

## Innovation through Tradition for Small Farm Success<sup>i</sup>

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American agriculture seems almost obsessed with endless innovation. Technologies of the past have made it possible for fewer farmers to provide Americans with a vast array of high quality foods at affordable prices, we are told, and new biological and electronic technologies seem destined to revolutionize American agriculture in the future. Biotechnology is proclaimed as the solution to world hunger and the savior of the natural environment. New electronics will allow us to trace foods back to their farm and field of origin, leading to dramatic improvements in food safety and food quality. New management systems guided by electronics, will support new global food supply chains, ensuring the widest possible variety of foods for all at the lowest possible cost, so we are told. But, where is the farmer in all of this innovation?

As the importance of off-farm technologies has grown, the importance of the farmer has been diminished. That's why U.S. agriculture today supports only a third as many farmers as in the 1930s. and why 90% of the income of farm families today comes from off-farm employment. Why should farmers expect make a living farming when the developers of technologies are doing the economically important things? Those who have done the thinking, meaning those who developed the technologies, have also received the benefits. And, if future advances in agriculture come from new off-farm technologies, rather than on-farm thinking, the role of the farmer will be diminished still further in the years ahead.

But, do we really believe we can meet the challenges of a growing world population and dwindling resources with still more new technologies? If not, or even if we are just not sure, we shouldn't be treating farmers as if they are intellectually obsolete. We should be encouraging innovations that enhance the ability of farmers to use their inherently human capacities of ingenuity, imagination, and creativity to address the challenges of the future. Why should we risk leaving all of the thinking to a few scientists in corporate laboratories when we still have a couple of million farmers who are perfectly capable to thinking as well? If the new agricultural technologies fail, as all *industrial* technologies ultimately will, the future of human civilization will depend on innovative, thinking, caring farmers.

Historically, agriculture was not nearly as much about innovation as about tradition. Traditions are made up of “beliefs, opinions, customs, and stories that are handed down from one generation to the next... by word of mouth or by example.”<sup>1</sup> Traditions make up the cultural half of *agriculture*, “the integrated patterns of human behavior, including thought, speech, action, and history, which depend upon the uniquely human capacity for learning and transmitting knowledge from one generation to another.”<sup>2</sup> Culture and traditions go beyond the things people do to be productive or to earn a living, beyond their individual material well-being, to include all of those things that connect us to each other and connect people across generations.

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Both the challenges and the opportunities confronting American farmers today, particularly those on small farms, are a direct consequence of the abandonment of time-honored agricultural traditions. Small farmers who rely on technological innovations to bring them into the mainstream of industrial agriculture mainstream are destined for disappointment. On the other hand, those who innovate by returning to traditional agrarian values, by restoring culture to agriculture, will find a growing number of likeminded consumers who are willing to help them create a new, sustainable agricultural mainstream. The key to small farm success in a changing world is innovation, but not through biotechnology, electronic sensors, or becoming part of corporate supply chains. The key to small farm success instead is innovations linked to traditional *agricultural* values. Farmers of the future will succeed by using their uniquely human capacities to care for the land, care for their neighbors, and care for their customers and for people in general, in an increasingly uncaring world.

The promises of new biological and electronic technologies are empty because they are but the latest new tools of an out-of-date industrial approach of farming, epitomized by new global food supply chains. An industrial agriculture is fundamentally incapable of meeting challenges of dwindling resources in an increasingly crowded world. An industrial agriculture quite simply is not sustainable. The industrial paradigm of development is inherently extractive and exploitative, and thus, cannot be sustained. The world is still as dependent upon the productivity of the land, and the people who farm the land, as in the days of hunting and gathering – and will remain so in the future. Sustainability, including the sustainability of human civilization, ultimately will require a return to the traditions and culture of agriculture in creating a sustainable agriculture.

The differences between *sustainable* and *industrial* approaches to farming are deep and fundamental. Nothing is more fundamental to a farm, a factory, or an economy than its purpose, and the purposes of industrial and sustainable organizations are very different. The central purpose of an *industrial* organization is *productivity*. Industrial organizations are organized and managed to achieve maximum output with minimum input, which in economic terms translates into maximum profits. Larger industrial organizations, like larger farms, typically are able to produce greater values of output with lower costs of inputs, so organizational growth results in ever-greater profitability and productivity. Thus, the guiding principles of an industrial agriculture are *maximum profits and growth*.

The purpose of all *sustainable* organizations, on the other hand, is *permanence* – sustained productivity. Sustainable organizations, including sustainable farms, must be organized and managed to conserve, renew, and regenerate their resource base, as well as to be productive and profitable. Rather than maximize or minimize, sustainable farmers must manage for balance and harmony among the ecological, social, and economic dimensions of their farms. They must care for the land to preserve its regenerative capacity as well as its productivity. They must care for their customers and neighbors to preserve the society within which, and for which, they exist. All organizations are similarly dependent upon nature and society for their sustainability. Only through caring for nature and caring for people, can organizations sustain their productivity, maintain economic viability, and thus achieve their purpose of permanence. The guiding principles of any sustainable organization are *balance and harmony* among *ecological* integrity, *social* responsibility, and *economic* viability.

At first thought, many farmers may see little to be gained from thinking about such abstract concepts as purpose and principles. They are interested in farming, not philosophizing. However, nothing is more critical, not just to the sustainable farming but also to sustainable living. If we fail to pursue permanence through the ecological, social, and economic principles of sustainability, we not only threaten the future of humanity, we threaten our own pursuit of happiness. It isn't just about philosophy; it's about our farms, our families, and our lives.

The lack of sustainability to industrial agriculture is not a matter of personal opinion; it is the logical result of scientific reasoning.<sup>3</sup> The laws of thermodynamics are among the most fundamental laws of science. The first law of thermodynamics states that the total of energy and matter is conserved. Energy may change in form, energy may change into matter, or matter may change into energy, but total energy, including energy embodied in matter, remains unchanged. Thus, sustainability might seem ensured. However, the second law of thermodynamics states that each time energy changes in form, or energy changed into matter or matter to energy, some of the *usefulness* of energy is lost.

This may sound complicated, but it is really fairly simply once you understand that the *usefulness* of energy refers to the capability of energy to perform *work* and is directly related to the *concentration* of energy. Work inevitable dissipates energy, changing it from more- to less-concentrated forms. So when energy becomes less concentrated, as when matter is transformed into energy, it becomes less *useful*. Dissipated energy can be *reused*, but it must be *re-concentrated* and *re-stored* to restore its usefulness. Unfortunately, energy required to concentrate and to store energy is no longer available to do work; its *usefulness* is lost. Scientists refer to this process as a natural tendency toward *entropy*, “the ultimate state reached in degradation of matter and energy; a state of inert uniformity of component elements; absence of form, pattern, hierarchy, or differentiation.”<sup>4</sup> A barren desert, without form, structure, or pattern, without life, is about as close to entropy as most of us have seen. Given the natural tendency toward entropy, sustainability might seem impossible.

Sustainability is possible only if *new* energy is made available to offset the energy inevitably lost when energy is used in performing any type of *work*. Without an infusion of new energy, the total supply of useful energy in any system eventually will be depleted. Fortunately, the sun provides solar energy, which is the only source of *new* energy on earth. Thus, systems that fail to utilize some form of solar energy to offset the unavoidable energy lost in performing *work* inevitably tend toward entropy.

Industrial organizations, including industrial farming operations, are very productive, meaning very efficient in doing *work*, because they focus on *extracting* energy and *using* energy, but do nothing to *re-concentrate*, *restore*, or *regenerate* energy, unless such processes improve the efficiency of energy extraction and use. When they deplete one source of energy – meaning either natural or human resources – they simply find new sources. Resource regeneration and renewal are *non-productive* energy uses; it is more efficient to extract and exploit new resources. Once all sources of energy have been depleted, however, energy-extracting systems lose their ability to do *work*; they reach entropy. So an industrial agriculture will eventually lose its ability to produce; it's not a matter of if, but when.

The same scientific concepts apply to *non-material* forms of production, specifically human labor or other personal services. The energy resources in this case are social rather than physical in nature. Social capital or social energy is embodied or stored in the ability of people to benefit from relationships with each other, within families, communities, and societies. Kinships within families, friendships within communities, and civility within societies all contribute directly to our happiness and quality of life but also contribute to our ability to *work* together, to be *productive* and *useful* to each other.

Industrial organizations are very efficient in utilizing human resources because they focus on using existing social relationships to facilitate production. But again, they do nothing to regenerate or restore the social capital that is inevitably lost. In industrial societies, families become business organizations, friendships become business relationships, and citizens become consumers, and little more. The social cohesiveness that makes societies productive as well as personally rewarding is lost. Using *social energy* to establish, maintain, and renew positive social relationships is considered *non-productive* use; it is more efficient to find new people, communities, and societies to exploit. Exploited societies, left without a sense of fairness, equity, or justice inevitably fall into patterns of conflicts, which lead to the destruction of both natural and human resources. The results of depleted social resources may be witnessed in many parts of the world today. An industrial society inevitably tends toward *social entropy*.

Economies simply provide means of facilitating relationships among people and between people and their natural environment in complex societies. There are simply too many people to produce their own food, clothing, and shelter or to barter with each other. Economies actually *produce* nothing; but they do facilitate production. All economic capital, meaning anything capable of producing economic value, is extracted from either natural capital or social capital. Thus, when all of the natural and social capital in a system have been extracted and exploited, all of the energy in the system has been dissipated, and it can no longer produce anything of economic value; it has reached a state of *economic entropy*.

In addition, industrial systems also diminish the social and personal quality of life of people within society in ways that have nothing to do with individual, material well-being. Nature provides direct benefits to people, through a healthy living environment, clean air and water, aesthetically pleasing landscapes, and opportunities to connect and commune with nature. Society also provides direct benefits to people, through personal relationships within families and communities and through equity and justice within societies. Direct personal relationships among people and between people and nature also help give purpose and meaning to our lives. The quality of our life, our happiness, is directly related to a sense of *rightness* in our relationships with people and nature. This rightness is determined within a higher order of things, which transcends the economy, society, and nature. Within this order, the unrestrained extraction and exploitation violates our common sense of rightness. An industrial agriculture may enhance our material well-being, but it diminishes our social and spiritual happiness and quality of life.

We have created an industrial agriculture economy and it is inevitably trending toward entropy. It is simply not sustainable. It is extractive and exploitative, rather than regenerative and renewing, and it is rapidly running out of energy to extract and people to exploit. The corporately

controlled, global food supply chain is a natural consequence of unbridled economic industrialization as agribusinesses relentlessly pursue ever-greater profits and growth. The new biotechnologies and information technologies are nothing but new tools to facilitate the continued unbridled exploitation of the resources and people of the world. Our industrial food system is like a cancerous tumor, multiplying and growing uncontrolled until it ultimately destroys the life of its host, the people it purports to feed. The tumor of industrial economic development, including industrial agriculture, is rapidly depleting the fossil energy upon which it depends for its continued growth and ultimately for its life. If we fail to choose a sustainable alternative to industrialization, human civilization will not survive.

Our time for choosing is running out. Sometime within the next decade, global oil production is destined to peak. Afterward, it will simply be impossible to produce enough oil to support continuing growth in industrial economies. *Peak oil* is a concept based on the premise that peaks in oil production occur when approximately half of the total amount of oil in a particular oil field has been extracted, which typically occurs some 30-40 years after its initial discovery.<sup>5</sup> Beyond that point, extraction becomes increasingly difficult and costly and total production inevitably declines. *Peak oil* gained credibility when U.S. domestic oil production peaked in 1970, thirty-plus years following the peak in U.S. oil discoveries. The peak in global oil discoveries occurred later, in the mid-1960s, signaling a peak in global oil production around the turn of the twenty-first century.

Precise calculations are difficult, but most forecasters now predict a global peak in oil production somewhere between 2006 and 2010. Even Exxon-Mobile has forecast a peak within five years.<sup>6</sup> After the peak, oil production is expected to decline an average of 2-3% per year, dropping by about 70% over the next fifty years. Even if major new oil fields were discovered next year, which is highly unlikely, those fields would not reach peak production for another 30-40 years. The world quite simply must learn to live with less oil. Peaks in other fossil energy sources, including natural gas and coal, are expected to follow over the next few decades, as they are found to be inefficient substitutes for petroleum.

The agricultural establishment has responded to energy concerns by promoting biological energy sources – ethanol, bio-diesel, methanol, biomass – with little apparent thought to the dependence of industrial food production on the dwindling supplies of fossil energy. If agriculture were able to convert all of the solar energy captured by green plants in the U.S. into fossil energy substitutes, we would still have to cut our fossil energy use by one-third, and we would have no solar energy left to produce food. In reality, American agriculture harvests only about 35% of total solar energy captured by plants, and food production claims about 17% of total U.S. fossil energy use, *in addition* to the energy captured from the sun. The American food system in total uses about ten calories of fossil energy for each calorie of food energy it is able to produce. In addition, it is questionable whether ethanol and bio-diesel can actually produce more total energy than the *fossil* energy consumed in their production.<sup>7</sup>

If we are to develop a sustainable agriculture, we must learn to manage our resources for permanence rather than maximum productivity. Industrial farms maximize productivity through specialization and standardization (facilitating routinization, mechanizations, and automation), which allows consolidation of management into ever-larger farms. Industrial farms are inherently

mechanistic, operating like sophisticated machines with many interrelated and replaceable parts, each performing a specific specialized function by a predefined standard procedure. This mechanistic way of farming has proved very effective in extracting the fertility of the land and exploiting farm workers, rural people, and even farmers for short run profits and growth. But, it does nothing to renew the natural productivity of the soil or to regenerate the capacity of farmers or farmer workers. It leaves no legacy of productive land and people for the next generation.

A sustainable agriculture, on the other hand, mimics the processes of living, biological systems. Living systems are self-making, self-renewing, reproductive, and regenerative. Living systems have the capacity to capture and store solar energy to offset the energy that is inevitably lost in the processes of re-concentrating and re-storing energy. Obviously, individual living organisms are not permanent or sustainable since all living things eventually die. But, all living things have the capacity to devote part of their productive capacity to regeneration and reproduction, creating new generations of life. Thus, communities of living things are regenerative and thus sustainable. Living human communities also have culture and traditions, which are passed from one generation to the next. All living systems – including farms and communities – are capable of permanence as well as productivity. A sustainable agriculture must utilize these capacities.

Fortunately, much of what we need to do to create new sustainable agricultural and food systems can be found in the culture and traditions of American agriculture. Not that traditional American agriculture was sustainable, because it clearly was not. Even before the era of agrichemicals, farmers mined the natural fertility of their land and allowed its top soil to erode. But, within the traditions of agriculture was a culture that embraced the fundamental principles of sustainability, farmers just didn't understand the consequences of their farming choices. Traditionally, farmers treated their farms as living systems; they cared about the land, cared about their neighbors and customers, not just about themselves. Their lives were connected to past, current, and future generations.

In the culture of farming, land was a sacred trust – something to be used, but also protected and nurtured, so it could be passed on to the next generation as healthy and productive as when it was passed to this generation from the last. Many farmers didn't really know how to care for the land, but they really did care. Farmers thought of themselves as stewards of earth, taking care of something for the benefit of others, even when they expected no individual benefit. Traditionally, farmers were members of families, of communities, and of society, who realized that they benefited from their predecessors and from their relationships with other people, in ways that had nothing to do with economics.

In traditional farming culture, farmers worked in harmony with nature, nurturing the natural ability of plants and animals to capture and to transform solar energy into foods and fibers of usefulness and of value to people. They didn't always know how to work with nature, but they tried. Traditionally, farmers worked in harmony with their communities and society, trusting that they would be rewarded – economically, socially, and spiritually. They didn't always treat others as we would expect to be treated today, but they felt a responsibility to society. The culture of agriculture was a legacy of both land and people, built upon the legacy handed down from past generations for the benefit of future generations. The traditions and culture of agriculture are very much in harmony with the purpose and principles of sustainability.

Thankfully, it is not too late to choose, but the innovations needed for a sustainable future are more challenging than the industrial innovations of the past. Sustainable farming is management intensive, thinking farming. They are less dependent of non-renewable fossil energy because they rely more on management of their on-farm, renewable resources. Sustainable farmers translate observation into information, information into knowledge, and knowledge into an understanding of how nature works and how to work with it. Sustainable farming is also feeling farming, which translates understanding into the wisdom needed to distinguish right from wrong. Sustainable farmers don't just produce food; they produce ecological and social benefits, both for current and future generations. They care for the land and care about their neighbors and customers. Thus, sustainable farmers must have ethical and social integrity, as well as intellect. Sustainable farmers are thinking workers – or working thinkers – as well as thoughtful, caring people. Sustainable farming combines the physical, mental, and spiritual dimensions of productivity, which requires innovation, creativity, knowledge, and wisdom.

Sustainable farming does not mean going back to the drudgery of farming in the past. Sustainable farmers choose appropriate technologies, which increase the productive capacities of people rather than replace people with computers and machines. Admittedly, farming sustainably requires some physical work, but work can be good for the body as well as the mind and soul. Sustainable farming is not a step backward from industrial agriculture; it is a quantum leap forward to something fundamentally better.

Many American consumers are seeking alternatives to the corporate, industrial food system, creating a growing market for sustainably produced foods. The market for organic food continues its decade long growth rate of 20% per year, doubling in size every three to four years. Issues of economic globalization, corporate consolidation, confinement animal feeding operations, biotechnology, and other more general food safety, health, and nutrition issues are all helping to expand the demand for sustainably produced foods well beyond the organic market. Increasingly, consumers want to know where their food comes from, how it is produced, and who produced it. *Local* food is even becoming more important than *organic* food; people want food produced by someone they can get to know and trust. The new sustainable food market probably makes up as much as a third of the total food market today and is still growing.<sup>8</sup>

Sustainable farmers and their customers are also finding new allies among independent food processors, distributors, and retailers. They are beginning to realize they face the same kinds of challenges from a corporately controlled, global food system as do independent family farmers. Food processors and marketers are also beginning to understand that they have the same kinds of opportunities as sustainable farmers in helping to create and to benefit from a new and different food system that reconnects consumers with farmers through relationships of trust. Together, they are meeting the needs of consumers that are not being met by the industrial, mass production, mass distribution food system of today by creating a new sustainable food system.

This new food system provides a unique advantage for small farms. Not that there is anything inherently wrong with large farms, but most large farms today are large because they have followed the industrial paradigm of profit maximization and growth. They specialize, standardize, and consolidate, with no internal restraints. It's this industrial mindset, rather than

absolute size, that leads to the lack of sustainability. The new food culture rejects the industrial technologies, methods, and strategies that most large farms today embrace. It not just a matter of size, it's a matter of an irresponsible mindset.

Most small farms today are still small because they have rejected the industrial paradigm in favor of more traditional approaches to farming. Some have already joined the sustainable agriculture movement, but to most small farmers, both sustainable and traditional, the values of family and community are still important in their farming decisions. Most small farmers know they can't compete with large corporate operations for global markets, so they don't mine their land and exploit their neighbors in a futile attempt to be the world's most efficient producers. Most small farmers simply have not abandoned the traditions and culture of farming for the sake of profits and growth. Ironically, these small farmers, who have written off as irrelevant, are now well positioned for success in a rapidly changing world.

No one articulates the small farm advantage more eloquently than does Wendell Berry. "Farming by the measure of nature, which is to say the nature of the particular place, means that farmers must tend farms that they know and love, farms small enough to know and love, using tools and methods they know and love, in the company of neighbors they know and love."<sup>9</sup> And I might add, producing food for people they know and love. A farmer can only truly know and love so much land and so many people, so the most successful farms of the future will be those that are appropriately small.

It is not too late to choose sustainability over entropy. We still have remnants of farming traditions that are consistent with the purpose of permanence and the ecological, social, and economic principles of sustainability. We still have more than million small farmers who are still on the land who are searching for ways to make a good living without abandoning their God-given responsibilities to take care of their land and to care for their neighbors. We have thousands of bright young people who would like to join them, if they just had some help in getting started. We can reject the false promises of an industrial agriculture, which relies on unending extraction and exploitation in a world of dwindling fossil energy and growing social conflict. We can place our confidence and trust in the ability of America's small farmers to be innovative, creative, and thoughtful in their relationships with the land, with their neighbors and customers, and we can reward them adequately for their contributions.

The world is changing for either better or worse. I don't know what a new sustainable food system will look like, but I know it will not be the industrial system of today. Perhaps it will be a *global* network of *local* food systems, linking small independent, farmers with independent food processors and food retailers. I don't know that farms in the future will be small, but I know they will be different from industrial farms today. Farming innovations of the future must link the intellectual capacities of farmers with farming traditions of taking care of the land and caring for people. Innovation through tradition will be the key to small farm success in a changing world.

## End Notes

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<sup>1</sup> *World Book, 2002 Standard Edition*, “Tradition.”

<sup>2</sup> *Webster New Collegiate Dictionary*, 1973 Edition, “Culture.”

<sup>3</sup> For a complete discussion of differences in industrial and sustainable systems, see John Ikerd, *Sustainable Capitalism: A Matter of Common Sense*, 2005, Kumarian Press, Inc., Bloomfield, CT, available through <http://kpbooks.com>.

<sup>4</sup> *Webster's New International Dictionary, Unabridged, 1993 edition*, “Entropy.”

<sup>5</sup> For a good basic discussion of the issue of “peak oil,” see, <<http://www.communitysolution.org/peakqanda.html>>

<sup>6</sup> Alfred J. Cavallo, “Oil: Caveat empty,” *Bulletin of the Atomic Scientists*, May/June 2005 (vol. 61, no. 3), 16-18.

<sup>7</sup> All energy percentages for agriculture, calculated using data from, David and Marcia Pimentel, ed., 1996, *Food, Energy, and Society*, University Press of Colorado, Niwot, CO.

<sup>8</sup> *The Hartman Report*, a nationally respected source of market information for natural food products, estimates that two groups of consumers, the New Green Mainstream and True Naturals, represent prime markets for natural foods and make up approximately 28 percent of all American consumers. See *Hartman Report: Food and the Environment – A Consumer's Perspective*, 1999. <<http://www.hartman-group.com/products/reportnatsens.html>>

<sup>9</sup> Wendell Berry. 1990. What are People For? North Point Press, Farrar, Straus and Giroux, New York, NY. (p. 206 and p. 210).