

# FIFTY MILLION FARMERS

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There was a time not so long ago when famine was an expected, if not accepted, part of life. This was the *normal* condition of life in pre-industrial societies, and it persisted for thousands of years. Today, in America, such a state of affairs is hard to imagine. Food is so cheap and plentiful that obesity is a far more widespread concern than hunger. The average mega-supermarket stocks an impressive array of exotic foods from across the globe, and even staples are typically trucked from hundreds of miles away. The average American family spent 20 percent of its income on food in 1950; today the figure is 10 percent.

This is an extraordinary situation; but because it is the only one that most Americans alive today have ever experienced, we tend to assume that it will continue indefinitely. **However, there are reasons to think that our current anomalous abundance of inexpensive food may be only temporary;** if so, present and future generations may become acquainted with that old, formerly familiar but unwelcome houseguest—famine. The following are four principal bases (there are others) for this gloomy forecast.

1. The first has to do with looming fuel shortages. This is a subject I have written about extensively elsewhere, so I shall not repeat myself in any detail.
2. The second factor potentially leading to famine is a shortage of farmers. Much of the success of industrial agriculture lies in its labor efficiency: far less human work is required to produce a given amount of food today than was the case decades ago (the actual fraction, comparing the year 2000 with 1900, is about one seventh). But that very success implies a growing vulnerability. We don't need as many farmers, as a percentage of the population, as we used to; so, throughout the past century, most farming families—including hundreds of thousands and perhaps millions that would have preferred to maintain their rural, self-sufficient way of life—were economically forced to move to cities and find jobs. Today so few people farm that vital knowledge of *how* to farm is disappearing. Who will grow our food twenty years from now? With more expensive energy, we will need far *more* knowledge devoted to food production, and thus far more people on the farm, than we have currently.
3. The third worrisome trend is an increasing scarcity of fresh water. Sixty percent of water used nationally goes toward agriculture. California's Central Valley, which produces the substantial bulk of the nation's fruits, nuts, and vegetables, relies overwhelmingly on irrigation. But the snowpack on the Sierras, which provides much of that irrigation water, is declining, and the aquifer that supplies much of the rest is being drawn down at many times its recharge rate. If these trends continue, the Central Valley may be incapable of producing food in any substantial quantities within two or three decades. Other parts of the country are similarly overspending their water budgets, and very little is being done to deal with this looming catastrophe.
4. Fourth and finally, there is the problem of global climate change. Often the phrase used for this is "global warming," which implies only the fact that the world's average temperature will be increasing by a couple of degrees or more over the next few decades. The much greater problem for farmers is destabilization of weather patterns. We face not just a warmer climate, but *climate chaos*: droughts, floods, and stronger storms in general (hurricanes, cyclones, tornadoes, hail storms)—in short, unpredictable weather of all kinds. Farmers depend on relatively consistent seasonal patterns of rain and sun, cold and heat; a climate shift can spell the end of farmers' ability to grow a crop in a given region, and even a single freak storm can destroy an entire year's production.. We have embarked on a century in which, increasingly, freakish weather is normal.

I am not pointing out these problems, and their likely consequences, in order to cause panic. As I propose below, there is a solution to at least two of these dilemmas, one that may also help us address the remaining ones. It is not a simple or easy strategy and it will require a coordinated and sustained national effort. But in addition to averting famine, this strategy may permit us to solve a host of other, seemingly unrelated social and environmental problems.

## **Intensifying Food Production**

In order to get a better grasp of the problems and the solution being proposed, it is essential that we understand how our present exceptional situation of cheap abundance came about. In order to do that, we must go back not just a few decades, but at least ten thousand years.

The origins of agriculture are shrouded in mystery, though archaeologists have been whittling away at that mystery for decades. We know that horticulture (gardening) began at somewhat different periods, independently, in at least three regions—the Middle East, Southeast Asia, and Central America. Following the end of the last Ice Age, roughly 12,000 years ago, much of humanity was experiencing a centuries-long food crisis brought on by the over-hunting of the megafauna that had previously been at the center of the human diet. The subsequent domestication of plants and animals brought relative food security, as well as the ability to support larger and more sedentary populations.

As compared to hunting and gathering, horticulture intensified the process of obtaining food. Intensification (because it led to increased population density—i.e., more mouths to feed), then led to the need for even more intensification: thus horticulture (gardening) eventually led to agriculture (field cropping). The latter produced more food per unit of land, which enabled more population growth, which meant still more demand for food. We are describing a classic self-reinforcing feedback loop.

As a social regime, horticulture did not represent a decisive break with hunting and gathering. Just as women had previously participated in essential productive activities by foraging for plants and hunting small animals, they now played a prominent role in planting, tending, and harvesting the garden—activities that were all compatible with the care of infants and small children. Thus women's status remained relatively high in most horticultural societies. Seasonal surpluses were relatively small and there was no full-time division of labor.

**But as agriculture developed—with field crops, plows, and draft animals—societies inevitably mutated in response.** Plowing fields was men's work; women were forced to stay at home and lost social power. Larger seasonal surpluses required management as well as protection from raiders; full-time managers and specialists in violence proliferated as a result. Societies became multi-layered: wealthy ruling classes (which had never existed among hunter-gatherers, and were rare among gardeners) sat atop an economic pyramid that came to include scribes, soldiers, and religious functionaries, and that was supported at its base by the vastly more numerous peasants—who produced all the food for themselves and everyone else as well. Writing, mathematics, metallurgy, and, ultimately, the trappings of modern life as we know it thus followed not so much from planting in general, as from agriculture in particular.

As important an instance of intensification as agriculture was, in many respects it pales in comparison with what has occurred within the past century or so, with the application of fossil fuels to farming. Petroleum-fed tractors replaced horses and oxen, freeing up more land to grow food for far more people. The process for synthesizing

ammonia from fossil fuels, invented just prior to World War I, has doubled the amount of nitrogen available — with nearly all of that increase going directly to food crops. New hybrid plant varieties led to higher yields. Technologies for food storage improved radically. And fuel-fed transport systems enabled local surpluses to be sold not just regionally, but nationally and even globally. Through all of these strategies, we have developed the wherewithal to feed seven times the population that existed at the beginning of the Industrial Revolution. And, in the process, we have made farming uneconomical and unattractive to all but a few.

**While we were achieving miracles of productivity, agriculture’s impact on the natural world was also growing;** indeed it is now the single greatest source of human damage to the global environment. That damage takes a number of forms: erosion and salinization of soils; deforestation (a strategy for bringing more land into cultivation); fertilizer runoff (which ultimately creates enormous “dead zones” around the mouths of many rivers); loss of biodiversity; fresh water scarcity; and agrochemical pollution of water and soil.

In short, we created unprecedented abundance while ignoring the long-term consequences of our actions. This is more than a little reminiscent of how some previous agricultural societies—the Greeks, Babylonians, and Romans—destroyed soil and habitat in their mania to feed growing urban populations, and collapsed as a result.

Fortunately, during the past century or two we have also developed the disciplines of archaeology and ecology, which teach us how and why those ancient societies failed, and how the diversity of the web of life sustains us. Thus, in principle, if we avail ourselves of this knowledge, we need not mindlessly repeat yet again the time-worn tale of catastrophic civilizational collapse.

### **The 21<sup>st</sup> Century: De-Industrialization**

How might we avoid such a fate? Surely the dilemmas we have outlined above are understood by the managers of the current industrial food system. They must have some solutions in mind. Indeed they do, and, predictably perhaps, those solutions involve a further intensification of the food production process. Since we cannot achieve much by applying more energy directly to that process, the most promising strategy on the horizon seems to be the genetic engineering of new crop varieties. If, for example, we could design crops to grow with less water, or in unfavorable climate and soil conditions, we could perhaps find our way out of the current mess.

Unfortunately, there are some flaws with this plan. Our collective experience with genetically modifying crops so far shows that glowing promises of higher yields, have seldom been fulfilled. At the same time, new genetic technologies carry with them the potential for unintended consequences in the forms of negative impacts on human health and the integrity of ecosystems. Even if future genetically modified commercial crops prove to be much more successful than past ones, the means of producing and distributing genetically engineered seeds is itself reliant on the very fuel-fed industrial system that is in question.

**Is it possible, then, that a solution lies in another direction—perhaps in deliberately de-industrializing production, but doing so intelligently,** using information we have gained from the science of ecology, as well as from traditional and indigenous farming methods, in order to reduce environmental impacts while maintaining total yields at a level high enough to avert widespread famine? I believe we must and can de-industrialize agriculture. The general outline of what I mean by de-industrialization is simple enough: this would imply a radical reduction of fossil fuel inputs to agriculture, accompanied by an increase in labor inputs and a reduction of transport, with production being devoted primarily to local consumption.

Once again, fossil fuel depletion coupled with radical climate change almost ensures that this *will* happen. But at the same time, it is fairly obvious that if we don't *plan* for de-industrialization, the result could be catastrophic. It's worth taking a moment to think about how events might unfold if the process occurs without intelligent management, driven simply by oil and gas depletion.

Facing high fuel prices, family farms would declare bankruptcy in record numbers. Older farmers (the majority, in other words) would probably choose simply to retire, whether they could afford to or not. However, giant corporate farms would also confront rising costs—which they would pass along to consumers by way of dramatically higher food prices.

Yields would begin to decline—in fits and starts—as weather anomalies and water shortages affected one crop after another. Meanwhile, people in the cities would also feel the effects of skyrocketing energy prices. Entire industries would falter, precipitating a general economic collapse. Massive unemployment would lead to unprecedented levels of homelessness and hunger.

Many people would leave cities looking for places to live where they could grow some food. Yet they might find all of the available land already owned by banks or the government. Without experience of farming, even those who succeeded in gaining access to acreage would fail to produce much food and would ruin large tracts of land in the process.

Eventually these problems would sort themselves out; people and social systems would adapt—but probably not before an immense human and environmental tragedy had ensued. I wish I could say that this forecast is exaggerated for effect. Yet the actual events could be far more violent and disruptive than it is possible to suggest in so short a summary.

## **Examples and Strategies**

Things don't have to turn out that way. As I have already said, I believe that the de-industrialization of agriculture could be carried out in a way that is not catastrophic and that in fact substantially benefits society and the environment in the long run. But to be convinced of the thesis we need more than promises—we need historic examples and proven strategies. Fortunately, we have two of each.

In some respects the most relevant example is that of Cuba's Special Period. In the early 1990s, with the collapse of the Soviet Union, Cuba lost its source of cheap oil. Its industrialized agricultural system, which was heavily fuel-dependent, immediately faltered. Very quickly, Cuban leaders abandoned the Soviet industrial model of production, changing from a fuel- and petrochemical-intensive farming method to a more localized, labor-intensive, organic mode of production.

How they did this is itself an interesting story. Eco-agronomists at Cuban universities had already been advocating a transition somewhat along these lines. However, they were making little or no headway. When the crisis hit, they were given free rein to, in effect, redesign the entire Cuban food system. Had these academics not had a plan waiting in the wings, the nation's fate might have been sealed.

Heeding their advice, the Cuban government broke up large, state-owned farms and introduced private farms, farmer co-ops, and farmer markets. Cuban farmers began breeding oxen for animal traction. The Cuban people adopted a mainly vegetarian diet, mostly involuntarily (Meat eating went from twice a day to twice a week). They increased their intake of vegetable sources of protein and farmers decreased the growing of wheat and rice (Green Revolution crops that required too many inputs). Urban gardens (including rooftop gardens) were encouraged, and today they produce 50 to 80 percent of vegetables consumed in cities.

Early on, it was realized that more farmers were needed, and that this would require education. All of the nation's colleges and universities quickly added courses on agronomy. At the same time, wages for farmers were raised to be at parity with those for engineers and doctors. Many people moved from the cities to the country; in some cases there were incentives, in others the move was forced.

The result was survival. The average Cuban lost 20 pounds of body weight, but in the long run the overall health of the nation's people actually improved as a consequence. Today, Cuba has a stable, slowly growing economy. There are few if any luxuries, but everyone has enough to eat. I don't want to give the impression that Cubans sailed through the Special Period unscathed. Cuba was a grim place during these years, and to this day food is far from plentiful there by American standards. My point is not that Cuba is some sort of paradise, but simply that matters could have been far worse.

Let us now consider another historical example closer to our own experience. **During both World Wars, Americans planted Victory Gardens.** During both periods, gardening became a sort of spontaneous popular movement, which (at least during World War II) the USDA initially tried to suppress, believing that it would compromise the industrialization of agriculture. It wasn't until Eleanor Roosevelt planted a Victory Garden in the White House lawn that agriculture secretary Claude Wickard relented; his agency then began to promote Victory Gardens and to take credit for them. At the height of the movement, Victory Gardens were producing roughly 40 percent of America's vegetables, an extraordinary achievement in so short a time.

In addition to these historical precedents, we have new techniques developed with the coming agricultural crisis in mind; two of the most interesting are Permaculture and Biointensive farming (there are others).

Permaculture was developed in the late 1970s by Australian ecologists Bill Mollison and David Holmgren in anticipation of exactly the problem we see unfolding before us. Holmgren defines Permaculture as "consciously designed landscapes that mimic the patterns and relationships found in nature, while yielding an abundance of food, fiber, and energy for provision of local needs." Common Permaculture strategies include mulching, rainwater capture using earthworks such as swales, composting, and the harmonious integration of aquaculture, horticulture, and small-scale animal operations. A typical Permaculture farm may produce a small cash crop but concentrates largely on self-sufficiency and soil building. Significantly, Permaculture has played an important role in Cuba's adaptation to a low-energy food regime.

Biointensive farming has been developed primarily by Californian John Jeavons, author of *How to Grow More Vegetables*. Like Permaculture, Biointensive is a product of research begun in the 1970s. Jeavons defines Biointensive (now trademarked as "Grow Biointensive") farming as ". . . an organic agricultural system that focuses on maximum yields from the minimum area of land, while simultaneously improving the soil." The goal of the method is long-term sustainability on a closed-system basis. Because biointensive is practiced on a relatively small scale, it is well suited to anything from personal or family to community gardens, market gardens, or minifarms. It has also been used successfully on small-scale commercial farms.

Advances in the science of agroecology promise further gains in ecological food production but investment in agroecology research is only just beginning. Nevertheless, it is possible in principle for industrial nations like the U.S. to make the transition to smaller-scale, non-petroleum food production as there are both precedents and models. However, all of them imply more farmers.

### **The Key: More Farmers!**

One way or another, re-ruralization will be the dominant social trend of the 21<sup>st</sup> century. Thirty or forty years from now—we will see a more historically normal ratio of rural to urban population, with the majority once again living in small communities. More food will be produced in cities than is the case today, but cities will be smaller. Millions more people than today will be in the countryside growing food. They won't be doing so the way farmers do it today, and perhaps not the way farmers did it in 1900.

**Indeed, we need to redefine the term *farmer*.** We have come to think of a farmer as someone with 500 acres and a big tractor and other expensive machinery. But this is not what farmers looked like a hundred years ago, and it's not an accurate picture of most current farmers in less-industrialized countries. Nor does it coincide with what will be needed in the coming decades. We should start thinking of a farmer as someone with 3 to 50 acres, who uses hand labor and borrows a small tractor that she or he fuels with biodiesel produced on-site.

How many more farmers do we need? Currently the U.S. has three or four million, depending on how we define the term. Let's again consider Cuba's experience: in its transition away from fossil-fueled agriculture, that nation found that it required 15 to 25 percent of its population to become involved in food production. In America in 1900, nearly 40 percent of the population farmed; the current proportion is close to one percent.

Do the math for yourself. Extrapolated to this country's future requirements, this implies the need for a minimum of 40 to 50 million additional farmers. Fortunately there are some hopeful existing trends to point to. The stereotypical American farmer is a middle-aged, Euro-American male, but the millions of new farmers in our future will have to include a broad mix of people, reflecting America's increasing diversity. Already the fastest growth in farm operators in America is among female full-time farmers, as well as Hispanic, Asian, and Native American farm operators.

Another positive trend worth noting: Here in the Northeast, where the soil is acidic and giant agribusiness has not established as much of a foothold as elsewhere, the number of small farms is increasing. Young adults—are aspiring to become Permaculture or organic farmers. Farmers markets and CSAs are established or springing up throughout the region.

What will it take to make these tentative trends the predominant ones? Among other things we will need new policies. The USDA will need to cease supporting and encouraging industrial monocropping for export, and begin supporting smaller farms, rewarding those that make the effort to reduce inputs and to grow for local consumption. We also need to pursue state, county, and municipal efforts to support small farms in various ways, through favorable zoning, by purchasing local food for school lunches, and so on.

Since so few people currently know much about farming, education will be essential. Universities and community colleges have both the opportunity and responsibility to quickly develop programs in small-scale ecological farming methods.

These new farmers will need higher and stabilized food prices. As difficult as it may be even to imagine this situation now, food rationing may be required at some point in the next two or three decades. That quota system needs to be organized in such a way as to make sure everyone has the bare essentials, and to support the people at the base of the food system—the farmers. Good food should be a human right, not a privilege.

Finally, we need a revitalization of farming communities and farming culture. A century ago, small towns across this land strove to provide their citizens with lectures, concerts, libraries, and yearly Chautauqua's. Over the past decades these same towns have seen their best and brightest young people flee first to distant cities. The folks left behind have done their best to maintain a cultural environment, but in all too many cases that now consists merely of a movie theater and a couple of video rental stores. Farming communities must be interesting, attractive places if we expect people to inhabit them and for children to want to stay there.

### **If We Do This Well**

We have been trained to admire the benefits of intensification and industrialization. But, as I've already indicated, we have paid an enormous price for these benefits—a price that includes alienation from nature, loss of community and tradition, and the acceptance of the anonymity and loss of autonomy implied by mass society. In essence, this tradeoff has its origins in the beginnings of urbanization and agriculture.

Could we actually regain much of what we have lost? Yes, perhaps by going back, at least in large part, to horticulture. Recall that the shift from horticulture to agriculture was, as best we can tell, a fateful turning point in cultural history. It represented the beginning of full-time division of labor, hierarchy, and patriarchy.

Biointensive farming and Permaculture are primarily horticultural rather than agricultural systems. These new, intelligent forms of horticulture could, then, offer an alternative to a new feudalism with a new peasantry. In addition, they emphasize biodiversity, averting many of the environmental impacts of field cropping. They use various strategies to make hand labor as efficient as possible, minimizing toil and drudgery. And they typically slash water requirements for crops grown in arid regions.

We have gotten used to a situation where most farmers rely on non-farm income. As of 2002 only a bit less than 60 percent of farm operators reported that their primary work is on the farm. Only 9 percent of primary operators on farms with one operator, and 10 percent on farms with multiple operators, report all of their income as coming from the farm.

The bad side of this is that it means it's hard to make a living farming these days. The good side is that we don't have to think of farming as an exclusive occupation. As people return to small communities and to farming, they could bring with them other interests. Rather than a new peasantry that spends all of its time in drudgery, we could look forward to a new population of producers who maintain interests in the arts and sciences, in history, philosophy, spirituality, and psychology—in short, the whole range of pursuits that make modern urban life interesting and worthwhile.

Moreover, the re-ruralization program I am describing could be a springboard for the rebirth of democracy in this nation. I do not have to tell this audience how, over the past few years, democracy in America has become little more than a slogan. In fact this erosion of our democratic traditions has been going on for some time. As Kirkpatrick Sale showed in his wonderful book *Human Scale*, as communities grow in size, individuals' ability

to influence public affairs tends to shrink. Sociological research now shows that people who have the ability to influence policy in their communities show a much higher sense of satisfaction with life in general. In short, the re-ruralization of America could represent the fulfillment of Thomas Jefferson's vision of an agrarian democracy—but without the slaves.

If we do this well, it could mean the revitalization not only of democracy, but of the family and of authentic, place-based culture. It could also serve as the basis for a new, genuine conservatism to replace the ersatz conservatism of the current ruling political elites.

What I am proposing is nothing less than a new alliance among environmental organizations, farmers, gardeners, organizations promoting economic justice, the anti-globalization movement, universities and colleges, local businesses, churches, and other social organizations. Moreover, the efforts of this alliance would have to be coordinated at the national, state, and local level. This is clearly a tall order. However, we are not talking about merely a good idea. This is a survival strategy.

It may seem that I am describing and advocating a reversion to the world of 1800, or even that of 8,000 BC. This is not really the case. We will of course need to relearn much of what our ancestors knew. But we have discovered a great deal about biology, geology, hydrology, and other relevant subjects in recent decades, and we should be applying that knowledge—as Holmgren, Mollison, Jeavons, and others have done—to the project of producing food for ourselves.

Cultural anthropology teaches us that the way people get their food is the most reliable determinant of virtually all other social characteristics. Thus, as we build a different food system we will inevitably be building a new kind of culture, certainly very different from industrial urbanism but probably also from what preceded it. As always before in human history, we will make it up as we go along, in response to necessity and opportunity.

Perhaps these great changes won't take place until the need is obvious and irresistibly pressing. Maybe gasoline needs to get to \$10 a gallon. Perhaps unemployment will have to rise to ten or twenty or forty percent, with families begging for food in the streets, before embattled policy makers begin to reconsider their commitment to industrial agriculture.

But even in that case, as in Cuba, all may depend upon having another option already articulated. Without that, we will be left to the worst possible outcome.

Rather than consigning ourselves to that fate, let us accept the current challenge—the next great energy transition—as an opportunity not to vainly try to preserve business as usual, the American Way of Life that, we are told, is not up for negotiation, but rather to re-imagine human culture from the ground up.

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*This lecture drew on certain ideas earlier put forward by Knox, New York farmer Sharon Astyk in her remarks at the 2006 Peak Oil and Community Solutions conference in Yellow Springs, Ohio. Astyk is the author of the book A Nation of Farmers.*