

Spoiled: Organic and Local Is So 2008

Our industrial food system is rotten to the core. Heirloom arugula won't save us. Here's what will.

—By Paul Roberts



—Photo: Scott Squire
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BEFORE THE thought of the carbon being emitted to move manure around the country gets you down, consider that on countless farms around the world, innovative farmers are reintegrating livestock and crop operations in closed-loop, self-sustaining operations. On a seven-acre farm on the Japanese island of Kyushu, for example, polyculture pioneer Takao Furuno produces enough rice, duck meat, duck eggs, fish, and vegetables to feed 100 local families—producing, according to some measurements, an output that rivals an industrial monoculture farm's.

But even in sustainable agriculture, there's no such thing as a free lunch. To achieve such yields, polyculture requires far more intensive and continuous management than does its industrial counterpart. Furuno, for example, must carefully monitor the performance of each crop and apply any new insights the following season—requirements that add considerably to a farmer's labor hours. Matt Liebman, a polyculture expert at Iowa State University, says a reintegrated model can require almost twice the labor hours of a conventional agribusiness one.

This is a critical point: The industrial agribusiness model of simplified monoculture became dominant not only because it gave us cheap food, but because it reflected a society that was becoming more urban. Scaling up a model like Furuno's and re-creating a nation of small farmers might have appeal, particularly in the current labor market, but making it happen—that is, reversing the century-long shift away from farm labor—presents serious policy hurdles.

In fact, most of the familiar candidates for alternative food would have trouble operating on the kind of scale necessary for a world of 6.7 billion people. Consider what it would take to make our farm system entirely organic. The only reason industrial organic agriculture can get away with replenishing its soils with manure or by planting nitrogen-fixing cover crops is that the industry is so tiny—making up less than 3 percent of the US food supply (and just 5.3 percent even in gung-ho green cultures like Austria's). If we wanted to rid the world of synthetic fertilizer use—and assuming dietary habits remain constant—the extra land we'd need for cover crops or forage (to feed the animals to make the manure) would more than double, possibly triple, the current area of farmland, according to Vaclav Smil, an environmental scientist at the University of Manitoba. Such an expansion, Smil notes, "would require complete elimination of all tropical rainforests, conversion of a large part of tropical and subtropical grasslands to cropland, and the return of a substantial share of the labor force to field farming—making this clearly only a theoretical notion."

That doesn't mean sustainable agriculture can't happen. But if we want to build large-scale capacity, we're going to need to broaden our definitions of sustainable practices. Suppose that instead of insisting that farmers forgo synthetic fertilizers and pesticides, as current organic regulations do, our goal was to dramatically reduce the need. We'd probably be able to recruit more conventional farmers, many of whom regard the switch to organic as highly risky. And even a small relaxation of the prohibition could open up massive potential for both crop yields and lower ecological impacts. Liebman, the Iowa State professor, has developed a farm model that uses a multiyear crop rotation (to fertilize naturally) and controls weeds naturally with populations of mice and other "seed predators" that eat weed seeds before they sprout. He uses herbicide and nitrogen fertilizers, but roughly 80 percent less than do conventional farms, while generating competitive, even improved, yields.

The local-food movement, too, must learn to bend. The reality of 21st-century America is that food demand is centered in cities, while most arable land is in rural areas. What open land remains around cities is so expensive that it either is out of reach for farmers or requires that farmers focus on high-end, high-margin products with little utility as mainstream foods. Thus, although there is great potential to increase urban agriculture (as we'll see in a minute), urbanites will always depend on rural areas for some of their food—especially given that by 2050, 70 percent of the world's population is expected to live in or near cities.

Conversely, rural areas with good farm potential will always be able to outproduce local or even regional demand, and will remain dependent on other markets. "One farmer in

Oregon with a few hundred acres can grow more pears than the entire state of Oregon eats," says Scott Exo, executive director of the Portland-based Food Alliance and an expert in the business challenges of sustainability. "Attention to the geographical origins of food is great, but you have to understand its economic limits."

In short, as important as the eat-local model is, it's going to have to work within other, much larger geographic systems—especially as these geographic mismatches are only getting larger. Asia and Africa, which are rapidly overdrawing water tables, soils, and other assets essential to food production, will increasingly depend on fertile regions such as the American Midwest, whose superb soils and favorable climate can easily generate exportable surpluses—even without heavy doses of pesticides and fertilizer.

Put another way, if sustainability means food security for everyone, and not just for affluent nations, trading food over long distances is here to stay.

Yes, this pragmatism presents us with a potentially slippery slope: On the question of trade, for example, we obviously need to rethink such practices as air freighting raspberries from Mexico or salmon from Chile. And sustainability will also require a new trade model that is less vulnerable to the predatory speculation (and protectionism) that helped fuel last year's price spikes in rice and other grains. As the *New Yorker's* James Surowiecki points out, the marketization of agriculture has made the food system more efficient, but also more fragile. Restoring stability and fairness will require more state regulation—and investment.

But the risks of pragmatism must be weighed against the risk of perfectionism. We can't wait for the perfect solution to emerge; we need to start transforming the food system today—most probably with hybrid models, like Fleming's or Liebman's, that take the best of both alternative and mainstream technologies and acknowledge not only the complexity of true sustainability but the practical reality that the perfect is often the enemy of the good. And as David Swenson, an Iowa State economist, notes, the alternative food sector already operates with a certain looseness to its standards. Most organic farmers, for example, know that the legacy of conventional farming means that "it is virtually impossible to keep certain nonorganic substances out of the production processes, including modified genes." In practical terms, he says, organic is already "mostly organic." The challenge is finding some new standard that formally reflects this reality.

As this more pragmatic system emerges, it's a good bet that many of our romantic notions about alternative food production will be cast off. The vision of a nation of small farms, for example, will give way to farms of multiple scales—small farms, but also massive agricultural operations that can produce bulk commodities like grain at the lowest possible cost.

Jettisoned, too, will be the postcard image of the small farm with its neat rows of crops, vegetables, and livestock as constraints on space and resources necessitate new and quite unfamiliar designs. Proponents of vertical farms, for example, envision enormous glass-

walled skyscrapers filled with vegetables, fruits, poultry, and aquaculture. Towering as high as 30 stories, and based on soilless farming, these space-age facilities would epitomize efficiency and sustainability: Water would be recycled, as would nutrients. The closed environment would eliminate the need for pesticides. Better still, the year-round, 24-hour growing season would boost yields anywhere from 6 to 30 times those of conventional dirt farms. Dickson Despommier, a Columbia University public health and microbiology professor who has championed vertical farming, claims that a single city block could feed 50,000 people.

Of course, Despommier's skyscraper farm would cost \$200 million to build, and skeptics question whether even a highly productive vertical farm could be profitable enough to afford pricey urban real estate. But more modest variants are already being rolled out—smaller vertical farms, as well as urban polyculture systems, such as Growing Power, a Milwaukee-based farm that houses more than 20,000 fruit and vegetable plants, aquaculture tanks, chickens, goats, ducks, and bees, all in a space twice the size of a supermarket.

And in the San Francisco area, Keith Agoada is launching Sky Vegetables, which partners with grocery stores to build rooftop hydroponic farms that can produce everything from lettuce to strawberries that are then sold in the stores below. Like vertical farming, Agoada's model reduces transportation, distribution, and warehousing costs—but requires a much smaller investment, since the stores already have the land. His plan is in the embryonic stage, but the potential here is massive: The nation's grocery chains have about 32,500 acres of potential "farmland"; a single Wal-Mart supercenter sits under more than four acres of rooftop—enough, according to Agoada, to produce 5.7 tons of wheat a year. The upsides, Agoada believes, will win over even those foodies squeamish at the prospect of partnering with box stores.