Bob Holmes, "Can Sustainable Agriculture Win the Battle of the Bottom Line?," Science 260 (June 25, 1993): 1893-1895.

25. Jack Early, Speech to the American Society of Agricultural Consultants, McClean, Virginia, 1980, in Opportunities in Times of Crisis: Proceedings of the Annual Meeting of the American Society of Agricultural Consultants 1 (1980), 117-120; For more on the resistance of agricultural chemical manufacturers and others to sustainable ecological agriculture see Jim Ruen, "Agricultural Research and Food Safety: A 130-Year Success Story," Across the Table, 1992, 12-14; Richard J. Mahoney, A Commitment to

Greatness (St. Louis: Monsanto, 1988); Gordon Berg, "We Are Winning the Ag Pollution Battle," Farm Chemicals, October 1982, 98; Lisa Heacox, "Ground water Contamination Not Widespread," Farm Chemicals, March 1991, 68; Dixie Lee Ray, "Let Consumers Know the Facts," Farm Chemicals, January 1992, 25; Dorothy Schumck, "CDPA Braces for the 1990s," Farm Chemicals, March 1991, 68; Dale Darling, "Other Comments," Journal of Soil and Water Conservation 48 (July-August 1993): 3-5-310; Lindsay Brown, "Sustainable Agriculture: What Is It?," Across the Table, 1991, 1-2; Francois Lepine, "Shut Down Leopold," Iowa State University Daily, 26 February 1993, 4.

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27. Michael R. Dicks, "What Will Be Required to Guarantee Sustainability of U.S. Agriculture in the 21st Century?," Journal of Alternative Agriculture 7 (1992): 190-195.

28. Dennis R. Keeney, "Toward a Sustainable Agriculture: Need for Clarification of Concepts and Terminology," American Journal of Alternative Agriculture 4 (1989): 101-105; Dennis R. Keeney, "The Future of Leopold Center," Farming Systems for Iowa: Seeking Alternatives (Ames: Leopold Center for Sustainable Agriculture, 1990), 19-20; J. Patrick Madden, "What is Alternative Agriculture?," American Journal of Alternative Agriculture 4 (1989): 32-34; Harold F. Breimeyer, "Defining Sustainable Agriculture," Missouri Farm, July-August 1990, 14.

29. William Lockeretz, "Commentary: Open Questions in Sustainable Agriculture," American Journal of Alternative Agriculture 3 (Fall 1988): 174-181.

30. William Lockeretz, "Commentary: Open Questions in Sustainable Agriculture," 178-179; Tim T. Phipps, Pierre Crosson and Kent A. Price, eds., Agriculture and the Environment: Report of the National Center for Food and Agricultural Policy (Washington DC.: Resources for the Future, 1986), 3-28; Pierre Crosson, "What is Alternative Agriculture?," American Journal of Alternative Agriculture 4 (1989): 28-31; Sandra S. Batie and Daniel B. Taylor, "Assessing the Character of Agricultural Production Systems: Issues and Implications," American Journal of Alternative Agriculture 6 (1991): 184-187; Hugh Lehman, E. Anne Clark, and Stephen F. Weise, "Clarifying the Definition of *Sustainable Agriculture*," Journal of Agricultural and Environmental Ethics 6 (1993): 127-143; Riley E. Dunlap, et. al., "What is Sustainable Agriculture? An Empirical Examination of Faculty and Farmer Definitions," Journal of Sustainable Agriculture 3 (1992): 5-40. "Can it Be Done?," "Get Acquainted With LISA," Pacific Northwest Sustainable Agriculture 3 (June 1991): 7.

31. On the no-till/minimum tillage revolution in the 1970s and 1980s see J. C. Siemens and W. R. Oschwald, Corn-Soybean Tillage Systems: Erosion Control, Effects on Crop Production, Costs (St. Joseph, MI: American Society of Agricultural Engineers, 1976), 1-18; Office of Planning and Evaluation, Minimum Tillage: A Preliminary Technology Assessment (Washington D. C.: USDA, 1975); "There's A Revolution Going On in Those Fields," Worthington (MN) Globe (December 22, 1978): 17; Don Muhm, "ISU Study Says Terracing May Not Pay," Des Moines Register, 24 February 1984, 5S, 8S; Larry Reichenbeg, "Here's What Successful No-Till Planters Must Do Right," Successful Farming, May 1980, 24-25; Charles E. Sommers, "Control Vegetation for Successful No-Till Corn," Successful Farming, April 1980, 34-35; "Tillage: Latest Research Will Be Our Own," Successful Farming, March 1978, 23-24; "Cut Costs, Tillage, But Not Yields," Farm Journal, December 1981, 19; "Farm Journal's Machinery

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32. Steve Kufrin, "Reduced Tillage Saves Soil, Labor and Fuel for Farmers," Reprint from Swift County (MN) Monitor-News, October 1980, 1-2; Don Muhm, "No-tillage innovators in Iowa Save Both Fuel and Soil," Des Moines Register, 5 September 5, 1982, 2F; James Risser, "Reduced Tillage Adding to State Water Pollution," Des Moines Register, 22 January 1984, 1A, 8A; Terry Cacek, "Organic Farming: The Other Conservation Farming System," Journal of Soil and Water Conservation 39 (November-December 1984): 65-68.

33. "A Giant Step or A Springtime Skip?," Newsweek, May 4, 1970, 26-28; On the more general corporate co-option of the environmental movement see Carl Deal, The Greenpeace Guide to Anti-Environmental Organizations (Berkeley: Odonian Press, 1993).

34. Rollie Henkes, "The Mainstreaming of Alternative Agriculture," "Land Preservers," The Furrow, September-October 1985, 10-15; "DMI Yield-Till Gets More Grain From Your Fields!," Wallaces' Farmer, August 1991, 19; "Stop Pollution! Knife Into the Seed Zone," Wallaces' Farmer, February 1990, no p.n.; "This Spring Launch Your Conservation Campaign With A Little Green Paint," Wallaces' Farmer, January 9, 1990, advertising insertion between pages 42-43.

35. "Sustainable Agriculture: Perspectives From Industry," Journal of Soil and Water Conservation 48 (January-February 1990): 31-33; see this entire issue of the

Journal of Soil and Water Conservation for a representative example of the co-option of sustainable ecological agriculture by the agriculture establishment.

36. "Big Changes Ahead In How You Control Weeds," Wallaces' Farmer, January 8, 1991, 38; "What's On His Mind?," Wallaces' Farmer, August 1991, 31.

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