

The Ecology of Waking Up to Reality

An Essay on Agriculture Today

By Joshua Lloyd Smith

An analysis of our mainstream agriculture system reveals a plethora of concerns that appear to be leading to catastrophic consequences for both people and the planet. At the same time, a variety of ecological farming systems both historic and contemporary clearly demonstrate superiority over today's dominant industrial model. This essay explores the contrast between ecological farming and industrial agriculture and stresses the critical need to redesign today's food system. The enormity of what is at stake is tremendous. As I write this paper, over a million people in Africa could die of starvation in the next few weeks and even in this, the richest nation on earth, roughly 50 million Americans are suffering from food insecurity.

A recent report by Oxfam predicts that if the current mainstream agriculture system is not changed, the price of food will more than double in the next 20 years. At the rate the price of food has already risen in the last few years, Oxfam's prediction may prove to be extremely conservative. That is certainly the case if Wall Street banks are not restrained from buying up huge quantities of grain and sitting on it until prices rise astronomically, a practice that has reportedly increased world hunger by an additional 250 million people. According to a 2010 report by the United Nations, 30,000 people a day die of starvation. This is not because there is a shortage of food. There's not. It is because people lack the money to buy the food.

One reason food is so expensive is that industrial agriculture flies in the face of conservatism and just good sense in its consumption of energy. This mainstream system of agriculture consumes 20% of our nation's energy. 40% of that energy goes into the manufacture and use of synthetic fertilizer

and pesticides. The result is that seven to ten times more energy is used to produce the food than we receive from eating it. It is therefore beyond debate that industrial agriculture is simply unsustainable.

Artificially manufactured pesticides not only squander energy, but there is little to justify their use at all. Consider the study that showed that between 1945 and 1993, while the use of pesticides in this country increased 3,300%, crop loss from pests increased 20%. Pests simply adapted resistance to the toxins while the beneficial insects, which control pests naturally, adapt poorly to these pesticides and their populations severely decline. Mono-cropping huge areas and clean cultivation – common industrial agricultural practices – contribute to the loss of beneficial insects further by eliminating their habitat.

More recently, scientists have found that widespread use of synthetic pesticides has also suppressed natural nitrogen fixation by rhizobium bacteria, resulting in, they estimate, a 1/3 reduction in crop yields. By the way, nitrogen is essential to all life and is a constituent of all plant and animal tissues.

Between 1996 and 2006, close to 12 million farmers worldwide, farming about 90 million acres that had replaced synthetic pesticides by encouraging beneficial insects and using other sustainable practices as well, saw their production increase 150% on average.

In a small village in India, farmers initiated a program they called "community managed sustainable agriculture" (CMSA) in 2007. Today, just four years later, 313,000 Indian farmers working over 2 million acres of farmland have quit intensive chemical agriculture and switched to CMSA. As soon as they quit using synthetic pesticides, crop loss from pests started falling sharply. They also stopped using chemical fertilizers and started using organic soil fertility practices and yields are increasing. Health problems from applying these chemicals have already fallen by 40% as a result of switching to CMSA, and their overall debt has been drastically reduced.

Then there's climate change. Providing you are not a Fox News enthusiast and you agree with 97% of the world's climate scientists that climate change represents a catastrophic environmental disaster, you should be anxious to see industrial agriculture phased out quickly and replaced by

agro-ecological farming. Why? Industrial agriculture in the U.S. alone releases 750 million tons of CO₂ into the atmosphere each year. In contrast, organic agriculture can sequester 7000 lbs of CO₂ per acre, probably more by using permaculture's ecological methods. Good farming works with nature's carbon cycle rather than rupturing it.

An additional dysfunction of the mainstream agricultural system is imports and exports. It is shockingly common for one country to export its crops to other countries, while at the same time importing the very same crops often from the same countries. Just one example is Canada, which is the second largest importer of the California cherry crop while at the same time exporting to the U.S \$19 million worth of cherries annually. Ships passing in the night. Even when there are severe famines in a developing nation, its commercial farms may be exporting its crops overseas. Often overlooked is the benefit of growing food locally. Locally grown food uses 10 times less energy and, as a by-product, money stays in the local community rather than being sent to corporate headquarters. Nationally, regional populations purchase less than one percent of their food from local agriculture.

The 2006 U.S. government agricultural census reports that small farms produce more food per acre whether measured in tons, calories, or dollars than their large corporate counterparts. What's more, they are more efficient in their use of land, water and oil. The water these small farms conserve is significant because mainstream agribusiness uses about 70% of the water used by Americans and wastes up to two-thirds of it.

In 1999, Frances Moore Lappé reported that small bio-intensive farms were 200% more productive than their large industrial counterparts. More recently, research by the University of Michigan's School of Natural Resources and Environment found that productivity could be doubled or tripled in developing nations simply by switching to organic agriculture. In India a couple of decades back, the impoverished rural village of Ananda Nagar abandoned the industrial agriculture model they had been practicing. In its place they brought back their traditional Indian system of farming, adding to it common organic practices. Not long after the transition was complete, they saw their productivity increase 400%.

It has often been pointed out that industrial agriculture, per acre, feeds one and a fraction people annually. John Jeavens, on the other hand, has demonstrated that using the system he champions called the biodynamic French intensive method (which is organic) can feed 10 and close to 11 people annually per acre on a vegetarian diet. The revival in highland Peru (at 12,000 feet altitude) of the traditional pre-Columbian Chinampa farming system demonstrated it could feed 15 people annually per acre, not counting the fish grown in its pest-control moats.

There are many examples of the productivity of agro-ecological farms, but it should not be overlooked that they can be labor saving as well. Highland Mayan agriculture, for example, can feed a family year round on just a month and a half of labor. The best documented agro-ecological farm in this regard was the tiny quarter-acre organic farm that belonged to the late scientist farmer Masanobu Fukuoka. His farm produced enough rice and winter grains to feed five to ten people annually. This took him a total of six days of work per year. In addition, he had a small orchard on his quarter acre, and domestic vegetables that with Fukuoka's help had reverted to semi-domesticity, and so grew like weeds, required little work beyond harvesting. He called his method natural farming.

If we extrapolate Fukuoka's natural farming out to a full acre, it would supply 20 to 40 people with an annual supply of grains that can be produced with less than a month's labor by just one person. Fukuoka flood irrigated his rice rather than growing it in paddies, as the rest of the rice farmers of the world do, yet his rice is still considered of the highest quality.

By any account, organic or ecological agriculture can feed the world better than today's agribusiness without poisoning the planet. The problem is that a mere handful of corporations control the market that affects billions of us. Commercial organic farming, however, is practiced today in 120 countries. It is growing and growing fast, but is still just 3% of the market and that must change and change fast for the sake of nature and humanity.

To make the transition to a sustainable, productive and ecologically responsible agricultural system, a wealth of new small farmers will be needed. Richard Heinberg of the Post Carbon Institute, who alerted the world about peak oil, said in an interview with Acres U.S.A. that the U.S. alone may need as many as 50 million new farmers in the next few decades to feed Americans.

Although Heinberg admitted his calculation was very rough, one thing is certain, the majority of farmers in this country today are getting old. Who will replace them?

Clearly what we need to do now is to train a new generation of farmers in the ecological and permaculture paradigm that models agriculture on nature and lets nature do most of the work. To that end we need ecological farm schools that demonstrate a diversity of methods and strategies students can learn from. With the economy unraveling and the cost of food rising, we need a host of small farmers who will provide jobs, as well as clean air, soil and water.

Joshua Lloyd Smith is a permaculture designer/instructor, an agro-ecologist, a restoration forester, and for 40 years a student of ethno-botany.

Copyright © 2011 by Joshua Smith