

## Has Agriculture reached a tipping point?

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So far, farm production has kept up with population growth but has the increase in productivity come at too high a cost? Faced with the additional threat of global warming, has industrialised farming reached a 'tipping point'?

We find ourselves at a dramatic point in human history. Agriculture, the largest industry on Earth, is exhausting the planet's biological support systems. Two billion hectares of soil (more than the area of the United States and Canada combined) have been degraded. In India, this damage has cut agricultural productivity by almost US\$ 2.4 billion a year. In Africa, three quarters of arable land is severely degraded, worsening the hunger crisis there.

The annual cost of soil erosion worldwide is estimated to be more than US\$ 400 billion. Similarly, water quality and availability are in peril. The 450 million kilograms of pesticides that US farmers use every year have now contaminated almost all of the nation's streams and rivers and the fish living in them with chemicals that cause cancer and birth defects.

And yet, as serious as this environmental predicament is, it will be energy issues that determine the fate of agriculture. Industrial agriculture uses at least 15% of all energy consumed in developed countries. So when oil production peaks, fossil-fuel-dependent agriculture will face a day of reckoning. And that inevitability raises a fundamental question: do we wait for some widespread disaster to happen and let panic determine our social policy? Or do we begin now to engage in purposeful social change?

Malcolm Gladwell's tipping point analysis provides a useful way to examine the dynamics of such dramatic social transformations. Tipping points have three essential factors, he says. One – lots of little behaviours accumulate and begin to push a system towards change; two – some ideas or issues "infect" public awareness and spread like a virus, pulling the system towards even greater change; three – one significant moment occurs when things 'tip'.

It is easy to recognise the first factor in sustainable agriculture's tipping point in the thousands of initiatives that support local and ecological food production. Sales of organic products have been growing by 20% a year for the last decade. In 2005, US retail sales of organic food and beverages amounted to almost US\$ 12.8 billion. Organic practices are being proven on both large and small scales and more acreage is being planted for organic crops.

As consumer demand increases, Wal-Mart has begun stocking organic food and chains of mid-size natural grocery stores are expanding. There are almost 4000 US farmers' markets selling fresh local food. Restaurants are putting sustainably raised food and fish on their menus and hundreds of schools are serving organic meals. Fair trade and green labelling programmes are on the rise.

The number of ways to produce and consume sustainable food keeps growing. Land grant colleges and new funding initiatives by foundations are revitalising sustainable agriculture programmes. Ecologically minded farmers and consumers are rejecting corporate technologies like genetically modified organisms.

Instead, they are turning to plants bred with traditional methods that are resistant to wind, drought, salt and disease. They are less expensive, they avoid the risks of genetic contamination and they do not require farmers to give up saving seed. Conventional farmers are adopting sustainable techniques and finding that, for instance, nature-based pest and weed controls are just as effective as toxic pesticides. No-till cultivation is proving to prevent soil erosion and has the added climate benefit of sequestering carbon.

These impressive technological and market successes are a tribute to the pioneers of the ecological farming movement. And there is no reason to believe that this innovative spirit cannot come up with even better ideas to deal with the enormous challenges ahead. But what will transform this popular enthusiasm into real and lasting changes are two other fundamental issues: health and trade.

These two, the second tipping point factors, are shifting public discourse over food and farming and pushing policy changes worldwide.

The public is becoming increasingly alarmed by food-related health problems. Rising rates of diabetes, heart disease and stroke, plus cancer and birth defects from pesticides as well as a growing obesity epidemic among children and adults are grabbing the headlines and raising health care costs. The US Department of Agriculture estimates that healthier diets alone could prevent US\$ 71 billion a year in medical expenses.

Trade issues are no less important. The billions spent every year on subsidies have created over-production and rock-bottom commodity prices for a handful of agribusiness companies. When surpluses are sold overseas for less than the cost of production, third-world farmers are put out of business.

But now, as world trade negotiators promise to end these practices, we are presented with an unprecedented opportunity to reformulate farm supports. Instead of paying for commodity production, these funds can be redirected toward soil and water conservation, wildlife preservation and maintaining the culturally and biologically diverse farming systems that lie at the heart of sustainable agriculture. The funding needed to transform industrial agriculture is available; what's missing is leadership. This fix will not be easy. Entrenched political interests and agribusiness will not willingly relinquish their stranglehold on the status quo.

But there may be no choice. The final tipping point factor, the one that will result in dramatic and lasting change, is the issue of energy and global warming. Renewable energy is already approaching its tipping point. Some energy experts argue that renewable energy sources are now ready to begin replacing oil and other fossil fuels. Amory Lovins of the Rocky Mountain Institute says that in the next few decades, the United States can get completely off oil and revitalise its industrial and rural economies through efficiencies, green design and substitutes for fossil fuels. And inevitably, as energy becomes renewable, agriculture becomes sustainable.

Sustainable agriculture, for its part, will also make a significant contribution to renewable energy

production. Model farms have shown that they can produce all the energy required for food production and provide excess energy to the grid, using biogas generators, wind, solar and fuel from farm waste.

Immediate reductions in fossil fuel use can be achieved with current technologies. Sustainably produced crops can provide bio diesel for transportation and corn starch-based plastics can be used for packaging. But just calling something sustainable does not make it so. Growing GMO corn with toxic chemicals for use in energy inefficient ethanol is not an acceptable alternative. The key to successfully transforming industrial agriculture will be the careful establishment and enforcement of standards that ensure sustainability.

Obviously we are not there yet. The public and business are engaging in change though government action is lagging. But what is different, as the moment of reckoning approaches, is that we are ready. Sustainable agriculture can provide food self-sufficiency while reducing the economic and environmental degradations of industrial agriculture.

Just as the end of oil does not mean the end of energy, and may instead be the beginning of an age of endless energy, the same is true for agriculture. Industrial agriculture was all about scarcity. Sustainable agriculture is all about abundance. Knowing that, we can ensure that this age-old human drama need not play out as tragedy.