

Can We Prevent a Food Breakdown?

World agriculture is now facing challenges unlike any before. Producing enough grain to make it to the next harvest has challenged farmers ever since agriculture began, but now the challenge is deepening as new trends—falling water tables, plateauing grain yields, and rising temperatures—join soil erosion to make it difficult to expand production fast enough. As a result, world grain carryover stocks have dropped from an average of 107 days of consumption a decade or so ago to 74 days in recent years.¹

World food prices have more than doubled over the last decade. Those who live in the United States, where 9 percent of income goes for food, are largely insulated from these price shifts. But how do those who live on the lower rungs of the global economic ladder cope? They were already spending 50–70 percent of their income on food. Many were down to one meal a day before the price rises. Now millions of families routinely schedule one or more days each week when they will not eat at all.²

What happens with the next price surge? Belt tightening has worked for some of the poorest people so far, but this cannot go much further. Spreading food unrest will likely lead to political instability. We could see a breakdown of political systems. Some governments may fall.

As food supplies have tightened, a new geopolitics of food has emerged—a world in which the global competition for land and water is intensifying and each country is fending for itself. We cannot claim that we are unaware of the trends that are undermining our food supply and thus our civilization. We know what we need to do.

There was a time when if we got into trouble on the food front, ministries of agriculture would offer farmers more financial incentives, like higher price supports, and things would soon return to normal. But responding to the tightening of food supplies today is a far more complex undertaking. It involves the ministries of energy, water resources, transportation, and health and family planning, among others. Because of the looming specter of climate change that is threatening to disrupt agriculture, we may find that energy policies will have an even greater effect on future food security than agricultural policies do. In short, avoiding a breakdown in the food system requires the mobilization of our entire society.

On the demand side of the food equation, there are four pressing needs—to stabilize world population, eradicate poverty, reduce excessive meat consumption, and reverse biofuels policies that encourage the use of food, land, or water that could otherwise be used to feed people. We need to press forward on all four fronts at the same time.

The first two goals are closely related. Indeed, stabilizing population depends on eliminating poverty. Even a cursory look at population growth rates shows that the countries where population size has stabilized are virtually all high-income countries. On the other side of the coin, nearly all countries with high population growth rates are on the low end of the global economic ladder.³

The world needs to focus on filling the gap in reproductive health care and family planning while working to eradicate poverty. Progress on one will reinforce progress on the

other. Two cornerstones of eradicating poverty are making sure that all children—both boys and girls—get at least an elementary school education and rudimentary health care. And the poorest countries need a school lunch program, one that will encourage families to send children to school and that will enable them to learn once they get there.⁴

Shifting to smaller families has many benefits. For one, there will be fewer people at the dinner table. It comes as no surprise that a disproportionate share of malnutrition is found in larger families.⁵

At the other end of the food spectrum, a large segment of the world's people are consuming animal products at a level that is unhealthy and contributing to obesity and cardiovascular disease. The good news is that when the affluent consume less meat, milk, and eggs, it improves their health. When meat consumption falls in the United States, as it recently has, this frees up grain for direct consumption. Moving down the food chain also lessens pressure on the earth's land and water resources. In short, it is a win-win-win situation.⁶

Another initiative, one that can quickly lower food prices, is the cancellation of biofuel mandates. There is no social justification for the massive conversion of food into fuel for cars. With plug-in hybrids and all-electric cars coming to market that can run on local wind-generated electricity at a gasoline-equivalent cost of 80¢ per gallon, why keep burning costly fuel at four times the price?⁷

On the supply side of the food equation, we face several challenges, including stabilizing climate, raising water productivity, and conserving soil. Stabilizing climate is not easy, but it can be done if we act quickly. It will take a huge cut in carbon emissions, some 80 percent within a decade, to give us a chance of avoiding the worst consequences of climate change. This means a wholesale restructuring of the world energy economy.⁸

The easiest way to do this is to restructure the tax system. The market has many strengths, but it also has some dangerous weaknesses. It readily captures the direct costs of mining coal and delivering it to power plants. But the market does not incorporate the indirect costs of fossil fuels in prices, such as the costs to society of global warming. Sir Nicholas Stern, former chief economist at the World Bank, noted when releasing his landmark study on the costs of climate change that climate change was the product of a massive market failure.⁹

The goal of restructuring taxes is to lower income taxes and raise carbon taxes so that the cost of climate change and other indirect costs of fossil fuel use are incorporated in market prices. If we can get the market to tell the truth, the transition from coal and oil to wind, solar, and geothermal energy will move very fast. If we remove the massive subsidies to the fossil fuel industry, we will move even faster.¹⁰

Although to some people this energy transition may seem farfetched, it is moving ahead, and at an exciting pace in some countries. For example, four states in northern Germany now get at least 46 percent of their electricity from wind. For Denmark, the figure is 26 percent. In the United States, both Iowa and South Dakota now get one fifth of their electricity from wind farms. Solar power in Europe can now satisfy the electricity needs of some 15 million households. Kenya now gets one fifth of its electricity from geothermal energy. And Indonesia is shooting for 9,500 megawatts of geothermal generating capacity by 2025, which would meet 56 percent of current electricity needs.¹¹

In addition to the carbon tax, we need to reduce dependence on the automobile by upgrading public transportation worldwide to European standards. Where cars are used, the emphasis should be on electrifying them. The

world has already partly electrified its passenger rail systems. As we shift from traditional oil-powered engines to plug-in hybrids and all-electric cars, we can substitute electricity from renewable sources for oil. In the meantime, as the U.S. automobile fleet, which peaked in 2008, shrinks, U.S. gasoline use will continue the decline of recent years. This decline, in the country that consumes more gasoline than the next 16 countries combined, is a welcome new trend.¹²

Along with stabilizing climate, another key component to avoiding a breakdown in the food system is to raise water productivity. This could be patterned after the worldwide effort launched over a half-century ago to raise cropland productivity. This extraordinarily successful earlier endeavor tripled the world grain yield per acre between 1950 and 2011.¹³

Raising water productivity begins with agriculture, simply because 70 percent of all water use goes to irrigation. Some irrigation technologies are much more efficient than others. The least efficient are flood and furrow irrigation. Sprinkler irrigation, using the center-pivot systems that are widely seen in the crop circles in the western U.S. Great Plains, and drip irrigation are far more efficient. The advantage of drip irrigation is that it applies water very slowly at a rate that the plants can use, losing little to evaporation. It simultaneously raises yields and reduces water use. Because it is labor-intensive, it is used primarily to produce high-value vegetable crops or in orchards.¹⁴

Another option is to encourage the use of more water-efficient crops, such as wheat, instead of rice. Egypt, for example, limits the production of rice. China banned rice production in the Beijing region. Moving down the food chain also saves water.¹⁵

Although urban water use is relatively small compared with that used for irrigation, cities too can save water.

Some cities now are beginning to recycle much if not most of the water they use. Singapore, whose freshwater supplies are severely restricted by geography, relies on a graduated water tax—the more water you use, the more you pay per gallon—and an extensive water recycling program to meet the needs of its 5 million residents.¹⁶

The key to raising water use efficiency is price policy. Because water is routinely underpriced, especially that used for irrigation, it is used wastefully. Pricing water to encourage conservation could lead to huge gains in water use efficiency, in effect expanding the supply that could in turn be used to expand the irrigated area.¹⁷

The third big supply-side challenge after stabilizing climate and raising water productivity is controlling soil erosion. With topsoil blowing away at a record rate and two huge dust bowls forming in Asia and Africa, stabilizing soils will take a heavy investment in conservation measures. Perhaps the best example of a large-scale effort to reduce soil erosion came in the 1930s, after a combination of overplowing and land mismanagement created a dust bowl that threatened to turn the U.S. Great Plains into a vast desert.¹⁸

In response to this traumatic experience, the United States introduced revolutionary changes in agricultural practices, including returning highly erodible land to grass, terracing, planting tree shelterbelts, and strip cropping (planting wheat on alternative strips with fallowed land each year). The government also created a remarkably successful new agency in the U.S. Department of Agriculture—the Soil Conservation Service—whose sole responsibility was to manage and protect soils in the United States.¹⁹

Another valuable tool in the soil conservation tool kit is no-till farming. Instead of the traditional practice of plowing land and discing or harrowing it to prepare the

seedbed, and then using a mechanical cultivator to control weeds in row crops, farmers simply drill seeds directly through crop residues into undisturbed soil, controlling weeds with herbicides when necessary. In addition to reducing erosion, this practice retains water, raises soil organic matter content, and greatly reduces energy use for tillage.²⁰

In the United States, the no-till area went from 7 million hectares in 1990 to 26 million hectares (67 million acres) in 2007. Now widely used in the production of corn and soybeans, no-till agriculture has spread rapidly in the western hemisphere, covering 26 million hectares each in Brazil and Argentina and 13 million hectares in Canada. Australia, with 17 million hectares, rounds out the five leading no-till countries.²¹

If we pursue the initiatives on both sides of the food equation as just outlined, we can rebuild world grain stocks to the level needed to improve food security. Since we no longer have idled cropland to bring back into production, our only cushion in the event of a disastrous world harvest is these carryover stocks.

No one knows for sure what level of stocks would be adequate today, but if stocks equal to 70 days of grain consumption were sufficient 40 years ago, then today we should plan on stocks equal to at least 110 days of consumption to take into account the more extreme weather events that come with climate change.²²

These initiatives do not constitute a menu from which to pick and choose. We need to take all these actions simultaneously. They reinforce each other. We will not likely be able to stabilize population unless we eradicate poverty. We will not likely be able to restore the earth's natural systems without stabilizing population and stabilizing climate. Nor can we eradicate poverty without reversing the decline of the earth's natural systems.

Achieving all these goals to reduce demand and increase supply requires that we redefine security. We have inherited a definition of security from the last century, a century dominated by two world wars and a cold war, that is almost exclusively military in focus. When the term national security comes up in Washington, people automatically think of expanded military budgets and more-advanced weapon systems. But armed aggression is no longer the principal threat to our future. The overriding threats in this century are climate change, population growth, spreading water shortages, rising food prices, and politically failing states.

It is no longer possible to separate food security and security more broadly defined. It is time to redefine security not just in an intellectual sense but also in a fiscal sense. We have the resources we need to fill the family planning gap, to eradicate poverty, and to raise water productivity, but these measures require a reallocation of our fiscal resources to respond to the new security threats.

Beyond this, diverting a big chunk of the largely obsolete military budget into incentives to invest in rooftop solar panels, wind farms, geothermal power plants, and more energy-efficient lighting and household appliances would accelerate the energy transition. The incentives needed to jump-start this massive energy restructuring are large, but not beyond our reach. We can justify this expense simply by considering the potentially unbearable costs of continuing with business as usual.²³

We have to mobilize quickly. Time is our scarcest resource. Success depends on moving at wartime speed. It means, for example, transforming the world energy economy at a pace reminiscent of the restructuring of the U.S. industrial economy in 1942 following the Japanese surprise attack on Pearl Harbor on December 7, 1941.

On January 6, 1942, a month after the attack, Franklin

D. Roosevelt outlined arms production goals in his State of the Union address to the U.S. Congress and the American people. He said the United States was going to produce 45,000 tanks, 60,000 planes, and thousands of ships. Given that the country was still in a depression-mode economy, people wondered how this could be done. It required a fundamental reordering of priorities and some bold moves. The key to the 1942 industrial restructuring was the government's ban on the sale of cars that forced the auto industry into arms manufacturing. The ban lasted from early 1942 until the end of 1944. Every one of President Roosevelt's arms production goals was exceeded.²⁴

If the United States could totally transform its industrial economy in a matter of months in 1942, then certainly it can lead the world in restructuring the energy economy, stabilizing population, and rebuilding world grain stocks. The stakes now are even higher than they were in 1942. The challenge then was to save the democratic way of life, which was threatened by the fast-expanding empires of Nazi Germany and Imperial Japan. Today the challenge is to save civilization itself.

Scientists and many other concerned individuals have long sensed that the world economy had moved onto an environmentally unsustainable path. This has been evident to anyone who tracks trends such as deforestation, soil erosion, aquifer depletion, collapsing fisheries, and the increase in carbon dioxide in the atmosphere. What was not so clear was exactly where this unsustainable path would lead. It now seems that the most imminent effect will be tightening supplies of food. Food is the weak link in our modern civilization—just as it was for the Sumerians, Mayans, and many other civilizations that have come and gone. They could not separate their fate from that of their food supply. Nor can we.²⁵

The challenge now is to move our early twenty-first-

century civilization onto a sustainable path. Every one of us needs to be involved. This is not just a matter of adjusting lifestyles by changing light bulbs or recycling newspapers, important though those actions are. Environmentalists have talked for decades about saving the planet, but now the challenge is to save civilization itself. This is about restructuring the world energy economy and doing it before climate change spirals out of control and before food shortages overwhelm our political system. And this means becoming politically active, working to reach the goals outlined above.

We all need to select an issue and go to work on it. Find some friends who share your concern and get to work. The overriding priority is redefining security and reallocating fiscal resources accordingly. If your major concern is population growth, join one of the internationally oriented groups and lobby to fill the family planning gap. If your overriding concern is climate change, join the effort to close coal-fired power plants. We can prevent a breakdown of the food system, but it will require a huge political effort undertaken on many fronts and with a fierce sense of urgency.

We all have a stake in the future of civilization. Many of us have children. Some of us have grandchildren. We know what we have to do. It is up to you and me to do it. Saving civilization is not a spectator sport.

Data, endnotes, and additional resources can be found at Earth Policy Institute, www.earth-policy.org.